London Borough of Hammersmith & Fulham

Pensions Sub-Committee

Agenda

Tuesday 4 September 2018 at 7.00 pm
Committee Room 3 - Hammersmith Town Hall

MEMBERSHIP

Administration	Opposition
Councillor Iain Cassidy Councillor Rebecca Harvey Councillor Asif Siddique	Councillor Matt Thorley
Co-optee	
Michael Adam	

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Date Issued: 24 August 2018

London Borough of Hammersmith & Fulham

Pensions Sub-Committee
Agenda

Item		**Pages**
1.	**MINUTES OF THE PREVIOUS MEETING**	4 - 10
	To approve the minutes of the meeting held on 23 July 2018.	
2.	**APOLOGIES FOR ABSENCE**	
3.	**DECLARATIONS OF INTEREST**	

If a Councillor has a disclosable pecuniary interest in a particular item, whether or not it is entered in the Authority's register of interests, or any other significant interest which they consider should be declared in the public interest, they should declare the existence and, unless it is a sensitive interest as defined in the Member Code of Conduct, the nature of the interest at the commencement of the consideration of that item or as soon as it becomes apparent.

At meetings where members of the public are allowed to be in attendance and speak, any Councillor with a disclosable pecuniary interest or other significant interest may also make representations, give evidence or answer questions about the matter. The Councillor must then withdraw immediately from the meeting before the matter is discussed and any vote taken.

Where Members of the public are not allowed to be in attendance and speak, then the Councillor with a disclosable pecuniary interest should withdraw from the meeting whilst the matter is under consideration. Councillors who have declared other significant interests should also withdraw from the meeting if they consider their continued participation in the matter would not be reasonable in the circumstances and may give rise to a perception of a conflict of interest.

Councillors are not obliged to withdraw from the meeting where a dispensation to that effect has been obtained from the Audit, Pensions and Standards Committee.

4.	**DRAFT PENSIONS BOARD MINUTES**	11 - 16
	To note the minutes of the meeting held on 27 June 2018.	
5.	**PENSION FUND QUARTERLY UPDATE PACK**	17 - 66
	This report provides an update for the quarter ended 30 June 2018.	
6.	**CARBON EXPOSURE AND EQUITY STRATEGY**	67 - 138
	This paper updates the Pensions Sub-Committee Members on the Carbon footprint on the Fund's equity portfolio and a possible alternative index option for the Fund's passive equity holdings.	

7. EXCLUSION OF THE PUBLIC AND PRESS

The Committee is invited to resolve, under Section 100A (4) of the Local Government Act 1972, that the public and press be excluded from the meeting during the consideration of the following items of business, on the grounds that they contain the likely disclosure of exempt information, as defined in paragraph 3 of Schedule 12A of the said Act, and that the public interest in maintaining the exemption currently outweighs the public interest in disclosing the information.

8. EXEMPT MINUTES OF THE PREVIOUS MEETING

To approve the exempt minutes of the meeting held on 23 July 2018.

9. CARBON EXPOSURE AND EQUITY STRATEGY - EXEMPT ELEMENTS

This report contains the exempt elements of item 6.

London Borough of Hammersmith & Fulham

Pensions Sub-Committee

Minutes

Monday 23 July 2018

PRESENT

Committee members: Councillors Iain Cassidy (Chair), Rebecca Harvey and Asif Siddique and Matt Thorley

Co-opted members: Michael Adam

Officers: Matthew Hopson (Strategic Investment Manager, Pensions), Phil Triggs (Director of Treasury and Pensions), Mark Grimley (Director of Corporate Services), Mark Jones (Director for Finance & Resources), Timothy Mpofu (Pension Fund Manager) and Amrita Gill (Committee Co-ordinator)

Guests: Kevin Humpherson (Deloitte)

1. APPOINTMENT OF VICE CHAIR

Councillor Matt Thorley was elected as Vice-Chair of the Pensions Sub Committee for the 2018-19 Municipal Year.

2. MINUTES OF THE PREVIOUS MEETING

RESOLVED
The minutes of the meeting held on 27 February 2018 were approved and signed by the Chair.

3. APOLOGIES FOR ABSENCE

Apologies for absence were received from Councillor Jonathan Caleb-Landy and Michael Adam.

4. DECLARATIONS OF INTEREST

There were no declarations of interest.

5. QUARTERLY REVIEW PACK

Matthew Hopson, Strategic Investment Manager, presented the report for the quarter ending 31 March 2018 and noted that the risk register remained unchanged. He said that the summary of the voting undertaken by the investment managers running segregated equity portfolios formed Appendix 5. This included both the London CIV, Majedie and Ruffer in addition to the Legal and General global data.

Kevin Humpherson, of Deloitte, provided an update about the fund's investments and performance and said that there were no major developments with the managers on their performance. He explained that, according to the report, it seemed that the Partners Group Infrastructure fund had performed negatively, however this was due to an administrative error that was being resolved with Northern Trust. The fund invested in euros, however the figures included in the Northern Trust performance report were incorrectly reported in sterling. The fund was actually performing better than average and a more accurate figure would be provided at a future meeting.

Councillor Matt Thorley asked if the error had led to any negative impact on the fund. Kevin Humpherson reassured members that all their assets were making good progress, the team was performing well and officers were satisfied with their investment strategy. The underperformance was purely based on a reporting issue which was being addressed.

Matthew Hopson said that the Ruffer fund underperformed its target over the first quarter of 2018, however this fund was designed to do well in challenging markets and their investment was likely to improve over time.

The Chair asked for a summary to be provided on the pensions fund asset allocation. Kevin Humpherson provided an overview and noted that the majority of the equity allocation was held with Legal and General and the remaining was with Majedie. Partners Group was a global private markets investment manager, financing in real estate and infrastructure. He explained that in November 2017, the Sub-Committee had taken the decision to transfer £30m from the Majedie Focus Fund to Aviva Infrastructure Income Fund (AIIF) due to an overweight position in equities and a desire to move into infrastructure.

RESOLVED
That the Sub-Committee noted the contents of the report.

6. CARBON EXPOSURE

Matt Hopson, Strategic Investment Manager, explained that carbon exposure was difficult to estimate for a number of reasons, including areas where many disclosures were voluntary and varied in nature from company to company. With companies that extracted fossil fuels from the ground, it was usually obvious, but where a company's supply chain caused a significant carbon exposure or simply used a lot of power, it was less transparent. The only clear way to measure a company's exposure to carbon was through its carbon reserves, which were the fossil fuel assets owned by individual companies.

Matt Hopson, referring to page 47 of the agenda pack, listed some of the investment risks associated with investing in companies with high fossil fuel exposure. In addition, he noted that the main area of exposure to fossil fuels remained within its equity portfolio. This was because they were easiest to measure exposure and the first assets to change in price.

He highlighted that the Sub-Committee's key fiduciary responsibility was to manage the fund's investments in the best interests of the beneficiary members and the Council tax payers, where the primary focus must be on generating an optimum risk adjusted return. In addition, it was vital that any investment decisions or strategies developed, such as the carbon strategy, would not negatively impact on this primary responsibility.

Kevin Humpherson explained that establishing the 'carbon footprint' of a given company was challenging, however there were data providers who could assist investors to better understand their portfolio's carbon footprint by providing bespoke reports and analysis on a given investment portfolio. He also explained that if the Paris Agreement was upheld this would have a political and social impact on companies and on the use of the current carbon reserves.

The Chair asked what passive funds were offered and had been of interest. Kevin Humpherson explained that based on the global equity market index, the most reputable option was MSCI low carbon target index. This was developed to address the growing concern from investors about their investment in fossil fuels and the recent trend to reduce their exposure. In addition, the Chair asked what options had been explored by other London Local Authorities around this issue. Kevin Humpherson said that other Local Authorities were looking at the MSCI low carbon index option and some had already invested. The Council was monitoring progress and feedback would be provided at a future Sub-Committee meeting.

The Chair said that going forward the Government required The Local Government Pension Scheme members to produce an Environmental, Social and Governance (ESG) strategy by 2020 and asked Officers to ensure that this was in place. Phil Triggs, Director of Treasury and Pensions, explained that the Council had a section in their investment strategy statement around their ESG principles and these would be updated in line with any changes.

The Chair asked what risks were involved from a financial point of view going forward and how likely would other funds be significantly affected. Kevin Humpherson explained that officers would need to evaluate the fund's total exposure to carbon and if the risk was too high the investment strategy would need to be reviewed accordingly. Furthermore, he said that Majedie and Ruffer were likely to have the highest carbon footprints compared to other funds.

The Chair asked officers if they knew the extent of the fund's investments in carbon exposure. Kevin Humpherson said that this would be assessed and a report of the analysis would be brought to the next meeting. In addition, Councillor Matt Thorley requested that a breakdown be provided on each investment manager individually.

The Chair asked who would take the lead on the analysis and the likelihood of it being ready by the next meeting. Kevin Humpherson said that he would contact the relevant providers and request for an analysis to be completed by the end of August 2018.

Phil Triggs said that the investment strategy would also be reviewed once an analysis was completed. In addition, a representative from FTSE Russell would be invited to the next meeting.

Members of Friends of the Earth attended the meeting to discuss the Council's intention to divest its fossil fuel exposed investments and asked when this change was likely to take place. The Chair explained that prior to the making any divestment decisions, it was vital for the Council to consider its key fiduciary responsibility – i.e. generating the best risk-adjusted-return. He said that an analysis of the fund's total carbon exposure and the risks involved would be completed for consideration at the next meeting of the Sub-Committee.

RESOLVED

1. That the Sub-Committee approved the approach of supplier of carbon portfolio analysis systems and bespoke reports on an investment portfolio to assist investors with carbon footprint and climate risk measurement and reporting.
2. That the Sub-Committee noted the contents of the report and the Deloitte report attached as Appendix 1.

7. EQUITY STRATEGY

NOTE: This item was discussed in conjunction with Item 6 (Carbon Exposure Strategy), please see item 6 for points raised by officers and Councillors.

Phil Triggs, Director of Treasury and Pensions, provided an overview of the current equity allocation for the fund. He stated that the Majedie Focus and Tortoise product would be the most appropriate area on which to reduce exposure, given that the diversification benefits from these portfolios were not particularly valuable to the fund when it was already well diversified across a number of alternative mandates.

The Sub-Committee had decided to defer the decisions for the sale of the assets remaining in the Majedie Focus and Tortoise Funds and the transfer of choice of index to track in the global equity portfolio.. The aim was to further explore the investment risks and issues surrounding the Sub-Committee's fiduciary duties before a decision was made.

8. LONDON CIV UPDATE

Phil Triggs, Director of Treasury and Pensions, briefly provided a history of the London CIV (LCIV). He highlighted the original governance review carried out by Willis Towers Watson on LCIV and emphasised that the key concern was about the engagement of a wide stakeholder base with conflicting priorities and managing these different groups to achieve joint outcomes. A new governance structure had been approved to solve this dilemma.

Following the concerns raised and feedback received from Local Authorities across London, LCIV had re-submitted a new approved governance report to streamline their processes from 32 stakeholders down to 12.

The Chair noted that he attended the Annual General Meeting (AGM) on 12 July. There were some concerns that previously some Local Authorities were over represented and 32 stakeholders meant that there was a huge variety of opinions. Furthermore, discussions around the terms of reference and governance structures were held.

Councillor Matt Thorley asked whether all the Local Authorities were pooled together and who made decisions around asset allocation. Matt Hopson explained that the Council still had the power to change its asset allocation to exit a mandate if it was no longer appropriate for its investment strategy, however manager selection was controlled by LCIV.

Phil Triggs explained that there would be amendments to the Shareholder Agreement and Terms of Reference that reflected the changes in the governance structure which would need to be signed by the Chair. In addition, officers were seeking legal advice and further clarification would be provided on some of the points included in the governance documentation.

RESOLVED
The Sub-Committee noted the update.

9. <u>DRAFT ANNUAL REPORT</u>

Matt Hopson, Strategic Investment Manager, presented the draft Pension Fund Annual Report and Statement of Accounts for the year ended 31 March 2018. He explained that the report, which included the Pension Fund Accounts, was a regulatory requirement and needed to be approved by the Sub-Committee. The pension fund accounts were produced and handed to the auditors on 15 May 2018. This was ahead of the statutory deadline of 31 May which reflected the diligent work of officers. A draft Annual Report was shared with the external auditors on 12 June 2018 and the external audit was progressing well.

The Fund increased in value by 1.2% in the 12 months to 31 March 2018 in comparison with its benchmark of 3.6%. The fund remained ahead of its benchmark over a two-year time horizon and since inception. He noted that the statement of responsibilities would be updated accordingly, however the content would remain the same. In addition, there were no amendments to the pension fund accounts stated within the annual report from the auditors.

RESOLVED

That the Sub-Committee approved and noted the Pension Fund Accounts for 2017/18.

10. ZURICH AVC UPGRADE PROJECT

Mark Grimley, Director of Corporate Services, provided an update of the Additional Voluntary Contribution (AVC) provider, Zurich Corporate Savings, transitioning their existing portfolio of the Council's Pension Fund Member asset to a new platform by 31 May. The transition provided members with a better service by utilising an online platform where members could check their benefits and receive up to date information. The transition to Zurich's new platform had already been completed and consequently there were no further actions required of officers.

RESOLVED
That the Sub-Committee noted the contents of the report.

11. SURREY PENSIONS ADMINISTRATION UPDATE

Mark Grimley, Director of Corporate Services, provided an overview and noted that the report updated members on the performance of the Surrey County Council (SCC) pension administration services to the Council under a section 101 agreement for the period January to March 2018. The section 101 agreements included key performance indicators which were generally consistent with national standards and were monitored quarterly by the shared services retained pensions teams.

Mark Grimley noted that the Surrey help desk received over 500 queries per month and over 90% were resolved at first point of contact. In instances where SCC had initiated and maintained the pension record, performance targets had been reached in most cases. However, data inaccuracies inherited from Capita still impacted upon performance.

A project plan to check and improve inherited data inaccuracies had been agreed with SCC and was monitored monthly by the shared services Retained Pensions Team. It had been brought to the attention of SCC that Transfers Out performance needed to be a priority for improvement and would be discussed at the next quarterly service review meeting. There had been no formal complaints received in the last quarter on Surrey's performance and feedback from scheme members remained very good.

Mark Grimley noted that overall, Surrey's performance was deemed acceptable in all areas with the exception of transfers-out of a scheme member's accrued pension cash value to another Local Government Pension Scheme employer.

The Chair asked whether pensioners could easily access their annual benefit statements online. Mark Grimley explained that scheme holders could log on to the Surrey system and access this information online, furthermore this had been a good transfer from Capital to SCC.

RESOLVED
That the Sub-Committee noted the contents of the report.

12. EXCLUSION OF THE PUBLIC AND PRESS

RESOLVED
That under Section 100A (4) of the Local Government Act 1972, that the public and press be excluded from the meeting during the consideration of the following items of business, on the grounds that they contain the likely disclosure of exempt information, as defined in paragraph 3 of Schedule 12A of the said Act, and that the public interest in maintaining the exemption currently outweighs the public interest in disclosing the information.

13. EQUITY STRATEGY - EXEMPT ELEMENTS

The exempt elements of the report were noted.

14. LONDON CIV UPDATE - EXEMPT ELEMENTS

The exempt elements of the report were noted.

15. FULHAM PALACE TRUST

RESOLVED
That the Sub-Committee approved the recommendations contained within the report.

Meeting started: 7:00pm
Meeting ended: 9:00pm

Chair ....

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Minutes are subject to confirmation at the next meeting as a correct record of the proceedings and any amendments arising will be recorded in the minutes of that subsequent meeting.

London Borough of Hammersmith & Fulham

Pensions Board

Minutes

Wednesday 27 June 2018

PRESENT

Committee members: Councillors Bora Kwon and Rory Vaughan

Co-opted members: Eric Kersey

Officers: Phil Triggs (Director of Treasury and Pensions), David Coates (HR and Payroll), Miriam Adams (Treasury and Pensions), and Amrita Gill (Governance).

1. **APPOINTMENT OF CHAIR AND VICE CHAIR**

RESOLVED:
That Councillor Rory Vaughan be appointed as the Chair of the Pensions Board for the 2018-19 municipal year.

The Pensions Board decided to defer the election of the Vice-Chair until the next meeting.

2. **MINUTES OF THE PREVIOUS MEETING**

The meeting held on 7 February 2018 was not quorate but an informal briefing session took place. Members noted the discussion held at this meeting.

3. **APOLOGIES FOR ABSENCE**
4.

Apologies for absence were received from Mark Grimley, Neil Newton and Orin Miller.

4. **DECLARATIONS OF INTEREST**

There were no declarations of interest.

5. **MINUTES OF THE PENSIONS SUB COMMITTEE**

RESOLVED:
That the minutes of the Pensions Sub-Committee meetings held on the 21 November 2017 and 27 February 2018 were noted.

6. **LONDON CIV UPDATE**

Phil Triggs updated the Board and noted that Chris Bilsland, a non-executive director at London CIV (LCIV), gave a presentation to the Pensions Sub Committee on 27 February 2018. He outlined three key areas, which covered an operational and responsible investing update. Additionally, he showed slides that noted the future direction of travel of LCIV.

Phil Triggs said that the Sub-Committee were not satisfied with the answers provided by the LCIV as they didn't offer any reassurances. Additionally, the LCIV lacked resources and with no clear long-term business strategy in place it was evident that they would need to address the fundamental issues. The Sub-Committee agreed that if the Council gave up some degree of sovereignty in relation to the management of its pensions fund, then the governance of LCIV needed to be as robust and as democratic as possible.

RESOLVED:
That the Board noted the update as presented to the Pensions Sub Committee.

7. LONDON CIV GOVERNANCE REVIEW

Phil Triggs provided an update and noted that the original governance review carried out by Willis Towers Watson on LCIV wasn't complimentary of the way work had been carried out. The report made a number of recommendations for change and improvement in LCIV's governance arrangements and operating model. The key concern highlighted the engagement of a wide stakeholder base with conflicting priorities and managing these different groups to achieve joint outcomes. The Investment Advisory Committee (IAC) and the Joint Committee were not perceived to be operating optimally in their current form.

Following the concerns raised and feedback received from Local Authorities across London, LCIV had re-submitted a new governance report to streamline their processes. This included the creation of a Shareholders Committee that would report to the Board, with two non-executive directors to be appointed to the Board by London Local Authorities. Discussions of the memberships of these governance structures were ongoing with nominations to be presented at the annual general meeting (AGM) on 12 July 2018.

Councillor Rory Vaughan asked what the arrangements were for the new management structure going forward. Phil Triggs said that LCIV had delayed the recruitment of a Chief Investment Officer (CIO) pending the outcome of the AGM meeting. The current interim Chief Executive was well regarded and had brought some stability to the future direction of LCIV, however the future plan was unknown at this stage.

RESOLVED:
That the report was noted.

8. QUARTERLY UPDATE REPORT

Phil Triggs presented the report for the quarter that ended 31 December 2017. He noted that the scorecard in Appendix 1 provided a high-level view of the key pensions issues and overall funding levels remained healthy. Over the 12-month period, the fund delivered a net return of 6.7%, underperforming the benchmark by 1.9%. However, the fund remained ahead of the benchmark over the three and five-year periods by 0.2% p.a. and 4.4% p.a. respectively.

Councillor Rory Vaughan, referring to page 56 of the agenda pack, asked why the net cash figures for April 2018 were higher than previous months. Phil Triggs explained that this was a result of the accruals from the last financial year as well as contributions received from other financial areas. Furthermore, the Council also paid their deficit at the end of the financial year. An analysis of the difference between the actuals and the forecast for the quarter were also shown, as well as an additional analysis of the invested cash in the Legal and General Investment Management (LGIM) sterling liquidity fund.

Phil Triggs noted that Appendix 4 showed the pensions fund risk register and there had been no changes this quarter. Councillor Rory Vaughan, referring to page 65 of the agenda pack, noted that risk 18 had a particularly high score and asked if there was a cause for concern. Phil Triggs explained that all the mitigating actions were in place and staff were obeying all the internal audit controls, therefore the risk needed to be reviewed. In addition, he noted that following a meeting with internal colleagues the risk register would be re-drafted to include a gross score and the likelihood of the risk. This would also include a series of mitigating actions and provide a net risk rating to ensure that all the appropriate safeguards were carried out. He noted that the risk register would be re-drafted to reflect these changes and brought to the next Pensions Board meeting.

Councillor Rory Vaughan, referring to page 61 (risk 9) of the agenda pack, asked if all mitigating actions were achieved and as a result had reduced the risk. Phil Triggs noted that fund managers were engaing with fund managers to understand the postion better in relation to MiFID II and members were up-to-date with the relevant training. In addition, pensions fund officers maintained links with central government and national bodies and regularly met with fund managers to discuss their processes. He noted that this risk would be reduced for inclusion at the next meeting.

RESOLVED
That the report was noted.

9. ADDITIONAL VOLUNTARY CONTRIBUTION PROVIDER TRANSITION UPDATE

Phil Triggs gave an overview and noted that the report provided an update of the AVC provider, Zurich Corporate Savings, transitioning their existing portfolio of Hammersmith and Fulham (H&F) pension fund member assets to a new platform. The transition aimed to provide members with a better service by utilising an online platform where members can check their benefits and receive up to date information. The implementation would require key contributions from Human Resources in communicating this change to affected members.

Between February-May 2018 regular joint consultations occurred between Zurich and officers representing the shared services treasury team and the shared services retained pensions team to ensure that the transition occurred smoothly and that target dates in the project were met. There had been no complaints from the scheme members relating to this transition.

RESOLVED
That the Pensions Board noted the update as presented to the Pensions Sub Committee.

10. LOW CARBON STRATEGY UPDATE

Phil Triggs provided an overview and noted that the paper updated the Board on the funds current approach to fossil fuel investment and any possibilities of divestment in the future. The Pensions Sub Committee was recommended to join the Local Authority Pension Fund Forum (LAPFF), as doing so would allow the Council to engage and support the work of the organisation to ensure better environmental, social and governance decisions were taken within its portfolio. The report would be re-drafted and presented at the next Pensions Sub Committee, to discuss options in more detail and a decision would be made on how to proceed.

He highlighted that the Sub-Committee held a key fiduciary responsibility to manage the fund's investments in the best interests of the beneficiary members and the Council tax payers, where the primary focus must be on generating an optimum risk adjusted return. In addition, it was vital that any investment decisions or strategies developed, such as carbon strategy, did not negatively impact on this primary responsibility.

RESOLVED
That the Pensions Board noted:

1. The recommendations approved by the Pensions Sub Committee and,
2. The Pensions fund's current approach to fossil fuel investing.

11. PENSION FUND ADMINISTRATION UPDATE

David Coates (HR and Payroll) provided a verbal update on the performance of the Surrey County Council (SCC) pension administration services for the period January to March 2018. He also circulated a report detailing Surrey County Council's performance against their agreed service levels. Surrey help desk received over 500 queries per month and over 90% were resolved by the help desk at first point of contact, which was high. In instances where SCC had initiated and maintained the pension record, performance targets had been reached in most cases.

Data inaccuracies inherited from Capita still impacted upon SCC performance, this was evidenced by the 'statements sent to member following receipt of leaver notification', which was below target. A target driven project plan to check and improve inherited data inaccuracies had been agreed with SCC and was monitored monthly by the shared services Retained Pensions Team. It had been brought to the attention of SCC that pension fund Transfers Out performance needs to be a priority for improvement. This would be discussed at the next quarterly service review meeting so that a plan was put in place to bring performance to an acceptable standard.

There had been some delays in the processing of claim forms, which was because the information sent to SCC was incorrect. This meant that the target may need to be reviewed going forward. The score for the deferred benefits statements sent to members following receipt of leaver notification was still low due to inherited data errors from Capita. In addition, it would take up to a year to fix this and for it to reach a score of 80-90%. There had been no formal complaints received in the last quarter on Surrey's performance and feedback from scheme members remained very good.

David Coates said that overall, Surrey's performance was deemed acceptable in all areas with the exception of transfers-out of a scheme member's accrued pension cash value to another Local Government Pension Schemes (LGPS) employer. Councillor Rory Vaughan thanked David Coates for providing an update on the performance. He also suggested that the target be lowered on areas where 100% score was not achievable. David Coates advised that we continued to push them to improve on areas where they were not performing as well, however acknowledged the good work and efforts mad by SCC.

Councillor Bora Kwon asked if SCC were complying with General Data Protection Record (GDPR) framework and if the Council was satisfied with the transition. David Coates said that SCC provided this service for the Council and other London boroughs. Their compliance documents would be made available on the website in August 2018. Furthermore, there had been no enquiries from scheme members in relation to compliance and there was no evidence to suggest data breaches and non-compliance.

12. EXCLUSION OF THE PUBLIC AND PRESS

RESOLVED

That under Section 100A(4) of the Local Government Act 1972, that the public and press be excluded from the meeting during the consideration of the following items of business, on the grounds that they contain the likely disclosure of exempt information, as defined in paragraph 3 of Schedule 12A of the said Act, and that the public interest in maintaining the exemption currently outweighs the public interest in disclosing the information.

13. LONDON CIV UPDATE - EXEMPT ELEMENTS

The exempt elements of the report were noted.

14. LONDON CIV GOVERNANCE REVIEW - EXEMPT ELEMENTS

The exempt elements of the report were noted.

Meeting started: 7:00pm
Meeting ended: 8:00pm

Chair ....

Contact officer Amrita Gill
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London Borough of Hammersmith & Fulham PENSIONS SUB-COMMITTEE 4 SEPTEMBER 2018	
PENSION FUND QUARTERLY UPDATE PACK	
Report of the Strategic Finance Director	
Open Report	
Classification - For Information **Key Decision: No**	
Wards Affected: None	
Accountable Director: Phil Triggs, Tri-Borough Director of Pensions and Treasury	
Report Author: Matt Hopson, Strategic Investment Manager	**Contact Details:** Tel: 0207 641 4331 E-mail: shands@westminster.gov.uk

1. EXECUTIVE SUMMARY

1.1. This report is the Pension Fund quarterly update pack for the quarter ended 30 June 2018. The scorecard in Appendix 1 provides a high-level view of key pensions issues with more detail provided in the remaining appendices.

2. RECOMMENDATIONS

2.1. That the report is noted.

3. REASONS FOR DECISION

3.1. Not applicable.

4. PROPOSAL AND ISSUES

4.1. This report and associated appendices make up the pack for the quarter ended 30 June 2018. It is designed to provide Pension Sub-Committee members with a high-level view of key pensions issues in the scorecard (see Appendix 1) with more detailed information in the remaining appendices.

4.2. Appendix 2 provides information about the Fund's investments and performance. Kevin Humpherson from Deloitte will be attending the meeting to present this report.

4.3. The actual cashflow for the period April to June 2018 and the forecast up to March 2019 are shown in Appendix 3. An analysis of the differences between the actuals and the forecast for the quarter is also shown.

4.4. Appendix 4 shows the Pensions Fund Risk Register with one change this quarter.

4.5. A summary of the voting undertaken by the investment managers running segregated equity portfolios forms Appendix 5. This now includes both the London CIV Majedie and Ruffer in addition to the LGIM Global data.

4.6. Appendix 6 gives an update on the Forward Plan as at 30 June 2018.

5. OPTIONS AND ANALYSIS OF OPTIONS

5.1. Not applicable.

6. CONSULTATION

6.1. Not applicable.

7. EQUALITY IMPLICATIONS

7.1. Not applicable.

8. LEGAL IMPLICATIONS

8.1. None.

9. FINANCIAL IMPLICATIONS

9.1. None.

10. IMPLICATIONS FOR BUSINESS

10.1. None.

11. BACKGROUND PAPERS USED IN PREPARING THIS REPORT

11.1. None

LIST OF APPENDICES:

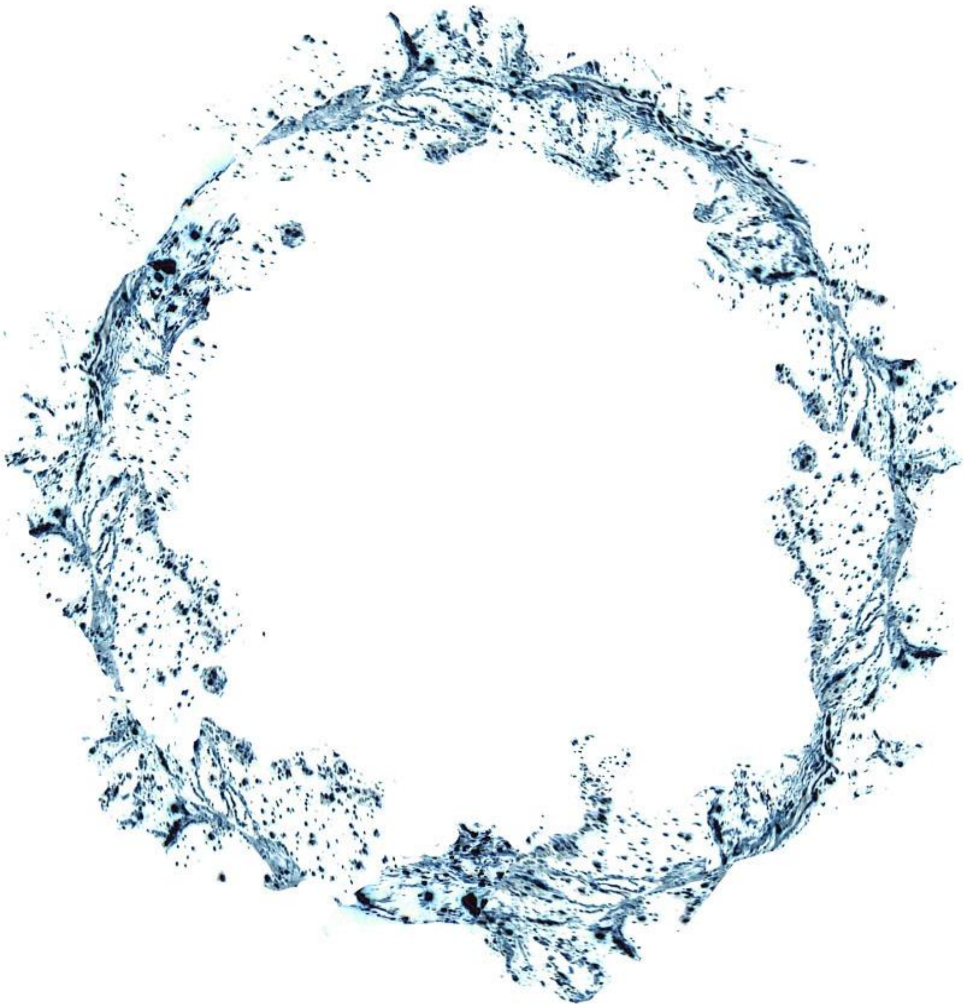
Appendix 1: Scorecard at 30 June 2018
Appendix 2: Deloitte quarterly report for quarter ended 30 June 2018
Appendix 3: Cashflow monitoring
Appendix 4: Pension Fund Risk Register
Appendix 5: Pension Fund Voting Summary
Appendix 6: Pensions Sub-Committee Forward Plan

Appendix 1: Scorecard at 30 June 2018

HAMMERSMITH AND FULHAM PENSION FUND QUARTERLY MONITORING

	Sep 17	Dec 17	Mar 18	Jun 18	Comment/ Report Ref if applicable
Value (£m)	1,011.9	1,033.1	997.6	1,035.3	Deloitte Report Gross of Fees
% return quarter	1.5%	2.6%	-2.5%	4.1%	
% return one year	8.8%	7.1%	1.7%	5.2%	
LIABILITIES					
Value (£m)	1,074.3	1,084.9	1,073.6	1,087.4	
Deficit (£m)	55.5	64.8	52.0	42.5	
Funding Level	95%	94%	95%	96%	
MEMBERSHIP					
Active members	4,356	4,228	4,166	4,166	
Deferred beneficiaries	5,753	5,687	6,603	6,603	
Pensioners	4,842	4,909	4,920	4,920	
Employers	41	41	61	61	
CASHFLOW					
Cash balance	£5.0m	£1.3m	£4.3m	£4.3m	Appendix 3
Variance from forecast	(£0.8m)	(0.5m)	0.6m	0.6m	
RISK					
No. of new risks	0	0	0	0	Appendix 4 – New Risk Register
No. of ratings changed	0	0	0	0	
VOTING					
No. of resolutions voted on by fund managers	5,282	4,732	5,711	5,711	Appendix 5 – LGIM, Ruffer & Majedie this quarter
LGPS REGULATIONS					
New consultations	None	None	None	None	No impact on the pension fund
New sets of regulations	None	None	None	IFRS9	

Deloitte.



