



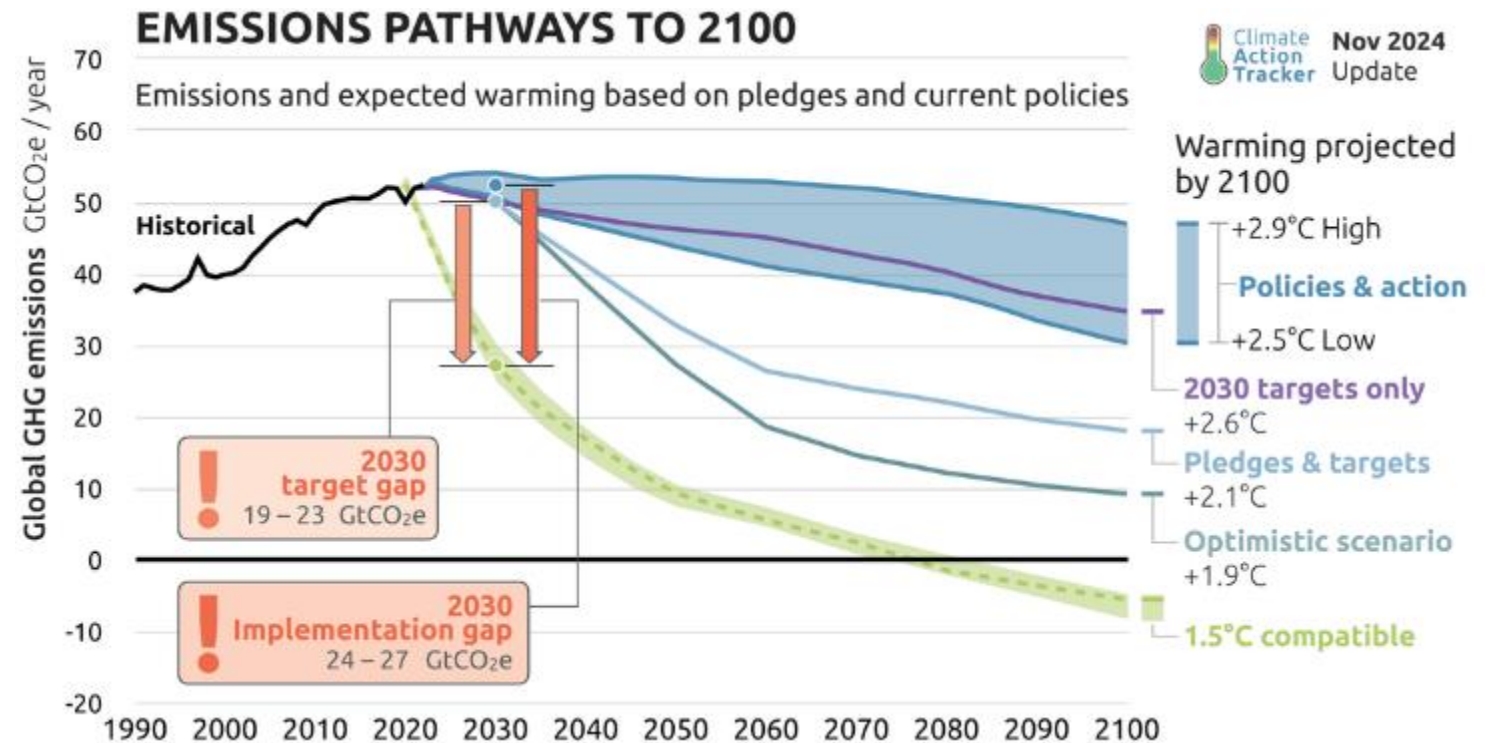
Physical climate risk quantification  
Differences and reliability for investment decisions  
2024 E-CREDA Annual Conference

