



EUROPEAN CENTRAL BANK

EUROSYSTEM

A central banker's perspective on climate change and nature degradation

Lecture at the University of
Oxford



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Outline

- 1 Climate-related risks: relevance for central banks
- 2 Nature-related risks
- 3 Climate and nature risks in supervision
- 4 Litigation risks
- 5 Way forward

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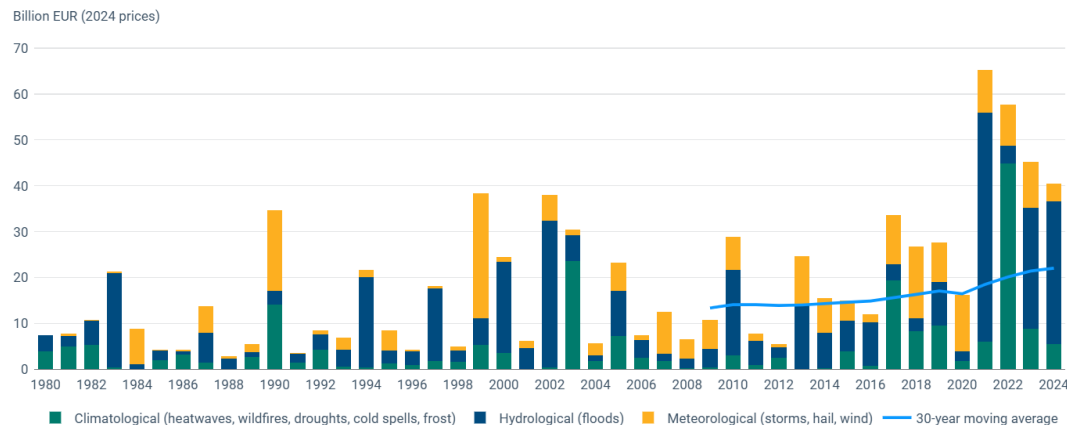
Climate-related risks

Relevance for central banks

Climate change already poses material risks to the EU economy

- Direct losses to infrastructure and assets estimated at **EUR 822 billion** during 1980 - 2024 in the EU; **expected to increase**
- In August 2023 Slovenia was hit by **intense floods** that have caused direct damages estimated equal to **16% of GDP**
- Valencia (Spain) was hit by severe floods in 2024, regional wealth loss amounted to more than **€17 billion**, i.e. **~20% of the regional GDP**

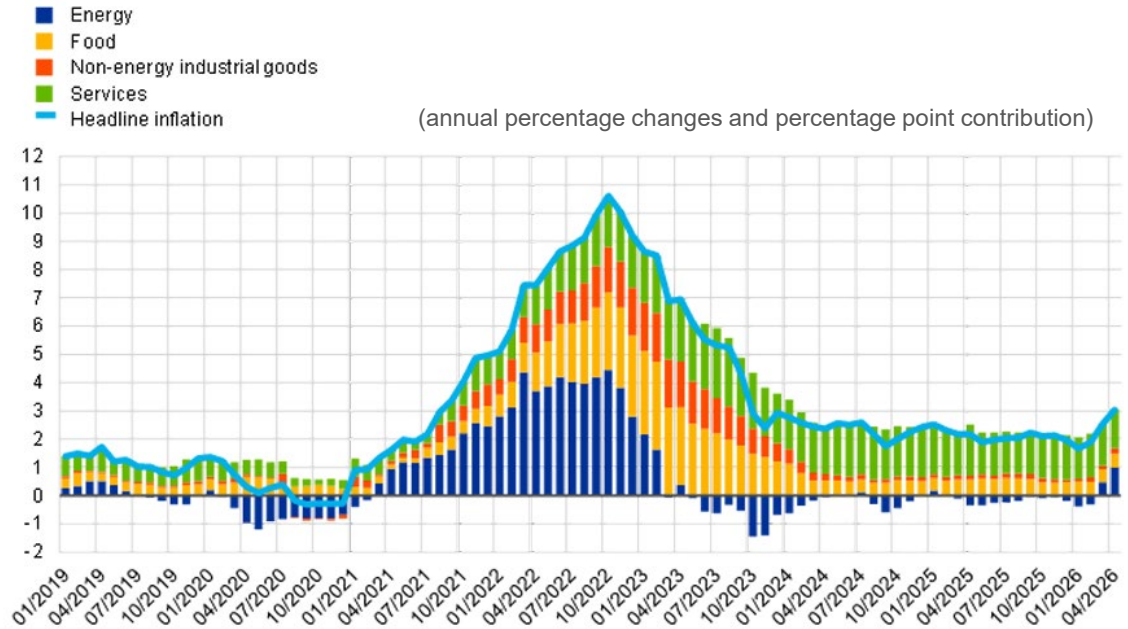
Annual economic losses from by weather- and climate-related extreme events in the EU Member States



Source: [European Environmental Agency](https://www.eea.europa.eu/en/press/2025/01/01), 2025

“Fossilflation” has consequences for inflation and monetary policy

- **Energy transition has become more urgent** as Europe’s energy dependence is a **critical vulnerability** and poses risks to **price stability (“fossilflation”)**
- Russia’s invasion of Ukraine pushed euro area inflation **up to 10.6%** in October 2022, with its effects lasting until **Q4 2023**