London Borough of Hammersmith & Fulham Pension Fund

Investment Performance Report to 30 June 2018

Deloitte Total Reward and Benefits Limited
August 2018

Contents

1 Market Background

1.1 Three months and twelve months to 30 June 2018

The UK equity market made strong gains over the second quarter of 2018, rebounding after the fall in the previous quarter. The FTSE All Share Index delivered a return of 9.2%. A general improvement in economic conditions in the UK and globally certainly contributed to gains, but the depreciation of sterling over the second quarter was the main driver of returns as overseas earnings were revalued at a more favourable exchange rate. Performance may well have been stronger but escalating trade tensions will have weighed on markets.

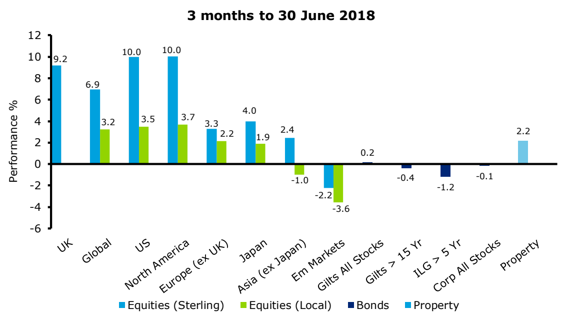
The FTSE 100 Index rose by 9.6% while the FTSE Small Cap Index increased by 6.1% over the quarter. All sectors delivered positive absolute returns over the quarter with the exception of Telecommunications, which delivered a negative return of -3.8%. Oil & Gas was the best performing sector (19.2%) fuelled by rising oil prices over the quarter.

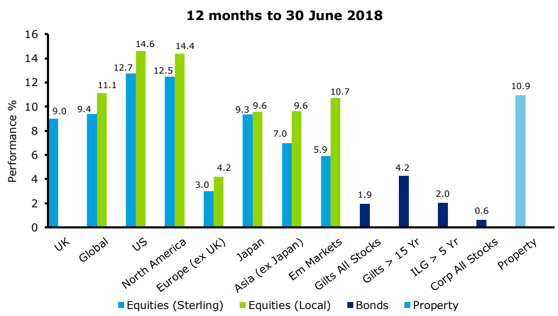
Global equity markets performed positively given the improving economic picture over the second quarter but underperformed UK equities in both local currency terms (3.2%) and sterling terms (6.9%). The weakening of sterling contributed to the UK's outperformance of overseas markets and also meant that currency hedging detracted from returns over the quarter. Trade tensions affected returns in overseas markets with countries and regions with greater reliance on exports particularly badly affected. For example, Asia Pacific ex Japan equities fell by 1% and returns across European markets, whilst positive, were weighed down by German stocks. North America was the best performing region (3.7% in local currency terms) with Emerging Markets the poorest performing region (-3.6%) as capital flowed out of the region as investors preferred the relative security of the US. Nominal gilt yields fell at the short end of the curve as inflation fears eased, but increased at longer maturities. Overall, the All Stocks Gilts Index delivered a return of 0.2% over the quarter. Real yields mirrored the shift in the nominal yield curve, falling for shorter durations and rising for longer durations. The general increase in real yields was more pronounced however, as inflation expectations fell, with the Over 5 Year Index-Linked Gilts Index returning -1.2% over the period. Credit spreads widened further over the second quarter, and the iBoxx All Stocks Non Gilt Index subsequently delivered a return of -0.1%.

Over the 12 months to 30 June 2018, the FTSE All Share Index delivered a positive return of 9.0% which was primarily attributable to the gains from the improving global economic environment in the second half of 2017 and continued sterling weakness. Oil & Gas (30.4%) was the best performing sector while Telecommunications (-19.1%) was the poorest performing sector. Global equity markets outperformed UK markets in both local and sterling terms, representative of the stronger economic environment overseas in the absence of Brexit related uncertainty.

UK nominal gilts delivered positive returns over the 12 months to 30 June 2018 as yields fell, with the All Stocks Gilts Index returning 1.9% and the Over 15 Year Gilts Index returning 4.2%. UK index-linked gilts also delivered positive returns, with the Over 5 Year Index-Linked Gilts Index returning 2.0%. Credit spreads widened over the year to 30 June 2018. Consequently, corporate bonds underperformed gilts over the period returning 0.6%.

The IPD UK Monthly Property Index returned 2.2% over the quarter and 10.9% over the year to 30 June 2018, following continued strong demand for UK property – and in spite of the continued uncertainty over Brexit.





2 Performance Overview

2.1 Investment Performance to 30 June 2018

Breakdown of Fund Performance by Manager as at 30 June 2018		3	1	2 year	3 year	5 year
Fund	Manager	month	year	p.a.	p.a.	p.a.
Equity Mandate						
	Majedie	10.1	7.6	13.4	7.7	10.2
FTSE All Share		9.2	8.8	13.3	9.4	8.7
Difference		0.9	-1.2	0.1	-1.8	1.4
	LGIM Global Equity	6.8	9.3	15.5	n/a	n/a
FTSE All World		6.9	9.4	15.6	n/a	n/a
Difference		0.0	0.0	-0.1	n/a	n/a
Dynamic Asset Allocation Mandates						
	Ruffer	2.1	0.7	4.1	2.8	4.2
3 Month Sterling LIBOR + 4% p.a.		1.2	4.5	4.4	4.5	4.5
Difference		1.0	-3.8	-0.4	-1.7	-0.3
	Insight	-2.3	-2.6	-0.7	n/a	n/a
3 Month Sterling LIBOR + 2% p.a.		0.7	2.5	2.4	n/a	n/a
Difference		-2.9	-5.1	-3.1	n/a	n/a
Private Equity						
	Invesco	6.0	10.5	9.5	12.9	15.2
	Unigestion	6.1	3.4	7.3	13.0	7.2
Secure Income						
	Partners Group MAC	1.0	4.3	5.5	5.3	n/a
3 Month Sterling LIBOR + 4% p.a.		1.2	4.5	4.4	4.5	n/a
Difference		-0.1	-0.2	1.0	0.8	n/a
	Oak Hill Advisors	-0.5	0.6	4.6	n/a	n/a
3 Month Sterling LIBOR + 4% p.a.		1.2	4.5	4.4	n/a	n/a
Difference		-1.6	-3.9	0.1	n/a	n/a
	Partners Group Infra	0.9	-4.6	-3.9	n/a	n/a
	Aviva Infra Income	n/a	n/a	n/a	n/a	n/a
Inflation *Protection*						
	M&G	1.0	6.2	7.4	n/a	n/a
RPI + 2.5% p.a.		1.8	5.9	5.9	n/a	n/a
Difference		-0.7	0.3	1.5	n/a	n/a
	Aberdeen Standard	1.9	9.1	8.6	7.5	n/a
FT British Government All Stocks		0.7	3.9	2.5	6.7	n/a
Difference		1.3	5.2	6.1	0.8	n/a
Total Fund		4.0	5.2	9.2	7.8	8.9
*Benchmark**		4.1	6.8	9.0	8.7	6.1
Difference		-0.1	-1.6	0.2	-0.9	2.8

Source: Northern Trust (Custodian). Figures are quoted net of fees and estimated by Deloitte. Differences may not tie due to rounding.
(*) The Total Assets benchmark is the weighted average performance of the target asset allocation.

3 Total Fund

3.1 Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (% p.a.)	Three Years (% p.a.)	Five Years (% p.a.)
Total Fund – Gross of fees	4.1	5.6	9.7	8.2	9.3
Net of fees(1)	4.0	5.2	9.2	7.8	8.9
Benchmark(2)	4.1	6.8	9.0	8.7	6.1
Net performance relative to benchmark	-0.1	-1.6	0.2	-0.9	2.8

Source: Northern Trust. Relative performance may not sum due to rounding.

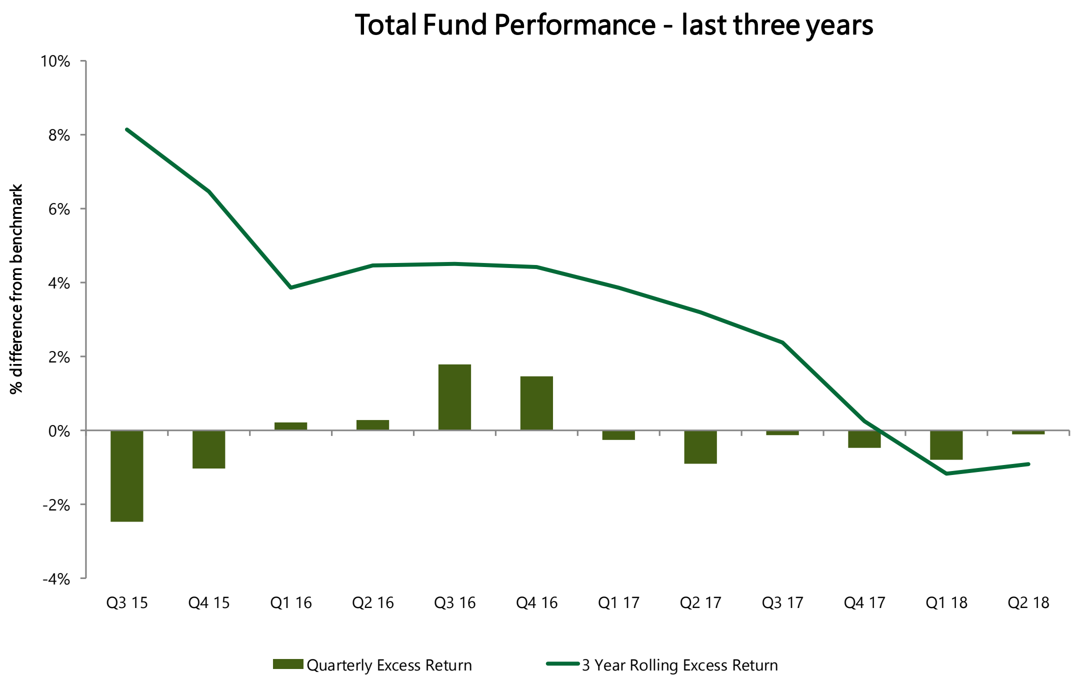
(1) Estimated by Deloitte

(2) Average weighted benchmark

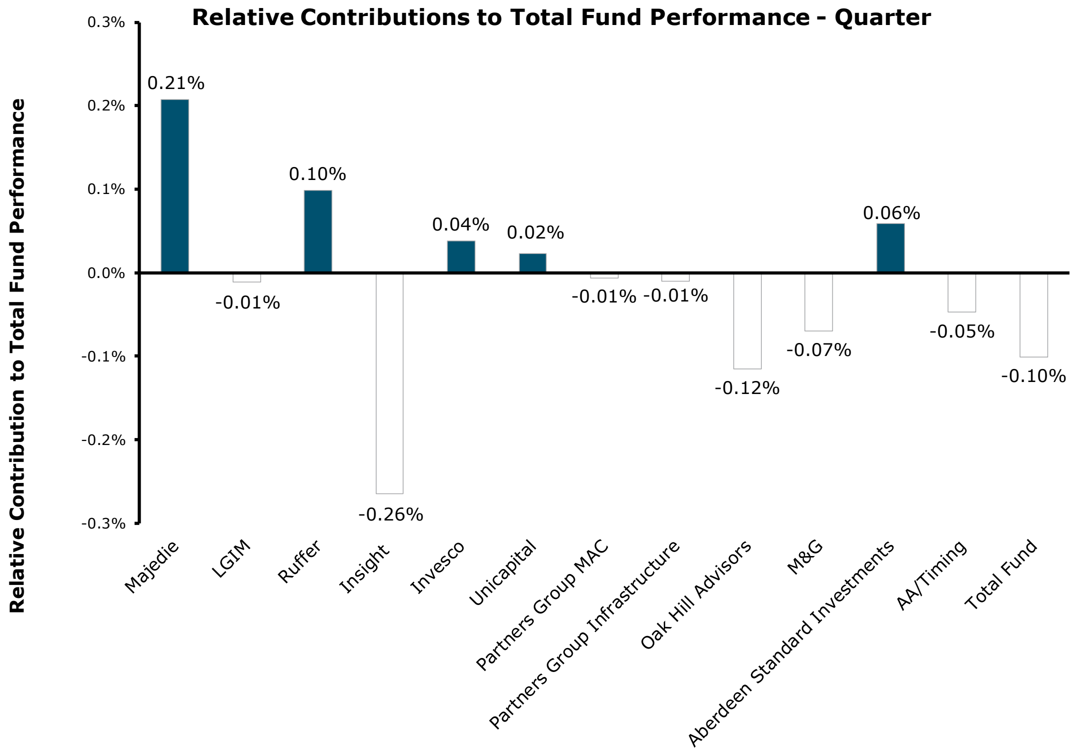
Over the quarter to 30 June 2018, the Total Fund returned 4.0% net of fees, underperforming its fixed weight benchmark by 0.1%.

Over the 12 month period, the Fund delivered a net return of 5.2%, underperforming the benchmark by 1.6%. Over the three year period the Fund underperformed the benchmark by 0.9% p.a. but remains ahead of the benchmark over the five year period by 2.8% p.a.

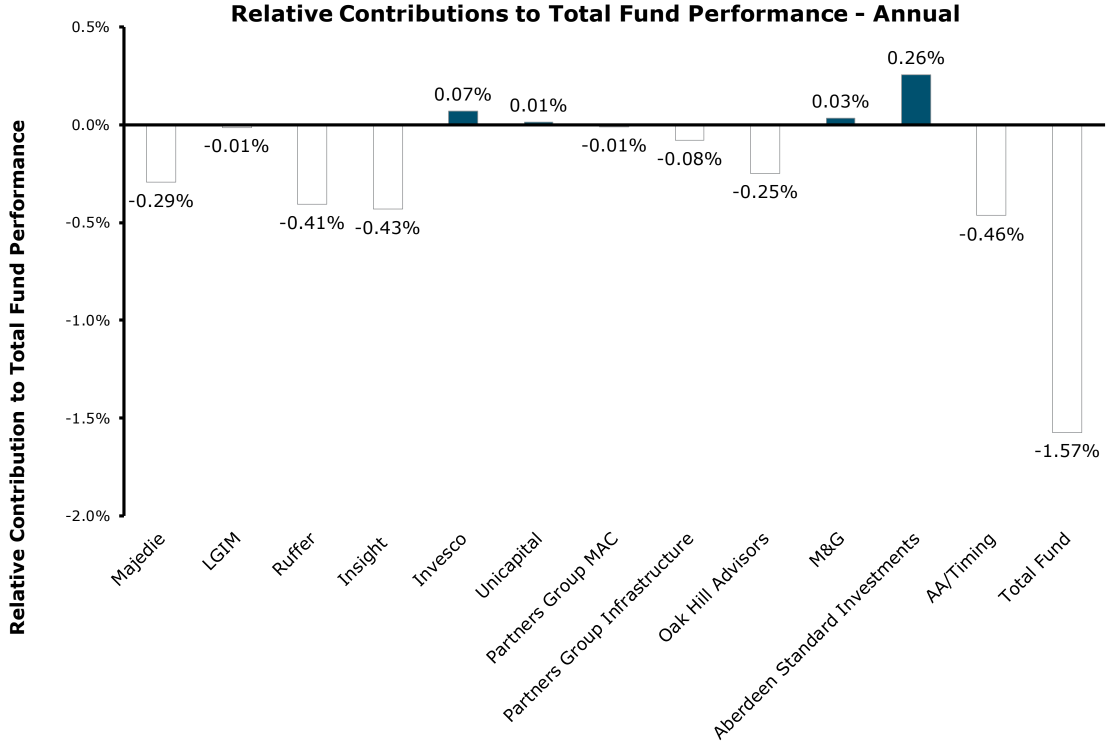
The chart below compares the net performance of the Fund relative to the fixed weight benchmark over the three years to 30 June 2018. The 3 year rolling excess return has been declining over recent quarters. This was to be expected as a result of the strong performance from Majedie towards the end of 2014 and start of 2015 dropping out of the 3 year calculations. The recent underperformance from Majedie and Ruffer has been the main contributor to the declining 3 year rolling excess returns.



3.2 Attribution of Performance to 30 June 2018



The Fund underperformed the composite benchmark by 0.1% on a net of fees basis over the second quarter of 2018, largely as a result of underperformance from Insight. Majedie's strong relative contribution partly deterred the impact of Insight's underperformance, however this was offset by Oak Hill's and M&G's underperformance over the quarter.



Over the year the Fund underperformed the composite benchmark by 1.6% as a result of negative contributions from OakHill, Majedie, Ruffer and Insight. This was partially offset by positive relative returns from Aberdeen Standard Iinvestments. The negative contribution represented by the "AA/Timing" bar was primarily a function of the Fund having an overweight allocation to equities over the 12 month period to 30 June 2018.

3.3 Asset Allocation

The table below shows the assets held by each manager as at 30 June 2018 alongside the Target Benchmark Allocation.

Manager	Asset Class	Actual Asset Allocation 31 Mar 2018 (£m)	30 June 2018 (£m)	31 Mar 2018 (%)	30 June 2018 (%)	Benchmark Allocation (%)
Majedie	UK Equity (Active)	159.1	175.5	16.0	16.9	15.0
LGIM	Global Equity (passive)	303.2	323.9	30.4	31.3	30.0
	Total Equity	**462.3**	**499.3**	**46.3**	**48.2**	**45.0**
Ruffer	Absolute Return	157.5	132.0	15.8	12.7	10.0
Insight	Bonds Plus	89.0	87.1	8.9	8.4	10.0
	Total Dynamic Asset Allocation	**246.4**	**219.0**	**24.7**	**21.2**	**20.0**
Invesco	Private Equity	3.8	4.0	0.4	0.4	0.0
Unicapital	Private Equity	1.9	1.6	0.2	0.2	0.0
	Total Private Equity	**5.6**	**5.6**	**0.6**	**0.5**	**0.0**
Partners Group	Multi Asset Credit	41.7	37.6	4.2	3.6	5.0
Oak Hill Advisors	Diversified Credit Strategy	72.4	72.1	7.3	7.0	7.5
Partners Group	Direct Infrastructure	7.0	9.1	0.7	0.9	5.0
Aviva	Infrastructure Income	0.0	28.2	0.0	2.7	2.5
	Secure Income	**121.1**	**147.0**	**12.1**	**14.2**	**20.0**
M&G	Inflation Opportunities	99.3	100.4	10.0	9.7	10.0
Aberdeen Standard Investments	Long Lease Property	51.9	53.0	5.2	5.1	5.0
	Total Inflation Protection	**151.2**	**153.4**	**15.2**	**14.8**	**15.0**
LGIM	Liquidity Fund	10.8	10.8	1.1	1.0	0.0
	Total	**997.6**	**1,035.3**	**100.0**	**100.0**	**100.0**

Source: Northern Trust (Custodian) and have not been independently verified

Figures may not sum to total due to rounding

3.4 Yield Analysis as at 30 June 2018

The following table shows the running yield on the Fund's investments:

Manager	Asset Class	Yield as at 30 June 2018
Majedie	UK Equity	2.90%*
LGIM	Global Equity	0.22%**
Ruffer	Dynamic Asset Allocation	1.20%
Insight	Dynamic Asset Allocation	1.22%
Partners Group MAC	Secure Income	3.22%
Oak Hill Advisors	Secure Income	6.30%
M&G	Inflation Protection	2.59%
Aberdeen Standard Investments	Inflation Protection	4.08%
	Total	**1.88%**

*Majedie yield provided by the London CIV and is a historic yield, reflecting distributions declared over the past 12 months as a percentage of average market value.
**Benchmark yield is 2.4% (represents the income that would be generated).

4 Summary of Manager Ratings

The table below summarises Deloitte's ratings of the managers employed by the Fund and triggers against which managers should be reviewed.

Manager	Mandate	Triggers for Review	Rating
Majedie	UK Equity	Further turnover within the core investment team Re-opening the UK equity products with no clear limits on the value of assets that they would take on	1
LGIM	Global Equities	Major deviation from the benchmark return Significant loss of assets under management	1
Ruffer	Absolute Return	Departure of either of the co-portfolio managers from the business Any significant change in ownership structure	1
Insight	Bonds Plus	A significant increase or decrease to the assets under management with no set limits Significant changes to the team managing the Fund	1
Partners Group	Multi Asset Credit	Significant changes to the investment team responsible for the Fund *Note the mandate is subject to a 7 year lock-up period	1
	Direct Infrastructure	Significant changes to the investment team responsible for the Fund. *Note the mandate is subject to a 10 year lock-up period	1
Oak Hill Partners	Diversified Credit Strategy	Significant changes to the investment team responsible for the Fund. Significant changes to the liquidity of underlying holdings within the Fund.	1
M&G	Inflation Opportunities	If the Fund's portfolio manager Gary Parker was to leave the business or cease to be actively involved in the Fund, this would trigger a review of the Fund. Failure to find suitable investments within the initial two year funding period.	1
Aberdeen Standard Investments	Long Lease Property	Richard Marshall leaving the business or ceasing to be actively involved in the Fund without having gone through an appropriate hand-over. A build up within the Fund of holdings with remaining lease lengths around 10 years.	1

4.1 London CIV

Business

As at 30 June 2018, the London CIV had 12 sub-funds and assets under management of £6.9bn. The total assets under oversight (which includes passive investments held outside of the CIV platform) increased over the quarter from just under £15bn to c. £16.2bn and represents c. 43% of the 32 London Borough's total AuM.

Over the quarter, two new funds were added to the LCIV:

- Sustainable Equity Fund, managed by RBC
- Multi Asset Credit Fund, managed by CQS.

These two fund launches have had £0.5bn investments from six borough pension funds to date.

Deloitte view – There has been high turnover of personnel at the London CIV, with the recent departures of Hugh Grover, CEO, and Julian Pendock, CIO, being of significant loss. It is crucial that steps are taken to rebuild the senior management team and an appropriate strategy agreed for taking the pool forward, getting "buy-in" from the shareholders. We are continuing to monitor developments on the business side as well as the new fund launches.

4.2 Majedie

Business

The total assets under management for Majedie was c. £15.0bn as at 30 June 2018, an increase of c. £1.2bn over the second quarter of 2018.

Personnel

Chris Reid, a Portfolio Manager on the UK Equity Income and Focus Fund and one of Majedie's founding partners, left the firm at the end of June to pursue a postgraduate degree in finance.

Mark Wharrier and Imran Sattar joined the firm over the quarter. Mark joined from Troy Asset Management and manages the UK Income Fund. Mark was previously at BlackRock for four years where he managed the BlackRock UK Income Fund. Imran joins from BlackRock and will co-manage the Majedie UK Focus Fund alongside existing managers James de Uphaugh, Chris Field and Matthew Smith. Imran was a fund manager on BlackRock's UK Equity Fund.

Harry Jebb and Karyne Blackman also joined as a Client Manager and Accounts Assistant respectively.

Deloitte view – We continue to rate Majedie positively for its UK Equity capabilities.

4.3 LGIM

Business

As at 31 December 2017, Legal & General Investment Management ("Legal & General") had total assets under management ("AuM) of £983bn, an increase of £32bn since 30 June 2017. (Note, LGIM reports AuM half-yearly and the 30 June 2018 figures are expected to be published in late August 2018.)

In July, post quarter-end, it was announced that Legal & General was reported to the FCA by at least three employees under whistleblower rules regarding its risk culture and compliance failures. This included trading errors, which were not reported to LGIM's internal risk management team. The complaints are in relation to LGIM's active asset management business.

We have held a number of subsequent conversations with Legal & General around this and concluded that the incident has no direct effect on the Fund's investments, with the errors being in relation to the active fixed income team. Legal & General explained that this is a longstanding allegation and has conducted an investigation using independent external advisors keeping the FCA regularly updated. The client for which the error was made was fully compensated some time ago. LGIM also carried out a broader investigation into its corporate culture, supported again by independent experts, which concluded that the culture is professional and positive. While we will continue to monitor the incident, we are satisfied that Legal & General has taken the action to rectify the error and we retain a positive view with regard to their attitude towards risk culture and client service in general.

Personnel

At a firm level, LGIM announced in July, post quarter-end, the planned retirement of Mark Zinkula, CEO of LGIM (UK), which has been agreed to take effect from 31 August 2019. Whilst significant, the announcement – if not the exact timing – had been expected as Mark had always made clear his period based in the UK would be finite and that he planned to return to the US. The 13-month notice is expected to give LGIM sufficient time to appoint a replacement and ensure a smooth transition, and we will continue to monitor updates of LGIM's succession plan and any likely impact it may have on the LGIM's firm-wide strategy and the Scheme's mandates invested with LGIM.

At the Index team level, there was one new joiner in the second quarter of 2018 as Ciera Radia joined to take up the position of Fund Management Analyst.

Deloitte View – We continue to rate Legal & General positively for its passive capabilities.

Allegations around risk failures are extremely serious but we believe that LGIM is taking these reports seriously and has already conducted an investigation into its corporate culture with the support of external independent experts. We are supportive of LGIM keeping the Regulator fully informed and see the fact that the FCA is not investigating this matter further as providing some reassurance. While we will continue to monitor the incident, we are satisfied that LGIM has taken action to rectify the error and our view of LGIM overall as a passive and LDI manager in particular remains positive.

4.4 Ruffer

Business

Total assets under management were £22.3bn as at 30 June 2018, an increase from £22.0bn at 31 March 2018. One major client left the Fund over the second quarter of 2018, taking the decision to move into fiduciary management.

Personnel

Trevor Bradley, member of the Executive Board left the firm in April 2018.

There were no other changes to senior staff or management structure over the quarter.

Deloitte view – The Ruffer product is distinctive within the universe of diversified growth managers with the manager willing to take contrarian, long term positions, where necessary drawing on the expertise of external funds.

4.5 Insight

Business

Insight's total AuM increased by c. £20bn over the quarter, with over £600bn in assets under management, as at 30 June 2018. Total assets in Insight's Bonds Plus Fund was £4.1bn as at 30 June 2018.

Personnel

Insight made no changes to their Bonds Plus team over the quarter.

There were three new joiners to the Fixed Income team over the quarter.

- Dimitrios Theodorikas, an Analyst in the Secured Finance Team, is responsible for analysing asset-backed investments. Prior to joining Insight, he spent two years at Moody's Analytics as a Financial Engineer having oversight of modelling and data process.
- Lillian Fieldman-Bernal, Loans Closer, has a primary focus on loan and bond settlement. Prior to Insight, she spent almost ten years at BlueBay Asset Management LLP.
- Pedro Fernandes, Senior Loans Closer, has a primary focus on loan and bond settlement. Prior to Insight, he spent ten years at Investec Bank Plc working as a Transaction Manager.

***Deloitte view* –** Performance of the Bonds Plus fund has been disappointing. We are currently conducting a review of the product.

4.6 Partners Group

Business - Multi Asset Credit

The net asset value of the MAC Fund was c. £160m as at 31 March 2018, a fall of c. £35m from 31 March 2018 following the two distributions made in April and May. The investment period for the 2014 MAC vintage finished at the end of July 2017, and the fund is continuing to make distributions back to investors in 2018.

The latest vintage of the Fund, MAC 2017, was launched in October 2017. The first close of the Fund happened in January 2018, with initial commitments of c. £0.9bn across 30 clients. A final close was held in April 2018 with commitments of c. £1.1bn.

Business - Direct Infrastructure

Total commitment value as at 30 June 2018 remained at c. €1,080m as the Fund held no further closes over the quarter.

The Fund ended the quarter at c. 22.6% drawn down, with commitment level increasing significantly to 48.3%.

Personnel

There were no significant personnel changes to the senior management team during the quarter.

Deloitte View - We continue to rate Partners Group for its private market capabilities.

4.7 Oak Hill Advisors – Diversified Credit Strategy (DCS)

Business

The total assets under management were approximately $33.3bn as at 30 June 2018, an increase of c. $0.2bn over the quarter.

It was announced over the quarter that General Atlantic sold its passive minority stake in OHA to Wafra. Wafra, founded in 1985 and owned by Kuwait's Public Institution for Social Security, is a global investment firm with significant experience in alternative investments.

Personnel
Robert Okun, Partner, will retire at the end of 2018 and will transition to the role of Senior Advisor in the interim.

Rajul Aggarwal joined the firm as Managing Director over the quarter. There have been no other material changes to the management team for multi-asset credit, or specifically for the OHA Diversified Credit Strategies Fund over the second quarter of 2018.

Following quarter end, Eric Muller joined as Portfolio Manager and Partner.

Deloitte view – We are comfortable with how the strategy is being managed and the level of risk within the strategy.

4.8 M&G – Inflation Opportunities Fund

Business
Assets under management in the Inflation Opportunities Fund V Fund as at 30 June 2018 were c. £506m, down slightly from c. £509m at the previous quarter end.

There have been no inflows or outflows from the fund over the quarter. Prudential plc has announced its intention to demerge M&G Prudential and to float it as an independent company on the London Stock Exchange at some point in the future. There will be no change to the M&G funds and strategies, or their fees and charges, as a result of the demerger.

Personnel
Over the quarter, John Foley, Chief Executive of M&G Prudential, became Chief Executive of the key regulated entities of M&G and Prudential UK. Clare Bousfield became Chief Financial Officer of M&G Prudential.

Anne Richards, currently Chief Executive of M&G Investments, is resigning from her role and from the Board of Prudential plc as of August 2018, following quarter end.

Deloitte view **–**The strategy has a high allocation to ILGs and has not managed to source as many 'inflation linked opportunities' as originally expected given the change in market conditions. The manager expects to increase the allocation to long lease property and, while we are positive on this asset class, it does create overlap with the Fund's Long Lease Property mandate with Standard Life Investments. As such, the Committee may wish to consider whether there are alternative options that could be considered for all or part of the allocation in this strategy which offer at least a degree of "inflation proofing".

4.9 Aberdeen Standard Investments – Long Lease Property

Business
The Fund's assets under management remained broadly unchanged at c. £2.2bn as at 30 June 2018.

