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PART 3/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

EU Framework for Climate Resilience

Accompanying the document

Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

establishing a framework to enhance climate resilience and amending Regulation (EU) 2018/1999 (European Climate Resilience Law)

{COM(2026) 730 final} - {SEC(2026) 730 final} - {SWD(2026) 730 final} - {SWD(2026) 732 final}

ANNEX 8: PROJECTED CLIMATE IMPACTS AND CONSEQUENCES; POTENTIAL BENEFITS OF CLIMATE RESILIENCE

This annex provides additional examples of evidence regarding the risks and plausible impacts of climate change and potential benefits of climate resilience.

Projected climate impacts and consequences

For more details on the risks and impact chains, as well as extensive references to evidence, the European Climate Risk Assessment (EUCRA)[1] provides a comprehensive presentation. The economic costs of climate change, including cost of inaction, have also been detailed in the Impact Assessment report accompanying the Commission Communication "Securing our future" (SWD (2024) 63 Final).

It is important to note, as highlighted in the Cross-Working Group on Economic Impacts from Climate Change in the IPCC AR6[2] and recent literature[3], that economic climate damage projections diverge significantly based on the chosen methodology, presenting a challenge for policy planning. Structural models that aggregate losses across specific sectors typically project lower global GDP impacts of 1% to 5% at 3°C of warming. In contrast, macro-statistical models, which capture historical sensitivities of productivity to temperature, project far more severe systemic shocks with losses potentially exceeding 20%. While structural models offer causal clarity but often omit non-market and compounding risks, the macro-statistical approaches attempt to capture broader systemic vulnerabilities but fail to account for complex spatial correlations in economic data.

The evidence provided in this Impact Assessment primarily reflects structural models, and such results can be considered a conservative reference point. Nevertheless, the GDP impacts from such models are comparable to recent economic crises, while climate damages would be a persistent negative impact, as for example underlined in the ECB supervisory priorities for 2026-2028, which consider climate risk *a permanent shock heading in one direction only, with serious long-term effects on house prices and other asset values*.[4]

While not cited here in more detail, emerging evidence also points to climate impacts driving inflation primarily through supply-side disruptions (destroying crops, capital/infrastructure impairments, reduced labour productivity, increasing insurance premiums[5]), which creates

[1] (European Environment Agency, 2024)

[2] Rose, S., Diaz, D., Carleton, T., Drouet, L., Guivarch, C., Méjean, A., and Piontek, F., 2022: Cross-Working Group Box ECONOMIC: Estimating Global Economic Impacts from Climate Change. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2495–2499.

[3] Morris, J., Rose, S. K., Reilly, J., Gurgel, A., Paltsev, S., & Schlosser, C. A.(2025).Reconciling widely varying estimates of the global economic impacts from climate change.Nature Climate Change, 15(2), 124–127.https://doi.org/10.1038/s41558-024-02232-7

[4] https://www.bankingsupervision.europa.eu/framework/priorities/html/ssm.supervisory_priorities202511.en.html

[5] https://www.banque-france.fr/en/governors-interventions/climate-change-already-hurting-our-economies

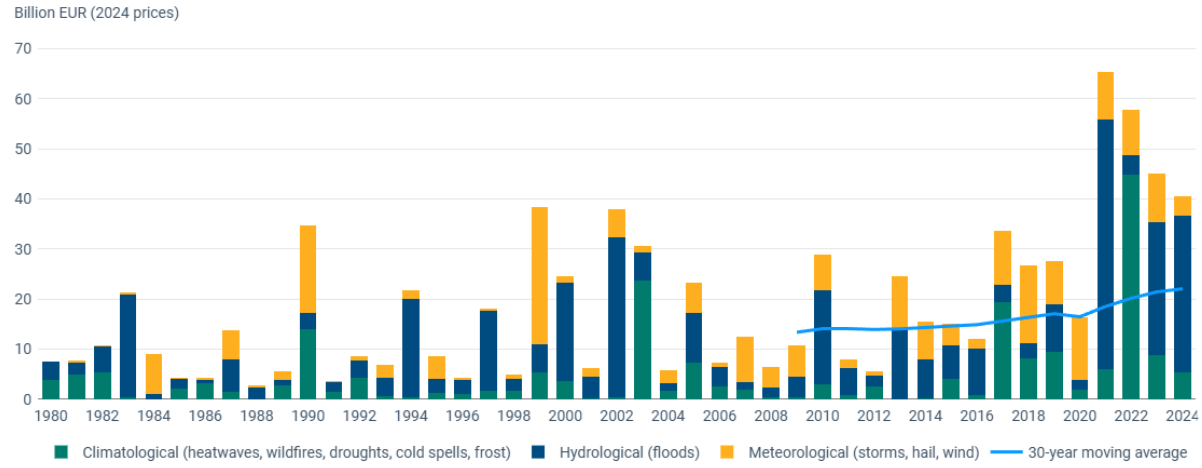
upward price pressure (particularly in food) that can be non-linear, persistent, and difficult for regulators to offset through conventional monetary policy tools[6].

Macroeconomic impacts

Climate impacts are already causing significant damage and disruption to Europe's economy, both in areas already identified as vulnerable and in new regions. Economic shocks Climate-related events cause economic shocks - both extreme events and structural climatic changes that depress growth potential. Such shocks undermine productivity, depress economic growth, pose risks to financial stability through increased potential credit defaults and losses, and higher or even prohibitive insurance premiums and heighten fiscal sustainability risks.

