
Legal & General Plc

TCFD report 2018

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Introduction

Legal & General Group PLC is listed on the London Stock exchange and is a FTSE 100 constituent with a market capitalisation of c£16bn. We are a top 20 global asset manager¹ and the UK's largest provider of individual life assurance products – leading the market in managing retirement risk for pension schemes, both in the UK and US. To secure our obligations in connection with those businesses we own £79.4 billion of assets, a portion of which matches the customer liability and a portion comprises our regulatory capital and surplus.

Our businesses will be directly impacted by the effects of climate change. According to the Intergovernmental Panel on Climate Change (IPCC) even 2°C of warming above pre-industrial levels would mean catastrophic flooding, drought and associated mass-migration, food scarcity and large scale loss of biodiversity and overall worsening living conditions. These changes will disrupt supply chains and damage infrastructure, impacting economies, markets, companies and people profoundly.

The science behind climate change is well developed and the link between greenhouse gas (GHG) emissions and increasing temperatures is clear and generally accepted. The global average temperature has already risen by 1°C since the pre- industrial era and is expected to continue to increase over this century.

We recognise two main risks to our business from climate change. Physical risks from the impact of more extreme weather conditions and transition risks as our investments are impacted by new regulations, technologies and consumer trends. At the same time, we are aware that there are potentially significant opportunities that may arise from the transition to a low carbon economy.

In the long run the most significant impacts of climate change will be through the increased physical risk to our investment portfolios especially property and our house insurance business. This will be due to weather-related damages reducing asset valuations and increasing future insurance claims. The extent to which this would impact individual holdings is difficult to quantify.

To protect long term investment values we believe all large investors should direct, encourage, and accelerate a transition from a high to a low-emissions economy. Through improving our understanding of the risks and opportunities posed by climate change we will be able to better allocate our capital and improve outcomes not just for us and our customers but for the wider global economy.

We recognise that our scale brings a responsibility to act decisively on climate change and we strongly support the stated aim of the Paris Agreement of limiting temperature rise to well below 2°C of pre- industrial levels.

¹ As at 31/12/18 LGIM manages £1015.5 billion on behalf of a wide range of internal and external clients.

We are able to support this objective both through the positioning of our own balance sheet but also through our ownership of one of the largest global institutional investors. Through Legal & General Investment Management (LGIM), our investment management arm, we engage with companies and governments and push for urgent action.

The Legal & General Group Plc entity, LGIM, has taken a strong position on integrating climate strategy into its investment process and product range across all assets and clients. As a significant investor with stakes in companies globally and in every sector, LGIM leverages its access to company management and voting power to ensure the right corporate focus on sustainable growth. For the fourth consecutive year LGIM's Corporate Governance team received the 2018 ICSA award for Best Investor Engagement. They were the largest asset manager in the world to support the G20 Financial Stability Board Task Force on Climate related Financial Disclosure (TCFD) recommendations when they were first released.

LGIM has launched the Future World range of funds. This has a strong focus on ESG scoring to identify material risks and an active engagement policy with some of the world's largest companies to drive change and raise standards.

We will work alongside LGIM to prevent market behaviour that destroys long term value and reallocate capital positively for a sustainable future.

We believe that the right approach for our own investments will be a combination of active repositioning over time and engagement with company management to encourage the right corporate strategy. It is in the interest of all stakeholders for companies to build sustainable business models that are also beneficial for society.

This disclosure, in line with TCFD guidance, is our commitment to actively contribute towards a low carbon transition. We are aware that there is much more work to be done in the area of data collection, risk analysis and portfolio positioning and this is only the beginning of this important conversation; we intend to keep improving on our actions and disclosure over time.

Legal & General and the TCFD

We believe that the reporting of our direct and balance sheet emissions and transparency around our mitigation strategy gives our customers and shareholders a better understanding of our business and its impact on society and the environment.

This report describes Legal & General's initiative in line with the voluntary TCFD recommendations.

We have decided to write two separate TCFD reports;

- Legal & General group report (this report) which is largely a consideration of the asset risk connected with climate change on the group balance sheet and
- LGIM report which describes our policies for managing climate risks and opportunities on behalf of a wide range of external customers. The LGIM report can be found on our website:

http://www.lgim.com/files/document-library/capabilities/lgim_tcf_d_report.pdf

LGIM policies and investment strategies have the strong support of the Legal & General Group Board and are applied to all group portfolios managed by LGIM. We recommend that the two reports are read in conjunction with each other.

Summary of group TCFD commitments

- We support the aim of the Paris Agreement to limit the global average temperature rise to well below 2°C of pre- industrial levels
- We will set emission reduction targets on our own investment assets to align with the Paris objective
- We will make changes in our Investment Management Agreements (IMA's) that exclude thermal coal investments and puts constraints on stocks excluded by LGIM from the Future World product range
- Through LGIM we will use our influence as a large investor to promote a transition to a low carbon economy
- We will improve our understanding of the financial impact of a range of warming scenarios through scenario analysis.

Report structure

In line with the TCFD recommendations this report covers the following areas:

1. Group assets exposure– we provide a breakdown of the relevant group assets covered in this report
2. **Governance** – we describe how climate risk is embedded in our investment governance processes
3. **Strategy** – we describe the actual and potential material impacts of climate related risks and opportunities
4. **Risk Management** – we describe how we identify, assess and manage climate related risks
5. **Metrics and setting targets** – we describe our climate risk metrics and approach to setting targets
6. Next Steps – We set out the areas that we plan to focus on to improve our understanding of a range of possible outcomes through scenario analysis, including the 2°C trajectory

It is almost certain that the full economic ramifications of the transition to a lower carbon world are not yet known and the full set of investment risks and opportunities are a matter of judgement. It is also likely that carbon measurement techniques and the consensus understanding of a 2°C pathway will change over time. We expect our approach to evolve and this report shows our current position.

Group assets

Breakdown by business and asset type

Our balance sheet comprises around £80 billion of investments to which shareholders are directly exposed as at 31 December 2018. Generally speaking we can think of the assets as either supporting our payments to insurance, savings and retirement customers or as shareholder's funds, covering the Solvency Capital Requirement (SCR) and surplus. These assets support the following core businesses:

Legal & General Retirement (LGR) offers both institutional 'pension risk transfer' products to pension scheme trustees and retail products to customers to help them manage their finances in retirement. These are largely 'annuity' products that give people a guaranteed income, either through life or for a fixed term.

Legal & General Capital (LGC) was established to invest a portion of shareholder capital. Its focus is on investing in real assets such as urban regeneration, housing, clean energy and small businesses.

Legal & General Insurance (LGI) helps individuals protect themselves and their families from the effects of death, critical illness and long term ill health. LGI also provides home contents and buildings insurance.

Across our businesses we invest in the full spectrum of asset classes including equity, corporate and government bonds, commercial and residential property and a range of other 'alternative' assets such as infrastructure.

Table 1 and 2 below shows a breakdown of group assets that are relevant for this report by business and by asset type.

Table 1 Total Group Investments

	LGR investments 2018 £m	Other non profit insurance investments 2018 £m	LGC investments 2018 £m	Other shareholder investments 2018 £m	Total 2018 £m
Equities	205	10	2,391	179	2,785
Bonds	57,355	1,869	3,384	488	63,096
Derivative assets	4,393	-	15	3	4,411
Property	2,930	-	125	-	3,055
Cash, cash equivalents and loans	2,294	539	1,633	428	4,894
Financial investments	67,177	2,418	7,548	1,098	78,241
Other assets	91	-	1,117	-	1,208
Total investments	67,268	2,418	8,665	1,098	79,449

Table 2 Direct Investments

	LGR 2018 £m	LGC 2018 £m	LGI 2018 £m	Total 2018 £m
Equities	6	1,124	36	1,166
Bonds	12,716	3	650	13,369
Property	2,930	125	-	3,055
Cash, cash equivalents and loans	-	64	354	418
Financial investments	15,652	1,316	1,040	18,008
Other assets	91	1,117	-	1,208
Total direct investments	15,743	2,433	1,040	19,216

Direct Investments (DI) are assets that are not traded (i.e. listed) on a stock market. They include directly held property, infrastructure assets, venture capital investments and bilateral loan arrangements. These are separately identified in table 2 (above) because the move from listed assets to DI with a focus on urban regeneration, housing and renewable energy is a key objective of the group's investment strategy.