ASI announced that from 1 April 2018 the fee rate being charged on the Long Lease Property Fund has changed from the flat fee of 0.5% on assets invested to the following sliding fee scale:

- 0.5% on first £25m of assets invested;
- 0.4% on assets in the range of £25m-£50m; and
- 0.3% on assets over £50m.

This will benefit the Fund which had c. £53.0m invested in the Fund as at 30 June 2018. Fee reductions will be achieved through a management charge rebate in the form of either increasing the number of units held by the Fund or through a cash payment made monthly to the Fund bank account.

Personnel
Aberdeen Standard Investments had previously announced that the leadership team for Aberdeen Standard Investments Real Estate Division who will be led by Global Co-Heads of Real Estate, David Paine and Pertti Vanhanen, with Mike Hannigan appointed as Head of Real Estate UK. In March 2018 Mike announced his integrated UK management team: Richard Marshall (Head of UK Secure, Residential and Alternative Funds), Cameron Murray (Head of UK Institutional Funds), Mark Watt (Head of UK Wholesale Funds and Investment Trusts), Nick Ireland (Head of UK Segregated Funds), Simon Moscow (Head of Portfolio Management), Rob Cass (Head of Transaction Management) and James Stevens (Head of UK Development).

It was also confirmed that Richard Marshall would remain as Fund Manager of both the SLI Long Lease Property Fund and SLI Ground Rent Fund.

Process

Since the two businesses merged, ASI has put in place a formalised process where all potential transactions are reviewed and an "allocation policy" applied where interest is expressed in the investment by more than one fund/client portfolio.

Deloitte View – We continue to monitor ASI post-merger with the organisation currently in the midst of the integration. ASI has been keen to stress that the management of the Long Lease Property Fund is unaffected by the merger and developments over the quarter appear to reinforce this view. We remain positive on long lease property given the long-term, inflation-linked nature of the contractual cashflows which arise from this type of investment.

4.10 Aviva Investors

Business

The Aviva Infrastructure Income Fund had a total subscription value of £1,176m as at 30 June 2018. No investor commitments were received over the second quarter. The undrawn amount as at 30 June was £287.2m.

The Fund completed two transactions over the quarter to 30 June 2018:

- £118m investment in two operational ROC accredited windfarms; and
- £34m investment into County Broadband for the roll-out of high-speed fibre broadband in rural areas of the East of England.

Personnel

There were no significant personnel changes to the senior management team during the quarter. Three new members joined at analyst level and one at associate level, with David Jerez, Senior Associate, leaving his role at the firm.

Deloitte View - We continue to rate Aviva Investors positively for its infrastructure capabilities.

5 London CIV

5.1 Investment Performance to 30 June 2018

As at 30 June 2018, the London CIV had 12 sub-funds and assets under management of £6,937m. The total assets under oversight (which includes passive investments held outside of the CIV platform) increased over the quarter from just under £15bn to c. £16.2bn.

The table below provides an overview of the sub-funds currently available on the London CIV platform.

Sub-fund	Asset Class	Manager	Total AuM as at 31 March 2018 (£m)	Total AuM as at 30 June 2018 (£m)	Number of London CIV clients	Inception Date
LCIV MJ UK Equity	UK Equity	Majedie	494	546	3	18/05/17
LCIV Global Equity Alpha	Global Equity	Allianz Global Investors	720	114	1	02/12/15
LCIV BG Global Alpha Growth	Global Equity	Baillie Gifford	1,808	2,183	11	11/04/16
LCIV NW Global Equity	Global Equity	Newton	531	575	3	22/05/17
LCIV LV Global Equity	Global Equity	Longview Partners	425	516	3	17/07/17
LCIV EP Income Equity	Global Equity	Epoch Investment Partners	212	225	2	08/11/17
LCIV HN Emerging Market Equity	Global Equity	Henderson Global Investors	76	105	2	11/01/18
LCIV RBC Sustainable Equity Fund	Global Equity	RBC Global Asset Management (UK)	-	269	2	18/04/18
LCIV PY Total Return	Diversified growth fund	Pyrford	274	312	5	17/06/16
LCIV Diversified Growth	Diversified growth fund	Baillie Gifford	480	507	7	15/02/16
LCIV RF Absolute Return	Diversified growth fund	Ruffer	826	902	10	21/06/16
LCIV NW Real Return	Diversified growth fund	Newton	331	338	3	16/12/16
LCIV MAC Fund	Multi Asset Credit	CQS	-	343	4	31/5/18
Total			**6,175**	**6,937**		

Over the quarter, the Global Equity Alpha sub fund (managed by Allianz Global Investors) lost two London Boroughs from their client list. Whereas the Global Alpha Growth sub fund (managed by Baillie Gifford) added two new London Boroughs to their client list and each of the HN Emerging Market Equity (managed by Henderson Global Investors), PY Total Return (managed by Pyrford) and Diversified Growth (managed by Baillie Gifford) sub funds each added another London Borough to their client list.

6 Majedie – UK Equity

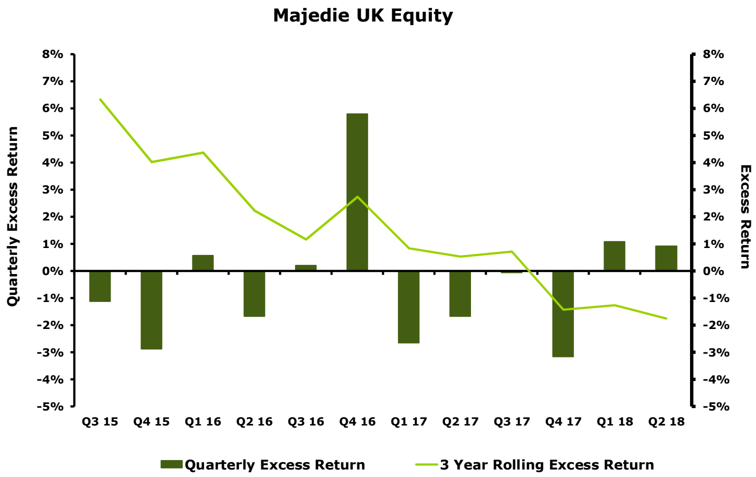
Majedie was appointed to manage an actively managed segregated UK equity portfolio. The manager's remuneration is a combination of a tiered fixed fee, based on the value of assets and a performance related fee of 20% of the outperformance which is payable when the excess return over the FTSE All Share +2% p.a. target benchmark over a rolling three year period. The investment with Majedie comprises a combination of the UK Equity Fund (no more than 30%), the UK Focus Fund and a holding in Majedie's long/short equity fund, Tortoise (no more than 10%).

6.1 UK Equity – Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (% p.a.)(1)	Three Years (% p.a.)	Five Years (% p.a.)
Majedie – Gross of fees	10.3	8.2	13.9	8.2	10.6
Net of fees(1)	10.1	7.6	13.4	7.7	10.2
Benchmark	9.2	8.8	13.3	9.4	8.7
Target	9.7	10.8	15.3	11.4	10.7
Net performance relative to Benchmark	0.9	-1.2	0.1	-1.8	1.4

Source: Northern Trust

(1) Estimated by Deloitte



The Fund returned 10.1% on a net of fees basis over the quarter against a benchmark return of 9.2%. This took the annual performance net of fees to 7.6% versus a benchmark return of 8.8%. Over the three year period, the Fund is lagging the benchmark return by 1.8% p.a. Whereas, over the five years to 30 June 2018, the Fund is ahead of benchmark return by 1.4% p.a., net of fees, but 0.5% p.a. below the target.

Gross of fees	Last Quarter (%)	One Year (%)	Three Years (% p.a.)
UK Equity (net of fees)	10.3	8.2	
Focus Fund	13.7	14.4	11.0
Tortoise Fund	3.3	-0.6	3.1

6.2 Performance Analysis

The top 10 holdings in the UK Equity strategy account for c. 50.6% of the Fund and are detailed below.

Top 10 holdings as at 30 June 2018	Proportion of Majedie Fund
Majedie Asset Management Special	9.1%
Royal Dutch Shell	8.1%
BP	7.9%
Tesco	5.6%
GlaxoSmithKline	4.2%
HSBC	4.1%
WM Morrison	3.4%
Centrica	2.9%
Vodafone	2.7%
Orange	2.7%
Total	**50.6%**

Note: The numbers in this table may not sum due to rounding.
Source: London CIV.

The tables below shows the top 5 and bottom 5 contributors to performance over the quarter to 30 June 2018.

Top 5 contributors as at 30 June 2018	Contribution
BP	+1.53
Royal Dutch Shell	+1.50
Tesco	+1.22
WM Morrison	+0.66
Sainsbury	+0.52

Top 5 detractors as at 30 June 2018	Contribution
Telecom Italia	-0.16
Barclays	-0.14
BT	-0.09
Lonmin	-0.04
William Hill	-0.03

The Fund's holdings in Telecom Italia, Barclays plc and BT Group provided the biggest detractions to performance over the quarter to 30 June 2018.

7 Legal and General – Global Equity

Legal and General Investment Manager ("LGIM") was appointed to manage a global equity portfolio with the objective of replicating the performance of the FTSE All World Index benchmark. The manager is remunerated on a tiered fixed fee based on the value of assets.

7.1 Global Equity – Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (% p.a.)
LGIM – Gross of fees	6.8	9.4	15.6
Net of fees[(1)]	6.8	9.3	15.5
Benchmark	6.9	9.4	15.6
Net Performance relative to Benchmark	0.0	0.0	-0.1

Source: LGIM. Relative performance may not tie due to rounding.
(1) Estimated by Deloitte

On a net of fees basis, the Fund provided returns slightly behind its benchmark over the quarter, year and two years p.a. periods to 30 June 2018.

8 Ruffer – Absolute Return

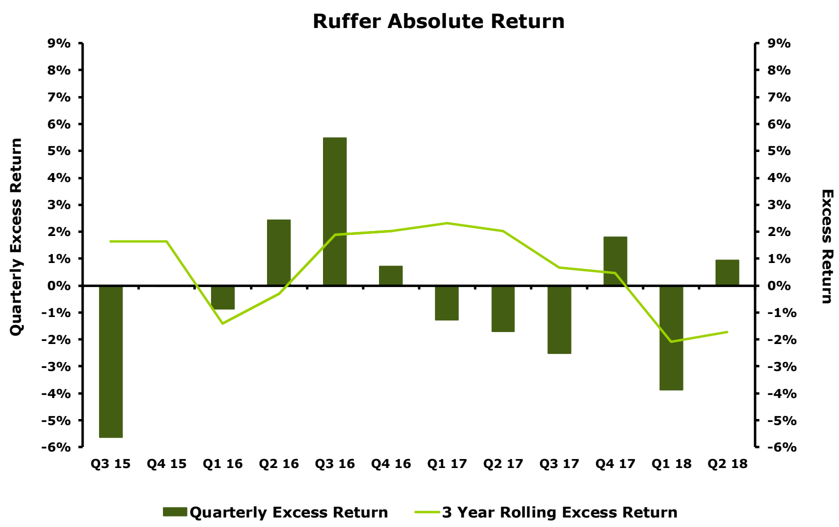
Ruffer was appointed to manage an absolute return mandate with the aim of outperforming the 3 month Sterling LIBOR benchmark by 4% p.a. The manager has a fixed fee based on the value of assets.

8.1 Dynamic Asset Allocation – Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (% p.a.)(1)	Three Years (% p.a.)	Five Years (% p.a.)
Ruffer - Gross of fees	2.3	1.5	4.9	3.6	5.0
Net of fees(1)	2.1	0.7	4.1	2.8	4.2
Benchmark / Target	1.2	4.5	4.4	4.5	4.5
Net performance relative to Benchmark	1.0	-3.8	-0.4	-1.7	-0.3

Source: Northern Trust. Relative performance may not tie due to rounding.

(1) Estimated by Deloitte



Ruffer outperformed its Libor +4% p.a. target over the second quarter of 2018 by 1.0% net of fees. This takes the 12 month and three year absolute net performance to 0.7% and 2.8% p.a. respectively.

Recognising a drop in price of UK stocks, despite concerns regarding Brexit, the Fund increased its UK equities exposure and reaped the benefits over the quarter to 30 June 2018.

The Fund's US dollar holdings provided a boost to performance over the quarter, with sterling deteriorating following Brexit concerns and strong US growth resulting in raised interest rates.

Over the 12 month period to 30 June 2018, the Fund underperformed its target by 3.8%. This is largely due to the Fund's relatively unchanged defensive position over the previous 12 months. Much of the drag has come from the portfolio's VIX positions, with very little volatility in the market recently. With volatility subsiding and equity markets strengthening towards the end of the 12 month period, the protection assets in the portfolio, particularly option protection, have been a deterrent to performance over the longer term.

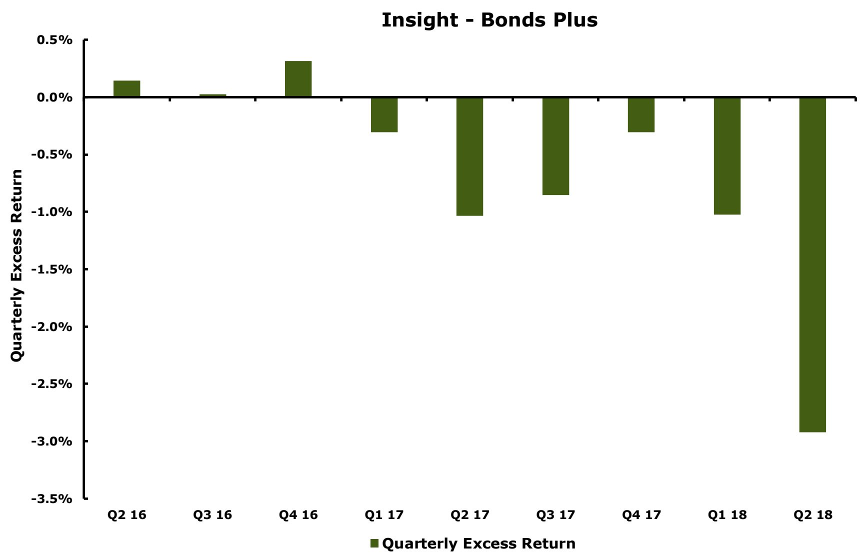
9 Insight – Bonds Plus

Insight was appointed to manage an active bond portfolio with an aim of outperforming the 3 Month Sterling LIBOR by 2% over a rolling three year period. The fees are based on the value of assets invested in the fund.

9.1 Absolute Return – Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (% p.a.)
Insight - Gross of fees	-2.1	-2.1	-0.2
Net of fees(1)	-2.3	-2.6	-0.7
Benchmark / Target	0.7	2.5	2.4
Net performance relative to Benchmark	-2.9	-5.1	-3.1

Source: Northern Trust. Relative performance may not tie due to rounding
(1) Estimated by Deloitte



Insight underperformed its target over the second quarter by 2.9% net of fees.

The fund's country allocation was the largest detraction to performance over the quarter to 30 June 2018. This was driven predominantly by being short Germany versus longs in Australia and the Fund's US cross market positions. The fund's duration positioning was also negative over the quarter, after being the most positive driver over the previous quarter. This was largely due to the cost of protective options in case of a flight to quality environment.

The Bonds Plus Fund has delivered disappointing returns since inception. Following a meeting with Insight, we understand that the key detractors from performance have come from a number of the fund's strategic views on market. In particular, a number of the longer term country allocation views that was deemed attractive (when trades were initially put on) have moved against them under the current geopolitical environment. Despite the mark-to-market, the manager continues to believe in the positions they have put on and have not cut their positions. Although performance has been weak the manager continues to adopt the same investment process and are not taking additional risk in order to deliver the target return.

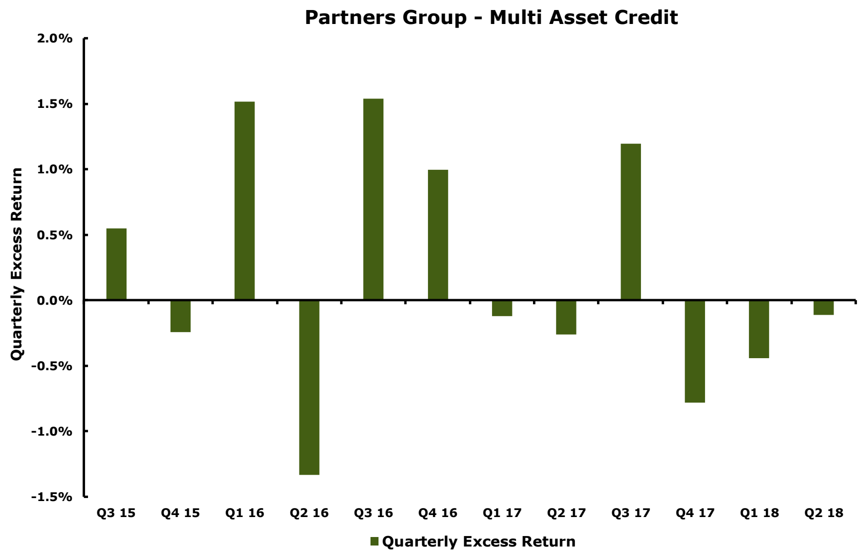
10 Partners Group – Multi Asset Credit

Partners Group was appointed to manage a multi asset credit mandate with the aim of outperforming the 3 month Sterling LIBOR benchmark by 4% p.a. The manager has an annual management fee and performance fee.

10.1 Multi Asset Credit - Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (% p.a.)	Three Years (% p.a.)
Partners Group MAC - Gross of fees	1.3	5.2	6.4	6.2
Net of fees[(1)]	1.0	4.3	5.5	5.3
Benchmark / Target	1.2	4.5	4.4	4.5
Net performance relative to Benchmark	-0.1	-0.2	1.0	0.8

Source: Northern Trust. Relative performance may not tie due to rounding.



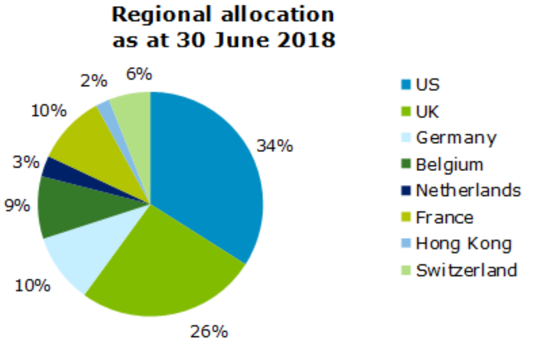
The Fund underperformed its target over the quarter, net of fees, by 0.1%.

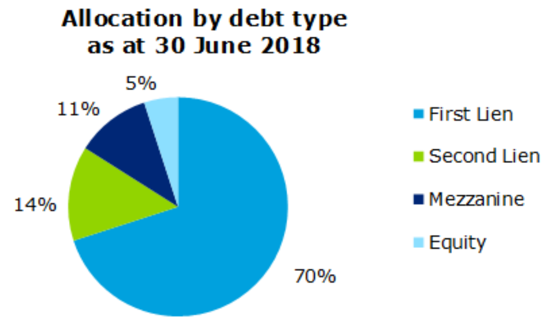
Over the 12 month period to 30 June 2018, the Fund returned 4.3% on a net of fees basis, underperforming the target 0.2%.

The Fund returned 5.3% p.a. net of fees over the 3 year period to 30 June 2018, outperforming the target by 0.8% p.a.

10.2 Asset Allocation

The charts below show that the majority of the Fund is invested in senior secured debt.





Note: Based on information provided by Partners Group.

The table below shows details of the Fund's five largest holdings based on net asset value as at 30 June 2018.

Investment	Description	Type of Debt	Tranche	Maturity Date	Current IRR (%)	NAV (£m)	% of NAV
Mirion Technologies, Inc.	US Electronic company	Corporate	First Lien	31 Mar 2022	6.6	8.2	9.2%
		Corporate	Second Lien	31 Mar 2023	9.6	6.5	
AS Adventure	Large European specialist multi-brand outdoor retail group	Corporate	First Lien	28 Apr 2022	5.6	14.2	8.9%
IDEMIA	Security and identity solutions company	Corporate	Mezzanine	31 May 2027	13.6	10.9	6.8%
Sabre Industries	US infrastructure products and services provider	Corporate	First Lien	29 May 2022	6.5	10.3	6.4%
Springer Science & Business Media	German based book, e-book and journal publisher	Corporate	First Lien	15 August 2022	5.2	9.9	6.2%

Note: Information provided by Partners Group. Current IRR is net of cost and fees of the investment partner but gross of Partners Group fees. For investments with a holding period less than 12 months, the IRR is not annualised.

10.3 Fund Activity

To date, the Fund has made investments in 54 companies, of which 29 have been fully realised as 5 more realisations took place during the second quarter. The Fund's 3 year investment period ended in July 2017 and, therefore, any investments realized have subsequently been repaid to investors. As a result, the distribution rate has increased over the last year with two further distribution made during the second quarter to June 2018.

In June 2018, the MAC 2014 Fund realised its debt investment in Motor Fuel Group, the UK petrol station chain that was previously one of the Fund's top 5 portfolio holdings, following the acquisition of the company by MRH.

Also in June 2018, the fund realised its first lien debt investment in Vista Group, the corporate services provider, after it was refinanced as part of the company's acquisition of Radius, another corporate services company based in the US.

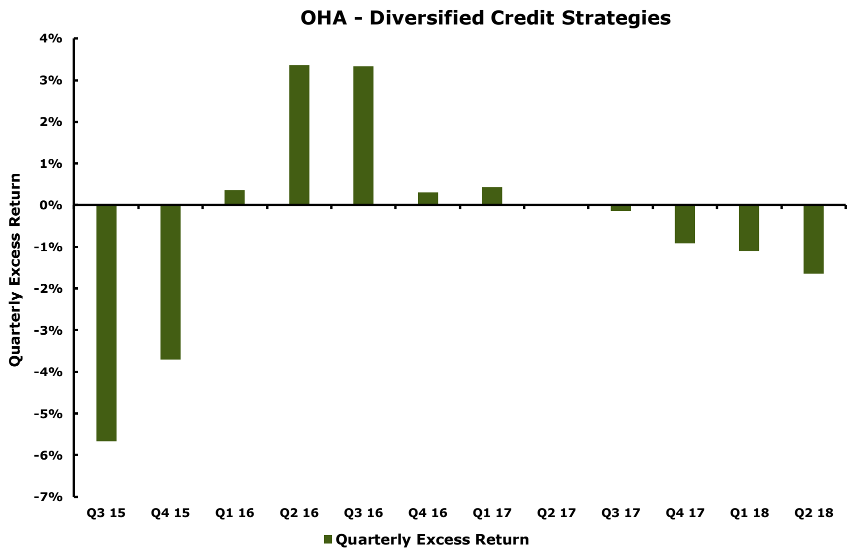
11 Oak Hill Advisors – Diversified Credit Strategies Fund

Oak Hill Advisors was appointed to manage a multi asset credit mandate with the aim of outperforming the 3 month Sterling LIBOR benchmark by 4% p.a. The manager has an annual management fee and performance fee.

11.1 Diversified Credit Strategies - Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (%)
OHA – Gross of fees	-0.3	1.3	5.2
Net of fees(1)	-0.5	0.6	4.6
Benchmark / Target	1.2	4.5	4.4
Net Performance relative to Benchmark	-1.6	-3.9	0.1

Source: Northern Trust. Relative performance may not tie due to rounding.



Over the quarter the Diversified Credit Strategies Fund returned -0.5% net of fees in absolute terms, underperforming its target by 1.6%. The Fund underperformed a blended benchmark of high yield and leveraged loans by 0.5% over the quarter to 30 June 2018.

Over the longer 12 months period to 30 June 2018, the Fund has returned 0.6% net of fees, underperforming its target by 3.9%. However, the Fund outperformed its blended benchmark over the year to 30 June 2018 by 0.4% on a net of fees basis. The fund's underperformance versus its cash +4% target over the quarter and year has largely been down to relatively poor performance in the High Yield and Loans space over this period, with Q1 18 being particularly poor for High Yield. OHA continue to outperform the broader markets, and are ahead of target over longer periods.

12 Partners Group – Direct Infrastructure

Partners Group was appointed to manage a global infrastructure mandate with the aim of outperforming the 3 month Sterling LIBOR benchmark by 8% p.a. The manager has an annual management fee and performance fee.

12.1 Direct Infrastructure - Investment Performance to 30 June 2018

Activity

The Fund continued to build up its portfolio over the quarter, which comprised eleven active investments as at 30 June 2018.

During the second quarter, the Fund added three new investments to its portfolio: Borssele III/IV, which reached financial close in June and received Partners Group's funding, Grassroots Renewable Energy Platform and Superior Pipeline Company.

Additionally, the Fund made an add-on commitment to Axia to further develop its French asset coverage.

The Fund's commitment level increased from 29.1% to 48.3% over the quarter to 30 June 2018.

Capital Calls and Distributions
18 June

- The Fund issued its 15th capital call, drawing down an additional c. 2.3% (€25m).
- Total drawn down following this call was c. 22.6%.

10 July

- The Fund issued its 16th capital call, drawing down an additional c. 7.9% (€85m).
- Total drawn down following this call was c. 28.4%.

Pipeline

Partners Group led a consortium in May to acquire Techem, which was sourced through its industry network and strategic relationships. The acquisition is expected to close in the third quarter and it is one of the largest infrastructure deals that Partners Group has ever transacted. The Techem acquisition is also the largest infrastructure transaction recorded sector-wide in the second quarter of 2018. Once closed, Partners Group Direct Infrastructure 2015 will commit approximately USD 280 million to Techem, which will elevate the Fund's commitment level to c. 60%.

Partners Group is also currently assessing an opportunity to acquire a large-scale under-construction wind farm in Australia.

Performance

Partners Group continues to deploy capital in a wide range of assets and the portfolio is developing according to expectations. Strong value drivers include Merkur Offshore (3.91x) and Japan Solar General Partner (3.06x), Fermaca LLC (1.41x) and Arcanum Infrastructure (1.29x) are also performing well.

Investments Held

The table below shows a list of the investments held by the Partners Group Direct Infrastructure Fund as at 30 June 2018.

Investment	Description	Type	Sector	Country	Commitment Date
Fermaca	Gas infrastructure operator based in Mexico.	Lead	Energy	Mexico	July 2015
Japan Solar General Partner	Solar platform based in Japan	Joint-lead	Solar Power	Japan	July 2015
Silicon Ranch	Solar platform based in US	Lead	Solar Power	USA	April 2016
Axia NetMedie	Internet and data network provider based in Canada and France	Lead	Communication	Canada & France	July 2016
Merkur Offshore	Wind farm based in German North Sea.	Lead	Wind Power	Germany	August 2016
Green Island Renewable Solar Platform	Solar power platform in Taiwan.	Lead	Solar Power	Taiwan	September 2016
High Capacity Metro Trains PPP	Delivery and maintenance of rolling stock for Australian State government.	Lead	Transportation	Australia	November 2016
Raven	Midstream clean energy processing facility in Texas.	Lead	Energy	USA	December 2016
Sapphire Wind Farm	Onshore windfarm in Australia.	Lead	Wind Power	Australia	December 2016
USIC	Utility location services	Lead	Utilities	USA	August 2017
Arcanum Infrastructure*	Develops and acquires infrastructure assets to supply strategic materials	Lead	Chemical Infrastructure	North America	tbc
Borssele III/IV*	Wind farm based in Netherlands	Lead	Wind Power	Netherlands	tbc

*Realised in Q2 2018.

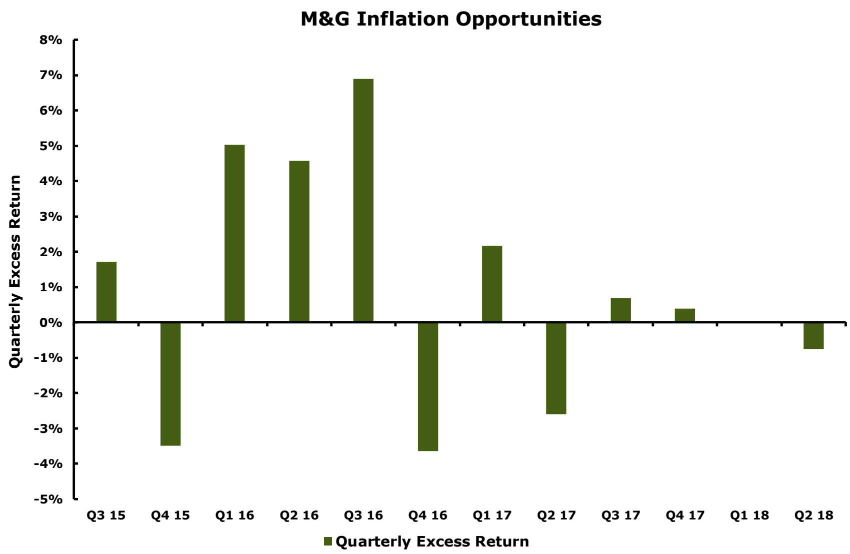
13 M&G – Inflation Opportunities

M&G was appointed to manage an inflation opportunities mandate with the aim of outperforming the RPI benchmark by 2.5% p.a. The manager has an annual management fee which is calculated based on the underlying assets

13.1 M&G Inflation Opportunities - Investment Performance to 30 June 2018

	Last Quarter (%)	One Year (%)	Two Years (%)
M&G Inflation Opportunities – Gross of fees	1.1	6.5	7.7
Net of fees(1)	1.0	6.2	7.4
Benchmark / Target	1.8	5.9	5.9
Net Performance relative to Benchmark	-0.7	0.3	1.5

Source: Northern Trust. Relative performance may not tie due to rounding.



Over the second quarter of 2018 the Fund returned 1.0% net of fees, underperforming the performance target by 0.7%. Over the longer 12 month period to 30 June 2018, the Fund has delivered a return of 6.2% net of fees, outperforming its target by 0.3%.

The Fund has again reduced its exposure to Index-linked gilts over the quarter but still the primary component of the portfolio at c. 35%, with long lease property remaining at c. 31%, income strips at c. 22% and ground rents exposure increasing slightly to c. 9%.

14 Aberdeen Standard Investments – Long Lease Property

Aberdeen Standard Investments was appointed to manage a long lease property mandate with the aim of outperforming the FT British Government All Stocks Index benchmark by 2.0% p.a. The manager has an annual management fee.

14.1 Long Lease Property - Investment Performance to 30 June 2018

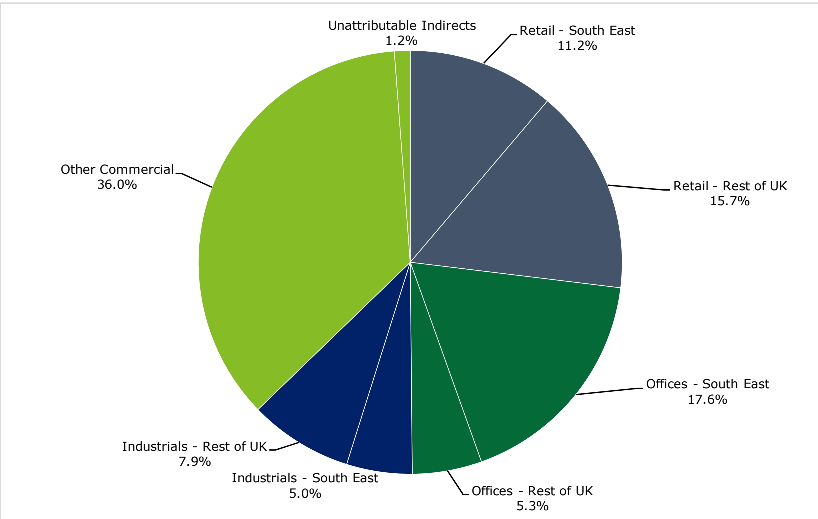
	Last Quarter (%)	One Year (%)	Two Years (% p.a.)	Three Years (% p.a.)
ASI Long Lease Property – Gross of fees	2.0	9.6	9.1	8.1
Net of fees[(1)]	1.9	9.1	8.6	7.5
Benchmark / Target	0.7	3.9	2.5	6.7
Net Performance relative to Benchmark	1.3	5.2	6.1	0.8

Source: Northern Trust. Relative performance may not tie due to rounding.

