



Actuarial Valuation - Climate Change Scenario Analysis

London Borough of Bromley Pension Fund

March 2023

welcome to brighter



Introduction

Funds are required to undertake climate change scenario analysis as part of the funding valuations both as good practice and also for the purpose of the Section 13 report. We have worked with GAD and the other actuarial firms to develop the principles underpinning the approach Funds will be required to take for this.

The analysis aims to illustrate the different elements of risk under two alternative climate change scenarios based on the current strategic allocation. The scenarios are not meant to be predictors of what may happen and are only a small subset of a very wide range of scenarios that could arise depending on the global actions taken in relation to climate change. The actions taken (both historically and in future) by the Fund in relation to making its asset portfolio more sustainable is or will be set out in the separate Taskforce for Climate Change (TCFD) reports. This will include analysis of the asset portfolio, adopting the same (or similar) scenarios.

Next steps

Whilst this basic analysis has been prepared to satisfy the requirements for the 2022 actuarial valuation, it could be developed further in order to improve understanding and therefore management of climate risks for pension scheme funding. We would be happy to work with the Fund in conjunction with your investment adviser to extend this over the course of 2023. For example to consider the impact of alternative climate change scenarios over a longer time horizon to better illustrate the associated risks (noting the long-term nature of both the Fund and the impacts of climate change); and of adopting alternative investment strategies which could, for example, be used to illustrate the potential impact of increasing sustainable tilts on overall risk. Whilst asset returns will be a key part of the further analysis undertaken, incorporating potential liability impacts provides more insight into the potential financial consequences in terms of contribution outcomes, and has the benefit of maintaining consistency with the analysis undertaken for the 2022 and future actuarial valuations. We will also incorporate the impact of other factors e.g. life expectancy in 2023 as the thinking on climate change evolves.

We look forward to discussing the contents of the report with you.

Clive Lewis FIA

Overview

We have considered climate change scenario analysis using our model which has been developed in partnership with Ortec Finance. Ortec Finance develop a broad range of scenarios and long-range projections on how the climate crisis could impact funding and investments, from a “rapid transition” that limits warming to 1.5°C to a “failed transition” with warming above 4°C. The collaboration enables us to provide you with analysis to better understand the strategic risks and opportunities presented by climate change. We have modelled the climate shock impacts over 20 years and included the two funding level projection scenarios noted above - a “rapid transition” and a “failed transition” – which is in line with the core requirements for the 2022 valuation. This is compared to the baseline (a projection using both the valuation assumptions and the best estimate – i.e. valuation assumptions with prudence removed) to show the overall prudence built into the valuation, and how much of this could potentially be eroded by climate change. We have also shown the impact on a relative basis which is the critical metric. For the actuarial valuation report we will show the relative impact as this measures climate risk but we will also comment on the level of prudence built into the assumptions. The approach taken will also be summarised in the Funding Strategy Statement.

