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*Pricing tomorrow's cost of carbon today*

# Measuring FTSE 100 Carbon Value-at-Risk

## Which sectors are adapting for a lower-carbon future?

## Executive Summary

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## About PAL

PAL is committed to determining a fair and credible carbon price. Published by PAL in June 2016, the book *Predicting the Price of Carbon: How to tackle the climate change code for good* by Richard Clarke, Director (Research) at PAL, addresses the goals and strategies for tackling climate change and sets out the methodology of PAL's carbon-pricing system.

PAL's suite of complementary products and services covers every aspect of evaluating loss and damage caused by manmade climate change to provide Carbon Pricing, Enhanced Carbon Auditing and the associated current and projected carbon liability:

**Enhanced Carbon Auditing (ECA):** Our bespoke audits provide in-depth financial analysis of the real $/£/€ carbon costs impacting your enterprise. Effective carbon costing for Life Cycle Assessments (LCA) of projects such as the Hinkley Point C nuclear power station can optimise decision-making and reduce costs.

**Carbon Pricing**: Our real-time carbon-pricing data factors in the real cost of damage caused by carbon emissions – past, present and future. A particular problem in carbon pricing is that a one-size-fits-all carbon price is a blunt instrument for encouraging behavioural change. A spectrum of prices based on impact (PAL's Carbon Intensity Weighting) is more effective as well as future-proof.

**Catastrophe Loss Modelling**: Our software product PALgamma provides algorithm-based forecasting of extreme weather-related disaster trends and loss events. It clearly identifies the financial impact of man-made climate change.

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## Measuring Carbon Value-at-Risk for Blue Chips

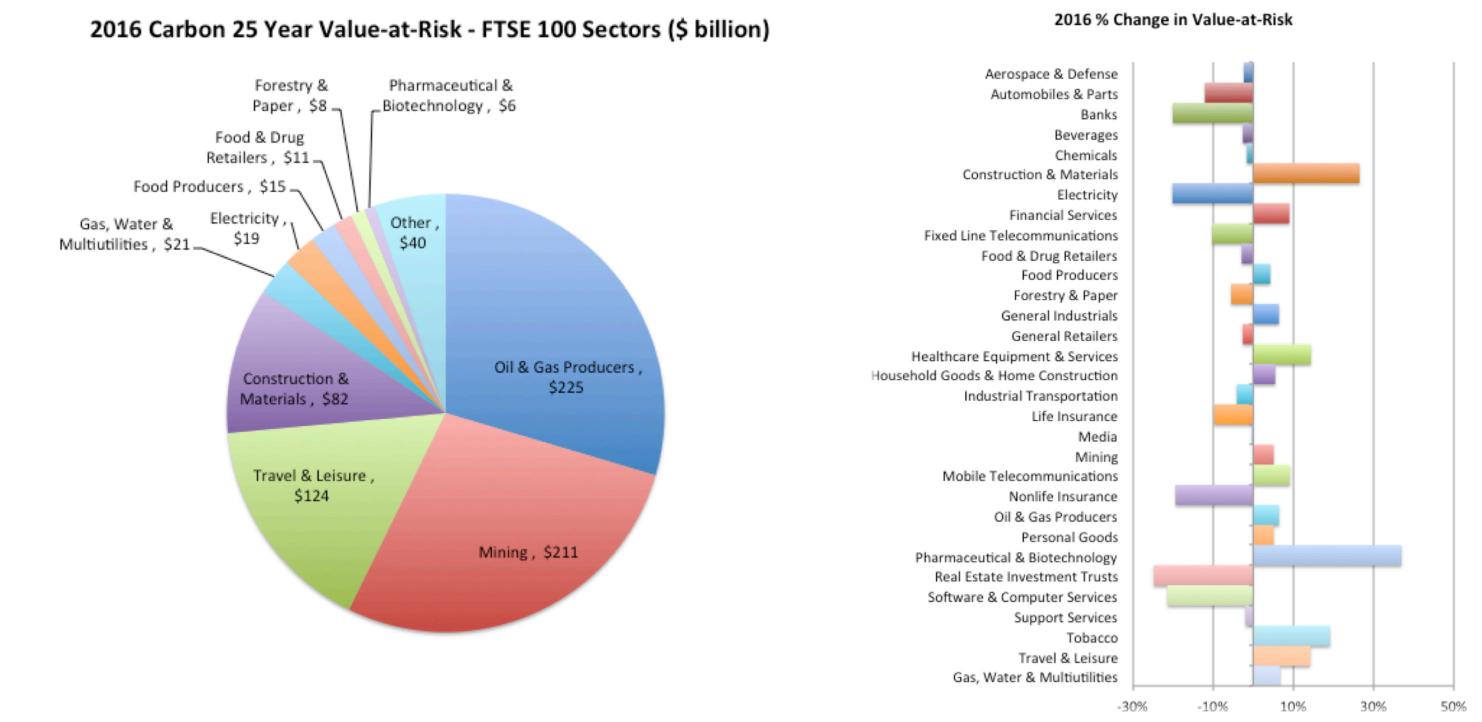
This report provides a lens through which the long-term financial impacts of climate change for a portfolio of companies may be measured. Whilst significant change is underway as sectors prepare to transition to a lower-carbon economy, a long-term quantitative risk approach is required to effectively measure the preparedness of individual companies and the rate-of-transition of sectors as a whole.