The ASI Long Lease Property Fund outperformed its FTSE Gilt All Stocks Index + 2% benchmark by 1.3%, returning 1.9% net of fees over the second quarter of 2018.

14.2 Portfolio Holdings

The sector allocation in the Long Lease Property Fund as at 30 June 2018 is shown in the graph below.



The Fund’s holdings in the office sector has decreased slightly from 24.1% as at 31 March 2018 to 22.9% as at 30 June 2018.

Throughout the quarter, the Fund’s industrial weight decreased from 13.4% to 12.9%, while the “other” weighting has increased from 34.3% to 37.2%.

The table below shows details of the top ten tenants in the Fund measured by percentage of net rental income:

Tenant	Total Rent £m p.a.	% Net Income
Tesco	8.2	8.8
Whitbread	6.4	6.9
Marston's	5.0	5.3
Sainsbury's	4.9	5.3
Asda	4.4	4.7
QVC	4.0	4.3
Salford University	3.9	4.2
Save The Children	3.8	4.0
Poundland	3.6	3.8
Glasgow City Council	3.5	3.7
Total	**47.8**	**51.0 ***

*Total may not equal sum of values due to rounding

The top 10 tenants contribute 51.0% of the total net income into the Fund. Supermarkets continue to make up a significant part of the fund with Tesco, Sainsbury's and Asda contributing 18.8% to the Fund's total net rental income as at 30 June 2018.

The Fund's average unexpired lease term decreased over the quarter from 26.7 years to 26.5 years.

The proportion of the Fund's income with fixed, CPI or RPI rental increases increased from 93.5% to 93.7% over the quarter.

14.3 Sales and Purchases

Over the second quarter of 2018:

- The Fund purchased the Legoland Hotel in Windsor for £36m, representing a yield of 3.4%. The hotel is let on a 29 year lease to Merlin which own Legoland. ASI was attracted by the strong occupancy levels.

- The Fund also entered into a forward purchase agreement for an industrial asset in Dartford for £21.5m representing a yield of 3.9%. The development is due for completion by the end of 2018 and a let has already been agreed on a 25 year lease with 5 yearly rent reviews linked to RPI.

Appendix 1 – Fund and Manager Benchmarks

The tables in this Appendix detail the benchmarks and outperformance targets, for the Total Fund and each individual manager.

Total Fund
Inception: 31 December 1999.

Manager	Asset Class	Allocation	Benchmark	Inception Date
Majedie	UK Equity	15.0%	FTSE All-Share Index +2% p.a. over three year rolling periods	31/08/05
LGIM	Global Equity	30.0%	FTSE All World Index	30/11/15
Ruffer	Dynamic Asset Allocation	10.0%	3 Month Sterling LIBOR +4% p.a.	31/07/08
Insight	Bonds Plus	10.0%	3 Month Sterling LIBOR +2% p.a.	30/09/15
Invesco	Private Equity	0.0%	n/a	30/09/09
Unigestion	Private Equity	0.0%	n/a	30/09/09
Partners Group	Multi Asset Credit	5.0%	3 Month Sterling LIBOR +4% p.a.	28/01/15
Oak Hill Advisors	Multi Asset Credit	7.5%	3 Month Sterling LIBOR +4% p.a.	01/05/15
Partners Group	Infrastructure Fund	5.0%	3 Month Sterling LIBOR +8% p.a.	31/08/2015
Aviva Investors	Infrastructure Income Fund	2.5%	FT British Government Index-Linked All Stocks Index +2.0%	23/05/2018
M&G	Inflation Opportunities	10.0%	RPI +2.5%	01/05/15
Aberdeen Standard Investments	Long Lease Property	5.0%	FT British Government All Stocks Index +2.0%	09/04/15
	Total	**100.0%**		

Note, for the benchmark performance calculation, we assume a 10% allocation to Partners Group MAC and Oak Hill Advisors MAC, and 0% allocation to Partners Group Infrastructure. This will be re-weighted as the Infrastructure Fund is drawn down.

Appendix 2 – Manager Ratings

Based on our manager research process, we assign ratings to the investment managers for specific products or services. The ratings are based on a combination of quantitative and qualitative factors, where the inputs for the qualitative factors come from a series of focused meetings with the investment managers. The ratings reflect our expectations of the future performance of the particular product or service, based on an assessment of:

- The manager's business management;
- The sources of ideas that go to form the portfolio ("alpha generation");
- The process for including the ideas into the portfolio ("alpha harnessing"); and
- How the performance is delivered to the clients.

On the basis of the research and analysis, managers are rated from 1 (most positive) to 4 (most negative), where managers rated 1 are considered most likely to deliver outperformance, net of fees, on a reasonably consistent basis. Managers rated 1 will typically form the basis of any manager selection short-lists.

Where there are developments with an investment manager that cause an element of uncertainty we will make the rating provisional for a short period of time, while we carry out further assessment of the situation.

Appendix 3 – Risk warnings & Disclosures

- Past performance is not necessarily a guide to the future.
- The value of investments may fall as well as rise and you may not get back the amount invested.
- Income from investments may fluctuate in value.
- Where charges are deducted from capital, the capital may be eroded or future growth constrained.
- Investors should be aware that changing investment strategy will incur some costs.
- Any recommendation in this report should not be viewed as a guarantee regarding the future performance of the products or strategy.

Our advice will be specific to your current circumstances and intentions and therefore will not be suitable for use at any other time, in different circumstances or to achieve other aims or for the use of others. Accordingly, you should only use the advice for the intended purpose.

Our advice must not be copied or recited to any other person than you and no other person is entitled to rely on our advice for any purpose. We do not owe or accept any responsibility, liability or duty towards any person other than you.

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Appendix 3: CASHFLOW MONITORING: April 18 to March 19

Pension Fund current account cashflow actuals and forecast for period April 2018 to March 2019

	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-18	Feb-18	Mar-18
	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s
	Actual	Actual	Actual	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast
Balance b/f	**4,360**	**2,068**	**5,738**	**6,599**	**5,649**	**4,699**	**4,339**	**3,389**	**2,439**	**2,079**	**1,129**	**179**
Contributions	2,028	7,853	3,318	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Pensions	-2,876	-2,899	-2,512	-2,800	-2,800	-2,800	-2,800	-2,800	-2,800	-2,800	-2,800	-2,800
Lump Sums	-1,094	-633	-497	-450	-450	-450	-450	-450	-450	-450	-450	-450
Net TVs in/(out)	-207	-556	19	500	500	500	500	500	500	500	500	500
Expenses	-143	-95	-57	-200	-200	-200	-200	-200	-200	-200	-200	-200
Net cash in/(out) in month	-2,292	3,670	271	-950	-950	-950	-950	-950	-950	-950	-950	-950
Net movements from invested cash (see overleaf)					115	1507	0	115	1508	0	115	1508
LCIV Distributions			590			590			590			590
Balance c/f	**2,068**	**5,738**	**6,599**	**5,649**	**4,699**	**4,339**	**3,389**	**2,439**	**2,079**	**1,129**	**179**	**-181**

Current account cashflow actuals compared to forecast in April to June 2018 quarter

	Apr-18		May-18		June-18		June Qtr 18
	Forecast	Actual	Forecast	Actual	Forecast	Actual	Variance
	£000	£000	£000	£000	£000	£000	£000
Contributions	9,900	2,028	2,000	7,853	2,000	3,318	701
Pensions	-2,800	-2,876	-2,800	-2,899	-2,800	-2,512	-113
Lump Sums	-450	-1,094	-450	-633	-450	-497	874
Net TVs in/(out)	500	-207	500	-556	500	19	2,244
Expenses	-200	-143	-200	-95	-200	-57	-305
Withdrawals from Fund Managers	950	0	950	0	950	0	2,850
LCIV Distributions	0	0	0	0	750	590	160
Totals	7,900	-2,292	0	3,670	750	861	6,411

<u>Notes on variances in quarter:</u>

- Net TVs In over the quarter were lower than forecast by £2.2m
- Lump Sums & Net Transfers exceed forecasts.
- Expense forecasts have been updated from March 2018 to reflect the current cash flows.
- Deficit recovery payments in May reduced the need for any manager drawdowns

Actuals and forecast of invested cash balance for period April 2018 to March 2019

	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-18	Feb-18	Mar-18
	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s	£000s
	Actual	Actual	Actual	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast	F'cast
Interest						9			10			10
Distributions												
Private Equity					115			115			115	
Multi Asset Credit						1,498			1,498			1,498
Infrastructure												
Aviva												
Drawdowns/Refunds paid to:												
Partners - Infrastructure												
Aviva - Infrastructure		-27,250	-1,750									
Paid to/from current account (see table above)		27,250	1,750									
Total	0	0	0	0	115	1,507	0	115	1,508	0	115	1,508

The forecast indicates that there should be sufficient cash available to fund pension payments and infrastructure drawdowns for the rest of 2018/19.

Appendix 4 - Pension Fund risk register, June 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
1	**STRATEGIC: INVESTMENT** That the combination of assets in the investment portfolio fails to fund the liabilities in the long term.	• Investment strategy in place and reviewed periodically. • Performance is measured against a liability based benchmark. • Fund performance is reviewed quarterly.	2	5		Low 10	Strategic Finance Director	Sep 2018
2	**STRATEGIC: INVESTMENT** Fund managers fail to achieve the returns agreed in their management agreements.	• Independent monitoring of fund manager performance by custodian against targets. • Investment adviser retained to keep watching brief. • Fund manager performance is reviewed quarterly.	3	4		Medium 12	Strategic Finance Director	Sep 2018
3	**STRATEGIC: INVESTMENT** Failure of custodian or counterparty.	• At time of appointment, ensure assets are separately registered and segregated by owner. • Review of internal control reports on an annual basis. • Credit rating kept under review.	2	5		Low 10	Strategic Finance Director	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	**Impact £'s**	**Impact No's**			
4	**STRATEGIC: FUNDING** The level of inflation and interest rates assumed in the valuation may be inaccurate leading to higher than expected liabilities.	• Review at each triennial valuation and challenge actuary as required. • Growth assets and inflation linked assets in the portfolio should rise as inflation rises.	3	4		Medium 12	Strategic Finance Director	Sep 2018
5	**STRATEGIC: FUNDING** There is insufficient cash available in the Fund to meet pension payments leading to investment assets being sold at sub-optimal prices to meet pension payments.	• Cashflow forecast maintained and monitored. • Cashflow position reported to sub-committee quarterly. • Cashflow requirement is a factor in current investment strategy review.	1	4		Low 4	Strategic Finance Director	Sep 2018
6	**STRATEGIC: FUNDING** Scheme members live longer than expected leading to higher than expected liabilities.	• Review at each triennial valuation and challenge actuary as required.	3	4		Medium 12	Strategic Finance Director	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score: Likelihood	Residual risk score: Impact £'s	Residual risk score: Impact No's	Risk Rating	Officer responsible	Next Review Date
7	**STRATEGIC: FUNDING** Scheme matures more quickly than expected due to public sector spending cuts, resulting in contributions reducing and pension payments increasing.	• Review maturity of scheme at each triennial valuation. • Deficit contributions specified as lump sums, rather than percentage of payroll to maintain monetary value of contributions. • Cashflow position monitored monthly.	2		4	Low 8	Strategic Finance Director	Sep 2018
8	**STRATEGIC: REGULATION** Pensions legislation or regulation changes resulting in an increase in the cost of the scheme or increased administration.	• Maintain links with central government and national bodies to keep abreast of national issues. • Respond to all consultations and lobby as appropriate to ensure consequences of changes to legislation are understood.	3	3		Low 9	Strategic Finance Director and Director of People Services	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
9	**STRATEGIC: REGULATION** Introduction of European Directive MiFID II results is a restriction of Fund's investment options and an increase in costs	• Officers are engaging with Fund Managers to understand the position better • Knowledge and Skills Policy in place for Officers and Members of the Committee • Maintain links with central government and national bodies to keep abreast of national issues.	3	5		Medium 15	Strategic Finance Director	Sep 2018
10	**OPERATIONAL: GOVERNANCE** Failure to comply with legislation leads to ultra vires actions resulting in financial loss and/or reputational damage.	• Officers maintain knowledge of legal framework for routine decisions. • Eversheds retained for consultation on non-routine matters.	2	4		Low 8	Strategic Finance Director	Sep 2018
11	**OPERATIONAL: GOVERNANCE** Committee members do not have appropriate skills or knowledge to discharge their responsibility leading to inappropriate decisions.	• External professional advice is sought where required • Knowledge and skills policy in place (subject to Committee Approval)	3	3		Low 9	Strategic Finance Director	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	I Impact No's			
12	**OPERATIONAL: GOVERNANCE** Officers do not have appropriate skills and knowledge to perform their roles resulting in the service not being provided in line with best practice and legal requirements. Succession planning is not in place leading to reduction of knowledge when an officer leaves.	• Person specifications are used at recruitment to appoint officers with relevant skills and experience. • Training plans are in place for all officers as part of the performance appraisal arrangements. • Shared service nature of the pensions team provides resilience and sharing of knowledge.	3	3		Low 9	Strategic Finance Director and Director of People Services	Sep 2018
13	**OPERATIONAL: GOVERNANCE** Inadequate, inappropriate or incomplete investment or actuarial advice is actioned leading to a financial loss or breach of legislation.	• At time of appointment ensure advisers have appropriate professional qualifications and quality assurance procedures in place. • Committee and officers scrutinise and challenge advice provided.	2	4		Low 8	Strategic Finance Director	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
14	**OPERATIONAL: GOVERNANCE** London CIV has inadequate resources to monitor the implementation of investment strategy and as a consequence are unable to address underachieving fund managers.	• Pension Fund Committee Chair is a member of the Joint member Committee responsible for the oversight of the CIV and can monitor and challenge the level of resources through that forum. • Tri-Borough Strategic Finance Director is a member of the officer Investment Advisory Committee which gives the Fund influence over the work of the London CIV.	2	4		Low 8	Strategic Finance Director	Sep 2018
15	**OPERATIONAL: FUNDING** Failure of an admitted or scheduled body leads to unpaid liabilities being left in the Fund to be met by others.	• Transferee admission bodies required to have bonds in place at time of signing the admission agreement. • Regular monitoring of employers and follow up of expiring bonds.	3	4		Medium 12	Strategic Finance Director and Director of People Services	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	I Impact No's			
16	**OPERATIONAL: FUNDING** Ill health costs may exceed "budget" allocations made by the actuary resulting in higher than expected liabilities particularly for smaller employers.	• Review "budgets" at each triennial valuation and challenge actuary as required. • Charge capital cost of ill health retirements to admitted bodies at the time of occurring. • Occupational health services provided by the Council and other large employers to address potential ill health issues early.	2	2		Low 4	Strategic Finance Director and Director of People Services	Sep 2018
17	**OPERATIONAL: FUNDING** Transfers out increase significantly as members transfer to DC funds to access cash through new pension freedoms.	• Monitor numbers and values of transfers out being processed. • If required, commission transfer value report from Fund Actuary for application to Treasury for reduction in transfer values.	2	1		Low 2	Strategic Finance Director and Director of People Services	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
18	**OPERATIONAL: ADMINISTRATION** Loss of funds through fraud or misappropriation leading to negative impact on reputation of the Fund as well as financial loss.	• Third parties regulated by the FCA and separation of duties and independent reconciliation procedures in place. • Review of third party internal control reports. • Regular reconciliations of pension payments undertaken by Pensions Finance Team. • Periodic internal audits of Pensions Finance and HR teams.	2	4		Low 8	Strategic Finance Director and Director of People Services	Sep 2018
19	**OPERATIONAL: ADMINISTRATION** Failure of fund manager or other service provider without notice resulting in a period of time without the service being provided or an alternative needing to be quickly identified and put in place.	• Contract monitoring in place with all providers. • Procurement team send alerts whenever credit scoring for any provider changes for follow up action.	2	5		Low 10	Strategic Finance Director and Director of People Services	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
20	**OPERATIONAL: ADMINISTRATION** Failure of financial system leading to lump sum payments to scheme members and supplier payments not being made and Fund accounting not being possible.	• Contract in place with BT to provide service enabling smooth processing of supplier payments • Process in place for Surrey CC to generate lump sum payments to members as they are due. • Officers undertaking additional testing and reconciliation work to verify accounting transactions	2		5	Low 10	Strategic Finance Director	Sep 2018
21	**OPERATIONAL: ADMINISTRATION** Failure of pension payroll system resulting in pensioners not being paid in a timely manner.	• In the event of a pension payroll failure we would consider submitting the previous months BACS file to pay pensioners a second time if a file could not be recovered by the pension administrators and our software suppliers.	1		5	Low 5	Director of People Services	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
22	**OPERATIONAL: ADMINISTRATION** Failure to pay pension benefits accurately leading to under or over payments.	• There are occasional circumstances where under or over payments are identified. Where under payments occur arrears are paid as soon as possible usually in the next monthly pension payment. Where an overpayment occurs, the member is contacted and the pension corrected in the next month. Repayment is requested and sometimes we collect this over a number of months.	2		3	Low 6	Director of People Services	Sep 2018
23	**OPERATIONAL: ADMINISTRATION** Failure of pension administration system resulting in loss of records and incorrect pension benefits being paid or delays to payment.	• Pension administration records are stored on the surrey servers they have a disaster recovery system in place and records should be restored within 24 hours of any issue, files are backed up daily.	1		5	Low 5	Director of People Services	Sep 2018

Ref	Risk	Mitigating Actions	Residual risk score			Risk Rating	Officer responsible	Next Review Date
			Likelihood	Impact £'s	Impact No's			
24	**OPERATIONAL: ADMINISTRATION** Administrators do not have sufficient staff or skills to manage the service leading to poor performance and complaints.	• Surrey CC administers pensions for Surrey, East Sussex and is taking on our Tri-Borough partners. They have a number of very experienced administrators two of whom tuped to them from LPFA with our contract. Where issues arise the Pensions Liaison Officer reviews directly with the Pensions Manager at Surrey. More detailed performance reports are being developed.	3		3	Low 9	Director of People Services	Sep 2018
25	**Operational: Administration** BT unable to provide monthly or end of year interface files in a format suitable for Surrey CC to update service records and undertake day to day operations. Inaccuracies in service records held on the pensions administration system may impact on the triennial funding valuation at March 2016 and notifications to starters and leavers.	• Issue has been escalated by the Chief Executive for high level resolution with BT • Test files are currently with SCC • Actuary undertakes data cleansing on the service records and is confident this will mitigate the inaccuracies in service records	1		5	Low 5	Director of People Services	Sep 2018

Appendix 5: Pension Fund Voting Summary: January to March 2018

The investment managers managing the Fund's assets on a segregated basis are able to report on how they have voted the Fund's specific holdings at AGMs and EGMs of companies the Fund is invested in.

LCIV Majedie voting information is as follows:

VOTING	
No. of companies	120
No. of meetings	121
No. of resolutions	1,933

LCIV Ruffer voting information is as follows:

VOTING	
No. of companies	30
No. of meetings	48
No. of resolutions	727

LGIM, who manage the global passive equity portfolio on behalf of the Fund, undertake extensive engagement with the companies they are invested in as well as voting. Below is a summary of the meetings they voted at during the April to June 2018 quarter.

VOTING	
No. of companies	2,137
No. of meetings	2,301
No. of resolutions	30,382

Appendix 6

Forward Plan for Pensions Sub-Committee – June 2018

Area of work	Sep 2018	Nov 2018	Mar 2019	Jun 2019
Governance	Quarterly Update Pack	Quarterly Update Pack Pension Board minutes	Quarterly Update Pack Pension Board minutes	Quarterly Update Pack Pension Board minutes Business Plan Internal Audit Report
Investments	Funding Manager Review (quarterly update) Equity Investment Strategy Review	Fund Manager monitoring Fixed income strategy Review	Fund Manager monitoring	Fund Manager monitoring Annual report to Scheme Advisory Board re pooling arrangements
Funding	Funding Update (quarterly update)			

London Borough of Hammersmith & Fulham PENSIONS SUB-COMMITTEE 04 September 2018	
CARBON EXPOSURE AND EQUITY STRATEGY	
Report of the Strategic Finance Director	
Open Report	
Classification - For Decision **Key Decision: No**	
Wards Affected: None	
Accountable Director: Philip Triggs, Director of Pensions and Treasury	
Report Author: Matt Hopson, Strategic Investment Manager	**Contact Details:** Tel: 0207 641 4126 E-mail: mhopson@westminster.gov.uk

1. EXECUTIVE SUMMARY

1.1 This paper updates the Pensions Sub-Committee Members on:

a. The carbon footprint of the Pensions Fund's equity portfolio.
b. A possible alternative index option for the Fund's passive equity holdings.

2. RECOMMENDATIONS

2.1 The Pensions Sub-Committee is requested to approve:

a. The sale of the equity assets remaining in the residual Majedie Focus and Tortoise Funds and consolidation into the LGIM mandate.

b. The transfer of choice of index to track in the global passive equity portfolio to the MSCI World Low Carbon Target Index.

3 BACKGROUND

3.1 The current equity allocation is 45% for the Fund, with which the Sub-Committee can be comfortable as it does not leave the Fund over-exposed to equity market risk.

3.2 The significant equity risk to the Fund is the relatively large allocation to UK Equities, since the Fund has 16% of its assets in UK Equities which makes up only 6% of equities globally, thus concentrating assets relative to the world markets in one country. Given the current uncertainty around the UK's exit from the European Union (EU), the Sub-Committee may wish give consideration to reducing some exposure in this area.

3.3 At the 23 July 2018 Sub-Committee meeting, a decision was taken to commit to selling the residual Majedie tortoise and focus funds. The sale of the assets was to commence after the Sub-Committee had agreed the direction of travel for its passive equity portfolio.

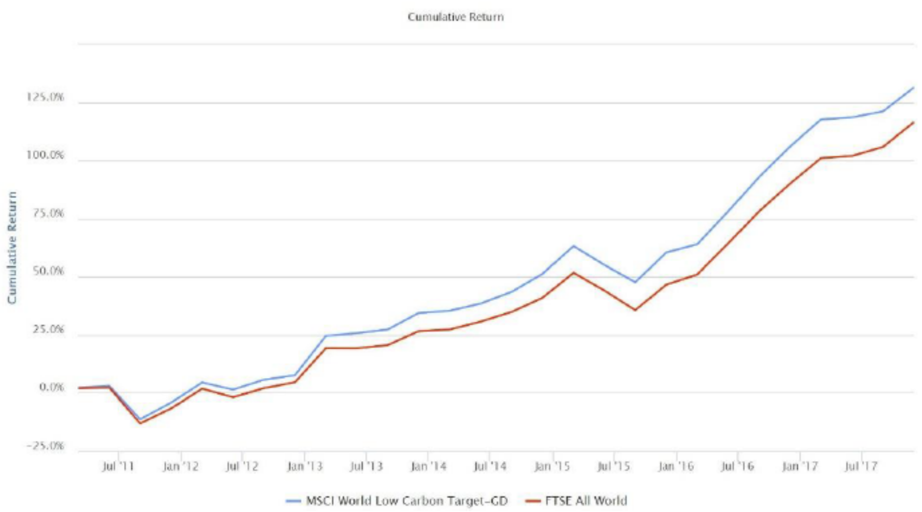
3.4 The Sub-Committee asked that an analysis be undertaken for the Fund's current equity holdings to assess the levels of carbon exposure.

4 LOW CARBON OPTIONS

4.1 The current exposure of the each of the Fund's portfolios to carbon can be seen in the attached appendices in detail.

4.2 The headline numbers show that the MSCI World Low Carbon Target Index contains, in absolute terms, 43 million tonnes of CO_2 (equivalent) less than the MSCI World Index at 28 million compared with 71 million.

4.3 As per the report taken to the Sub-Committee on 23 July 2018 and the graph below, the MSCI World Low Carbon Target Index has outperformed the MSCI World Index over a seven-year period.



4.4 The Sub-Committee was reminded of its fiduciary duties at the 23 July 2018 meeting:

If decisions on carbon reduction are taken by the Sub-Committee, those decisions must be based on the likely positive investment outcome pertaining to the Pension Fund, and be not be based on any ethical approach or ideological attitude adopted either by the Sub-Committee or the local authority itself.

4.5 By the fact that the MSCI World Low Carbon Target Index has outperformed the MSCI World Index over a seven-year cycle, it presents a compelling case for moving the portfolio to this index as part of an investment decision to secure better returns from the portfolio.

4.6 This investment based decision would also mitigate some of the investment risk surrounding fossil fuel companies connected with the fears of “stranded assets” that were discussed at the 23 July 2018 Sub-Committee meeting.

5 CONSULTATION

5.1 Not applicable

6 EQUALITY IMPLICATIONS

6.1 Not applicable

7 LEGAL IMPLICATIONS

7.1 None

8 FINANCE AND RESOURCES IMPLICATIONS

8.1 None

9 IMPLICATIONS FOR BUSINESS

9.1 Not applicable

10 RISK MANAGEMENT

10.1 None

11 PROCUREMENT IMPLICATIONS

11.1 None

12 IT STRATEGY IMPLICATIONS

12.1 None

LIST OF BACKGROUND PAPERS USED IN PREPARING THIS REPORT

No.	Description of Background Papers	Name/Ext of holder of file/copy	Department/ Location
1.			

LIST OF APPENDICES:

Appendix 1: Equity Review
Appendix 2: Equity Portfolio Carbon Exposure
Appendix 3: LGIM Carbon Exposure
Appendix 4: Majedie Carbon Exposure
Appendix 5: LGIM Low Carbon Carbon Exposure

Trucost Portfolio Analytics

LBHF: Carbon Footprint: 2018

Aggregate - Majedie+LGIM vs LGIM - Benchmark

August 21, 2018

S&P Dow Jones Indices
ESG Analysis

About Trucost

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.

About S&P Dow Jones Indices

S&P Dow Jones Indices is the largest global resource for essential index-based concepts, data and research, and home to iconic financial market indicators, such as the S&P 500 ® and the Dow Jones Industrial Average ®. More assets are invested in products based on our indices than products based on indices from any other provider in the world. Since Charles Dow invented the first index in 1884, S&P DJI has been innovating and developing indices across the spectrum of asset classes helping to define the way investors measure and trade the markets.

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Table of Contents

Benefits of Trucost Portfolio Analysis

It is well-documented that overuse of environmental resources and emission of pollutant gases is not only unsustainable for the planet but could also have widespread economic and social consequences. As governments, capital markets and consumers start to challenge the status quo, those companies that use resources less efficiently than peers, or are more carbon intensive, could lose their market share, licences to operate and ability to source from suppliers. This has possible operational and financial implications for revenues, profit, cost of capital and valuations.

Trucost's portfolio analysis provides investors with essential intelligence to appraise large numbers of holdings or investments for potential exposure to carbon and other environmental impacts, regardless of asset class, geography or investment style. This report provides an invaluable tool for investors to understand:

- Exposure to rising carbon costs
- Carbon performance of holdings within a sector
- Materiality of different environmental impacts
- Engagement opportunities
- Exposure to possible stranded assets
- The baseline against which to measure improvement over time

Summary of Coverage

Portfolio: Aggregate - Majedie+LGIM

Benchmark: LGIM - Benchmark

Analysis Date: August 21, 2018

Holdings Date: June 30, 2018

Asset Classes: Equity

Apportioning Factor: Market capitalization

Largest Contributor Level: Companies

	VoH Covered GBPm	Coverage Rate (% of Starting VOH)	Number of Instruments Analysed	Number of Companies Analysed
Portfolio	438.526	97.09	1641/1652	1576
Benchmark	438.526	99.73	1559/1569	1538

Summary of Results

		Unit	Portfolio	Benchmark	Relative Efficiency
Carbon	Carbon to Revenue	tCO2e/mGBP	364.29	435.93	16%
	Carbon to Value Invested	tCO2e/mGBP	262.39	220.45	-19%
	Weighted Average Carbon Intensity	tCO2e/mGBP	381.92	381.31	-0%
	Absolute CO2e	tonnes	115,066	96,673	-19%

Carbon

Introduction

Carbon exposure analysis offers a systematic assessment of the carbon risks and opportunities within a portfolio or index at a point in time. The analysis quantifies greenhouse gas emissions (GHG) embedded within a portfolio presenting these as tonnes of carbon dioxide equivalents (tCO2e). Comparing the total GHG emissions of each holding relative to either revenues generated or capital invested, gives a measure of carbon exposure that enables comparison between companies, irrespective of size or geography.

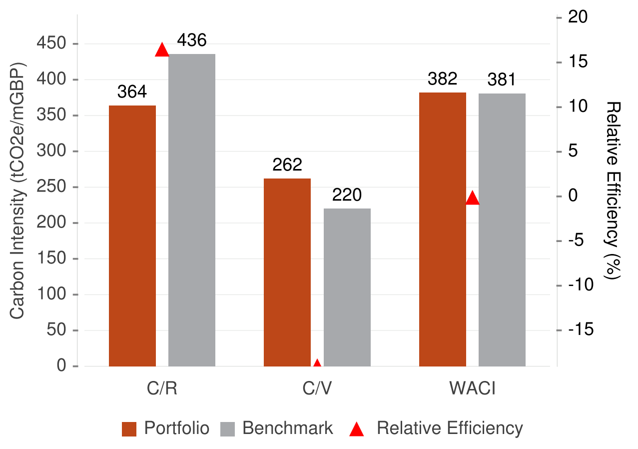
The **Total Carbon Emissions, Carbon to Value Invested (C/V), Carbon to Revenue (C/R),** and **Weighted Average Carbon Intensity (WACI)** are all presented below. For more information on methodological approaches please refer to Appendix 2 and 3.

The scope used in this analysis was Direct Emissions, First Tier Indirect Emissions. For more information on scopes please refer to Appendix 1.

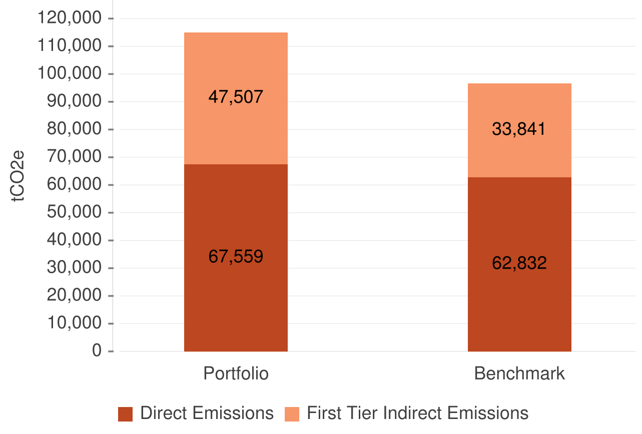
The disclosure rate is measured against the value of holdings (VOH), the share of apportioned GHGs, and number of companies. For details, please refer to Carbon Appendix 4.

