

## Climate Risk: The Horizon Paradox

Markets price risk in quarters, climate unfolds in decades – and the gap is where catastrophe hides

Digital Finance

BSc Digital Finance Course

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# Why Are Banks Still Financing Coal Plants That Will Be Worthless in 15 Years?

## The Horizon Paradox

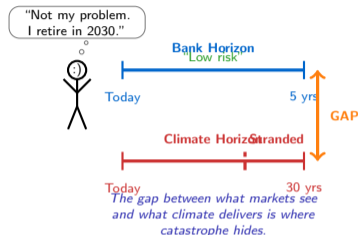
A bank evaluates a coal plant loan over a 5-year horizon. The plant generates steady cash flows today. The credit model says: low risk. But climate policy will make that plant unprofitable by 2040. The model does not see 2040 – it was not built to.

## Why banks keep financing fossil assets:

- Credit models look 3–5 years ahead; climate risk materializes in 10–30
- CEO tenure averages 5 years – no one is punished for risks that arrive after they leave
- Quarterly earnings pressure rewards short-term revenue over long-term prudence
- Regulatory capital rules do not yet penalize carbon-intensive exposures

## Why this is a financial time bomb:

- Stranded assets – reserves that can never be burned under a 2C pathway
- Transition shock – sudden policy changes repricing entire sectors overnight
- Physical damage – insured losses doubling every decade
- Liability risk – lawsuits holding emitters and their financiers accountable



**Banks price risk in quarters. Climate unfolds in decades. The mismatch is not ignorance – it is structural.**

# What If Your Pension Fund Held Assets That Climate Change Will Make Uninsurable?

## Reflection Prompt

Your pension fund invests in a diversified portfolio: real estate, infrastructure, equities, and bonds. Some of that real estate is in flood zones. Some of those equities are fossil fuel companies. Some of those bonds finance airports.

**What happens to your retirement if those assets become uninsurable, unburnable, or stranded?**

Climate risk is not abstract. It is already repricing assets you own:

### How climate risk reaches your portfolio:

- Coastal property values declining as flood insurance becomes unaffordable or unavailable
- Fossil fuel equities trading at permanent discounts as investors price in stranded reserves
- Utilities facing billions in wildfire liability – your bond coupon depends on their solvency
- Agricultural supply chains disrupted by drought – food companies in your index fund lose revenue

The problem is not that these risks are unknown. The problem is that pension funds, banks, and insurers use models calibrated to the past. Climate risk has no historical precedent – the past is not a reliable guide to the next 30 years.

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**Climate risk is not a future problem – it is a present mispricing. Your pension is exposed whether you know it or not.**

# What Is the Difference Between Physical Risk, Transition Risk, and Liability Risk?

Dimension	Physical Risk	Transition Risk
Source	Climate events	Policy/tech change
Timeline	Accelerating now	5–15 year horizon
Examples	Floods, wildfires, drought	Carbon tax, EV mandates
Sectors hit	Real estate, agriculture	Energy, transport, cement
Measurement	Cat models, RCP scenarios	Carbon price sensitivity
Insurance	Repricing or withdrawal	Stranded asset write-downs

## Liability risk (the third dimension):

- Lawsuits against emitters for climate damages
- Directors held personally liable for inadequate disclosure
- Financiers sued for enabling high-carbon activities
- Over 2,300 climate litigation cases filed globally by 2024

## Why the three risks compound

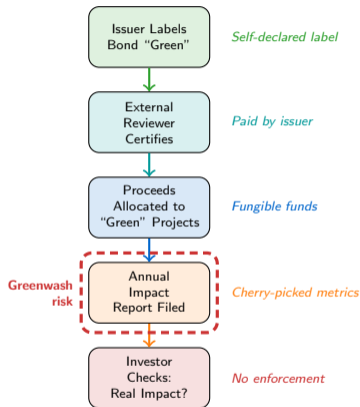
- **Physical risk** damages assets directly – a flood destroys a factory. Insurable today, but premiums are rising faster than inflation.
- **Transition risk** reprices assets suddenly – a carbon tax of \$100/ton makes coal plants uneconomic overnight. The asset still stands but its cash flows collapse.
- **Liability risk** assigns blame retroactively – courts hold companies responsible for damages their emissions caused decades earlier.
- **Correlation:** All three hit simultaneously during a disorderly transition. A flood triggers insurance withdrawal, which triggers asset repricing, which triggers litigation.

**Key insight:** Traditional risk models treat these independently. Climate risk is the correlation.

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Physical, transition, and liability risk are not independent – they compound. A disorderly transition triggers all three simultaneously.

