Bridging the Gap Between Climate Science and Pension Fund Investment Decisions

Summary of Carbon Tracker and CICERO Roundtable in Norway, 2025 on "The Underpricing of Climate Damages in the Financial System – How can we Align Pension Fund Investment Decisions with Climate Science?"

Climate change is no longer a distant threat—it's a present and intensifying risk to the global financial system. During a roundtable convened by Carbon Tracker and CICERO held on 3 June 2025, experts, scientists, and financial stakeholders gathered to address a critical issue: the underpricing of climate damages in financial models.

Key points raised during the discussion:

- **Climate risk poses a systemic** risk to the financial system.
- **Current economic models underestimate climate damages**, especially physical risks.
- **Pension funds and financial institutions lack adequate tools** to assess climate risk accurately.
- **Scenario analysis is flawed**, missing key transmission channels and long-term impacts.
- **Investors must shift focus** from short-term returns to long-term resilience and decarbonisation.
- **Policymakers play a key role in setting clear policy frameworks and climate targets** that guide investment decisions and align with the net zero transition.

A Collective Challenge Demanding Collective Solutions

Participants agreed that climate risk is a **systemic issue**—one that cannot be diversified away. There was strong consensus that **bringing diverse stakeholders together** to explore solutions is the right approach. Pension funds, in particular, are increasingly concerned that **physical climate risks are not adequately captured** in current models, leading to **underestimated economic damage projections**.

While considered to be a collective problem issue, policymakers play a critical role by setting decarbonisation targets and sending clear policy signals to facilitate alignment of corporates and financial institutions with the Paris Agreement.

The Disconnect Between Climate Science and Economics

Scientific presentations at the roundtable highlighted the existential nature of climate change. More than a third of all sectors are highly exposed to physical climate impacts, and many corporates inherit this exposure through their value chains—creating ripple effects for financial institutions.[1]

The impacts of climate change are global, compounding, and cascading. From droughts and extreme heat to water stress and food system disruptions, the risks are mounting. And yet, traditional climate risk models used to assess economic damages associated with global temperature rises remain reliant on outdated assumptions, often underestimating acute risks, and non-linear systemic threats such as the breaching of climate tipping points. Furthermore, Integrated Assessment Models, such as the DICE model, often rely on outdated assumptions and fail to incorporate forward-looking data. This leads to the under-pricing of risk, false precision in metrics, and strategic blindness.

The difference between limiting global temperature rise to 1.5°C versus 2°C is significant on account of the adverse implications the half a degree of warming poses for the economy and financial assets. A **precautionary principle approach** is therefore needed to ensure all eventualities are captured in risk assessments.

Flaws in Scenario Analysis and Risk Modelling

Current scenario analysis suffers from several critical flaws:

- **Timescale misalignment:** Short-term financial planning horizons (3–5 years) miss the most severe climate impacts, which are expected post-2030.
- **Missing transmission channels:** Key pathways like supply chain disruptions, migration flows, political instability, and infrastructure breakdowns are often ignored.
- **False precision**: Single-point estimates obscure the full range of potential outcomes, reducing deep uncertainty to misleading precision.
- **Spatial aggregation bias:** National or regional averages mask extreme local variations, creating non-linear exposure patterns.

There are also **challenges in choosing appropriate damage functions**, as those most commonly applied fail to include forward-looking data on the impacts of higher temperatures and the growing intensity of physical risk. There have been some improvements to modelling the economic damages associated with growing temperature rises. Kotz et al.'s 2024 damage function used alongside the latest NGFS climate scenarios higher economic damages associated with higher temperature pathways and covers more than just mean temperature, but this estimate doesn›t capture all risks, notably acute risk, nature damages or non-linear events such as tipping points .[2]

1 S&P Global, Sustainability Insights Research: Ripple Effect: How Value Chains Compound Sector Exposures to Physical Climate Risks, March 2025, available here.

2 Kotz, M., Levermann, A. & Wenz, L. The economic commitment of climate change. Nature628, 551–557 (2024). Available here.

The narrow definition of fiduciary duty—focused solely on financial returns—limits how pension fund trustees respond to climate risk.

Investors can choose to exclude oil and gas companies from their investment strategies as a means of reducing their climate risk exposure. However, for those following a performance benchmark, this could create a tracking error as it causes their portfolios to deviate from the benchmark index used to measure performance. There are ways to change an investment portfolio while keeping the tracking error small by reweighting oil and gas companies to reduce exposure to the sector . Still, this has been identified as a major issue for Norwegian investors.

Top-Down vs Bottom-Up Approaches

Two modelling approaches were discussed:

- **Top-down models** estimate climate impacts on GDP and asset prices using damage functions. These models capture macroeconomic effects but may miss company-level nuances.
- **Bottom-up models** assess damages at the company level and aggregate them to the portfolio level. While more granular, they often omit broader economic impacts.

Both approaches have limitations, but the consensus was clear: **climate change is a financial risk**, and modelling must evolve to reflect this reality. Investors are increasingly applying both approaches to gain a better understanding of their climate risk exposure. Furthermore, there is a growing awareness that climate scenario analysis should not be treated as a full risk assessment tool, but as a means of providing a partial view that can trigger internal discussions and questions about building climate-resilient portfolios.

Strategic Implications for Investors

The consequences for financial decision-makers are profound:

1. **Underpricing risk** leads to insufficient capital allocation and inadequate risk premiums.
2. **False precision** creates overconfidence in risk management.
3. **Strategic blindness** results in surprise exposures and poor contingency planning.

Scenario analysis must be treated as **a strategic risk management tool**, not just a compliance exercise. Financial institutions should develop **tailored and ambitious stress scenarios** that reflect their specific portfolios, vulnerabilities and time horizons.

Participants acknowledged that investors cannot diversify away from climate and nature collapse. Instead, they must focus on **decarbonising the real economy**, accepting their role as vehicles for capital reallocation, guided by climate policies.

Photo: CICERO

The Role of Policy and Regulation

Policymakers have a critical role in setting decarbonisation targets and frameworks that guide investment decisions. Expectations about climate policy are self-fulfilling—when markets anticipate ambitious policy, they respond with aligned investments.

However, participants noted that **inconsistent policy signals** and **regulatory uncertainty** are hindering progress. The lack of standardised sectoral carbon pricing was also raised as a market failure that impedes the transition. The experts also identified a gap between EU policies and those in emerging markets, where climate adaptation and mitigation investments are not adequately incentivised.

Investors must engage more actively with policymakers to explain how climate change affects their businesses and to advocate for stronger regulatory frameworks.

Looking Forward

Despite challenges, there is reason for optimism. Renewable energy investments are growing globally, and the transition to a low-carbon economy presents opportunities for innovation and financial returns.

But to seize these opportunities, the financial system must evolve. This means **better data, improved climate modelling, clearer policy signals**, and **stronger collaboration** between science, finance, and government.