Governance of climate related risks and opportunities

TCFD recommendations addressed in this section

- Describe the Board's oversight of climate related risks and opportunities
- Describe the manager's role in assessing and managing climate related risks and opportunities

Group Board oversight

Overall responsibility for climate change and environmental performance is held by the Group CEO, Nigel Wilson.

Responsibility for consideration of group market risk connected to our investments (including the risk of climate change) is held by the Group CFO, Jeff Davies, who is also a Board member.

Corporate Responsibility and Ethics Committee (GCRE)

The Group Corporate Responsibility and Ethics Committee (GCRE) has been established by the Board. It is responsible for ensuring compliance with the principles of good corporate governance. Its purpose is to develop and review the group strategy and policies in relation to group wide ESG risks and opportunities, including climate change.

The chairman of the Committee (Group Corporate Affairs Director – John Godfrey) reports to the Group Board on any significant issue or corrective action. The Committee's membership includes the heads of key businesses driving the group investment strategy along with heads of Corporate Governance, Sustainability, HR and Community Involvement.

The Corporate Social Responsibility (CSR) strategy is presented to the Board on an annual basis giving the Board's executive and non-executive directors the chance to formally engage with the CSR programme at least once a year. The Committee is then responsible for monitoring and delivering against forward looking targets. The five year plan for the group in relation to low carbon transition was set in 2017 –

https://www.legalandgeneralgroup.com/media/2467/entire_lng_csr17.pdf.

The Environment Committee (GEC)

The Group Board has delegated authority to the Environment Committee (GEC) under the guidance of the Group Corporate Responsibility & Ethics (GCRE) Committee to set the Company's environmental tone and policy in the context of strategy and to set annual targets where appropriate. GEC is then responsible for the monitoring of the implementation process. GEC reports directly into GCRE on environmental key performance indicators (KPIs) and performance against targets.

In order to fulfil its duties, the Committee is able to seek information from any Director or employee of the group and has access to all group records. All employees and directors will comply with all requests made by the Committee.

The Committee is authorised by the Board to obtain outside accounting, legal, or other independent professional advice, where the Committee deems it necessary, at the Company's expense.

Group Asset Liability Committee (GALCO)

On group market risk the Group CFO is advised by the Group Asset Liability Committee (GALCO) which he chairs. A good understanding and monitoring of climate change risk is an important part of understanding market risk.

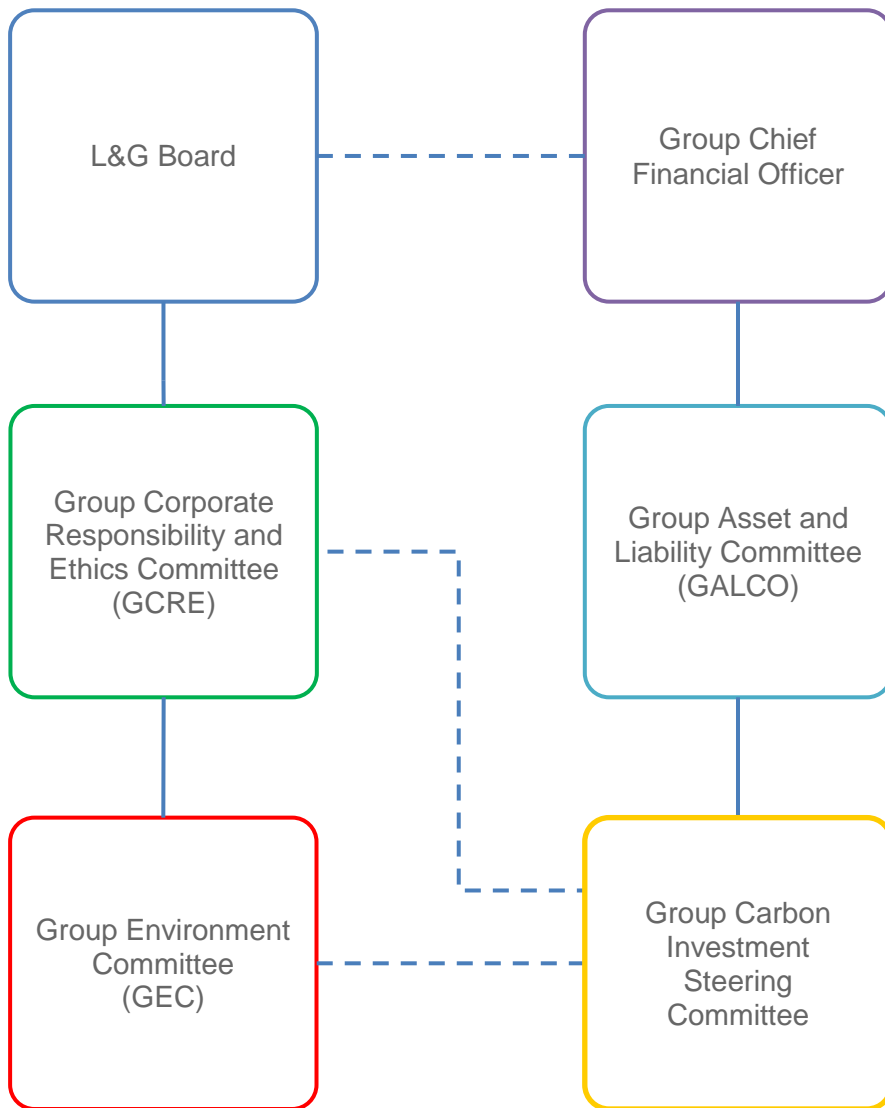
GALCO has established a Group Carbon Investment Steering Committee to undertake a carbon analysis of the group balance sheet, understand the risk concentrations and make detailed strategy recommendations to GALCO.

Group Carbon Investment Steering Committee

The Group Carbon Investment Steering Committee is a sub-committee of relevant members of GALCO and the GEC that has been established to advise the Group CFO. The Committee supports the Group CFO by providing analysis and management information on climate change risk to the Group exposed balance sheet.

The Committee is an advisory Committee to the Group Asset and Liability Committee (GALCO), the Group Corporate Responsibility and Ethics Committee (GCRE) and the Group Environment Committee (GEC).

Chart 1 Committee interactions and relationships



Role of LGIM

LGIM's commitment to address climate change and to finance the low carbon opportunities on behalf of all its clients is outlined in the separate LGIM TCFD provided.

The Group Board fully supports LGIM leadership in addressing the risk of climate change and group funding has been instrumental in helping to establish the LGIM Future World range of funds.

Investment Management Agreements (IMAs)

We are proposing to embed a focus on climate change risk in the Investment Management Agreements (IMA's) that group businesses have with LGIM and other fund managers.

These will focus on:

- 1) Environmental, Social and Governance reporting requirements and aligning to the TCFD recommendations,
- 2) Constraints on companies involved in coal extraction and coal-based electricity production and
- 3) Constraints on stocks excluded from the LGIM Future World portfolio.

The constraints are planned to be agreed and incorporated into all segregated group investment mandates over 2019.

Strategy

TCFD requirements addressed in this section:

- a) Describe the climate related risks and opportunities the organisation has identified over the short medium and long term
- b) Describe the impacts of climate related risks and opportunities on the organisations business strategy, and financial planning
- c) Describe the resilience of the organisations strategy taking into consideration different climate related scenarios, including 2 degrees or lower scenario

We recognise there is more to do before we meet the TCFD guidance in full. We have a clear understanding of both the risks and opportunities associated with climate change and have set out below a range of case studies of how we are repositioning our portfolio to mitigate the climate change threat. However, we recognise that we are not yet in a position to *quantify* our resilience to a wide range of possible outcomes including the 2°C. We are committed to developing this analysis as set out in the next steps section of this document.