# Follow One Green Bond from Issuance to Impact Report – and Spot the Greenwashing



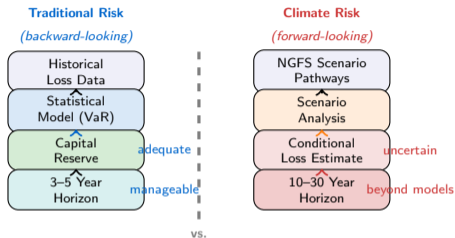
## Five steps, five failure points

- **Labeling:** "Green" is self-declared. No universal standard exists. The EU Green Bond Standard (voluntary) helps but is not mandatory.
- **External review:** The reviewer is paid by the issuer – a conflict of interest identical to pre-2008 credit rating agencies.
- **Use of proceeds:** Funds are fungible. A company can issue a green bond for solar panels while simultaneously expanding coal operations.
- **Impact reporting:** Metrics are chosen by the issuer. Avoided emissions are estimated, not measured. Baselines are often generous.
- **Verification:** No independent authority enforces green bond commitments after issuance. Investors have no recourse if proceeds are misused.

**Key insight:** The green bond market works on trust, not verification. When trust fails, the entire asset class loses credibility.

Green bonds work on trust, not enforcement. Every step relies on self-reporting by the party with the strongest incentive to exaggerate.

# How Do You Put a Price on a Risk That Materializes After the CEO Retires?



## Two paradigms, fundamental incompatibility

- **Traditional risk** uses historical data to estimate future losses. It works when the future resembles the past. Climate change guarantees the future will not resemble the past.
- **Climate risk** requires scenario analysis – forward-looking models that simulate pathways with no historical precedent.

## The NGFS framework

The Network for Greening the Financial System provides six reference scenarios:

- Orderly transition (1.5C): gradual policy, low disruption
- Disorderly transition (2C): delayed action, sudden shocks
- Hot house world (3C+): no new policy, severe physical damage

**The core problem:** Banks must hold capital against risks their models cannot quantify, over horizons their governance cannot reach.

Traditional risk models look backward. Climate risk requires looking forward – into scenarios with no historical precedent.

# What Happens When Stranded Assets Hit Bank Balance Sheets All at Once?

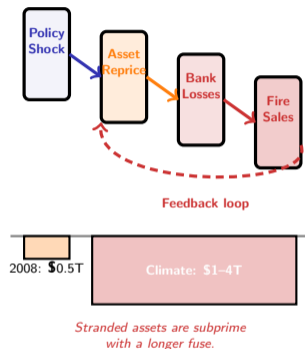
## When Repricing Is Not Gradual

Markets assume climate transition will be orderly – gradual repricing over decades. But policy changes are inherently discontinuous. A carbon border tax, an emissions ban, or a court ruling can reprice an entire sector overnight.

## The stranded asset cascade:

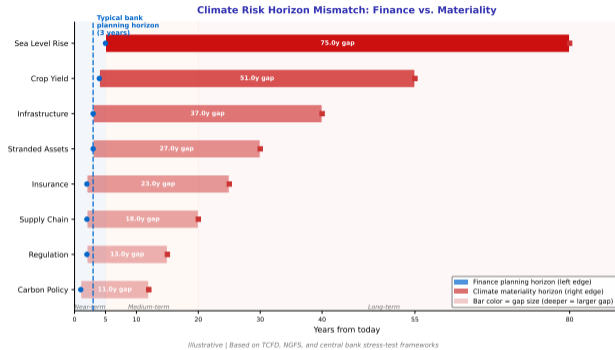
- **Policy shock:** Government announces binding carbon price of \$150/ton effective in 3 years
- **Asset repricing:** Coal, oil, and gas reserves lose 30–80% of NPV as extraction becomes uneconomic
- **Bank exposure:** Loans secured by fossil assets become under-collateralized simultaneously
- **Fire sales:** Forced asset disposals depress prices further – the same feedback loop as 2008
- **Insurance retreat:** Insurers stop covering carbon-intensive assets, accelerating abandonment

**Scale:** The Carbon Tracker Initiative estimates \$1–4 trillion in fossil assets could become stranded under a 2C scenario. For comparison, subprime losses in 2008 were approximately \$500 billion.



Stranded assets are subprime with a longer fuse. The exposure is 2–8x larger, the repricing is inevitable, and the models are not ready.