Key Findings

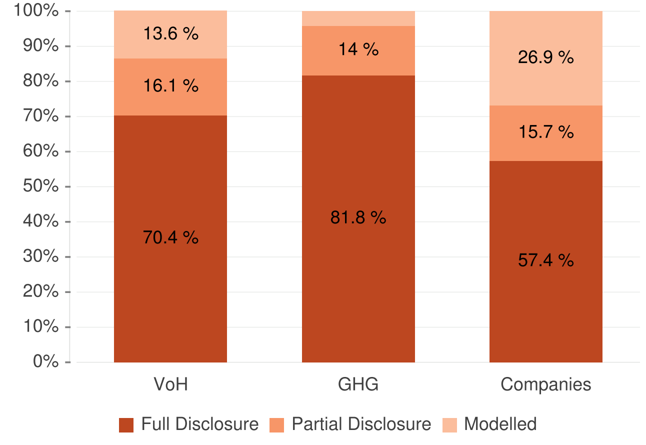
Carbon Intensity by Method



Carbon Apportioned by Scope



Portfolio Disclosure



Carbon

Attribution Analysis - Carbon to Revenue

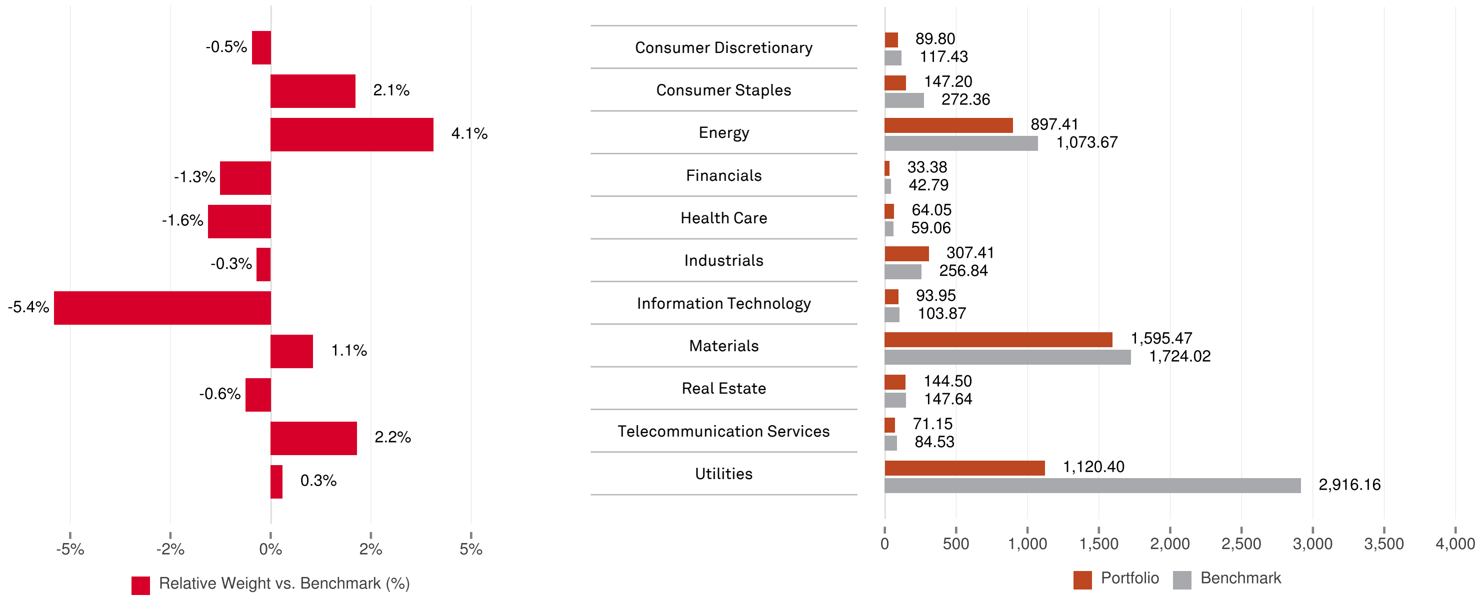
	Carbon to Revenue (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	89.80	117.43	-1.45%	0.86%	-0.59%
Consumer Staples	147.20	272.36	3.33%	5.64%	8.97%
Energy	897.41	1,073.67	-4.93%	5.04%	0.11%
Financials	33.38	42.79	-4.10%	0.31%	-3.78%
Health Care	64.05	59.06	-3.13%	-0.06%	-3.19%
Industrials	307.41	256.84	-0.39%	-1.33%	-1.72%
Information Technology	93.95	103.87	-3.21%	0.11%	-3.09%
Materials	1,595.47	1,724.02	2.76%	1.42%	4.18%
Real Estate	144.50	147.64	-0.37%	+0.00%	-0.36%
Telecommunication Services	71.15	84.53	1.45%	0.17%	1.62%
Utilities	1,120.40	2,916.16	-15.72%	30.01%	14.29%
	364.29	435.93	-25.76%	42.19%	16.43%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

Relative Sector Weight plus Sector Efficiency



Carbon

Largest Contributors - Carbon to Revenue

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/R Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
BP	13.167	Energy	10.38	780.25	34/92	-5.82	Full Disclosure
Royal Dutch Shell PLC	14.047	Energy	8.37	884.40	42/92	-5.10	Full Disclosure
Mondi PLC	1.698	Materials	2.95	3,619.08	103/120	-2.66	Full Disclosure
Exxon Mobil Corp	2.467	Energy	1.64	1,242.96	61/92	-1.17	Full Disclosure
Lonmin	0.131	Materials	1.51	1,585.01	N/A	-1.16	Full Disclosure
Ryanair Holdings Plc	2.729	Industrials	1.39	1,790.02	N/A	-1.11	Partial Disclosure
RWE AG	0.086	Utilities	1.15	4,242.65	52/75	-1.05	Full Disclosure
FirstGroup Plc	1.206	Industrials	2.94	549.53	N/A	-1.01	Full Disclosure
American Electric Power	0.242	Utilities	0.97	9,597.63	74/75	-0.93	Full Disclosure
Anglo American Plc	1.816	Materials	1.30	1,248.57	71/120	-0.92	Full Disclosure

Largest Modelled Contributors - Carbon to Revenue

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
Berkshire Hathaway	2.550	Financials	0.61	594.06	271/273	-0.24	Modelled
Valero Energy Corp	0.333	Energy	0.37	849.15	39/92	-0.21	Modelled
Fortis Inc	0.094	Utilities	0.16	5,079.85	58/75	-0.14	Modelled
Ensco plc	1.129	Energy	0.49	509.33	N/A	-0.14	Modelled
Taiwan Cement Corp	0.034	Materials	0.14	10,815.02	118/120	-0.13	Modelled
Anhui Conch Cement Co Ltd	0.047	Materials	0.13	11,373.11	119/120	-0.12	Modelled
Formosa Chem & Fibre Co	0.094	Materials	0.12	3,498.81	101/120	-0.11	Modelled
Coal India Ltd	0.033	Energy	0.08	4,603.50	90/92	-0.07	Modelled
Nucor Corp	0.140	Materials	0.10	1,134.18	67/120	-0.07	Modelled
Mitsui & Co	0.201	Industrials	0.14	648.91	196/217	-0.06	Modelled

Carbon

Attribution Analysis - Carbon to Value Invested

	Carbon to Value (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	73.55	74.45	-0.31%	0.05%	-0.26%
Consumer Staples	200.54	179.54	0.39%	-0.99%	-0.60%
Energy	736.73	718.20	-9.17%	-0.92%	-10.09%
Financials	21.28	23.34	-1.13%	0.15%	-0.97%
Health Care	24.99	23.66	-1.39%	-0.06%	-1.45%
Industrials	258.77	158.91	-0.10%	-4.43%	-4.52%
Information Technology	22.53	23.74	-4.82%	0.08%	-4.74%
Materials	933.30	1,026.91	-3.85%	2.52%	-1.33%
Real Estate	27.58	30.35	-0.54%	0.03%	-0.52%
Telecommunication Services	57.64	57.63	1.59%	-0.00%	1.59%
Utilities	1,858.25	2,323.89	-2.81%	6.68%	3.87%
	262.39	220.45	-22.15%	3.12%	-19.03%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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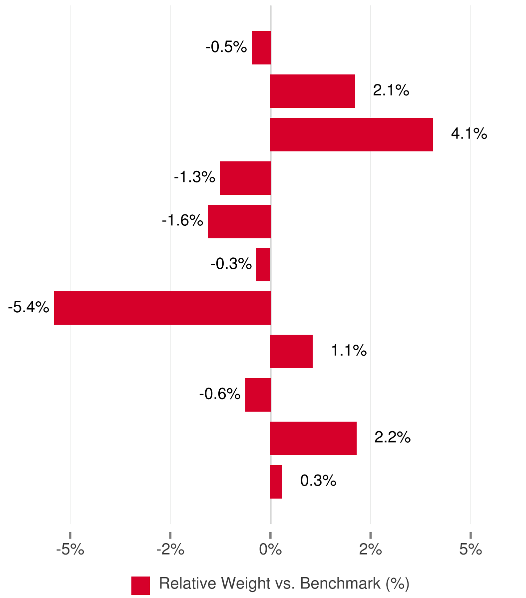
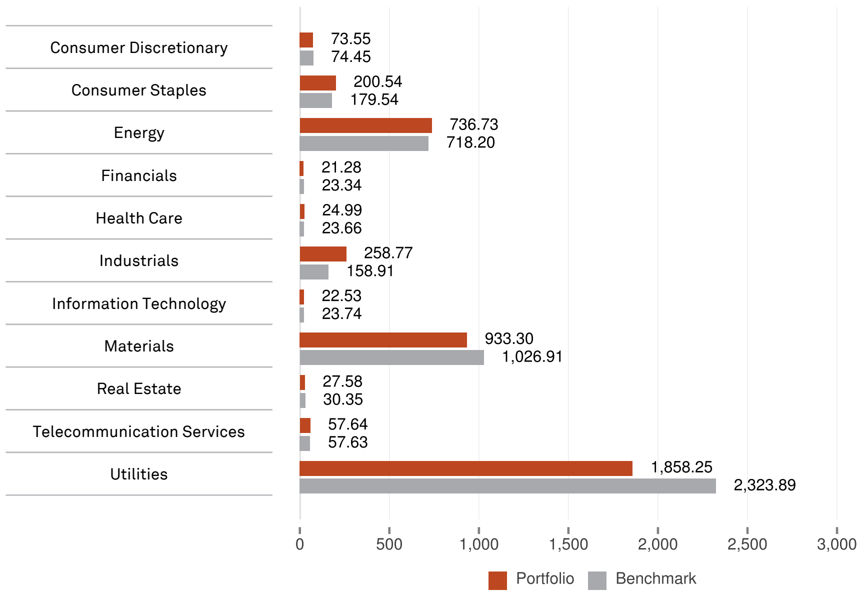
Relative Sector Weight plus Sector Footprint





Carbon

Largest Contributors - Carbon to Value Invested

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/V Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
BP	13.167	Energy	10.38	907.37	56/92	-7.61	Full Disclosure
Royal Dutch Shell PLC	14.047	Energy	8.37	685.24	55/92	-5.33	Full Disclosure
Centrica	5.453	Utilities	5.31	1,121.33	30/75	-4.12	Full Disclosure
FirstGroup Plc	1.206	Industrials	2.94	2,809.92	N/A	-2.68	Full Disclosure
Mondi PLC	1.698	Materials	2.95	2,002.17	101/120	-2.58	Full Disclosure
Lonmin	0.131	Materials	1.51	13,178.07	N/A	-1.48	Full Disclosure
RWE AG	0.086	Utilities	1.15	15,333.95	72/75	-1.13	Full Disclosure
Exxon Mobil Corp	2.467	Energy	1.64	765.75	51/92	-1.09	Full Disclosure
Gazprom PJSC	0.164	Energy	1.00	7,061.59	90/92	-0.97	Full Disclosure
LafargeHolcim Ltd	0.136	Materials	0.95	8,036.14	118/120	-0.92	Full Disclosure

Largest Modelled Contributors - Carbon to Value Invested

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
Valero Energy Corp	0.333	Energy	0.37	1,289.77	64/92	-0.30	Modelled
Ensco plc	1.129	Energy	0.49	494.64	N/A	-0.23	Modelled
Fortis Inc	0.094	Utilities	0.16	1,902.79	38/75	-0.13	Modelled
Taiwan Cement Corp	0.034	Materials	0.14	4,678.87	110/120	-0.13	Modelled
Anhui Conch Cement Co Ltd	0.047	Materials	0.13	3,127.10	119/120	-0.12	Modelled
Formosa Chem & Fibre Co	0.094	Materials	0.12	1,488.55	98/120	-0.10	Modelled
Mitsui & Co	0.201	Industrials	0.14	785.95	201/217	-0.09	Modelled
Coal India Ltd	0.033	Energy	0.08	2,733.17	89/92	-0.07	Modelled
Nucor Corp	0.140	Materials	0.10	847.64	70/120	-0.07	Modelled
Bharat Petroleum Corp Ltd	0.037	Energy	0.06	1,814.65	84/92	-0.05	Modelled

Carbon

Attribution Analysis - Weighted Average Carbon Intensity

	WACI (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	99.44	117.34	-0.33%	0.56%	0.24%
Consumer Staples	237.22	299.32	0.45%	1.69%	2.15%
Energy	980.36	1,206.79	-8.79%	6.49%	-2.30%
Financials	41.27	47.26	-1.10%	0.26%	-0.85%
Health Care	82.05	81.06	-1.23%	-0.02%	-1.25%
Industrials	355.50	281.03	-0.09%	-1.91%	-2.00%
Information Technology	78.62	83.42	-4.22%	0.19%	-4.04%
Materials	1,544.82	1,635.51	-3.46%	1.41%	-2.05%
Real Estate	141.37	148.41	-0.38%	0.04%	-0.35%
Telecommunication Services	72.20	85.18	1.67%	0.17%	1.84%
Utilities	2,490.96	3,830.50	-2.66%	11.11%	8.45%
	381.92	381.31	-20.15%	19.99%	-0.16%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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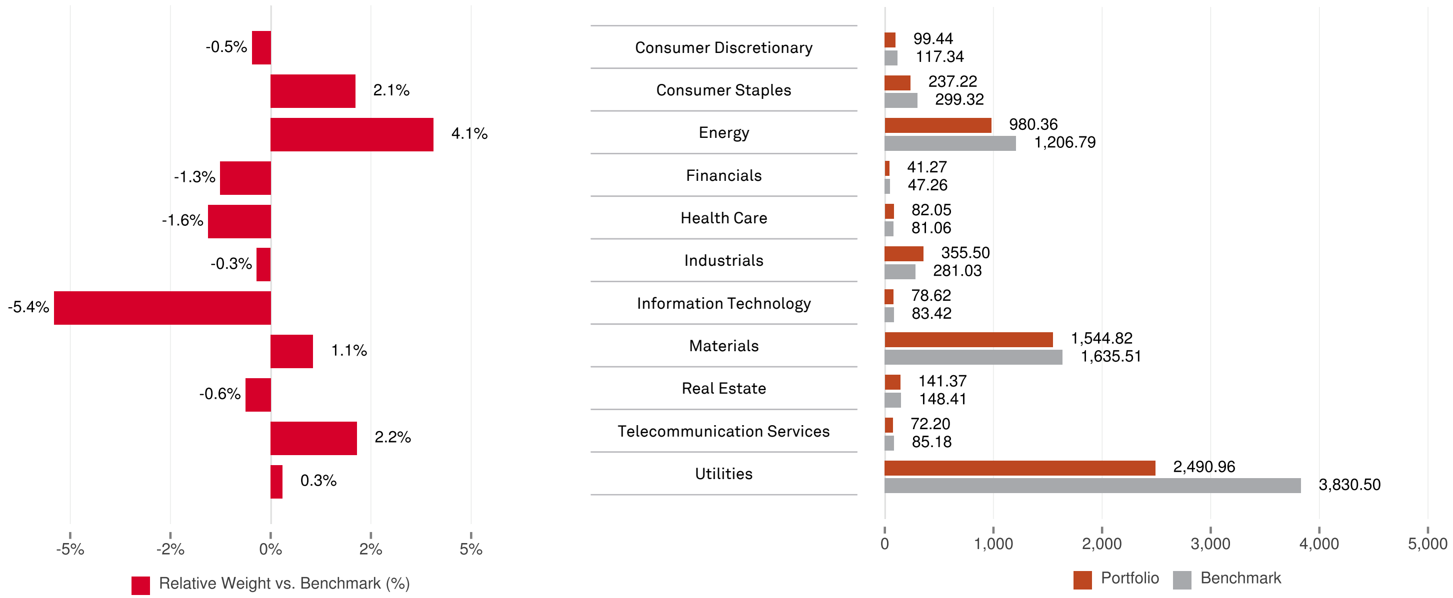
Relative Sector Weight plus Sector Intensity



Carbon

Largest Contributors - Weighted Average Carbon Intensity

The largest contributors to the portfolio's carbon intensity are shown below. The 'WACI Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Royal Dutch Shell PLC	14.047	Energy	8.37	884.40	42/92	-7.42	Full Disclosure
BP	13.167	Energy	10.38	780.25	34/92	-6.13	Full Disclosure
Mondi PLC	1.698	Materials	2.95	3,619.08	103/120	-3.67	Full Disclosure
Ryanair Holdings Plc	2.729	Industrials	1.39	1,790.02	N/A	-2.92	Partial Disclosure
Power Assets Holdings Ltd	0.065	Utilities	0.04	69,382.27	75/75	-2.68	Partial Disclosure
Exxon Mobil Corp	2.467	Energy	1.64	1,242.96	61/92	-1.83	Full Disclosure
KAZ Minerals Plc	0.929	Materials	0.31	2,660.06	N/A	-1.47	Full Disclosure
Duke Energy Corp	0.395	Utilities	0.87	6,198.64	61/75	-1.46	Full Disclosure
Southern Co	0.334	Utilities	0.87	7,202.57	69/75	-1.44	Full Disclosure
American Electric Power	0.242	Utilities	0.97	9,597.63	74/75	-1.39	Full Disclosure

Largest Modelled Contributors - Weighted Average Carbon Intensity

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Berkshire Hathaway	2.550	Financials	0.61	594.06	271/273	-0.90	Modelled
Ensco plc	1.129	Energy	0.49	509.33	N/A	-0.34	Modelled
Anhui Conch Cement Co Ltd	0.047	Materials	0.13	11,373.11	119/120	-0.32	Modelled
Fortis Inc	0.094	Utilities	0.16	5,079.85	58/75	-0.29	Modelled
Amazon.com Inc	4.872	Consumer Discretionary	0.06	90.66	104/217	-0.26	Modelled
Taiwan Cement Corp	0.034	Materials	0.14	10,815.02	118/120	-0.22	Modelled
Formosa Chem & Fibre Co	0.094	Materials	0.12	3,498.81	101/120	-0.20	Modelled
Valero Energy Corp	0.333	Energy	0.37	849.15	39/92	-0.17	Modelled
Martin Marietta Materials	0.099	Materials	0.04	1,843.20	84/120	-0.11	Modelled
Nucor Corp	0.140	Materials	0.10	1,134.18	67/120	-0.09	Modelled

APPENDIX

1. Scopes

Before beginning a carbon or environmental audit, an investor must decide on what scopes to include in their analysis. Some believe that only operational impacts/emissions should be considered when calculating a company's exposure, i.e. the resources/pollutants owned or controlled by the reporting entity. This casts the net around impacts that the investee (and, to a lesser extent, the investor) has a direct sphere of influence over. It also avoids the possibility of double counting. However, as risks may be passed on through the supply chain in the form of higher prices, it may sometimes be more pragmatic to include emissions originating from suppliers.

CARBON: Trucost collects greenhouse gas data covering Scopes 1, 2 and 3 upstream emissions, as well as additional data relating to non-Kyoto Protocol greenhouse gases. Definitions of the available scopes are shown below:

- **Scope 1** = CO_2e emissions based on the Kyoto Protocol greenhouse gases generated by direct company operations.
- **Scope 2** = CO_2e emissions generated by purchased electricity, heat or steam.
- **Scope 3** (upstream) = CO_2e emissions generated by a company's non-electricity supply chain.
- **Direct** = Scope 1 plus CO_2e emissions from four additional sources, CCl_4, $C_2H_3Cl_3$, $CBrF_3$, and CO_2 from Biomass.
- **First Tier Indirect** = Scope 2 plus emissions from direct (or "Tier 1") upstream Scope 3 emissions.
- **Remaining Indirect** = Scope 2 plus upstream Scope 3.

ENVIRONMENT: As with carbon analysis, the scopes available for an environmental audit are Direct, First Tier Indirect, and Remaining Indirect impacts. Direct impacts result from a company's own operations and include emissions from fuel combustion (boilers and company owned vehicles), pollution from water abstracted, natural resource use, and waste generated from industrial production. Indirect impacts from supply chains occur because of the goods or services a company procures. Indirect impacts are broken down between those in the first tier of the supply chain and those in the remaining tiers.

2. Apportioning

Many of the exposure metrics calculated by Trucost rely on the apportioning of company owned resources/pollutants to the portfolio or benchmark. Apportioning, as an approach, is built on the principle of ownership. That is, if an investor owns - or in the case of debt holdings, finances - 1% of a company, then they also 'own' 1% of the company's resources/pollutants.

For equity only portfolios the apportioning factor is usually obtained by dividing the value of holding by the company's market capitalisation on the date of analysis. For debt only, or mixed portfolios, enterprise value usually replaces market capitalization as the denominator. The company level resources/pollutants are then multiplied by the apportioning factor to arrive at resource/pollutant quantities specific to each holding. The portfolio level resources/pollutants is the sum of all of these quantities.

APPENDIX

3. Carbon & Environmental Footprint/Efficiency/Intensity Calculation

Portfolios with larger assets under management will typically have a higher amount of total apportioned resources/pollutants than smaller portfolios because of their size. As most portfolios have a remit to grow assets under management, it is important to normalise these absolute quantities to allow for fair comparison year on year against other portfolios or benchmarks. The three most common approaches to normalizing emissions/impacts are:

1. Dividing the apportioned emissions/impacts by the amount invested.
2. Dividing the apportioned emissions/impacts by the apportioned annual revenues.
3. Summing the product of each holdingâs weight in the portfolio with the company level carbon/environmental revenue intensity.

For ease of reference, Trucost has defined these as the **Footprint**, the **Efficiency**, and the **Intensity** respectively.

The first gives an indication of carbon or environmental 'efficiency' with respect to shareholder value creation. The second gives an indication of 'efficiency' with respect to output (as revenues are closely linked to productivity). The third approach circumvents the need for apportioning ownership of carbon, revenue or environmental impacts to individual holdings. Whilst the first two methods act as indicators of an investor's contribution to climate change or ecosystem damage, the weighted average method seeks to show an investor's exposure to carbon/environmentally intensive companies, i.e. is not an additive in terms of carbon budgets.

For more information on the three approaches, please follow the link below:
https://us.spindices.com/documents/additional-material/spdji-esg-metrics.pdf

4. Carbon Disclosure

The level of carbon disclosure is based on each company's Scope 1 emissions, and can be classified as fully disclosed, partially disclosed, or modelled.
- **Full Disclosure** refers to when exact figures have been extracted from annual reports, 10Ks, financial account disclosures, CDP disclosures, environmental/CSR reports, or from personal communication with a company.
- **Partial Disclosure** refers to when Trucost has needed to derive, adjust, or scale any of the data acquired from the sources described above.
- **Modelled** refers to when Trucost has calculated estimates using its proprietary environmentally enhanced input-output model, due to the unavailability or unreliability of up-to-date disclosures.

The overall level of disclosure in the portfolio is assessed using the following three approaches:

- **Value of Holdings**: This is the sum of the weights of each holding within each of the three disclosure categories.
- **GHG**: This is the sum of the portfolio's apportioned Scope 1 CO2e within each of the three disclosure categories.
- **Number of companies/instruments**: This is the number of companies/instruments within each of the three disclosure categories.

APPENDIX

5. Revenue & Reserves Exposure

When assessing exposure to extractive industries, coal, or energy generation revenues, three approaches are used.

1. Apportioned Revenue Exposure
2. Weighted Average Revenue Exposure
3. VOH Exposure

The first represents the share of apportioned revenues from the sectors in question as a percentage of the total apportioned revenues from any sector (for more information on apportioning please refer to Appendix 2). The second is calculated by summing the product of each holding's weight in the portfolio with the company level revenue dependency on the sector in question. The third is calculated by summing the weights of any holdings in companies that have a revenue dependency on the sectors in question above a predefined threshold. The reason for the threshold is to allow users to exclude companies whose revenue dependency on the sectors in question may not be considered material.

In the case of reserves, holdings in any company disclosing any amount of reserves is included in the VOH exposure metric. Companies that have reserves, but do not disclose them, will not be captured by the analysis.

6. 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 Trucost analysis are:

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

These conversion figures are taken from the publically available 2006 Intergovernmental Panel on Climate Change's (IPCC) 'Guidelines for National Greenhouse Gas Inventories'.

APPENDIX

7. Environmental Valuation

Why apply valuations to environmental impacts? Traditional approaches to environmental impact measurement provide a variety of different metrics. For example, carbon and other pollutants are measured in tonnes, for water it is cubic meters. This makes it difficult to compare the relative contribution of each impact and therefore prioritise risks. Trucost addresses this problem by applying monetary valuations to each impact, thereby providing an overarching common metric to assess risk and opportunity across companies and portfolios.

The analysis applies the chosen valuations to the impacts associated with a company's own business activities and those of its upstream suppliers, all the way back to raw material extraction. Environmental impacts are often concealed within global supply chains, therefore we use environmentally extended input output (EEIO) modelling to reveal liabilities at each tier of the value chain for holistic risk and opportunity analysis.

ENVIRONMENTAL KPIs:

Greenhouse Gases:
The categories included in the environmental footprint are carbon dioxide, methane, nitrous oxide, sulphur hexaflouride, per fluoro carbons as well as hydro flouro carbons and nitrogen trifluoride.

Water Abstraction:
The categories included in the environmental footprint are direct cooling and direct process water, as well as purchased water (i.e. the water acquired from utility companies).

Waste Generation:
The categories included in the environmental footprint are waste incineration, landfill waste, nuclear waste (e.g. from the manufacture of products, the combustion of nuclear fuel or other industrial and medical processes) and recycled waste.

Air Pollutants:
The categories included in the environmental footprint are all emissions released to air by the consumption of fossil fuels and production processes which are owned or controlled by the company. This includes acid rain precursors (e.g. nitrogen oxide, sulphur dioxide, sulphuric acid, ammonia), ozone depleting substances (HFCs and CFCs), dust and particles, metal emissions, smog precursors and VOCs. Each has a set of impacts on human health, buildings and/or crop and forest yields.

Land & Water Pollutants:
The categories included in the environmental footprint are pollutants from fertiliser and pesticides, metal emissions to land and water, acid emissions to water, and nutrient and acids pollutant.

Natural Resource Use:
The categories included in the environmental footprint are extraction of minerals, metals, natural gas, oil, coal, forestry, agriculture and aggregates.

Disclaimer

Trucost Portfolio Analytics

S&P Dow Jones Indices
ESG Analysis

LBHF: Carbon Footprint: 2018

LGIM vs LGIM - Benchmark

August 21, 2018

About Trucost

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.

About S&P Dow Jones Indices

S&P Dow Jones Indices is the largest global resource for essential index-based concepts, data and research, and home to iconic financial market indicators, such as the S&P 500 ® and the Dow Jones Industrial Average ®. More assets are invested in products based on our indices than products based on indices from any other provider in the world. Since Charles Dow invented the first index in 1884, S&P DJI has been innovating and developing indices across the spectrum of asset classes helping to define the way investors measure and trade the markets.

S&P Dow Jones Indices is a division of S&P Global (NYSE: SPGI), which provides essential intelligence for individuals, companies, and governments to make decisions with confidence.

For more information, visit www.spdji.com

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Table of Contents

Benefits of Trucost Portfolio Analysis

It is well-documented that overuse of environmental resources and emission of pollutant gases is not only unsustainable for the planet but could also have widespread economic and social consequences. As governments, capital markets and consumers start to challenge the status quo, those companies that use resources less efficiently than peers, or are more carbon intensive, could lose their market share, licences to operate and ability to source from suppliers. This has possible operational and financial implications for revenues, profit, cost of capital and valuations.

Trucost's portfolio analysis provides investors with essential intelligence to appraise large numbers of holdings or investments for potential exposure to carbon and other environmental impacts, regardless of asset class, geography or investment style. This report provides an invaluable tool for investors to understand:

- Exposure to rising carbon costs
- Carbon performance of holdings within a sector
- Materiality of different environmental impacts
- Engagement opportunities
- Exposure to possible stranded assets
- The baseline against which to measure improvement over time

Summary of Coverage

Portfolio: LGIM

Benchmark: LGIM - Benchmark

Analysis Date: August 21, 2018

Holdings Date: June 30, 2018

Asset Classes: Equity

Apportioning Factor: Market capitalization

Largest Contributor Level: Companies

	VoH Covered GBPm	Coverage Rate (% of Starting VOH)	Number of Instruments Analysed	Number of Companies Analysed
Portfolio	297.245	99.73	1559/1569	1538
Benchmark	297.245	99.73	1559/1569	1538

Summary of Results

		Unit	Portfolio	Benchmark	Relative Efficiency
Carbon	Carbon to Revenue	tCO2e/mGBP	436.55	435.93	-0%
	Carbon to Value Invested	tCO2e/mGBP	221.02	220.45	-0%
	Weighted Average Carbon Intensity	tCO2e/mGBP	381.74	381.31	-0%
	Absolute CO2e	tonnes	65,697	65,528	-0%

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Carbon

Introduction

Carbon exposure analysis offers a systematic assessment of the carbon risks and opportunities within a portfolio or index at a point in time. The analysis quantifies greenhouse gas emissions (GHG) embedded within a portfolio presenting these as tonnes of carbon dioxide equivalents (tCO2e). Comparing the total GHG emissions of each holding relative to either revenues generated or capital invested, gives a measure of carbon exposure that enables comparison between companies, irrespective of size or geography.

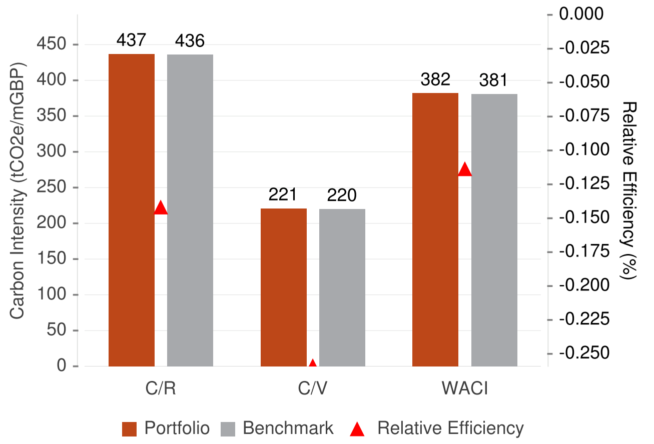
The **Total Carbon Emissions, Carbon to Value Invested (C/V), Carbon to Revenue (C/R),** and **Weighted Average Carbon Intensity (WACI)** are all presented below. For more information on methodological approaches please refer to Appendix 2 and 3.