Corporate mission

“Our purpose is to improve the lives of customers, build a better society for the long term and create value for shareholders. This shapes every aspect of how we do business”

Investment philosophy

We have a concept of ‘patient capital’ that drives our investment philosophy and time horizon. It is firmly embedded as part of our investment approach and culture that we take the long term view. It is the views we have on key structural issues like climate change, demographics, future cities and changes in technology that are the key drivers of our group investment strategy.

We believe that this approach not only makes sense from an investment perspective but has broader benefits for society. We are investing for a positive economic and social impact and we make sure there are positive benefits to society in what we do.

Carbon reduction commitments

We are fully committed to a 2°C pathway and have an important role in the transition to a low carbon economy. We can run our own business in an environmentally sustainable way, create products and services that support a low carbon future, influence the companies we invest in and ensure that our property investments support the aim to limit climate change. These steps are fundamental to the long term success of our business as well as helping to deliver a low carbon economy.

We have also committed to targets aligned to the UN Sustainable Development Goals (UNSDGs) as follows:

Table 3 Targets from UN Sustainable Development Goals

Target	Deadline for delivery
As a group, we will continue our strategy to invest £15 billion into sectors of the economy that are economically, socially and environmentally useful.	2019
Develop investment solutions via LGIM that are more clearly aligned to the UN Sustainable Development Goals (SDGs).	2023
LGIM will develop and enhance long-term investment offerings which integrate ESG themes.	2023
Legal & General Capital will enable over £10 billion of funding into small to medium sized enterprises (SMEs), supporting job creation and economic growth.	2023
As a group, we will expand our divestment strategy from shareholder funds to investing in new economy assets.	2023
As a group, we will support at least one development of a new economy asset classes to create economic and social value to our communities through mechanisms such as Social Stock Exchanges, Incubators and Community Share Schemes.	2019
By 2021 as a group, invest in major regeneration schemes in at least ten UK cities.	2021

These are described in more detail in our video “Investing in a Sustainable Future World” and in our CSR Report. These are found here:

<https://www.legalandgeneralcapital.com/media-centre/videos/lg-capital---media-centre---videos---legal--general-investing-in-a-sustainable-future-world.html>

https://www.legalandgeneralgroup.com/media/2467/entire_lng_csr17.pdf

Operational footprint

We manage and report on our operational CO₂e. We have set targets for a reduction in carbon emissions per policy, reductions in carbon emissions from our property portfolio and for investments in UK renewables and associated key technologies.

We have management systems and processes in place to minimise the impacts from our operations and we report our performance annually in our CSR report².

² An important part of the CSR Report is the commitment to using 100% renewable electricity in our businesses (the RE100 initiative)

Climate change risks and opportunities

Our investment strategy is focussed on getting the strategic big picture right. A detailed understanding of key themes that are driving the growth and mix of economic output is therefore important to us and climate change is one of those themes. This is consistent with our longer term 'patient capital' philosophy.

In the near term, we believe the key risks posed by climate change to our investments are transitional. These arise from technological and regulatory developments in connection with the necessary transition to a lower carbon world.

Over the long-term, we expect physical risks to be more pronounced. Clearly the severity of such physical risks will be dependent on the extent to which global decision makers are successful in curbing greenhouse gas (GHG) emissions.

Physical Risks

The physical risk of climate change arises from the increased severity of extreme weather events.

In our internal risk assessment, we define these as: Physical risks from climate change arise from a number of factors, and can be related to specific weather events (such as heat waves, floods, wildfires and storms) and longer term shifts in climate (such as changes in precipitation and extreme weather variability, sea level rise and rising mean temperatures).

This manifests itself in damage to property and asset write-offs and higher capital costs particularly in high risk locations. Physical risk can also be expected to increase insurance premiums and potentially reduces the availability of insurance.

All these factors will increase the on-going cost of commercial activities which can be expected to adversely impact asset valuations. The impact of physical risks may be realised through:

- One-off impacts after which productive capacities and markets recover. These types of risks can manifest themselves through losses in cash flows in the short-term as well as through 'recovery costs' and additional adaptation costs.
- Permanent impacts on cash flows with no recovery or adaptation costs, but more long-term impacts in terms of lost cash flows.

The extent of these impacts is dependent on the climate scenario. We would anticipate lower physical impacts to be associated with scenarios where comprehensive climate regulation is enacted, in the UK and globally.

The IPCC published a number of scenarios of potential warming outcomes, known as Representative Concentration Pathways (RCPs). These scenarios are useful for assessing both the physical and transition risks associated with climate change, the most relevant of which are:

- Ambitious mitigation (RCP2.6) – action is taken in line with the Paris Agreement to limit global warming to less than 2 °C. This scenario has the least severe physical effects.
- Intermediate (RCP 4.5 and RCP 6) – action is taken to limit GHG emissions, but it is too little, too late to meet the Paris Agreement. The median outcome is an increase in global warming of 3 °C, which is associated with more severe physical impacts.
- Business as usual (RCP 8.5) – only limited measures are taken to reduce GHG emissions and these continue to rise in line with growth in the global economy and population. The median outcome is warming of more than 5°C, which is associated with extreme physical effects.

There is a high level of uncertainty associated with both the extent of warming and the degree of physical effects under each scenario. For example, an emissions reduction trajectory that follows the intermediate pathway could still result in warming of 4°C.

In addition, there are a number of physical tipping points that, if breached, could exacerbate warming and frustrate attempts to arrest it. Part of the reason for including 1.5°C within the Paris Agreement text is because climate scientists consider this to be the upper limit of warming that is ‘safe’, i.e. to avoid the worst effects of climate change and breaching tipping points.

Physical risk will impact Legal & General balance sheet in three ways.

1. Direct Property and Infrastructure holdings

Our real estate (housing and commercial property) and infrastructure assets could be impacted by extreme weather events and rising sea levels/flooding. This risk could either be directly owned because we own the property or indirectly owned where the asset is security for a loan. In this case the risk of flooding reduces property values, which in turn reduces the security held for the loans (i.e. increases the Loan to Value Ratio -LTV) and therefore reduces the expected recovery in the event of default.

Flood and environmental risks are considerations within the LGIM real assets investment approval process, where there is a presumption against investment in areas of high flood risk or with environmental contamination. All directly LGIM managed real estate assets are fully insured. However, if physical effects worsen over time, insurance premium increases can be expected, or in extremis insurance could be difficult to obtain and/or prohibitively expensive.

2. Asset devaluation

Our asset portfolio is also exposed to physical risk through our investments in companies that are exposed to damage and disruption from adverse weather events. The physical effects of climate change are likely to have an adverse financial impact on a wide range of companies through disruption to supply chains, damage to infrastructure and increased production costs (particularly for the food and beverage sector, as crop yields decline).

As a general observation our clear bias in term of asset mix is towards fixed income securities (around 80%) which are a lower risk asset class relative to equity. We acknowledge that the equity and debt connected with a particular issuer are likely to be correlated with respect to climate risk but the price impact on debt will generally be lower.

We take these risks into account as part of our investment decision making process but there is more to be done to fully understand these risks. We are in the process of developing further analysis that considers different climate scenarios. An aspect of this will be to strengthen the mandate with LGIM to incorporate additional ESG assessment and reporting.

3. General Insurance risk

Climate change will directly impact the liabilities of our general insurance business (specifically our housing insurance) through the claims process.