The below presents historical evidence on climate-related losses and projected increase in impacts.

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



Source: *EEA*

While **cumulative losses from weather- and climate-related extremes in the EU have reached an estimated EUR 822 billion since between 1980 and 2024, roughly one quarter of these losses occurred in just the past five years**.[7]

Projected GDP impacts

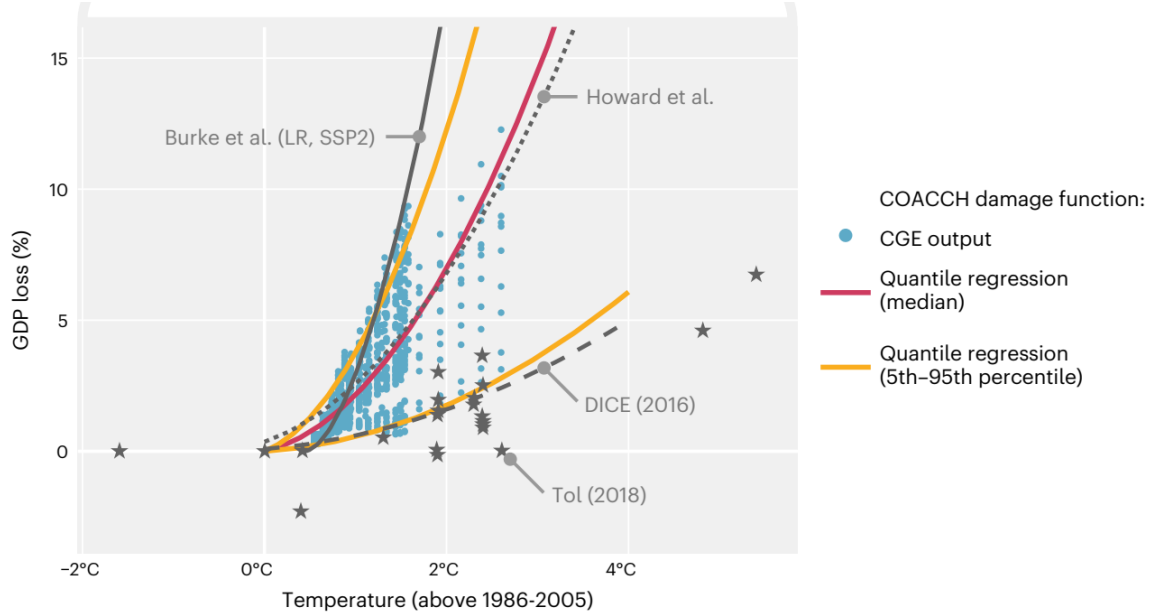
Conservative estimates indicate that climate damages could cost EU GDP by up to 1% annually already in the next few years, with damages strongly increasing afterwards, reaching up to

[6] Cf
NGFS, "Acute Physical Impacts from Climate Change and Monetary Policy", August 2024.
https://www.ngfs.net/en/communique-de-presse/ngfs-publishes-report-acute-physical-impacts-climate-change-and-monetary-policy
Schnabel, I. et al. / Deutsche Bundesbank, "Price Stability and Climate Change", speech, May 2025.
https://www.bundesbank.de/en/press/speeches/price-stability-and-climate-change--957450

[7] https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related

2.3% of EU GDP by mid-century, and possibly getting much higher in only a few decades in case of uncontrolled climate change with estimates for the EU reaching 7% by the end of the century.[8] At the same time, research indicates that macroeconomic damages from climate change could be one order of magnitude larger than previously thought and 1°C warming reduces world GDP by over 20% in the long run[9][10].

Example of damage functions as used in Integrated Assessment Models



Source: *van der Wijst et al. (2023)[11], as presented in Figure 31 of SWD(2024) 63 final, Part 2/5, Annex 7*

Fiscal impacts

Climate change is recognised as a significant source of macroeconomic and fiscal risks, which means that its macro-fiscal impacts need to be assessed and integrated into national budgetary frameworks. For example, the risk to sovereign credit quality and debt financing rates, and interaction with financial stability, is also recognised in the Financial Stability Review[12]. This is also confirmed by the recent amendments to the Council Directive 2011/85/EU[13], introducing new requirements for Member States to assess and disclose information, to the extent possible, on how climate-related macro-fiscal risks may affect the medium- and long-term sustainability of public finances, on disaster- and climate-related contingent liabilities,