The scope used in this analysis was Direct Emissions, First Tier Indirect Emissions. For more information on scopes please refer to Appendix 1.

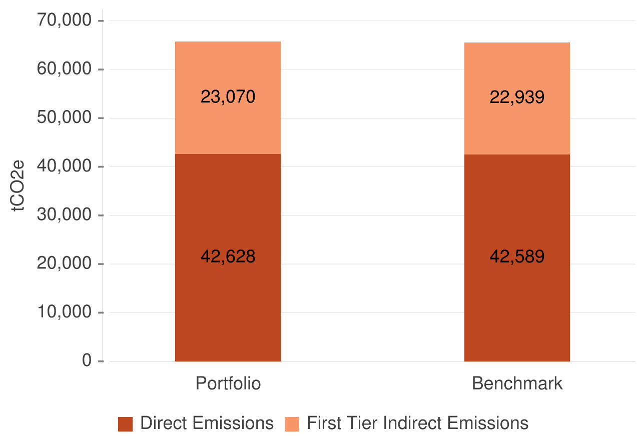
The disclosure rate is measured against the value of holdings (VOH), the share of apportioned GHGs, and number of companies. For details, please refer to Carbon Appendix 4.

Key Findings

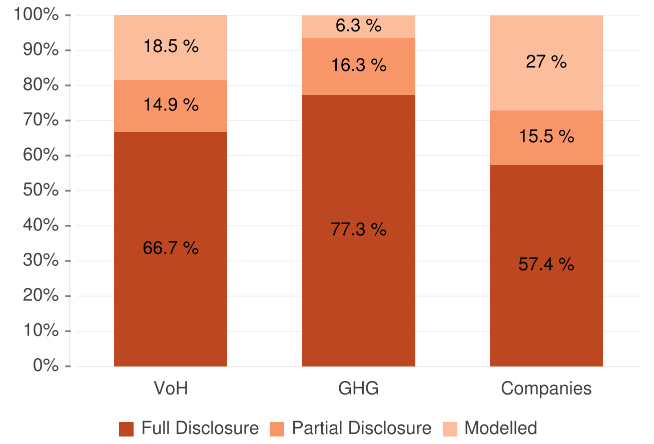
Carbon Intensity by Method



Carbon Apportioned by Scope



Portfolio Disclosure



Carbon

Attribution Analysis - Carbon to Revenue

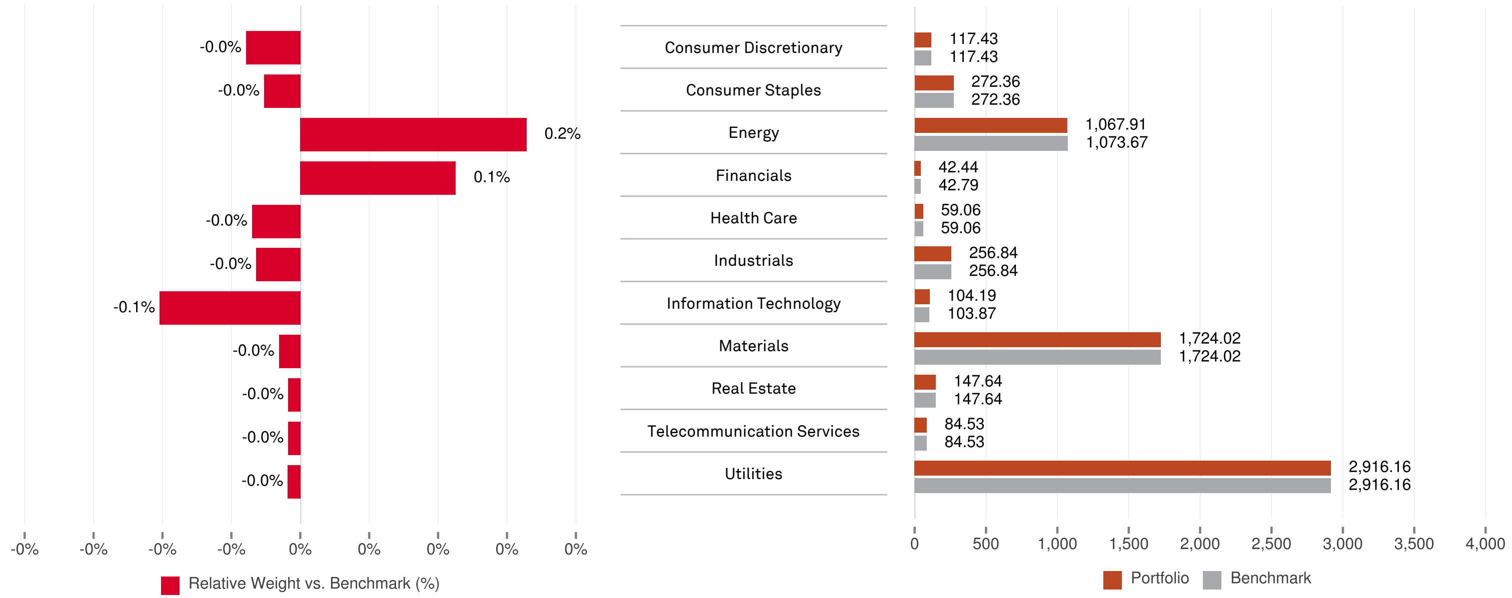
	Carbon to Revenue (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	117.43	117.43	-0.05%	-0.00%	-0.05%
Consumer Staples	272.36	272.36	-0.02%	+0.00%	-0.02%
Energy	1,067.91	1,073.67	-0.36%	0.12%	-0.24%
Financials	42.44	42.79	0.11%	0.02%	0.13%
Health Care	59.06	59.06	-0.03%	-0.00%	-0.03%
Industrials	256.84	256.84	-0.02%	+0.00%	-0.02%
Information Technology	104.19	103.87	-0.07%	-0.00%	-0.08%
Materials	1,724.02	1,724.02	0.07%	+0.00%	0.07%
Real Estate	147.64	147.64	-0.00%	+0.00%	-0.00%
Telecommunication Services	84.53	84.53	-0.01%	-0.00%	-0.01%
Utilities	2,916.16	2,916.16	0.11%	+0.00%	0.11%
	436.55	435.93	-0.27%	0.13%	-0.14%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

Relative Sector Weight plus Sector Efficiency



Carbon

Largest Contributors - Carbon to Revenue

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/R Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
Exxon Mobil Corp	2.467	Energy	2.88	1,242.96	61/92	-1.88	Full Disclosure
RWE AG	0.086	Utilities	2.02	4,242.65	52/75	-1.81	Full Disclosure
American Electric Power	0.242	Utilities	1.70	9,597.63	74/75	-1.62	Full Disclosure
LafargeHolcim Ltd	0.136	Materials	1.67	9,079.55	117/120	-1.59	Full Disclosure
Gazprom PJSC	0.164	Energy	1.76	3,498.13	88/92	-1.54	Full Disclosure
ArcelorMittal Inc	0.125	Materials	1.63	5,011.15	109/120	-1.49	Full Disclosure
Southern Co	0.334	Utilities	1.53	7,202.57	69/75	-1.44	Full Disclosure
Duke Energy Corp	0.395	Utilities	1.52	6,198.64	61/75	-1.41	Full Disclosure
Korea Elec Power Corp	0.052	Utilities	1.28	6,468.41	63/75	-1.20	Partial Disclosure
Tokyo Electric Power Co. Holding	0.052	Utilities	1.40	2,985.25	44/75	-1.20	Full Disclosure

Largest Modelled Contributors - Carbon to Revenue

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
Valero Energy Corp	0.333	Energy	0.65	849.15	39/92	-0.32	Modelled
Berkshire Hathaway	2.550	Financials	1.07	594.06	271/273	-0.29	Modelled
Fortis Inc	0.094	Utilities	0.27	5,079.85	58/75	-0.25	Modelled
Taiwan Cement Corp	0.034	Materials	0.24	10,815.02	118/120	-0.23	Modelled
Anhui Conch Cement Co Ltd	0.047	Materials	0.23	11,373.11	119/120	-0.22	Modelled
Formosa Chem & Fibre Co	0.094	Materials	0.21	3,498.81	101/120	-0.19	Modelled
Coal India Ltd	0.033	Energy	0.14	4,603.50	90/92	-0.13	Modelled
Nucor Corp	0.140	Materials	0.18	1,134.18	67/120	-0.11	Modelled
Mitsui & Co	0.201	Industrials	0.24	648.91	196/217	-0.08	Modelled
CITIC Limited	0.048	Industrials	0.10	1,329.96	209/217	-0.06	Modelled

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Carbon

Attribution Analysis - Carbon to Value Invested

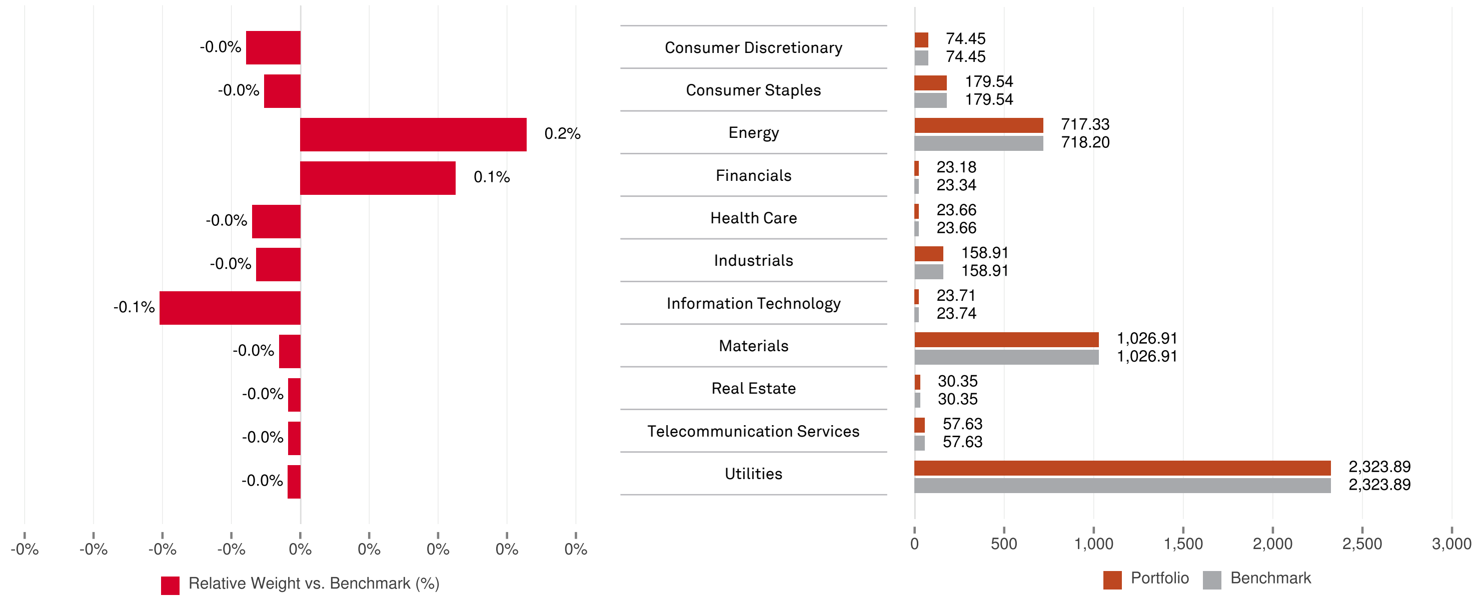
	Carbon to Value (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	74.45	74.45	-0.03%	-0.00%	-0.03%
Consumer Staples	179.54	179.54	-0.00%	+0.00%	-0.00%
Energy	717.33	718.20	-0.37%	0.03%	-0.34%
Financials	23.18	23.34	0.10%	0.01%	0.11%
Health Care	23.66	23.66	-0.03%	+0.00%	-0.03%
Industrials	158.91	158.91	-0.00%	+0.00%	-0.00%
Information Technology	23.71	23.74	-0.09%	+0.00%	-0.09%
Materials	1,026.91	1,026.91	0.06%	+0.00%	0.06%
Real Estate	30.35	30.35	-0.00%	+0.00%	-0.00%
Telecommunication Services	57.63	57.63	-0.00%	-0.00%	-0.00%
Utilities	2,323.89	2,323.89	0.09%	+0.00%	0.09%
	221.02	220.45	-0.30%	0.04%	-0.26%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

Relative Sector Weight plus Sector Footprint



Carbon

Largest Contributors - Carbon to Value Invested

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/V Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
Exxon Mobil Corp	2.467	Energy	2.88	765.75	51/92	-2.06	Full Disclosure
RWE AG	0.086	Utilities	2.02	15,333.95	72/75	-1.99	Full Disclosure
Gazprom PJSC	0.164	Energy	1.76	7,061.59	90/92	-1.70	Full Disclosure
LafargeHolcim Ltd	0.136	Materials	1.67	8,036.14	118/120	-1.62	Full Disclosure
American Electric Power	0.242	Utilities	1.70	4,601.78	59/75	-1.62	Full Disclosure
ArcelorMittal Inc	0.125	Materials	1.63	8,570.09	120/120	-1.59	Full Disclosure
Royal Dutch Shell PLC	2.066	Energy	2.15	685.24	55/92	-1.47	Full Disclosure
Southern Co	0.334	Utilities	1.53	3,002.52	47/75	-1.42	Full Disclosure
Duke Energy Corp	0.395	Utilities	1.52	2,521.88	42/75	-1.39	Full Disclosure
Tokyo Electric Power Co. Holding	0.052	Utilities	1.40	17,635.34	73/75	-1.38	Full Disclosure

Largest Modelled Contributors - Carbon to Value Invested

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
Valero Energy Corp	0.333	Energy	0.65	1,289.77	64/92	-0.54	Modelled
Fortis Inc	0.094	Utilities	0.27	1,902.79	38/75	-0.24	Modelled
Taiwan Cement Corp	0.034	Materials	0.24	4,678.87	110/120	-0.23	Modelled
Berkshire Hathaway	2.550	Financials	1.07	275.29	269/273	-0.21	Modelled
Anhui Conch Cement Co Ltd	0.047	Materials	0.23	3,127.10	119/120	-0.21	Modelled
Formosa Chem & Fibre Co	0.094	Materials	0.21	1,488.55	98/120	-0.18	Modelled
Mitsui & Co	0.201	Industrials	0.24	785.95	201/217	-0.17	Modelled
Nucor Corp	0.140	Materials	0.18	847.64	70/120	-0.13	Modelled
Coal India Ltd	0.033	Energy	0.14	2,733.17	89/92	-0.13	Modelled
China Petroleum & Chemical	0.159	Energy	0.14	596.39	78/92	-0.09	Modelled

Carbon

Attribution Analysis - Weighted Average Carbon Intensity

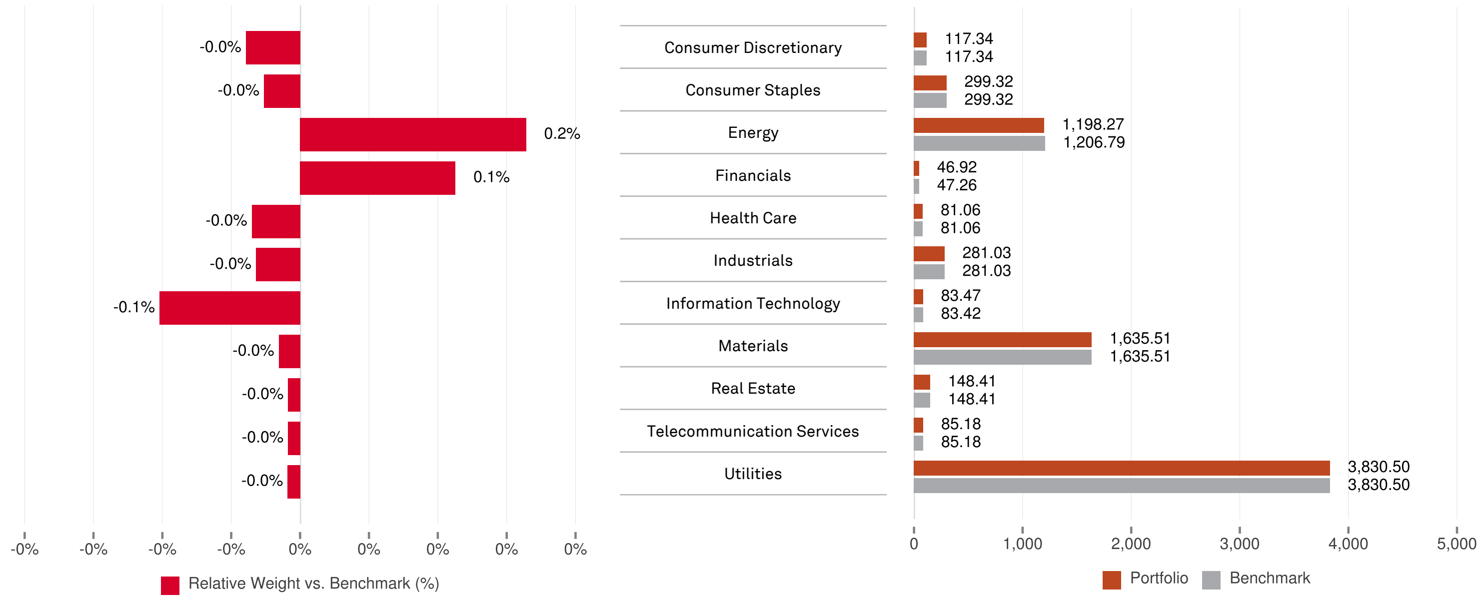
	WACI (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	117.34	117.34	-0.03%	+0.00%	-0.03%
Consumer Staples	299.32	299.32	-0.00%	+0.00%	-0.00%
Energy	1,198.27	1,206.79	-0.36%	0.16%	-0.20%
Financials	46.92	47.26	0.10%	0.02%	0.11%
Health Care	81.06	81.06	-0.03%	+0.00%	-0.03%
Industrials	281.03	281.03	-0.00%	+0.00%	-0.00%
Information Technology	83.47	83.42	-0.08%	-0.00%	-0.08%
Materials	1,635.51	1,635.51	0.05%	-0.00%	0.05%
Real Estate	148.41	148.41	-0.00%	+0.00%	-0.00%
Telecommunication Services	85.18	85.18	-0.00%	-0.00%	-0.00%
Utilities	3,830.50	3,830.50	0.08%	+0.00%	0.08%
	381.74	381.31	-0.28%	0.17%	-0.11%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

Relative Sector Weight plus Sector Intensity



Carbon

Largest Contributors - Weighted Average Carbon Intensity

The largest contributors to the portfolio's carbon intensity are shown below. The 'WACI Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Power Assets Holdings Ltd	0.065	Utilities	0.07	69,382.27	75/75	-3.96	Partial Disclosure
Exxon Mobil Corp	2.467	Energy	2.88	1,242.96	61/92	-2.70	Full Disclosure
Duke Energy Corp	0.395	Utilities	1.52	6,198.64	61/75	-2.16	Full Disclosure
Southern Co	0.334	Utilities	1.53	7,202.57	69/75	-2.12	Full Disclosure
American Electric Power	0.242	Utilities	1.70	9,597.63	74/75	-2.05	Full Disclosure
NextEra Energy Inc	0.561	Utilities	0.63	3,651.02	46/75	-1.80	Full Disclosure
Chevron Corp	1.695	Energy	1.32	1,146.71	58/92	-1.71	Full Disclosure
Royal Dutch Shell PLC	2.066	Energy	2.15	884.40	42/92	-1.61	Full Disclosure
Berkshire Hathaway	2.550	Financials	1.07	594.06	271/273	-1.33	Modelled
Dominion Energy Inc	0.315	Utilities	0.50	4,005.59	47/75	-1.11	Partial Disclosure

Largest Modelled Contributors - Weighted Average Carbon Intensity

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Berkshire Hathaway	2.550	Financials	1.07	594.06	271/273	-1.33	Modelled
Anhui Conch Cement Co Ltd	0.047	Materials	0.23	11,373.11	119/120	-0.48	Modelled
Fortis Inc	0.094	Utilities	0.27	5,079.85	58/75	-0.42	Modelled
Amazon.com Inc	4.872	Consumer Discretionary	0.11	90.66	104/217	-0.39	Modelled
Taiwan Cement Corp	0.034	Materials	0.24	10,815.02	118/120	-0.32	Modelled
Formosa Chem & Fibre Co	0.094	Materials	0.21	3,498.81	101/120	-0.29	Modelled
Valero Energy Corp	0.333	Energy	0.65	849.15	39/92	-0.25	Modelled
Martin Marietta Materials	0.099	Materials	0.07	1,843.20	84/120	-0.16	Modelled
Nucor Corp	0.140	Materials	0.18	1,134.18	67/120	-0.14	Modelled
Broadcom Inc	0.738	Information Technology	0.03	211.51	157/182	-0.14	Modelled

APPENDIX

1. Scopes

Before beginning a carbon or environmental audit, an investor must decide on what scopes to include in their analysis. Some believe that only operational impacts/emissions should be considered when calculating a company's exposure, i.e. the resources/pollutants owned or controlled by the reporting entity. This casts the net around impacts that the investee (and, to a lesser extent, the investor) has a direct sphere of influence over. It also avoids the possibility of double counting. However, as risks may be passed on through the supply chain in the form of higher prices, it may sometimes be more pragmatic to include emissions originating from suppliers.

CARBON: Trucost collects greenhouse gas data covering Scopes 1, 2 and 3 upstream emissions, as well as additional data relating to non-Kyoto Protocol greenhouse gases. Definitions of the available scopes are shown below:

- **Scope 1** = CO2e emissions based on the Kyoto Protocol greenhouse gases generated by direct company operations.
- **Scope 2** = CO2e emissions generated by purchased electricity, heat or steam.
- **Scope 3** (upstream) = CO2e emissions generated by a company's non-electricity supply chain.
- **Direct** = Scope 1 plus CO2e emissions from four additional sources, CCl_4, $C_2H_3Cl_3$, $CBrF_3$, and CO_2 from Biomass.
- **First Tier Indirect** = Scope 2 plus emissions from direct (or "Tier 1") upstream Scope 3 emissions.
- **Remaining Indirect** = Scope 2 plus upstream Scope 3.

ENVIRONMENT: As with carbon analysis, the scopes available for an environmental audit are Direct, First Tier Indirect, and Remaining Indirect impacts. Direct impacts result from a company's own operations and include emissions from fuel combustion (boilers and company owned vehicles), pollution from water abstracted, natural resource use, and waste generated from industrial production. Indirect impacts from supply chains occur because of the goods or services a company procures. Indirect impacts are broken down between those in the first tier of the supply chain and those in the remaining tiers.

2. Apportioning

Many of the exposure metrics calculated by Trucost rely on the apportioning of company owned resources/pollutants to the portfolio or benchmark. Apportioning, as an approach, is built on the principle of ownership. That is, if an investor owns - or in the case of debt holdings, finances - 1% of a company, then they also 'own' 1% of the company's resources/pollutants.

For equity only portfolios the apportioning factor is usually obtained by dividing the value of holding by the company's market capitalisation on the date of analysis. For debt only, or mixed portfolios, enterprise value usually replaces market capitalization as the denominator. The company level resources/pollutants are then multiplied by the apportioning factor to arrive at resource/pollutant quantities specific to each holding. The portfolio level resources/pollutants is the sum of all of these quantities.

APPENDIX

3. Carbon & Environmental Footprint/Efficiency/Intensity Calculation

Portfolios with larger assets under management will typically have a higher amount of total apportioned resources/pollutants than smaller portfolios because of their size. As most portfolios have a remit to grow assets under management, it is important to normalise these absolute quantities to allow for fair comparison year on year against other portfolios or benchmarks. The three most common approaches to normalizing emissions/impacts are:

1. Dividing the apportioned emissions/impacts by the amount invested.
2. Dividing the apportioned emissions/impacts by the apportioned annual revenues.
3. Summing the product of each holdingâs weight in the portfolio with the company level carbon/environmental revenue intensity.

For ease of reference, Trucost has defined these as the **Footprint**, the **Efficiency**, and the **Intensity** respectively.

The first gives an indication of carbon or environmental 'efficiency' with respect to shareholder value creation. The second gives an indication of 'efficiency' with respect to output (as revenues are closely linked to productivity). The third approach circumvents the need for apportioning ownership of carbon, revenue or environmental impacts to individual holdings. Whilst the first two methods act as indicators of an investor's contribution to climate change or ecosystem damage, the weighted average method seeks to show an investor's exposure to carbon/environmentally intensive companies, i.e. is not an additive in terms of carbon budgets.

For more information on the three approaches, please follow the link below:
https://us.spindices.com/documents/additional-material/spdji-esg-metrics.pdf

4. Carbon Disclosure

The level of carbon disclosure is based on each company's Scope 1 emissions, and can be classified as fully disclosed, partially disclosed, or modelled.
- **Full Disclosure** refers to when exact figures have been extracted from annual reports, 10Ks, financial account disclosures, CDP disclosures, environmental/CSR reports, or from personal communication with a company.
- **Partial Disclosure** refers to when Trucost has needed to derive, adjust, or scale any of the data acquired from the sources described above.
- **Modelled** refers to when Trucost has calculated estimates using its proprietary environmentally enhanced input-output model, due to the unavailability or unreliability of up-to-date disclosures.

The overall level of disclosure in the portfolio is assessed using the following three approaches:

- **Value of Holdings**: This is the sum of the weights of each holding within each of the three disclosure categories.
- **GHG**: This is the sum of the portfolio's apportioned Scope 1 CO2e within each of the three disclosure categories.
- **Number of companies/instruments**: This is the number of companies/instruments within each of the three disclosure categories.

APPENDIX

5. Revenue & Reserves Exposure

When assessing exposure to extractive industries, coal, or energy generation revenues, three approaches are used.

1. Apportioned Revenue Exposure
2. Weighted Average Revenue Exposure
3. VOH Exposure

The first represents the share of apportioned revenues from the sectors in question as a percentage of the total apportioned revenues from any sector (for more information on apportioning please refer to Appendix 2). The second is calculated by summing the product of each holding's weight in the portfolio with the company level revenue dependency on the sector in question. The third is calculated by summing the weights of any holdings in companies that have a revenue dependency on the sectors in question above a predefined threshold. The reason for the threshold is to allow users to exclude companies whose revenue dependency on the sectors in question may not be considered material.

In the case of reserves, holdings in any company disclosing any amount of reserves is included in the VOH exposure metric. Companies that have reserves, but do not disclose them, will not be captured by the analysis.

6. 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 Trucost analysis are:

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

These conversion figures are taken from the publically available 2006 Intergovernmental Panel on Climate Change's (IPCC) 'Guidelines for National Greenhouse Gas Inventories'.

APPENDIX

7. Environmental Valuation

Why apply valuations to environmental impacts? Traditional approaches to environmental impact measurement provide a variety of different metrics. For example, carbon and other pollutants are measured in tonnes, for water it is cubic meters. This makes it difficult to compare the relative contribution of each impact and therefore prioritise risks. Trucost addresses this problem by applying monetary valuations to each impact, thereby providing an overarching common metric to assess risk and opportunity across companies and portfolios.

The analysis applies the chosen valuations to the impacts associated with a company's own business activities and those of its upstream suppliers, all the way back to raw material extraction. Environmental impacts are often concealed within global supply chains, therefore we use environmentally extended input output (EEIO) modelling to reveal liabilities at each tier of the value chain for holistic risk and opportunity analysis.

ENVIRONMENTAL KPIs:

Greenhouse Gases:
The categories included in the environmental footprint are carbon dioxide, methane, nitrous oxide, sulphur hexaflouride, per fluoro carbons as well as hydro flouro carbons and nitrogen trifluoride.

Water Abstraction:
The categories included in the environmental footprint are direct cooling and direct process water, as well as purchased water (i.e. the water acquired from utility companies).

Waste Generation:
The categories included in the environmental footprint are waste incineration, landfill waste, nuclear waste (e.g. from the manufacture of products, the combustion of nuclear fuel or other industrial and medical processes) and recycled waste.

Air Pollutants:
The categories included in the environmental footprint are all emissions released to air by the consumption of fossil fuels and production processes which are owned or controlled by the company. This includes acid rain precursors (e.g. nitrogen oxide, sulphur dioxide, sulphuric acid, ammonia), ozone depleting substances (HFCs and CFCs), dust and particles, metal emissions, smog precursors and VOCs. Each has a set of impacts on human health, buildings and/or crop and forest yields.

Land & Water Pollutants:
The categories included in the environmental footprint are pollutants from fertiliser and pesticides, metal emissions to land and water, acid emissions to water, and nutrient and acids pollutant.

Natural Resource Use:
The categories included in the environmental footprint are extraction of minerals, metals, natural gas, oil, coal, forestry, agriculture and aggregates.

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Trucost Portfolio Analytics

LBHF: Carbon Footprint: 2018

Majedie vs LGIM - Benchmark

August 21, 2018

TRUCOST
S&P Dow Jones Indices
ESG Analysis

About Trucost

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.

About S&P Dow Jones Indices

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Benefits of Trucost Portfolio Analysis

It is well-documented that overuse of environmental resources and emission of pollutant gases is not only unsustainable for the planet but could also have widespread economic and social consequences. As governments, capital markets and consumers start to challenge the status quo, those companies that use resources less efficiently than peers, or are more carbon intensive, could lose their market share, licences to operate and ability to source from suppliers. This has possible operational and financial implications for revenues, profit, cost of capital and valuations.

Trucost's portfolio analysis provides investors with essential intelligence to appraise large numbers of holdings or investments for potential exposure to carbon and other environmental impacts, regardless of asset class, geography or investment style. This report provides an invaluable tool for investors to understand:

- Exposure to rising carbon costs
- Carbon performance of holdings within a sector
- Materiality of different environmental impacts
- Engagement opportunities
- Exposure to possible stranded assets
- The baseline against which to measure improvement over time

Summary of Coverage

Portfolio: Majedie

Benchmark: LGIM - Benchmark

Analysis Date: August 21, 2018

Holdings Date: June 30, 2018

Asset Classes: Equity

Apportioning Factor: Market capitalization

Largest Contributor Level: Companies

	VoH Covered GBPm	Coverage Rate (% of Starting VOH)	Number of Instruments Analysed	Number of Companies Analysed
Portfolio	141.281	91.96	82/86	82
Benchmark	141.281	99.73	1559/1569	1538

Summary of Results

		Unit	Portfolio	Benchmark	Relative Efficiency
Carbon	Carbon to Revenue	$tCO_2e/mGBP$	298.53	435.93	32%
	Carbon to Value Invested	$tCO_2e/mGBP$	349.44	220.45	-59%
	Weighted Average Carbon Intensity	$tCO_2e/mGBP$	382.29	381.31	-0%
	Absolute CO_2e	tonnes	49,369	31,145	-59%

Carbon

Introduction

Carbon exposure analysis offers a systematic assessment of the carbon risks and opportunities within a portfolio or index at a point in time. The analysis quantifies greenhouse gas emissions (GHG) embedded within a portfolio presenting these as tonnes of carbon dioxide equivalents (tCO2e). Comparing the total GHG emissions of each holding relative to either revenues generated or capital invested, gives a measure of carbon exposure that enables comparison between companies, irrespective of size or geography.