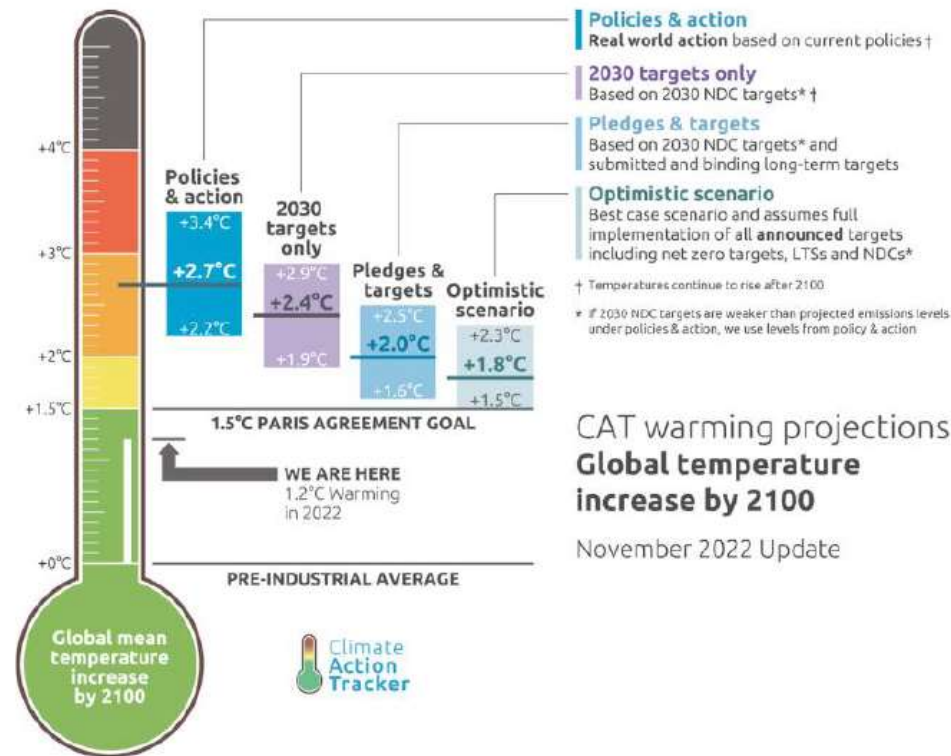
Our scenarios apply a more nuanced approach to understand what is/is not priced in to the markets in terms of transition and physical risks. They include assumptions about what is currently priced into markets, and later price in shocks when the markets account for future impacts (both physical and transition impacts). There is also a granular insight into sector and regional impacts for equities, corporate bond and high yield allocations, with fixed income analysis considering the impact of changes in yield, spread, transitions and defaults.

It is important that we ensure any messaging is understood and recognises the potential risks of the impact of Climate Change as well as what the Fund is doing to address this via its investment strategy.

Why is Climate scenario Analysis important?

Where are we currently heading?

- Climate change is a systemic risk.
- The world is already experiencing ~1.2°C of warming compared to pre-industrial times.
- The Paris Agreement (2015) aims to keep global mean surface temperatures to “well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C”.
- Under global policies we are currently on track for ~2.7°C of warming to the end of the century. More remains to be done to meet the ambition of the Paris Agreement.
- It is important that investors assess their portfolio’s resilience to different climate scenarios and also consider the impact of their portfolios on future climate trajectories.



Source: <https://climateactiontracker.org/>

Climate scenario analysis

What is transition and physical risk?

Risk Factors



Transition

Technology

Policy

Physical damages

Availability of natural resources
(inc biodiversity)

Chronic Damage
(including productivity)

Acute Damage
(catastrophes)

Sudden asset re-pricing
risk

Opportunities from the
low carbon transition

Sector performance
divergence –
energy, transport and agriculture
most impacted

Physical risks increasingly
dominate over longer term



In order to fully assess climate-related risks and opportunities, we must consider both transition and physical impacts.

Mercer's Climate Scenarios

Our Mercer scenarios are constructed to explore a range of plausible futures over the projection period (up to 40 years can be considered), rather than exploring tail risks. In shorter timeframes, transition risk tends to dominate while over longer timeframes physical risk will be the key driver of climate impacts. A key strength of our scenarios is that they allow for climate impacts to be “priced-in” before they happen. This reflects likely market dynamics and means climate impacts are more likely to fit within investment timeframes.

The two scenarios considered for the purpose of the core analysis are as follows:

- **A Rapid Transition** – Average temperature increase of 1.5°C by 2100. Sudden divestments across multiple securities in 2025 to align portfolios to the Paris Agreement goals which have disruptive effects on financial markets with sudden repricing followed by stranded assets and a sentiment shock. Following this shock there is a partial recovery.
- **A Failed Transition** – Average temperature increase above 4°C by 2100. The world fails to co-ordinate a transition to a low carbon economy and global warming exceeds 4°C above pre-industrial levels by 2100. Physical climate impacts cause large reductions in economic productivity and increasing impacts from extreme weather events. These are reflected in repricing events in the late 2020s and late 2030s.

Our assumptions for modelling the **Rapid Transition** and **Failed Transition** scenarios are shown on the next page.