There are a number of dimensions to quantifying 'carbon risk' that are encapsulated in our Value-at-Risk (VaR) methodology and Carbon Liability to Earnings and Assets Ratio (CLEAR) risk metric. The key dimensions considered are global emission trajectories, temperature anomaly, climate loss and damage, portfolio emissions and financial status.

### Key Findings

- The **FTSE 100 portfolio of companies shows an overall reduction in emissions** (5%)
- However the long-term **carbon value at risk increased 8%** to $760bn.
- Top performing sectors for emissions reduction are **Electricity Generation** and **Mining**.
- However **Oil & Gas, Mining, Travel & Leisure** and **Construction** together still account for nearly 85% of portfolio risk and emissions.
- Value-at-risk increased in carbon intensive sectors: **Oil & Gas** ($225bn , up 6%), mining ($211bn, up 5%) and **Travel & Leisure** ($122bn, up 14%).
- **Pharmaceutical & Biotechnology** saw the largest % increase in value-at-risk, up 37% to $5.8bn although this is due to Shire's Baxalta acquisition in 2016.
- **Nonlife Insurance, Banks, Electricity, Software & Computer Services** and **Real Estate Investment Trusts** all saw reductions in value-at-risk of 19% and over. Admiral Group saw the largest reduction (63%).
- Highest ranking companies for absolute emissions reduction are **BHP Billiton, SSE, Glencore, Associated British Foods** and **BP.** Lowest ranking companies are **easyJet, Centrica, Antofogasta, International Consolidated Airlines** and **CRH**.
- Most at-risk companies in terms of Carbon Liabilities to Earnings and Assets Risk (CLEAR) are **International Consolidated Airlines, CRH, easyJet, TUI** and **Anglo American.** Least at risk are **3i Group, Hargreaves Lansdown, St James's Place, Schroders** and **Admiral Group**.

## Figure 1 – Sectoral Carbon Value-at-Risk[1]




Source: PAL, company reports.

## Figure 2 – CLEAR[2] Rankings

| 2016 Rank | Company Name | Sector | Market Cap ($M)[3] | 25Y VaR 2016 ($M) | 1Y VaR 2016 ($M) | Scope 1,2 Emissions 2016 (MtCO2e) | 25Y VaR Change[4] | 1Y VaR Change | Emissions Change | CLEAR (25Y VaR / Market Cap) | CLEAR (1Y VaR / EBITDA) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3i Group | Financial Services | 12,201 | 3 | 0.0 | 0.0 | 229% | 145% | 133% | 0% | 0% |
| 2 | Hargreaves Lansdown | Financial Services | 8,703 | 5 | 0.0 | 0.0 | 43% | 8% | 5% | 0% | 0% |
| 3 | St James's Place | Life Insurance | 8,636 | 6 | 0.1 | 0.0 | 16% | 5% | 2% | 0% | 0% |
| 4 | Schroders | Financial Services | 12,106 | 11 | 0.1 | 0.0 | 4% | -8% | -10% | 0% | 0% |
| 5 | Admiral Group | Nonlife Insurance | 7,321 | 10 | 0.1 | 0.0 | -63% | -46% | -47% | 0% | 0% |
| 96 | Anglo American | Mining | 20,633 | 28,217 | 357.4 | 17.8 | 8% | 0% | -2% | 137% | 7% |
| 97 | TUI | Travel & Leisure | 9,585 | 15,516 | 142.4 | 7.1 | 39% | 7% | 4% | 162% | 12% |
| 98 | easyJet | Travel & Leisure | 6,819 | 14,329 | 130.5 | 6.5 | 19% | 10% | 7% | 210% | 27% |
| 99 | CRH | Construction & Materials | 30,787 | 82,040 | 542.1 | 27.0 | 26% | 26% | 22% | 266% | 15% |
| 100 | International Consolidated Airlines | Travel & Leisure | 21,650 | 59,707 | 570.0 | 28.4 | 13% | 10% | 7% | 276% | 13% |

Source: PAL, company reports.

¹ Carbon Value-at-Risk (VaR) measures the expected impact of climate related losses based on a set of emission and loss scenarios.
² Carbon Liability to Earnings and Assets Ratio (CLEAR) provides a measure of value at risk as a proportion of market cap and/or earnings (EBITDA).
³ Market Cap, EBITDA estimates: Yahoo Finance, July 2017.
⁴ Changes in carbon VaR between 2015 and 2016.

## Requesting access to the full report

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