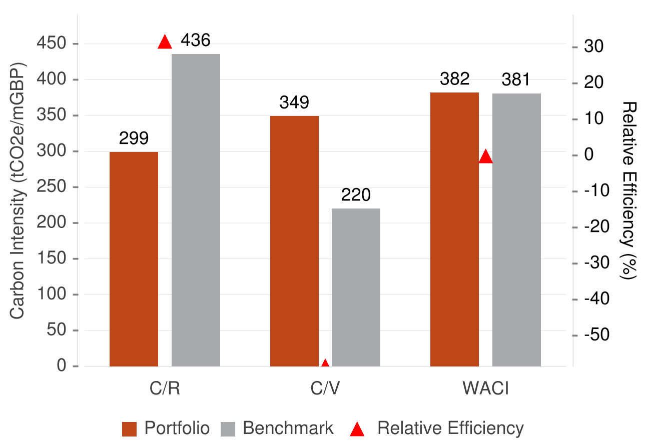
The **Total Carbon Emissions, Carbon to Value Invested (C/V), Carbon to Revenue (C/R),** and **Weighted Average Carbon Intensity (WACI)** are all presented below. For more information on methodological approaches please refer to Appendix 2 and 3.

The scope used in this analysis was Direct Emissions, First Tier Indirect Emissions. For more information on scopes please refer to Appendix 1.

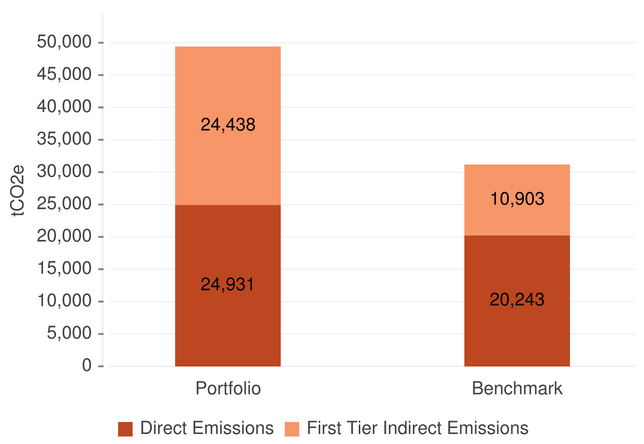
The disclosure rate is measured against the value of holdings (VOH), the share of apportioned GHGs, and number of companies. For details, please refer to Carbon Appendix 4.

Key Findings

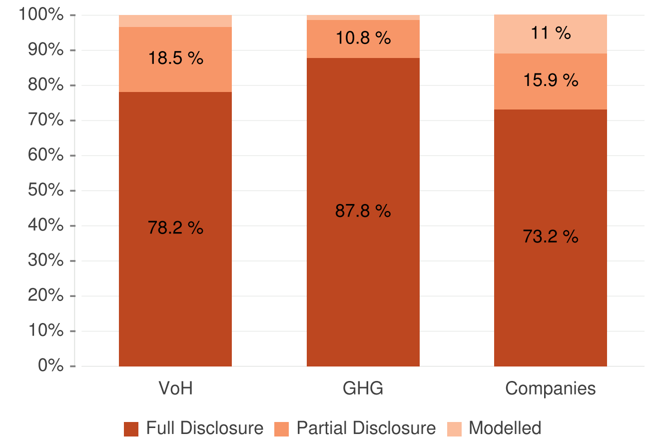
Carbon Intensity by Method



Carbon Apportioned by Scope



Portfolio Disclosure



Carbon

Attribution Analysis - Carbon to Revenue

Sector Allocation	Carbon to Revenue (tCO2e/mGBP) Portfolio	Benchmark	Attribution Analysis Sector Allocation	Company Selection	Total Effect
Consumer Discretionary	56.91	117.43	-2.72%	1.65%	-1.08%
Consumer Staples	103.13	272.36	6.37%	10.78%	17.15%
Energy	802.78	1,073.67	-9.09%	9.51%	0.42%
Financials	18.02	42.79	-7.93%	0.59%	-7.34%
Health Care	85.02	59.06	-5.94%	-0.11%	-6.06%
Industrials	360.96	256.84	-0.73%	-2.53%	-3.27%
Information Technology	23.55	103.87	-6.06%	0.22%	-5.84%
Materials	1,427.74	1,724.02	5.20%	2.72%	7.92%
Real Estate	91.34	147.64	-0.70%	+0.00%	-0.69%
Telecommunication Services	64.85	84.53	2.78%	0.32%	3.11%
Utilities	371.03	2,916.16	-30.13%	57.31%	27.18%
	298.53	435.93	-48.95%	80.47%	31.52%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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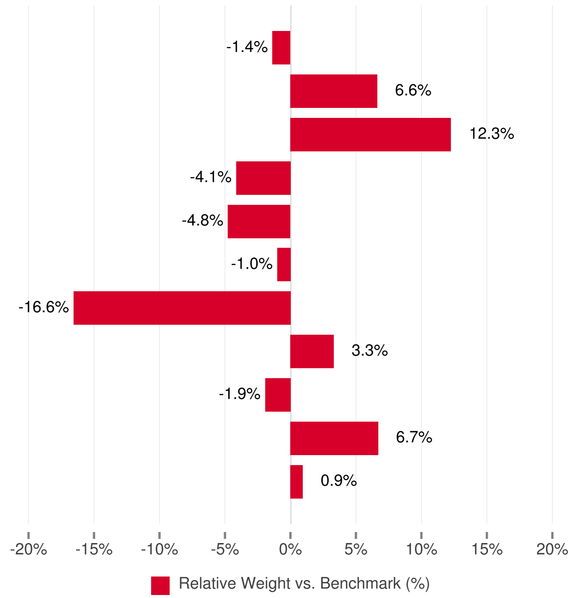
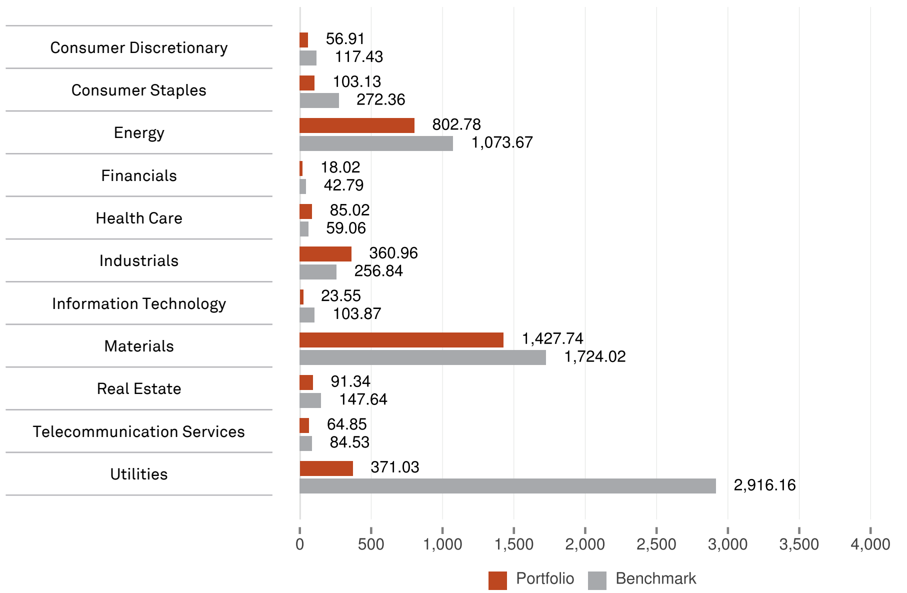
Relative Sector Weight plus Sector Efficiency





Carbon

Largest Contributors - Carbon to Revenue

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/R Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO_2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
BP	12.128	Energy	22.29	780.25	N/A	-15.05	Full Disclosure
Royal Dutch Shell PLC	11.981	Energy	16.63	884.40	N/A	-11.67	Full Disclosure
Mondi PLC	1.628	Materials	6.60	3,619.08	N/A	-6.09	Full Disclosure
FirstGroup Plc	1.206	Industrials	6.86	549.53	N/A	-3.26	Full Disclosure
Lonmin	0.131	Materials	3.51	1,585.01	N/A	-2.87	Full Disclosure
Ryanair Holdings Plc	2.729	Industrials	3.25	1,790.02	N/A	-2.72	Partial Disclosure
Centrica	5.371	Utilities	12.20	371.03	N/A	-2.64	Full Disclosure
Anglo American Plc	1.661	Materials	2.77	1,248.57	N/A	-2.12	Full Disclosure
Associated British Foods	1.905	Consumer Staples	2.10	924.18	N/A	-1.43	Full Disclosure
Marshalls	1.073	Materials	1.47	1,385.32	N/A	-1.15	Full Disclosure

Largest Modelled Contributors - Carbon to Revenue

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO_2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
Ensco plc	1.129	Energy	1.13	509.33	N/A	-0.47	Modelled
Diamond Offshore Drilling	0.261	Energy	0.16	509.33	N/A	-0.06	Modelled
Fevertree Drinks Plc	0.637	Consumer Staples	+0.00	191.52	N/A	+0.00	Modelled
888 Holdings Plc	0.081	Consumer Discretionary	+0.00	29.67	N/A	0.02	Modelled
Oceaneering Intl Inc	0.251	Energy	0.11	239.23	N/A	0.03	Modelled
First Republic Bank	0.485	Financials	+0.00	9.17	N/A	0.04	Modelled
Sohu.com Inc	0.078	Information Technology	+0.00	29.67	N/A	0.04	Modelled
FDM Group (Holdings) Plc	0.622	Information Technology	+0.00	19.45	N/A	0.06	Modelled
GVC Holdings Plc	1.086	Consumer Discretionary	+0.00	29.67	N/A	0.07	Modelled

Carbon

Attribution Analysis - Carbon to Value Invested

	Carbon to Value (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	71.45	74.45	-0.91%	0.15%	-0.76%
Consumer Staples	225.03	179.54	1.23%	-3.07%	-1.85%
Energy	751.73	718.20	-27.69%	-2.91%	-30.60%
Financials	16.04	23.34	-3.71%	0.45%	-3.26%
Health Care	29.88	23.66	-4.26%	-0.18%	-4.44%
Industrials	491.38	158.91	-0.28%	-13.74%	-14.03%
Information Technology	8.98	23.74	-14.78%	0.25%	-14.53%
Materials	816.08	1,026.91	-12.08%	7.83%	-4.24%
Real Estate	7.88	30.35	-1.67%	0.08%	-1.59%
Telecommunication Services	57.65	57.63	4.94%	-0.00%	4.94%
Utilities	1,121.33	2,323.89	-8.90%	20.74%	11.84%
	349.44	220.45	-68.11%	9.60%	-58.51%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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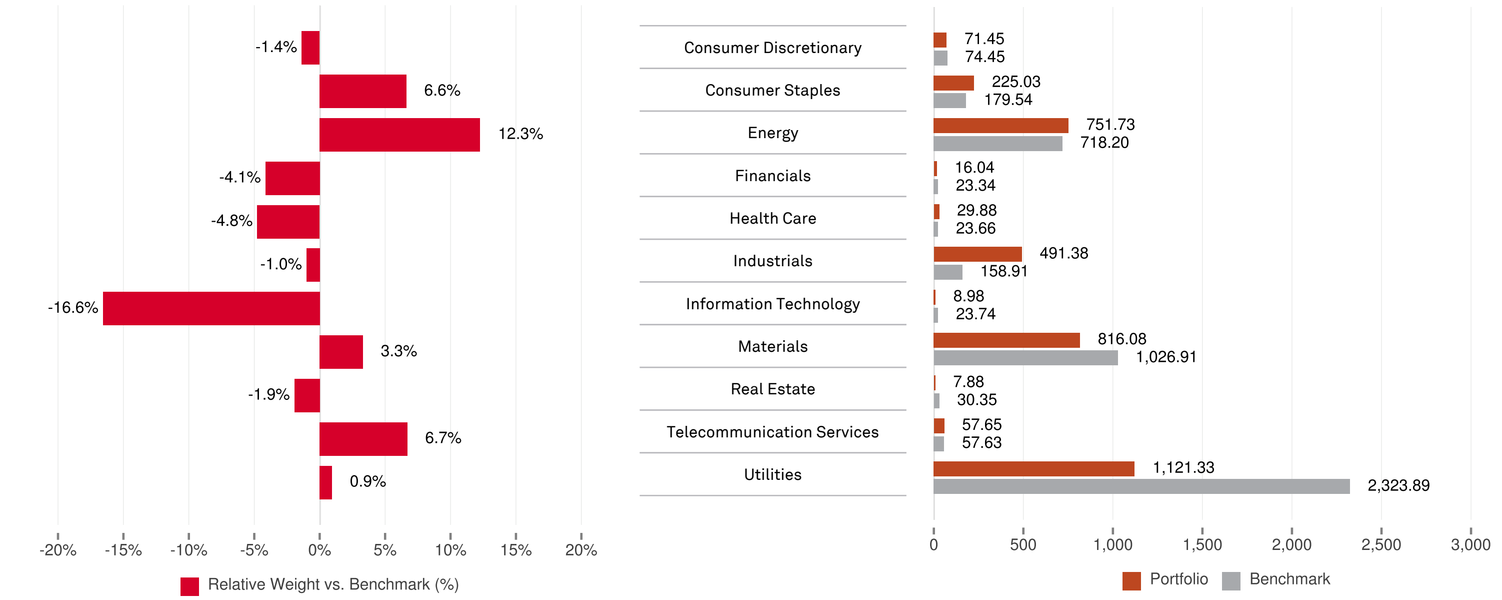
Relative Sector Weight plus Sector Footprint



Carbon

Largest Contributors - Carbon to Value Invested

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/V Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
BP	12.128	Energy	22.29	907.37	N/A	-14.99	Full Disclosure
Royal Dutch Shell PLC	11.981	Energy	16.63	685.24	N/A	-8.90	Full Disclosure
Centrica	5.371	Utilities	12.20	1,121.33	N/A	-8.73	Full Disclosure
FirstGroup Plc	1.206	Industrials	6.86	2,809.92	N/A	-6.06	Full Disclosure
Mondi PLC	1.628	Materials	6.60	2,002.17	N/A	-5.51	Full Disclosure
Lonmin	0.131	Materials	3.51	13,178.07	N/A	-3.42	Full Disclosure
Anglo American Plc	1.661	Materials	2.77	822.18	N/A	-1.61	Full Disclosure
Ryanair Holdings Plc	2.729	Industrials	3.25	587.94	N/A	-1.34	Partial Disclosure
Associated British Foods	1.905	Consumer Staples	2.10	543.83	N/A	-0.76	Full Disclosure
Marshalls	1.073	Materials	1.47	674.06	N/A	-0.71	Full Disclosure

Largest Modelled Contributors - Carbon to Value Invested

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
Ensco plc	1.129	Energy	1.13	494.64	N/A	-0.33	Modelled
Diamond Offshore Drilling	0.261	Energy	0.16	293.83	N/A	0.03	Modelled
Sohu.com Inc	0.078	Information Technology	+0.00	29.53	N/A	0.05	Modelled
888 Holdings Plc	0.081	Consumer Discretionary	+0.00	11.58	N/A	0.06	Modelled
Oceaneering Intl Inc	0.251	Energy	0.11	217.34	N/A	0.07	Modelled
First Republic Bank	0.485	Financials	+0.00	1.21	N/A	0.34	Modelled
FDM Group (Holdings) Plc	0.622	Information Technology	+0.00	3.28	N/A	0.44	Modelled
Fevertree Drinks Plc	0.637	Consumer Staples	+0.00	4.38	N/A	0.45	Modelled
GVC Holdings Plc	1.086	Consumer Discretionary	+0.00	3.39	N/A	0.77	Modelled

Carbon

Attribution Analysis - Weighted Average Carbon Intensity

	WACI (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	57.23	117.34	-0.95%	1.74%	0.79%
Consumer Staples	164.82	299.32	1.42%	5.26%	6.68%
Energy	811.74	1,206.79	-26.55%	19.82%	-6.72%
Financials	25.64	47.26	-3.63%	0.77%	-2.87%
Health Care	85.73	81.06	-3.76%	-0.08%	-3.83%
Industrials	528.98	281.03	-0.27%	-5.93%	-6.19%
Information Technology	22.72	83.42	-12.94%	0.59%	-12.36%
Materials	1,431.28	1,635.51	-10.86%	4.39%	-6.47%
Real Estate	91.34	148.41	-1.18%	0.12%	-1.06%
Telecommunication Services	64.23	85.18	5.20%	0.52%	5.72%
Utilities	371.03	3,830.50	-8.44%	34.49%	26.05%
	382.29	381.31	-61.96%	61.70%	-0.26%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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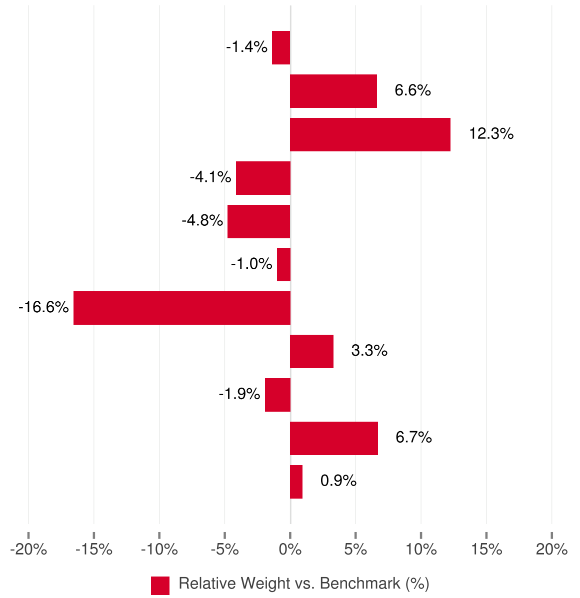
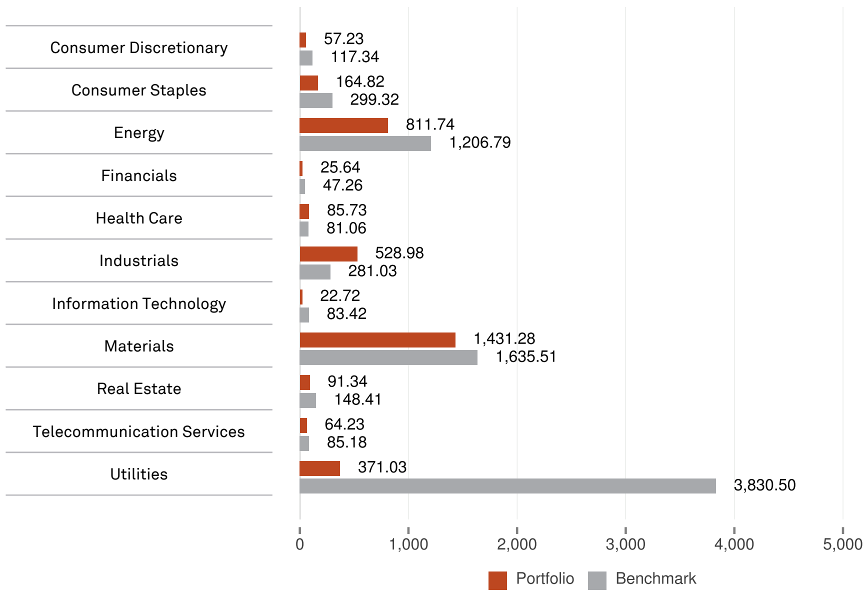
Relative Sector Weight plus Sector Intensity





Carbon

Largest Contributors - Weighted Average Carbon Intensity

The largest contributors to the portfolio's carbon intensity are shown below. The 'WACI Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Royal Dutch Shell PLC	11.981	Energy	16.63	884.40	N/A	-19.62	Full Disclosure
BP	12.128	Energy	22.29	780.25	N/A	-17.52	Full Disclosure
Mondi PLC	1.628	Materials	6.60	3,619.08	N/A	-10.91	Full Disclosure
Ryanair Holdings Plc	2.729	Industrials	3.25	1,790.02	N/A	-9.04	Partial Disclosure
KAZ Minerals Plc	0.929	Materials	0.73	2,660.06	N/A	-4.57	Full Disclosure
Anglo American Plc	1.661	Materials	2.77	1,248.57	N/A	-3.84	Full Disclosure
Centrica	5.371	Utilities	12.20	371.03	N/A	-3.69	Full Disclosure
BHP Billiton Plc	1.731	Materials	0.84	1,032.56	N/A	-3.31	Full Disclosure
Associated British Foods	1.905	Consumer Staples	2.10	924.18	N/A	-3.26	Full Disclosure
Marshalls	1.073	Materials	1.47	1,385.32	N/A	-2.75	Full Disclosure

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Largest Modelled Contributors - Weighted Average Carbon Intensity

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Ensco plc	1.129	Energy	1.13	509.33	N/A	-1.06	Modelled
Diamond Offshore Drilling	0.261	Energy	0.16	509.33	N/A	-0.25	Modelled
Fevertree Drinks Plc	0.637	Consumer Staples	+0.00	191.52	N/A	-0.23	Modelled
Oceaneering Intl Inc	0.251	Energy	0.11	239.23	N/A	-0.11	Modelled
GVC Holdings Plc	1.086	Consumer Discretionary	+0.00	29.67	N/A	-0.06	Modelled
FDM Group (Holdings) Plc	0.622	Information Technology	+0.00	19.45	N/A	-0.02	Modelled
First Republic Bank	0.485	Financials	+0.00	9.17	N/A	-0.00	Modelled
888 Holdings Plc	0.081	Consumer Discretionary	+0.00	29.67	N/A	-0.00	Modelled
Sohu.com Inc	0.078	Information Technology	+0.00	29.67	N/A	-0.00	Modelled

APPENDIX

1. Scopes

Before beginning a carbon or environmental audit, an investor must decide on what scopes to include in their analysis. Some believe that only operational impacts/emissions should be considered when calculating a company's exposure, i.e. the resources/pollutants owned or controlled by the reporting entity. This casts the net around impacts that the investee (and, to a lesser extent, the investor) has a direct sphere of influence over. It also avoids the possibility of double counting. However, as risks may be passed on through the supply chain in the form of higher prices, it may sometimes be more pragmatic to include emissions originating from suppliers.

CARBON: Trucost collects greenhouse gas data covering Scopes 1, 2 and 3 upstream emissions, as well as additional data relating to non-Kyoto Protocol greenhouse gases. Definitions of the available scopes are shown below:

- **Scope 1** = CO2e emissions based on the Kyoto Protocol greenhouse gases generated by direct company operations.
- **Scope 2** = CO2e emissions generated by purchased electricity, heat or steam.
- **Scope 3** (upstream) = CO2e emissions generated by a company's non-electricity supply chain.
- **Direct** = Scope 1 plus CO2e emissions from four additional sources, CCl4, C2H3Cl3, CBrF3, and CO2 from Biomass.
- **First Tier Indirect** = Scope 2 plus emissions from direct (or "Tier 1") upstream Scope 3 emissions.
- **Remaining Indirect** = Scope 2 plus upstream Scope 3.

ENVIRONMENT: As with carbon analysis, the scopes available for an environmental audit are Direct, First Tier Indirect, and Remaining Indirect impacts. Direct impacts result from a company's own operations and include emissions from fuel combustion (boilers and company owned vehicles), pollution from water abstracted, natural resource use, and waste generated from industrial production. Indirect impacts from supply chains occur because of the goods or services a company procures. Indirect impacts are broken down between those in the first tier of the supply chain and those in the remaining tiers.

2. Apportioning

Many of the exposure metrics calculated by Trucost rely on the apportioning of company owned resources/pollutants to the portfolio or benchmark. Apportioning, as an approach, is built on the principle of ownership. That is, if an investor owns - or in the case of debt holdings, finances - 1% of a company, then they also 'own' 1% of the company's resources/pollutants.

For equity only portfolios the apportioning factor is usually obtained by dividing the value of holding by the company's market capitalisation on the date of analysis. For debt only, or mixed portfolios, enterprise value usually replaces market capitalization as the denominator. The company level resources/pollutants are then multiplied by the apportioning factor to arrive at resource/pollutant quantities specific to each holding. The portfolio level resources/pollutants is the sum of all of these quantities.

APPENDIX

3. Carbon & Environmental Footprint/Efficiency/Intensity Calculation

Portfolios with larger assets under management will typically have a higher amount of total apportioned resources/pollutants than smaller portfolios because of their size. As most portfolios have a remit to grow assets under management, it is important to normalise these absolute quantities to allow for fair comparison year on year against other portfolios or benchmarks. The three most common approaches to normalizing emissions/impacts are:

1. Dividing the apportioned emissions/impacts by the amount invested.
2. Dividing the apportioned emissions/impacts by the apportioned annual revenues.
3. Summing the product of each holdingâs weight in the portfolio with the company level carbon/environmental revenue intensity.

For ease of reference, Trucost has defined these as the **Footprint**, the **Efficiency**, and the **Intensity** respectively.

The first gives an indication of carbon or environmental 'efficiency' with respect to shareholder value creation. The second gives an indication of 'efficiency' with respect to output (as revenues are closely linked to productivity). The third approach circumvents the need for apportioning ownership of carbon, revenue or environmental impacts to individual holdings. Whilst the first two methods act as indicators of an investor's contribution to climate change or ecosystem damage, the weighted average method seeks to show an investor's exposure to carbon/environmentally intensive companies, i.e. is not an additive in terms of carbon budgets.

For more information on the three approaches, please follow the link below:
https://us.spindices.com/documents/additional-material/spdji-esg-metrics.pdf

4. Carbon Disclosure

The level of carbon disclosure is based on each company's Scope 1 emissions, and can be classified as fully disclosed, partially disclosed, or modelled.
- **Full Disclosure** refers to when exact figures have been extracted from annual reports, 10Ks, financial account disclosures, CDP disclosures, environmental/CSR reports, or from personal communication with a company.
- **Partial Disclosure** refers to when Trucost has needed to derive, adjust, or scale any of the data acquired from the sources described above.
- **Modelled** refers to when Trucost has calculated estimates using its proprietary environmentally enhanced input-output model, due to the unavailability or unreliability of up-to-date disclosures.

The overall level of disclosure in the portfolio is assessed using the following three approaches:

- **Value of Holdings**: This is the sum of the weights of each holding within each of the three disclosure categories.
- **GHG**: This is the sum of the portfolio's apportioned Scope 1 CO_2e within each of the three disclosure categories.
- **Number of companies/instruments**: This is the number of companies/instruments within each of the three disclosure categories.

APPENDIX

5. Revenue & Reserves Exposure

When assessing exposure to extractive industries, coal, or energy generation revenues, three approaches are used.

1. Apportioned Revenue Exposure
2. Weighted Average Revenue Exposure
3. VOH Exposure

The first represents the share of apportioned revenues from the sectors in question as a percentage of the total apportioned revenues from any sector (for more information on apportioning please refer to Appendix 2). The second is calculated by summing the product of each holding's weight in the portfolio with the company level revenue dependency on the sector in question. The third is calculated by summing the weights of any holdings in companies that have a revenue dependency on the sectors in question above a predefined threshold. The reason for the threshold is to allow users to exclude companies whose revenue dependency on the sectors in question may not be considered material.

In the case of reserves, holdings in any company disclosing any amount of reserves is included in the VOH exposure metric. Companies that have reserves, but do not disclose them, will not be captured by the analysis.

6. 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 Trucost analysis are:

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

These conversion figures are taken from the publically available 2006 Intergovernmental Panel on Climate Change's (IPCC) 'Guidelines for National Greenhouse Gas Inventories'.

APPENDIX

7. Environmental Valuation

Why apply valuations to environmental impacts? Traditional approaches to environmental impact measurement provide a variety of different metrics. For example, carbon and other pollutants are measured in tonnes, for water it is cubic meters. This makes it difficult to compare the relative contribution of each impact and therefore prioritise risks. Trucost addresses this problem by applying monetary valuations to each impact, thereby providing an overarching common metric to assess risk and opportunity across companies and portfolios.

The analysis applies the chosen valuations to the impacts associated with a company's own business activities and those of its upstream suppliers, all the way back to raw material extraction. Environmental impacts are often concealed within global supply chains, therefore we use environmentally extended input output (EEIO) modelling to reveal liabilities at each tier of the value chain for holistic risk and opportunity analysis.

ENVIRONMENTAL KPIs:

Greenhouse Gases:
The categories included in the environmental footprint are carbon dioxide, methane, nitrous oxide, sulphur hexaflouride, per fluoro carbons as well as hydro flouro carbons and nitrogen trifluoride.

Water Abstraction:
The categories included in the environmental footprint are direct cooling and direct process water, as well as purchased water (i.e. the water acquired from utility companies).

Waste Generation:
The categories included in the environmental footprint are waste incineration, landfill waste, nuclear waste (e.g. from the manufacture of products, the combustion of nuclear fuel or other industrial and medical processes) and recycled waste.

Air Pollutants:
The categories included in the environmental footprint are all emissions released to air by the consumption of fossil fuels and production processes which are owned or controlled by the company. This includes acid rain precursors (e.g. nitrogen oxide, sulphur dioxide, sulphuric acid, ammonia), ozone depleting substances (HFCs and CFCs), dust and particles, metal emissions, smog precursors and VOCs. Each has a set of impacts on human health, buildings and/or crop and forest yields.

Land & Water Pollutants:
The categories included in the environmental footprint are pollutants from fertiliser and pesticides, metal emissions to land and water, acid emissions to water, and nutrient and acids pollutant.

Natural Resource Use:
The categories included in the environmental footprint are extraction of minerals, metals, natural gas, oil, coal, forestry, agriculture and aggregates.

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Trucost Portfolio Analytics

LBHF: Carbon Footprint: 2018

LGIM Low Carbon vs LGIM - Benchmark

August 21, 2018

S&P Dow Jones Indices
ESG Analysis

About Trucost

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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Benefits of Trucost Portfolio Analysis

It is well-documented that overuse of environmental resources and emission of pollutant gases is not only unsustainable for the planet but could also have widespread economic and social consequences. As governments, capital markets and consumers start to challenge the status quo, those companies that use resources less efficiently than peers, or are more carbon intensive, could lose their market share, licences to operate and ability to source from suppliers. This has possible operational and financial implications for revenues, profit, cost of capital and valuations.

Trucost's portfolio analysis provides investors with essential intelligence to appraise large numbers of holdings or investments for potential exposure to carbon and other environmental impacts, regardless of asset class, geography or investment style. This report provides an invaluable tool for investors to understand:

- Exposure to rising carbon costs
- Carbon performance of holdings within a sector
- Materiality of different environmental impacts
- Engagement opportunities
- Exposure to possible stranded assets
- The baseline against which to measure improvement over time

Summary of Coverage

Portfolio: LGIM Low Carbon

Benchmark: LGIM - Benchmark

Analysis Date: August 21, 2018

Holdings Date: June 30, 2018

Asset Classes: Equity

Apportioning Factor: Market capitalization

Largest Contributor Level: Companies

	VoH Covered GBPm	Coverage Rate (% of Starting VOH)	Number of Instruments Analysed	Number of Companies Analysed
Portfolio	321.063	99.89	1086/1090	1081
Benchmark	321.063	99.73	1559/1569	1538

Summary of Results

		Unit	Portfolio	Benchmark	Relative Efficiency
Carbon	Carbon to Revenue	tCO2e/mGBP	173.64	435.93	60%
	Carbon to Value Invested	tCO2e/mGBP	86.41	220.45	61%
	Weighted Average Carbon Intensity	tCO2e/mGBP	176.29	381.31	54%
	Absolute CO2e	tonnes	27,743	70,778	61%

Carbon

Introduction

Carbon exposure analysis offers a systematic assessment of the carbon risks and opportunities within a portfolio or index at a point in time. The analysis quantifies greenhouse gas emissions (GHG) embedded within a portfolio presenting these as tonnes of carbon dioxide equivalents (tCO2e). Comparing the total GHG emissions of each holding relative to either revenues generated or capital invested, gives a measure of carbon exposure that enables comparison between companies, irrespective of size or geography.