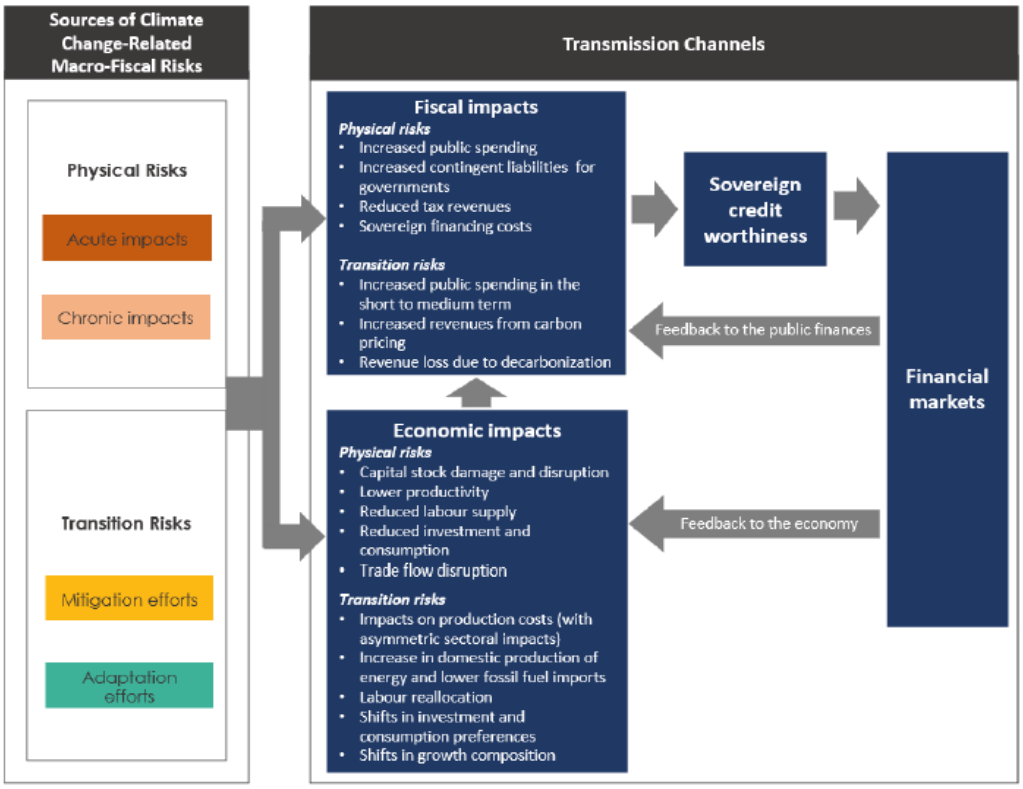
[8] 2040 target IA
[9] See SWD(2024) 63 final, Part 2/5, Annex 7, Section 3 (for example Figure 31).
[10] Adrien Bilal and Diego R. Känzig, "The Macroeconomic Impact of Climate Change: Global vs. Local Temperature," NBER Working Paper 32450 (2024), https://doi.org/10.3386/w32450
[11] van der Wijst, KI., Bosello, F., Dasgupta, S. *et al.* New damage curves and multimodel analysis suggest lower optimal temperature. *Nature Climate Change*, **13**, 434–441 (2023). https://doi.org/10.1038/s41558-023-01636-1
[12] https://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr202305~65f8cb74d7.en.pdf
[13] Directive on Requirements for Budgetary Frameworks of the Member States

and on the fiscal costs incurred due to disasters and climate-related shocks. The methodologies for assessing the levels of risk are evolving[14].

Below examples indicate the transmission channels and connections of climate risks to fiscal space, and projected impacts on debt-to-GDP ratios.

Transmission channels of climate risks to the economy and public finances (non-exhaustive)

Figure 3. **Transmission channels of climate risks to the economy and public finances (non-exhaustive)**

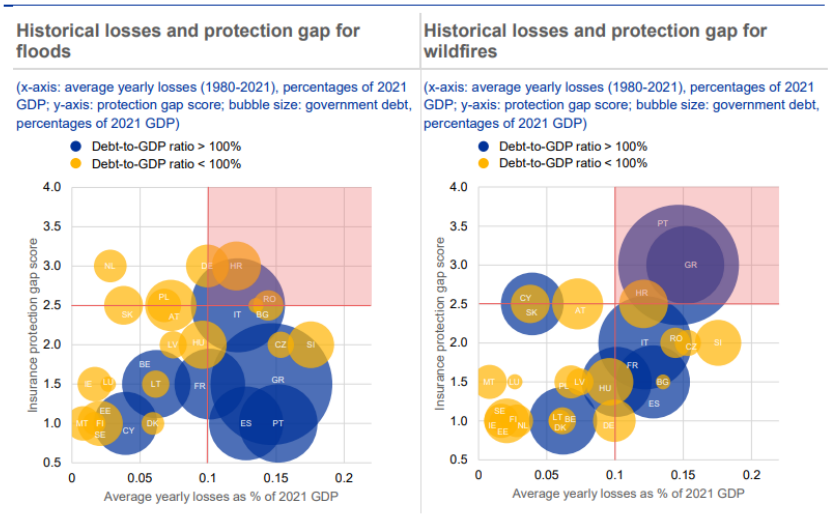


***Source**: Salmon-Genel (2025), Assessing the Macro-Fiscal Risks from Climate Change: Concepts, Methodological Approaches, and Insights from Country Practices.. See similar: The Fiscal Impact of Extreme Weather Events: Stress Tests for EU Countries*

[14] https://economy-finance.ec.europa.eu/publications/assessing-macro-fiscal-risks-climate-change-concepts-methodological-approaches-and-insights-country_en

Climate damages and impact on Debt-to-GDP ratios

Some countries suffering historically high catastrophe losses as a share of GDP also have a large insurance protection gap, which can weigh on debt sustainability



Sources: EIOPA dashboard on insurance protection gap for natural catastrophes, EEA, Eurostat, ECB GFS and ECB calculations.
Notes: The x-axes refer to the average yearly losses (data from the EEA) from floods and wildfires respectively between 1980 and 2021 relative to GDP (data from Eurostat). The size of the bubble is proportional to the country's debt-to-GDP ratio. The y-axes refer to EIOPA's estimated protection gap score, ranging from 0 to 4 (0 = no gap, 1 = low, 2 = medium, 3 = high, 4 = very high). Each protection gap score is country and peril-specific. The red shaded areas indicate countries with both a high protection gap and high average losses, the thresholds for which are set at a protection gap score of 2.5 out of 4 and 0.1% of GDP respectively.

