Appendix 3

Lothian Pension Fund – Managing climate risk

Background

Climate change is a material risk to the fund. It has the potential to significantly disrupt financial markets and economic systems and affect the life expectancy of the fund's members.

Tackling climate change is a global challenge. However, as a holder of significant financial capital, the fund recognises that it has a role to play in the transition to a greener economy. The fund also recognises the need to manage the risks that climate change brings to its funding and investment strategies.

This paper outlines the strategic measures that the fund has taken to tackle climate risk. There are also comments on future developments that are underway, using fresh insights from climate science as it continues to evolve.

1. Funding strategy

1.1 Primary objective

The fund is required to meet all benefit payments as they fall due. Triennial actuarial valuations are used to review and adjust employer contribution rates to meet this objective, after allowing for prudent estimates of future expected investment returns.

1.2 How could climate change affect the funding strategy?

Climate change presents different risks to the funding strategy:

- *Lower economic growth and investment returns* – tackling climate change will require significant capital investment. This may reduce growth and returns on assets during the transition to a greener economy.
- *More climate events* – 'extreme' events, such as heatwaves or flooding, are likely to increase in frequency and adversely affect stock markets and asset valuations.
- *Increased volatility/uncertainty* – the pace of transition to a greener economy is highly uncertain. Financial markets and other economic indicators, such as interest rates and inflation, are likely to be more volatile and unpredictable due to the uncertainty.
- *Life expectancy* – climate change can affect human health and the longevity of the fund's members, possibly either positively or negatively.

1.3 What measures are the fund currently using to manage climate risk?

The 2023 triennial valuation was an opportunity for the fund to review how it manages all key risks and build controls into its Funding Strategy Statement. Climate risk was tackled from two angles.

a) Risk budgeting

With a significant surplus being reported at the 2023 valuation, analysis and modelling was undertaken to 'stress test' the funding position under a range of future contribution scenarios and investment strategies, and scenarios with a sudden permanent loss of assets ('asset shocks'). This provided a risk budget to help fund officers and committee to understand how robust the funding strategy was to future adverse experience, and to make decisions **about the fund's approach to setting employer contribution rates.**

The fund recognised that it was unrealistic and unaffordable for contribution rates to directly target the cost of extreme climate events. Instead, it was agreed to build in extra protection over time against the cost of climate-induced risks. Using the risk budget information, the fund added prudence into its funding strategy by:

- Increasing the confidence level – the 'likelihood of funding success' parameter under the risk-based valuation approach was raised from a minimum of 67% (for some scheduled bodies) at the 2020 valuation to a minimum of 80% across all employers.
- Applying an asset shock – employer assets at the valuation were reduced by 20% for the purpose of determining contribution rates.

Both measures retain money in the fund to hold as shock absorbers against future poor experience. In addition to managing uncertainty around climate risk, they act as a buffer against other 'tail' risks in the modelling, such as geopolitical concerns, or rapid reductions in interest rates.