Mercer supports limiting warming to 1.5°C but recognises that given the current warming trajectory, based on existing policies and actions, this pathway may represent a short term shock to investment portfolios. Investors should position their portfolios for a low carbon transition while also understanding the potential impact of physical damages

Modelled Strategy

Modelling Asset Class	New Strategy Partially Sustainable SAA (%)
MSCI ACWI Equity	58.0%
UK Investment Grade Credit	9.3%
Global Real Estate	5.0%
UK Sovereign Bonds	3.8%
UK Real Estate	4.0%
Multi Asset Credit	20.0%

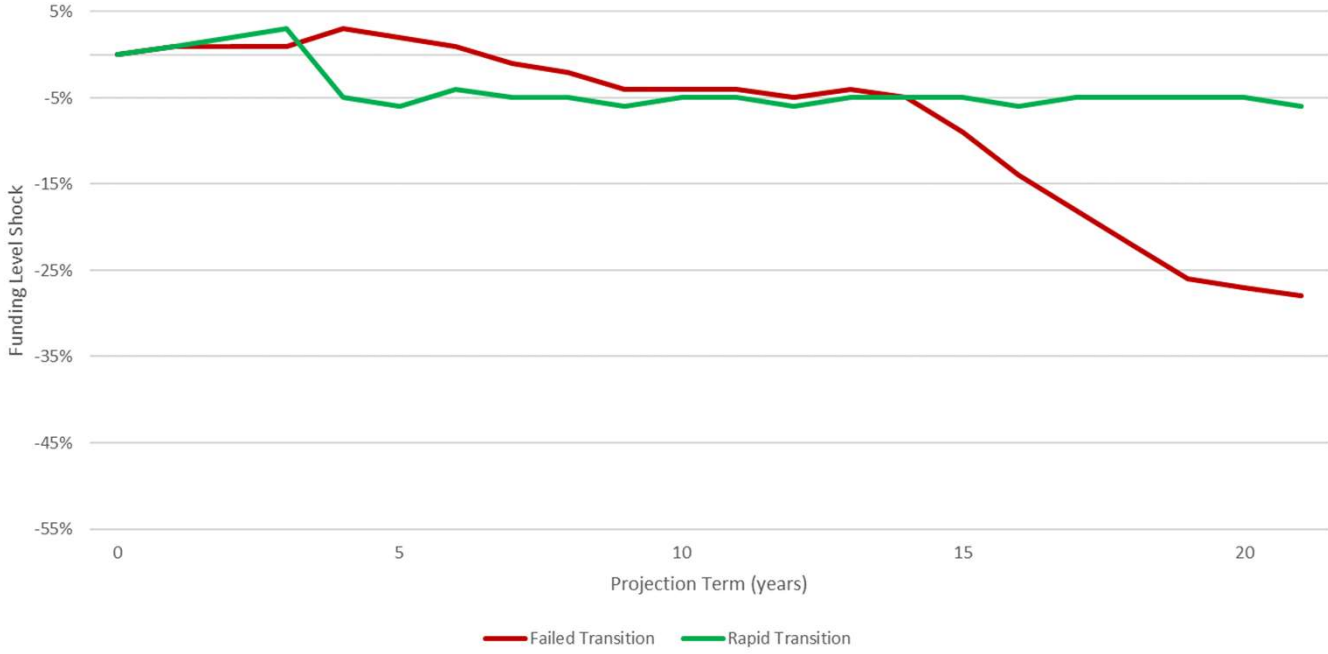
The table illustrates the asset allocation we have modelled (taken effective as at 31 March 2022 for simplicity). The projections are from 31 March 2022 with an initial asset value of £1,339m and an initial liability value of £1,163m*. We have made some simplifying assumptions that contributions and accrual into the Scheme offset benefits paid out of the Scheme. This should not have a material impact on the outcome.

Under the two baseline scenarios on slide 9 assets are projected assuming an average best estimate expected return (CPI+3.6% p.a.) and prudent valuation assumption (CPI + 1.0% p.a.) from 31 March 2022, to be consistent with the valuation position. Liabilities are projected on the basis of unwinding the valuation discount rate of CPI+1.0% p.a. only.