Source: *Policy options to reduce the climate insurance protection gap*

Table 3.5. **Debt-to-GDP projections of selected countries, baseline versus 1.5°C and 2°C warming scenarios**

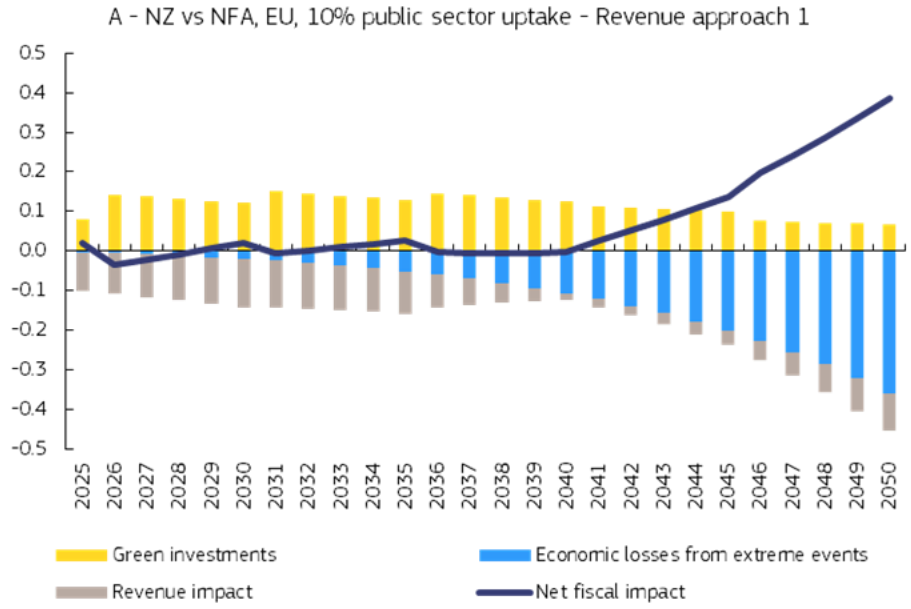
Debt-to-GDP projections					
Spain	**2021**	**2023**	**2024**	**2032**	**2032 change**
Baseline	120.6	116.9	120.3	126.1	
1.5°C scenario	120.6	116.9	125.4	130.6	4.5
2°C scenario	120.6	116.9	126.2	131.3	5.2
Romania	**2021**	**2023**	**2024**	**2032**	
Baseline	49.3	53.2	54.3	76.9	
1.5°C scenario	49.3	53.2	57.4	79.6	2.7
2°C scenario	49.3	53.2	57.9	80.1	3.2
Portugal	**2021**	**2023**	**2024**	**2032**	
Baseline	128.1	122.7	121.8	126.2	
1.5°C scenario	128.1	122.7	124.5	128.6	2.4
2°C scenario	128.1	122.7	124.9	129.0	2.7
Czechia	**2021**	**2023**	**2024**	**2032**	
Baseline	42.4	46.3	48.0	67.1	
1.5°C scenario	42.4	46.3	52.6	71.1	4.0
2°C scenario	42.4	46.3	53.5	71.8	4.7
Hungary	**2021**	**2023**	**2024**	**2032**	
Baseline	79.2	76.4	74.9	68.1	
1.5°C scenario	79.2	76.4	78.8	71.3	3.1
2°C scenario	79.2	76.4	79.5	71.9	3.7
Poland	**2021**	**2023**	**2024**	**2032**	
Baseline	54.7	49.5	48.2	48.3	
1.5°C scenario	54.7	49.5	51.8	51.1	2.8
2°C scenario	54.7	49.5	52.5	51.7	3.4
Greece	**2021**	**2023**	**2024**	**2032**	
Baseline	202.9	192.1	185.9	154.7	
1.5°C scenario	202.9	192.1	188.8	157.3	2.6
2°C scenario	202.9	192.1	189.2	157.5	2.8
Italy	**2021**	**2023**	**2024**	**2032**	
Baseline	154.4	151.0	150.6	161.6	
1.5°C scenario	154.4	151.0	153.0	163.9	2.2
2°C scenario	154.4	151.0	153.3	164.1	2.5
Austria	**2021**	**2023**	**2024**	**2032**	
Baseline	82.9	77.6	76.9	76.3	
1.5°C scenario	82.9	77.6	78.9	77.9	1.6
2°C scenario	82.9	77.6	79.2	78.1	1.9
France	**2021**	**2023**	**2024**	**2032**	
Baseline	114.6	112.9	114.2	122.3	
1.5°C scenario	114.6	112.9	116.0	123.8	1.5
2°C scenario	114.6	112.9	116.5	124.2	1.9
Belgium	**2021**	**2023**	**2024**	**2032**	
Baseline	112.7	114.6	116.5	133.6	
1.5°C scenario	112.7	114.6	117.5	134.4	0.8
2°C scenario	112.7	114.6	117.6	134.5	0.9
Germany	**2021**	**2023**	**2024**	**2032**	
Baseline	71.4	68.1	67.0	61.6	
1.5°C scenario	71.4	68.1	68.3	62.6	1.0
2°C scenario	71.4	68.1	68.4	62.8	1.1
The Netherlands	**2021**	**2023**	**2024**	**2032**	
Baseline	57.5	56.1	56.0	62.8	
1.5°C scenario	57.5	56.1	56.8	63.5	0.7
2°C scenario	57.5	56.1	57.1	63.7	0.9