The impact of climate change on our insurance risk is uncertain. Our biggest weather risks are damage caused by windstorm, flood, freeze and subsidence. The weather in the UK is influenced by weather patterns over the Atlantic and the jet stream. Climate change could lead to a warming of the UK. We'd expect this to increase windstorm activity and lead to increased losses from this peril. Subsidence events could also become more frequent and severe if summers become warmer and drier. Conversely losses from the freeze peril would be expected to decrease if winters become warmer. There is also an argument that melting ice from the Arctic could weaken the jet stream and lead to a cooling of the UK. In this scenario the opposite would be expected to happen with fewer windstorms being brought over the UK by the jet stream and increased freeze losses.

Recent windstorm activity in the UK has been benign with the last major windstorm occurring in 1990. The period from 2000 to now has seen few large storms. Some analysis suggests this is due to oscillation in weather patterns over the Atlantic with windstorm activity expected to return to long term average levels. A repeat of either of the windstorms from 1987 or 1990 would produce losses far in excess of any weather event loss suffered since 2000.

The insurance contracts we write are all for a maximum of 12 months meaning long term climate change trends will have limited impacted in the short term. Our approach is to price for the riskiness of the policy for Storm, Flood and Freeze losses for the period covered by the policy.

However changes need to be monitored in order to ensure our pricing and risk selection remains appropriate. To do this we use the RMS external catastrophe model. RMS models are used all over the world to model all kinds of natural catastrophe. The main model users are insurance and reinsurance companies and therefore, given insurance policies tend to be 1 year, they attempt to capture short term forward looking risks. The model is typically updated every 2-3 years and RMS employ a range of experts from climatology to engineering to develop 'event set', 'hazard' and property 'vulnerability' modules. These modules, in combination with data on each property insured, can be combined to estimate the insurance loss for a given portfolio of risks. The event set is a combination of historic scenarios and potential scenarios created by RMS. It is a stochastic model so can generate potentially millions of simulations.

The model is regularly updated. We review new releases and, if appropriate, move to the latest version subject to Prudential Regulatory Authority (PRA) model change approval.

4. Life Assurance risk

We believe there will be a causal positive correlation between global warming and higher mortality leading to higher claims costs. A plausible connection is through colder winters, hotter summers, increasing storms and the spread of some vector borne diseases. In the west this will likely be mitigated by protective action and healthcare systems.

We seek to understand the underlying causes of changes in claims experience and this includes the impact of weather and other factors linked to climate change.

Transitional Risks

Transition risk can be broadly defined as economic and financial risk associated with the transition to a low-carbon economy.

Our internal risk assessment recognises this as: – Transition risks can arise from the process of adjustment towards a low-carbon economy. This adjustment is influenced by a range of factors including: climate-related developments in policy and regulation, the emergence of disruptive technology or business models, shifting sentiment and societal preferences, and evolving evidence, frameworks and legal interpretations. This could prompt a reassessment of the value of a large range of assets and create credit exposures for banks and other lenders as costs and opportunities become apparent.

In the long term as a global investor Legal & General stands to benefit from comprehensive regulatory action to limit climate change, as failing to keep temperature rise below 2°C above pre-industrial levels would result in significant damage to the global economy and financial markets. In the near to medium term the transition from a high to a low carbon economy presents risks to our portfolios. Transition risk is likely to peak within the next 5 to 10 years, as this represents the critical period for agreeing actions to meet the Paris Agreement target.

As with physical risks we can categorise the areas where transitional risk may be realised, examples from TCFD guidance include:

- Policy and legal (emission pricing, reporting costs, new regulations on products, exposure to litigation)
- Technology (substitutions, unsuccessful investment in new tech, cost of transition)
- Market (changing customer behaviour, uncertainty in market signals, increased cost or raw material)
- Reputation (shift in consumer preference, stigmatisation of sector, increased stakeholder concern/ negative feedback).

According to a Bank of England report from September 2015, it has been estimated that around a third of the world's equities and bonds are linked to high-carbon sectors that could suffer losses in value from this transition. Decarbonisation is set to have significant implications for high-carbon sectors, most prominent among which are the fossil fuel, power and transport sectors, contributing the majority of global GHG emissions. In particular, according to the International Energy Agency (IEA), energy-related GHG emissions need to fall by nearly half of 2017 levels by 2040 and reach net-zero emissions by 2070 in its Sustainable Development Scenario (SDS).

As the economy decarbonises, companies that fail to properly anticipate this transition are set to be exposed to economic risks. Companies well-prepared for this transition in turn are set to capitalise from this economic opportunity. Similarly, economic risks may translate into financial risks and more volatility in financial markets if these risks are not properly anticipated and therefore discounted in current pricing.

The greatest impact will be on the global power industry. The world's energy system is decarbonising driven by a government policy response to climate risk demand for energy security and the falling costs of technologies such as renewables and batteries for energy storage. There is a risk that new-build fossil fuel infrastructure could become obsolete or uneconomic in the future as the drive to cut emissions and increasing availability of alternatives reduces demand (asset stranding).

The speed at which the low-carbon energy transition takes place will have a significant impact on both the value of fossil fuel reserves, and on companies which depend on fossil fuels as a key input to their products or services, such as carmakers, airlines and electrical utilities. It is therefore important that as well as measuring and monitoring carbon emissions we also measure risk in terms of the portfolio reserve exposure.

As the negative effects of rising temperatures becomes more apparent, those sectors viewed as mostly responsible for global emissions could increasingly find themselves the subject of legal action or consumer boycott. This is particularly true for companies involved in the production of fossil fuels. Such risks may also extend to Legal & General and other large institutional investors in fossil fuels.

Consumer behaviour is changing and will continue to do so. Examples include growing urbanisation with consumers choosing public transport over personal automobiles, decentralisation of electricity grids, a change in attitude to plastics and plant based diets. These changed behaviours are likely to be reflected in changes in regulations and the law such as a phasing out of internal combustion cars in cities, a halt in deforestation or the introduction of carbon taxes which could alter the valuation of companies materially.

A risk for us is where we are invested in businesses that are not adapting their business strategy at the appropriate rate and therefore stand to see their assets lose value in the transition. For example, an automaker seen as a laggard in the transition towards electrical vehicles may see its value eroded, as would a European utility investing in coal power generation when carbon prices on the continent are on a steep upwards trajectory.

This risk is mitigated if we can identify which sectors or companies within a sector are best placed to manage more stringent regulatory requirements and quickly adapt their business accordingly.

This report does not provide specific estimates as to the potential loss in value that may be realised in the portfolio should these risks materialise which is associated with significant uncertainty and modelling complexity. For any individual security, the potential loss may range from 0 to 100% and may even be associated with positive returns, depending on the adaptive capacity of the company and the anticipation of the trend by financial markets.

As described, most of our assets are bonds (c80%) which rank above equity in the capital structure. So while the value of both the debt and the equity are likely to be impacted in a similar way from climate related risk events, generally bonds are less risky than equity.

A more detailed assessment of asset risk in a range of warming scenarios is planned during 2019.

Transitional Opportunities

The transition to a low carbon economy creates significant investment opportunities. A successful transition will need a fundamental change in the way we consume and produce energy over the next 20 years. As technology advances up to 50% of global power could be generated by renewable energy by 2035³.

In Europe and the UK aging power generation assets will need to be replaced with clean energy generation requiring substantial capital investment. At the same time, the market is faced with an opportunity to find efficiencies that further reduce overall energy demand. As energy is usually the highest contributor of businesses' fixed costs, any gains from efficiencies are an attractive option.

In 2017, the price tag of keeping global temperature rise well below 2°C was estimated at \$2.4 trillion⁴, presenting investors with significant opportunities to direct capital flows towards low carbon emitting investments.

We are making direct investments to address the major elements of the energy system where immediate investment in new systems, technology and infrastructure is required to transition to a low carbon future.