06.12.2024

**Ben Höhn**

## Global warming is progressing – time is running out

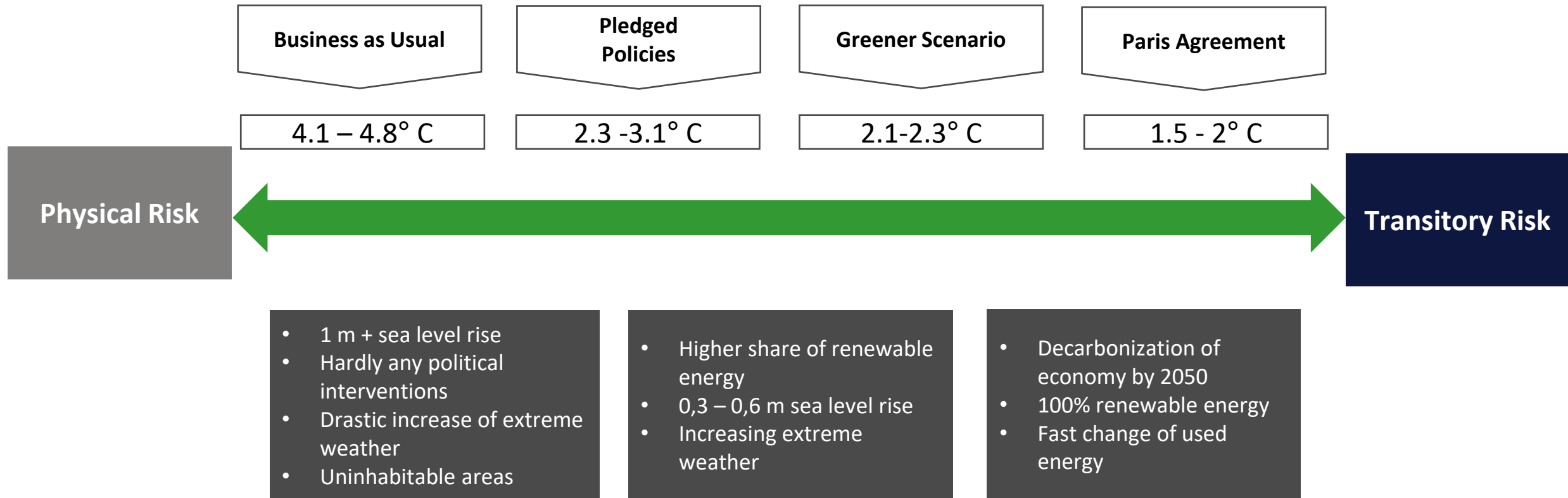
- Progress not as fast as it should be
- With every year not meeting the targets the carbon budget for the following years decreases
- Increasing consequences following the rising temperature
- Current warming already ~1.3 -1.5°C



Source: Climate Action Tracker (2024).