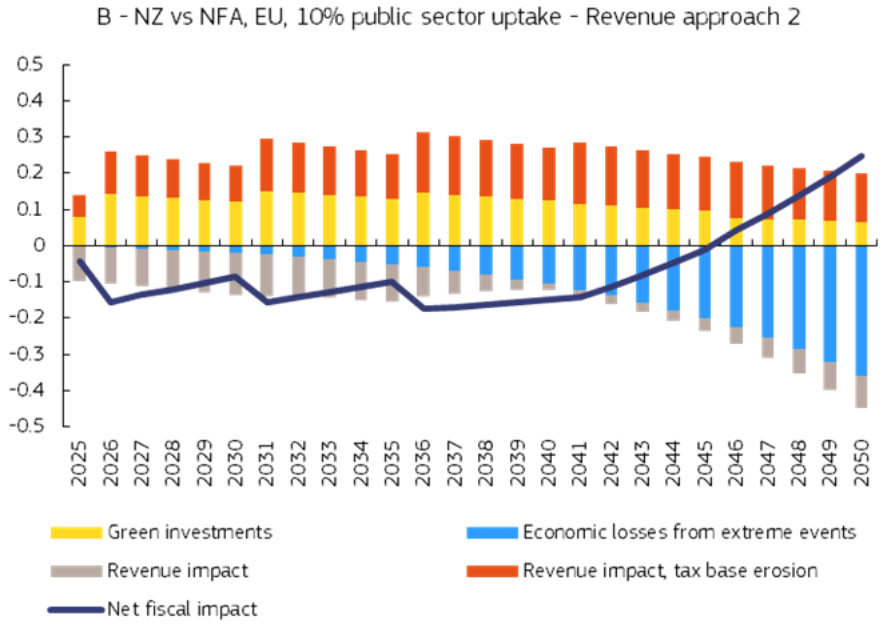
Note: The 2032 change measures the difference, in 2032, between debt-to-GDP in the 1.5°C and 2°C scenarios, respectively, compared to the European Commission's 10-year baseline debt-to-GDP projections (i.e. based on the Autumn forecast 2021).

Source: European Commission, based on The Emergency Events Database (EM-DAT; CRED, UCLouvain) and the PESETA IV project (Feyen et al., 2020).

Source: *The Fiscal Impact of Extreme Weather Events: Stress Tests for EU Countries*

Net Fiscal Impact in 2050: No-Further-Action' (NFA) scenario vs 'Net Zero' (NZ), % GDP





Note: The net fiscal impact (% of GDP) is given by the difference in primary balance (and its sub-components) between the NZ and NFA scenarios for the EU aggregate. Negative values reduce fiscal pressure; positive values increase fiscal pressure. Projections shown in Figure 1 assume a 10% uptake of investment needs by the public sector. In Panel A (left), an output-driven revenue approach is followed. In Panel B (right), an output-driven revenue approach is combined with assumptions on structural energy-tax base erosion.

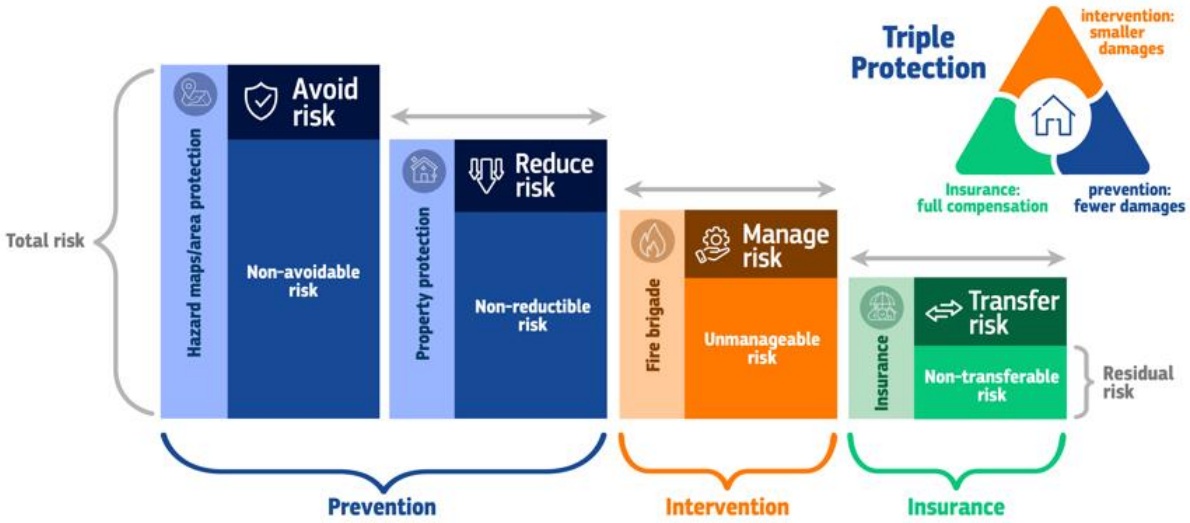
Source: Gagliardi (2025), The Macroeconomic and Fiscal Impact of Climate Change: A Stylised approach

Insurance impacts

The insurance markets play an important role in managing climate risks, notably through encouraging resilience measures through price signals, and risk transfer. At the same time, as shown for example in the Final Report of the Climate Resilience Dialogue[15] it is not currently fulfilling these functions to its potential, and the share of insured economic losses related to natural catastrophes in Europe is low and could decline in the medium to long term[16].