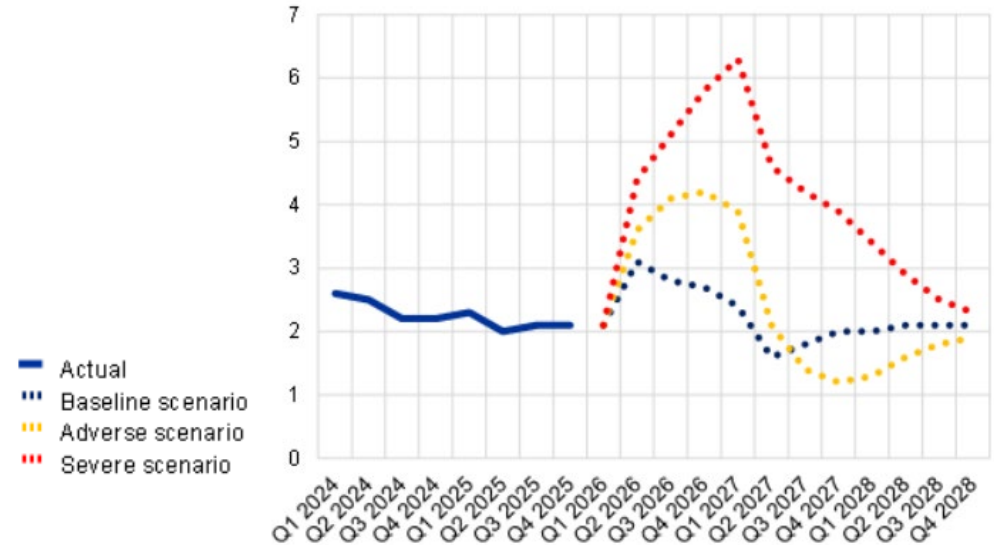
Source: Eurostat and ECB calculations.
Note: The latest observations are for April 2026.

The fossil fuel price crisis is an extra push towards renewable energy transition

- Short-term effects of the war in Iran are already **larger than during the three previous energy crises combined** (1973, 1979 and 2022)
- Current energy crisis emphasises **need to transition to renewable energy sources**
- **Green energy transition is a way to achieve goals of energy security and affordability**

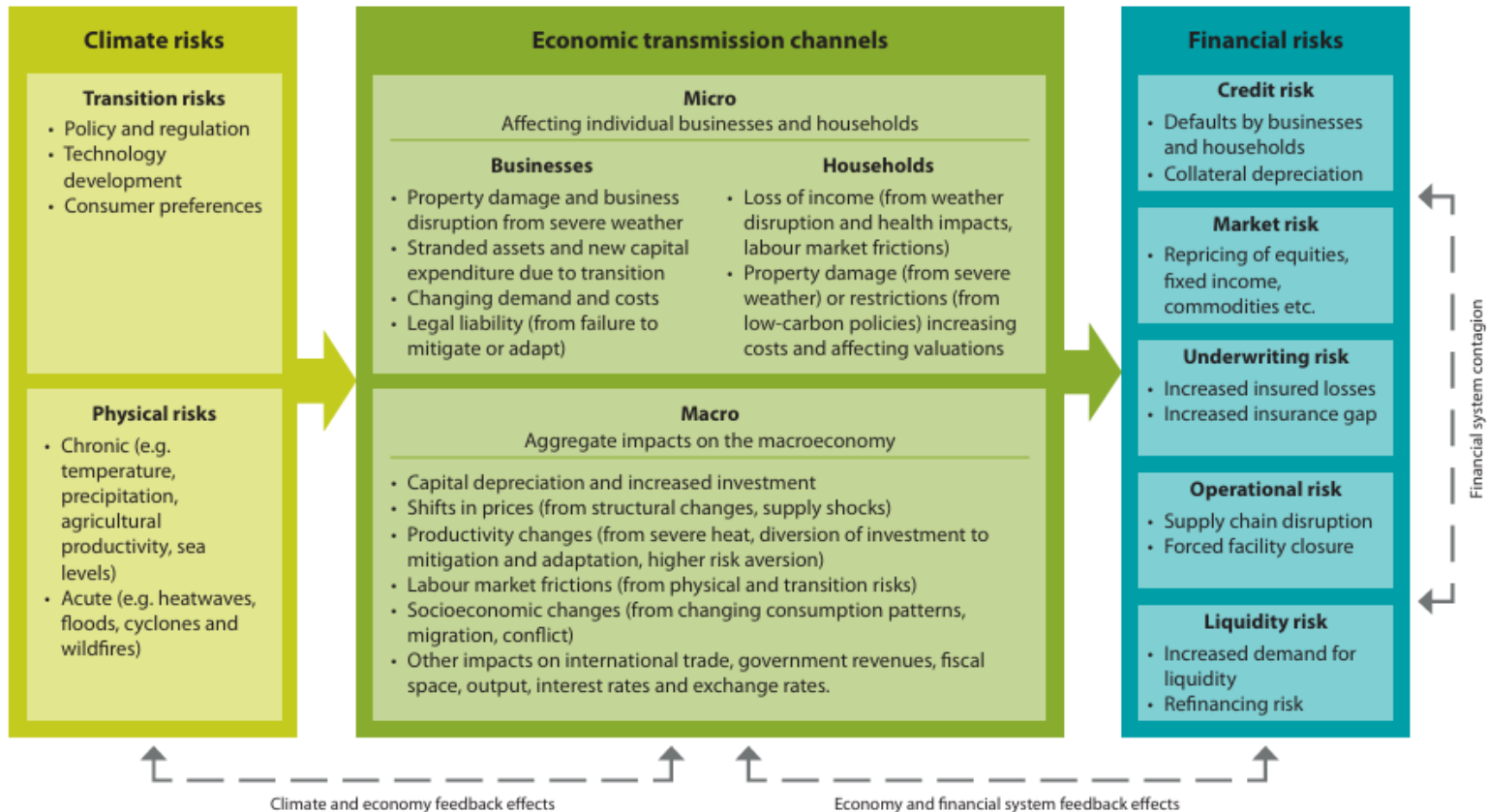
Headline inflation in the EU

(annual percentage changes in the Harmonised Index of Consumer Prices)



Sources: Eurostat and ECB (2026), [ECB staff macroeconomic projections for the euro area](#), March.