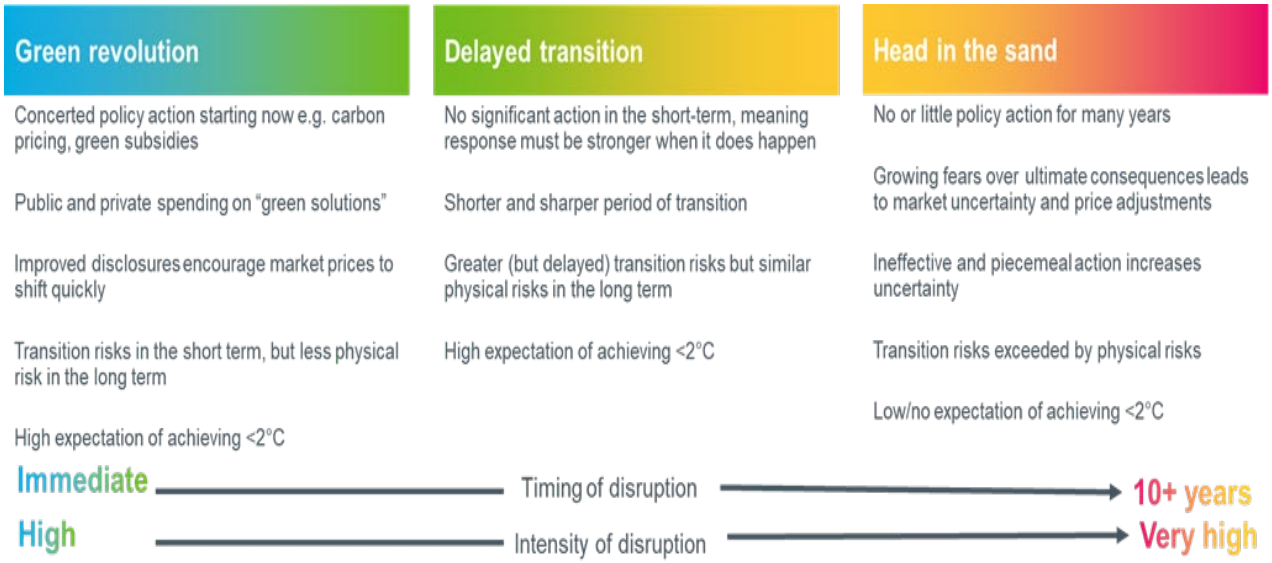
Whilst these measures are prudent and make the fund more resilient to climate risk, the three-yearly valuation process also offers the opportunity to review the funding strategy and make changes in reaction to evolving circumstances eg to recent research from the actuarial profession and other bodies that suggests that modelling techniques may be underestimating the impacts of extreme climate events. The funding strategy ultimate relies on the ability of the fund's employers to pay contributions so that the fund can pay pensions. Overall, the fund's employers have a strong financial covenant and a low risk of failing.

b) Climate scenario modelling

Description of climate scenarios

The impact of climate change is too uncertain to build directly into the valuation modelling. Instead, the results of the core valuation model were 'stress tested' under three different climate change scenarios. This was intended to test the resilience of the modelling, as required under Task Force on Climate-Related Financial Disclosures (TCFD), rather than rerunning the full analysis.

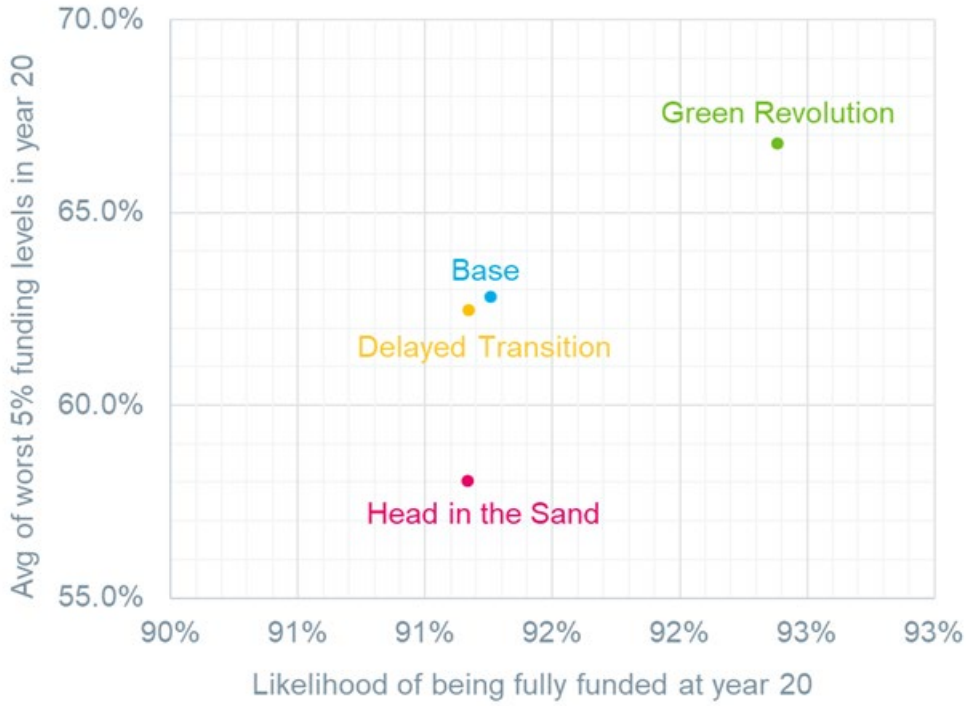
The three climate scenarios considered had differing speeds and strengths of response on climate transition:



Each scenario assumed a period of disruption linked either to the impact of measures to combat climate change (transition risks) or to the fallout from it (physical risks), with the disruption leading to high volatility in financial markets and economic variables such as inflation. The later the period of disruption, the more pronounced it would be.