# Real estate industry and climate change

## Transitory vs. physical risk



# Physical risk in the real estate industry

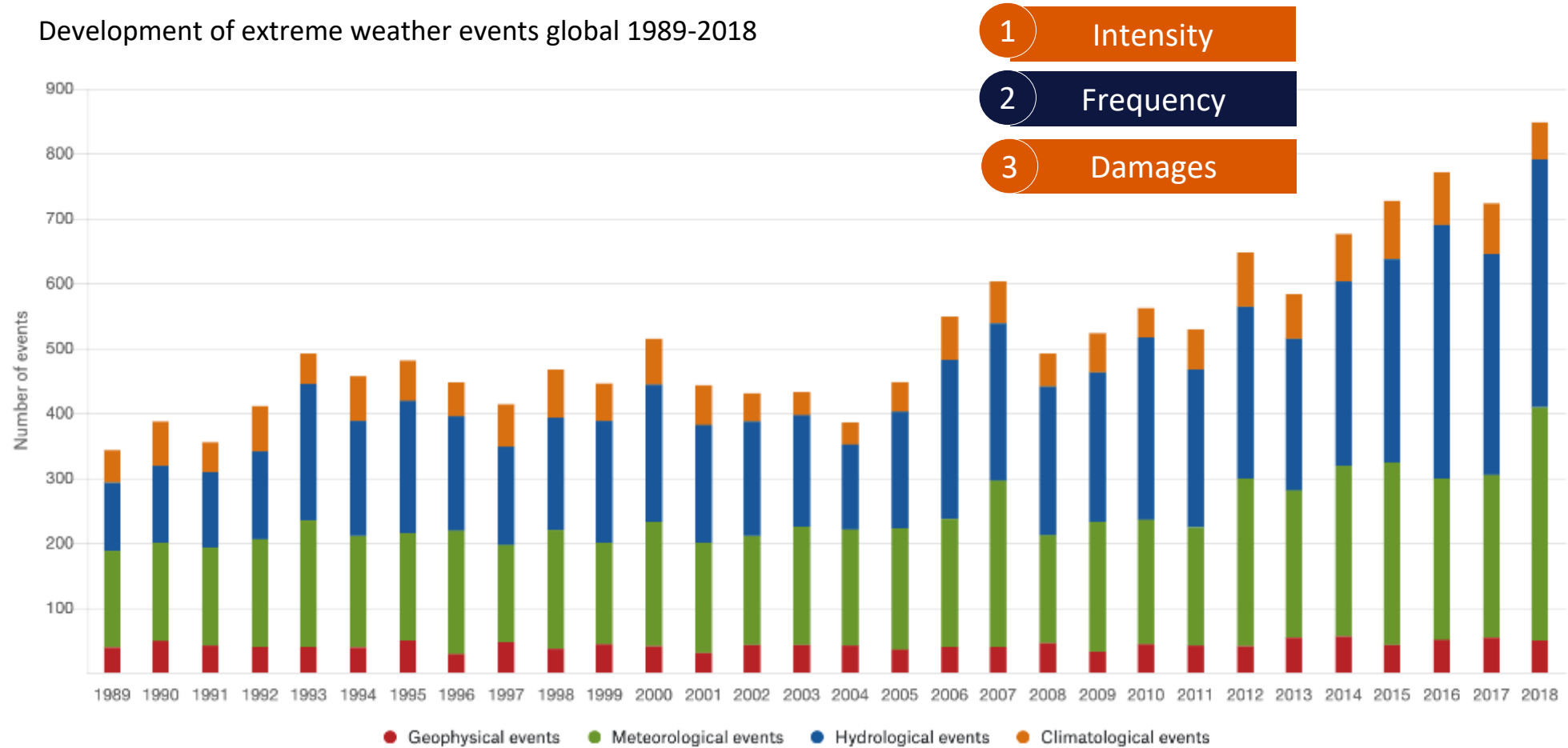
## Flood damage in Germany 2021

- Numerous railway lines, roads, bridges and mobile phone masts destroyed, as well as the gas, electricity and water supply in many places.
- Costs to rebuild the transport routes approx. 2 billion euros.
- Outage of many railway lines for months.
- Overall economic damage probably significantly higher (approx. 30 billion euros).
- Gesamtverband der Deutschen Versicherungswirtschaft (GDV) currently estimated a loss amount of 5.5 billion euros for insured property alone.