Transmission of climate risks



Relevance of climate risks for the ECB



Climate change and policies **affect the outlook for price stability** through their impact on macroeconomic indicators and the transmission of monetary policy



Climate change affects the value and risk profile of assets held on the Eurosystem's balance sheet, thereby increasing **climate-related financial risk**



Euro area financial institutions are exposed to **transition** and **physical risk** (via loans and securities) through **firms, households** and **governments**

The ECB addresses climate change in several areas

Economic analysis and data

- Integrate climate change in **staff projections** and risk assessments
- Climate-related **statistical indicators**
- Impact on **monetary policy** transmission

Monetary policy

- Tilting of **corporate bond holdings**
- Climate risk in **collateral framework**
- Push for more transparency in **credit ratings**

Banking supervision

- **Guide** on climate-related and environmental risks
- **Thematic review**
- Climate **stress test** and **on-site inspections**

Financial stability

- Economy-wide **climate stress tests**
- Developing NGFS **climate scenarios**
- **Insurance protection gap**

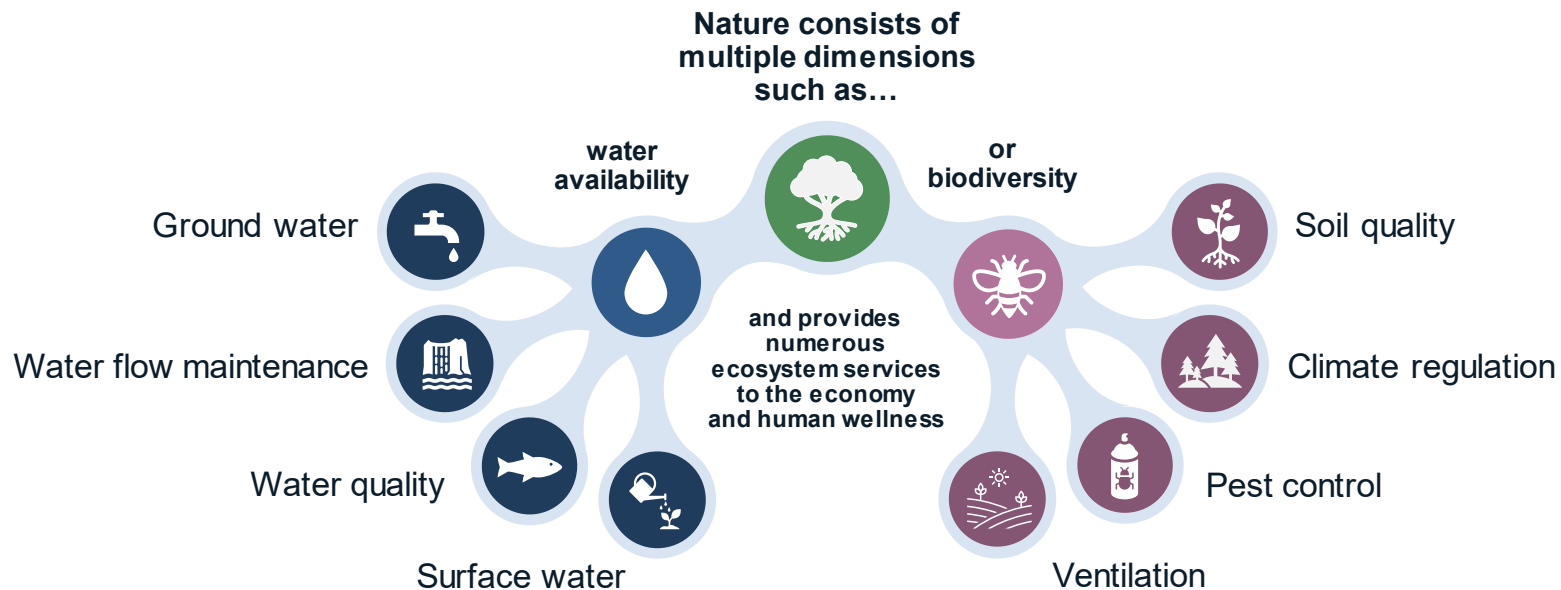




Nature-related risks

Expanding the scope from climate to environmental risks

Definitions of nature and ecosystem services

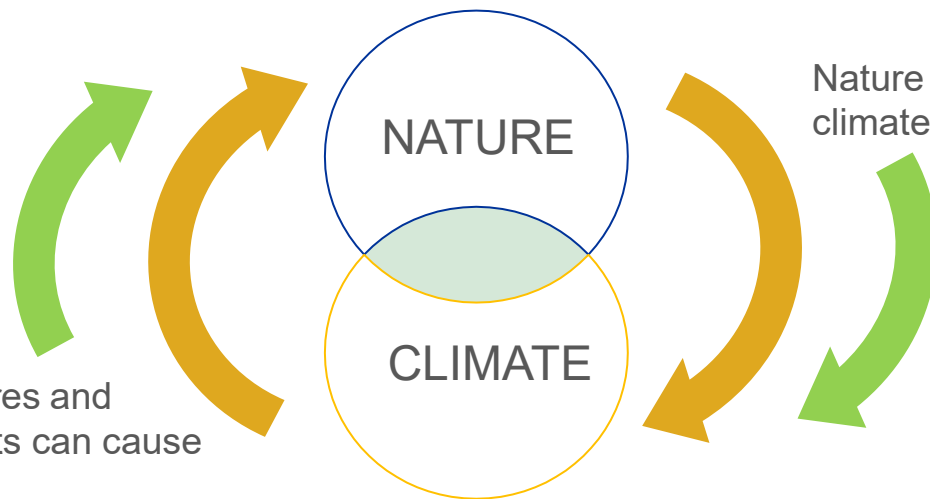


The climate-nature nexus

Nature and climate related risks are **strongly interconnected**.