*includes economic / inflation reserve for those employers who have requested it

Analysis Outcome

Funding Level Projection – Relative impact



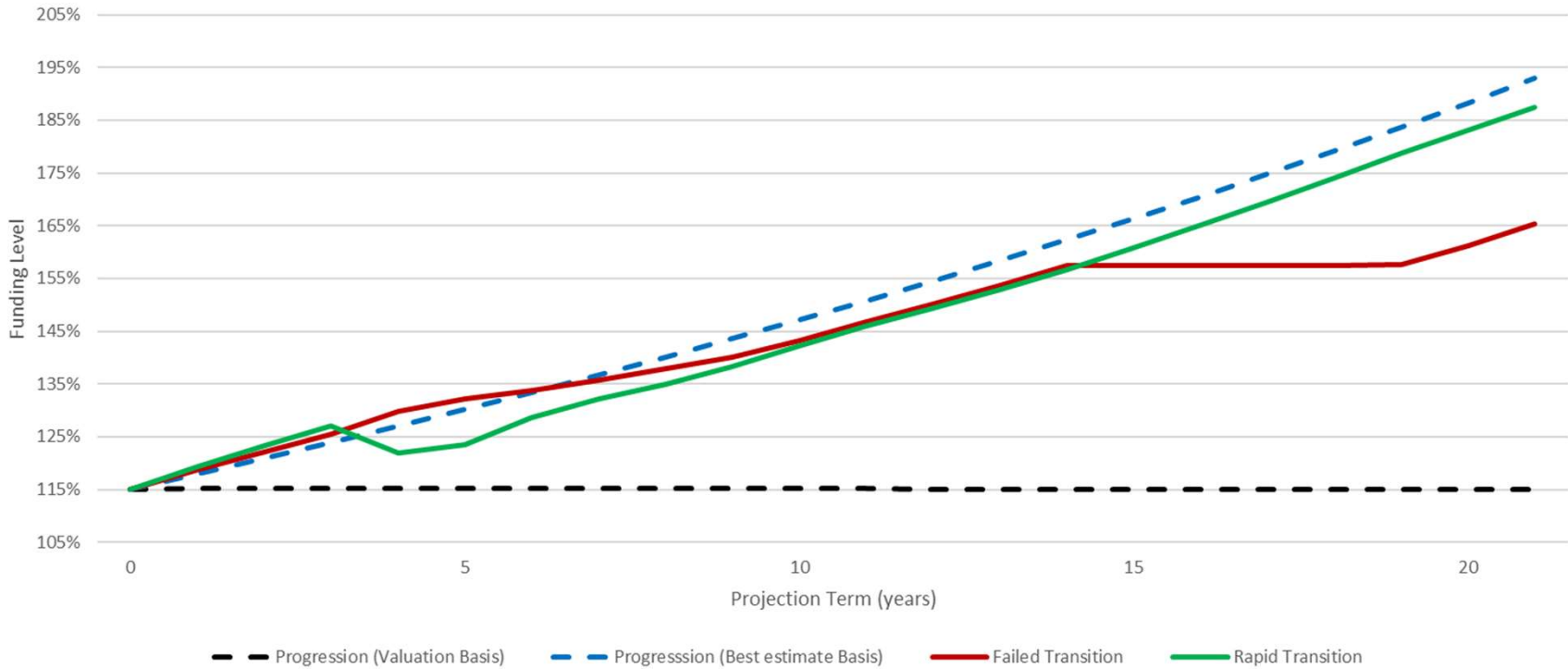
Key points at different time frames :

Over the short term, transition risk dominates. The Rapid Transition is the most impactful scenario. Under this scenario there is a shock which reduces the funding level by about 5% relative to baseline. The Failed Transition funding level is marginally higher than the baseline in the short term due to transition costs not materialising.