The **Total Carbon Emissions, Carbon to Value Invested (C/V), Carbon to Revenue (C/R),** and **Weighted Average Carbon Intensity (WACI)** are all presented below. For more information on methodological approaches please refer to Appendix 2 and 3.

The scope used in this analysis was Direct Emissions, First Tier Indirect Emissions. For more information on scopes please refer to Appendix 1.

The disclosure rate is measured against the value of holdings (VOH), the share of apportioned GHGs, and number of companies. For details, please refer to Carbon Appendix 4.

Key Findings

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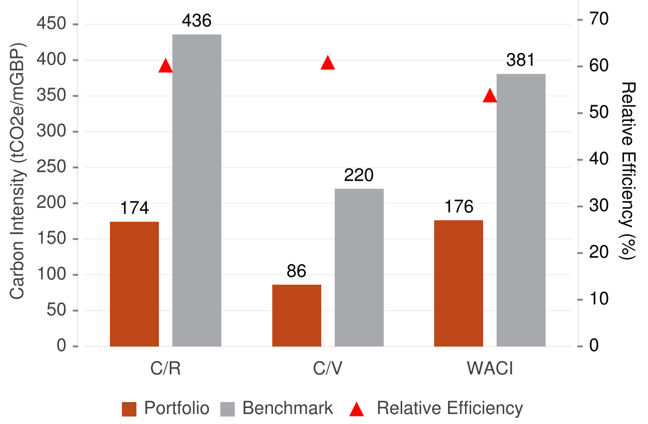
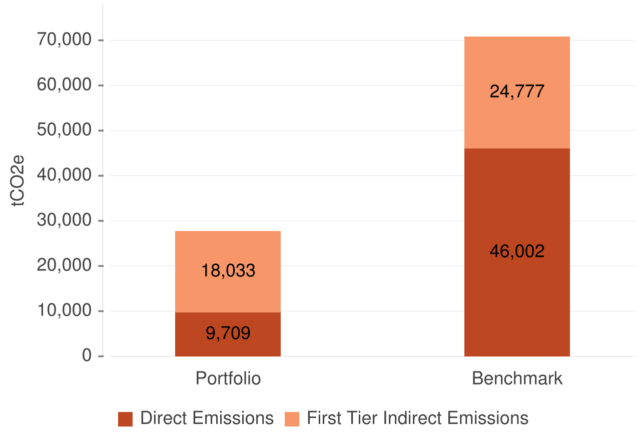
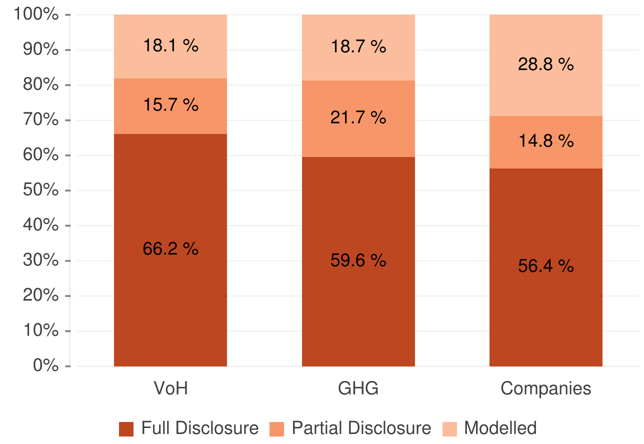
Carbon Intensity by Method



Carbon Apportioned by Scope



Portfolio Disclosure



Carbon

Attribution Analysis - Carbon to Revenue

	Carbon to Revenue (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	94.38	117.43	0.52%	0.86%	1.38%
Consumer Staples	182.05	272.36	-0.06%	2.21%	2.15%
Energy	701.37	1,073.67	3.68%	5.61%	9.30%
Financials	30.42	42.79	0.82%	0.57%	1.39%
Health Care	55.05	59.06	1.20%	0.09%	1.29%
Industrials	220.59	256.84	2.12%	1.46%	3.58%
Information Technology	78.78	103.87	-0.92%	0.46%	-0.47%
Materials	624.01	1,724.02	8.26%	7.48%	15.74%
Real Estate	116.06	147.64	0.04%	0.08%	0.12%
Telecommunication Services	74.92	84.53	0.47%	0.10%	0.57%
Utilities	547.91	2,916.16	12.17%	12.94%	25.11%
	173.64	435.93	28.31%	31.86%	60.17%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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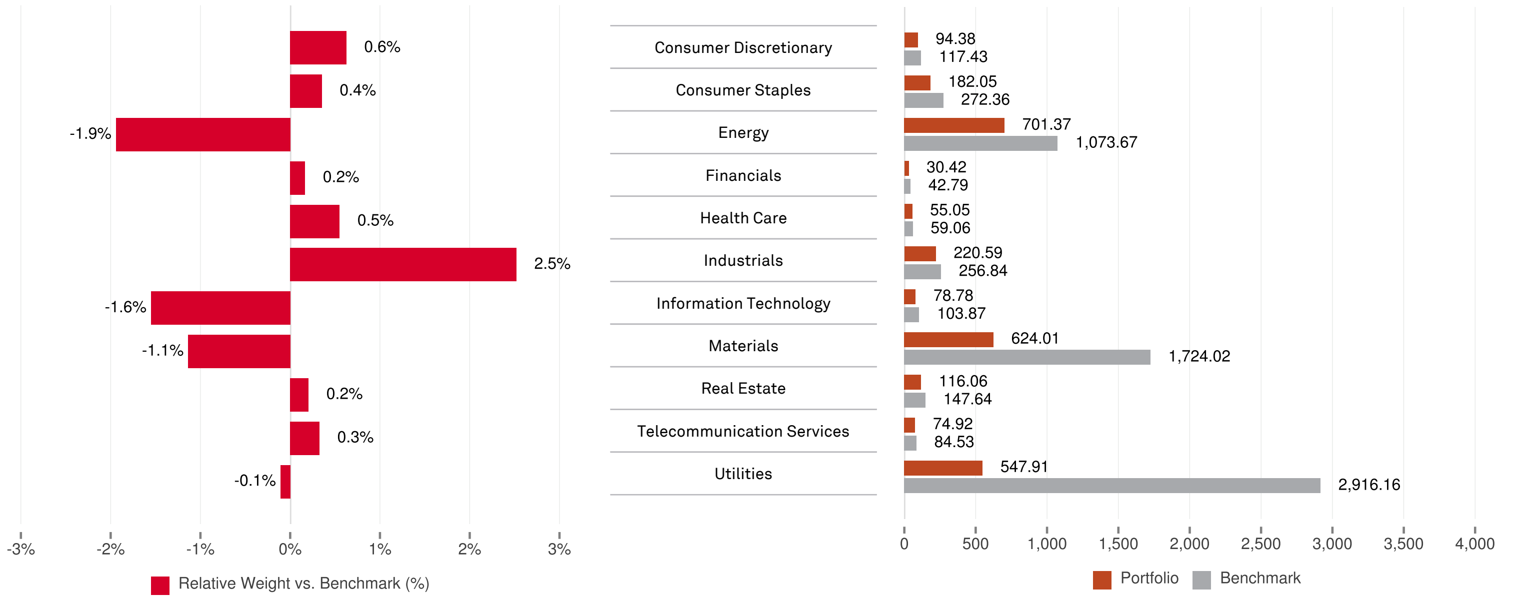
Relative Sector Weight plus Sector Efficiency



Carbon

Largest Contributors - Carbon to Revenue

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/R Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO_2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
Phillips 66	1.698	Energy	6.36	662.29	24/92	-4.77	Partial Disclosure
Valero Energy Corp	1.167	Energy	5.42	849.15	39/92	-4.36	Modelled
Marubeni Corp	0.840	Industrials	5.57	469.97	188/217	-3.59	Partial Disclosure
Royal Dutch Shell PLC	1.609	Energy	3.98	884.40	42/92	-3.22	Full Disclosure
Mitsui & Co	1.066	Industrials	3.02	648.91	196/217	-2.23	Modelled
Marathon Petroleum Corp.	0.503	Energy	2.63	791.38	36/92	-2.06	Full Disclosure
Andeavor	0.354	Energy	1.63	1,089.99	54/92	-1.37	Full Disclosure
Berkshire Hathaway	1.874	Financials	1.86	594.06	271/273	-1.32	Modelled
Dow Chemical	1.155	Materials	1.46	1,166.60	68/120	-1.25	Full Disclosure
Nestle SA	2.028	Consumer Staples	1.70	614.44	99/119	-1.23	Full Disclosure

Largest Modelled Contributors - Carbon to Revenue

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO_2e/mGBP)	Rank in Benchmark Sector	C/R Intensity Contribution (%)	Data Source (Scope 1)
Valero Energy Corp	1.167	Energy	5.42	849.15	39/92	-4.36	Modelled
Mitsui & Co	1.066	Industrials	3.02	648.91	196/217	-2.23	Modelled
Berkshire Hathaway	1.874	Financials	1.86	594.06	271/273	-1.32	Modelled
HollyFrontier Corporation	0.412	Energy	1.05	863.14	41/92	-0.84	Modelled
Atmos Energy Corp	0.884	Utilities	0.61	615.44	N/A	-0.44	Modelled
Itochu Corp	0.264	Industrials	0.52	421.27	185/217	-0.31	Modelled
Toyota Tsusho Corp	0.162	Industrials	0.76	264.15	153/217	-0.26	Modelled
The Chemours Company	0.121	Materials	0.22	789.52	N/A	-0.17	Modelled
Uni Charm Corp	0.083	Consumer Staples	0.11	1,062.45	111/119	-0.10	Modelled
Kinder Morgan Inc	0.250	Energy	0.15	491.70	19/92	-0.09	Modelled

Carbon

Attribution Analysis - Carbon to Value Invested

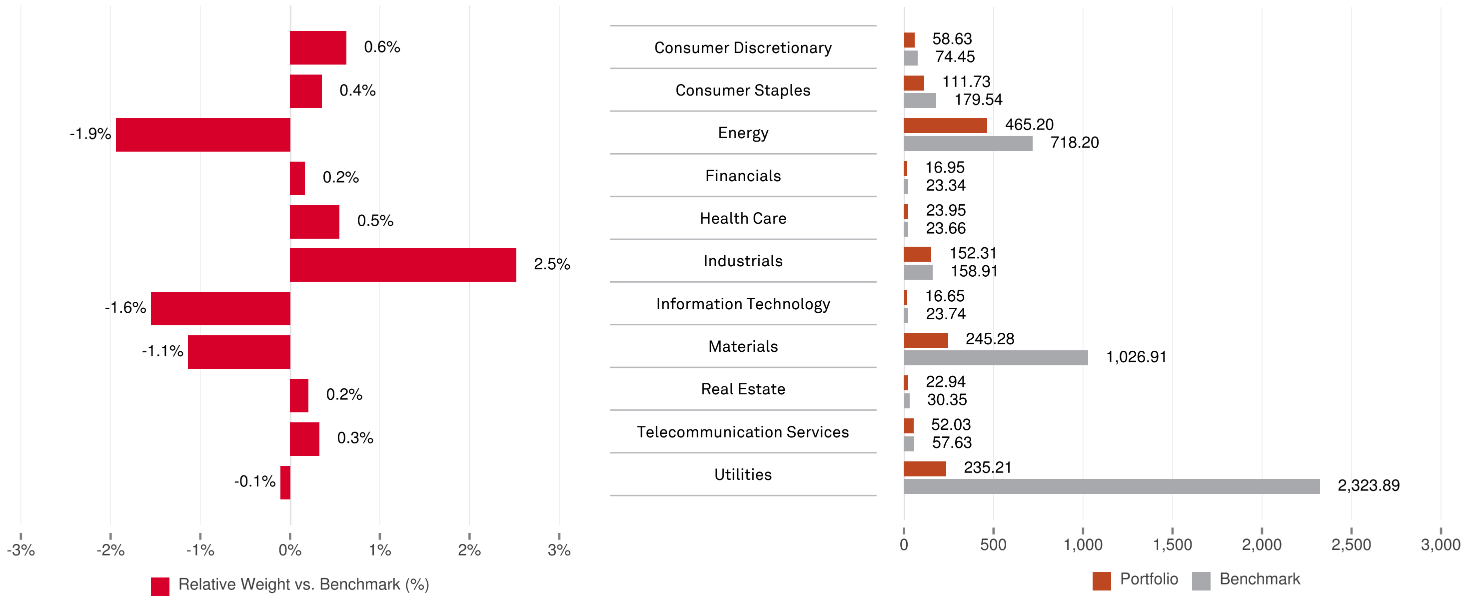
	Carbon to Value (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Consumer Discretionary	58.63	74.45	0.41%	0.94%	1.35%
Consumer Staples	111.73	179.54	0.07%	2.66%	2.72%
Energy	465.20	718.20	4.38%	5.66%	10.04%
Financials	16.95	23.34	0.15%	0.52%	0.66%
Health Care	23.95	23.66	0.49%	-0.02%	0.47%
Industrials	152.31	158.91	0.70%	0.38%	1.08%
Information Technology	16.65	23.74	-1.38%	0.60%	-0.78%
Materials	245.28	1,026.91	4.16%	13.31%	17.47%
Real Estate	22.94	30.35	0.18%	0.10%	0.27%
Telecommunication Services	52.03	57.63	0.24%	0.08%	0.32%
Utilities	235.21	2,323.89	1.04%	26.15%	27.19%
	86.41	220.45	10.43%	50.38%	60.80%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

Relative Sector Weight plus Sector Footprint



Carbon

Largest Contributors - Carbon to Value Invested

The largest contributors to the portfolio's carbon intensity are shown below. Note that a company may appear due to the proportion owned/financed, rather than because it is the most carbon intensive held. The 'C/V Intensity Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
Phillips 66	1.698	Energy	6.36	1,038.61	60/92	-5.86	Partial Disclosure
Marubeni Corp	0.840	Industrials	5.57	1,840.29	207/217	-5.32	Partial Disclosure
Valero Energy Corp	1.167	Energy	5.42	1,289.77	64/92	-5.08	Modelled
Royal Dutch Shell PLC	1.609	Energy	3.98	685.24	55/92	-3.49	Full Disclosure
Mitsui & Co	1.066	Industrials	3.02	785.95	201/217	-2.70	Modelled
Marathon Petroleum Corp.	0.503	Energy	2.63	1,451.06	67/92	-2.48	Full Disclosure
Andeavor	0.354	Energy	1.63	1,275.14	65/92	-1.52	Full Disclosure
BASF SE	0.956	Materials	1.62	468.68	45/120	-1.32	Full Disclosure
Berkshire Hathaway	1.874	Financials	1.86	275.29	269/273	-1.28	Modelled
Galp Energia SGPS SA	0.529	Energy	1.38	723.28	59/92	-1.22	Full Disclosure

Largest Modelled Contributors - Carbon to Value Invested

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/V Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	C/V Intensity Contribution (%)	Data Source (Scope 1)
Valero Energy Corp	1.167	Energy	5.42	1,289.77	64/92	-5.08	Modelled
Mitsui & Co	1.066	Industrials	3.02	785.95	201/217	-2.70	Modelled
Berkshire Hathaway	1.874	Financials	1.86	275.29	269/273	-1.28	Modelled
HollyFrontier Corporation	0.412	Energy	1.05	708.26	52/92	-0.93	Modelled
Toyota Tsusho Corp	0.162	Industrials	0.76	1,304.95	210/217	-0.71	Modelled
Itochu Corp	0.264	Industrials	0.52	549.06	194/217	-0.44	Modelled
Atmos Energy Corp	0.884	Utilities	0.61	192.27	N/A	-0.34	Modelled
The Chemours Company	0.121	Materials	0.22	495.07	N/A	-0.18	Modelled
Hydro One Limited	0.369	Utilities	0.21	161.19	13/75	-0.10	Modelled
Uni Charm Corp	0.083	Consumer Staples	0.11	379.90	105/119	-0.09	Modelled

Carbon

Attribution Analysis - Weighted Average Carbon Intensity

	WACI (tCO2e/mGBP)		Attribution Analysis		
Sector Allocation	Portfolio	Benchmark	Sector Allocation	Company Selection	Total Effect
Consumer Discretionary	89.40	117.34	0.43%	0.96%	1.39%
Consumer Staples	256.52	299.32	0.08%	0.97%	1.04%
Energy	615.81	1,206.79	4.20%	7.64%	11.85%
Financials	36.45	47.26	0.14%	0.51%	0.65%
Health Care	80.26	81.06	0.43%	0.02%	0.46%
Industrials	213.42	281.03	0.66%	2.24%	2.90%
Information Technology	70.09	83.42	-1.21%	0.65%	-0.56%
Materials	681.53	1,635.51	3.74%	9.39%	13.13%
Real Estate	133.19	148.41	0.12%	0.12%	0.24%
Telecommunication Services	74.25	85.18	0.25%	0.09%	0.34%
Utilities	882.98	3,830.50	0.98%	21.34%	22.32%
	176.29	381.31	9.83%	43.93%	53.77%

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation decisions and company allocation decisions.

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 low carbon. If the portfolio is overweight in carbon intensive sectors the portfolio is likely to be more carbon intensive than the benchmark.

However, if the companies 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.

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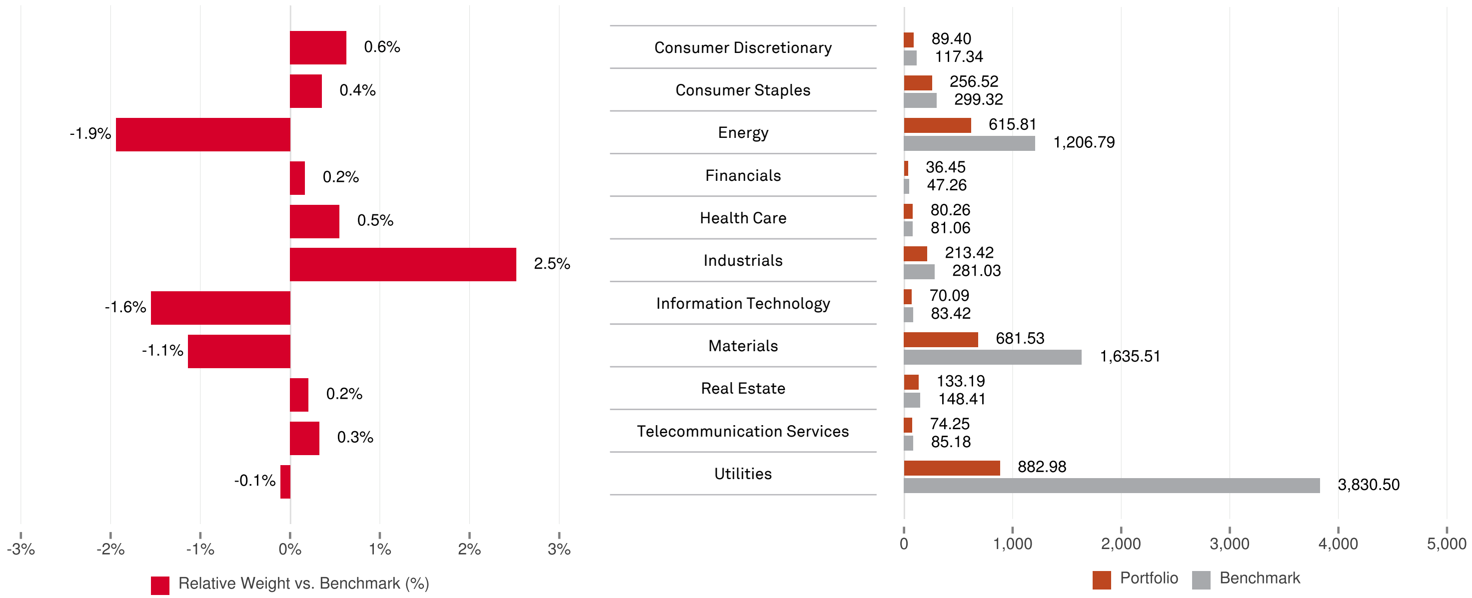
Relative Sector Weight plus Sector Intensity



Carbon

Largest Contributors - Weighted Average Carbon Intensity

The largest contributors to the portfolio's carbon intensity are shown below. The 'WACI Contribution' is the percentage change in the portfolio's intensity that would be caused by excluding the holding referenced. In other words, it is a measurement of how much a specific holding effects the carbon performance of the portfolio

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Power Assets Holdings Ltd	0.038	Utilities	0.10	69,382.27	75/75	-4.72	Partial Disclosure
Royal Dutch Shell PLC	1.609	Energy	3.98	884.40	42/92	-2.51	Full Disclosure
Dow Chemical	1.155	Materials	1.46	1,166.60	68/120	-2.38	Full Disclosure
Nestle SA	2.028	Consumer Staples	1.70	614.44	99/119	-2.20	Full Disclosure
Phillips 66	1.698	Energy	6.36	662.29	24/92	-1.99	Partial Disclosure
Berkshire Hathaway	1.874	Financials	1.86	594.06	271/273	-1.97	Modelled
Valero Energy Corp	1.167	Energy	5.42	849.15	39/92	-1.75	Modelled
ONEOK Inc	1.432	Energy	1.04	668.54	25/92	-1.69	Full Disclosure
Nutrien Ltd.	0.309	Materials	0.42	2,932.18	99/120	-1.60	Full Disclosure
Eversource Energy	1.130	Utilities	1.20	705.98	19/75	-1.41	Full Disclosure

Largest Modelled Contributors - Weighted Average Carbon Intensity

In order to highlight for engagement purposes, we have identified the largest contributors for which up-to-date disclosures were not available. These are ranked according to the size of their impact on your carbon intensity as estimated by Trucost, using our proprietary environmental profiling model.

Company Name	Holding (mGBP)	Sector	Carbon Apportioned (% of total)	Company C/R Intensity (tCO2e/mGBP)	Rank in Benchmark Sector	WACI Contribution (%)	Data Source (Scope 1)
Berkshire Hathaway	1.874	Financials	1.86	594.06	271/273	-1.97	Modelled
Valero Energy Corp	1.167	Energy	5.42	849.15	39/92	-1.75	Modelled
Mitsui & Co	1.066	Industrials	3.02	648.91	196/217	-1.22	Modelled
Atmos Energy Corp	0.884	Utilities	0.61	615.44	N/A	-0.96	Modelled
Amazon.com Inc	5.764	Consumer Discretionary	0.30	90.66	104/217	-0.92	Modelled
HollyFrontier Corporation	0.412	Energy	1.05	863.14	41/92	-0.63	Modelled
Diamondback Energy Inc	0.346	Energy	0.04	705.49	32/92	-0.43	Modelled
Broadcom Inc	0.867	Information Technology	0.07	211.51	157/182	-0.32	Modelled
CK Infrastructure Holdings Ltd	0.099	Utilities	0.11	1,678.60	35/75	-0.29	Modelled
Pembina Pipeline Corporation	0.496	Energy	0.10	323.02	11/92	-0.28	Modelled

APPENDIX

1. Scopes

Before beginning a carbon or environmental audit, an investor must decide on what scopes to include in their analysis. Some believe that only operational impacts/emissions should be considered when calculating a company's exposure, i.e. the resources/pollutants owned or controlled by the reporting entity. This casts the net around impacts that the investee (and, to a lesser extent, the investor) has a direct sphere of influence over. It also avoids the possibility of double counting. However, as risks may be passed on through the supply chain in the form of higher prices, it may sometimes be more pragmatic to include emissions originating from suppliers.

CARBON: Trucost collects greenhouse gas data covering Scopes 1, 2 and 3 upstream emissions, as well as additional data relating to non-Kyoto Protocol greenhouse gases. Definitions of the available scopes are shown below:

- **Scope 1** = CO2e emissions based on the Kyoto Protocol greenhouse gases generated by direct company operations.
- **Scope 2** = CO2e emissions generated by purchased electricity, heat or steam.
- **Scope 3** (upstream) = CO2e emissions generated by a company's non-electricity supply chain.
- **Direct** = Scope 1 plus CO2e emissions from four additional sources, CCl4, C2H3Cl3, CBrF3, and CO2 from Biomass.
- **First Tier Indirect** = Scope 2 plus emissions from direct (or "Tier 1") upstream Scope 3 emissions.
- **Remaining Indirect** = Scope 2 plus upstream Scope 3.

ENVIRONMENT: As with carbon analysis, the scopes available for an environmental audit are Direct, First Tier Indirect, and Remaining Indirect impacts. Direct impacts result from a company's own operations and include emissions from fuel combustion (boilers and company owned vehicles), pollution from water abstracted, natural resource use, and waste generated from industrial production. Indirect impacts from supply chains occur because of the goods or services a company procures. Indirect impacts are broken down between those in the first tier of the supply chain and those in the remaining tiers.

2. Apportioning

Many of the exposure metrics calculated by Trucost rely on the apportioning of company owned resources/pollutants to the portfolio or benchmark. Apportioning, as an approach, is built on the principle of ownership. That is, if an investor owns - or in the case of debt holdings, finances - 1% of a company, then they also 'own' 1% of the company's resources/pollutants.

For equity only portfolios the apportioning factor is usually obtained by dividing the value of holding by the company's market capitalisation on the date of analysis. For debt only, or mixed portfolios, enterprise value usually replaces market capitalization as the denominator. The company level resources/pollutants are then multiplied by the apportioning factor to arrive at resource/pollutant quantities specific to each holding. The portfolio level resources/pollutants is the sum of all of these quantities.

APPENDIX

3. Carbon & Environmental Footprint/Efficiency/Intensity Calculation

Portfolios with larger assets under management will typically have a higher amount of total apportioned resources/pollutants than smaller portfolios because of their size. As most portfolios have a remit to grow assets under management, it is important to normalise these absolute quantities to allow for fair comparison year on year against other portfolios or benchmarks. The three most common approaches to normalizing emissions/impacts are:

1. Dividing the apportioned emissions/impacts by the amount invested.
2. Dividing the apportioned emissions/impacts by the apportioned annual revenues.
3. Summing the product of each holdingâs weight in the portfolio with the company level carbon/environmental revenue intensity.

For ease of reference, Trucost has defined these as the **Footprint**, the **Efficiency**, and the **Intensity** respectively.

The first gives an indication of carbon or environmental 'efficiency' with respect to shareholder value creation. The second gives an indication of 'efficiency' with respect to output (as revenues are closely linked to productivity). The third approach circumvents the need for apportioning ownership of carbon, revenue or environmental impacts to individual holdings. Whilst the first two methods act as indicators of an investor's contribution to climate change or ecosystem damage, the weighted average method seeks to show an investor's exposure to carbon/environmentally intensive companies, i.e. is not an additive in terms of carbon budgets.

For more information on the three approaches, please follow the link below:
https://us.spindices.com/documents/additional-material/spdji-esg-metrics.pdf

4. Carbon Disclosure

The level of carbon disclosure is based on each company's Scope 1 emissions, and can be classified as fully disclosed, partially disclosed, or modelled.
- **Full Disclosure** refers to when exact figures have been extracted from annual reports, 10Ks, financial account disclosures, CDP disclosures, environmental/CSR reports, or from personal communication with a company.
- **Partial Disclosure** refers to when Trucost has needed to derive, adjust, or scale any of the data acquired from the sources described above.
- **Modelled** refers to when Trucost has calculated estimates using its proprietary environmentally enhanced input-output model, due to the unavailability or unreliability of up-to-date disclosures.

The overall level of disclosure in the portfolio is assessed using the following three approaches:

- **Value of Holdings**: This is the sum of the weights of each holding within each of the three disclosure categories.
- **GHG**: This is the sum of the portfolio's apportioned Scope 1 CO_2e within each of the three disclosure categories.
- **Number of companies/instruments**: This is the number of companies/instruments within each of the three disclosure categories.

APPENDIX

5. Revenue & Reserves Exposure

When assessing exposure to extractive industries, coal, or energy generation revenues, three approaches are used.

1. Apportioned Revenue Exposure
2. Weighted Average Revenue Exposure
3. VOH Exposure

The first represents the share of apportioned revenues from the sectors in question as a percentage of the total apportioned revenues from any sector (for more information on apportioning please refer to Appendix 2). The second is calculated by summing the product of each holding's weight in the portfolio with the company level revenue dependency on the sector in question. The third is calculated by summing the weights of any holdings in companies that have a revenue dependency on the sectors in question above a predefined threshold. The reason for the threshold is to allow users to exclude companies whose revenue dependency on the sectors in question may not be considered material.

In the case of reserves, holdings in any company disclosing any amount of reserves is included in the VOH exposure metric. Companies that have reserves, but do not disclose them, will not be captured by the analysis.

6. 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 Trucost analysis are:

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

These conversion figures are taken from the publically available 2006 Intergovernmental Panel on Climate Change's (IPCC) 'Guidelines for National Greenhouse Gas Inventories'.

APPENDIX

7. Environmental Valuation

Why apply valuations to environmental impacts? Traditional approaches to environmental impact measurement provide a variety of different metrics. For example, carbon and other pollutants are measured in tonnes, for water it is cubic meters. This makes it difficult to compare the relative contribution of each impact and therefore prioritise risks. Trucost addresses this problem by applying monetary valuations to each impact, thereby providing an overarching common metric to assess risk and opportunity across companies and portfolios.

The analysis applies the chosen valuations to the impacts associated with a company's own business activities and those of its upstream suppliers, all the way back to raw material extraction. Environmental impacts are often concealed within global supply chains, therefore we use environmentally extended input output (EEIO) modelling to reveal liabilities at each tier of the value chain for holistic risk and opportunity analysis.

ENVIRONMENTAL KPIs:

Greenhouse Gases:
The categories included in the environmental footprint are carbon dioxide, methane, nitrous oxide, sulphur hexaflouride, per fluoro carbons as well as hydro flouro carbons and nitrogen trifluoride.

Water Abstraction:
The categories included in the environmental footprint are direct cooling and direct process water, as well as purchased water (i.e. the water acquired from utility companies).

Waste Generation:
The categories included in the environmental footprint are waste incineration, landfill waste, nuclear waste (e.g. from the manufacture of products, the combustion of nuclear fuel or other industrial and medical processes) and recycled waste.

Air Pollutants:
The categories included in the environmental footprint are all emissions released to air by the consumption of fossil fuels and production processes which are owned or controlled by the company. This includes acid rain precursors (e.g. nitrogen oxide, sulphur dioxide, sulphuric acid, ammonia), ozone depleting substances (HFCs and CFCs), dust and particles, metal emissions, smog precursors and VOCs. Each has a set of impacts on human health, buildings and/or crop and forest yields.

Land & Water Pollutants:
The categories included in the environmental footprint are pollutants from fertiliser and pesticides, metal emissions to land and water, acid emissions to water, and nutrient and acids pollutant.

Natural Resource Use:
The categories included in the environmental footprint are extraction of minerals, metals, natural gas, oil, coal, forestry, agriculture and aggregates.

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