Stress test results for the fund

The three climate scenarios were stress tested against the results of the core valuation modelling (referred to as the 'Base' scenario). The following chart, which assumes a fixed contribution rate of 20% of pay for modelling purposes, summarises the results:



The chart shows that:

- On the upside, the likelihood of the fund being fully funded in 20 years' time remains high, with little movement in the likelihood percentages across the different scenarios.
- However, on the downside, the differences are more marked. There is less downside risk under the 'Green Revolution' scenario (an average worst-case funding level of 67% at year 20) compared to the 'Base' (63%) and 'Delayed Transition' (62%) scenarios. The downside risk worsens under the 'Head in the Sand' scenario (58%).

Whilst the results differ across scenarios, the differences are not sufficiently material to suggest that the fund's strategy is not resilient to climate change risk. Or, put another way, the results provide assurance that the core valuation model does not appear to be significantly underestimating climate risk. However, it is important to monitor the risk and how it may evolve (see next section). This illustrative modelling uses a fixed contribution rate of 20.0% for 20 years. In practice, the fund would respond to a changing funding environment by varying the employer contributions at each valuation.

1.4. Future measures to manage climate risk

Section 1.3 discussed the measures taken at the 2023 valuation to manage climate risk. Climate science is, however, a rapidly evolving area. Further work is already underway to enhance the information available to the fund for decision making. This is outlined below and will become available during 2024, giving time for officers and the committee to consider ahead of the 2026 valuation.

a) Narrative-based climate modelling

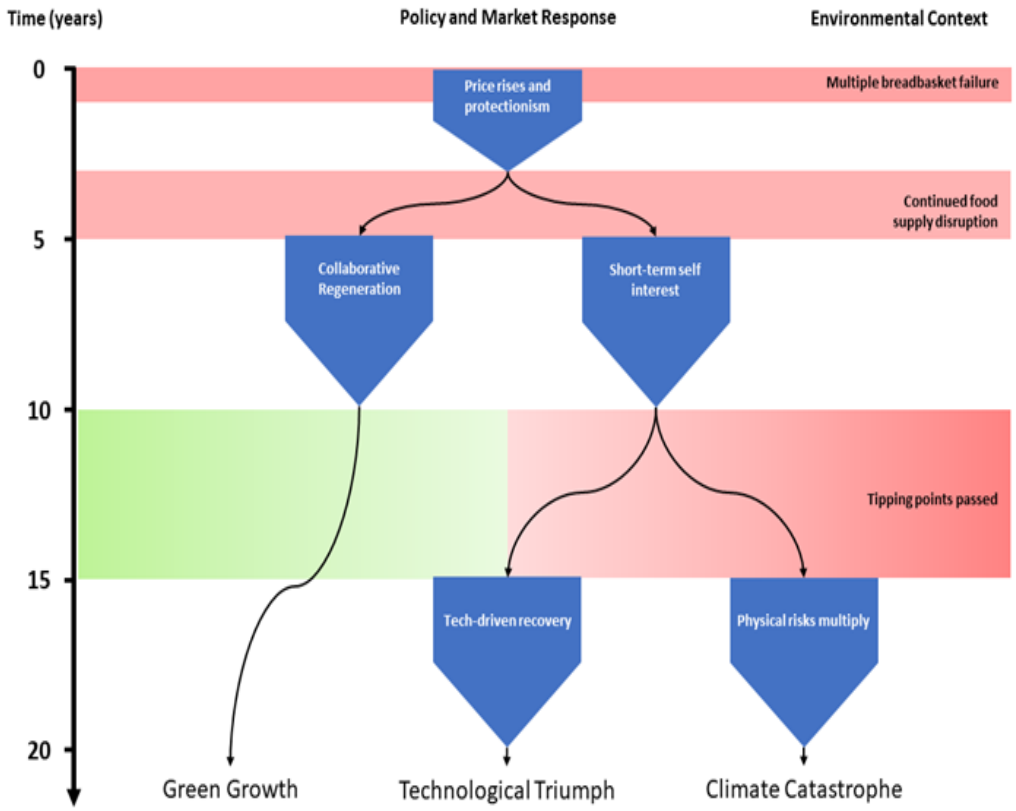
The approach at the 2023 valuation stress tested the core model and explored what outcomes might arise if we took account of greater variability. However, it didn't provide detail of what may be going on underneath. Furthermore, when developing climate scenarios, past data may be of limited value. There is no guarantee that the traditional relationships between economic variables will hold under extreme climate change.