Below examples show the role of insurance in the management of financial risks in the society, economic losses from natural catastrophes, the climate insurance protection gap, and potential benefits of resilience measure.

Role of insurance in managing financial climate risks

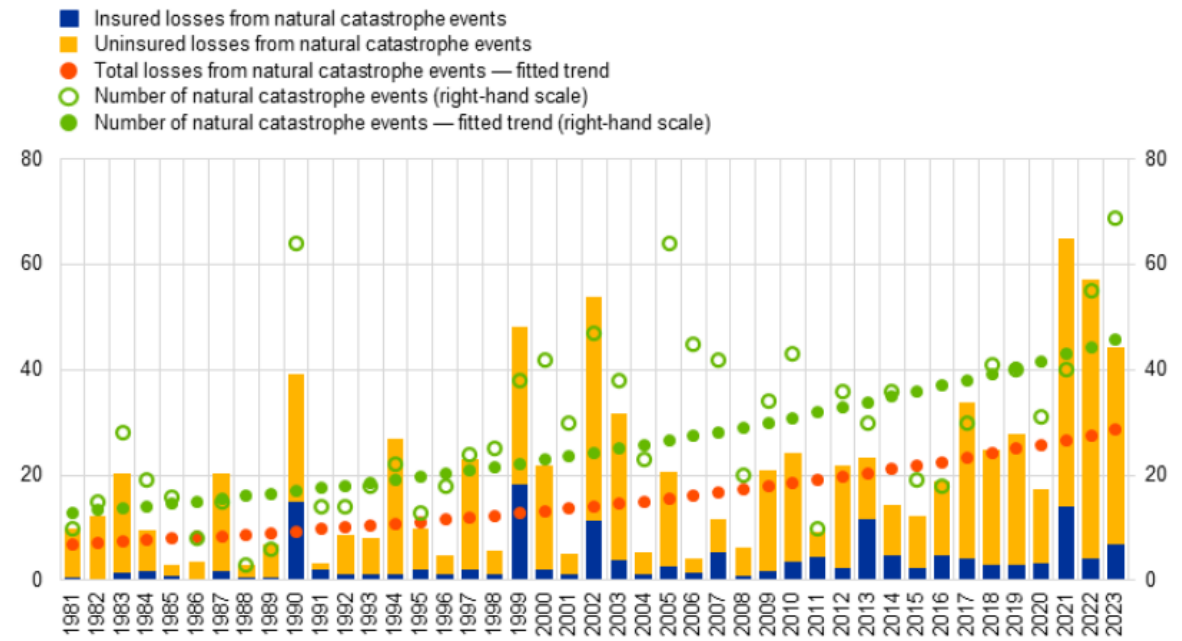


[15] https://climate.ec.europa.eu/document/download/4df5c2fe-80f9-4ddc-8199-37eee83e04e4_en?filename=policy_adaptation_climate_resilience_dialogue_report_en.pdf

[16] https://www.ecb.europa.eu/pub/pdf/other/ecb.climateinsuranceprotectiongap_EIOPA202412~6403e0de2b.en.pdf

Economic losses from and number of natural catastrophes in the EU

(1981-2023; EUR billions as measured in 2023 values, number of events)