As longer term physical damages begin to be priced in, the Failed Transition becomes the most impactful scenario. Extending the projection period out further would provide greater insight into these impacts

Analysis Outcome

Funding Level Projection – Absolute impact



Overall, across a range of timescales, climate impacts have the potential to impact prudence margins from the actuarial basis (which is illustrated as the difference between the two dash lines). This would leave the funding strategy more exposed to other risks e.g. economic, market and demographic risks. Given the long-term nature of the Fund we recommend this analysis is further extended to consider the impact of alternative investment strategies and the longer time horizon.

Supporting Information



Introduction to Climate Scenario Analysis

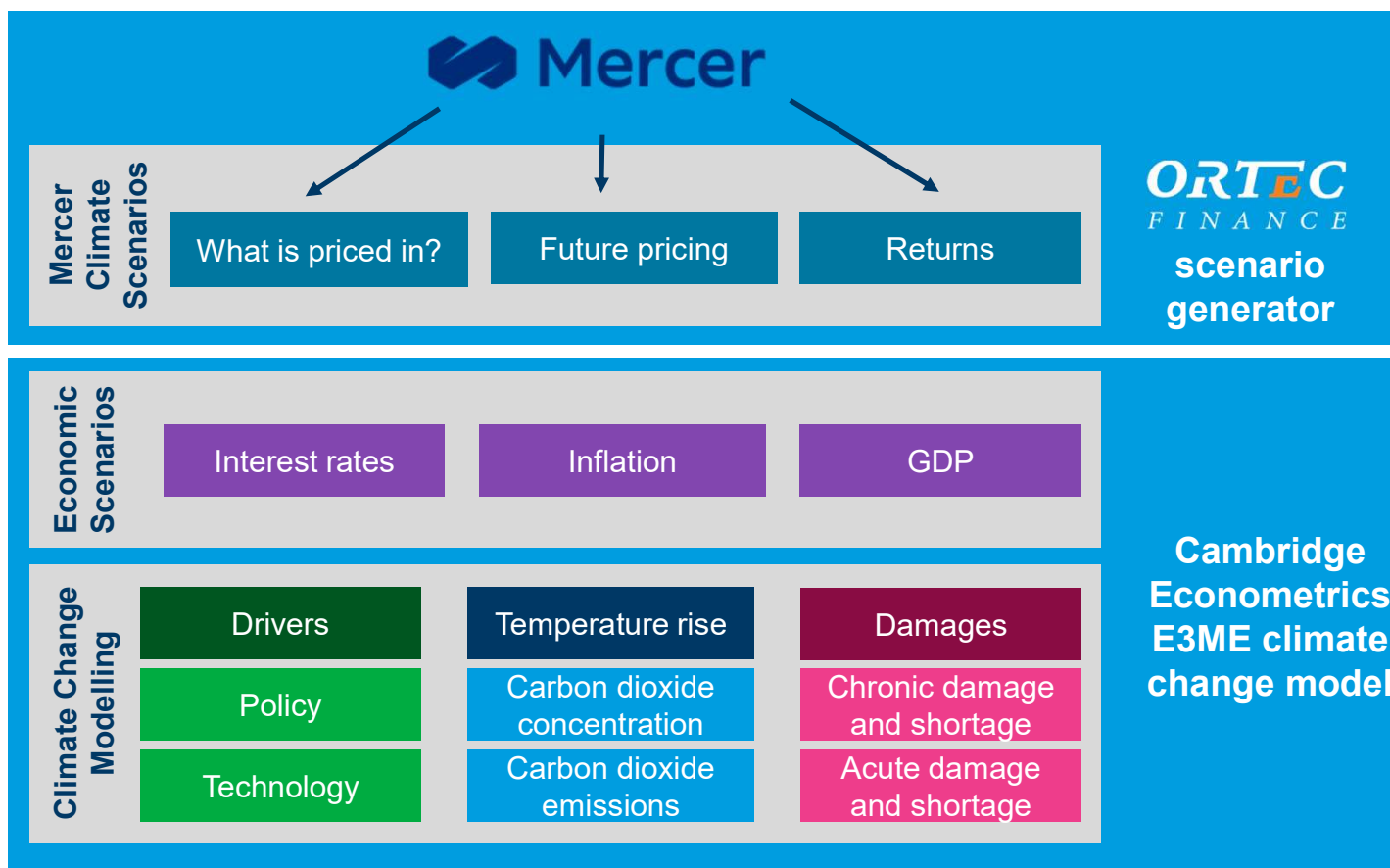
Scenario Construction

Mercer has partnered with Ortec Finance and Cambridge Econometrics to develop climate scenarios that are grounded in the latest climate and economic research and give practical insights.

