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EXECUTIVE SUMMARY OF THE 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) 731 final}

Executive summary of the impact assessment report

Climate change is and will remain the defining challenge of the coming decades and beyond, shaping societies and economies due to unavoidable impacts and the efforts required to address them. The delay with which the climate responds to emissions reduction, means that the impacts of climate change will continue to cause significant economic, fiscal and human damage, into the future. The Integrated Framework for Climate Resilience should support Member States (MS) to tackle these challenges and strengthen the preparedness of the European Union (EU).

The EU has longstanding climate acquis primarily focused on reducing greenhouse house gases emissions, which has driven successful decarbonisation of the EU economy and is aligned with the EU's international obligations. The EU will continue these efforts in line with the recently revised European Climate Law on the 2040 target. The current proposal is not in any way an alternative to continued and redoubled mitigation efforts. This said, scientific evidence suggests that current mitigation policies lead to around 2°C of global warming by 2050 and reach 3°C by the end of the century, implying potentially **4 to 5°C of warming in Europe. Preparing for such scenarios is necessary** to help protect European assets, public service structures, communities, businesses, and economic and defence capabilities. **Policies addressing climate impacts must be strengthened to fill the widening gap between current efforts and increasing risks**.

Climate resilience is a key component of overall societal resilience to multiple risks affecting critical systems such as infrastructure, health, finance and food and water supply. It is partially addressed under the European Climate Law, the Governance Regulation, the EU Strategy on Adaptation to Climate Change and some sectoral legislation. However, the first European Climate Risk Assessment (EUCRA) and related Communication highlight **progress remains uneven and insufficient relative to accelerating risks, with policy implementation lagging behind**.

Climate change is a threat multiplier, exacerbating social tensions, resource competition and security risks. Damages from climate related events are already increasing, threatening prosperity, competitiveness and security. Of the cumulative EU-wide losses from climate extremes, estimated to be EUR 822 billion in damage between 1980 and 2024, about one quarter occurred after 2021, showing a sharp upward trend. In the future, Europe faces significant and growing human, economic, infrastructural and environmental losses, which risk **undermining productivity, growth, fiscal sustainability and financial stability, while disproportionately affecting vulnerable groups and** eroding social cohesion. Ecosystems are also under increasing threat with possibility of **irreversible losses occurring soon and affecting essential services**.

The core problem addressed in this impact assessment is the fragmented and insufficient preparedness for climate impacts and risks of the European economy and society. This overall problem consists of three elements: fragmented climate resilience in the EU and MS (P1), insufficient preparedness of the private sector (P2) and limited awareness and preparedness among the population (P3). **Addressing P1 is the key leverage point**, as it should indirectly drive improvements in private sector and societal preparedness (P2 and P3). Alongside national and local action, **EU-level intervention is necessary** to ensure systemic

climate resilience, and it **provides clear added value** given the cross-border nature of climate risks and their impact on the single market and EU policy objectives.

Four specific objectives guide the initiative:

- Clarify climate risk ownership across governance levels and sectors;
- Ensure decisions account for current and future climate risk, assessed based on a reference warming trajectory;
- Strengthen policy implementation for resilience;
- Improve awareness and capacity of private sector actors and populations.

This initiative aims to accelerate progress on climate resilience and adaptation in line with Article 5 of the European Climate Law. As required by Article 6(4) of that Law, this impact assessment includes a climate consistency check. The initiative will not directly result in actions causing greenhouse gas emissions, however it will help minimise the vulnerabilities of climate-sensitive decarbonisation pathways such as land carbon sinks and hydropower. It therefore is deemed **consistent with the climate-neutrality objective set out in Article 2(1) of the European Climate Law** and with the Union's 2030 and 2040 climate targets.

Three policy options, differing in level of intervention and balance between mandatory and voluntary measures, **were assessed**. Each policy option includes core elements such as common objectives; a reference warming trajectory as a common baseline for decisions; horizontal principles (such as a 'duty to consider', 'risk ownership' and 'climate resilience by design'); climate risk assessments, planning and implementation; progress monitoring; and horizontal enablers such as supporting tools.

Policy option A introduces voluntary, **non-binding measures,** without changing existing frameworks and relying on improved information and coordination. Its impacts would mainly **consist of improved processes and decision-making**, that would only partially reduce the vulnerabilities. **Benefits would be distributed unevenly,** with stronger uptake among better-resourced actors. While direct costs are **low and limited to** one-off coordination and guidance costs, its overall effectiveness is constrained. **Avoided losses and resulting gains would be mostly modest.**

Policy option B introduces a **targeted set of binding rules** on EU and MS public authorities to address persistent barriers and align climate resilience across governance levels, while allowing significant discretion over implementation. These rules are complemented by voluntary guidance and tools, and no direct obligations are imposed on the private sector or the population. **Its main direct effect would be a more disciplined and comparable governance cycle, that increasingly shapes public and private decisions, ensuring a more systematic approach**, with the most important downstream reductions in exposure and vulnerability emerging progressively rather than immediately. Option B is expected to reduce avoidable **macroeconomic losses and improve decision-making quality.** While it entails **moderate administrative costs** these remain limited relative to overall budgets. Costs are **outweighed by** improved **efficiency, reduced maladaptation** and long-term economic benefits. It also supports competitiveness, innovation and fiscal stability.

Policy option C contains a **fully harmonised and comprehensive framework** at Union level in which virtually all measures are mandatory: **extensive binding provisions** and **strong**

compliance mechanisms, to be applied consistently across all sectors and levels of governance. It would **accelerate convergence and integration** of resilience policies across the Union with **significant long-term benefits**. But because these major regulatory changes take a long time, there is a considerable **risk that climate-related dangers and damage will keep getting worse** in the meantime and could even grow much faster. This option **requires substantial administrative capacity** and entails **high costs**, including for monitoring and reporting. Moreover, while reducing fragmentation, this option risks implementation challenges, insufficient short-term effectiveness, low flexibility, and high burdens for public authorities and businesses, including SMEs.

All three options generate EU added value, but to different extents. Option A is the least costly and easiest to implement but also least effective, with limited and uneven results. Option C offers the highest long-term potential but faces significant complexity, costs and implementation risks, reducing its short to medium term effectiveness.

Against this background, **Option B is the preferred option**. It is more effective than Option A, **more effective sooner** than Option C, and the **most cost-efficient** of the three. It delivers meaningful improvements in governance and preparedness while maintaining manageable costs and **flexibility**. It ensures earlier and more consistent action by public authorities, with positive spillovers to private actors and society. It delivers the necessary transformational action in the short to medium term while preparing the EU for long-term climate impacts. It establishes a consistent governance cycle, improves decision-making, simplifies planning and reporting and progressively reduces risk. It would be delivered through a proposal for a Regulation, complemented by a Commission Communication and possible guidance.

Key elements of the preferred option provide a solid foundation for sustained action and they have also received considerable public support, including a common reference global warming trajectory (supported by 70% of the respondents of the public consultation), harmonisation of risk assessments (65%), attribution of risk ownership (70%), and creation of a ‘duty to consider climate risks’. These elements enhance policy coherence, cross-border cooperation, and accountability, while allowing flexibility for adjusting them to specific national circumstances. Also, greater regulatory certainty supports innovation and investment in resilience, including for SMEs.

The final design of the preferred option also incorporates selected elements from Options A and C, where their inclusion leads to greater flexibility, faster delivery, stronger behavioural change and better implementation. From policy option A, the development of a Navigator of climate resilience tools, a European climate viewer and climate awareness campaigns are envisaged. From policy option C, measures include assessment of climate risk management and the use of the European climate viewer to inform climate resilience decisions.

Climate change poses escalating risks to Europe’s economy, society and security. Strengthening climate resilience is essential to safeguard long-term prosperity and stability. **The preferred policy option provides a balanced, effective and feasible pathway to improve preparedness, reduce vulnerabilities, support innovation and competitiveness and ensure a more climate resilient European Union.**

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PART 1/5

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Glossary

8EAP	8th Environment Action Programme	**GDP**	Gross Domestic Product
CAPR	Climate Action Progress Report	**GovReg, Governance Regulation**	Regulation on the Governance of the Energy Union and Climate Action
C3S Atlas	Copernicus Climate Change Service (C3S) Climate Atlas	**ICT**	Information and Communication Technology
CER	Climate Emergency Response	**IPCC**	Intergovernmental Panel on Climate Change
CDDD	Corporate sustainability due diligence Directive	**IPCC AR6**	IPCC Sixth Assessment Report
Climate-ADAPT	European Climate Adaptation Platform	**MFF**	Multiannual Financial Framework
CAP	Common Agricultural Policy	**MREL**	Monitoring, Reporting, Evaluation, and Learning
CSRD	Corporate Sustainable Reporting Directive	**NAP**	National Adaptation Plan
DNSH	"Do No Significant Harm" principle	**NAS**	National Adaptation Strategy
ECB	European Central Bank	**NECPs**	National Energy and Climate Plans
ECDE (viewer)	European Climate Data Explorer	**OECD**	Organisation for Economic Co-operation and Development
EIA	Environmental impact assessment	**PUS**	Preparedness Union Strategy
EIB	European Investment Bank	**SEA**	Strategic environmental assessment
EIOPA	European Insurance and Occupational Pensions Authority	**SMEs**	Small and Medium-sized Enterprises
ESABCC	European Scientific Advisory Board on Climate Change	**TEN-E**	Trans-European Networks for Energy
ESRB	European Systemic Risk Board	**TEN-T**	Trans-European Transport Network
EUCRA	European Climate Risk Assessment	**TFEU**	Treaty on the Functioning of the European Union
GeoRisques	Geological and Climate Risks Portal	**UCPM**	Union Civil Protection Mechanism

1 INTRODUCTION: POLITICAL AND LEGAL CONTEXT

Climate change is and will remain the defining challenge of the coming decades and beyond, shaping societies and economies, requiring significant adjustment to unavoidable impacts. Even though climate change mitigation policies and measures have been adopted and implemented for decades, global ambition falls short of what is required to stay within the Paris Agreement temperature thresholds.[1] The delay with which the climate responds to emissions reduction, means that the impacts of climate change will continue to cause significant damage, in economic, fiscal and human terms, into the future. **The Integrated Framework for Climate Resilience should support the ability of Member States to tackle these challenges** to the benefit of their economies and societies and in doing so, harmonise and strengthen the preparedness of the European Union (EU). In doing so, it responds directly to the Political Guidelines for 2024-2029, the political mandate established by the European Green Deal and the EU Climate Law, complements the adaptation commitments embedded in the Paris Agreement, and provides a basis for coherent climate risk management across EU and Member States, sectoral policies, public investment decisions, infrastructure planning and fiscal policy at the scale the challenge now demands.

The EU has longstanding climate acquis primarily focused on reducing greenhouse gases emissions, which has driven successful decarbonisation of the EU economy and is aligned with the EU's international obligations. The EU will continue these efforts in line with the recently revised European Climate Law on the 2040 target.[2] The current proposal is not in any way an alternative to continued and redoubled mitigation efforts. This said, scientific evidence suggests that full implementation of **current international mitigation policies would lead to around 2°C of global warming by 2050 and reach 3°C by the end of the century**[3], resulting probably in **4 to 5°C of average warming in Europe.**[4] **Preparing for such a scenario is thus necessary** to help protect businesses and communities and safeguard our economy and defence capabilities.

Policies dealing with climate risks on the ground need to be strengthened to fill the widening gap between current low levels of climate resilience and future climate scenarios.[5] As this gap widens, its consequences will be felt more directly across sectors, severely compromising the effectiveness of sector policies and related investments. Currently, climate resilience and adaptation are addressed in an incoherent and fragmented manner under several Union policies. In climate-focused policies, climate resilience is addressed, but only partially and inconsistently, through the European Climate Law, the Regulation on the Governance of the Energy Union and Climate Action (Governance Regulation) and the EU Strategy on Adaptation to Climate Change. In sectoral legislation, climate resilience is implicitly included or mentioned, but in most cases in general terms that are not easily implementable. For example, consideration of climate scenarios in the national fiscal projects is mandated, but the methodologies and application are nascent and fragmenting for lack of common approaches.

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[1] This commits the Parties collectively to "pursue efforts to remain under 1.5 degrees and not to exceed 2 degrees global temperature increase above preindustrial levels"

[2] This Amendment to the Climate Law introduces a binding interim 2040 target of 90% emissions reduction from the 1990 level.

[3] (Calvin et al., 2023)

[4] (European Scientific Advisory Board on Climate Change, 2026)

[5] (Foster et al., 2026)

In 2024, the first European Climate Risk Assessment (EUCRA)[6], and the Communication on managing climate risks[7] identified the most urgent climate risks across Europe and concluded that the **progress in integrating climate resilience and adaptation to Union and Member States policies is uneven**, not keeping pace with accelerating climate change, and policy implementation is lagging. The 8th Environment Action Programme (8EAP) mid-term review[8] revealed that the EU and its Member States must become significantly better at preparing for and effectively addressing climate risks to increase long-term resilience of the EU economy and society.

More action and a more coherent and systematic integration of climate resilience and preparedness objectives across EU policies is needed. This has been requested by the European Parliament,[9] the Council of the EU[10] and the Committee of the Regions,[11] and recommended by the European Court of Auditors.[12] The Environment Council adopted conclusions in December 2025 conveying a strong support to the development of an Integrated Framework for Climate Resilience.[13] The Commission, in the latest Climate Action Progress Report (CAPR) stressed how climate resilience urgently needs to become an integral part of all European policies, as climate change is undermining Europe's prosperity, competitiveness and security.[14] The information from stakeholders transmitted during European Climate Pact[15] events, the meetings of the Reflection Group for Mobilising Climate Resilience Financing[16], and numerous stakeholder consultations also called for accelerated action and informed the work on this initiative.

The urgency of building climate resilience and capacity to adapt is underscored by its interconnectedness with other challenges facing the EU. Climate change is a threat multiplier exacerbating social tensions, heightening competition over scarce resources and undermining our security and defence.[17] The continent risks severe human, economic, infrastructural and environmental loss from climate-related impacts which impinge on Europe's security, society, ecosystems, and the economy.[18] The need for robust climate action and enhanced climate resilience is further reinforced by the rate of approach towards tipping points[19] in the climate system which threaten to unleash high-risk, irreversible conditions.[20] Cascading climate risks can lead to system-wide challenges affecting whole societies, with vulnerable social groups particularly at risk. These dynamics risk increasing

[6] (European Environment Agency, 2024)
[7] (European Commission, 2024c)
[8] (European Commission, 2024d)
[9] (European Parliament 2024/2817)
[10] (General Secretariat of the Council, 2024)
[11] (European Committee of the Regions (CoR), 2025)
[12] (European Court of Auditors, 2024)
[13] (Council of the European Union: General Secretariat, 2025)
[14] (European Commission. DG CLIMA, 2025a)
[15] (European Union, 2026)
[16] (European Commission. DG CLIMA, 2025b)
[17] (Bilal et al., 2024; European Commission, 2023d; NATO, 2024; World Economic Forum, 2026, p. 1)
[18] (European Environment Agency, 2024)
[19] critical threshold beyond which a system reorganises, often abruptly and/or irreversibly (IPCC AR6 Glossary definition)
[20] Examples include a potential collapse of the West Antarctic ice sheet, leading to extreme sea-level rise, or the breakdown of the Atlantic Meridional Overturning Circulation (AMOC), which would bring major cooling and harsher winters in northwestern Europe, threatening agriculture.

political and governance instability and fragmentation, both within Europe and in neighbouring regions to the EU.[21]

This impact assessment addresses climate resilience within a wider context of external drivers that determine preparedness. Climate resilience is a part of overall societal and economic resilience to all relevant hazards, threats and risks (such as global pandemics, social conflict or interstate aggression, triple planetary crisis[22]) that may impact on a function or system (e.g. infrastructure, supply chains, health system, financial system, water supply). Therefore, while climate resilience alone is not enough to ensure overall resilience, it is an indispensable element thereof. This report is limited in scope to climatic preparedness and does not duplicate existing work on overall preparedness to all risks and threats, that are addressed in other initiatives, such as the Preparedness Union Strategy.

Within this wider context, the focus of this impact assessment is on the overall problem of fragmented and insufficient preparedness for the impacts related to climate change and on addressing it through the development of a new EU policy framework for strengthening climate resilience, as a contributor to broader societal and economic resilience. Whilst acknowledging global interdependencies as an important climate vulnerability factor, the geographical and policy focus of this initiative is on the EU. Particular attention is nevertheless to be paid to enlargement and neighbourhood countries in view of the respective policies and as climate risks and impacts are often shared.

When designing its draft measures and legislative proposals, the Commission shall ensure their alignment with the objectives of the European Climate Law. As required by Article 6(4), this impact assessment requires a climate consistency check. The initiative will not directly result in actions generating greenhouse gas emissions. It will however help minimise the vulnerabilities of climate-sensitive decarbonisation pathways such as through land carbon sinks and hydropower generation, and seek to minimise its key external problem driver (see chapter 2 and Figure 1) by encouraging progress towards climate neutrality. It therefore is deemed consistent with the climate-neutrality objective set out in Article 2(1) of the European Climate Law and with the Union's 2030 and 2040 climate targets.

2 PROBLEM DEFINITION

2.1 What is the overall problem and its consequences?

The changing climatic and weather conditions will increasingly undermine Europe's prosperity, competitiveness and security. As the planet continues to heat, climate hazards will intensify, bringing frequent, severe, persistent and far-reaching impacts.

Climate change impacts are a risk multiplier: from mega-droughts leading to water and food insecurity, unpredictability of wildfires, (marine) heatwaves, disruptions of critical infrastructure and critical transport routes, to threats to financial markets. Climate impacts continue to cause avoidable harm, which indicates 'that existing climate resilience and preparedness across EU and Member States policies and actions remain insufficient, fragmented, largely incremental, often coming too late, occasionally incoherent, and are not yet commensurate with the scale, pace and complexity of

[21] (European Environment Agency, 2024)
[22] (United Nations Framework Convention on Climate Change, 2022)

increasing climate risks'[23]. The current **fragmentation of approaches** means that **poorer regions and communities will fall further behind** economically at an increasing rate; entire **categories of impacts are left unaddressed** or underserved; the resilience of transboundary infrastructure and operations is hampered; **the cost of action is higher** both in the public and the private sector than need be; and social and political cohesion is put under further stress.

The level of future risks – and subsequent losses - depends to a large degree on how effectively our societies and economies manage to reduce their exposure and vulnerability, to enhance preparedness, and thereby build resilience.

This document uses three related concepts: preparedness, resilience and adaptation. Preparedness is "the knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters"[24]. Resilience is defined as "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management"[25]. Climate adaptation is adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities[26].

Climate resilience therefore relies on anticipatory, risk-managing, and preventive action that ultimately leads to higher level of preparedness, and often includes purposeful climate adaptation.

The findings of EUCRA provide evidence that the EU's current state of preparedness is not commensurate with the scale, pace or complexity of its climate risks. 21 of 36 major climate risks identified for Europe require more action and eight of these were assessed as particularly urgent. The eight most urgent risks span across multiple policy clusters – from ecosystems, food, to health, infrastructure, economy and finance. The 'need more action' and 'urgent' indicate the different levels and/or scopes of addressing the climate risks. For example, coastal wetlands and marine ecosystems are approaching tipping points, reducing their buffer capacity against severe storms and coastal erosion. Crop production is hindered by insufficient water retention capacity, multi-year droughts and soil degradation. Physical assets, such as water management systems, transport networks or energy grids, are designed around historical climate averages rather than future extreme events and usually do not take into account compound risks, such as simultaneous heatwaves and droughts reducing thermal cooling capacity or grid stability. EUCRA also identifies risks to public finances, property and insurance markets and European solidarity mechanisms, with the latter already at critical levels and requiring urgent action,

The Member States exposure to climate risks and levels of preparedness are not uniform. EUCRA shows that southern Europe will face stronger climatic pressures than the rest of Europe, as will Arctic areas. The outermost regions have a distinct set of risks. Asymmetrical exposure to climate impacts exacerbates the already existing disparities between regions in terms of need for climate adaptation, risk prevention and preparedness, which can put pressure on EU-wide cohesion. The

[23] (European Scientific Advisory Board on Climate Change, 2026)
[24] (United Nations Office for Disaster Risk Reduction, 2017a)
[25] (United Nations Office for Disaster Risk Reduction, 2017b)
[26] (Intergovernmental Panel on Climate Change, 2001)

Member States follow different approaches when preparing national adaptation strategies and plans, with only some of them based on robust, comprehensive climate risk assessments. Moreover, the report on progress on implementation of Article 6 of the Union Civil Protection Mechanism[27] shows that Member States see different risks as key ones. This also means that the fiscal impacts from increased global warming will vary across countries (more details in Annex 8 – Fiscal impacts)[28].

Regarding past events, the data on economic losses and fatalities caused by weather- and climate-related extreme events shows a high degree of divergence among the Member States. While in absolute terms, the highest economic losses during the period 1980-2024 were recorded in Germany, Italy, France and Spain, the highest losses per capita were calculated in Slovenia, Luxembourg and Spain.[29] The highest losses per area (in km^2) were found in Slovenia, Belgium, Luxembourg and Germany[30].

According to the latest EEA data[31] 440,000 fatalities from climate-related events were reported between 1980 and 2024, most of which were caused by heatwaves, cold waves, droughts and forest fires. While the heatwaves caused the highest number of fatalities, the distribution between event types and how they take place over time vary significantly across different countries. The 30-year moving average indicates an upward trend of the economic losses (see Annex 8), proving the vulnerabilities and exposures have not been lowered at a pace that can counter the increase in hazards.

All of the above shows that the **current overall level of preparedness for climate risks is clearly inadequate**. Differences in climate-related losses and fatalities between Member States reveal **gaps in climate risks management and uneven levels of preparedness**. The different levels of severity and urgency of climate risks addressed in EUCRA points to an **overall trend for further fragmentation in preparedness of the European economy and society to climate risks**. As many climate risks affecting Europe are shared or transboundary in nature, such as risks to river basins and other ecosystems, energy and transport systems, supply chains and financial systems, this fragmentation ultimately reinforces the systemic nature of climate risks.

Therefore, the **fragmented, uneven and insufficient preparedness of the European economy and society for climate change impacts is the overall problem which must be addressed.**

Consequences of the overall problem

Economic consequences[32]

Fragmented and insufficient preparedness for climate impacts have already severe economy-wide consequences. Furthermore, it leaves **underserved or unaddressed entire categories of impacts** that require coordinated response at a higher level, such as ensuring that roads and railways withstand higher levels of maximum temperatures than previously experienced, transitioning food systems to ensure production and access under much more extreme weather, or flood protection for unprecedented levels of floods. It **hampers the resilience of transboundary infrastructure and**

[27] (COM(2024) 130 final)
[28] (European Commission, DG ECFIN, 2026; European Commission. DG ECFIN and Gagliardi, N. (2025).
[29] (European Environment Agency, 2025a)
[30] (European Environment Agency, 2025a)
[31] (European Environment Agency, 2025a)
[32] See also Annex 8 for more details

operations, since territories are making their own individual assumptions about the level of impacts to prepare for.

If not properly addressed, serious sector- and regional-specific risks to Europe could catalyse a systemic financial shock, and trigger economy-wide failures[33].

EU-wide economic losses from weather- and climate-related extremes have risen significantly in recent years. More than one quarter of the EUR 822 billion of damage registered between 1980 and 2024 occurred after 2021.[34] In 2024, flooding alone caused EUR 31.1 billion in losses across the EU[35]. Annual losses from droughts are amounting to EUR 9 billion a year and are spread unevenly across Member States, with Spain (EUR 1.5 billion/year), Italy (EUR 1.4 billion/year) and France (EUR 1.2 billion/year) suffering the greatest losses[36]. A single event can result in severe consequences, for example reconstruction costs of the 2023 flash flood damage in Slovenia were estimated to represent 16% of their annual national GDP[37]. Simultaneously, extreme events are decreasing economic activity. Preliminary results suggest that in 2025 the gross value added in Europe was lowered by EUR 43 billion due to extreme events (floods, droughts, heatwaves), while these losses occurred disproportionally in Southern Europe[38]. Furthermore, economic losses are often long-lasting with indirect effects and productivity losses that can compound and intensify with time -, these losses could rise to EUR 129 billion by 2029[39].

Estimates of future climate-related GDP loss vary significantly across the literature, depending on the modelling approach. [40] A report on the costs of inaction prepared for the Commission estimates that GDP losses in the EU could be up to 1% annually in the coming years, 2.3% by 2050, and up to 7% by the end of the century[41]. Others estimate that by 2050, climate change could reduce average GDP per capita by 3–15% due to rises in local temperatures and sea-level, and some climate tipping points, based on a rise in global average temperature of 2.2–2.8°C relative to the pre-industrial climate, and assuming no further increases in adaptation and resilience[42]. Yet another study says that current climate trends could lead to a loss of EUR 2.4 trillion between 2031 and 2050[43] while food prices could be 20% higher by 2050.