# Physical risk in the real estate industry

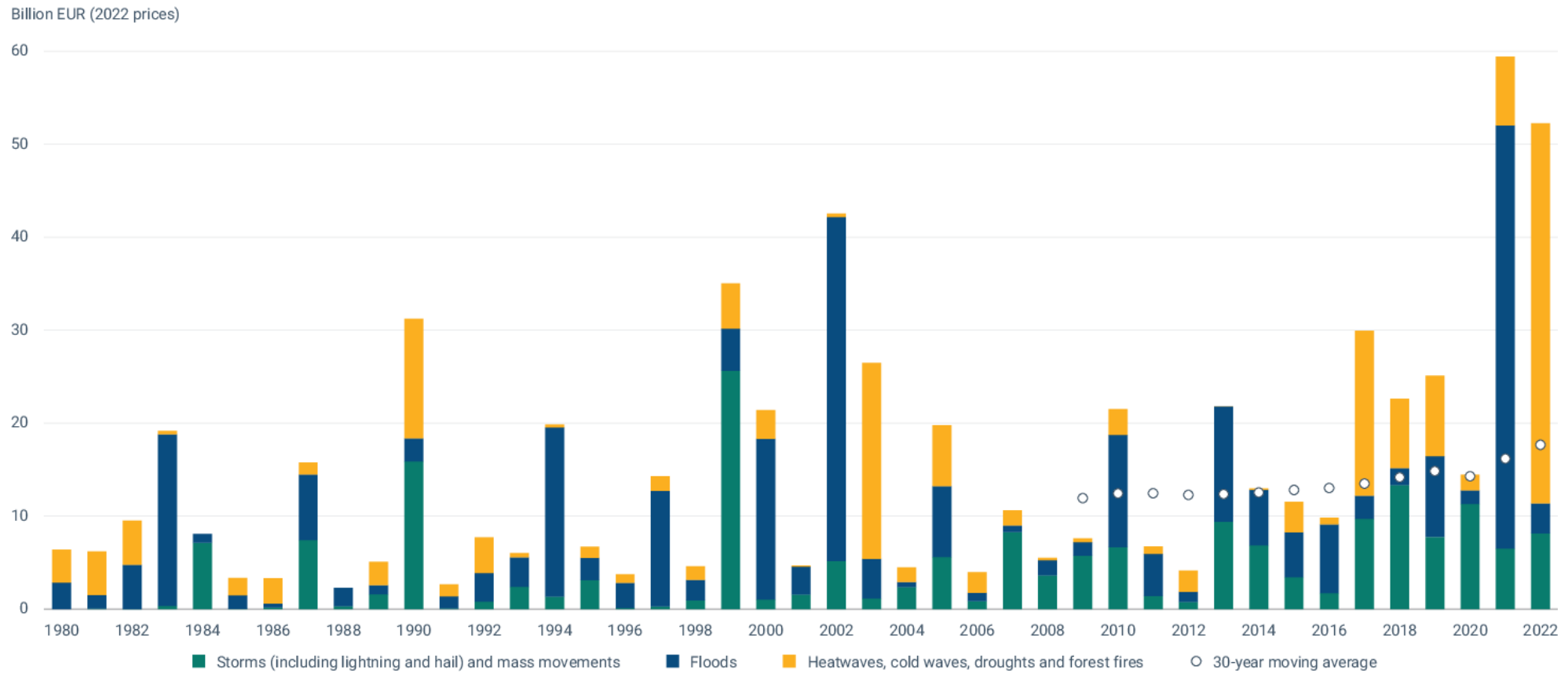
## Historic development of extreme