A controlled global warming and mitigation of climate change can help preserve ecosystems

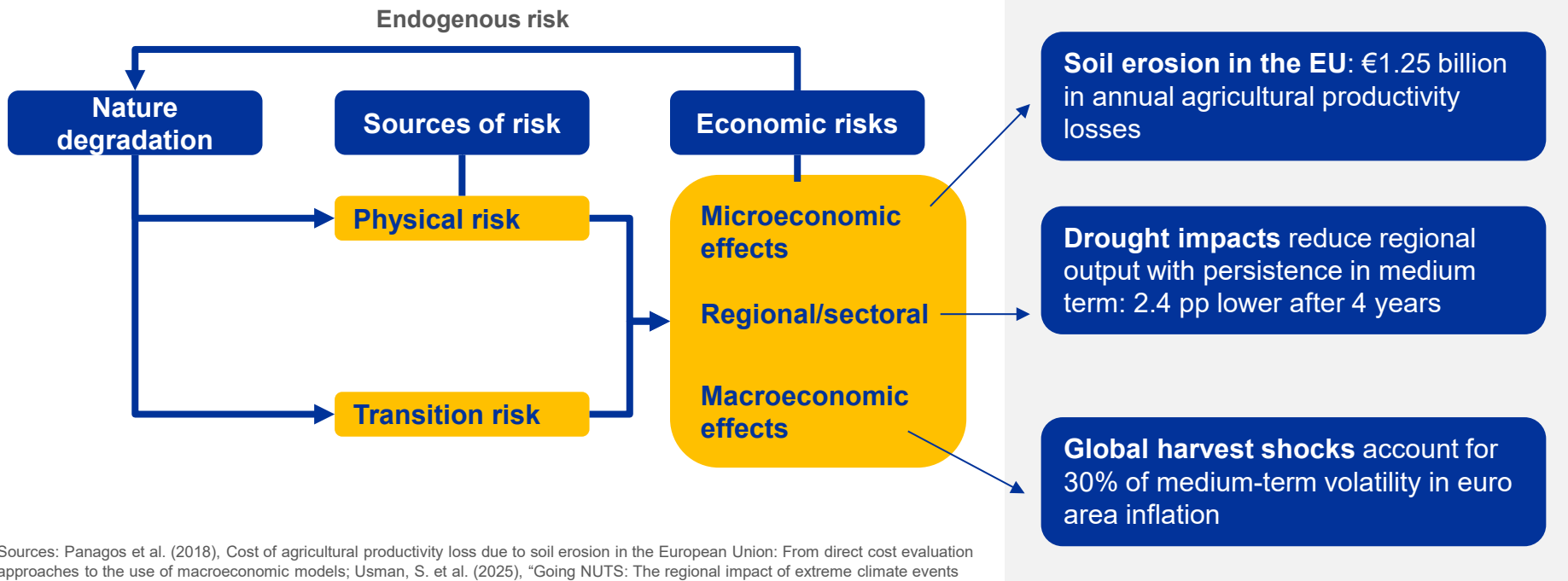
- Increasing temperatures and extreme climate events can cause nature degradation
- Policies aimed at mitigating climate change can negatively impact nature



Nature degradation can amplify climate change

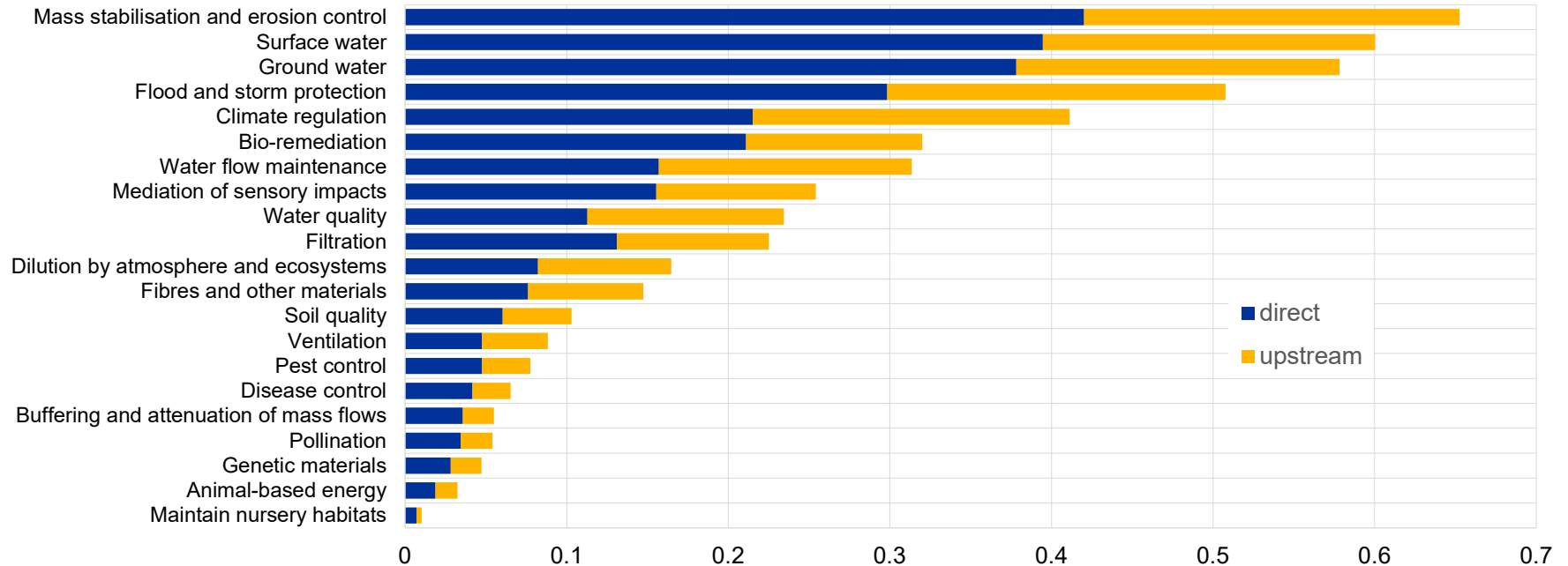
Healthy nature and biodiversity are essential for limiting climate change

Illustration of observed nature-related economic shocks



Sources: Panagos et al. (2018), Cost of agricultural productivity loss due to soil erosion in the European Union: From direct cost evaluation approaches to the use of macroeconomic models; Usman, S. et al. (2025), "Going NUTS: The regional impact of extreme climate events over the medium term"; Peersman, G. (2022) "[International Food Commodity Prices and Missing \(Dis\)inflation in the Euro Area](#)"

From 4.2 mln companies in the Euro area, around 3 mln are highly dependent on ecosystem services