The costs depend on the type of events considered, and on whether and how compounding effects across risks are accounted for. Furthermore, they are highly unevenly distributed across Member States. Under a sustainability scenario, direct annual coastal flood losses for Europe by 2100 are projected to grow to EUR 209.8 billion (very likely range: EUR 29.7 billion to EUR 844.5 billion).

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[33] (European Environment Agency, 2024)
[34] (European Environment Agency, 2025b)
[35] (European Scientific Advisory Board on Climate Change, 2026)
[36] (European Commission. Joint Research Centre., 2020d)
[37] (Republic of Slovenia - Ministry of Cohesion and Regional Development, 2023; World Bank Group, 2026)
[38] (Usman et al., 2025)

[39] (European Scientific Advisory Board on Climate Change, 2026)
[40] 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% (Bilal et al., 2024). While structural models offer causal clarity but often omit non-market and compounding risks, macro-statistical approaches attempt to capture broader systemic vulnerabilities yet fail to account for complex spatial correlations in economic data.
[41] (European Environment Agency, 2025b)
[42] (Rising et al., 2026)
[43] (European Commission. Directorate General for Economic and Financial Affairs., 2025)

Under a scenario with fossil fuel-based development, the losses would rise to EUR 1,268.4 billion (160.9–4,731.1); France, the UK, Italy and Denmark would experience the highest absolute increase in damages, and the countries with the highest loss as share of GDP would be Cyprus, Greece, Denmark, Ireland and Croatia[44]. Absolute annual drought losses for the EU under a 3-4°C warming scenario are projected to increase five-fold, rising to EUR 45 billion per year by 2100[45]. The Mediterranean and Atlantic regions are expected to suffer 86% of total European losses[46].

The costs of adaptation do not rise linearly with temperature but increase significantly faster. For the EU and UK, annual adaptation investment needs are estimated to double when moving from 1.5°C to 2°C and roughly quadruple at 3-4°C of warming[47]. Keeping in mind the evolution of the global warming trajectory, the sooner the EU and Member States adapt and prepare, the more solutions there are and at relatively lower cost. The uncertainties regarding the climate impacts are significantly higher with high emission scenarios, increasing the risk of facing unmanageable situations[48].

Climate impacts will affect all economic sectors. Climate hazard exposure across a sample of 70 investment grade European companies is projected to rise about 23% between the 2020s and the 2050s.[49] [50] A 2025 TRACE paper[51] indicates projected annual damages in Europe by 2050 under different warming pathways (see Table 1).

Table 1: Sectoral climate related losses indicating relative impact (EUR billion, per year) [52]

Sector	1.5°C	2°C	3°C
Labour	35	44	71
Residential	28	31	39
Industry & Commerce	27	31	40
Agriculture	11	13	17
Ecosystems	6	7	7
Transport	4	5	10
Energy	3	3	4

The climate impacts and risks **reduce productivity, depress growth, and undermine fiscal sustainability and heighten financial stability risks** e.g. through increased potential credit defaults, rising insurance premiums, and impacts on house values.[53] According to CDP, a non-profit that runs an independent environmental disclosure system, companies reported that extreme-weather events caused nearly EUR 2.6 billion in real losses in 2025 alone, primarily through increased direct costs (EUR 266 million) and operational shutdowns (EUR 230 million). Heavy rain was the largest single driver of these losses, accounting for EUR 1.3 billion across disclosing companies[54].

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[44] (Vousdoukas et al., 2020)
[45] (European Commission. Joint Research Centre., 2020c, 2020e)
[46] (European Commission. Joint Research Centre., 2020c)
[47] (European Environment Agency et al., 2025)
48 (European Environment Agency et al., 2025)
[49] (S&P Global, 2026)
[50] (European Commission. Joint Research Centre., 2025a; European Foundation for the Improvement of Living and Working Conditions., 2025a)
[51] (Feyen, 2025)
[52](Feyen, 2025)
[53] (European Commission. DG ECFIN (2025); European Environment Agency, 2024; U.S. Senate Committee on the Budget, 2024)
[54] (CDP, 2026)

Looking ahead, however, the figures will escalate, with companies anticipating EUR 773 billion in future financial impacts over next 10 years, which are expected to be driven by reduced production capacity (EUR 280 billion) and asset impairment or early retirement (EUR 188 billion). The losses are expected to spread across systems that businesses depend upon, such as infrastructure, supply chains, insurance markets and public services[55]. These impacts often do not remain within the country primarily affected, but propagate through trade, supply chains, increased prices and volatility, as well as subsequent socio-economic tension which can cascade effects across boundaries, and are increasingly recognised as a systemic risk for the EU's short- and long-term security and prosperity.[56] The indirect impacts cause additional heterogeneity in exposure to climate change risks: some countries are directly affected by climate change (e.g. Mediterranean countries) while others experience high exposure due to their large trade connections, such as Germany and Luxemburg.[57]

Weak private sector resilience reduces the EU's competitiveness and the functioning of the single market, raising production costs, deterring investment, and slowing climate resilient innovation and business models. Annual climate-related economic losses in the EU have averaged EUR 45 billion since 2020. Climate hazard exposure across a sample of 70 investment-grade European companies is projected to rise by 23% from the 2020s to the 2050s.[58] These are burdens on productivity, return on investment and fiscal headroom. Without stronger policy coordination, the EU will struggle to manage rising risks or seize economic opportunities.[59] It is widely recognised that climate resilience holds strong innovation opportunities representing major future markets globally[60], but lack of experimentation and upscaling, limited understanding of future markets and insufficient policy coordination hamper the development of a climate adaptation economy[61].

Delays in managing climate risks and in raising preparedness levels across the EU will likely increase costs, deepen disruptions, and leave the EU economy and industry losing ground to global competitors, especially those that innovate and invest in climate resilience.

Defence and Security Consequences

The Joint Communication on the Climate-Security Nexus in 2023 already recognised[62] that **the impacts of climate change and lack of preparedness are intensifying and destabilising the security situation for Europe**. This is further affirmed in the forthcoming Comprehensive Risk and Threat Assessment.

Three events in the period 2022–2024 alone illustrate climate impacts on European defence: extreme heat disrupted military training operations across Europe in 2022; in 2023, a wildfire reached a major Hellenic Air Force base and ignited a munitions stockpile; and in 2024, the Valencia floods triggered the largest peacetime deployment of the Spanish Army in an operation. The last one also demonstrated that hostile actors are systematically exploiting climate disasters to spread disinformation and erode

[55] (CDP, 2026)
[56] (Auer et al., 2025; Clark et al., 2025; Council of the European Union. European External Action Service, 2021; Harris et al., 2026; Knaepen et al., 2022; West et al., 2021)
[57] (European Central Bank., 2024b)
[58] (S&P Global, 2026)
[59] (European Central Bank., 2024a; European Investment Bank, 2024)
[60] (SYSTEMIQ, 2026)
[61] (European Commission. Joint Research Centre., 2024; European Commission. Joint Research Centre et al., 2026)
[62] (JOIN(2023) 19 final)

public trust in governments. Even beyond specific disasters, structural risks are becoming more entrenched.

These events expose a deeper structural vulnerability: EU military installations depend almost entirely on civilian-owned critical energy infrastructure for electricity, fuel, gas and water, yet defence ministries have limited control over the resilience of such infrastructure to climate impacts. When civilian energy networks fail, the cascade to military readiness is direct - a study found that military installations experienced 3,018 unplanned utility outages in a single year, with severe weather responsible for a quarter of prolonged outages.[63] It also identified a critical gap that persists across EU Member States: climate hazards are not yet systematically integrated into defence capability planning, procurement criteria or investment lifecycles. Environmental and climate vulnerability can also be exploited by adversaries: Russia's destruction of the Kakhovka Dam displays how a deliberate action can exploit the devastation nexus of environmental and infrastructure warfare, while the broader destruction of climate and energy infrastructure in Ukraine demonstrate that adversarial actors have already operationalised climate vulnerability as a weapon.

Europe is also materially exposed to climate risks through its supply chains. The continent's defence industrial base depends on materials and products transported through maritime chokepoints increasingly vulnerable to climate disruptions. The closure of the Straits of Hormuz and the threat of extreme El Niño conditions with consequent impacts on food security in the developing world illustrate how climate and geopolitical supply chain risks cascade and amplify each other. Impacts of climate change, both extreme weather events and gradual climatic changes, can have cascading effects that cross borders and continents. The effects can further cascade and escalate through political and security relations, international trade, supply chains, financial markets, international aid as well as migration. The European neighbourhood, with a large overlap of pre-existing fragility and climate vulnerability, could see further escalation with conflict and migratory spill-over effects into Europe. European companies with assets and operations in affected areas may see shocks influence capital flows, profit margins and insurance premiums, with potential knock-on effects for the banking sector and national economies. With their potential to lead to far reaching and unforeseen effects – potentially affecting political and social stability worldwide, these transboundary risks have been increasingly recognised as a systemic risk for the EU endangering its security and prosperity in the short and long run.

Social consequences

Insufficient and fragmented climate preparedness has very negative impacts on people and society. More than eight out of ten Europeans consider climate change a serious problem, and four out of five experienced at least one climate-related impact in the last five years.[64] As climate risks intensify, the social consequences of inaction can negatively affect **employment, housing security or public health** in Europe.[65] In 2022 in the EU, more than 60,000 people died prematurely because of the summer heatwave. In Portugal, heatwaves have increased hospitalisations across all age groups and major disease diagnostic categories by 19%.[66] Labour productivity losses due to stress have also negative effects on the economy.[67] By the end of the century, in the EU and the UK 100 million people

[63] (European Commission. Joint Research Centre., 2023)
[64] (European Environment Agency et al., 2026)
[65] The European Climate and Health Observatory provides a comprehensive overview.
[66] (Alho et al., 2024)
[67] (European Commission. Joint Research Centre., 2025a; European Foundation for the Improvement of Living and Working Conditions., 2025b)

are expected to experience extreme heatwaves every year, and extreme heat-related mortality in the EU is projected to increase more than 30-fold at 3°C global warming levels. [68]

Climate impacts and risks disproportionally affect vulnerable groups, such as low-income households, elderly people, pregnant women, children, people with disabilities, workers at poorly climate-controlled workplaces, migrants and ethnic minorities. The level of climate vulnerability depends on socioeconomic and other environmental risk factors (income, health, gender, age, exposure to pollution etc.) which often overlap. Multiple exposures and recurrent climate shocks may thus trap already vulnerable populations in a downward spiral of worsening impacts, poverty, displacement and reduced access to essential services.[69] These groups not only have limited ability to prepare for climate impacts, but also to respond and recover from them. One example are immigrants who often do not have stable housing and/or limited local language knowledge that directly compromises their capacity to understand and respond to early warning notifications of climate events. Workers in outdoor occupations (e.g. agriculture, fisheries, construction) and those performing physical work in indoor environments that are not or poorly climate-controlled are particularly exposed to climate impacts. Emergency workers (e.g. firefighters, rescue services) and healthcare workers can be overburdened during or after climate emergencies.[70]

Climate impacts exacerbate inequalities and conflicts, erode social cohesion and fray trust. For instance, water shortages can trigger regional conflicts. The related crop failures, declining fish stocks, less snowfall in winter tourism resorts and other disruptive changes undermine regional livelihoods. The heatwaves also increase online hate speech[71] and gender-based violence.[72]

Failing to implement climate resilience in a transparent and just manner may also generate tensions across regions and generations, since measures implemented without considering distributional effects can shift risks from one community or territory to another, burdening vulnerable groups.[73] It is therefore of utmost importance that climate resilience is considered from a just resilience perspective.

Just resilience is a set of policies, measures, and guiding principles intended to **tackle systemic inequalities in the transition towards a climate-resilient society**, in line with the principles of the European Pillar of Social Rights. (*More details in Annex 11)*

Environmental consequences

The environmental consequences of insufficient and fragmented preparedness in EU and Member States are evident – Europe's ecosystems are experiencing intensifying pressure, and climate change has already been **driving irreversible losses, jeopardising the delivery of vital ecosystem services for Europe's economy and population**. **Ecosystems on up to half of Europe's land area may experience major climate-change shifts during this century**, including many of today's protected areas.[74] Climate change exacerbates the rate and magnitude of several ongoing land degradation

[68] (Naumann et al., 2020. EUCRA 2024)
[69] (European Scientific Advisory Board on Climate Change, 2026)
[70] (European Agency for Safety and Health at Work, n.d.)
[71] (Dave Jones, 2025; Stechemesser et al., 2021)
[72] (Mulambo et al., 2025)
[73] (European Scientific Advisory Board on Climate Change, 2026)
[74] (Hoffmann et al., 2019)

processes, introduces new degradation patterns, and is already the dominant driver of coastal erosion, permafrost thawing, and emergence of wildfires.[75]

Fragmentation of preparedness for climate impacts can lead to a large-scale disruption of biodiversity and ecosystem services. Such disruption of ecosystem services could critically impact the existing water cycle, food production and infrastructure - with repercussions on carbon sinks, human health and economic activities, which may further trigger other changes.

Other factors affecting ecosystems include land use planning and, particularly, land use management, deforestation, biodiversity loss, land degradation and unsustainable practices like excessive water use and intensive farming, which negatively affect soil health and water quality and quantity.[76] To provide but a few examples: droughts, heatwaves and wildfires have caused unprecedented tree mortality and damage in Europe's forests in recent years, with more than 60% of EU forest biomass exposed to future risks[77], and without effective countermeasures, the value of forest land may decrease by 14 to 50% by 2100[78]. Droughts negatively affect the adaptative capacity of agricultural ecosystems, the resilience of forest ecosystems and in urban ecosystems droughts indirectly affect the ability of green urban spaces to protect people against heatwaves.[79] Oceans are projected to enter 'unprecedented conditions' over this century, marked by marine heatwaves, acidification and relative oxygen loss[80] that further lead to faster loss of biodiversity, habitats and productivity.

[75] (Intergovernmental Panel On Climate Change, 2022a)
[76] (European Environment Agency, 2024)
[77] (Forzieri et al., 2021)
[78] (Hanewinkel et al., 2013)
[79] (European Environment Agency, 2025c)
[80] (Intergovernmental Panel On Climate Change, 2022b)

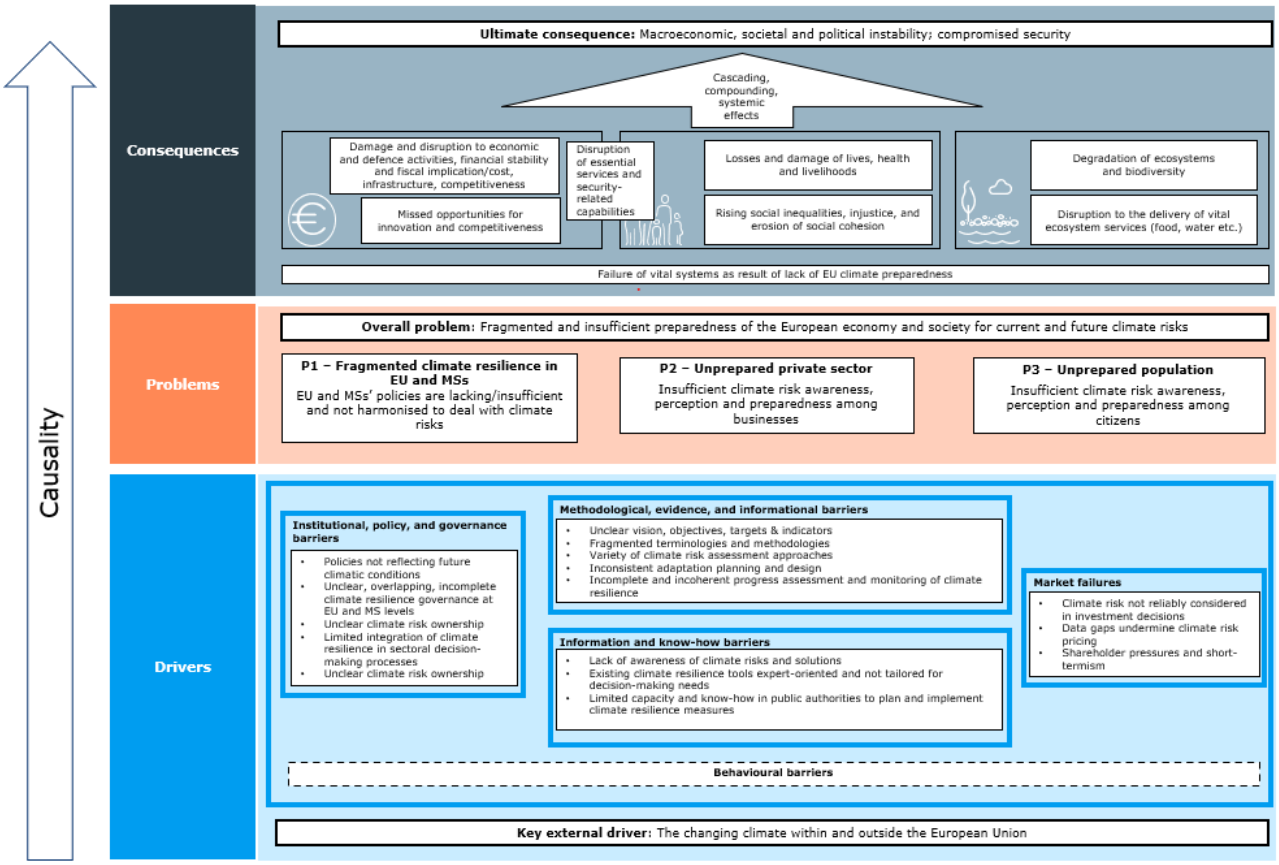


Figure 1: Problem tree[81]

[81] The problem definition phase of this impact assessment considered initially a wide array of drivers and problems, including many external drivers, as shown and described in supporting report. The problem tree displayed here centres on the drivers and problems which this initiative addresses.

2.2 What are the key problems addressed by this policy initiative?

The overall problem can be broken down into three main elements: fragmented climate resilience in EU and Member States (P1), and the unpreparedness of the private sector (P2) and of the population (P3).

2.2.1 Problem 1: Fragmented climate resilience in EU and Member States

Building resilience and enhancing preparedness for climate risks requires combined and coordinated efforts by actors across policy domains and at multiple levels of governance, including national and subnational, in order to put in place the enabling conditions for adaptation such as adequate policies, resources, and institutional capacities for coordinated systemic responses.

At the moment, EU and Member States **lack a common reference for future climate conditions and a unified vision of how Europe's climate resilience must be built**. This absence of a coherent Europe-wide understanding of climate risks and preparedness needs is a **structural deficiency of the existing legal framework rather than a failure of individual actors.** (more details in section 2.3)

Weak consideration of climate preparedness in policy- and decision-making, poor coordination in implementation, and inadequate monitoring hinder progress on the collective ability to manage escalating climate risks effectively. The EUCRA confirmed that the "complicated and at times ambiguous configuration of risk ownership presents a serious challenge for the implementation of robust and effective adaptation measures"[82]. The EUCRA policy readiness assessment rates the preparedness of EU policies to manage specific climate risks as 'medium', defined as "limited consideration of climate hazards, short-term focus, lack of proactive actions, or a lack of clear targets" confirming that existing instruments are not calibrated to manage those risks at the level required by projected climate change trajectories.[83] This reflects systemic inadequacy.

Whilst virtually all major EU policy sectors are exposed to specific climate impacts and risks, there are also significant **discrepancies and fault lines between how these various sector policies consider and implement climate preparedness and resilience**. A document-based analysis of a sample of 40 EU policy instruments in six sectors (see Annex 10) shows major gaps and significant differences in scope, objectives, climate projections used, responsibilities, planning, and monitoring approaches. This suboptimal, checkered picture does not only point to risks in each policy sector individually, such as potential water, agricultural production and food, energy supply or transport disruptions during extreme weather events. The identified inter-sector fragmentation also increases the risk of cascading impacts across social, economic, and ecological domains.

There are **persistent gaps in the availability of data, institutional capacity and financial resources, which further contribute to differences across Member States**. Gaps are particularly relevant for the assessment of compound and cascading risks, which remain less systematically addressed. These limitations, in turn affect how climate risks are identified and integrated into policies. It contributes to uneven levels of risk awareness, preparedness and policy uptake across countries and sectors.[84]

The fragmentation of climate resilience and preparedness across EU can be illustrated by an example. According to the EEA, the 2003 European heatwaves caused approximately 18,000 excess

[82] (European Environment Agency, 2024)
[83] (European Environment Agency, 2024)
[84] (European Environment Agency, 2026b)

deaths in France alone.[85] In reaction to this excess mortality and to mitigate the impact of future heatwaves, French authorities bolstered their national resilience frameworks, including heat health action plans, public health preparedness measures, and urban adaptation investment. As a result, similar heatwaves in 2022 had comparatively minimal effects in France with 7,000 excess deaths. In Italy, heat health action plans exist in some regions but are not uniformly mandated across all municipalities. The summer of 2022 also resulted in an estimated 18,000 excess deaths from heat in Italy, despite access to the same scientific evidence, the same climate projections, and the same voluntary EU-level guidance as in France. This shows that other countries which had not adopted proactive measures like France remained acutely vulnerable. Where no binding requirement exists to establish and activate heat preparedness protocols, implementation is uneven, under-resourced, and dependent on local discretion.

This example demonstrates that effective and common legal and policy frameworks can yield substantial and quantifiable benefits. However, at the same time it shows the insufficiency of a reactive and fragmented approach, which results in overall avoidable losses and increased disparities between Member States.

Policy approaches vary due to **different governance systems, legal traditions, institutional arrangements and coordination mechanisms**. Climate risk evidence is often not clearly linked to measurable policy objectives, corresponding indicators or climate-risk responsive actions, reducing the ability of planning systems to guide action and track progress. Diverse policy approaches and complex coordination during preparation and implementation of climate adaptation policies across sectors and governance levels continue to hinder effective implementation and policy coherence across Europe.[86]

Another example of the consequences of fragmented policy approach is the catastrophic flooding of the Ahr valley in Germany in 2021, which caused over 180 deaths and approximately EUR 33 billion in economic damage. Germany operates under the EU Floods Directive, which requires flood hazard maps and risk management plans. Those instruments were formally in place. However, the Floods Directive does not require risk management plans to be calibrated to forward-looking climate projections, nor does it establish binding requirements for the integration of updated hazard data into spatial planning and building regulations at the local level. German authorities had complied with the letter of the existing legal framework. The absence of a legal requirement compelling the revision of risk assumptions in line with changing climate conditions was a key factor for the Ahr disaster. While acting in compliance with the existing European legal framework, Germany was insufficiently prepared to prevent catastrophic outcomes, as it lacked a forward-looking obligation.

Finally, **regional and local implementation is hindered** by the limited capacity and resources available to subnational authorities. This impedes the ability to translate national priorities into targeted action.

In conclusion the **preparedness and resilience building in the EU and Member States is fragmented** and does not protect the economies and societies to the extent necessary to face current and future climate risks.

[85] (European Environment Agency, 2025b)
[86] (European Environment Agency, 2026b)

2.2.2 Problem 2: Unprepared private sector - Insufficient climate risk awareness/perception and preparedness among businesses

For this problem, the private sector includes large corporations, SMEs, primary and land-based sectors (including farms, forestry enterprises and businesses in food processing and rural tourism that depend on the climate-sensitive resources); financial actors (including banks, insurers, institutional investors and other intermediaries, insofar as they manage and price physical climate risks.

The private sector is not immune to the negative impact of extreme weather events. The share of firms experiencing two or more heatwaves annually rose from 10% in 2000 to over 40% by 2021 across a sample of 23 countries.[87] Heatwaves significantly reduce labour productivity and could reduce global working hours by the equivalent of 80 million full-time jobs by 2030, with the most pronounced impacts in agriculture, construction, transport, and tourism[88].

Business losses have ripple effects across the broader economy. Physical damage to business assets and disruptions in production cascade through value chains and thereby lead to higher input costs, reduced productivity and forgone revenues. An example of these ripple effects is the slowing of shipping traffic along the Rhine River during the 2018 drought, when water levels fell so low that cargo ships could carry only a fraction of their normal loads. As a result, transportation costs increased and supply chains were disrupted, leading to a 1% reduction in Germany's manufacturing output[89] and a 10% reduction in the production of chemicals and pharmaceuticals over three months[90].