weather events



Source: MunichRe (2020)

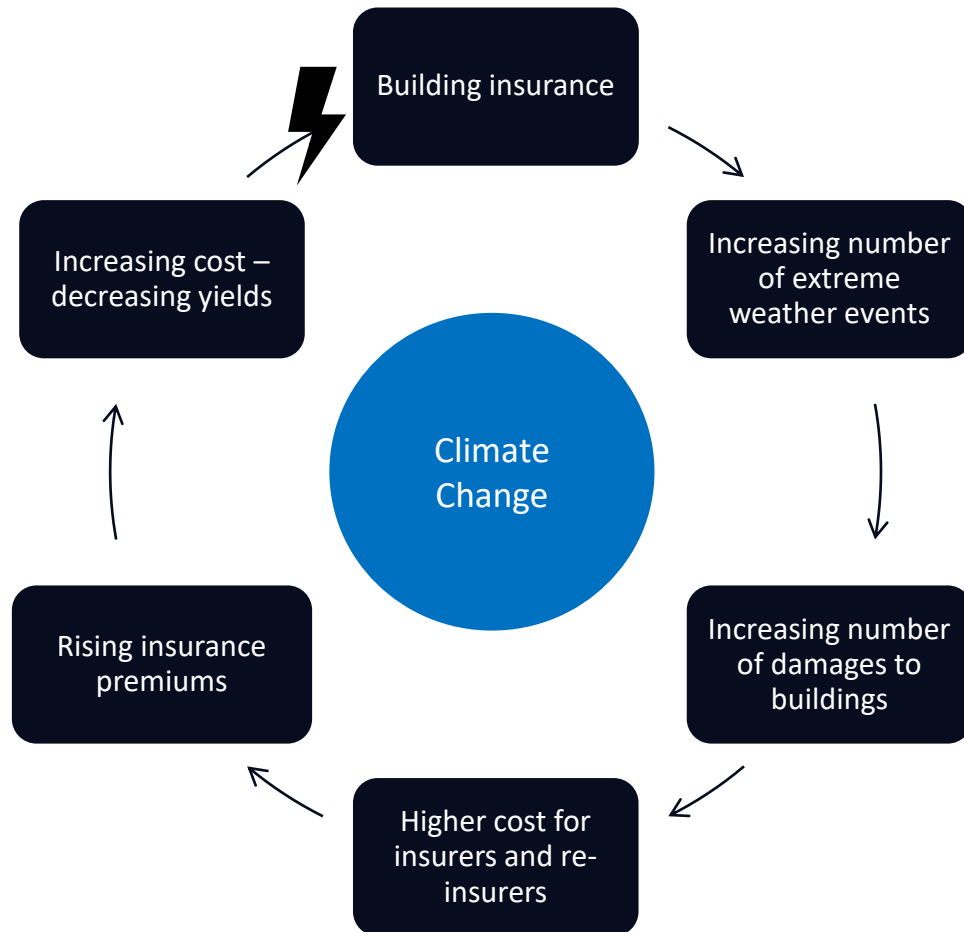
# Physical risk in the real estate industry