This includes:

- a) Clean energy generation (including renewables like solar, wind and nuclear fusion; technology such as batteries and heat pumps; smart grid digital management and energy efficiency improvement);
- b) Transport and mobility (electric vehicles and supporting charge infrastructure);
- c) Housing (moving towards zero carbon homes)
- d) Commitment to LGIM Future World product range and strategy

³ source – McKinsey Energy Report 2019

⁴ source – McKinsey Energy Report 2017

Examples of Legal & General Group Plc investing in new technologies

a) Renewable Energy

Onshore Wind

In many markets onshore wind is the lowest cost way to generate renewable power and therefore LGC has invested to support the development, construction and operation of this global leading renewable technology.

LGC owns a 25% share in NTR Asset Management Europe a clean energy asset manager and we made a €100 million commitment to their first fund in December 2015. The fund raised €200 million in equity and the investment period is now complete with around 82% of commitments deployed into 12 construction wind farm assets in the UK & Ireland. Total capacity is 223MW, enough to power 150,000 homes.

We recently made further commitment to match 20% of all commitments up to a maximum €100 million in a second fund, which is targeting €500 million equity investment in solar PV, onshore wind and energy storage assets in European markets. The second fund will also be more focused on the development and construction of new renewable power assets.

When fully invested Funds 1 and 2 will own approximately €1 billion of onshore renewable energy assets.

In addition, whilst direct investment in the construction of new renewable energy assets can take a year or two to complete, we have invested c£146m in closed end listed funds focused on operating wind and solar power production.

Further, LGR have provided £710 million of debt financing into off-shore wind infrastructure. We supported the long-term debt financing of Global Infrastructure Partners 50% acquisition of the Hornsea Project One offshore wind farm. The financing will enable the construction of what will become, the world's largest offshore wind farm project, powering over 1 million homes. This will provide an export capacity of 1,200 megawatts, providing enough power for over 1,000,000 UK homes.

In December 2018, LGR also entered into a joint venture in Dudgeon Offshore Wind Ltd, located off the East Coast of England, producing enough electricity to power 410,000 homes.

These complement the financing of the Walney Extension offshore wind farm made in 2017. These three wind farms combined have the capacity to provide enough power to service over 2,000,000 homes.

Solar Photovoltaic (PV)

Solar PV is fast becoming one of the lowest cost renewable energy sources and presents useful benefits to society, for example in terms of its technology characteristics (no moving parts) and its different applications (large scale plants and individual rooftops). Whilst costs have fallen significantly, solar PV is not yet as cost competitive as wind in many parts of the world.

Oxford PV ('OPV') is a UK-headquartered solar perovskite technology company that develops breakthrough, high-efficiency solar PV products.

OPV's first product is a perovskite-silicon tandem PV module which can produce substantially more power than a typical silicon PV module of the same size. If successfully commercialised, OPV technology could significantly improve the economics, practicality and availability of renewable solar power at a global scale.

LGC first invested in OPV in 2016 and has subsequently invested more capital in 2018 to support the research, development and commercialisation of this technology.

In addition, LGR provided £36 million of finance in 2018 to support a fully operational portfolio of around 13,250 residential rooftop systems (providing 94% of total capacity) and 2 commercial systems (providing 6% of total capacity) giving 40.4MWp (megawatt-peak) spread out across the UK. These supplement the £138 million of debt financing invested in this sector to date.

Tokamak Energy

Tokamak Energy is striving to harness the significant potential of fusion power to deliver an abundant, safe and cost-effective source of clean energy on a global scale.

LGC has invested in the business since 2016 to help finance the research, development and engineering of the technology being led by a team based in Oxford, UK.

Upside Energy

LGC recognises that there are many changes to be addressed as the energy system transitions towards more clean and renewable sources of energy. For example, as more renewable power is delivered to power grid systems, there is a need to use this power in the most effective way and match the variable nature of the generation, with the profile of consumption.

Upside Energy has developed a digital software platform that uses advanced algorithms and artificial intelligence to match energy demand with the available supply, helping the electricity grid deal with fluctuations and times of peak usage. Supporting the grid in this way reduces energy costs and carbon emissions and helps to create a more sustainable and efficient power network.

b) Transport and heat

Two of the major sources of GHG emissions, especially in the UK and Europe, are heat derived from fossil fuels and transport. We are therefore actively engaged in assessing investment opportunities to support the electrification of transport and reduction of GHG emissions due to heating in homes and offices.

Pod Point

The majority of new vehicles sold a decade from now will be electric vehicles (EV's) which are likely to reach cost-parity within the 5 years. Petrol and diesel cars will increasingly be seen as socially unacceptable in the coming decade and, once a certain level of EV uptake is reached, the internal combustion engine will be seen as obsolete technology, accelerating the switch.

Pod Point provides EV charging units and management software to households as well as to companies wanting to provide EV charging capability for their customers, visitors or employees. The focus is on convenience which means drivers can recharge their cars at home, or top-up whilst shopping, at the gym, or theme park. This strategy also aligns well with the activities of our wider businesses, specifically the residential, retail, leisure, commercial and industrial property portfolios. We think this is an attractive segment and the convenience trend in charging will be encouraged as the driving range of a typical EV increases.

c) Housing

Meeting government policy targets and growing consumer demands requires highly efficient, near zero carbon, homes. To ensure that our Homes businesses are part of this solution we have a target to develop low carbon, energy efficient homes in our housing businesses.

We construct new homes to meet the latest standards contained within the Building Regulations, in line with government policy on low carbon homes. The carbon compliance standard within these regulations was introduced in 2006 and since then has been tightened by around 30% in progressive steps in 2010 and 2013. A number of strategies are possible to ensure that this target is met – we operate a dual approach which concentrates on improvements to the fabric of the dwellings, as well as incorporating new technologies. For example we've included solar PV, solar thermal, air source heating and shower save into the construction of 462 of our CALA Homes properties. This dual approach, focusing first on the thermal performance of our homes, builds in energy demand reduction to the lifetime of the buildings, delivering long term carbon reductions and homes that are cheaper to run.

d) Group support for LGIM Future World Range

We have demonstrated our strong support for LGIM Future World Range of investment funds by investing around £450 million of our own capital⁵. The range has a strong focus on ESG scoring to identify material risks and an active engagement policy with some of the world's largest companies to drive change and raise standards.

The Future World Fund range has the following ESG policies:

1

LGIM's Climate Impact Pledge.

A targeted engagement process with Companies identified as critical to meeting the aims of the Paris Agreement. We may divest from companies that do not meet minimum standards after engagement

2

Coal Mining.

Coal is at increased risk of their assets being stranded due to the transition to a low carbon economy. Therefore the Future World Funds will not hold 'pure' coal miners

3

Controversial Weapons

Controversial weapons are those that have an indiscriminate and disproportionate humanitarian impact, in many jurisdictions their use is illegal. The Future World Funds will not invest in companies involved in the manufacture and production of Controversial Weapons

4

United Nations Global Compact.

The UNGC's principles set globally accepted standards on human rights, labour, environment and corruption. Companies that have violated these principles consistently for three years or longer will not be held within the Future World funds.

⁵ As at 31 December 2018

Risk management

TCFD Recommendations addressed in this section:

- a) Describe our processes for identifying and assessing climate related risks
- b) Describe our processes for managing climate related risks
- c) Describe our processes for identifying, assessing and managing climate related risks are integrated into the organisation's overall risk management

We have a formal framework for risk management policies in place, which sets out approaches to managing different types of risks and defines the minimal control standard over the short, medium and long-term. These can be broken down into four key areas where we capture information as a business and use it to influence our strategy and policies:

1. We will decarbonise the assets on our balance sheet and we have set long-term targets on our own energy usage. By 2020 we want to 'reduce carbon emission per policy by 20% based on 2013 baseline'.
2. For our commercial property portfolio we set carbon reduction targets and monitor through our managing agents.
3. We are committed as a long-term investor in UK renewables and associated key technologies. We have a target to increase investments into UK energy infrastructure with our own money and that of our customers to support the transition to a low carbon economy over the next three years.
4. Through LGIM we will use our influence with companies as a large investor, specifically on environmental issues and transition to a low carbon economy. This will be enforced through changes in the Investment Management Agreements (IMA's) that exclude pure thermal coal and constrains investment in stocks excluded from the Future World investment range.