Therefore, it is of utmost importance that businesses reduce their vulnerabilities to climate impacts. However, adaptation gaps are widespread among businesses, with many firms still responding reactively to climate impacts rather than taking anticipatory and impactful measures[91], and climate resilience and adaptation planning remaining 'nascent' in leading European companies.[92]

SMEs are particularly affected due to limited access to finance, data and risk management capacity.[93] Inconsistent public risk data, unclear policies, and fragmented guidance create high uncertainty and discourage investment, especially for cross-border businesses.[94] The high upfront costs of adaptation also act as a barrier to action: adaptation is seen as a cost rather than an investment. While adaptation investments tend to yield results over the medium to long term, this may not align with shorter business planning cycles. At the same time, markets still underprice climate risks, risking financial and fiscal instability[95] and disruptions in interconnected sectors, forcing costly public interventions when failures cascade across borders.[96] Financial institutions only partially account for physical risks in lending and most disaster losses remain uninsured.[97]

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[87] (Costa et al., 2024)
[88] (Costa et al., 2024)
[89] (Deutsche Bank, 2023)
[90] (OECD, 2023)
[91] (Intergovernmental Panel On Climate Change, 2023)
[92] (S&P Global, 2026)
[93] (European Investment Bank, 2024; OECD, 2023)
[94] (European Commission. DG FISMA et al., 2020; OECD, 2024c)
[95] (European Central Bank., 2021)
[96] (ABN-AMRO, 2023)
[97] (European Central Bank et al., 2024)

2.2.3 Problem 3: Unprepared population - Insufficient climate risk awareness/perception and preparedness among the EU population

For this problem populations are understood as households and citizens.

While many EU citizens are aware of climate change, affected by it and concerned about the impacts, most remain underprepared and household-level measures remain inadequate [98]. Climate resilience is a shared responsibility: public authorities must provide policies and emergency support, businesses should manage operational risks, and individuals act within their household, family and local community.

The risks associated with climate extremes are directly linked to society's vulnerability to them, with demographic shifts and socioeconomic transformations altering future exposure to these extremes. The complex interplay between climate change and population dynamics can profoundly influence the exposure and vulnerability of communities to such extremes and makes the case for better preparedness even stronger.

EUCRA[99] concluded that societal preparedness remains low, as policy implementation is lagging substantially behind quickly increasing risk levels. Preparedness fragmentation, combined with private sector unpreparedness, weakens the population's structural ability and incentives to act. Capacity for resilience is also unevenly distributed, with vulnerable groups having fewer resources for it.[100] Behavioural hurdles, such as short-term thinking or over-reliance on public support, or simply feeling overwhelmed by the scale of challenge, further reduce individual action.

2.3 What are the problem drivers?

2.3.1 Institutional, policy and governance barriers

Institutions, governance structures and public policy responses influence, to a large degree, the levels of exposure and vulnerability to the growing climate hazards, shaping the climate related risks for the European economy and society.

2.3.1.1 Policies not reflecting future climatic conditions

Chapters 1 and 2.1 have already described the effects of climate change, and Annex 12 provides more detail on the projected future climates. To recapitulate these briefly: Europe is currently on course to be 3.2°C to 4.5°C warmer than in pre-industrial times, which will result in more frequent and more severe hazards, both from slow-onset processes and extreme weather events.

One of the primary drivers of uneven climate resilience and preparedness across the Union is that the **policies do not reflect future climatic conditions**. The provisions are set for the climate of today/time of adoption and while policies often have long-term consequences and sometimes significant lag

[98] (European Commission. DG ECHO, 2024; European Environment Agency et al., 2026)
[99] (European Environment Agency, 2024)
[100] (European Environment Agency., 2025)

before they bring effects, they do not consider sufficiently the climatic conditions in which the policies will need to keep being effective.

Generally, projected climatic conditions are insufficiently reflected in EU sector policy requirements, if at all (see Annex 10). As a result, decisions taken today (e.g. on infrastructure design, building standards, land-use planning, and water management) lock in vulnerability to projected climate hazards for the lifetime of those systems. This represents a systemic preparedness failure. Given the long lead times associated with adaptation action and the multi-decadal policy horizons involved, the absence of legally binding requirements to calibrate decisions to future climatic conditions is a compounding failure. Its consequences grow with each investment cycle in which it remains unaddressed.

This driver applies and contributes to all three problems identified above.

2.3.1.2 Unclear, overlapping, incomplete climate resilience governance at EU and Member State levels

Unclear governance structures and administrative barriers – such as incoherent or missing laws and procedural requirements, institutional silos or lack of institutional capacity – can result in **gaps, overlaps and inconsistencies between sector policies or administrative levels**[101], thereby preventing a systemic, efficient and effective response to climate risks and affecting the potential for transformational adaptation. Weak coordination, lack of understanding of climate conditions, common objectives and goals, and divergent horizontal climate resilience policy and sector approaches can lead to weak, inconsistent or contradictory outcomes, and dampen the signals and incentives needed by investors.[102]

At Union level, the current horizontal climate resilience governance framework combines binding and non-binding policy instruments (see Annex 10). The legally binding European Climate Law and Governance Regulation are complemented by the EU Strategy on Adaptation to Climate Change established under the Climate Law as a Communication, intermediate policy messages presented in the Commission Communication on managing climate risks, and with ad hoc knowledge products such as the Commission guidelines on Member States' national adaptation strategies and plans and EUCRA.

The EU Strategy on Adaptation to Climate Change is a non-binding instrument that sets out the Union vision to become a climate-resilient society by 2050. The original strategy dates from 2013 and was revised in 2021 to consider the Paris Agreement's temperature goal of 1.5°C; it puts forward a multitude of actions for the Commission.

However, since the adoption of the Adaptation Strategy, climate projections for Europe have evolved significantly (indicating stronger warming) and the first EUCRA has been published. The Strategy's non-binding nature means that it cannot create enforceable obligations on the Union and the Member States, resulting in incoherent and fragmented approaches. As highlighted by the first Union level progress assessment the Strategy has not delivered measurable and sufficiently rapid climate resilience outcomes, with several envisaged actions still to advance.[103] **The Strategy does not constitute a solid**

[101] (European Court of Auditors, 2024; van Minnen et al., 2025)
[102] 'Fragmentation and lack of policy coordination' and 'regulatory uncertainty and inconsistent policy signal' were also frequently highlighted as a key barriers to better climate preparedness in the OPC.
[103] (European Commission. DG CLIMA, 2025a)

overall framework due to its aspirational nature and the fact that it is based on outdated assumptions. (More details in Annex 10)

The European Climate Law is a regulation establishing the main legal foundation for horizontal climate adaptation action at Union and Member State level, with limited links to sectoral policies. It merely sets out a general obligation to ensure *'*continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change*'*, in accordance with the Paris Agreement. It requires the Commission to adopt and regularly review the Union adaptation strategy, and Member States to adopt and review national adaptation strategies and plans, based on robust climate change and vulnerability analyses, progress assessments and indicators. The Law contains provisions for five-yearly assessments by the Commission of Union progress and measures, and of national measures.

However, the Law's adaptation provisions are too general and lack clear specific objectives or targets, adaptation-specific governance and robust progress assessment, which limits systematic consideration of climate risks in Union sectoral policies and across Member States. **While the Law creates a general obligation to pursue climate adaptation, it does not provide a sufficiently comprehensive and operational framework to ensure coherent and effective climate resilience action across the Union.** (More details in Annex 10)

The Governance Regulation provides the Union framework for planning and reporting on energy and climate policies and targets. It requires Member States to set out their planned policies and measures in integrated national energy and climate plans (NECPs), and report regularly on their progress. As regards adaptation, it requires adaptation goals to be reflected in NECPs "where applicable" and sets the reporting channel through which Member States provide information on horizontal national adaptation actions, and on some sectoral actions.

However, the Governance Regulation has not been sufficient to support the level of climate resilience needed across the Union and Member States. The 2024 Commission report on the review of the Governance Regulation[104] and the 2025 EU-wide assessment of the final updated NECPs[105] confirm that adaptation remains insufficiently embedded: NECPs often refer to national adaptation strategies and plans rather than systematically integrate climate risks considerations into energy sector and climate planning; and gaps and inconsistencies persist in the scope and quality of information reported under Article 19(1), and adaptation reporting lacks indicators to track progress. (More details in Annex 10)

While the Union-level horizontal policy framework sets broad aspirations and provides some tools, both its level of detail and its practical application remain insufficient. The ECA concluded[106] that reporting on climate adaptation adds limited value for tracking progress and supporting future policy decisions, due to the lack of common indicators, identified challenges in tracking adaptation related funding, and weaknesses in the use of scientific data in national adaptation policies, in particular with respect to sectoral policies.

[104] (COM(2024) 550 final)
[105] (European Commission, 2025b)
[106] (European Court of Auditors, 2024)

In the last decade, Member States have been gradually strengthening their policy foundations for climate resilience and adaptation. The latest data[107] [108] shows that all 27 Member States have adopted national adaptation policies, and most have completed at least one full policy cycle. However, progress remains uneven in terms of climate risk evidence base, legal anchoring, policy formats and progress monitoring.

21 Member States have published climate change and vulnerability analyses, although methodological approaches vary. Six of these analyses are more than eight years old, which limit their ability to reflect the latest climate science and evolving risk patterns. 14 Member States anchor climate adaptation in national climate legislation, but the scope and level of detail of these provisions differ. In addition, 14 Member States use national indicators to track implementation progress, but these indicator frameworks are different and cannot provide a consistent basis for assessing adaptation progress across the Union.

These individual policies do not a guarantee of implementation and systematic operational preparedness across the Union and across national borders. The policy development continues to be challenged by diverse approaches, complex coordination across sectors and governance levels, unclear ownership of climate-related risks, variable institutional capacity and uncertain financing. The fragmented Member States' approaches continue to affect also the implementation of measures and challenge policy coherence. Although the subnational level is central to adaptation, regional and local implementation remains constrained by limited capacity and resources, limiting the translation of national priorities into targeted action and contributing to uneven preparedness across Europe.[109]

The Commission assessment of Member States' adaptation progress under the European Climate Law[110] showed that, while national climate adaptation frameworks were in place, major weaknesses remained in their operationalisation and implementation. Overall, key gaps concerned insufficient climate risk and investment needs assessments, lack of dedicated budgets, use of outdated scientific data, weak interinstitutional coordination and integration of nature-based solutions in strategic and sectoral policies, and missing indicators for monitoring of actions and results. Due to lack of harmonised approaches under the Law across all steps of the climate adaptation policy cycle, the Commission was unable to assess the real progress on the ground towards enhanced climate preparedness and resilience. Instead, the assessment focused on processes and administrative arrangements. For the same reason, the Commission could not assess relative progress at Member State level nor could have it aggregated in a meaningful manner. These findings were also mentioned in the 8EAP Mid-Term Review.[111]

The Commission issued in 2023 Guidelines on Member States' adaptation strategies and plans to support them in developing and revising their policy frameworks. However, due to their non-binding nature, the guidelines have not managed to resolve the persisting gaps, as in many Member States risk ownership, political commitment, coordination, capacity and sustainable financial resources are not sufficient.

This driver, due to its nature, applies and contributes mainly to Problem 1.

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[107] (European Environment Agency, 2026c)
[108] (European Environment Agency, 2025d)
[109] (OECD, 2023)
[110] (SWD(2023) 932 final)
[111] (COM(2024) 123 final)

2.3.1.3 Limited integration of climate resilience in sectoral decision-making processes

Across the EU and Member States, **sectoral policies often consider climate resilience insufficiently and inconsistently, if at all.** The likely exposure and vulnerability to climate risks[112] is insufficiently reflected in sectoral policies, from energy to transport, to agriculture or financial services, to give just a few examples. This leaves weak links and thus constrains effective and systemic climate risk management, even in sectors with significant exposure.[113] The overall preparedness of EU policy areas is not sufficient as evidenced by EUCRA, indicating the exposures in policy areas, interlinkages between the risks and policy areas, and the gaps in reducing such fragmentation of approaches (see Annex 9).

Climate resilience dimension is to some degree present in a range of EU policies, such as the amended Directive on Requirements for budgetary frameworks of the Member States[114]; the EU Taxonomy Regulation[115]; the surveillance mechanisms for tracking climate risks used by the European Central Bank, European Systemic Risk Board, and European Banking Authority; the PUS[116]; the Critical Entities Resilience Directive; the Risk-Preparedness Regulation[117] and the envisaged revision of the EU energy security architecture[118]; certain tools of the Common Agricultural Policy; the European Nature Restoration Law[119]; the Marine Strategy Framework Directive[120]; the Regulation on Serious Cross-Border Threats to Health[121]; the EU Occupational Safety and Health (OSH) Framework Directive[122]; the Union's Environmental assessment instruments[123]; the Water Framework Directive[124]; the European Ocean Pact[125]; the LIFE programme[126]; and strategies such as the EU Ports Strategy[127], EU Medical Countermeasures Strategy[128], EU Forest Strategy[129] and the European Water Resilience Strategy [130]. At the same time, the approaches to climate resilience differ, are not coordinated and operationalised. For example, the Energy Performance of Buildings Directive does address thermal comfort in buildings as part of considerations, but only as an element in the calculation of cost-optimal levels of energy performance, to be transposed through national building regulations and other actions; yet there are no clear objectives for this, and broader resilience of buildings is not addressed.

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[112] Embedding climate resilience considerations into the design phase of EU legislation and policy decisions. See Annex 11 for a full definition.
[113] (Cortés Arbués et al., 2025; EFCA, 2025; Gancheva et al., 2024; Leitner et al., 2024)
[114] (EU) 2024/1265
[115] (EU) 2020/852
[116] (European Commission et al., 2025)
[117] (EU) 2019/941
[118] (European Commission, 2026g)
[119] (EU) 2022
[120] (EU) 2024/1991
[121] (EU) 2022/2371
[122] (89/391/EEC)
[123] (European Commission, 2026b)
[124] 2000/60/EC
[125] (European Commission, 2026h)
[126] (European Commission, 2026d)
[127] (European Commission, 2026f)
[128] (European Commission, 2026e)
[129] (European Commission, 2026c)
[130] (European Commission, 2025a)

The amended Council Directive 2011/85/EU on Requirements for Budgetary Frameworks of the Member States does contain provisions requiring Member States to assess and report 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 and on the fiscal costs incurred due to disasters and climate-related shocks. Despite analytical progress, implementation approaches remain relatively nascent and diverging across Member States.[131] So far, there has been no systematic and structured assessment of integration of climate resilience across EU policies; a tentative mapping of selected policies and their potential coverage of the main dimensions of the initiative is included in Annex 10. This mapping does not address the potential gaps in implementation as relevant, comprehensive and sufficiently robust information is not available (reflecting the fragmentation and unclear distribution of responsibilities), but from evidence presented in Annex 9 about increasing sectoral risks as well as historical evidence on increasing losses, it can be inferred that lack of policy preparedness cannot be fully assigned to regulatory failure and therefore insufficient implementation is also part of the problem driver.

Whilst information on sector integration at Member State level is widely lacking, the EUCRA finds that there are significant governance barriers which are hindering progress at Member State level, and identifies a wide range of national policy competence areas that are exposed, such as spatial planning, zoning or public finance management (See Annex 9).

Despite increased efforts since 2021 to integrate climate adaptation into sectoral policies, and to strengthen links with disaster risk management and environmental assessment processes, the reported information under the 2025 Governance Regulation indicates that adaptation across sectors is currently unevenly integrated.

This driver, to different extent, contributes to all problems either directly (Problem 2) or indirectly (Problem 1 and Problem 3).

2.3.1.4 Unclear climate risk ownership

Unclear risk ownership[132] and lack of democratic accountability contribute to slow and ineffective progress. Research points to the ambiguity of risk ownership mandates between the EU and Member States, which reduces policy coherence and effectiveness, and highlights policy areas in need of a stronger EU role.[133] Administrative capacity constraints exacerbate this situation e.g. many subnational authorities lack the expertise, funding and tools for climate risk management[134].

So far climate adaptation is primarily treated as the responsibility of environment and climate ministries. This has severely hampered the understanding of risk ownership and consequently action across sectors. The Climate Law's provisions have been proven insufficient to improve adaptive capacity across sectors, as mentioned in sub-section 2.3.1.2 and Annex 10. There are no minimum content requirements, no common methodological standards, and no enforceable sectoral outcomes.

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[131] (European Commission, DG ECFIN, 2025). The Commission has been conducting scenario analysis reflecting climate risks into its Debt Sustainability Analysis (European Commission. DG ECFIN (2026); European Commission. DG ECFIN and Gagliardi, N. (2025); European Commission. DG ECFIN (2022)).

[132] A governance concept that, in the EU adaptation context, defines the responsibility for managing climate risks. It is strongly related to accountability. See Annex 10 for a full definition

[133] (European Scientific Advisory Board on Climate Change, 2026)

[134] (Intergovernmental Panel On Climate Change et al., 2023)

The EEA Report[135] confirms that risk ownership and sectoral responsibilities are often unclear. Responsibilities for managing climate-related risks are often spread across several ministries, agencies, sectors and levels of governance, without clear accountability for who should act, by when and with which resources. This is particularly important in sectors where adaptation decisions are made in practice, such as buildings, land use, infrastructure, water management, health, agriculture and civil protection. Where climate risks are not embedded in sectoral rules, standards and investment decisions, adaptation remains difficult to operationalise.

Risk ownership, in the EU climate resilience building and climate adaptation context, refers to the **distribution of responsibilities between public authorities for policy decisions** - including implementation choices - that have the potential to reduce exposure or vulnerability to climate risks in their primary domain and for other policies. *(More details in Annex 11)*

This driver contributes directly to Problems 1 and 2.

2.3.2 Methodological, evidence and informational barriers

2.3.2.1 Unclear vision, objectives, targets and indicators barriers

The visions, objectives, targets and indicators in EU and Member State climate adaptation and preparedness strategies remain general and lack strong mandates needed for driving consistent action across sectors and governance levels[136] [137](see Annex 10). Combined with **divergences in the understanding of the climatic futures** that policies should prepare for, this prevents building systemic climate resilience effectively. EU level reports to address this barrier do exist[138], yet they use indicators and provide information with limited relevance to climate resilience.[139] Usually, Member States and policy sectors choose independently what they deem most appropriate or available.

This driver contributes directly to Problems 1 and 2.

2.3.2.2 Methodology and terminology barriers

Climate resilience terminologies and methodologies – such as definitions of climate adaptation, climate resilience, preparedness, risk, thresholds for drought events - are often understood and applied differently. Together with diverging methodologies to conduct climate risk assessments they undermine data comparability in the EUCRA and other climate risk assessments, complicating cross-sectoral and cross-government coordination.

This driver contributes directly to Problem 1 and indirectly to Problems 2 and 3.

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[135] (European Environment Agency, 2026b)
[136] (European Scientific Advisory Board on Climate Change, 2026), recommendation 3 (p14)
[137] (OECD, 2025)
[138] Notably reporting under the Governance Regulation and the adaptation chapters of the annual EU Climate Action Progress Reports, also others such as the State of the Energy Union Report ESTAT SDG reports, 8 EAP monitoring, or EU Semester reports.
[139] (European Court of Auditors, 2024) The Court concluded that adaptation reporting "lacks common indicators for measuring progress towards climate resilience by 2050" and therefore adds little value for strategic steering.

2.3.2.3 Climate risk assessment (CRA) barriers

While the evidence base on climate risks is improving across Europe, it is not yet supported by sufficiently harmonised approaches to national climate risk assessments. Methodologies, the use of future scenarios and reference warming trajectories, sectoral coverage and timing of assessments vary significantly across Member States. As a result, climate risks are increasingly identified, but not in a sufficiently coherent and coordinated way. This leads to uneven levels of climate risk knowledge, awareness and preparedness, and makes it difficult to assess how systematically climate risk evidence informs adaptation policy development and implementation. This weak link reduces the ability to prioritise action according to the most significant risks and can result in policies and action that are not sufficiently targeting the most urgent risks or the most vulnerable sectors. Methodological diversity across Europe further limits comparability and coherence, while insufficient cross-border cooperation and data sharing leave shared and transboundary risks only partially understood and addressed[140].

Across governance levels and policy sectors, **large differences in CRA approaches and methods** undermine their comparability and effectiveness as a coherent foundation for policy and action, hampering systemic climate resilience.[141] At the EU level, whilst EUCRA filled critical evidence gaps and offered a first, much-needed Europe-wide risk overview, its continuity remains unclear and relies on political initiatives. At the national level, whilst 21 Member States had climate risk assessments by 2025[142], there are still significant shortcomings and differences e.g. in risk structure, quantification, scenario use, coverage of systemic and cascading risks. The main gaps concern the availability and interoperability of data, the technical expertise needed for integrated and systemic risk assessment, and the financial and institutional capacity required to translate CRA findings into action. These constraints weaken the uptake of risk knowledge in adaptation planning and implementation, and risk widening preparedness gaps between countries.

This driver contributes directly to Problem 1.

2.3.2.4 Climate adaptation planning and design barriers

Climate adaptation planning across the EU remains inconsistent, with wide variations in methodologies, and ambition. At the national level, the 2023 Guidelines on Member States' adaptation strategies and plans[143] could so far not prevent large variations in their methodologies. Many countries continue to struggle with coordination across sectors and governance levels, particularly in decentralised and federal systems. Fragmented mandates, unclear roles and limited administrative capacity reduce the coherence, effectiveness and efficiency of adaptation planning, even where strategies and plans are in place. This **variety of approaches prevents the effective management of the many shared, transnational and systemic climate risks.[144]**

This driver contributes directly to Problem 1 and indirectly to Problems 2 and 3.

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[140] (European Environment Agency, 2026c)
[141] (European Commission. DG ECFIN, 2022, 2025; European Environment Agency, 2024; Luo et al., 2023; Newman et al., 2023; Schwarzwald et al., 2022; Stern, 2007)
[142] (European Environment Agency, 2025e)
[143] (European Commission, 2023a)
[144] (European Commission, 2024b)

2.3.2.5 Progress monitoring and assessment barriers

Current frameworks for monitoring, reporting, evaluation, and learning (MREL) allow only **limited tracking of the effectiveness of climate resilience and adaptation policies, restricting insights into progress** (as mentioned in section 2.3.2.5 and Annex 10). Developing suitable metrics for adaptation is often challenging due to the diversity and complexity of climate risks and adaptation responses. Compared to monitoring and reporting, policy evaluations as less common among Member States. At the national level, many countries lack robust evaluation systems with shared guidelines or indicators, making it hard to compare progress across Member States, assess the effectiveness of measures, justify investments, or refine strategies. An additional barrier here is that sometimes the effects of a particular adaptation response are only visible after a delay, which can make it hard to evaluate certain activities[145]. MREL limitations also prevent financial institutions and insurers from pricing climate risks.[146]

This driver contributes to Problem 1.

2.3.3 Information and know-how barriers:

Access to reliable, actionable data and skills remain insufficient to adequately support climate risk management decisions. Limited awareness and use of EU adaptation tools and knowledge platforms at local level was identified as a shortcoming by the ECA[147]. EU-level tools providing climate resilience data remain underused, for various reasons: they are too technical (e.g. the C3S Atlas), provide too coarse information (e.g. the European Climate Data Explorer), key users are not aware of them (e.g. Climate-ADAPT)[148], and have difficulties in understanding their methodologies. Data formats of current tools are often inconsistent, and quality of external information reported is not always ensured. Current tools also tend to overlook systemic risks. National tools do exist, yet with different scopes and approaches, limiting their comparability and use for cross-sectoral, cross-border and multi-governance level purposes[149].

Also, economic impact data are not complete enough for a comprehensive assessment macro-fiscal impacts and risks[150] and incomplete vulnerability data and uncertain risk projections create significant uncertainty for large European corporations.[151]

At the Member State level, implementation is constrained by uncertain financing and limited capacity (staffing). Few Member States have dedicated adaptation financing mechanisms that track and ring-fence resilience expenditure separately from broader disaster response and recovery spending. Limited institutional and technical capacity, especially at regional and local levels, restricts the translation of national priorities into targeted measures on the ground. Low. Moreover, funding going into skills for innovation is not always well coordinated towards innovation needs.[152]

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[145] (European Environment Agency, 2026c)
[146] (European Central Bank et al., 2023; European Scientific Advisory Board on Climate Change, 2026; Leitner et al., 2024; OECD et al., 2022; United Nations Environment Programme et al., 2024)
[147] (European Court of Auditors, 2024)
[148] (Copernicus Climate Change Service, 2024; European Court of Auditors, 2024; European Environment Agency, n.d.)
[149] (European Environment Agency, 2024)
[150] (European Commission. DG ECFIN, 2025)
[151] (Cortés Arbués et al., 2025)
[152] (European Commission, 2024g; European Commission, 2024h)

This driver contributes to, to different extents, to all the identified Problems.

2.3.4 Market failures

There are three interconnected market failures that distort investment decisions when it comes to factoring in future climate conditions. Firstly, the true costs of inaction – damage to infrastructure, public health burdens, productivity losses – are not internalised, skewing incentives toward short-term considerations. Many of these costs are borne by actors other than those making investment decisions. For example, governments frequently absorb a substantial share of the costs of disaster response, reconstruction and emergency support, while healthcare systems bear the costs associated with heat-related illnesses, disease outbreaks and deteriorating air quality. Supply chain disruptions and productivity losses often affect entire sectors and regions rather than individual firms (e.g. Rhine low water in 2018 and 2022 that affected several sectors[153]). As these wider societal costs are not fully reflected in market prices, firms and investors may face limited incentives to invest in adaptation measures whose benefits accrue primarily to society as a whole.