## Economic damages caused by extreme weather events in the EU



Source: EEA (2024)

## Insurance only offers partial protection



### The problem of insurance against natural hazards :

- Although they offer protection, insurance premiums also rise as the risk increases.
  - Risk of unilateral termination by insurance company.
  - 4 degrees World no longer insurable according to current models.
- Rising costs for owners and users in the medium term.
- Buildings with a particularly high risk may no longer be insurable.

## Tightening reporting requirements



ESRS E1

Climate change



B Climate-Related Risks, Opportunities, and Financial Impacts

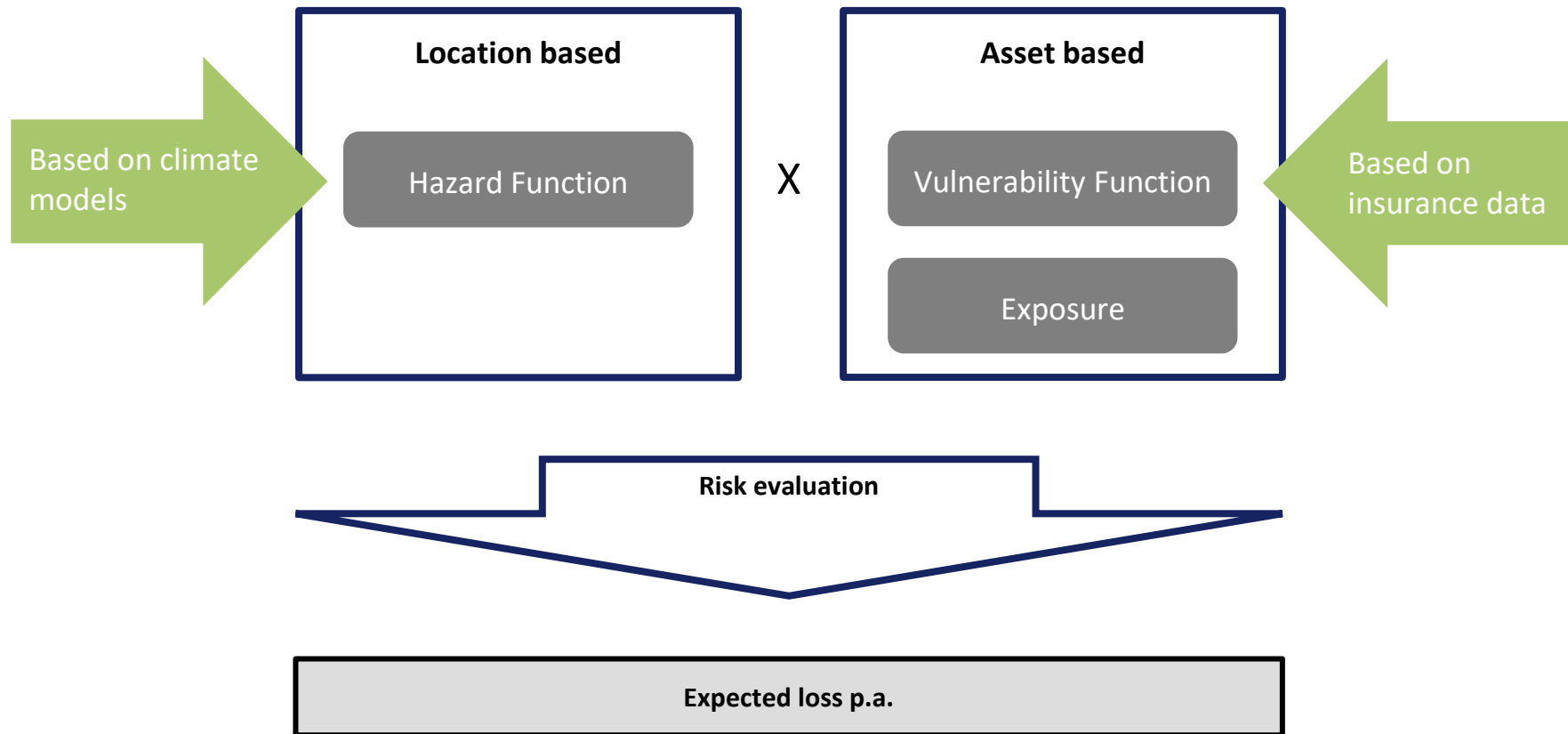
Most of the current reporting standards demand the disclosure of quantified physical risk on portfolio or asset level.