When developing more realistic and useful climate scenarios, consideration needs to be given to how different actors within our global system respond to stress. This adds in the 'human response' i.e. it recognises that different entities may not always take decisions that lead to an optimal outcome. In particular, the actions of global powerhouses such as the EU, China and the US will be influenced by other risk factors and could lead to unexpected outcomes. The risk drivers that are likely to influence policymakers are:

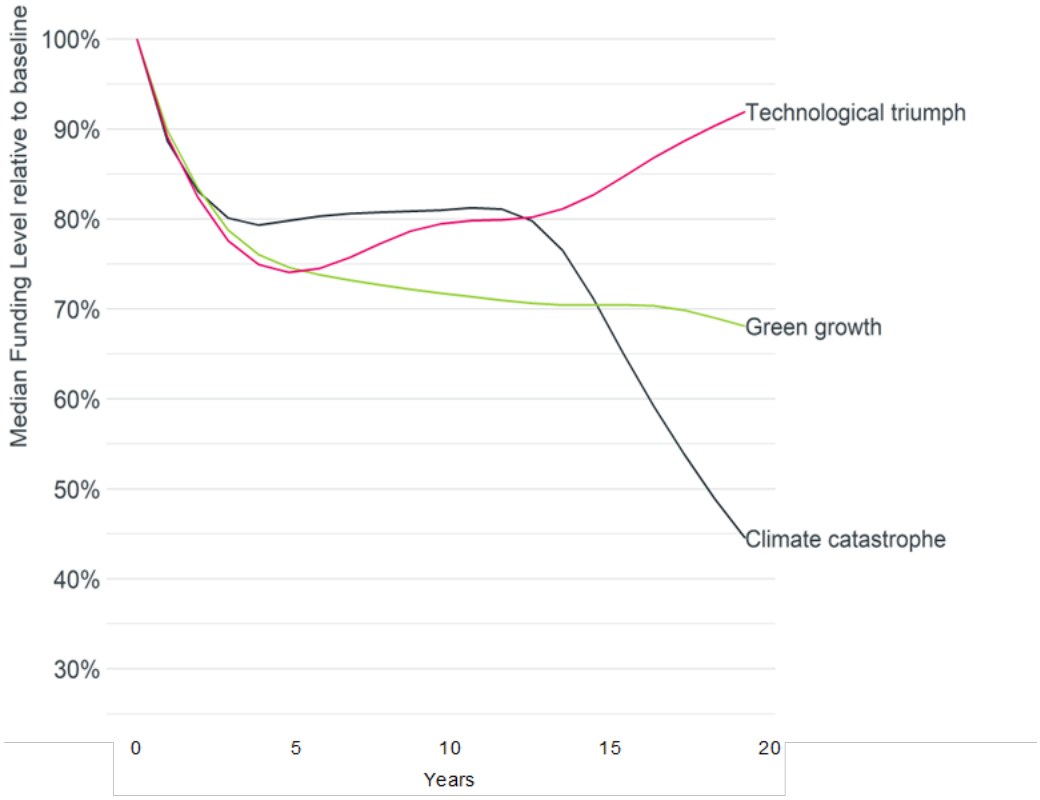
- Environmental severity and feedback
- Energy usage
- Technology progression
- Social policies and adaptation
- Geopolitical tension

Our real-world climate narrative scenario assumes an extreme event acts as a catalyst, changing the dynamics of the global economy. For example, a climate-induced food shock, where adverse weather in a small number of breadbasket regions that produce a

disproportionate amount of the world's food leads to chronic crop failures. The diagram below explores the narrative in a step-wise manner, moving along each pathway from the initial catalyst, through two possible medium-term responses and on to potential long-term outcomes.