Secondly, the **benefits of adaptation materialise over the long term** and are inadequately monetised, which weakens the case for investment and reinforces inaction. Unlike investments that generate new revenues or increase productivity, adaptation measures typically create value by reducing future losses and preserving existing economic activity. Their benefits are therefore realised through damages avoided rather than income generated. This creates significant measurement challenges, as avoided losses are inherently counterfactual and depend on uncertain future climate conditions (see Annex 8 and examples in chapter 6). Conventional investment appraisal frameworks frequently struggle to capture these benefits, particularly where project evaluation periods are short or discount rates place less weight on long-term outcomes. As a result, many adaptation measures that would deliver substantial economic benefits over their lifetime appear less attractive than investments with more immediate and easily quantifiable returns.

Thirdly, **climate risks are not reliably priced in across financial markets, infrastructure planning and public procurement**. The asset pricing often relies on historic data[154] that do not reflect the new risk patterns that will emerge because of climate change. The nature of the risk is long-term and depends on complex interactions between climate variables and socioeconomic developments that are difficult to model. According to the ESRB[155], the incomplete incorporation of climate-related risks in market prices can cause assets to be overestimated or liabilities to be underestimated, affecting both financial institutions (mainly through holdings of financial assets) and non-financial corporations (particularly through tangible assets measured at fair value, such as investment property. ECB supervisory mandate also underlines that modelling and quantification of climate risks is subject to significant underestimations by banks.[156] Thus, **markets may not price future physical risk correctly**, **potentially leading to capital misallocation and economic inefficiency.**

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[153] In a month with 30 days of low water, industrial production in Germany declines by about 1 percent, ceteris paribus, according to study by Ademmer, et al. (Ademmer et al., 2020).

[154] ESRB advice to EBA shows historical data use is standard (ergo not considering future climate): conventional risk management methods used by financial institutions and supervisors may not be suitable for properly capturing the full range of climate-related financial risks, methods are based on historical data that do not reflect the new risk patterns that will emerge as a result of climate change

[155] (European Systemic Risk Board., 2024)

[156] (European Central Bank, 2025)

Together **these failures produce wrong price signals that perpetuate and deepen the preparedness gap**. These distortions are further compounded by information asymmetries, as investors, lenders and households often lack access to consistent, forward-looking information on physical climate risks and the effectiveness of adaptation measures and do not factor them in their decisions, as confirmed also by the ECB 2022 climate risk stress test.[157]

An important example of this effect is the 2021 floods in Germany, which caused more than EUR 33 billion in damages.[158] After the disaster the average property prices in flood-prone areas did not adjust to account for flood risk. Meaningful price declines occurred only in areas located close to the flooding or in regions shown to have higher levels of climate-change awareness.[159] This shows that flood-risk valuation does not adjust uniformly across the market and can lead to "suboptimal capital allocation", potential overinvestment in flood-prone areas and demonstrates how climate risks remain inadequately priced into market decisions despite existing flood-risk regulations. This example shows that market prices can continue to underestimate physical climate risks and lead to increase of future economic losses as climate impacts intensify.

Short-term perspectives and shareholder pressures, focused on annual returns, hinder long-term resilience investments, even if they promise substantial long-term gains, leading to underfunding and overreliance on outdated climate data rather than forward-looking scenarios[160]. Estimating potential losses from indirect impacts (supply chain disruption, labour productivity etc.) is challenging, and **physical climate risks remain underpriced**: though natural disasters cause financial losses, equity valuations and markets show little reaction to major climate shocks.[161] Consequently, private resilience investment stays low - particularly in manufacturing, a key GDP driver in Europe - risking locked vulnerabilities and higher future costs[162]. Despite vast market potential for climate solutions, **resilience also remains an innovation blind spot**.[163] The fact that governments bear costs of disaster management, not only results in a sense of complacency and disincentivises risk aversion by citizens and industry but also strains public budgets and diverts funds from education and R&D, undermining competitiveness.

Finally, there is a growing transfer of risks to an **insurance industry**, which is either unable or unwilling to accept them. This is leading to a **widening protection gap** as insurers increase the complexity of underwriting in a bid to reduce their payouts and protect their operating model. Beyond this, the structural erosion of insurability stems from the increased frequency and severity of losses. As risks are non-linear and geographically correlated, this limits the extent to which they can be priced using solely historical data. Therefore, conventional mechanisms are constrained which limits the ability for insurers to offer coverage that is broad and affordable, even in places where demand is strong. Moreover, households and investors are encouraged to rely on insurance as a de-risking mechanism, while the parallel implementation of risk reduction measures would be beneficial to improve long-term insurability.[164] (see also Annex 8)

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[157] (European Central Bank., 2022)
[158] (Ulrich et al., 2026; Zenker et al., 2024)
[159] (Gruhl et al., 2025)
[160] (EFCA, 2025; European Environment Agency, 2024)
[161] (European Commission. DG ECFIN, 2025)
[162] (Cortés Arbués et al., 2025)
[163] (McKinsey, 2025a; Tailwind, 2024)
[164] (Climate Resilience Dialogue, 2024; Crugnola-Humbert, 2025)

This driver contributes directly to Problem 2 and indirectly to Problems 1 and 3.

2.3.5 Behavioural barriers

Behavioural responses to climate risks are strongly influenced by framing, reference points, personal experience, and emotional salience rather than objective data. **Behavioural barriers** - such as short-term thinking, cognitive tunnelling[165], and risk misperception – **increase the gap between high climate concern and low preparedness**. Climate resilience is often seen as a long-term challenge whose benefits materialise beyond electoral cycles, competing with more immediate priorities like economic growth or energy security[166]. Public-sector ambiguity on climate risk management also discourages private investments in long-term, systemic solutions[167]. Without compelling, positive narratives on climate resilience, risk awareness, risk perception and risk ownership remain weak, which combined with the market failures described above, results in stalling action by individuals, companies and governments.

This driver contributes to all the identified Problems.

2.4 How likely is the problem to persist?

Climatic hazards will continue to increase, with existing policies insufficient to keep pace. The persistence of the problem and of its drivers have been set out in this and the previous chapter, evidenced by the EUCRA and other major studies in the field, and summarised in early 2026 by the European Scientific Advisory Board on Climate Change (ESABCC)[168]. The persistence of the problem is also echoed in the EU strategic foresight report from 2025, which presents key long-term megatrends and EU-specific challenges, identifying climate resilience as a key area for action[169].

The preparedness of European economy and society to climate risks is one element of overall societal resilience, and the two are interrelated:

- Forceful, comprehensive solutions in sectoral policy areas (e.g. structural and systemic infrastructure security approaches, water resilience policies) may reduce climate vulnerabilities and exposures, even without additional horizontal climate resilience and adaptation action. Yet, the identified problem drivers strongly suggest that this effect will be very limited at best.
- As such, horizontal climate resilience and adaptation policies and actions will not be enough to deliver overall resilience of the society, but they are an essential part of it, as recognised also in the Preparedness Union Strategy and its relevant actions, such as the Comprehensive Risk and Threat Assessment and the nonbinding Minimum Preparedness Requirements.

Therefore, the **described problems are highly likely to persist and amplify** without additional interventions to tackle the identified barriers, as a contribution to overall societal resilience. Chapter 5.1 on the policy baseline provides more details on projected developments.

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[165] (Mani et al., 2013; Mullainathan et al., 2013; Shah et al., 2015)
[166] (OECD, 2025; United Nations Environment Programme, 2021)
[167] (European Commission. DG CLIMA, 2025d)
[168] (European Scientific Advisory Board on Climate Change, 2026)
[169] (European Commission. Secretariat General., 2025)

3 WHY SHOULD THE EU ACT?

3.1 Legal basis

This initiative is based on Article192(1) of the Treaty on the Functioning of the European Union (TFEU), on Union policy on the environment[170]. There are also several other Treaty provisions of relevance to the initiative, such as Articles 114 (internal market), 122 (emergency measures), 168 (public health), 194 (energy policy) and 196 (civil protection).

3.2 Subsidiarity: Necessity of EU action

Climate hazards increasingly affect the entire EU territory and put core Treaty objectives and policy areas at risk[171], thus demanding strong EU-level action.

Many climate risks are shared between MSs because of their cross-border, transboundary dimension. River basins, seas, energy grids, transport networks, supply chains, ecosystems, infectious disease pathways, financial systems, markets and societies span across national borders. Impacts can cascade and compound at broader economic and societal level degrading Union-wide cohesion, financial stability and investment outlook, posing a wider systemic threat with considerable potential to impact on the free movement of goods, services, capital and persons between countries.

MSs addressing these shared risks in varying ways will not deliver the same result as a joint approach. To be efficient and effective, climate resilience policies require more uniform application, and coordinated action across different sectors and governance levels. Weak links between risks and policies can be prevented to avoid compromising the prosperity and safety of all EU citizens and industry.

EU-level action on climate resilience and adaptation is also needed because, at the international level, the EU has committed to achieving the Global Goal on Adaptation under Article 7 of the Paris Agreement[172], and is party to other international agreements with important climate resilience aspects[173]. This need is further underpinned by the Treaty principle of sincere cooperation, external representation and the coordination of Union and Member State action in international agreements and multilateral fora, as well as the Union's objective of promoting measures at international level combating climate change under Article 191 TFEU.

In sum, climate impacts can undermine the effective delivery of EU policies including the functioning of the single market, as well as the Union's ability to uphold its fundamental rights and pursue its international obligations and promote more ambitious approaches internationally. Actions at the national level would not be sufficient in addressing climate risks. Policy intervention at the EU level

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[170] (Consolidated Version of the Treaty on the Functioning of the European Union, 2012)

[171] These include security, social justice and protection, economic growth, fiscal and financial sustainability, territorial cohesion, public health, food security, a functioning internal market, environmental protection, and marine biological resources under the common fisheries policy.

[172] Article 7 of the 2015 Paris Agreement established the Global Goal on Adaptation more details.

[173] E.g. Espoo Convention; Convention on the Protection and Use of Transboundary Watercourses and International Lakes; Kunming-Montreal Global Biodiversity Framework, 2022; Sendai Framework for Disaster Risk Reduction 2015 - 2030, 2015; Transforming our world: the 2030 Agenda for Sustainable Development, 2015; Convention to Combat Desertification, 2017)

– in concert with national, regional and local action - is necessary to effectively and efficiently achieve the needed levels of systemic, EU-wide climate resilience and preparedness levels.

3.3 Subsidiarity: Added value of EU action

This initiative is expected to generate added value over and above what the Member States can achieve nationally for the following reasons:

- The magnitude and complexity of the challenge, and the fact that climate change affects many policy areas of shared competence, requires an all-of-government approach that includes intervention at the EU policy level.
- Complementing different national policies and rules, EU-level action is needed for promoting a more harmonised and coherent understanding and approach to climate resilience at national and subnational level and across policy areas, thereby effectively reducing transnational, cross-border and systemic risks.
- In addition to contributing to greater effectiveness, EU-level intervention for climate resilience has significant potential for achieving policy objectives in a more cost-efficient manner. For instance, a single EU-wide early warning and surveillance system for wildfires or climate-sensitive infectious diseases is cheaper and will deliver better results on these cross-border impacts compared to the development and operation of separate systems by each Member State.
- Similarly, improving the functioning of the internal market for climate resilience products and services (e.g. heat-protection gear for workers, less water intensive and more climate resilient crops, smart building cooling solutions) holds potential for economies of scale, greater competitiveness at the global scale, and better leverage over global norms and regulatory standards.
- Strengthening the role of climate resilience in EU budgetary and economic governance frameworks not only provides a common direction to public authorities, but also – by extension - to the private sector and citizens.
- EU-led policies and support measures for climate resilience have a bigger chance of leading to true transformation. These will not only make the EU and the Member States more prepared to face current and future climate risks, but also strengthen core values of the Union, such as solidarity, cohesion and reduction of inequalities.

4 OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1 General objective

To address the problems identified in chapter 2, the general objective (GO) is **to make EU and its Member States more resilient to current and future climate risks.** This objective contributes to implementing

- the Political Guidelines 2024-2029 of the Commission, and the priorities of the 2024-2029 strategic agenda[174];
- the objectives of protecting the environment and human health, and dealing with the worldwide problem of climate change, with a view to promoting sustainable development (Article 191 TFEU);
- the European Climate Law and Article 7 of the Paris Agreement, which require the Union institutions and its MS to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change.
- of strengthening the EU's long-term competitiveness and strategic autonomy, as highlighted in the Draghi[175] and Letta[176] reports, by enhancing resilience to climate risks, safeguarding productivity, supporting innovation, and ensuring a stable and predictable environment for sustainable investment and economic growth.

[174] (European Union, 2024)
[175] (European Commission. European Political Strategy Centre., 2025)
[176] (Enrico Letta, 2024)

4.2 Specific objectives

The specific objectives (SO) of this initiative address the key problems and drivers identified in Chapter 2.2. This impact assessment will evaluate the capacity of the different policy options to deliver them.

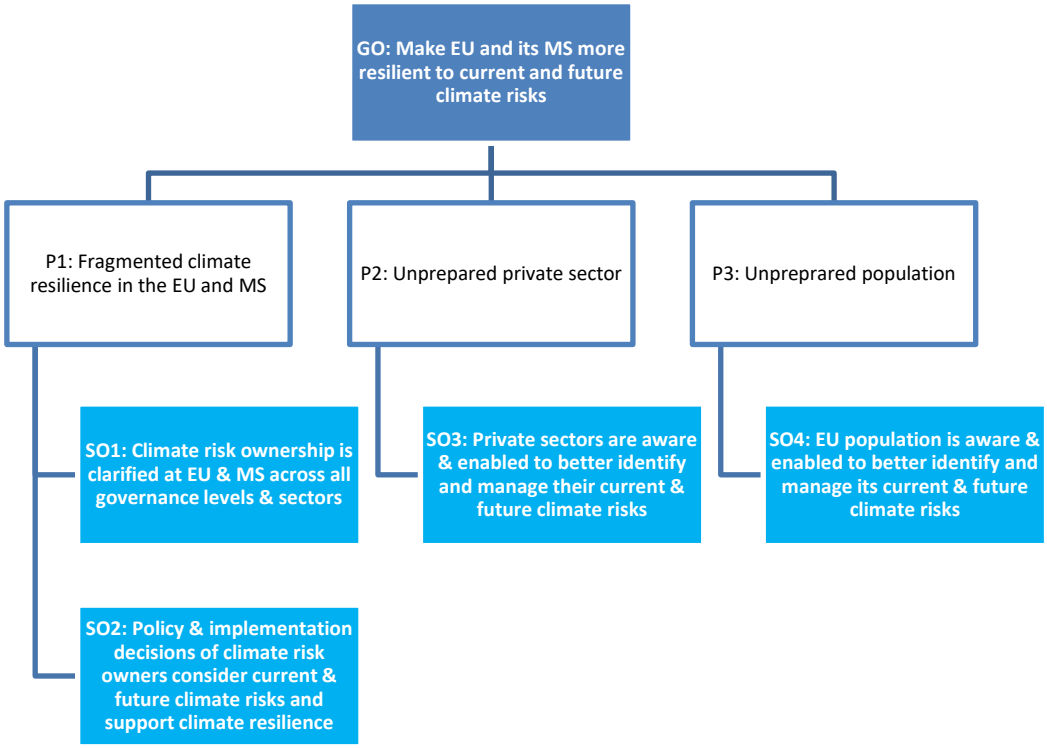


Figure 2: General objective, problems, and specific objectives

SO1: Climate risk ownership is clarified in EU and Member States across all governance levels and sectors

This SO relates to problem 1 fragmentation of climate resilience in the EU and Member States. As outlined in chapter 2, the multilevel governance structures of climate resilience – including horizontal and sectoral policies – can lead to unclear allocation of responsibility for identifying and addressing climate risks. By integrating climate risk ownership systematically into EU and Member States governance levels and sectors, responsibilities for identifying, assessing and addressing climate risks are clearly allocated in public authorities. The objective aims at strengthening coherence and accountability in climate resilience planning and implementation both within horizontal climate resilience policy and sectoral policies, while maintaining flexibility for national and subnational governance arrangements and sectoral competences. Implementation and progress will be monitored through relevant planning and reporting processes. Clarifying climate risk ownership will help reduce gaps, duplication, overlaps and inconsistencies.

SO2: Policy and implementation decisions by climate risk owners consider current and future climate risks and support climate resilience

This SO addresses the misalignment between existing policy-making processes and the growing scale and complexity of climate risks and impacts. Climate risk assessments should be based on a common

vision of future climatic conditions stemming from the global warming trajectory, allowing to anchor the proposed adaptation options and to ground subsequent decisions on risk ownership and climate resilience by design on the outcomes of those assessments. Once risk ownership is clearly defined, responsible authorities, supported by the appropriate instruments, will be better positioned to assess and address both current and future climate risks. This will enable more informed and forward-looking policy decisions, integrating climate resilience considerations from the outset. As a result, policy implementation will be more coherent, coordinated and efficient across sectors, strengthening the EU's overall resilience and preparedness to climate change.

SO3: Private sector actors are aware and enabled to better identify and manage their current and future climate risks

Climate risks and impacts affect both public and private actors alike. Strengthening the climate resilience of the EU economy therefore requires an active engagement from the private sector. When public authorities provide clear signals and adopt forward-looking policies and decisions, awareness among private sector actors of their exposure to climate risks increases. Supported by the appropriate instruments, this will incentivise the development of a climate resilient economy, strengthen leadership in developing markets, provide signals to stimulate investment, create competitive advantages for the EU globally, and contribute to job creation and growth.

SO4: The EU population is aware and enabled to better identify and manage its current and future climate risks.

Population preparedness is also essential to improving societal climate resilience. EU populations need to have an improved understanding of the risks they face and their capacity to respond. By ensuring clear and accessible information on risks and measures to combat these, communities across the EU can better anticipate and adapt to both current and future climate risks, while also improving public acceptance for building climate resilience. More transparent design and implementation processes also contribute to support and protection specifically for vulnerable groups, by promoting a fair, inclusive and participatory approach to climate resilience and adaptation.

5 WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1 What is the baseline from which options are assessed?

The baseline option represents a 'no policy change' projection that considers the effects of current policy measures and their interactions. It serves as a counterfactual, against which the incremental impacts of the policy options and measures can be assessed. It also allows identifying remaining policy gaps and avoidable risks regarding climate preparedness under a business-as-usual policy scenario.

At the EU level, considering the current horizontal climate resilience policy framework, the baseline comprises of the continuation of the EU Adaptation Strategy, European Climate Law and the Governance Regulation (see Annex 10). Under the baseline, the obligations defined in these policies would continue to guide EU and Member State action on preparedness and climate resilience. The European Climate Law and Governance Regulation would remain the main binding elements of the horizontal policy framework, requiring Union and Member State planning, reporting and progress assessment. The EU Adaptation Strategy, Commission Communication on managing climate risks and

subsequent editions of EUCRA would continue to support policy development and implementation on a non-binding basis.

The baseline would allow for some continued progress, through planned policy reviews, informed by emerging climate risk evidence, and this could support gradual and slow improvements in policymaking and coordination.

However, in the absence of additional policy change, progress would continue to depend largely on the current (unclear) distribution of responsibilities, existing EU coordination and support mechanisms, the (uneven) level of implementation by Member States and the voluntary uptake of non-binding instruments and existing reporting requirements. It would also do little to clarify policy risk ownership and improve fragmented policy approaches, implementation, financing, management of shared and cross-border climate risks, progress monitoring and the evidence on the effectiveness of adaptation measures.

The baseline is thus unlikely to fully address the identified main problem of fragmented and insufficient preparedness for current and future climate risks. Instead, it can be expected to continue current trends, with persistent differences across Member States, sectors and governance levels in climate preparedness and resilience.

However, because of the voluntary nature, diversity of methods and reference scenarios, and fragmentation of approaches in planning and implementation would remain substantial. This would for example then entail the following consequences:

- due to lack of coordinated cross-sectoral effort the ambiguity of policy risk ownership between the EU and Member States is not solved;
- an operational, integrated EU-wide system for setting horizontal climate resilience objectives and targets, as well as robust progress monitoring and assessment with common indicators and baselines is not established.
- transformative push triggering increasing ambition and coherence of action across sectoral policies is not achieved.

EU sectoral policies and measures are underprepared as demonstrated in section 2.2.1 and Annex 10. While the sectoral policies consider the climate risks and resilience in varying degrees, they do have different approaches (see section 2.3.1.3). As a result, the risks in policy areas are projected to increase without further action.

At face value, the inclusion of some climate resilience dimension in a wide range of policies presents an impressive regulatory and policy lineup. At the same time, Annex 10 demonstrates that these are not currently ready to address the key elements of the initiative designed to address the problem drivers. Whilst the current policies will likely have some effect, the integration of climate resilience has so far progressed in a fragmented and incremental way, raising concerns about overall policy coherence, reflecting the lack of an overarching and coherent framework to guide action. Without a reference scenario for what climate reality to expect, these tools will also remain flawed and incomplete. In the baseline option, the policies at EU level are likely to continue developing in similar fashion, with expected improvements for example through the upcoming Multiannual Financial Framework and through European Semester:

- The July 2025 Commission proposal for the next Multiannual Financial Framework mentioned the need for EU funding to promote preparedness and resilience (also to climate risks) in the recitals

and objectives of the acts that will govern the different funds, including the National and Regional Partnership Plans[177], the European Competitiveness Fund[178], Horizon Europe[179] and the Union Civil Protection Mechanism[180]. The proposed horizontal Performance Regulation[181] lists intervention fields for dedicated climate resilience measures, and one of the three co-efficients tracking spending towards the overall 35% green target will cover climate adaptation. Specific decisions regarding criteria, including the simplified approach to the Do No Significant Harm and possibly climate resilience proofing are currently being discussed.

- The 2026 European Semester Package aims to boost competitiveness, secure strategic autonomy, increase resilience, and strengthen preparedness while maintaining fiscal sustainability. The Commission has concluded that enhancing climate resilience is among the key priorities to meet these objectives in 11 Member States, adding to other 9 Member States from previous years[182]. The EU Semester reports pinpoint specific climate resilience issues to be addressed in individual Member States, e.g. climate resilience governance, inadequate insurance, need for investments, climate-proofing of infrastructure, use of nature-based solutions, etc. Furthermore, these country-specific recommendations shall inform priorities of the future national and regional reforms and investments of individual Member States. The scope and coverage of climate resilience aspects in the Semester process depends on the relative urgency between policy priorities in the coming years.

However, although some existing instruments might continue strengthening climate resilience in their respective areas (for example through revisions of sectoral legislation), these developments are likely to be reactive to events and remain fragmented and sector specific. This approach will not ensure the required levels of systemic and coherent resilience and preparedness action (including anticipation, precaution, risk ownership, accountability, planning, resourcing, implementation and progress monitoring) across all policy areas. As there is no EU-wide framework to track and assess progress, availability of data remains scarce, making it difficult to assess sectoral and climate policies efficiency.

By 2050, if global warming exceeds 1.5°C (current projection indicate 2°C) and no additional policy action is taken, food prices in Europe could increase by 20%; and by 2041–2060, expected annual economic damages from pluvial and fluvial flooding are projected to reach approximately EUR 13–29 billion across Europe, representing an increase of 110–150% due to climate change alone, while the number of people affected annually could increase by around 150%.[183] In the longer-term, the proportion of EU citizens aged over 65 is projected to increase from around 19% today to approximately 30% by 2100 – which means extreme heat-related mortality in the EU may increase approximately tenfold under a 1.5°C global warming level, and by more than thirtyfold under a 3°C warming scenario.[184]

[177] (European Commission, 2025d)
[178] (European Commission, 2025g)
[179] (European Commission, 2025f)
[180] (European Commission, 2025h)
[181] (European Commission, 2025e)
[182] Climate resilience is a subject of country-specific recommendations (CSRs) for 7 Member States, and of recitals for another 4 Member States in 2026. Further 11 Member States have received CSRs on climate resilience in previous European Semester reports.
[183] (European Environment Agency, 2024)
[184] (European Environment Agency, 2024)

A similar picture emerges when forecasting trends at the **national level,** under a 'no policy change' scenario. Section 2.2.1 demonstrates that while there is some progress in policy and action for climate resilience in many Member States, policy approaches are fragmented and many sector policies in national competence are exposed, such as spatial planning, heat-health planning or public financial management (see section 2, Annex 9). There is limited direct and comparable information on implemented sector actions in Member States and their effectiveness, which hinders a full understanding.