Mercer's climate scenarios are developed by building the investment modelling on top of the economic impacts of different climate change scenarios within the E3ME climate model.

Each climate scenario covers a specific level of warming driven by levels of carbon dioxide (CO₂) and other green house gases. These levels are determined by the policies enacted and the technological developments. The impacts of the warming are shown in the physical damages. E3ME maps this to economic impacts and Ortec's scenario generator maps the economic impacts to investment return impacts by making assumptions on what is priced in currently and how future pricing shocks will occur.

Mercer's scenarios include our own views on what is priced in and are built on Mercer's climate aware capital market assumptions.



Modelling Assumptions – Background

	Failed transition	Rapid transition
Summary	The world fails to meet the Paris Agreement goals and global warming reaches 4.3°C above pre-industrial levels by 2100. Physical climate impacts cause large reductions in economic productivity and increasing impacts from extreme weather events.	Sudden divestments in 2025 to align portfolios to the Paris Agreement goals have disruptive effects on financial markets with sudden repricing followed by stranded assets and a sentiment shock.
Temperature change	Average temperature increase of >4°C by 2100.	Average temperature increase stabilises at 1.5°C around 2050.
Cumulative emissions	5,127 GtCO ₂ (2020-2100)	416 GtCO ₂ (2020-2100)
Key policy & assumptions	Existing policy regimes are continued with the same level of ambition.	An ambitious policy regime is pursued to encourage greater decarbonization of the electricity sector and to reduce emissions across all sectors of the economy. Higher carbon prices, larger investment in energy efficiency and faster phase out of coal-fired power generation. This is earlier and more effective under a Rapid Transition than the Orderly Transition, which allows for less investment in energy efficiency and bioenergy with carbon capture and storage.
Financial climate modelling	Physical risks are priced in two different periods: 2026-2030 (risks of first 40 years) and 2036-2040 (risks of 40-80 years).	Pricing in of transition and physical risks of the coming 40 years occurs within one year in 2025. As a result of this aggressive market correction, a confidence shock to the financial system takes place in the same year.
Physical risks considered	Physical risks are regionally differentiated, consider variation in expected temperature increase per region and increase dramatically with rising average global temperature. Physical risks are built up from: <ul style="list-style-type: none"> • Gradual physical impacts associated with rising temperature (agricultural, labour, and industrial productivity losses) • Economic impacts from climate-related extreme weather events Current modelling does not capture environmental tipping points or knock-on effects (e.g., migration and conflict).	

Modelling Assumptions – Cumulative Climate Return Impacts for:

Asset Class	Failed Transition		Rapid Transition	
	30/06/2022			
	5 Years	20 Years	5 Years	20 Years
MSCI ACWI Equity	2.9%	-28.9%	-11.6%	-7.8%
UK Investment Grade Credit	0.3%	-2.5%	-2.3%	-2.3%
Global Real Estate	0.8%	-21.7%	-4.3%	-0.6%
UK Sovereign Bonds	0.3%	-0.4%	0.2%	0.5%
UK Real Estate	0.8%	-28.9%	-6.3%	-1.3%
Multi Asset Credit	-0.3%	-2.1%	-3.1%	-4.7%
MSCI ACWI ESG Equity	2.2%	-29.6%	-8.8%	-4.4%

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- We have prepared this document for the Administering Authority for the purpose of advising on the 2022 valuation
- “Technical Actuarial Standard 100: Principles for Technical Actuarial Work” issued by the Financial Reporting Council applies to this presentation and the associated work, and we confirm compliance with this standard. This presentation should be read in conjunction with our report on the actuarial valuation of the Fund as at 31 March 2019.
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