An example of the output available from this narrative modelling is shown below, based on data from the fund's 2023 valuation. This summarises the impact of our scenario on funding levels, relative to our baseline assumptions. It reports changes in the median funding level along each pathway as a proportion of the baseline median funding level, highlighting the downside risks associated with the scenario. However, care should also be taken when interpreting this output as it omits uncertainty associated with funding levels by focussing on the median outcomes only.



Current climate science provides confidence that scenarios such as this are more likely, but we can't say how much more likely. The broad-ranging nature of the scenarios, and the breadth of possibilities for the nature of the shock, suggest that the risks are "undiversifiable". i.e. they aren't specific to only those entities which seem to be obviously relevant to climate change, rather they are relevant to all entities.

b) Longevity modelling

The fund uses Club Vita, a longevity data analytics company, to help its actuary to set life expectancy assumptions.

Vita produced 'Hot and Bothered?' research in 2018 which examined the impact of climate change on longevity patterns across the same three climate scenarios mentioned in section 1.3 above. The diagram below summarises the research.

Head in the Sand

- Extreme heat events lead to global crop failures
- Vector borne diseases spread widely around globe- reversal of victory on infectious diseases
- Severe temperature fluctuations
- Increased frailty at older ages
- Severe strains on health system (both supply and demand)

Challenging Times

- Some adaptation, but accelerates when impact of finite resources becomes apparent in oil supplies/price
- Significant fiscal challenges (heightened pressures on sustainability of health care systems)
- Challenges with food importation and year round healthy diet
- Widening socio-economic inequality in health outcomes

Green Revolution

- Positive adaptation in response to increased public awareness and widespread calls for change
- Significant improvements n the availability and efficiency of green energy coupled with reduced energy usage
- Diet, exercise and air quality all improve
- Positive benefits from housing stock adaptation and reduced road traffic

This was provided with indicative life expectancies and liability impacts to help funds to stress test their funding plans.

With climate change scenario modelling moving on in recent years, Vita are refreshing their research. Whilst the key features of each scenario will be retained, updates will be made by:

- Allowing for observed longevity experience since 2018
- Refreshing the time horizons and potential magnitude of impacts in light of global events, pledges and initiatives since 2018. For example, allowance will be made for the world being off-track on reaching the target of the Paris Agreement.
- Reflecting the direct impact of Covid-19 on mortality levels, and the potential impact of vector-borne diseases in general.

2. Investment strategy

The Statement of Investment Principles guides the fund's investment objectives and policies including high-level strategic asset allocation decisions which define risk and return objectives and that owning a diversified portfolio of assets reduces exposure to any particular contingency. The SIP confirms that whilst the fund's fiduciary duty is the pursuit of financial returns, non-financial considerations can be taken into account, that exercising ownership rights in a responsible way can reduce risk and may improve returns.

The supplementary Statement of Responsible Investment Principles (SRIP) expands on this, highlights the importance of the Paris Agreement of the United Nations Framework Convention on Climate Change, and the risks and opportunities for the fund and sets out a series of commitments to climate monitoring and action.

The methodology used in the valuation considers expected returns and volatilities of asset classes in future but cannot directly model the impacts of climate risk at asset class or geographic level. This same modelling is used to set the strategic asset allocation and for the investment strategy and cannot enable direct capture of investment risk and opportunity at this granular level.

Therefore, the investment strategy, more accurately the strategic asset allocation, is not directly impacted by nor account for the recognition of climate change risk. This undiversifiable and unhedgeable risk this can only be recognised by adopting a more prudent funding strategy and as set out above has been. Even then, the tail risk ie the low likelihood/high impact outcomes cannot be allowed for within an acceptable funding strategy.

The implementation of the investment strategy involves making decisions at the level of stock, bond, property and transaction level. Each decision needs to take account of the full range of risks and opportunities and an assessment of the expected risk adjusted return. Diversification across geographies, industries and investment is intended to reduce both idiosyncratic and systemic risk and provide the expected long-term return required to support the funding assumptions and contribution levels.

The investment holdings will evolve over time seeking to earn an appropriate return for the risks incurred as companies and economies evolve and adapt. Throughout this period the portfolio managers will seek to engage with companies, partner funds and organisations in line with the SRIP to meet the fund's objectives as a good steward of capital whilst seeking an appropriate risk adjusted investment return and enable the Committee to meet it's fiduciary duty.