**Problem:** Physical risk quantification is complex and highly dependent on assumptions taken. Companies are often overwhelmed by the requirements.



# Physical risk in the real estate industry

## Basic quantification of physical risk



# Physical risk in the real estate industry

## The solution? Physical Climate Risk Quantification Tools



→ Tool landscape is chaotic. Transparency and comprehension in the market is low.

Where do the tools differ? What are the main assumptions and how do they affect the results?

# Physical risk in the real estate industry

## How can we tackle this problem for the RE industry?

Mixed Methods - Multi step approach:

Qualitative



1. Extensive literature review to identify relevant characteristics.



2. Development of questionnaire for both providers and users.



3. Interview sessions.

Quantitative



4. Development of fictitious pan-European real estate portfolio

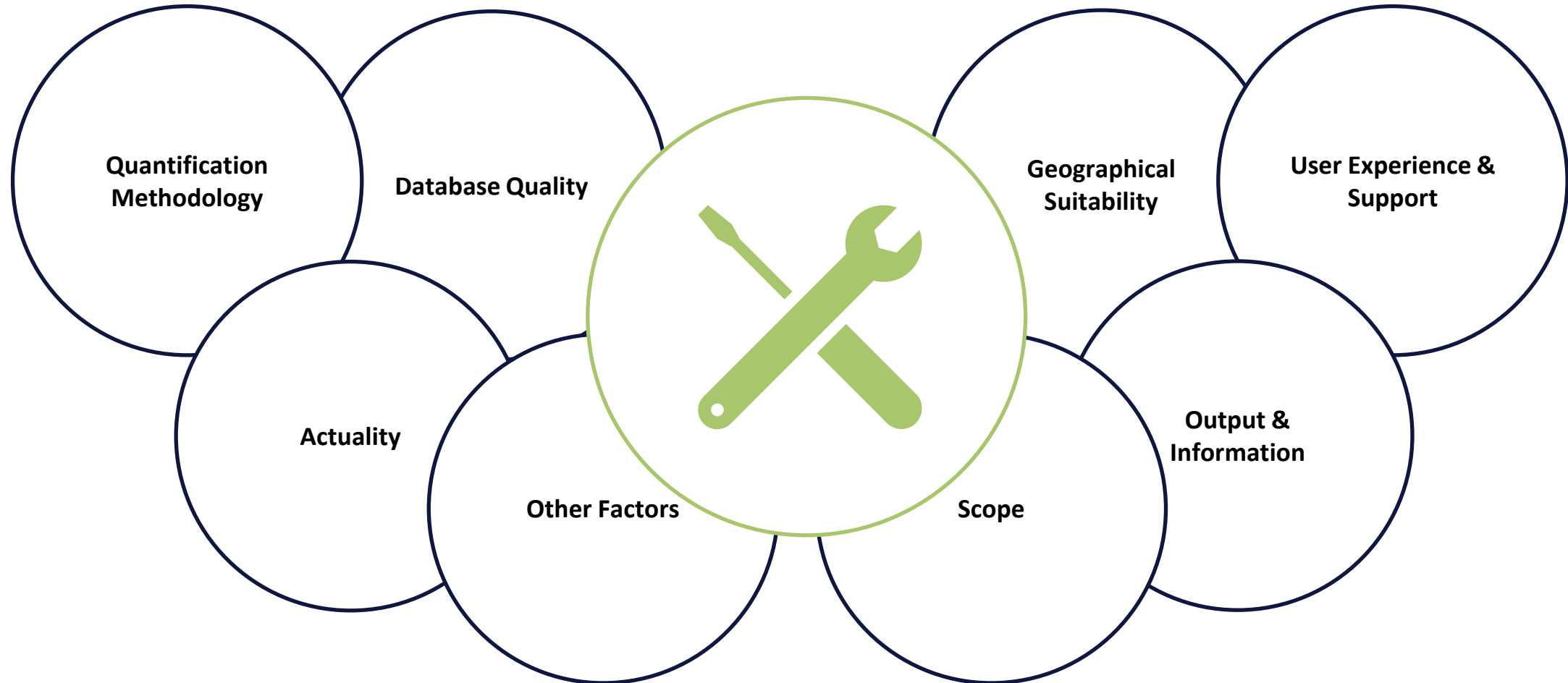


5. Quantification of two physical risks with multiple tools for the portfolio.



6. Analysis of results.

## Critical characteristics of the tools



## Qualitative findings – Providers

- Tools published by **large companies are more untransparent.**
- Tools assessing multiple physical risks on a **global scale tend to use uniform global data.**
- Providers are **not equally confident in the physical risks** they are predicting → Especially river floods seem to be problematic for the providers.
- Most tools **do not provide detailed information** about the risk score or monetary risk they are calculating such as confidence intervals etc.
- Providers with large corporate backgrounds are mostly **overlay tools**, with a focus on an intuitive user experience.
- Many tools are **not able to quantify monetary risk** for the real estate industry, but rather provide hazard scores.
- Downscaling methodology is different for most providers – especially hazards requiring granular modelling require “heavier” downscaling.

→ Surprisingly large differences in all the prior presented characteristic. Evident differences especially small vs large providers and single vs multi risk tools

# Physical risk in the real estate industry

## The test portfolio



- 360 Assets total in the largest cities in every country in Europe
  - Randomized location, size, value, asset type (office, residential) and height of every asset
  - Fed into all tools cooperating
  - Quantification for different scenarios, risks and projections
- Same input for every provider