Each Member State has adopted a national adaptation policy. Typically, environment or climate ministries are responsible for NASs and NAPs. Some Member States have also subnational climate adaptation plans, e.g. Belgium, Finland, Germany, Greece, Portugal and Sweden, but there is no systematic approach across the EU. Specific sectoral climate adaptation plans are not very common, with just four Member States reporting these (Finland, Ireland, Spain and Sweden).[185] Most countries highlight their adaptation policies as central instruments for mainstreaming. While Member States make effort to integrate adaptation in overall sectoral policies, based on the information available, it can be concluded that progress is uneven[186]. As of 2026, 14 Member States have incorporated climate adaptation into national climate laws.[187] There is limited direct and comparable information on implemented actions and their effectiveness, which hinders a full understanding of progress and challenges. Adaptation policies are diverse, fragmented and hard to compare and cross-evaluate with regard to objectives; specific climate risks to be addressed; governance structures; levels of horizontal and vertical integration; data sources, methods and models used, instrument mix; and outcome/impact progress monitoring[188].

Under a 'no policy change' baseline, it can be expected that Member State policy development and implementation approaches continue being fragmented and data on implementation and progress on climate resilience will remain limited. Disparities between Member States are expected to persist or widen, as some with stronger institutional capacity, data availability and financial resources may progressively adopt more anticipatory and integrated resilience approaches, potentially creating examples to follow, but others may remain primarily focused on short-term disaster response and recovery following extreme events, with limited capacity to implement long-term resilience planning.

The projected losses due to these incomplete resilience policies and preparedness vary across countries and models. SwissRE estimates[189] that in a severe scenario of a 3.2°C temperature increase, Europe would suffer the loss of about 11% of GDP before 2050. Economies such as Finland or Switzerland are less exposed (6%) than, for example, France or Greece (13%). Another estimate says that extreme weather due to climate change may cost Italy more than 5% of GDP in 2050[190].

In brief: the 'no policy change' baseline is not commensurate with the scale, pace and complexity of increasing climate risks. Put simply: doing nothing will cost us a lot. Whilst government policies and actions will evolve, bigger changes will likely happen only in response to acute crises and limited to the sectors or geographical areas affected. The continuation of today's climate resilience building and

[185] (Climate ADAPT, 2016)
[186] (European Union, 2025)
[187] (European Environment Agency, 2025c)
[188] (Bukowska et al., 2023; European Environment Agency, 2025g; Leitner et al., 2024; Zobeidi et al., 2025)
[189] (Swiss Re Institute, 2021)
[190] (Reuters, 2025)

adaptation efforts across the EU and its Member States can be expected to remain insufficient, largely incremental, fragmented, often coming too late and causing unnecessary costs.

5.2 Description of the policy options

Addressing fragmentation of preparedness for climate change impacts

Chapter 2 presented the overall problem of fragmented and insufficient preparedness of the European economy and society for climate impacts, which can be further broken down into P1- Fragmented climate resilience in EU and Member States, P2 - Unprepared private sector, and P3 - Unprepared populations. All of the problems are caused by very similar drivers, albeit to a different extent. It needs to be noted that as there are interlinkages between the problems, there will be also interlinkages between the proposed approaches.

The overall problem can be addressed through harmonisation and increase of the overall level of preparedness by ensuring that the minimum elements for achieving systemic climate resilience are delivered at all levels of government and across all policy sectors. To prepare for climate impacts it is important to understand first that they are the result of materialisation of climate risks. Since climate risk is a product of hazard, exposure and vulnerability, and the climate hazards are expected to keep increasing (see Annex 12), a forward-looking, anticipatory preparedness will mean lowering exposures and vulnerabilities. Also, to improve the level of preparedness, such actions need to happen at a faster pace than the projected hazard increases. To increase and harmonise preparedness, it is important that actors have a common knowledge about the future climatic conditions, the evolution of hazards, as well as an appropriate level of climate risk awareness and perception.

While talking about the preparedness of the European economy and society and it is important to distinguish here between **policy preparedness and physical preparedness/resilience**. Since EUCRA analysed **policy characteristics (policy horizon, policy readiness, risk ownership)** and translated them into **urgency classes**, it provided the **best available comprehensive proxy for policy preparedness.** The economic losses and fatalities data reflect **physical preparedness**. Policy and physical preparedness are closely interlinked, with policy preparedness being often a condition and a driver for physical preparedness. If addressed together, they can improve and harmonise the overall preparedness for climate impacts.

The initiative does not seek to resolve the physical preparedness problem by imposing direct climate preparedness requirements such as e.g. mandatory flood defences for 100-year flood event. Instead, it aims to **improve physical preparedness through enhanced policy preparedness at EU and Member State levels at all stages of the adaptation policy cycle**.

The adaptation policy cycle describes the main stages through which adaptation policy is developed, implemented and revised. In line with the UAE Framework for Global Climate Resilience, the cycle starts with **assessing climate risks and vulnerabilities.** This evidence informs the formulation of adaptation objectives and targets, and the identification and selection of priority adaptation measures, usually consolidated in an **adaptation plan.** The next stage is the **implementation of measures**, followed by **monitoring, evaluation and learning** to assess progress, results and remaining gaps. **The cycle is iterative**. New climate risk knowledge, lessons from implementation and findings from tracking progress inform the next generation of plans and measures. Each step is explained in detail under for e.g. the Regional Adaptation Support Tool, developed for the needs of the Mission on

Adaptation[191].The harmonised adaptation policy cycle between the EU and Member States would be built along the elements in Figure 3.

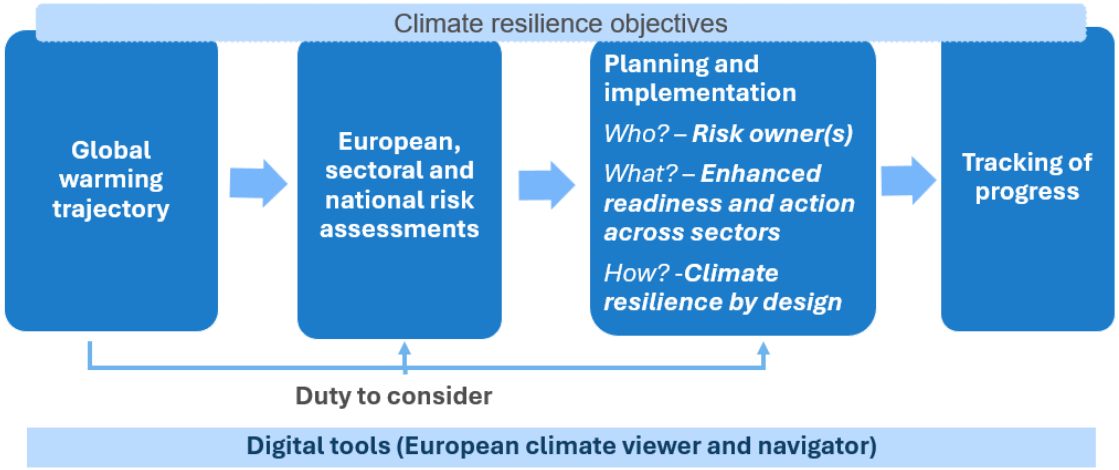


Figure 3: Harmonised adaptation policy cycle

The harmonisation of the adaptation policy cycle and providing digital tools to support its implementation will allow to address most of the drivers contributing to the identified problems. The general objective and desired ultimate effect of this initiative require both incremental and transformational approaches that build adaptive capacity and address root causes of vulnerability[192]. This requires systematic, consistent and effective policy decisions and measures across all levels of government and in all policy sectors, as outlined under 'outputs' and 'outcomes' in Figure 4.

To create the conditions for delivering these outputs and outcomes, this report has considered three policy options - each characterised by a distinctive set of main policy measures and reflecting different intensities of intervention and a different balance between mandatory and voluntary measures.

The initiative aims to address the main problems by dealing with their main drivers. Most identified drivers are underlying more than one problem, so dealing with them will allow to improve compared to the baseline. The drivers, and through them, the problems, can be addressed by a set of measures designed to: ensure a common view of the climatic future, which will be directly applicable to all policies; improve and harmonise the adaptation policy cycle in the EU and Member States, and enable and empower public and private actors.

To meet the objectives of the initiative (Chapter 4), a set of core elements (also reflecting the recommendations by ESABCC[193]) to improve policy preparedness for future climate risk has been identified:

[191] (Climate ADAPT, 2026
[192] (European Scientific Advisory Board on Climate Change, 2026)
[193] (European Scientific Advisory Board on Climate Change, 2026)

1. A **common vision and understanding** of strengthened resilience based on **clear climate resilience objectives**[194] and a "**duty to consider"**[195] requirement for **risk owners** to **reflect how these objectives are achieved in their decisions** in their respective policy areas, making their policies **climate resilient by design**. [196]

2. A **scientifically solid and reliable reference global warming trajectory** (Annex 12) **- from now on referred to as "reference warming trajectory"** - to provide a connecting element for decisions at all governance levels.[197] A reference warming trajectory for near, medium and long-term time horizons will be set, based on authoritative available scientific evidence and the precautionary principle. The trajectory may be updated when material, new information becomes available.

3. More aligned **national and EU assessments of climate risk to** provide evidence for climate risk management options **and improve the comparability of the risks under various climate scenarios** that may have transboundary or Union implications.

4. Based on the information provided by the climate risk assessment **the policy risk owners will be identified.** Risk ownership, in the EU adaptation context, refers to the distribution of responsibilities between public authorities for policy decisions (including implementation choices) that have the potential to reduce exposure and/or vulnerability to climate risks in their primary domain and for other policies. The risk ownership is policy, system and asset based i.e. a ministry in charge of a specific policy domain will need to consider the climate exposure of the policy, system or material assets in their policy remit. Such policy risk ownership is strongly related to accountability. It does not refer to or prejudge the ownership of financial risks, which are distributed across public and private stakeholders.

5. The policy risk owners will follow **the climate resilience by design** principle, which is part of the concept of Preparedness by design and means embedding climate resilience considerations into the design phase of EU legislation and policy decisions as well as investment and financing decisions. Climate resilience by design means reducing exposure and/or vulnerability under plausible future climates from the outset to the extent possible, thus enhancing readiness and action across sectors to ensure that increasing hazard events do not become unexpected crises. The approach is anticipatory and complements the disaster risk management measures that deal with the residual risks. (More details in Annex 11)

6. **The decisions on tolerable level of risk will be made by the competent authority** to balance competing policy objectives within practical constraints. The definition of risk will vary across policy areas and risk owners but should follow three steps: identify and characterise the hazard; assess the likelihood of its occurrence; and characterise the risk – quantitatively and if not possible, qualitatively[198]; identify the available measures to reduce the risk, and consider and document the decisions made regarding implementation of such measures, in light of national and context specific circumstances. These steps need to take into account information provided by climate risk

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[194] For example, this could be expressed in terms of reduction of loss of life and economic damages caused by climate change

Understood as requirement to consider the possible risks of the decisions under future climatic conditions, with the reference global warming trajectory as a baseline.

[196] 70% of the OPC respondents were in favour of identifying risk owners

[197] 70% of the OPC respondents were in favour of defining a common climate baseline trajectory

[198] As described in the Tool 14 of the Better Regulation Toolbox

assessments, other sectoral/policy evidence and latest available science. The decisions will also be informed by available fiscal space and other prevailing priorities.

7. **Common parameters for progress monitoring and assessment** to provide feedback on the efficacy of ongoing climate resilience and adaptation actions, and a basis for learning and improving.

The above elements, accompanied by the climate resilience tools and solutions, will address the identified problem drivers and enable the risk owners to design and implement their policies and plan investments and reforms. The ensure a logical progression from drivers and problems to outputs and outcomes, each policy option presented in the next section explicitly maps onto the intervention logic and causal linkages outlined in our Theory of Change. The analysis uses available evidence, including on the behavioural change.

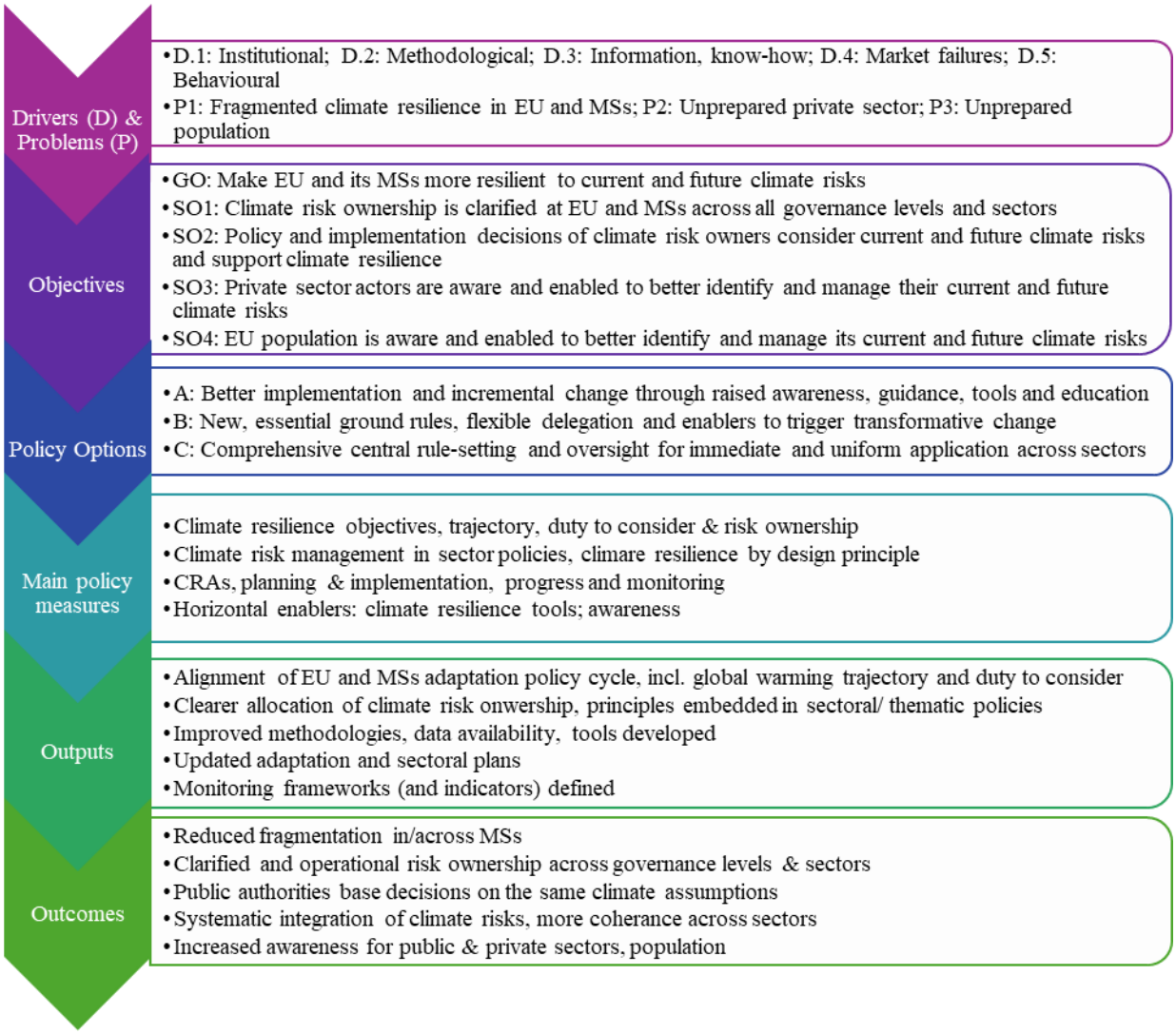


Figure 4: Intervention logic

5.2.1 *OPTION A: Better implementation and incremental change through raised awareness, guidance, tools and education*

This policy option combines measures to act on the identified problems without changing the existing regulatory or policy frameworks. It leverages on the informed self-interest of all actors affected by climatic risks as a motivator and driver for action. Therefore, all actors must be equipped with the appropriate information, support tools and non-regulatory incentives to make sound decisions on climate resilience and preparedness. This requires improving clarity and coordination by public authorities. Overall, this policy option **introduces new, non-binding elements** which provide signals to national, sectoral and transboundary actors with responsibility for climate resilience and adaptation.

Under this option, improvements to decision-making and the integration of climate resilience across sectoral policies and sectors will be recommended, but it would be left to the public authorities, at both EU and Member State levels, to decide on how and when to do so.

Under this option, the EU and Member States could voluntarily set out climate resilience objective(s) at EU/national level and include thematic targets from the Global Goal on Adaptation (A0) in EU and national sectoral documents. For example, DG AGRI and a national Ministry for Agriculture could consider integrating the thematic target for "proportion of area under management for food and agricultural production utilising practices and technologies relevant to climate change adaptation"[199] in their respective agriculture policies.

The Commission would develop guidance for both EU and Member State levels on how to identify authorities responsible for addressing climate risks (= risk owners) (A1) and how these risk owners could consider climate resilience in their policy and implementation choices (A2). For example, at EU level this would mean supporting DGs on how to use EUCRA for embedding climate risks into their sectoral risk assessments, along with providing good practices (linked to A12). Similarly at national level, the preparation of the guidance would facilitate common understanding, as well as could be used by national authorities in developing their measures to support sector authorities at national level.

To improve planning for current and future climate risks, the Commission would support the development of a reference warming trajectory to guide EU decisions and actions across sectors and could help national authorities to translate them into climate projections for national and subnational levels (A4). Member States would be encouraged, but not obliged, to define reference warming trajectory to guide their decisions and actions, while retaining discretion over the choice of trajectory and its operationalisation (A3). In addition to guidance on how to use the trajectory, there would also be guidance on how risk owners can systematically consider climate resilience in the implementation of priority sectoral policies (A5). No simplification of existing EU-level regulatory requirements on planning would take place.

The option also emphasises better implementation of existing EU legislation and governance processes. The existing planning, reporting, progress monitoring and assessment provisions of the European Climate Law and the Governance Regulation would remain unchanged. The Commission Guidelines on NAP/NAS would be updated (A6) (e.g. with the reference warming trajectory, climate resilience indicators) as further support for Member States for their climate resilience and adaptation planning, while continuing with the flexibility to implement and operationalise them to suit their needs. At the EU level, possible next EUCRAs would be carried out depending on the political needs and preferences and would be updated and further refined as needed (A7). For planning and implementation, two alternatives are considered at EU level: the development of a new EU climate resilience strategy (A10a) or no new EU strategy (A10b). Union and Member State level climate adaptation progress would continue to be assessed under the Climate Law and Governance Regulation, on the basis of current general obligations and Member State reporting. Findings will continue to be incorporated into the Climate Action Progress Reports and State of the Energy Union Reports under the Governance Regulation.

Another central element of this policy option is better access to existing knowledge and decision-support tools and sharing best practices. To support this, the repository of climate resilience knowledge on the Climate-ADAPT platform would be enhanced (A11). Under this option, two new open-access digital tools would be developed to provide easy to understand and use information on climate risks and how to address them. The navigator of climate resilience tools (A12) will be an interactive, searchable database to support and guide users exploring existing, trusted tools, covering EU, national,

[199] (United Nations Framework Convention on Climate Change, 2025)

transboundary and subnational levels and all steps of the adaptation policy cycle. The European climate viewer (A14) will translate the reference warming trajectory into concrete and spatially resolved climate hazard information, for e.g. showcasing what will a 2ºC warmer world in 2050 mean in terms of precipitation, heatwaves, etc in an EU country/region/municipality. Its main target audience are non-expert actors involved in EU policy-making and cross-border risk management and countries/regions which do not have appropriate climate risk tools.

As **all the above actions are voluntary**, public authorities at EU and national level retain the power to assess how and when to take action, making these decisions based on improved information, and using updated recommendations, guidance and new digital tools.

In this option, action in the private sector should emerge due to better information and awareness of climate risks and solutions for example through sector-specific communication campaigns in cooperation with EU umbrella organisations (A8), as well as tailored guidance to support the integration of climate risks into sectoral European standardisation activities (A9). There are no obligations on the private sector – but wherever the public authorities start identifying risk owners, implementing the trajectory, improve their climate risk assessments, indirectly the risk awareness and perception in the private sector should improve and trigger further action. For example, a construction company receives guidance for their sector, including on how to find information about the relevant climate risks; which trajectory is being used in the geographical areas where they are operating, and which digital tools are at their disposal to visualise climate risks. This information is then incorporated in their decision-making (including on investments), leading to a more anticipatory approach to climate risk management, and incentivising the development and use of solutions (e.g. early-warning systems, use of circular economy materials, use of anti-heat gear for outside workers), which can increase their productivity and competitiveness because of less business interruption and higher revenue retention.

As for the population, their awareness could be improved through implementation of the Preparedness Union Strategy chapter on population preparedness, and additional, EU-wide campaigns (A13), and the use of free, public digital services such as the improved Climate-ADAPT platform (A11), the navigator of climate resilience tools (A12) and the European climate viewer (A14).

Together with increased awareness, and the action taken by public and private sectors, the population's climate resilience should improve. As the measures under this Option rely on existing structures and the willingness and capacity of public authorities, the private sector, and the population, they can be expected to be implemented relatively quickly, within one to three years.(For detailed list of Option A measures, see Annex 13)

5.2.2 OPTION B: New, essential ground rules, flexible delegation and enablers to trigger transformative change

This policy option includes a limited set of new mandatory rules to overcome the identified, persistent barriers to long-term, precautionary climate resilience. These rules are intended to catalyse a step change in ambition and action by reorienting and aligning key policy and regulatory processes across the EU and Member States, through more uniform application. It combines a **targeted and proportionate legislative proposal with a broad set of enabling and supporting measures.**

Under this option, the proposed legislative framework would introduce a combination of binding requirements complemented by voluntary actions designed to trigger systemic change across governance levels and sectors. Even when establishing obligations, this policy option would leave

significant discretion to public authorities on how best to implement and operationalise these obligations within authorities' respective mandates.
The legislation would **establish a shared climate resilience objective** at Union and Member State level (B0) to manage short, medium and long-term climate risks to strengthen climate resilience. This includes a requirement to set **corresponding sectoral objectives**, and **where appropriate, quantified targets** in relevant EU and national legislation, strategies, and plans based on the Global Goal on Adaptation.

It would also **introduce a reference warming trajectory**, defined as expected global temperature increases over specific time horizons (B1), which would be required **to be used as a baseline** for the EU and Member States' policy decisions that weigh the expected benefits of the proposed actions in the context of broader constraints.

EU and Member States' authorities would be required, through the "duty to consider" to **ensure that policies, measures and investments relevant to climate resilience take into account the resilience objective**, make use of the reference warming trajectory, and **ensure that the residual climate risks[200]are tolerable**[201] (B2) This would be supported by **mandatory common parameters** for identifying risk ownership among public authorities and for assessing risk tolerance (B3). However, the legislation **will not determine neither EU nor national targets/ thresholds for tolerable risk**, as these are to be determined by each risk owner.

To ensure that public funding is efficiently and responsibly used in a way that supports minimising vulnerability and exposure, application of the climate resilience by design principle (B4) (definition in Annex 11) will be required. Application of climate resilience by design principle would also be required in the policy context when reviewing relevant EU and national legislation (B5). For EU policies broadly, this would mean using the Commission interservice mechanism/process for **attribution of risk ownership to the departments that are responsible for relevant policies** and for strengthening the climate resilience aspects. For a specific policy, such as e.g. infrastructure planning in TEN-T, it would mean analysing (on the basis of the relevant climate risk assessment) priority corridors through the lens of projected climate risks, assessing potential disruptions at a system's level and subsequently complementing (rather than replacing) the existing project-level climate proofing requirements.

The initiative would also strengthen requirement for CRAs. For the EU level, **regular EUCRAs would be codified in the law**, and both EUCRA and **national CRAs would have to meet minimum requirements** (e.g. regarding frequency, scenarios, time horizons and coverage of sectors). At both levels the CRAs would be required to use the reference warming trajectory as a baseline and consider more adverse scenarios (B6). National assessments would also be **required to address cross-border risks**, including those identified at the EU level (B7). The CRAs would identify major risks and present these by sectors and policy areas, and would identify adaptation options for managing these risks.

To make planning and implementation more coherent, and to operationalise Article 5 of the European Climate Law, streamlined and simplified common parameters and requirements would be set for climate resilience planning and policies, both at EU and Member State level (B8). The current

[200] Climate residual risk should be understood as the IPCC AR6 definition, consistent with the use of the residual risk concept in the Tool 14 of the Better Regulation Toolbox.
[201] The acceptability of risk should be determined by the risk owner, consistent with approach to the intolerable risks as presented in the Tool 14 of the Better Regulation Toolbox.

obligation for adaptation planning under the Governance Regulation would be **simplified** by removing requirements to address adaptation from NECPs and long-term strategies. Adoption of Union and Member State **strategic plans** on climate resilience, operationalising the common parameters and requirements would be required. The proposed Member State strategic plans would function as the equivalent of the current national adaptation strategies (NASs) and plans (NAPs) under the European Climate Law. In result, for Member States, this single plan would replace the current NAS and NAP. The mandatory common parameters and requirements within climate resilience planning would ensure that respective policies **consider climate risk management options in a way that residual risks remain tolerable, identify policy risk owners and adequately address transboundary climate risks**. Mandating a dedicated or existing authority in Member States to centrally coordinate climate resilience related policies would be proposed, while respecting the specific circumstances of Member States and the principle of subsidiarity.