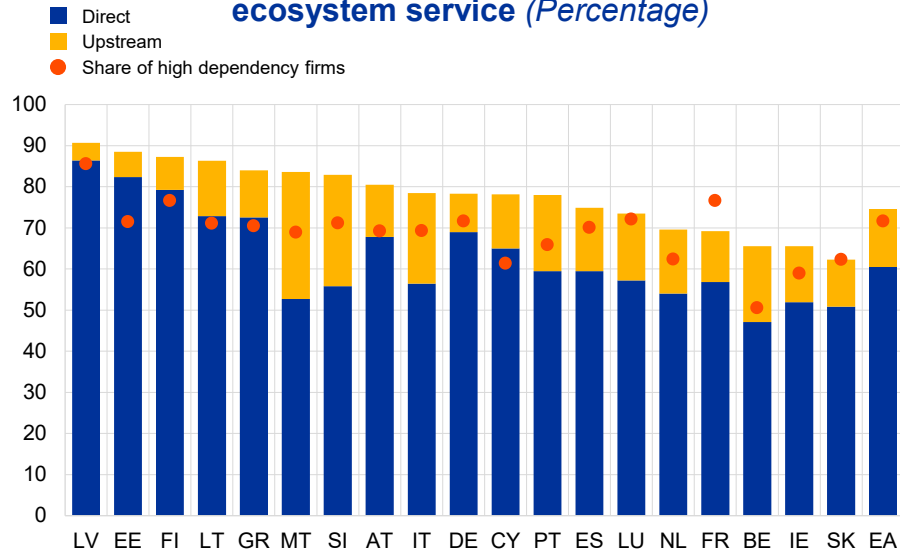


Sources: ENCORE, EXIOBASE, AnaCredit and ECB calculations.

Notes: Euro area dependency score is computed as the average of the dependency scores of euro area non-financial corporations. A distinction is made between direct dependency (Scope 1) and indirect dependency (upstream) associated with the supply chain.

75% of banks' corporate loans are to companies that are highly dependent on nature

Share of Euro area corporate loans (bars) and non-financial firms (dots) that are **highly dependent on at least one ecosystem service** (Percentage)



Notes: The chart presents the share of euro area corporate loans (bars) and non-financial firms (dots) that in each country have a high total dependency from at least one ecosystem service. The analysis considers both direct dependency and the one attributable to the supply chain

Source: ECB/ESRB Project Team.

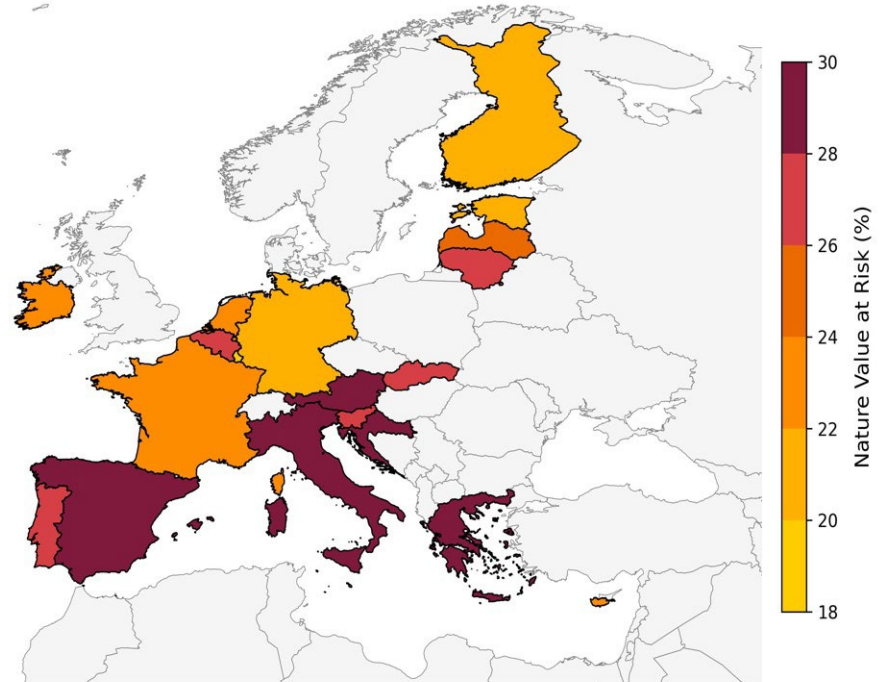
Considering more than **€ 4.5 tn** in corporate loans to around **4.2 mln NFCs** in the euro area:

- **75% of all loan exposures** (around € 3.1 tn) are towards highly dependent borrowers
- Differences between countries are moderated by the **indirect dependencies** related to supply-chain

Water-related risks are the highest for the euro area

Water related ecosystem services are most material for euro area economy:

- **1-in-100 year drought can put 24% of euro area economic output at risk** due to surface water scarcity
- Corresponding share of loans at risk: **19% of banks loans** given to non-financial corporations
- Around half of overall nature-related risks are related to **global supply chains**



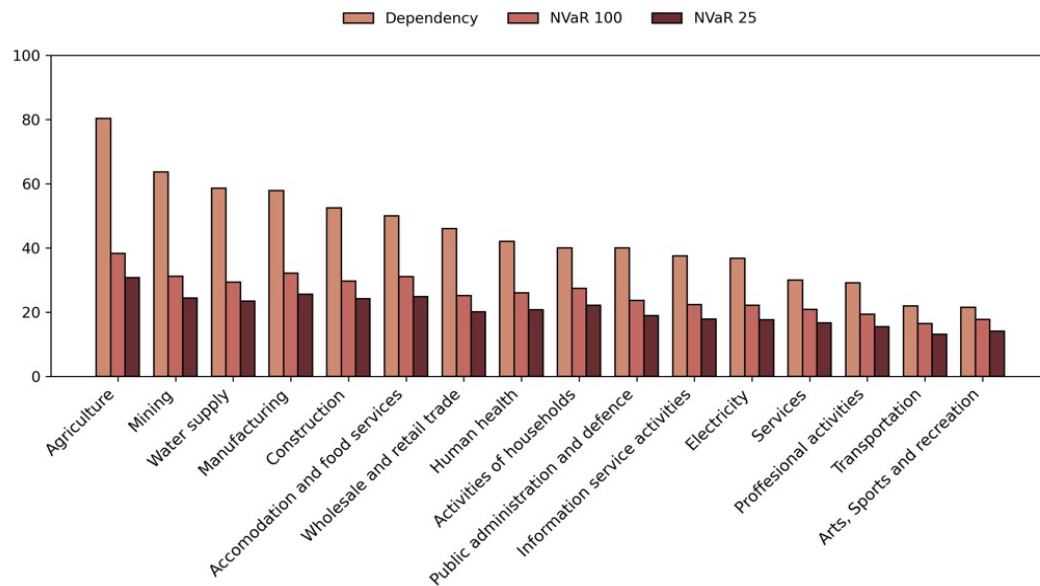
Share of national economic output at risk from surface water scarcity under a 1-in-100 year drought event (Ceglar et al., Occasional Paper)