# Physical risk in the real estate industry

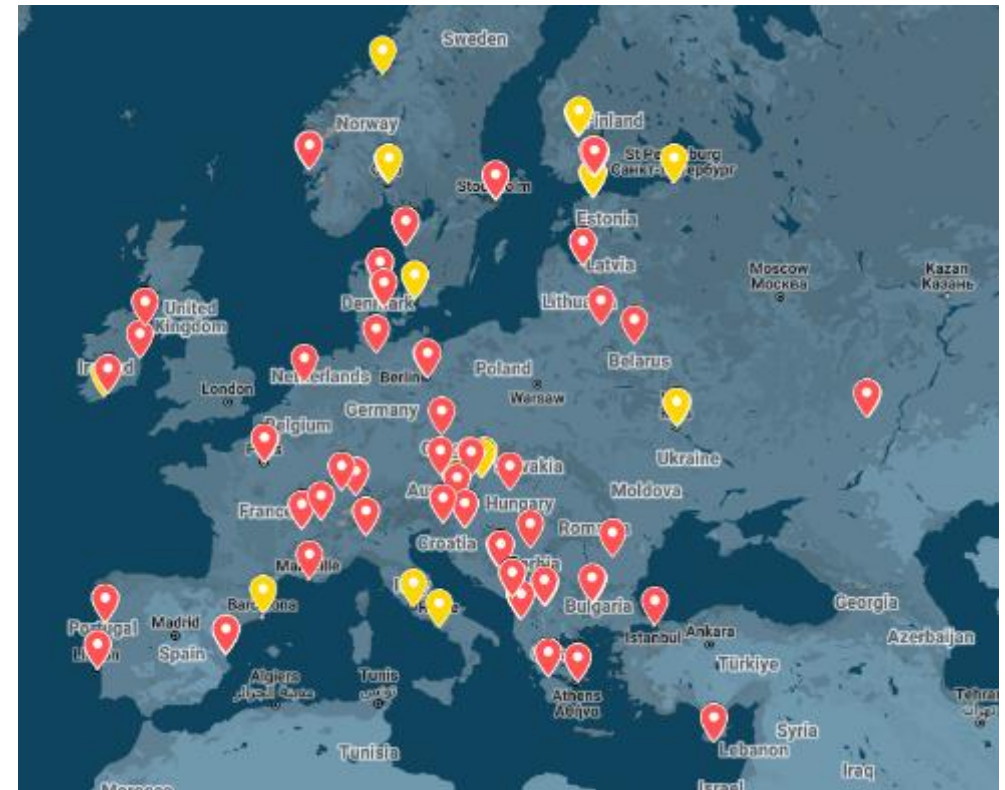
## Quantification results

Expected and actual deviation of analyzed hazards for pan-European test portfolio\*

	Tatsächlich	Erwartet
River Flood (Undefended)	1	1
Drought	2	4
Strom Surge	3	3
Extreme Heat Days	4	5
Coastal Flood Score	5	6
Wildfire Score	6	2

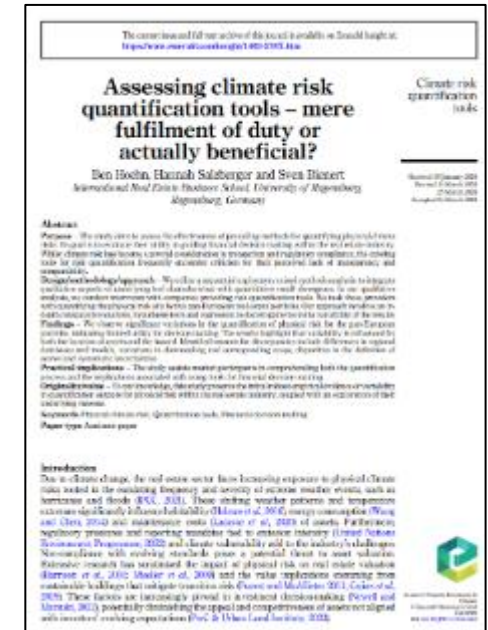
\*1 is the highest deviation and 6 the lowest. Expectation refers to the tool providers.

Result deviation river flood (undefended)




## What can we learn from the results?

1. There is **no level playing field** yet.
2. While the basis for most quantifications is often similar, the **results diverge significantly**.
3. The **lacking standards for physical risk quantification**, scores and definition of hazards leads to unnecessary incomparability of many results.
4. Market participants need to **understand the assumptions** made and the uncertainty inherent in the tools to be able to manage the risk effectively.
5. Not all hazards are quantified with the same (high) confidence.
6. Regulators might have to introduce more detailed standards for physical risk reporting, to increase its value to the (investment) market.
7. Physical risk assessment remains crucial for the industry, however investment decisions shouldn't be based on the output of a singular global tool.







Thank you for your attention!

06.12.2024

Ben Höhn