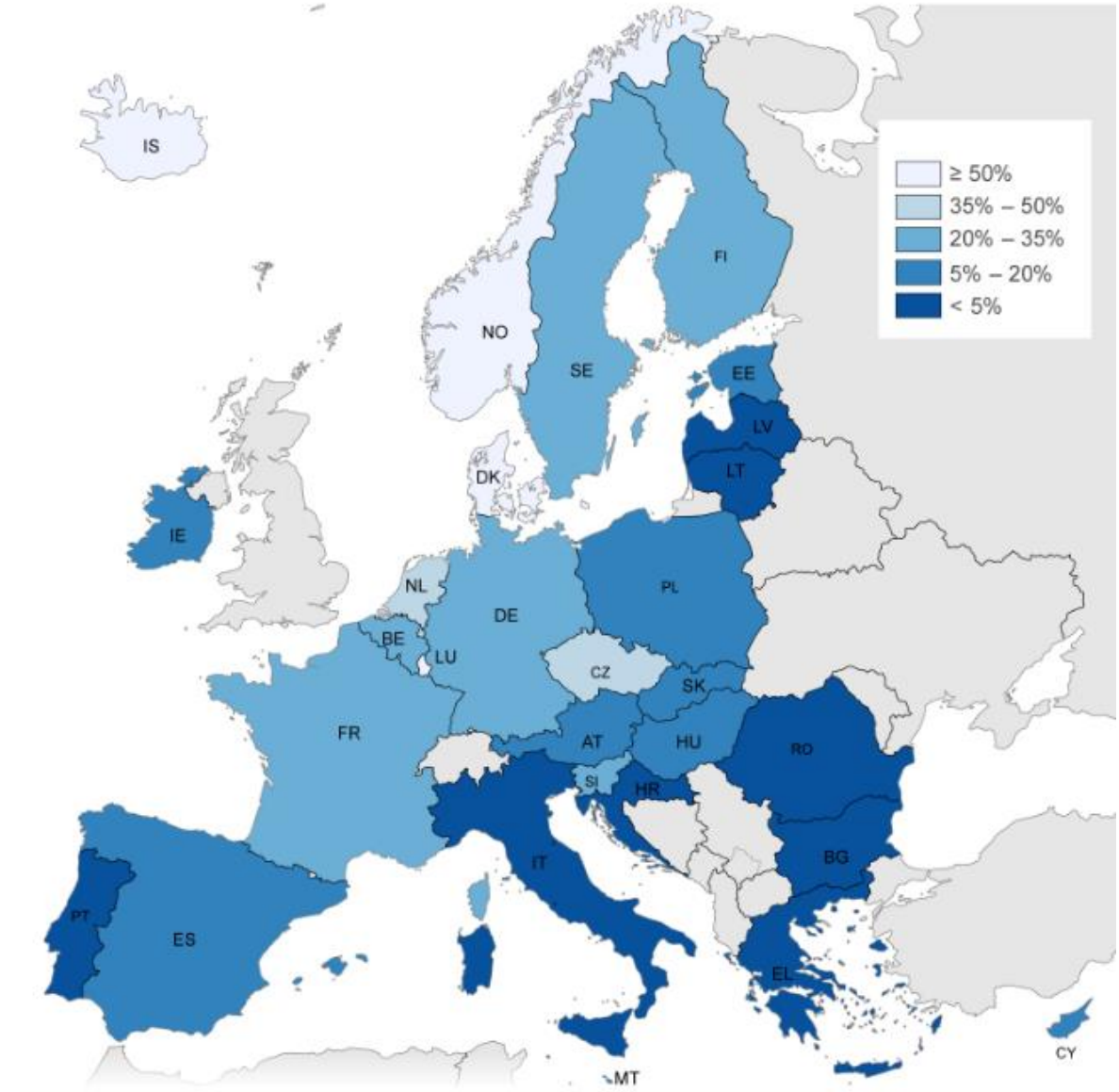
Sources: CATDAT (Risklayer GmbH – Europe Climate related impact Analysis Project), EIOPA's Dashboard on insurance protection gap for natural catastrophes – European Union (europa.eu) and EM-DAT.
Notes: The two fitted trends depict exponential trends fitted to the annual time series of the number of and the total losses (insured and uninsured) from natural catastrophe events. (Initially, two types of linear regressions were fitted, one for the original data and one for logs of the original data: since better fits – as measured by R-squared – were obtained for the logs of the original data, the estimated coefficients from these regressions were used to depict the exponential trends). The trend fitted to total losses remains upward-sloping when total losses are scaled by GDP. Natural catastrophes include both geological catastrophe events (e.g. earthquakes, volcanic eruptions) and climate-related catastrophe events (droughts, extreme temperatures, floods, mass movements, storms and wildfires). The frequency of geological catastrophe events (as opposed to that of all natural catastrophe events or climate-related catastrophe events) is not upward-trending.

Source: *EIOPA/ECB*

The share of insured economic losses related to natural catastrophes in Europe

Average share of insured economic losses caused by natural catastrophe events in Europe

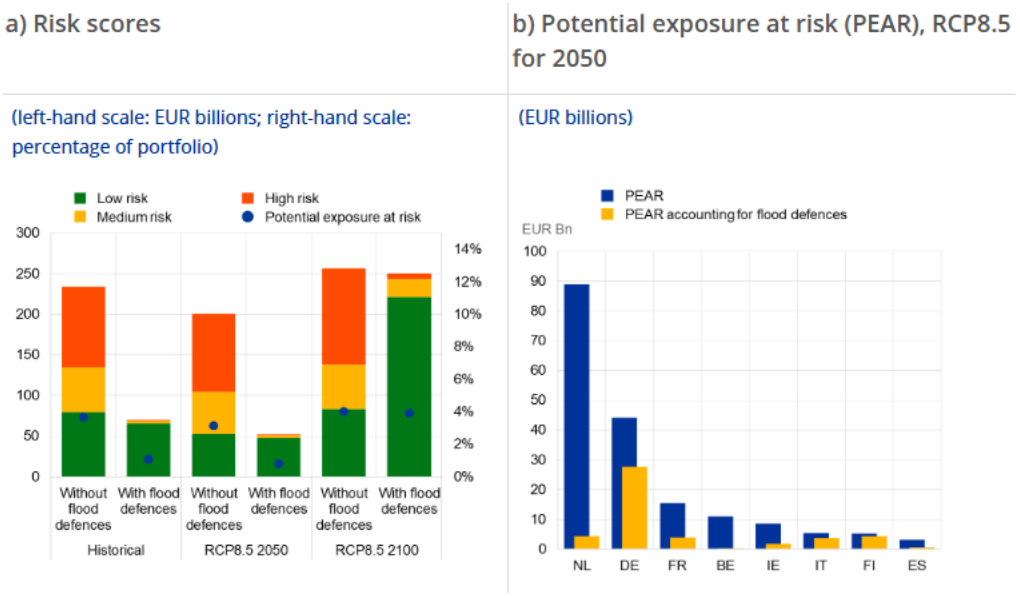
(1980-2023, percentages)



Sources: EIOPA dashboard on insurance protection gap for natural catastrophes, European Environment Agency (EEA) CATDAT.