The focus on these areas helps us mitigate climate risk in the short term and our on-going monitoring and portfolio activity is described in the previous sections. However we need to improve our risk metrics to fully understand the impact of climate risk over the medium and long term. Central to this is a capability to model the impact of various forward looking scenarios on both individual assets and the total portfolio level. The area is complex and we have yet to see a convincing model that is based on solid analysis and data points. We will work with LGIM during 2019 to develop our own energy model.

Climate risk metrics and targets

TCFD Recommendations to be met in this section:

- a) Disclose the metrics used to assess climate related risks and opportunities in line with strategy and risk
- b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions, and the related risks
- c) Describe the targets used to manage climate-related risks and opportunities and performance against targets.

Carbon dioxide is the most significant contributor to global GHG emissions (these consist also of methane, nitrous oxide and fluorinated gases). In order to align all emissions under the same metric all GHG emissions by companies are measured in CO₂e which is carbon dioxide *equivalent* measured in tonnes. This measures the equivalent warming impact of GHG emissions.

There are broadly three types of carbon emission as described below.

Direct and indirect emissions

Scope 1 emissions occur from sources that are owned or controlled by the reporting company, and are therefore also called direct emissions.

Scope 2 emissions are indirect emissions from the consumption of purchased electricity, steam, heat, or cooling (collectively referred to as “electricity”).

These emissions are considered indirect because the emissions are a consequence of activities of the reporting organisation but actually occur at sources owned or controlled by another organisation (in this case, at an electricity generator or utility).

Scope 3 emissions are all other indirect emissions that occur in a company’s value chain. This includes extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services.

While scope 1 and 2 are disclosed relatively widely and the data quality can be measured to some extent, scope 3 is very patchy in disclosure and there are no consistent disclosure methodologies. It is also plausible to argue that in many cases a company has more influence on its scope 1 and scope 2 emissions.

There is no agreed or perfect way to ‘footprint’ a portfolio and understand carbon risks. It requires a combination of quantitative and qualitative assessments. This is because a large investment portfolio like ours contains lots of different kinds of companies whose business operations can be vastly different from each other.

The simplest carbon measure is total carbon emissions expressed in tonnes of CO₂e but this figure is an absolute and not normalised for the size of the company or investor. It is therefore reflective of the portfolio or company size rather than a genuine measure of carbon intensity. It does not allow for comparisons across companies, portfolios or against a benchmark (which we want to do).

To measure our footprint we have therefore normalised individual stock emission data by dividing company emissions (scopes 1 and 2) by the market capitalisation of each company. We then considered the portion of carbon footprint we 'own' given the size of the investment we have in the company. Our preferred metric is therefore tonnes of CO₂e/£1m investment which can be applied to the company, sector or portfolio level for comparative purposes. It attributes the carbon emissions of the issuer to each investor based on its ownership, normalised for the size of the investment.

If we want to know total portfolio emissions we can simply multiply the preferred metric by the portfolio size (in £m).

This approach is consistent with the S&P Global approach of carbon efficiency, demonstrating that the method is based on the principle of ownership, and gives an indication of carbon efficiency with respect to shareholder value creation.

Link: <https://www.trucost.com/trucost-news/sp-dow-jones-indices-debuts-carbon-metrics-on-indices/>

Link: <https://us.spindices.com/documents/research/research-carbon-scorecard-april-2016.pdf>

We accept there is an element of double counting across the portfolio (Scope 1 generation by one company can also be included in scope 2 energy purchased by another).

The carbon intensity of Group assets

What gets measured can be managed and understanding the emissions from our portfolio is the starting point for determining a trajectory to a sustainable position.

The analysis below has captured 96% of total group exposed assets and we are confident that we have not left anything out that is material in the sense of having a high carbon footprint⁶.

We have calculated the total carbon footprint (tonnes of CO₂e/£1m) using carbon data sourced from Trucost and applying supplementary input from Bloomberg, and effective proxies, stock comparators or sector averages, where appropriate.

To complement the emissions data and corroborate the intensity concentrations we have incorporated an analysis of carbon reserves to identify where the risk of stranded assets is highest.

This remains work in progress. Improving our granular coverage, widening the definition of emissions and broadening the range of warming scenarios will be a focus over the next year.

Methodology

Our key input is the Trucost dataset that covers c13,000 companies. The data gives coverage of about 30% of our portfolio.

We have applied the emission data equally to equity and bond assets. This is an enterprise value approach, the rationale is simply that all capital raised by corporates both equity and debt is used to fund the operations and assets of the business.

Where we don't have Trucost data we have applied alternative sources in the following order 1) Bloomberg 2) a suitable stock proxy 3) a sector average (smaller holdings) 4) a judgement on where the stock sits within the sector range (larger holdings)

For government and quasi government bonds we apply the total outstanding debt held within the c£80bn of Group exposed assets to total country emissions sourced from EDGAR – the Emissions Database for Global Atmospheric Research – European Commission.

⁶ The analysis excludes assets held in the Legal & General Pension Fund, the housing businesses, Direct Equity Investments and approx. £1.2 billion of assets managed with Fund Managers outside of LGIM.

The carbon analysis of our property portfolio is a judgement based on a number of sources;

1) Global Real Estate Sustainability Benchmarking (GRESB) – occupier data collection. As part of our occupier liaison processes we currently receive operational data for approximately 30% of our occupiers. This data cannot be verified, so can only be taken as an indication of the carbon emissions within our property portfolio.

2) Chartered Institute of Building Services Engineers (CIBSE) and Better Buildings Partnership's Real Estate Environmental Benchmarks (BEEB). Another method is to use industry standard benchmarks. Energy (and carbon) benchmarks for various types of property have been published in the UK for over 20 years, originating from the Energy Efficiency Best Practise (EEBPp), a government funded programme to improve the energy efficiency of the current property stock. The most recent update to these benchmarks was undertaken by the CIBSE and can be found in their Technical Memorandum 46: Energy Benchmarks 2008.

3) In addition the Better Building Partnership , a voluntary group comprising 27 of the major landlords in the UK, have established more recent benchmarks for particular types of commercial buildings, predominantly offices and shopping centres (<http://www.betterbuildingspartnership.co.uk/node/129>).

By using a combination of these benchmarks we establish an indicative magnitude of the carbon emissions associated with all our direct property investments and also identify which property sectors are on average most intensive in terms of carbon emissions.

We have assumed that no emissions apply to the cash and derivative exposures.

Carbon intensity (Group assets)

Table 4 shows the broad output of the carbon analysis of group assets by asset type and business:

Table 4 Carbon emission intensity by asset class and business

Carbon footprint contribution (CO ₂ e / £1m invested) as at 31/12/18				
	LGR	LGC	LGI	Total
Equities	0.0%	1.4%	0.2%	1.7%
Bonds	93.4%	2.0%	2.7%	98.1%
Property	0.3%	0.0%	0.0%	0.3%
Total Investments	93.7%	3.4%	2.8%	370.22
<i>YE17 Measurement</i>				486.87

The 2018 carbon emission intensity of the balance sheet is 370.22 tonnes CO₂e per £1m invested. When applied to the equity, bonds and property components of Group assets this gives total CO₂ emissions of approximately 26 million tonnes.

This 2018 measure of intensity of 370.22 is down 24% from the previous year (486.87) albeit the footprint data at that time was limited to just £25bn of Trucost data extrapolated across the full balance sheet. Whilst the Trucost data covers the key emitting stocks and sectors the lower coverage brings uncertainty to the year on year comparison.