High risks from water scarcity for economic output

- **Agriculture most affected** in terms of **relative sectoral losses**, with potential output losses of up to 30% (25-year return period event)
- **Other sectors face substantial risks:** manufacturing, mining, water supply, construction, accommodation and food services

Sectoral distribution of nature value-at-risk for a surface-water provision shock

Relative sectoral output losses as a share of EA sectoral economic output



Water-related risks could become material sources of risks for banks

- Highest concentrations of loans at risk from **water scarcity** in **real estate activities, manufacturing and wholesale and retail trade**.
- **Water quality** is more relevant for **manufacturing, mining and food services**
- To **assess the resilience of banks' credit portfolios**, the ECB will soon publish analytical research on the impact of nature degradation **on probabilities of default and credit losses** under different scenarios

Share of loans at risk from water scarcity and water quality degradation in the euro area by borrower sector



Unit: Percentage shares; (loan expressed as outstanding nominal amounts)

Source: Enhanced NVaR Systemic Risk, AnaCredit, EXIOBASE3, ENCORE.



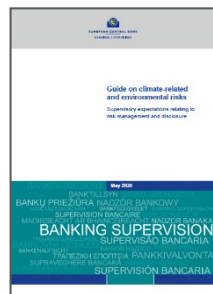
Climate and nature risks in supervision

Strengthening banks' capacities
to manage risks

The ECB has followed a multi-year programme to build capacity in the banking sector



ECB has updated two major publications on good practices to support the industry



ECB Guide

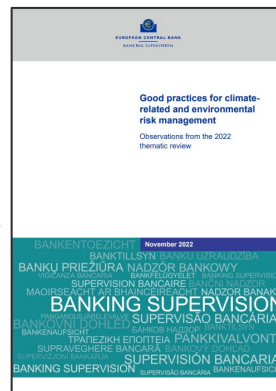
Risk management

- 1. Business environment
- 2. Business strategy
- 3. Management body
- 4. Risk appetite framework
- 5. Organisational structure
- 6. Internal reporting
- 7. Risk management framework
- 8. Credit risk management
- 9. Operational risk management
- 10. Market risk management
- 11. Stress testing
- 12. Liquidity risk management

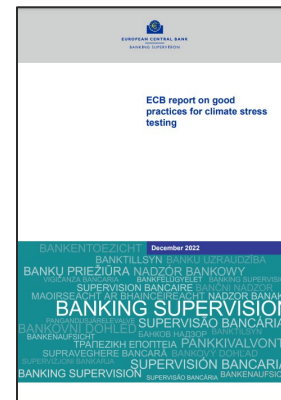
Disclosures

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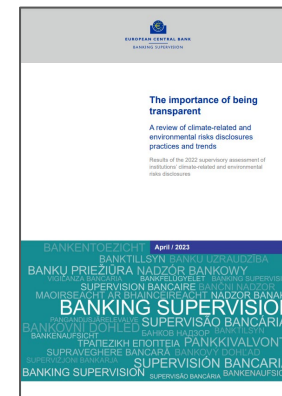
Governance, strategy and risk management



Stress testing



Disclosures



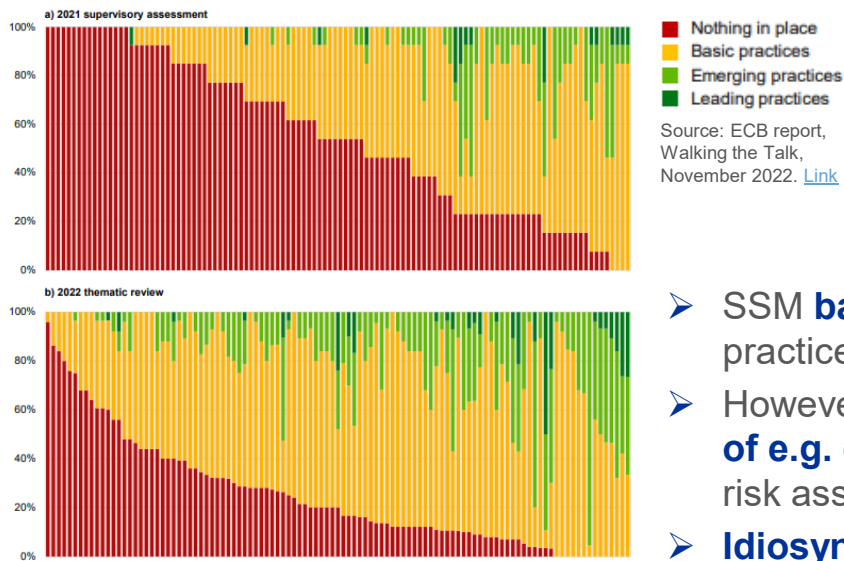
See Elderson, F. (2026), “[Good practices for advancing climate and nature-related risk management](#)”, *The Supervision Blog*, ECB, 8 May. The good practices are not legally binding and do not set expectations or standards.