For progress monitoring and assessment, Member State reporting on climate adaptation would be simplified, streamlined and improved under Article 19 as well as Annex VIII Part 1 of the Governance Regulation, and through removing redundant reporting requirements under Article 17, and streamlining others, such as the reporting on the use of the reference warming trajectories. Alignment and use of existing processes across policy areas would be improved (B9). A streamlined framework with a limited set of high-level indicators to assess collective progress at EU level would be established, alongside flexibility for Member States to develop national indicator sets. Commission would continue progress assessments under the European Climate Law and prepare regular progress reports.

To support the obligations set by the initiative, some additional voluntary elements are foreseen in this policy option. For e.g., guidance on how Member States could support regional and local authorities, including on applying the principle of climate resilience by design when mobilising private finance (B10), and digital tools. The Climate-ADAPT platform would be updated to reflect the key provisions (B12). As in option A, a navigator of climate resilience tools (A12), a European climate viewer (A14). The climate viewer will also support the practical implementation of the reference warming trajectory and CRA requirements. The Commission would also be encouraged to use this tool systematically in policy-making processes for relevant sector policies (B13).

As an illustrative example, Option B for the EU would mean that DG SANTE is the lead Commission service for prevention, preparedness and response to climate related cross-border health threats and emergencies like the emergence of dengue virus, West Nile Virus, chikungunya virus and other climate-sensitive infectious diseases. DG HERA, in addition, is the Commission service responsible for medical countermeasures. The European climate viewer would help both Commission services to identify regions where climatic conditions can be expected to favour the establishment and transmission of these diseases, thus supporting decision-making on prevention, preparedness and response measures. Deciding on the cost-efficiency, appropriateness and urgency of these measures, and on the tolerable residual risks would be left to the discretion of SANTE and HERA, subject to their expertise and mandate. Public health, including the responsibility and risk ownership for climate-related health threats, is a competence shared between the EU and its Member States.

At the same time, the risk ownership can be shared with EU-level frameworks, for example regarding electricity security of supply. At national level, a Member State can use the European climate viewer to visualise how a global reference warming trajectory would look like in different countries or regions (e.g. due to the asymmetry of exposure a 2°C reference warming trajectory can mean a 3°C local increase of temperature in a specific Member State and 4.5°C in another). The Ministry responsible

for energy, as the risk owner, would apply that trajectory when reviewing risk preparedness of the power grids. Drawing on EUCRA, national and sectoral CRAs, information from the European Network of Transmission System Operators for Electricity on transborder and regional risks, and local data, it would then assess tolerable risk levels and steer the investments proposed by the energy system operators accordingly – for example, whether to install a new power grid in a flood-prone area where costs are lower, accept higher future risk, or to invest more upfront in a lower-risk location.

In this option, no obligations are imposed on the private sector. However, there would be guidance on how to voluntarily apply key public-sector concepts, such as the reference warming trajectory or the principle of climate resilience by design (B11). To align with the latter, requests would be made to European Standardisation Organisations to climate-proof sectoral standards, covering both physical components and design processes[202]. This would introduce indirect compliance requirements for private actors to adhere to these standards, notably when related to harmonised standards[203].

The obligations imposed on public authorities (e.g. risk ownership, integration of climate resilience across sectors/ policies, use of the trajectory) are expected to have triggering effects on private entities, as they will want to align their decision-making with the EU and national levels. The OPC has showed strong demand for clarity on the public approach, to signal direction for private sector. As policies would increasingly address climate risks and the information will be more accessible through the navigator and climate viewer, the private sector can use those to better inform their own decisions and investments, manage their own climate risks, remain competitive and deploy climate resilient solutions.

As in Option A, the population awareness and empowerment to manage climate risks would be done through campaigns across the EU (A13), and the access to the digital tools. Combined with the more systemic action by public authorities, triggered by the obligations in the law, and subsequent shifts in the private sector, public trust could increase, and catalyse broader awareness and overall climate resilience in the population.

Under this Option, certain measures are voluntary and other are mandatory. The voluntary measures could be implemented relatively quickly, while the effects of the mandatory measures would likely only start to materialise after the entry into force of the legislation, which could be three to six years. (For detailed list of Policy option B measures, see Annex 13)

5.2.3 OPTION C. Comprehensive central rule-setting and oversight for immediate and uniform application across sectors

This policy option would result in a comprehensive and fully harmonised policy framework at Union level, with a strong compliance mechanism with possible penalties. **A legislative proposal would introduce an extensive set of binding provisions**, to be applied consistently across all sectors and levels of governance. It entails high degree of harmonisation and synchronisation of horizontal and sectoral climate resilience related policies and actions at EU and Member State levels, with the Commission playing a central role as coordinator, supervisor and enforcer. Both the European Climate Law and Governance Regulation would be amended.

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[202] A standardisation request by the Commission to ESOs is based on the Standardization regulation and is once accepted by the ESO considered as a contract that is binding for both parties.
[203] (European Commission. DG GROW, 2026)

The legislation would establish legally binding climate resilience objectives and targets for both the EU and Member States (C0).

To operationalise these objectives and targets, the law would also introduce the following obligations. For the EU, the establishment of a reference warming trajectory as in (B1). The law would set up common minimum requirements for Member States to translate the trajectory into nationally relevant climate projections (C1). The Commission would hold a central role in steering this process, coordinating scientific bodies and Member State authorities to produce consistent European climate projections aligned with the trajectory (C2). EU and Member State public authorities would be under a strict obligation to align all relevant policies, measures, and investments with the climate resilience objectives and the reference warming trajectory, ensuring the lowest possible level of residual climate risk (C3).

The law would define risk ownership attribution process and establish detailed, mandatory parameters for assessing the tolerance of residual risks for both EU and Member State public authorities (C4). Together with the obligation to apply the principle of climate resilience by design in public funding (as in B4), and requiring Member States to support regional and local authorities in mobilising private finance for resilience investments (C5), there would be a more uniform application and integration of climate resilience across sectors, policies at both EU and national levels. For the Commission, the current climate adaptation tool would be upgraded into a detailed, mandatory climate resilience check within the Better Regulation toolbox (C20). A specific example would be the Tool 14 regarding risk assessments, that already refers to climate risks and related aspects: a clear reference to the use of the reference warming trajectory, the use of the viewer, and the use of EUCRA and other risk assessments would be included. This would allow for all services to act in the same context and increase policy coherence.

Under this policy option, once the law enters into force, existing EU sectoral legislation and policies would need to be revised immediately to embed the climate resilience by design principle (C6). Following those sectoral provisions, they would then be translated for example in the European infrastructure design and equipment standards managed by the standardisation organisations.

The law would also introduce harmonised, mandatory methodologies for EU and national CRAs (C8). Roles for EU, national and sectoral assessments would be clearly defined in the law, to ensure alignment and coherence across governance levels, sectors and policies (C9). At the EU level, besides EUCRA becoming a regular exercise enshrined in the law (as in B6), it would be legally tasked to identify inconsistencies between national CRAs regarding transboundary risks, and to propose approaches to Member States on how to improve coordination (C10).

Planning and implementation would also follow a more harmonised and standardised approach. The 2023 Commission Guidelines on NAP/NAS would be upgraded to meet the new obligations imposed by the law, and its implementation would be assessed (C11). In addition to the common parameters and requirements for EU and Member States climate resilience planning (as in B8), the law would also impose an obligation to explicitly evaluate the tolerance of residual risks in the assessment of climate risk management options (C12).

For the Commission, all relevant policy sectors and services would be legally required to develop and implement dedicated sectoral or thematic strategies based on a common methodology (C13). For Member States, there would also be a requirement in the law to assign specific obligations to subnational authorities, such as the preparation of local climate vulnerability and risk plans, and the submission of local CRAs to inform national planning processes (C14).

For progress monitoring and assessment, the law would establish a fully harmonised system, which would cover EU, national and subnational levels and integrate data from across sectors (C15). To be able to meet with the climate resilience objectives at EU and Member State levels, a mandatory set of common indicators for EU and Member States would be enshrined in the law, with mandatory reporting to support a robust assessment of collective progress(C16). Assessment provisions of the European Climate Law and Governance Regulation would be stepped up, requiring more detailed reporting from Member States and Commission progress reports and recommendations.

At the EU level, the Climate-ADAPT platform would become the centralised, mandatory platform supporting the implementation, monitoring and compliance with the law (C17), and there would be an obligation for the Commission to systematically use the European climate viewer in all planning and policy-making processes (C18). For Member States, the law would introduce an obligation for them to integrate common climate resilience indicators into their public national digital tools (C19).

For example, at the EU level it could mean the following: DG MOVE is the risk owner for transport infrastructure and has to apply the obligations set up by the law. The DG would be required to develop and implement a transport climate resilience strategy, based on the common EU methodology, and incorporating the EU designated reference warming trajectory. It would have to revise the TEN-T regulation, to ensure it would include the trajectory, the duty to consider climate risks, and the obligation to embed the climate resilience by design. When doing this legislative revision, DG MOVE would have to use the European climate viewer to meet with the climate resilience check in the Better Regulation Toolbox. As risk owner, DG MOVE would also be legally responsible for ensuring that European infrastructure design and equipment standards (managed via standardisation organisations) are updated to guarantee the lowest possible level of residual climate risk for European infrastructure.

In this option, there is a **direct obligation imposed by the law to the private sector**. As sectoral legislations need to be revised at both EU and national levels (C6), these would impose **a direct binding legal "duty to consider"** climate resilience for private entities acting in those sectors/areas (C7). While the European infrastructure design and equipment standards updates follow the revised legislations, an indirect obligation would stem for the private sector, which would translate the principle of climate resilience by design into market requirements.

As obligations are imposed on public authorities (including at subnational level) and to the private sector, a consequent, more systemic improvement of the population's awareness of climate risks and on solutions to increase their climate resilience can be expected.

The implementation of this Option measures would likely only begin after at least six years, as it involves revisions to multiple pieces of legislation and introduces new obligations for both the public and private sectors. (For detailed list of Policy Option C measures, see Annex 13)

5.3 Options discarded at an early stage

Several policy options and measures considered during the preparation of this initiative were assessed early to be disproportionate, not feasible in the current policy context, insufficiently aligned with the objectives, or not delivering commensurate added value:

- Replacing current national, regional and local climate adaptation policies with a single European climate resilience law/framework – as decisions are often local or embedded in sector decisions, thus need to reflect the local value choices about tolerable levels of risk to be democratically

viable. Shifting responsibility to EU level would infringe the subsidiarity principle and lead to reduced effectiveness and efficiency.

- The creation of a large-scale, ring-fenced EU climate resilience fund to accelerate investment - while it could provide strong financial support and visibility to climate resilience and adaptation efforts, it was discarded due to concerns regarding feasibility, political acceptability and proportionality, including overlaps with existing and planned EU funding instruments.
- Measures to impose binding obligations on private sector actors, such as carrying out climate risk assessments, prepare risk management plans, or disclose specific climate resilience metrics - while potentially impactful, they would require substantial amendments to existing legislative frameworks (e.g. corporate reporting and due diligence rules) and go beyond the scope of this initiative.
- Binding obligations at regional and local level, including requirements for regions and local authorities to develop comprehensive climate resilience and adaptation frameworks, conduct climate risk assessments, and report regularly on implementation – this option was discarded on the grounds of subsidiarity and proportionality, as it would entail significant intervention in national governance structures and could impose disproportionate administrative burdens on local authorities, particularly in lower-capacity regions.
- The establishment of a comprehensive progress monitoring and assessment system covering EU institutions, Member States, regional and local authorities and the private sector - although such a system could enhance transparency and accountability, it was discarded due to the administrative burden it would impose across governance levels and sectors, and which was assessed disproportionate to the expected benefits.

6 WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

The assessment suggests that each of the three policy options, to varying degrees, can address the problem drivers. The intervention logic presented in Chapter 5 and Figure 4describe the expected channels how the measures contribute to achieving specific objectives, and how the specific objectives contribute to addressing the overall objective of harmonising preparedness to climate impacts and at the same time reducing the fragmentation of preparedness across the EU economy and society. The policy options are designed to help reduce the projected economic, social and environmental losses associated with climate change.

Key constraints in assessing and comparing the impacts of the policy options are linked to the uncertainties in projected futures, notably regarding climatic impacts, policy developments and implementation across sectors both at EU and Member States' level. **Another major constraint is the indirect impact** channel between the measures addressing problem drivers and the expected reductions in vulnerability and exposures to climatic risks, which is also delayed. **It presents a difficulty notably for quantifying the effects of the proposed three policy options, which would materialise often indirectly and over time**, through induced changes in public governance and overall decision-making, investment behaviour, and the action by businesses and the population. Also, separating the effects of individual measures from their combined overall impact is difficult i.e. the sum can be expected to be larger than its parts.

The projected climatic futures and their associated socio-economic losses are subject to a high degree of uncertainty and variability, but are considered to be subject to systemic, structural underestimation, as explained in Chapter 2 and Annexes 8 and 12. Recorded extreme climate-related events and socio-

economic impacts have increased in scale and frequency over the past decades. Model-based estimates of economic impacts have tended to be conservative as they do not capture the full range of damages or their cascades and compounding between sectors and regions. The climate tipping points are typically not modelled at all because of their complexity and uncertainty. As such, the potential benefits of avoided damages in the assessment are also conservative and likely to be underestimates.

Regarding policy developments, there is **limited direct scientific evidence**, and for the purposes of the assessment they are considered to continue as currently set. The Chapter 5.1 baseline is based on evidence (including EUCRA) that considers future broad trends, but assumes policy continuity, not a qualitative, structural improvement in how climate risks are addressed. As such, the future policies are considered to be neutral, which conceptually isolates the benefits of the policy options considered. The broad logical assumption is that if policies dealing with vulnerabilities and exposures remain the same, while the climatic hazards increase, then vulnerabilities and exposures increase. This assumption is made *inter alia* in the EUCRA assessment which concluded that policies are not keeping pace with the increasing hazards.

Reducing vulnerabilities to the current or expected impacts of climate change is done through climate change adaptation. The **cost of adaptation** can be assessed through several measures. One is the total expenditure dedicated to adaptation. Another one is the total investment needs, which refers to the level of investment required to implement all the measures described in a given adaptation plan (national, subnational, sectoral or other), where tagging the cost added because of the adaptation objectives is often difficult to assess. **Actual spending** consists of the expenditure mobilised for adaptation measures and tracked and categorised accordingly by governments, either annually or cumulatively since the beginning of the planning period.

When it comes to quantification, the **benefits of adaptation are commonly assessed by calculating avoided losses**, i.e. considering the avoided direct and indirect damage to infrastructure and assets and the avoided deaths and well-being losses, because adaptation measures mostly serve to maintain existing value, rather than generating new value. Such benefits are difficult to quantify for several reasons. Most importantly, **accounting for losses avoided because of adaptation measures is inherently counterfactual in nature**. As comparing the impacts of an event on two very similar assets in the same location is near impossible, **benefits need to be estimated or inferred on the basis of portfolio-level losses** experienced in a given event. Adaptation is highly context-specific, responding to local hazards, levels of exposure, and vulnerability factors – and adaptation needs may shift over time in response to climate change. The benefits of adaptation measures can be difficult to disentangle from other factors. In some cases, economically beneficial adaptation measures may already be being taken – but they may not be identified as 'adaptation' per se, since they are part of another project. Finally, the severity of physical impacts is one of the factors determining whether adaptation measures result in benefits.

The initiative addressed **most of the costs of adaptation and all of the benefits of adaptation indirectly**. Since it does not prescribe or determine individual adaptation decisions, it would not be sound nor feasible to assume specific implementation decisions across the range of actors. Therefore, for the purposes of assessing the **Options in the impact assessment, macro-assessments and sectoral assessments are used to act as EU-wide proxies for benefits of adaptation. For estimating approximative differences between Options, behavioural evidence regarding efficiency and effectiveness of different governance approaches is used.**

The benefits of adaptation also capture the effects on the local economy and the ancillary impacts of adaptation. These include reducing future risks, improving the productivity of unaffected resources

and people, boosting innovation by seeking solutions amid new challenges, increasing the environmental benefits and improving ecosystem services. The ancillary impacts of adaptation can be either positive (co-benefits) or negative (maladaptation) and may, or may not, include cascading effects. Co-benefits of adaptation include the positive effects on biodiversity, air quality, water management, greenhouse gas emission reductions, and health and well-being. The benefits of adaptation in terms of both climate extremes and slow-onset events — lowering climate change impacts, contributing to positive effects on the local economy and having other positive ancillary impacts — is often referred to as the 'triple dividend', with two types of benefits being reaped regardless of the disasters happening[204].

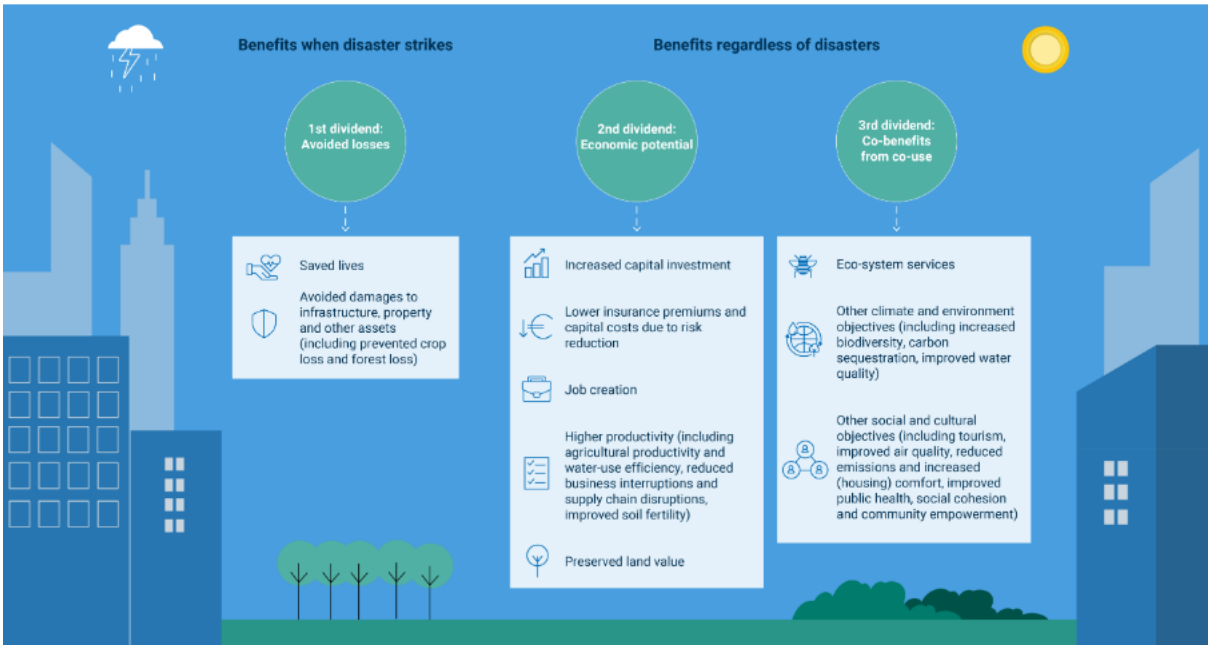


Figure 5: The 'Triple Dividend' concept[205]

For the reasons mentioned above, **it is difficult to quantify avoided losses and benefits of adaptation at a whole economy level.** Therefore, costs and benefits of the individual measures have been mainly characterised in a qualitative way. **Whenever possible, quantified costs and benefits are ascribed to measures and the policy options or examples of similar measures and their efficacy provided**. Notably, the monetised administrative burden of the envisaged measures was estimated using the Standard Cost Model. Also, each individual measure has been grouped for assessment within its broader policy option cohort, while some measures received particular focus. **Estimating the precise contribution of each policy option to improved EU resilience and overall preparedness is not possible, but illustrative examples (national, regional) are provided wherever available.**

Climate impacts will affect all economic sectors. Climate hazard exposure across a sample of 70 investment grade European companies is projected to rise about 23% from the 2020s to the 2050s.[206]

[204] (European Environment Agency, 2023; Global Commission on Adaptation, 2019)
[205] (European Environment Agency, 2026e)
[206] (S&P Global, 2026)

Sectoral climate losses outlined in chapter 2.1 (Table 1) provide a cost baseline against which investment needs may be weighted.

Any effective climate resilience building and adaptation action is likely to avoid significant expenditure and lost revenue. A recent report on the Assessment of Climate Adaptation Investment needs (prepared for the Commission) examined at an EU and Member State level the investment requirements to create resilient sectors by 2050(Table 2) provides the indicative benefit-cost-ratios for such investment, as documented in a wide range of studies.

Table 2: Adaptation Investment Needs at EU level to 2050[207,]

Sector	Annual investment (EUR bn)	Indicative BCR range
Infrastructure	29	Flood Prevention - **11.9:1**[208] Flood Barriers - **14:1**[209] [210] Coastal Protection - **15.6**[211]
Ecosystems	21	Nature Restoration Law potential **4 – 38:1**[212] Floodplain & Natural Water Retention Restoration **2.5:1**[213]
Food sector	11.5	Reclaimed water for nutrient management – **17.02:1**[214] Desalinated water for irrigation – **4:1**[215] While BCRs are difficult to calculate across the range of implementation measures EEA analysis of 51 farm transitions across Europe found that climate-resilient practices such as reduced tillage can deliver production **cost reductions of around 40%**, diesel savings of around 50%, and labour reductions of 25–30%, associated with lower dependence on external inputs and restored soil-water functions.[216] Farm transitions nonetheless require significant upfront investment, learning costs and can involve yield declines before returns are realised.
Health	7	Heat-health warning systems - **11–3,700:1**[217] Urban green infrastructure - **1.09–2.68:1**[218] Community green spaces - **2.15–4.27:1**[219] Residential retrofitting - **1.43–1.92:1**[220]
Economic & Finance	0.72	BCR evidence has not been quantified at scale as risk transfer and insurance product development returns are

[207] (European Commission. DG CLIMA et al., 2026)
[208] (World Bank Group, 2021a)
[209] (European Environment Agency, 2023)
[210] (European Commission. Joint Research Centre., 2020a)
[211] (COACCH, 2019)
[212] (Aubert et al., 2022)
[213] (European Commission. Joint Research Centre., 2020b)
[214] (Hurtado et al., 2024)
[215] (Hurtado et al., 2024)
[216] (European Environment Agency, 2026a)
[217] (European Environment Agency, 2023)
[218](Johnson et al., 2021)
[219] (Vačková et al., 2025)
[220] (Colclough, 2021)

Sector	Annual investment (EUR bn)	Indicative BCR range
		realised indirectly through avoided fiscal costs and faster economic recovery.
Defence & Security	1.5% of GDP.[221]	Gaps in data for the relationship between climate resilience, defence and security in Europe are consistently noted in official communications on the subject.[222]
Total	**69**	

The Table 2 illustrates that **the return on investment implies a strongly positive benefit-cost ratio at scale**, which is likely to carry through compiling these measures. **Most sectors show an immediate return on investment in avoiding the sectoral losses outlined above, while in some cases returns are only realised after an initial transition period.** Some - such as the high investment cost of ecosystems - are essential to optimising climate resilience in other sectors such as labour and agriculture through their cross sectoral adaptation and mitigation potential – mitigating flood and heat risk, supporting water management and agriculture. More details can be found in Annex 8.

6.1 Policy Option A

Option A forms an internally coherent package which is likely to improve the information, coordination and learning environment for climate risk management decisions across the Union, however it will not create a consistent operational duty to act. Because of the lower (and possibly delayed) uptake of the proposed voluntary measures, its **strongest effects are therefore likely to appear first in the form of better processes and more informed decisions** in the 2030s, and only later, and only partially, in the form of lower exposure, vulnerability and damages by 2050. **Benefits would be most visible among frontrunners and administrations with sufficient capacity,** while weaker actors may respond more slowly and to a lesser degree, so uneven uptake remains a defining feature of the option. It would be expected to provide quicker change than under the baseline in some areas, but does not guarantee that advised anticipatory approach, precautionary changes in policy and investment approaches are implemented evenly and on necessary scale across Member States and other actors.