In the table we can see that the vast bulk (approx. 98%) of group carbon footprint comes from bonds as an assets class. This simply reflects the importance of the asset class on our balance sheet. Bonds comprise approximately c80% of the investment portfolio measured by market value.

Given that LGR is the largest holder of assets and most of these are bonds to back the annuity business it follows that LGR is the largest business contributor to the total group carbon footprint.

The charts below show the split of group asset emissions by sector:

Chart 2 Contribution to Group Carbon emissions by sector

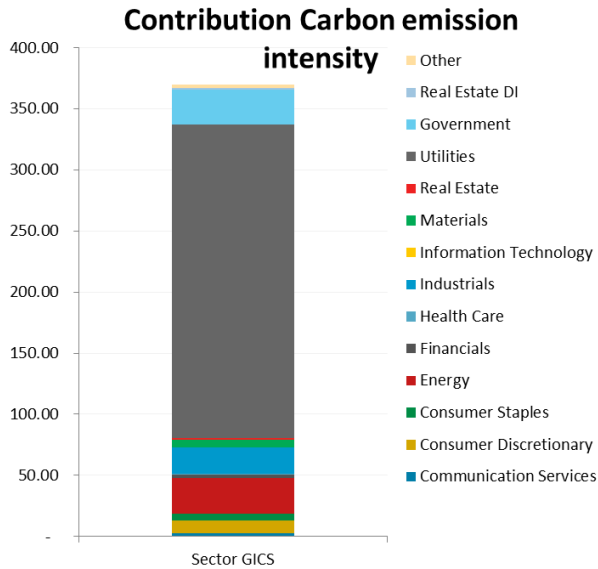
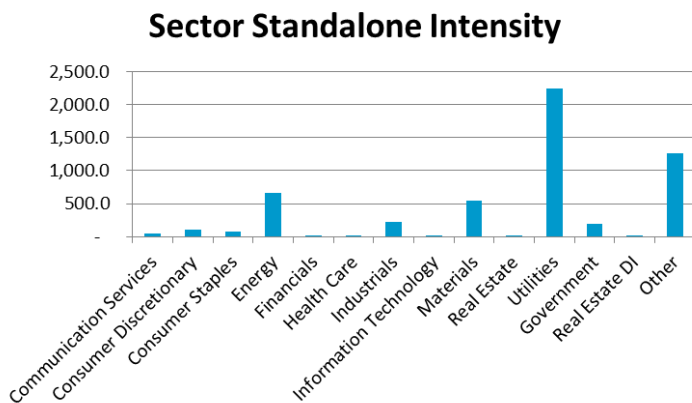


Chart 3 Standalone sector carbon emission intensities

The table below shows the carbon intensity of industry sectors. We refer to these as 'standalone' intensity values because they are not weighted by their sizing in a portfolio.



The utilities sector is the main driver of the group carbon footprint accounting nearly 70% of the total. This is consistent with the utilities sector being the most carbon intensive on a standalone basis.

Within the top 20 largest contributors to total carbon intensity, 18 holdings are utilities. These 20 stocks account for a significant portion of our total carbon footprint.

The “Other” category contains a handful of small holdings so does not materially contribute to the total footprint.

Further sector analysis to identify key sub-sectors while considering multiple warming scenarios is a focus for us over the next year to identify effective transition strategies.

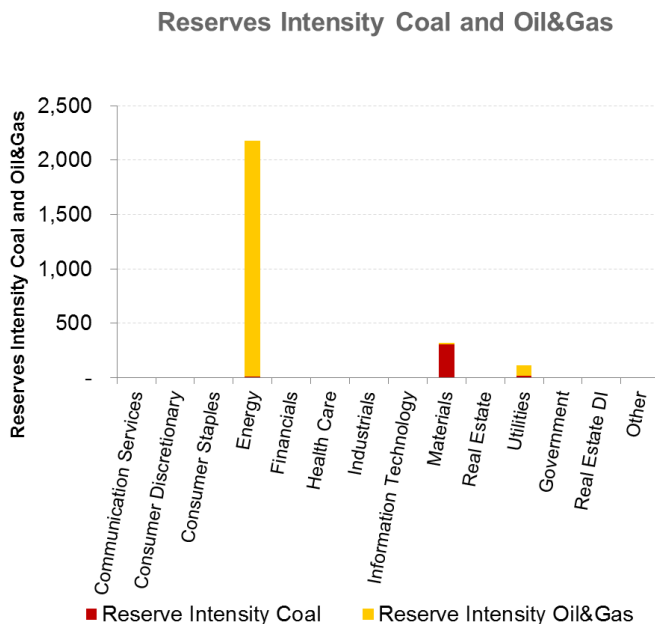
Coal, oil and gas reserves analysis

The emissions figure indicates the current operational corporate impact. On the other hand, carbon reserves indicate the fossil fuel assets owned by a company which will become future emissions. These are coal, oil and gas assets that are still in the ground where the intention is to extract them and sell them in future years.

The reserve information is important to understand the exposure of each portfolio to the changes in demand for fossil fuels. As it currently stands, if we were to meet the international carbon emissions targets some of these reserves could not be burned and therefore would become ‘stranded’ This is a significant risk to us as investors and the reserve position of the large international oil and gas companies in our portfolio is included in our analysis.

Therefore in addition to carbon emission foot printing, we also have considered our exposure to coal, oil and gas reserves. From our core measured data, we are also exposed to 2,630 tonnes of coal, gas and oil reserves with 85% of this exposure concentrated in just 10 issuers.

Chart 4 Breakdown of reserves intensity to Coal, Oil & Gas



By reserves the concentration is in the Energy sector. It is important to note here that we also have limited exposure to coal reserves, with the vast majority of this exposure arising in the materials sector. The risk to reserves will be brought into our scenario stress testing this year.

Setting targets

Achieving alignment with less than 2 degrees of warming by 2040

Methodology

Analysis by the International Energy Agency (IEA) (table 5 below) shows that aggregate global carbon emissions need to come down by c46% by 2040 to meet the 2°C pathway. It is clear that the focus for emission reduction is in the power generation (mainly coal) and Oil and Gas sectors where the reduction needs to be much higher.

Table 5 IEA meeting the 2°C pathway

	CO2 equivalent			
	2017	2 degree target 2040	Reduction	Reduction %
Coal generation	10.54	1.08	9.46	89.8
Gas generation	2.96	2.16	0.8	27.0
Cars	3.08	1.54	1.54	50.0
Trucks	2.21	2.1	0.11	5.0
Steel	2	1.29	0.71	35.5
Cement	2.69	1.94	0.75	27.9
Oil and Gas	2.64	0.54	2.1	79.5
Buildings	3.38	2.3	1.08	32.0
Other	9.3	8.16	1.14	12.3
Total	38.8	21.11	17.69	45.6

We can think of the required reduction to our carbon footprint in the context of the current global industry mix that is driving carbon intensity and total emissions. This start point 'current global industry mix' can be seen as the reference point from which we can gauge our own balance sheet position and where we need to make changes.

We are still developing this global reference point. We have considered a number of global equity and bond indices but these raise further issues on how we ensure that we have appropriately captured our balance sheet exposures not least how we would adjust these assessments for the fact that listed indices do not contain some of the world's largest emitters⁷.

Until we are confident that we have found something better, a key assumption we have made is that the sector mix on our current portfolio is broadly representative of the IEA 2017 start point.

The implication of this, and our current working hypothesis, is that by 2040 our portfolio carbon footprint needs to reduce by c46%.

The important point is that while there is some uncertainty around the metric, we have a good enough understanding of our carbon footprint to make progress and move in the right direction now.

⁷ For example China, Russia, India and Poland Coal, ARAMCO (Saudi Arabian Oil) and the National Iranian Oil co.

Implementation

There are two important levers we can pull to get the desired outcome, *engagement* and *portfolio transitioning*.