The ECB measures progresses in banks C&E risk management capabilities

Progress 2021-2022

The level of maturity of practices across areas of supervisory expectations (bank-by-bank)

(percentages of areas of supervisory expectations)



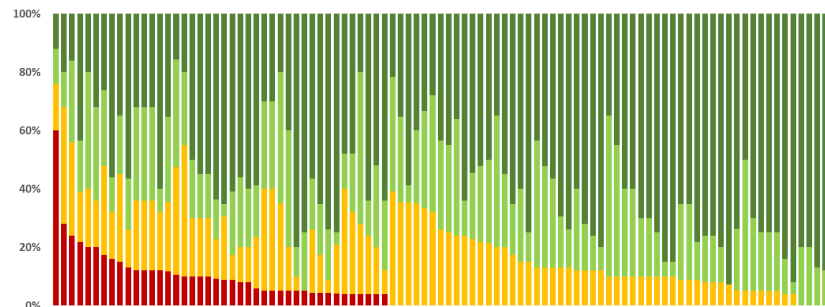
Source: ECB report, Walking the Talk, November 2022. [Link](#)

Notes: The 2021 supervisory assessment scores are taken as a proxy to indicate the level of maturity of institutions' practices in 2021. Owing to the updated assessment methodology used in the 2022 thematic review, direct comparison with the results from 2021 gives an indication only.

(1) [The Supervision Blog, 11 July 2025](#)

Progress (as at end 2024)⁽¹⁾

Preliminary progress of bank's C&N risk management capabilities since 2022



- SSM banks have made significant strides in developing sound practices.
- However, **not depicted on the chart are weaknesses in terms of e.g. comprehensiveness, effectiveness** and granularity of risk assessment and modelling.
- **Idiosyncratic shortcomings are widespread** and still followed up on.



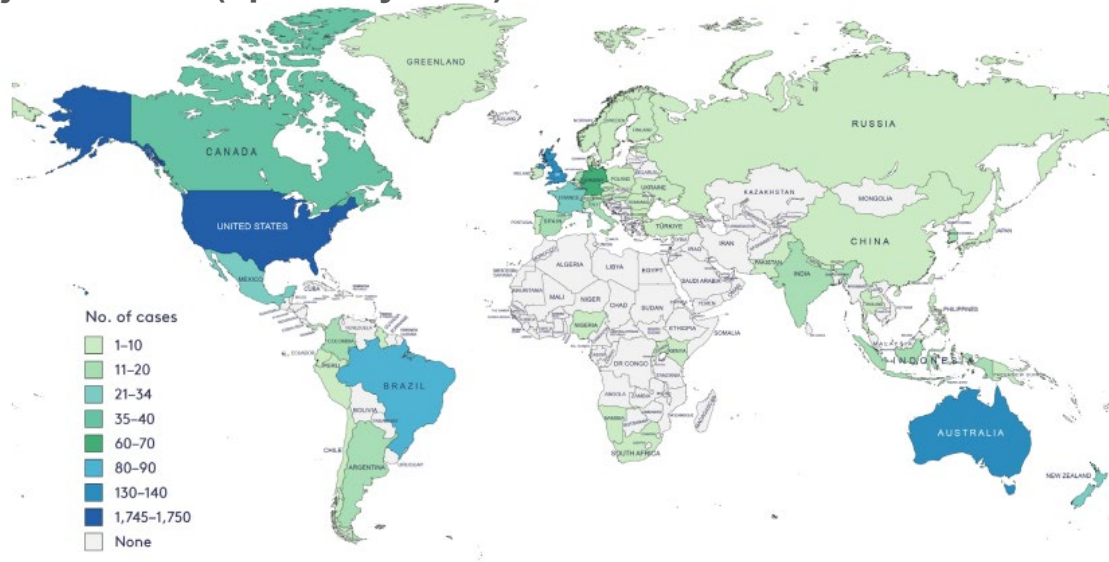
Litigation risks

Climate/nature litigation – a growing risk for the financial system

Climate litigation: increasing relevance for central banks and supervisors

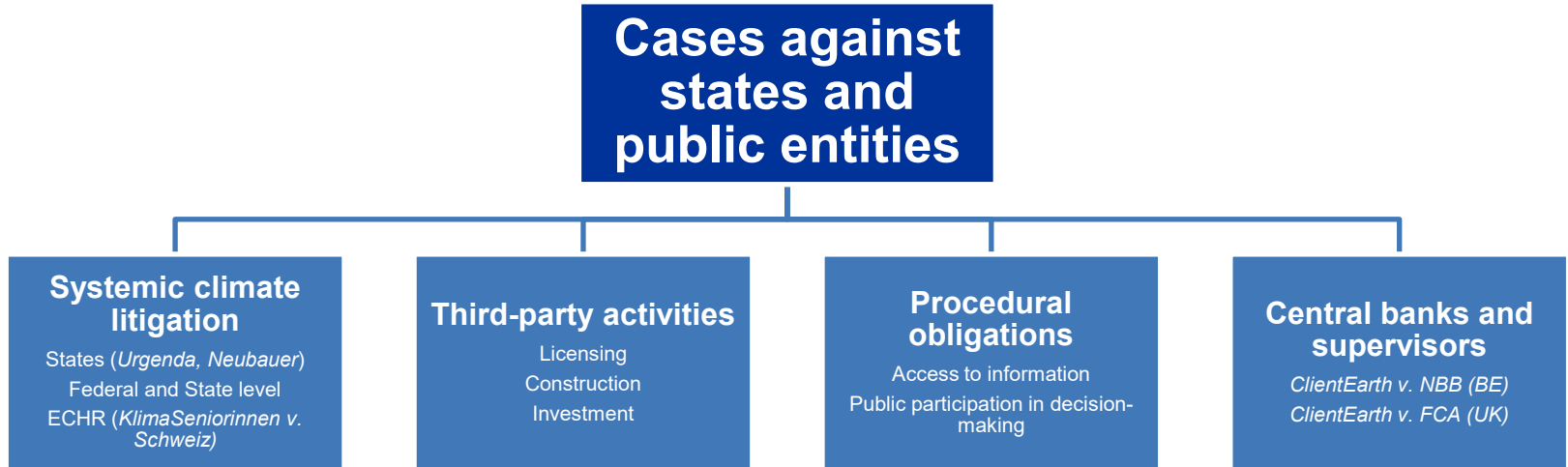
- UN: “Cases that raise **material issues** of law or fact relating to climate change **mitigation, adaptation** or the **science** of climate change”
- NGFS and central banks started to **include litigation risks** in their focus:
 - **NGFS Experts’ Network on Legal Issues** ([2021](#), [2023](#), [2024](#))
 - **NGFS Workstream on Supervision** ([2023](#))
 - **ECB** ([2023](#))