# Where Does the Horizon Gap Between Financial Planning and Climate Risk Hit Hardest?



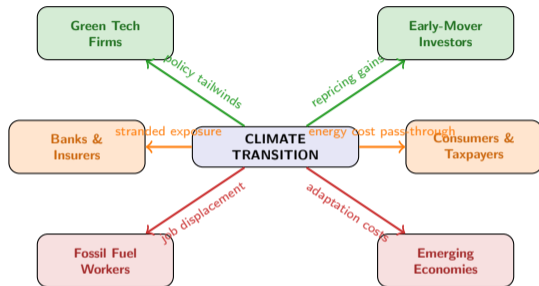
## The horizon mismatch revealed

- **Financial planning horizons** cluster between 1–5 years: quarterly earnings, annual budgets, 3-year credit assessments, 5-year strategic plans
- **Climate risk horizons** extend to 10–30 years: infrastructure lifetimes, policy implementation cycles, physical damage accumulation
- **The gap** is widest for real assets: a building financed today will still be standing in 2055, but the loan was underwritten with 2026 flood maps
- **Insurance is retreating first:** coastal and wildfire zones are already seeing policy cancellations – the market is pricing climate risk faster than regulators
- **Mortgage risk:** 30-year mortgages in flood zones embed climate exposure that no bank model currently quantifies

**Pattern:** The longer the asset life, the larger the gap between what markets price and what climate delivers.

**The chart reveals a structural blind spot: the longest-lived assets face the largest climate exposure, yet receive the shortest-horizon risk assessment.**

# Who Bears the Cost of the Climate Transition – Investors, Consumers, or Governments?



## Winners

- + **Green tech firms:** Carbon pricing creates structural demand for renewables, batteries, and efficiency technology.
- + **Early-mover investors:** Those who divested from fossil fuels before repricing capture the transition premium.

## Losers

- **Fossil fuel workers:** Transition eliminates jobs in coal, oil, and gas – often in regions with few alternatives.
- **Emerging economies:** Bear the worst physical damage while having the least capital to adapt.

## Mixed impact

- ~ **Banks and insurers:** Stranded asset losses vs. green finance revenue.
- ~ **Consumers:** Higher energy costs in transition, lower costs after.

The transition creates winners and losers. The central question is not whether to transition, but who pays – and whether the losers are compensated.

# The Climate Risk Assessment Checklist: Physical, Transition, and Liability

## The Climate Risk Checklist

Before investing in or lending to any company, evaluate:

### 1 Physical exposure

Where are the company's assets located? Are they in flood zones, wildfire corridors, or water-stressed regions? What is the insurance trajectory – are premiums rising or is coverage being withdrawn?

### 2 Transition exposure

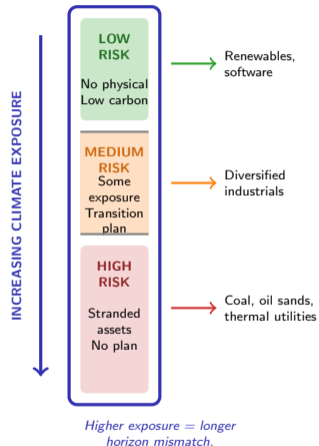
How sensitive is the business to a \$100/ton carbon price? What percentage of revenue depends on fossil fuel inputs? Does the company have a credible decarbonization pathway with interim targets?

### 3 Liability exposure

Has the company been named in climate litigation? Are its disclosures TCFD-aligned? Could directors face personal liability for inadequate climate governance?

### 4 Horizon alignment

Does the investment horizon match the climate risk horizon? A 5-year bond may avoid transition risk. A 30-year infrastructure project cannot.



The checklist converts abstract climate risk into four concrete, assessable dimensions. Apply it to any asset in your portfolio.

# Your Challenge: Compute the Carbon VaR of a Hypothetical Portfolio

## Mini-Challenge (15 minutes)

You manage a portfolio with four positions: a European utility (40% coal generation), a diversified oil major, a commercial REIT in a coastal city, and a green bond ETF. A carbon price of \$100/ton is announced, effective in 3 years.

**Your deliverable:** A one-page climate risk assessment with four sections:

① **Exposure mapping:**

- For each position, classify: physical, transition, or both
- Estimate the revenue percentage at risk under \$100/ton carbon
- Which position has the shortest horizon to material impact?

② **Carbon VaR estimate:**

- If the utility loses 60% of coal revenue, what is the portfolio impact?
- If the oil major's reserves are discounted by 30%, what is your loss?
- What is the combined portfolio loss at the 95th percentile?

③ **Mitigation options:**

- Which position would you sell first? Why?
- Can you hedge climate exposure without divesting entirely?

④ **Horizon check:**

- Does your investment horizon match the risk horizon for each asset?
- If not, are you being compensated for the mismatch?

**Discuss:** Is a portfolio that passes today's credit model but fails a 2C stress test actually "low risk"?  
The best way to understand climate risk is to compute it for a specific portfolio – not in theory, but position by position.