EU added value

The positive impact of option A stems from improving the enabling environment for both public and private actors. Better information and guidance coordinated at EU level would support more efficient prioritisation of resilience measures and investment decisions, helping to reduce some avoidable losses and inefficiencies by 2050. **By defining climate resilience building and adaptation needs, roles and responsibilities based on evidence and targets, the EU added value lies in providing a common framing of risk ownership and an enhanced sense of duty to consider climate risks**. In terms of the harmonisation of climate resilience and preparedness, this would be an

[221] While this figure relates to resilience more broadly than in a climate context and is the agreed target of partners rather than specifically the EU, it is a useful proxy for this exercise: (NATO, 2025)
[222] (European Commission. Joint Research Centre., 2023)

improvement over the baseline, especially in areas where access to information and the adaptive capacity are limited because of uncertainty, lack of knowledge or lack of practical methods.[223]

Effectiveness

Option A is moderately effective, mainly because it can trigger action at a low formal burden, however its overall impacts depend heavily on voluntary uptake. Voluntary approaches tend to be most effective among already aware and motivated actors, while less-engaged groups are harder to reach and typically require additional support, incentives, and clear implementation pathways to convert knowledge into behavioural change.[224] The strongest effect of the Option A is likely to be at Commission level, where it is plausible that horizontal work on defining risk owners and organising capacity-building could be undertaken even without binding obligations. It can also be expected to improve administrative clarity in some Member States, especially those that already have relatively advanced climate adaptation frameworks and would have better basis and capacity to use the recommendation to further clarify horizontal and vertical responsibilities. This could however **potentially widen further the differences in implementation across Member States** and **increase the fragmentation of preparedness** as the ones that already have relatively better capacity would be more likely to adopt the voluntary measures[225]. **The positive impact of better information provision should not be understated.** A key driver of the failure of effective German response to the 2021 floods around the city of Cologne and the ensuing high death toll were related to issuing and understanding warnings, and a lack of information and data exchange between municipalities.[226] **Even under voluntary schemes the provision of greater information is likely, in some cases, to increase climate resilience** and lend to an anticipatory rather than a reactive attitude to climate hazards.

The effectiveness of Option A is lower in those Member States where climate adaptation governance and adaptive capacity remain weak. Under the baseline, Member States differ substantially in legal requirements, systemic risk approaches, and coordination capacity, and while many policies are co-owned, there is no common formula for attribution of risk ownership, either across sectors within Member States or between the EU and Member States. Because Option A only recommends action, **some Member States might either delay or partially engage**, meaning that fragmentation in risk ownership, accountability and uptake would persist. The **ESABCC explicitly states that the overall gaps in governance cannot be bridged by voluntary actions**, like the ones proposed in EU-level strategies alone, such as the EU Adaptation Strategy or the Preparedness Union Strategy[227]. It is likely that capacity constraints are a central determinant of outcomes. The European Environment Agency (EEA) notes that insufficient local capacity, limited funding, weak tools and unclear roles remain common barriers across Europe.[228] While Option A improves awareness, guidance and knowledge exchange, it **only partially corrects the baseline problem of unclear risk ownership** and provides weak integration of climate risk into decisions in the medium to long-term.

[223] (Runhaar et al., 2018)
[224] (Davids et al., 2021)
[225] (Davids et al., 2021; Maidl et al., 2015)
[226] (Fekete et al., 2021)
[227] (European Scientific Advisory Board on Climate Change, 2026)
[228] (European Environment Agency, 2025f)

The benefits of the supporting elements are also likely to be **overall positive but uneven**. A capacity-building and knowledge-sharing action plan through the improvement of Climate-ADAPT could be useful, especially for lower-capacity regional and local authorities, by reducing transaction costs and improving access to methodologies and examples. The provision of the navigator of existing tools and the European climate viewer will improve access to high-quality and policy-relevant climate resilience tools and enhance the understanding of future climate conditions across Europe for non-expert users. One example of the practical success of an information tool is the Klimaateffectatlas[229], used by most of Dutch local authorities, water bodies and provinces (80%) for their required risk assessments, and providing building-level data source for financial and real estate sectors for the Corporate Sustainability Reporting Directive (CSRD) and EU taxonomy obligations. A just resilience guidance could also improve policy framing. While these measures can increase awareness, knowledge and preparedness, evidence suggests that information and communication alone are rarely sufficient to drive behavioural or institutional change unless they are accompanied by practical support, resources and clear pathways for implementation[230], to overcome entrenched sectoral silos or weak national prioritisation. Therefore, it seems unlikely that they would overcome the fragmentation of preparedness in the Member States.

Option A is also unlikely to keep pace with accelerating climate risks. Uneven and delayed climate resilience building and adaptation tends to increase eventual economic costs and narrow available adaptation options. While Option A may improve implementation among willing and capable actors, it would not ensure EU-wide convergence in methodologies, baselines, planning or of implementation, but rather lead to further fragmentation and less coherence. **Investment is likely to be mobilised by greater information in those Member States with the most capacity to do so.** As a result, even if there would be progress, in the long-term it would remain fragmented across Member States and across sectors, failing to address systemic risks and limiting the climate resilience gains. Overall, A is likely to deliver **incremental governance improvements, but not a consistent Union-wide shift** in common understanding of future climate, clear allocation of risk ownership and harmonisation of preparedness.

Cost-efficiency

Table 3: Overview of costs/benefits for Option A

	EU level	MS level
Main direct costs	• One-off coordination/support studies likely < EUR 0.5 million; • Climate Resilience Navigator ~EUR 50 000/year; • European Climate Viewer ~EUR 30,000/year; • Possible capacity-building support benchmarked ~EUR 10 million/year (Mission Adaptation)	• Update of national CRA and NAS/NAP likely < EUR 1 million per MS • No additional/new mandatory reporting or compliance costs. • Large share of avoidable climate losses remains under baseline trajectory.

[229] (Climate Adaptation Services (CAS), 2026)
[230] (Hine et al., 2016; Márquez-García et al., 2018; McLoughlin et al., 2023a; Weyrich et al., 2020)

	EU level	MS level
Main benefits	• Improved EU-wide access to climate risk information, methodologies and existing tools • Stronger knowledge-sharing	• MSs who are frontrunners and take earlier voluntary action: improved preparedness and investment decisions; resilience investments with estimated BCRs of 1.6–5.7; flood warning systems may reduce infrastructure damage by up to 25%; heatwave warning systems show average BCR of 131; wildfire decision-support systems BCRs of 6–39.

Option A is likely to be cost-efficient in narrow budgetary terms, because it has **low direct implementation costs**. At EU level, the main direct costs are limited one-off coordination and guidance costs. Here the additional costs would depend on the extent to which the work would be externally contracted. If it is, **the one-off costs of procurement contracts would likely not exceed half a million euro**[231]. The cost of maintenance of the navigator of existing climate resilience tools is estimated to be approx. EUR 50,000 per year, including staff costs, such as desk review for additional and review of tools, updating the database and responding to user requests. For the European climate viewer it is approximately EUR 30,000 per year, which covers EUR 10,000 for user support, EUR 10,000 for technical maintenance and EUR 10,000 for data curation and documentation.

In terms of capacity-building, if implemented through an existing support vehicle such as e.g. the Mission Adaptation platform, costs could remain moderate relative to the potential benefits. The current Mission Adaptation budget dedicated to capacity-building for subnational authorities is about **EUR 10 million per year, which provides a practical upper benchmark for a substantial EU support mechanism.** For this level of cost, the measure could reduce transaction costs for subnational authorities, spread good practice, and accelerate action in frontrunner jurisdictions. For those who are yet to take action, costs will increase as impacts become more frequent, further increasing the fragmentation of preparedness across territories. However, the Mission Adaptation has been launched as a decadal effort in 2021, therefore any extension or replacement after 2030 is uncertain and, if it happens, it will entail additional cost.

At Member State level, additional costs would arise only where governments actively choose to undertake risk owner mapping and governance clarification. **There is not a lot of available data**, but assuming a Member State would update their national CRA and NAS/NAP, costs could be below EUR 1 million per country[232], if supported by external studies.

Option A does **not introduce any new planning, progress monitoring, or assessment or** mandatory indicator policy measure. Therefore, no specific related costs are expected to arise. Savings from better informed policy choices would however remain untapped.

Option A is only moderately cost-efficient in a wider economic sense, because the low implementation cost is matched by relatively limited and uneven delivery. While resilience investments often have high returns under Option A only part of this potential will be realised because the measures offer support but do not require authorities to act, therefore resulting in an uneven and

[231] Based on the assumption that a procurement contract would entail a study to identify risk ownership and support to developing guidance and action plans, at a contract value of EUR 500,000.
[232] For e.g. Spain national CRA (EUR 355,500; (Explorador de Gobierto Contratación, 2023))and Estonia (EUR 426,929; (The EEA and Norway Grants, 2026))

only partial uptake. **The main economic value of this policy option lies in reducing transaction costs, improving project preparation and encouraging earlier voluntary action**.

However, because of a voluntary nature and related lower uptake and/or lag in the implementation, a **large share of potentially avoidable losses would remain on the baseline course/path.**

Furthermore, while benefits may accrue to some early and advanced adopters in a scenario where adaptation pathways diverge across Europe, modelling conducted as part of the Debt Sustainability Monitor shows that **a non-uniform approach may lead to higher macroeconomic and fiscal costs overall.**[233] The local/regional variation of adaptive capacity is also likely to lead to inefficiencies. A study of the climate adaptation plans in over 200 urban areas in Europe showed that **inaction in some areas is detrimental to overall national adaptation actions and consequently to European adaptation as a whole**.[234] These results have been amplified by more recent studies which show that funding is uneven for climate adaptation both across European regions and the urban-rural divide.[235] An uneven implementation poses the risk that some of the weak links will not be addressed, therefore the systemic risks related to climate impacts may persist. The limitations of the "opt-in" approach Option A would not be able to overcome the systemic element of climate impacts.

Furthermore, this option is likely to produce **modest competitiveness indirect benefits through clearer signalling and voluntary action, however these gains would remain limited**. By providing signals, through action taken by public authorities, to support the development of a resilience solutions market, Option A would likely **stimulate some growth of the EU share in what is expected to be a global USD 4 trillion dollar market by 2050.**[236] However, while better able actors are likely to seize upon the advantages to competitiveness provided by better information and guidance, the lack of binding rules mean that growth in this sector in the EU will be piecemeal, restricted to regions most able to engage with resilience solutions, and private sector actors which either have very high risk profiles, or are already leaders in the field. **Very large protection and financing gaps would remain.** Somewhat better project preparation and awareness of existing tools could marginally improve uptake of available funding, therefore Option A represents **limited maximisation of the significant cost and investment opportunity offered by stimulating a resilience solutions market** as evidenced for example by the estimate rate of return on flood defence.[237]

Flood risk management accounts for the most extensively analysed set of adaptation investments in Europe, and consistently demonstrates high returns across a range of intervention types and geographies. JRC PESETA IV modelling, which is the most comprehensive EU-scale cost-benefit analysis of flood adaptation, projects that without action, annual river flood losses in the EU will grow from around EUR 7.8 billion today to nearly EUR 50 billion by 2100 under a 3°C scenario.

On coastal flooding, PESETA IV shows that optimised dyke improvements along Europe's coastlines could reduce projected 2100 annual coastal flood damages — which could otherwise reach EUR 240 billion under unmitigated climate change — by around 89–90%. This represents avoidance of between EUR 97 billion and EUR 216 billion in annual damages relative to a high-emissions scenario. Work

[233] (European Commission. DG ECFIN, 2026)
[234] (Reckien et al., 2014)
[235] (Venner, Olazabal et al., 2025)
[236] (World Economic Forum, 2025)
[237] in some cases, the benefit-to-cost ratio (BCR) of flood protection investments can reach as high as 120, meaning every dollar invested generates USD 120 in benefits (Flood Control Interantional, 2025).

conducted by COAACH to 2050 complements these findings.[238] Table 4 below shows the estimated damage mitigation of adaptation work on coastal and river flood damage as well as damage caused to transport infrastructure out to 2050:

	Damage	Cost of Adaptation	Damage Mitigation by Adaptation	Damage Reduction (%)	BCR
Coastal Flooding	EUR 115 - 310 B	EUR 14-17 B	EUR 87 - 266 B	76 - 86%	6.2 - 15.6:1
River Flooding	EUR 11 -18		EUR 6.4 - 10.3 B	58%	
Transport	EUR 954 -1147 M		EUR 562 - 645 M	56 - 59%	

Table 4: Estimated damage mitigation of adaptation work

Although the benefit-cost ratio modelling is limited to coastal flooding due to their estimation of the required costs, the potential for damage mitigation under what COAACH describes as "optimum" adaptation is considerable, consistently above 50% for these three areas and about 75% for coastal flooding damage specifically. According to this estimation, Option A risks to be below the 'optimum' adaptation level.

Targeted dyke strengthening and retention reservoir investment shows positive benefit-cost ratios across the majority of EU NUTS2 regions under a 2°C scenario. Country and city-level evidence confirm this picture across different infrastructure types and investment scales:

- **Portugal (flood prevention and nature-based water management):** BCR up to 11.9, returning nearly EUR 12 in benefits per EUR 1 invested. [239]
- **Vega Baja del Segura, Alicante (Spain):** An integrated flood protection plan recovered EUR 265 million in land productivity and avoided EUR 620 million in property damage. [240]
- **Lublin region, Poland (decentralised rainwater solutions):** BCR of 1.20–1.88 for dual installations and infiltration tunnels in commercial buildings.[241]

The case studies here illustrate what planned, well-designed flood protection delivers relative to its cost, as an example of direct measures from the initiative and follow-up intervention. **Climate resilience by design is the primary mechanism through which these returns are systematically captured (direct measure)**; without a duty to consider climate risk (direct measure) in infrastructure planning decisions, investment defaults toward reactive post-disaster repair, where the same evidence base shows costs are orders of magnitude higher.

The macroeconomic impacts will be uneven across sectors, regions, and Member States. France for example will need to increase its annual investment against climate change to EUR 127 billion by 2050, while Spain will need to input EUR 56 billion per year by the end of the same period.[242] Option A may lead to less than optimal return on investment for these expenditures and consequently to

[238] (COACCH, 2019)
[239] (World Bank Group, 2021a)
[240] (Ortuño et al., 2022)
[241] (Iwanek et al., 2023)
[242] (European Commission. DG ECFIN et al., 2025)

inefficiencies in climate resilience and adaptation when policies do not align across transboundary risks.

The benefits of limited intervention presented by the "opt-in" position of A are counterbalanced by the unrealised cost-saving potential represented by operationalised climate resilience and adaptation in Member States and sectors where adaptation is low priority. This not only has effects for Member States themselves but also knock-on effects for cross-border regions, transnational sectors and shared resources which limit the realised potential of climate adaptation efforts elsewhere.

Sectoral examples of the use of direct measures from the intervention

Agriculture and forestry: Better uptake of climate information, advisory services and planning guidance could modestly improve crop choice, farm management and drought preparedness in willing regions.[243] Decision support tools for and wildfire risk alerting systems may yield BCRs ranging from 6 to 39.[244] However, the substantial EU-level work on wildfire prevention know-how and early warnings has had limited impact, as demonstrated by the catastrophic 2025 wildfire season.[245] The Communication on Integrated Wildfire Risk Management[246] outlined an integrated approach to wildfire risk management and identified measures to support its implementation at both the EU and national level. Similarly, forest owners' awareness about climate risks cannot be expected to result in tangible adaptation actions.[247]

Health and wellbeing: Option A could modestly improve preparedness for heat through better awareness, earlier warning, and wider use of available planning tools[248]. The World Bank found heatwave early warnings to provide a mean benefit-cost-ratio of 131 (range of 48– 246).[249]

Infrastructure and the built environment: Relative to the baseline EUCRA range of around EUR 13-29 billion expected annual economic damage by the 2050, Option A could plausibly moderate losses by some percentage points over time. Better information and early warning systems for flooding could limit infrastructure and built environment damage by as much as 25%.[250]

Finance and insurance: Better information, clearer signalling and somewhat earlier voluntary action could help avoid a limited share of maladaptation and improve risk pricing and project selection in some sectors.[251] This would mean a modest reduction in avoidable fiscal pressure relative to the baseline, but not enough to change the overall severity category or the broad risk of widening divergence between better-prepared and less-prepared regions**.**

[243] (European Commission. Joint Research Centre. Institute for Environment and Sustainability., 2012)
[244] (World Bank Group, 2024)
[245] (European Commission. DG ECHO, 2026b)
[246] (European Commission, 2026a)
[247] (Sousa-Silva et al., 2018)
[248] (European Commission, 2025i)
[249] (World Bank Group, 2021b)
[250] (Commission of the European Union. Joint Research Centre., 2015)
[251] (OECD, 2024a)

Distributional effects

Social impacts are likely to be negative overall. In the absence of stronger incentives, obligations or support mechanisms, **lower-capacity households, SMEs, municipalities and lagging regions are less likely to prioritise resilience**, increasing the risk of reduced social protection and widening disparities over time. Significant cross-country variation is expected. The share of citizens who remain unable to act on risk information would likely stay high or unchanged.

In terms of environmental impacts, option A would likely improve only modestly compared to the baseline, without significantly altering ongoing ecosystem degradation or strengthening natural buffering capacity. Option A could help some authorities and land managers take more climate-informed decisions and better account for ecosystem vulnerabilities, transboundary effects and maladaptation risks. This would improve ecosystems which are degrading partly due to poor information or weak integration into planning and permitting. However, as this option does not impose any new obligations, and systemic change would be marginal, therefore broader trend of environmental degradation would not be reversed. In the long term, environmental impacts would depend on whether climate resilience is integrated effectively across sectors in a coherent way – otherwise, irreversible environmental losses would still remain.

6.2 Policy Option B

Option B would result in a more disciplined, harmonised and comparable governance cycle that begins to shape public and private decisions more systematically, with the most important downstream reductions in exposure and vulnerability emerging progressively rather than immediately.

Because Option B is the first package that establishes binding ground rules for how climate risks, residual risks, and climate resilience by design are treated in public decision-making, **its mid-century impact should be understood as materially bending the baseline expectations** rather than merely improving implementation marginally.

EU added value

Option B would reduce current fragmentation in climate resilience and preparedness while converting the growing body of knowledge into a more harmonised and operational adaptation policy cycle that would shape public and private decisions more systematically.

The delegated and flexible design of the option **preserves the agency of Member States for local specificities, while setting a common minimum framework for core processes**. Uniform application is likely to lead to significantly greater individual and Union level climate adaptation status, as Member States and stakeholders can build on the learnings of early adopters and draw on common practises. **The result of this common framework of both understanding and action is an increased efficiency and effectiveness**. Reduced divergence in methods, planning, monitoring and the promotion of a common terminology for communication would reduce duplications and contribute to simpler, more coherent reporting to the EU and within Member States, as well as for progress assessments. For example, the amendments to Council Directive 2011/85/EU on Requirements for Budgetary Frameworks of the Member States, adopted as part of the revised EU Economic Governance Framework, require EU Member States to assess and report from 2026 onwards, to the extent possible, on (i) how the macro-fiscal risks from climate change may affect the medium- and long-term sustainability of public finances (Article 9(2)(d)) – covering both the fiscal implications of climate

change impacts and of adaptation and mitigation efforts – and on (ii) disaster- and climate-related contingent liabilities and the fiscal costs of disasters and climate-related shocks (Article 14(3)). The Directive allows flexibility in the methodologies used to conduct assessments, acknowledging the diversity of existing approaches, and differences in data availability and country-specific contexts. The elements of the Integrated Framework, such as mandatory use of reference warming trajectory, harmonised national climate risk assessments and the availability of climate viewer, would support the assessments of climate change impacts on the sustainability of public finances by providing a common analytical basis (reference warming trajectory, climate risk assessments) and better access to location-specific data (European climate viewer).

Underlining climate resilience and adaptation through a common EU framework reduces the information costs required to make cross-border measures effective. Minimum obligations outlined in Option B contribute to establishing common expertise across shared landscapes, sectors and resources. This would enable administrative synergies to be fully exploited and reduce the risk that adaptation actions undertaken in one part of a transboundary riverine landscape is weakened by inconsistent or contradicting actions across the border.

Option B would not erase the differences in EU and national climate resilience and adaptation policies and risk assessments, but it would make it less plausible that weak performance would continue undetected over time.

EU added value is strong because **establishing a common duty to consider and shared parameters helps reduce fragmentation in how authorities define and manage climate-risks across the Union.** Member States would move from a mostly voluntary and fragmented process of climate resilience policy development to an anticipatory, more coherent but still flexible and contextualised process, with better informed tracking of progress. The harmonisation of the policy cycle will also allow for exchange of information, know-how and experience between the Member States, further underpinning the systemic and transboundary aspects of climate risk management.

Effectiveness

Option B is likely to be effective, because it changes the default expectation for public decision-making and addresses the common failure of long-horizon risks (climate, infrastructure) not being assigned to anyone. All Member States would need to engage in defining horizontal and vertical risk ownership arrangements. An example of how effective a clear attribution of risk ownership can be, is the Netherlands, where Delta Commissioner oversees the progress of the National Delta Programme, reporting annually to Parliament, and advising the government on climate adaptation matters, either on request or own initiative. The Commissioner owns the risk in a coordinating sense rather than a direct operational sense, which is more appropriate for a whole-of-government challenge, and it means that the effectiveness depends heavily on multi-actor cooperation. This model – clear risk ownership, structured accountability, cross-sector collaboration[252] – is the kind of approach the initiative seeks to trigger.

This Option also strengthens the interaction between Member States and EU on adaptation duties, because the allocation of responsibilities and the duty to consider would no longer depend on voluntary alignment. Improved and streamlined progress monitoring and assessment would better inform policy development and facilitate regular reviews and revision to drive continuous

[252] (Bloemen et al., 2019)

improvement. The option also tackles several operational gaps and fragmented approaches simultaneously. Establishing a requirement to decide about what level of residual risks is tolerable would improve consistency in decisions on where to adapt further and where to rely on insurance, compensation or solidarity mechanisms. **The operationalised climate resilience by design principle would push climate resilience upstream into public spending decisions,** reducing likelihood of the future damages and vulnerability of the assets**. Designing assets for resilience from the outset is substantially less costly than retrofitting after climate-related damages –** while e.g. at the infrastructure level climate proofing the asset during construction translates into average 3% cost increase[253], the post disaster reconstruction, including structural improvements, costs on average 35% of the cost of building a new house of the same size[254]. On top of this, the indirect costs of climate-related damage include avoided displacement and debris removal, loss of business or rental income, loss of life quality and productivity, loss of customers, supply chain delays, reduction in employment, costs to the public health system, tax base erosion, and loss of affordable housing. The transboundary cooperation and stakeholder consultation provisions would also support further harmonisation of climate resilience and preparedness.

Option B would also strengthen resilience to systemic and cascading climate shocks. Improved anticipatory governance and cross-sectoral planning would reduce fragmentation and enhance preparedness. It would significantly lower the risk that responses are dominated by reactive crisis management and distributional conflict, helping to preserve institutional capacity for preventive action, adaptation finance and coordinated responses, while supporting cohesion, solidarity and the functioning of the single market.

Option B is **expected to improve the consistency with which future climatic conditions are reflected** in investment decisions, infrastructure standards and risk management practices. It would also contribute to stronger cross-sectoral coherence and a more systematic management of climate risks compared to the baseline. The European climate viewer will support the uptake of the reference warming trajectory by providing its first practical implementation, making it readily accessible to all risk owners. Commission services are expected to be early adopters of the viewer, given their obligation to incorporate the trajectory into policy decisions at EU scale. As shown by the Klimaateffectatlas[255] reported in Option A, digital tools gain substantial traction when they are aligned and support compliance with regulatory obligations. A common framework for climate resilience building and adaptation is likely to have positive effects on the overall competitiveness of the EU, as it guarantees a baseline condition for resilience and adaptation technologies and solutions and ensures demand for those solutions. It would also support Single Market, as **Union-level standards and minimum requirements will have a strong positive interaction with the tenets of the Single Market and promote growth.** A common framework for climate resilience and adaptation action is likely to provide a solid foundation for innovative financial and insurance instruments that will aid the development of adaptation actions in the private sector, even though these are not directly regulated under Option B.[256]

[253] (Nicolas et al., 2019)
[254] (Collins et al., 2022)https://www.iccsafe.org/building-safety-journal/bsj-technical/how-much-does-resilient-housing-cost/
[255] (Climate Adaptation Services (CAS), 2026)
[256] (European Commission. DG ECFIN, 2024)

This option is likely to generate notable economic benefits compared to the baseline, as it would shape public and private investment decisions. **Investment in climate adaptation measures is likely to be mobilised effectively both by greater information, harmonised adaptation policy cycle and minimum requirements**. **Stable policy is essential for actors to invest**. Research has already shown how operational market architectures can for example help the EU, to translate water resilience objectives into investable outcomes.[257]

Option B should reduce avoidable macroeconomic losses relative to the baseline. A cautious assumption would be that, while climate-related losses remain in 2050, the baseline trajectory is materially moderated. For example, where the baseline points to annual coastal flood losses of around EUR 10.9 billion in 2050 under a moderate mitigation pathway and EUR 14.1 billion under high emissions[258], Option B could plausibly bring these down significantly if direct measures (such as climate risk ownership, duty to consider, use of trajectory) are combined with follow-up interventions (for example decision to build infrastructure which can withstand a certain level of water rise estimated until 2100, based on latest scientific data). The Dutch 'room for rivers' programme implemented between 2006 and 2015 reduced flood frequency and exposure, with benefits valued at around EUR 2 billion of avoided economic damage in case of breaching and around EUR 70,000 a year from reduced flood frequency.[259] In Denmark, the cloudburst flood management system to prevent surface flooding is providing approximately a net EUR 400 million in benefits.[260] The EUR 1.88 billion investment in the Integrated Rhine Programme has been calculated to prevent future flood damages of some EUR 41 billion in the German States of Baden-Württemberg, Rhineland-Palatinate, and Hesse alone.[261]

The overall economic impact of reducing fragmentation presented by Option B cannot be understated: a recent report advised that a fragmented approach to climate could lead to higher fiscal costs overall.[262]

Implementation quality will matter greatly. Evidence suggests that formal duties and consultation requirements can help shift decision-making practices, but meaningful change depends on clear responsibilities, leadership and organisational capacity. Without these enabling conditions, there is a risk that compliance becomes procedural rather than leading to substantive adaptation action.[263] The effect at EU level may also be smaller than at Member State level because some horizontal integration is already emerging in the current and proposed MFF architecture. Still, **Option B is likely to produce a broader, deeper and more durable change in governance practices, with benefits compounding over time** as risks become more systemic and cross-border.