Example of financial exposure with and without adaptation measures

Potential exposure at risk for coastal flooding with and without flood defences



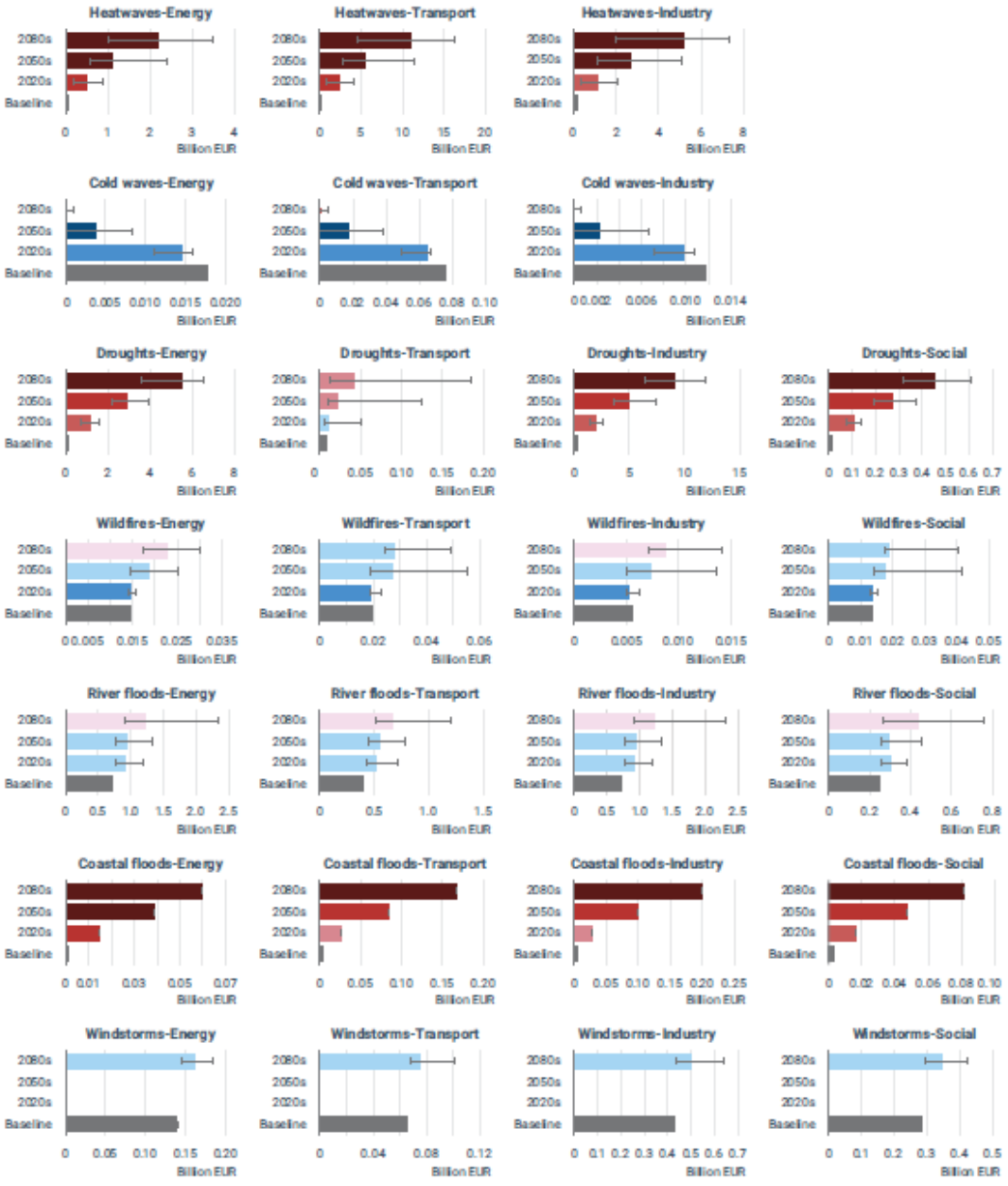
Sources: ESCB calculations based on data from AnaCredit, RIAD, SHSS, Delft University of Technology (TUD), and the JRC.
Notes: Portfolio exposures cover loans, debt securities and equity portfolios of euro area financial institutions vis-à-vis non-financial corporations. Financial institutions include deposit-taking corporations except central banks (S122), non-money market fund investment funds (S124), insurance corporations (S128) and pension funds (S129). Panel b): RCP8.5 projections are for 2050. Some countries have been removed owing to confidentiality constraints and the limited relevance of this hazard. The reference period is December 2024.

***Source**: ECB*

Infrastructure impacts

Cited from EUCRA, chapter 15.3. Forzieri et al. (2018), for instance, whose analysis of current risks to European infrastructure was presented in Table 15.1 above, estimated future financial risks for different infrastructure systems to 2080 (see Figure 15.2). They found that while the economic annual damage (EAD) to European infrastructure in the 2000s was EUR 3.4 billion, it could rise to EUR 9.3 billion by the 2020s, EUR 19.6 billion by the 2050s and EUR 37.0 billion by the 2080s. Large increases in transport risk are also underlined by, for example, the JRC PESETA IV project (Bubeck et al. (2019), Alfieri et al. (2017) and Christodoulou et al. (2019)). It should be noted that these model results refer to annual averaged damage. Damage in individual years, and even from individual events, can be higher than the values indicated above. Furthermore, the model results likely underestimate actual damage as this study was unable to consider more recent evidence on the increase in downpours and pluvial floods as a result of climate change.

Figure 15.2 Expected annual damage to critical infrastructure assets



Notes: Expected annual damage (EAD) to critical infrastructure assets aggregated at European level (EU+) for each hazard, time period and sector. Bar length indicates the ensemble median — also reported in numerical labels in millions. Whiskers reflect the inter-model climate variability. Colours reflect the relative change in EAD with respect to the baseline.

Source: Adapted from Forzieri et al., 2018.