Number of climate litigation cases around the world, per jurisdiction (up to May 2024)



Source: Setzer, J. and Higham, C. (2024), [Global trends in climate change litigation: 2024 snapshot](#), LSE Grantham Research Institute on Climate Change and Environment

Climate litigation against states



Consequences for the financial system

- **Transition risks** – more ambitious state action
- **Delaying or preventing** fossil fuel projects, revoking licenses and other permissions (losses, stranded assets)
- **Procedural obligations** – time and costs
- Expanding **judicial precedents** to impose obligations on the private sector

Climate litigation against corporates and financial institutions

Cases against corporates and financial institutions

Tort law, incl. damages, duty of care

Lliuya v. RWE (2025, DE)
Milieudefensie v. Shell (2024, NL)

Corporate due diligence legislation

Les Amis de la Terre et al v. BNP Paribas (2023, FR)

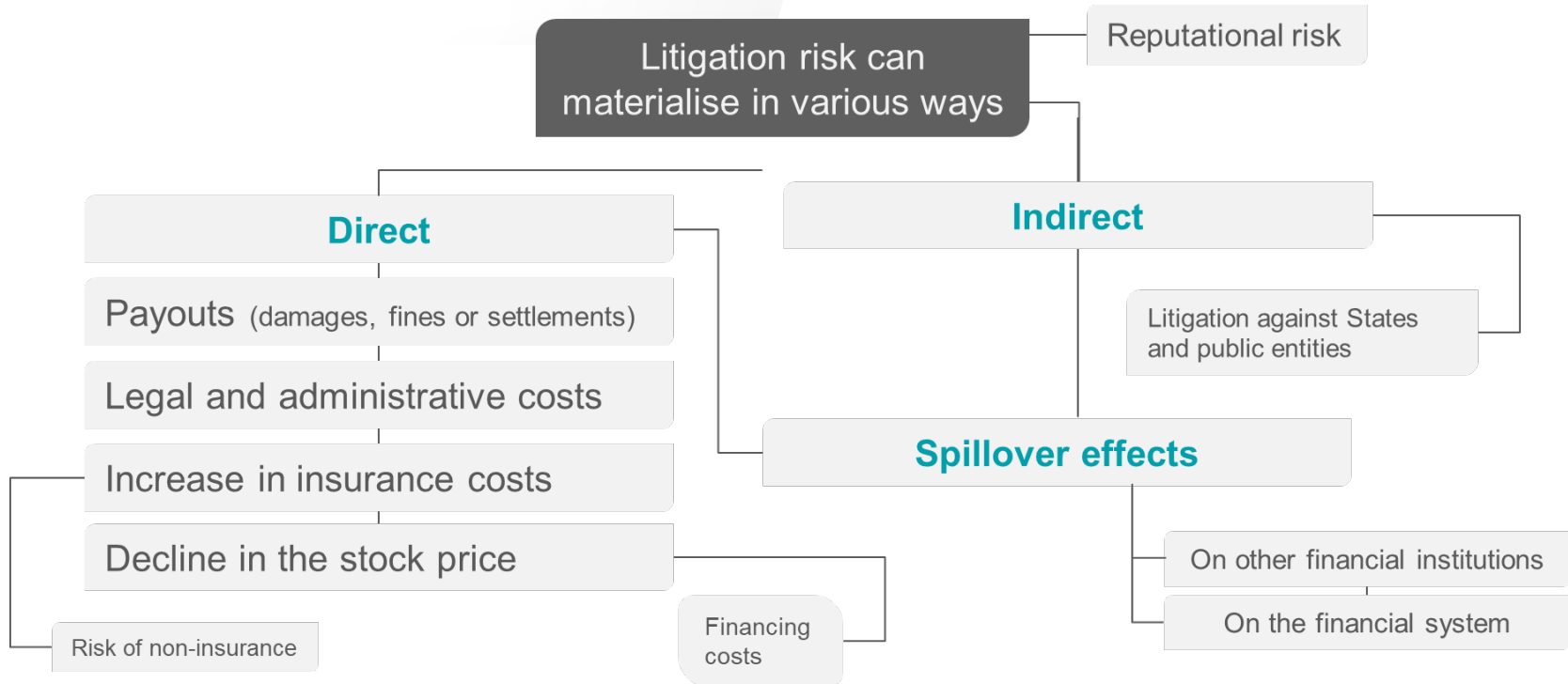
Breach of fiduciary duties

ClientEarth v. Board of Directors of Shell (2022, UK)

Greenwashing

Verbraucherzentrale Baden-Württemberg v. Commerz Real (2023, DE)
ASA v. HSBC (2022, UK)

Potential impact on companies, financial institutions





Way forward

Daunting news



- Global heating is on the brink of passing 1.5 degrees
- We are heading for a global temperature increase of 2.8 degrees by the end of the century. Europe, the fastest-warming continent, is heating up twice as fast as the global average
- The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) warns that biodiversity loss is among the most serious threats to businesses

But there is hope

- Since the Paris Agreement was adopted, renewable energy capacity has increased by 140% and investment in clean energy has increased by 80%
- Last year saw the world add 585 gigawatts of new renewable energy capacity

Staying the course and continuing to act

- The climate and nature crises are one of the most encompassing issues we have ever faced
- All of us need to play our part in our respective fields with a sense of urgency
- Central banks are not and do not intend to be climate and nature policy *makers*. We are policy *takers*. The primary responsibility for addressing the climate and nature crises lies with elected governments – the policy *makers* –
- Within our price stability and financial stability mandate, we will stay the course and will continue to take climate and nature related risks into account

“In the face of the ongoing climate and nature crises, inaction is not an option. Where fragilities form, where risks rise, where resilience recedes, we must continue to act”



Thank you!

Any questions?