Engagement

Part of the desired transition will be driven by changes generated in the underlying companies themselves as they move to realign their own businesses to get on a sustainable path. Therefore direct and continual dialogue with companies is a vital part of our commitment to a sustainable future.

LGIM, which manages group's assets, is mandated to carry out this activity on our behalf. LGIM has been engaging intensively on climate change issues over many years, holding companies and policy makers accountable. In 2016, LGIM went a step further and established a powerful engagement programme called Climate Impact Pledge. (http://www.lgim.com/web_resources/lgim-thought-leadership/Files/LGIM-Climate-Impact-Pledge-The-results-so-far-Umbrella.pdf) This engagement also helps us identify which companies are best positioned to manage climate related risks and those that are falling behind.

Through LGIM, we have focused the engagement effort on the world's largest companies in six sectors which are key to the low carbon transition; Oil and Gas, mining, electric utilities, autos, food retailer/distributors and financial services.

The companies targeted are scored on over 170 indicators related to both their management of climate risks, and to what extent they are pursuing related opportunities. Companies are ranked relative to their peers, and while we engage with all companies, those ranked in the bottom are the focus of particularly targeted discussions in order to encourage improvements in performance. The aim of the engagement is twofold. By encouraging companies to improve transparency and disclosure related to their climate strategy, we can help enable financial markets to accurately price climate risks. It also allows us to identify material climate related risks; through in-depth conversations with companies, we gain a better understanding of the level of sophistication of their climate strategies.

The consequence of this engagement is that companies which are leading the way are named and 'famed', demonstrating that low carbon transition can and should be enacted by every industry. On the other hand, the companies which fail to meet the minimum thresholds, after the engagement period, will now be put on the 'no further investment' list for group's assets. This shows that the engagement is leading to a tangible capital reallocation by Legal & General and puts further impetus on companies to action on this matter.

Portfolio transitioning

Another way of achieving the transition is to reposition the portfolio over time. Cash flows connected with maturing bonds give a steady stream of cash to reinvest and reposition the fund over time. As described in the strategy section we are committed to investing in new technologies including renewable energy which is identified as a key strategic theme and opportunity for us.

If the transitioning is considered more urgent we can actively sell high emitting stocks into low emitting stocks.

Some of this will occur as 'business as usual' given that consideration of climate risk is embedded in the investment decision making process both for DI and the listed assets. We also intend to hard wire a number of exclusions in the investment management agreements (IMA's)⁸.

For the rest of this year we will review key positions within the Utility and Energy sectors and assess the extent to which we think these businesses are naturally transitioning to a sustainable position.

⁸ See next steps

Commercial Property

We put environmental and social sustainability at the heart of all of our property investment decision making. It is our belief that sustainability already sits alongside location, occupier, building size and building quality as a key factor in real estate's value and performance, and its importance will only increase over time.

We have the following initiatives in place to continue to reduce carbon emissions from commercial property⁹.

- All properties have an Energy Performance Certificate (EPC). Less than 3% of properties across the entire portfolios have the lowest rating (F or G), all with a plan in place for improvement at the end of the current occupational lease.
- An Asset Sustainability Plan is established for each property under management.
- Quarterly Sustainability Report produced for every asset under management which review performance against best practice emissions targets.
- Inclusion of sustainability related KPI's in employees' appraisal targets and property supplier contracts.
- 100% of service charge properties have ISO 14001 accreditation - an Environmental Management System (EMS) which looks at managing any environmental risks at a site level.
- Current policy is that 100% of electricity is purchased from renewable sources¹⁰.
- Adopting 'green' clauses into our standard lease since 2011.
- All new developments, and where possible major refurbishment with BREEAM rating "excellent". BREEAM (Building Research Establishment Environmental Assessment Method) is a sustainability assessment method that is used to master-plan projects, infrastructure and buildings.
- In all our acquisitions, we specify best practise standards in terms of sustainability and have an industry leading due diligence process to ensure assets we purchase have high sustainability credentials.

⁹ Relates to our directly owned commercial property portfolio, where we have management control, excluding property held as collateral on our bond portfolio

¹⁰ This applies only to electricity, not all energy sources, e.g. gas.

House building

The establishment of our house building businesses has had an impact on our operational carbon emissions.

We are in the process of working with these businesses to set up governance and reporting structures with the aim of minimising carbon from our building processes, but also from the UK house building stock, which in 2017 was responsible for 17% of total carbon dioxide emissions.

Our analysis shows that the carbon associated with the operation of our CALA Homes business is less than 10% of the construction based emissions. We will therefore concentrate our efforts on capturing, understanding, managing and reducing our construction based emissions.

Furthermore we recognised that the largest impact we could have over the longer term would be to design and build sustainable homes which are carbon zero. Therefore we will continue to work with these new businesses to focus on our fabric first approach to minimising operational carbon, whilst also taking advantage of renewable technology.

In addition to the carbon from the construction process we have a potential impact from the housing stock we hold i.e. homes we have built but not yet sold. For example, we know that, whilst we have a well-controlled pipeline of supply, on average our CALA Homes business has 143 vacant homes. As these are vacant properties they therefore draw little carbon demand. However we are currently seeking effective ways to measure and report this impact.

Next Steps

IMA stock exclusions

We are committing to embedding in Group Investment Management (IMA) the following restrictions.

Thermal coal - We will not invest in companies where thermal coal comprises a substantial part of the business. The precise threshold for this exclusion will be agreed and implemented this year.

No additions to assets excluded by the LGIM Future World range.

Setting emissions targets

We are committed to setting targets that are aligned with the 2°C pathway.

To do this we need to understand the balance between portfolio carbon footprint reduction through engaging with corporate business plans and what will require transition via active portfolio changes. This will largely follow from our assessment during 2019 of the largest stock specific contributors to our carbon footprint.

With this assessment, supported by scenario analysis, we can set targets for the portfolio's carbon footprint reduction over time and monitor progress and identify if further portfolio restructuring is necessary.

We expect during 2019 to approve annual group targets consistent with 2°C pathway. Performance against this target will be as part of our internal process for managing climate related risks as described in the Governance section of this report. By the end of this year we expect to have established a 'direction of travel' in terms of a desired emission trajectory over the next 20 years.

Due to the developing nature of climate related targets and our developing understanding of the physical and transitional impacts from climate change, our targets and progress will be reviewed at the end of each year.

Data and modelling

We will continue to update our carbon footprint intensity on an annual basis.

We need to improve our understanding of climate related risks through the quantification of impacts. This means we need a better understanding of a wide range of climate scenarios including the 2°C scenario and the impact of higher carbon prices through scenario analysis. Alongside LGIM we will develop an Energy model that allows us to stress test both individual assets and the broader portfolio in a wider range of climate change scenarios.

We will continue to consider climate risk within our Solvency II-compliant Internal Model. We use an approved partial internal model (the “Internal Model”) to calculate our Solvency II regulatory capital requirements. Our Internal Model includes a wide range of risks and is calibrated to ensure that we hold sufficient capital for an adverse 1-in-200 year event, as required under Solvency II.

We believe it would be premature and out-of-line with industry to hold explicit capital against climate change risk. However, given the increasing significance of this risk, we are taking steps to increasingly incorporate it within our Internal Model. As a first step, our 2019 calibration process will consider how climate change risk interacts with our existing risk drivers (where relevant). Longer term, we will consider potential developments to our Internal Model to allow for climate change risk at a more granular level.

Summary of group TCFD commitments

- We support the aim of the Paris Agreement to limit the global average temperature rise to well below 2°C of pre- industrial levels
- We will set emission reduction targets on our own investment assets to align with the Paris objective
- We will make changes in our Investment Management Agreements (IMA’s) that exclude thermal coal investments and puts constraints on stocks excluded by LGIM from the Future World range
- Through LGIM we will use our influence as a large investor to promote a transition to a low carbon economy
- We will improve our understanding of the financial impact of a range of warming scenarios through scenario analysis.