Progressively more pronounced, this change would **result in lower residual damages, fewer long-term inefficiencies, and better preservation of productivity and fiscal stability** across the EU.

[257] (Victoria Edwards et al., n.d.)
[258] (European Commission. Joint Research Centre., 2020a)
[259] (Asselman et al., 2016)
[260] (European Environment Agency, 2023)
[261] (Ministerium für Umwelt, Klima und Energiewirtschaft Baden-Württemberg, n.d.)
[262] (European Commission. DG ECFIN, 2026)
[263] (Burnside-Lawry et al., 2016; Clark et al., 2025; Wehn et al., 2015)

Cost Efficiency

Table 5: Overview of cost/benefit for Option B

	EU level	MS level
Main direct costs	• One-off development costs for criteria, guidance, methodologies > EUR 1 million • Climate Resilience Navigator ~EUR 50,000/year; • European Climate Viewer ~EUR 30,000/year; • Policy cycle support package: EUR 4–5 million per cycle (includes EUCRAs, development of Union adaptation/climate resilience plan, and improved Commission progress monitoring) • Resilience by design public funding: ~EUR 15 billion over the MFF period (~EUR 2 billion/year based on a 3% climate-proofing uplift).	• Policy cycle support package : ~EUR 2–4 million per Member State, which includes: • national CRAs: ~ EUR 0.3 - 0.7 million per MS • national climate resilience policy ~ EUR 0.4 - 1.2 million per Member State • progress monitoring, assessment, evaluation ~ EUR 0.1 - 2 million per Member State
Main benefits	• Efficiency: Limits administrative burden by building on existing processes and reducing duplication and fragmentation. • Improved EU-wide access to climate risk information, methodologies and digital tools • Stronger knowledge-sharing • Policy coherence: Provides clearer, uniform market signals to investors and industry across the EU. • Market growth: Stimulates the EU climate resilience technology market (global market revenues projected to quadruple from USD 1 trillion in 2024 to USD 4 trillion by 2050)	• Better policy coherence, improved risk assessments which support better planning and implementation at national, transboundary and EU levels • 4:1 benchmark BCR for resilient infrastructure, yielding EUR 60 billion in lifetime benefits (avoided damages/disruptions). • SME & Public Finance resilience: Clearer risk data improves SME investment decisions and mitigates long-term pressure on public budgets.

Estimates of costs at EU level are based on the costs of comparable EU external contracts which, although undertaken at times for different purposes, are considered a reasonable proxy for estimating the likely costs of this policy Option.

The **direct administrative and adjustment costs** will mainly occur from integrating climate resilience and adaptation into planning and regulatory processes, which **will require analytical capacity and procedural changes**.

Option B entails some direct costs but is balanced in cost-efficiency terms. At EU level, the **one-off cost of developing** common criteria, guidance, and methodologies could be estimated at more than EUR 1 million.[264]

Option B seeks to align existing processes across EU sectors by building on what is already in place, rather than creating new procedures, thus helping to address current fragmentation and duplication. Even though some upfront costs are expected, the Option B would still aim at minimising administrative burden and overall costs by making better use of the already established planning and

[264] EUR 300,000 for EU Taxonomy Appendix C sectoral guidance (European Commission. DG ENV, 2024); EUR 630,000 for Pan-European fire safety mapping data and addressing data gaps (European Commission. DG GROW, 2019)

reporting processes. In so far as **sectoral policies** are concerned, the aim would be that sectoral departments of the Commission would consider the development and integration of relevant climate resilience reporting and indicators in their sector governance, as relevant. While this will ensure ownership within the sectoral policies, it also means that administrative and adjustment costs will be impact assessed within sectoral acquis and are not directly emerging from the initiative.

Direct costs at the EU level for a full climate adaptation policy cycle support package could be estimated at EUR 4 to 5 million per cycle.[265]

Activities include an estimated EUR 2 million for future EUCRAs[266], EUR 0.5 to 1.5 million for the preparation of a Union adaptation plan[267]. In addition, for the **EU-level indicator set**, costs would arise on the Commission and EU agency side to support development and harmonised implementation, but those would depend on the sets to be adopted and whether information sources are already available. A relevant benchmark is the EEA's Reportnet 3, the EU environmental e-reporting platform used to collect, quality-check and process hundreds of reporting dataflows: its set-up cost was EUR 3.5 million[268], with estimated annual operation/IT costs of around EUR 1 million[269]. **Union level reporting and assessments would continue within the existing setup under the European Climate Law and the Governance Regulation** tailored to the Option B, and would thus mainly require maintenance and incremental adjustments resulting from the review of the Regulation.

At national level, publicly available cost evidence is limited and uneven, as many Member States do not publish contract values or budgets for climate adaptation policy cycle work, particularly where tasks are delivered internally by ministries, environment agencies or research institutes. **The available evidence comes mainly from small to mid-sized Member States and may not be directly transferable to larger ones**, with more complex governance systems, federal structures or stronger subnational responsibilities.[270]

Direct costs at national level for a full climate adaptation policy package can be estimated approximately between EUR 2 million and 4 million in external technical assistance costs.[271] Activities include: national CRA procured externally between EUR 350,000 and EUR 750,000[272]; between

[265] Excluding internal Commission and EU agency staff time

[266] (European Environment Agency, 2024)

[267] EUR 572,000 for the Green Public Procurement (European Commission. DG ENV, 2026); EUR 600 000 for the EU Forest Strategy (European Commission. DG ENV, 2025b); EUR 750,000 for the Implementation of EU Water Legislation and Water Resilience Strategy (Opća bolnica 'Dr. Anđelko Višić' Bjelovar, 2024); EUR 1.8 million for assistance to the EU Nature Restoration Law and the EU Biodiversity Strategy for 2030 (European Commission. DG ENV, 2025a)

[268] (Task Force on access to information, nd)

[269] Based on EEA list of contracts 2021 - EEA/DIS/18/018 (EUR 1,080,000)

[270] The evidence base covers the last 15 years, rather than only recent years, because up-to-date public cost data are sparse. Older figures may not fully reflect current prices, inflation, higher analytical expectations or newer requirements. Finally, the estimates exclude internal public-sector staff time and do not cover the cost of implementing adaptation measures. They should therefore be read as planning estimates for technical assistance, analytical support work, IT development and policy cycle support, rather than as full costs of adaptation action.

[271] Including for e.g. establishment of a national knowledge platform, monitoring centre and additional analytical work.

[272] For a standalone and comprehensive national climate risk assessment procured externally, recent EU MS evidence suggests a defensible planning range of around € 350k - € 750k, based on Spain (EUR 355,500; (Explorador de Gobierto Contratación, 2023)), Malta (EUR 452,540, (National Audit Office Malta, 2025)) , Belgium (EUR 500,000, (Cerac et al., 2025)) , Netherlands (EUR 500,000, (Ministerie van Infrastructuur en Waterstaat, 2022)) and Ireland (EUR 754,627, (TED, 2024)) .

EUR 400,000 and 1.2 million for the development/revision of a NAP/NAS[273]. In terms of progress monitoring and assessment, costs are more variable: light indicator updates or basic reporting tools costs may range between EUR 100,000 and 300,000, while setting up a full national adaptation monitoring system may require EUR 1 to 2 million, with annual maintenance around EUR 300,000.[274]

Option B would also **indirectly drive additional costs (and benefits)** related to possible sectoral policy or implementation changes both at national and EU level, resulting from the consideration of climate risks in the decisions of the risk owners. Those costs (and benefits) will be assessed in the Impact Assessments conducted within the context of these revisions. Given that risk owners will need to weigh the costs and benefits of adaptation measures within their policy area, only the measures where long-term benefits outweigh costs would be taken, and therefore the outcome is expected to be net positive.

Sectoral aspects

Next to the administrative costs, the main cost comes from the resilience-by-design element in public funding, which would come in form of additional cost of climate-proofing when investing in built environment. To give an illustrative example, assuming a 3% average climate-proofing cost uplift[275] to 50% of the proposed EUR 2 trillion next MFF implies **additional resilience investment around EUR 15 billion over the MFF period, or about EUR 2 billion per year**. Using the benchmark benefit-cost ratio of about 4:1 for resilient infrastructure[276], **these indirect additional costs could translate into roughly EUR 60 billion in lifetime benefits** through avoided repair costs, fewer disruptions, lower maintenance, longer asset life and reduced stranded-asset risk. This is emulated by real world examples. Flood barriers installed in Prague after flooding in 2002 at a cost of EUR 146 million have been estimated to have saved more than EUR 2 billion in damage reduction.[277] Meta-analysis conducted by the JRC focusing on flood adaptation measures supports the considerable benefit to cost ratios of adaptation investment, as the following table shows.

Table 6: Return on flood adaptation investment[278]

Adaptation Measure	Return on Investment per EUR
Strengthening Dikes	EUR 2 – EUR 2.9
Flood Water Storage	EUR 2.9 – EUR 3.5
Building Protections	EUR 5 .20

Option B represents not only a significant cost-saving but also an investment opportunity by stimulating growth of a climate resilience technologies market in Europe, creating

[273] The strongest direct evidence points are Estonia (EUR 426,929; (The EEA and Norway Grants, 2026)), Croatia (EUR 770,000; (Republika Hrvatska. Ministarstvo zaštite okoliša i zelene tranzicije, 2016)), Latvia (EUR 1,035,629; (The EEA and Norway Grants, nd)), Portugal (EUR 1,200,275; (The EEA and Norway Grants, nd)) and Bulgaria (EUR 1,564,229.86; (European Commission, nd)).
[274] The best current benchmark is Finland, where updating the indicator base is estimated at EUR 250,000, while setting up a full adaptation monitoring system is estimated at EUR 1 - 2 million with annual maintenance of about EUR 300,000 (Finsih Government, 2024).
[275](OECD, 2024b)
[276] (Rising et al., 2026)
[277] (European Environment Agency, 2023)
[278] (European Commission. Joint Research Centre., 2020c)

competitiveness and innovation benefits. By establishing a common duty to consider climate risks (as projected according to reference warming trajectory) across all public investment and policy decisions, it generates long-term, predictable requirements for resilience products and services across every Member State simultaneously. The measures included in the Framework would create, indirectly, structural demand for resilience solutions e.g. for flood defences, heat-resilient urban cooling, early warning systems and climate-resilient infrastructure in transport and energy sectors. **Global investors estimate that annual revenues from climate resilience solutions will more than quadruple in size from USD 1 trillion in 2024 to USD 4 trillion by 2050**.[279][280]

While it is difficult to extract a potential European market share from these figures, there is a clear economic logic to the European growth in this space. Annual climate-related economic loses have reached on average EUR 45 billion since 2020.[281] **This creates a large adaptation investment gap and holds out the opportunity for growth, as European firms already operating in this space are well placed to take advantage of this gap and of the demand for climate resilience solutions. Providing clear and uniform policy direction as contained within the Option B signals to investors and industry that real and long-term gains are to be made** within this market, underpinned by clear policy signals. Innovative climate resilience solutions will protect businesses, create profits for the ones providing them, strengthen Single Market and drive further competitiveness and growth. Providing a uniform approach to climate resilience while still allowing for local innovation, Option B maximises the potential for climate resilience technologies in the EU.

Option B will have **indirect impacts on SMEs**, mainly through better policy coherence, improved information and market signals. The integration of the climate resilience by design principle into public funding and policies is likely to shape SMEs investment decisions, improved and more coordinated climate risks assessments will provide clearer information on sectoral and cross-sectoral risks, helping SMEs better understand and manage their climate risks. Many adaptation measures are inherently local and small-scale, from building renovations to local contracting for labour and infrastructure work, energy or risk audits, or provision of tailored financial or digital products and services. This necessarily creates opportunities for SMEs.

Option B is expected to **increase indirect short-term design and compliance costs, but the balance is likely to remain positive over time**. Furthermore, improved resilience of infrastructure, public services, health preparedness and public and private investment, would mitigate pressure on public finances.

Option B therefore appears cost-efficient over time, because it increases near-term compliance and investment costs, but improves the quality of expenditure and reduces future losses from maladaptation and poorly designed assets.

[279] (BloombergNEF, 2025)
[280] (World Economic Forum, 2025)
[281] (European Central Bank et al., 2026)

Sectoral examples of the use of direct measures from the intervention

Agriculture and forestry: Compared with the baseline, the trajectory of avoidable losses would be moderated. Option B could make agricultural adaptation more anticipatory and consistent, especially in relation to crop choice, irrigation planning, drought preparedness and advisory systems. Integrated fire risk management can strengthen fire suppression capacity even as the risk of wildfires continue to increase. From a longer-term perspective, over a quarter of Europe was found to be suitable for preventive land management strategies within areas of greater fire risk.[282]

Health and wellbeing: The broad EUCRA conclusion that heat stress becomes a critical risk by 2050 would remain, but the avoidable burden could be reduced materially. Considering the 1990-2019 period, fully implemented heat-prevention plans (including heat-health early warning systems and heat health action plans) might be associated with a ~25% reduction of excess deaths.[283] Heat-related mortality by 2050 could plausibly even be reduced by up to 77% compared to a baseline trajectory in integrated contexts, as evidenced from the uptake of similar programmes in France.[284]

Infrastructure and the built environment: Relative to the baseline EUCRA range of around EUR 13-29 billion expected annual economic damage by the mid-term, Option B could plausibly reduce losses by a large margin by 2050 under full implementation. Integrated flood management systems can reduce economic and infrastructural damage by as much as 70-80%.[285]

Finance and insurance: Option B would reduce climate risk more systematically across the wider economy and society and mitigate costs in insurance and financial markets. Identification of risk ownership is in fact expected to lead to innovative insurance products which will contribute to increased EU competitiveness.[286]

Distributional effects

Social outcomes are expected to improve compared to the baseline. **Embedding considerations of exposure, vulnerability and just resilience** into risk assessments, policy planning, progress monitoring and assessment, **would strengthen the abilities to identify risk owners and improve the basis for addressing distributional impacts**. This would help narrow protection gaps and facilitate targeted support for vulnerable cohorts which require it.[287] While some inequalities are likely to persist, as differences in implementation capacity across Member States and sectors may lead to uneven outcomes, the identification of these cohorts through the identification of risk gaps is still a positive step towards providing supports.

This would have a significant distributional effect for example on mitigation of climate driven hydrological disasters in regions across Europe. In the absence of climate adaptation, **such disasters are expected to cause a 0.7% negative welfare change expressed in GDP** under a 2°C scenario

[282] (OECD, 2026), In 2024 92% of fires were extinguished within 90 minutes in contrast to 79% in 2017 and in the context of a growing exposure to wildfires. (Neidermeier et al., 2023)
[283] (Urban et al., 2025)
[284] (Callahan et al., 2025; Urban et al., 2025)
[285] (Kok et al., 2005)
[286] (European Commission. DG ECFIN, 2024)
[287] (European Commission. Joint Research Centre., 2020c)

regional differences can vary significantly between 0.2% and 1.8%[288], primarily driven by drought. These distributional effects are supported by and explored further by work conducted by the JRC.[289] In some modelled scenarios, climate adaptation measures can **reduce the annual costs of damage in economic and human terms by 66%**.[290] The compounding effects of a uniform approach to climate resilience and adaptation means that there is potential for even greater cost saving and return on investment across regions.

Uninsured losses across regions vary significantly with 8% of economic losses in Spain between 1980 and 2022 uninsured, while less than 1% of losses were uncovered in Ireland and Belgium.[291] Parity of approach to climate resilience building and adaptation is expected to create more equal footing alongside innovate insurance and financial products because of the uniform framework.[292]

Environmental impacts would improve relative to the baseline, though not sufficiently to lead to immediate ecosystem recovery or to prevent all deterioration. The duty to integrate the climate resilience by design principle in public spending would support a more integrated and forward-looking approach to ecosystem management, encouraging public authorities to systematically account climate risks and long-term environmental pressures in planning and investment decisions.

For example, the integration of climate risks into decisions affecting land, water and infrastructure would not only reduce maladaptive practices, but also help ecosystem functions and services, enhance biodiversity resilience, and limit further degradation of natural habitats. This in turn could generate co-benefits across environmental, social and economic dimensions, including improved water retention, soil health and natural protection against extreme weather events. Transboundary natural resources, such as river basins, forest or coastal areas would also benefit from greater policy coherence and coordination. With a more systematic and coherent framework applied within and across sectors, some environmental degradation could be slowed, halted or partially reversed in the medium to long term. However, given the inertia of ecological systems and the already advanced state of degradation in certain areas, some degradation remains unavoidable.

6.3 Policy Option C

Option C forms the most centralised package. The cumulative effect of the measures would push convergence, comparability and formal integration of resilience across the Union more uniformly. Option C lies less in changing the direction of travel than in accelerating and standardising it. **Its positive impact trajectory by 2050 would likely be significant**.

EU added value

The EU added value of Option C has high potential to address transboundary risks, internal-market implications and shared principles for the use of public funding. **A stronger common framework can reduce fragmentation in how Member States define risk owners, tolerable levels of residual risk and climate resilience by design requirements,** while improving planning, progress monitoring and assessment and therefore comparability and enforcement across jurisdictions.

[288] (McDougal et al., 2021)
[289] (European Commission. DG REGIO, 2025)
[290] (European Commission. Joint Research Centre., 2020c)
[291] (European Environment Agency, 2025b)
[292] (European Commission. DG ECFIN, 2022)

At EU and Member State level, Option C would create strong governance architecture and prospects for robust implementation and **should result in uniform application across the Union.**

Effectiveness

This option is based on a strong coordination and convergence in climate resilience and adaptation policy. Member States would have to change their existing systems and align their future development with a unified EU model. **While this centralisation would reduce fragmentation and raise the ambition in the long-term** - especially in geographical areas where climate adaptation is currently less developed - **it also adds new responsibilities** to administrative systems. In some cases, this could limit the margin for locally appropriate approaches. Although direct evidence on harmonised EU-wide adaptation requirements is limited, behavioural research suggests that common rules can reduce uncertainty, clarify expectations and promote more consistent action across jurisdictions. However, governance evidence also indicates that obligations can remain procedural unless accompanied by sufficient administrative capacity, sectoral expertise and effective monitoring and enforcement arrangements.[293]

The direct and uniform integration of climate resilience into sectoral policies and legislation **would allow for sectors to be better prepared**, especially those strategically important and risk-prone (e.g. agriculture energy, transport). However, reviewing multiple sectoral legislation simultaneously would require adequate capacity and knowledge to already be in place across sectors, otherwise there would also run a risk of maladaptation or simply an administratively costly process that may not deliver on the objectives.

The option could accelerate the alignment of investment and planning decisions across the EU, reducing maladaptation and improving climate risk management more uniformly. Uniform operationalisation of the duty to consider climate risks would effectively mobilise investment in public administrations and have downstream effects for private actors. **If successfully implemented, these effects could translate into substantial reductions in residual climate risks** and long-term economic and human losses compared to the baseline.

Option C could deliver relatively uniform and robust outcomes, but they would depend heavily on sustained political commitment and administrative capacity across all Member States, as well as Commission's ability to monitor progress and propose and take corrective action.

[293] (Clark et al., 2025; European Commission. Joint Research Centre., 2025b; Rode et al., 2024; Wehn et al., 2015)

Cost Efficiency

Table 7: Overview of cost/benefit for Option C

	EU level	MS level
Main direct costs	• One-off development costs for criteria, guidance, methodologies: likely > EUR 1 million • Harmonised policy cycle support package: > EUR 4–5 million per cycle • Centralised progress monitoring and reporting: ~EUR 5 million	• Revision of NAP/NAS: ~ EUR 1.5 million per MS or more • Broader adaptation knowledge & monitoring platforms > EUR 3 million • High upfront operational/coordination investments for MSs setting up multi-level structures
Main benefits	• Legally binding integration of climate resilience across governance levels, sectors and private sector • Uniform methodologies, harmonised and consistent monitoring and reporting at EU level • Strengthened long-term investor confidence and reduced exposure to macro-fiscal/public finance shocks	• Overall return on investment potentially reaching as much as EUR 6 for every EUR 1 input. • Long-term: sectoral climate resilience improved, for e.g. avoidable heat stress burden plausibly reduced by 58–70% via harmonised indicators

Economically, this option is likely to involve significant upfront costs. This includes **direct costs at EU and Member States** level related to central planning, progress monitoring, assessments and compliance assurance, combined with multiple sectoral policy revisions, more detailed transboundary and consultation requirements and stronger private and public financing obligations. It would increase administrative and adjustment costs for public authorities and for businesses, including SMEs, especially in the short to medium term.

Under this Option, guidelines are transformed into legally binding obligations. While this ensures deep integration of climate resilience across EU and national policies, it requires structural changes.

Estimates of costs at EU level are based on the costs of comparable EU external contracts which, although undertaken at times for different purposes, are considered a reasonable proxy for estimating the likely costs of this policy Option.

At the EU level, the one-off cost of developing common criteria and methodologies for defining the level of tolerable risk could be estimated at more than EUR 1 million.[294]

The direct costs at the EU level for a full climate resilience policy cycle support package, highly harmonised, centralised and including sectoral plans, can be expected to increase in relation to Option B. Under this assumption, it could be estimated that these direct costs could be superior to

[294] EUR 300,000 for EU Taxonomy Appendix C sectoral guidance (European Commission. DG ENV, 2024); EUR 630,000 for Pan-European fire safety mapping data and addressing data gaps (European Commission. DG GROW, 2019).

EUR 4 to 5 million per cycle This package includes EUCRA[295], revision of the Union adaptation/climate resilience plan[296] and monitoring and reporting costs.

The harmonised, centralised reporting and monitoring of progress also carries additional direct upfront costs. Under this option, additional national and subnational data would need to be processed. While data on building such systems from scratch is limited, using the e-platform from the Governance Regulation[297] as a benchmark, the design and implementation of such platform would be around EUR 5 million, and annual maintenance costs between EUR 100,000 and 150,000.[298] .

At national level, publicly available cost evidence remains limited and uneven. As Option C requires a more ambitious revision of NAP/NAS, which includes subnational and sectoral dimensions, **Member States direct administrative costs** would also scale up.

Under the assumption that more complex governance structures would mirror higher benchmarks, based on the available information from Portugal[299] and Bulgaria[300], the revision and updating of NAP/NAS could be estimated at EUR 1.5 million per national revision cycle, but depending on the size and governance structures of each Member State, these costs could be higher.

Broader adaptation knowledge platforms and monitoring centre packages can exceed EUR 3 million (e.g. Romania[301]), if these usually combine MRE with strategy support, climate services, studies and institutional capacity-building.

Furthermore, the integration of climate resilience under this Option C would be harmonised across sectors. Once again, depending on the Member State, this will require operationalising an integrated, multilevel planning, monitoring and reporting structures at national and subnational levels involving further costs.

An example of an integrated policy cycle support, capacity-building and multi-level coordination is Greece's LIFE-IP AdaptInGR project, which required a budget of EUR 14.19 million over a 7-year period. It included the development of Greece's NAS and 13 regional adaptation action plans, capacity-building, coordination across governance levels, monitoring and evaluation and pilot actions in some regions and municipalities. Under Option C, Member States with more advanced systems would not require such a big upfront investment, but those who would need to set up such frameworks from the start, would need to do it in a shorter period of time, to be able to comply with their obligations.

Under Option C, the integration of climate resilience across sectors will be harmonised, and depending on the Member States governance and institutional organisation, adjustments to internal structures/ administrations might be required. For example, in the Netherlands, a Delta programme was established at national level, against high water and flooding, to ensure fresh water and robust urban planning. In 2026, development of strategy, knowledge products, monitoring and communication

[295] Based on EUR 2 million for EUCRAs (European Environment Agency, 2024)
[296] EUR 600 000 for the EU Forest Strategy (European Commission. DG ENV, 2025b); EUR 1.8 million for assistance to the EU Nature Restoration Law and the EU Biodiversity Strategy for 2030 (European Commission. DG ENV, 2025a).
[297] Which is made of two systems: Reportnet managed by the EEA and ReportENER managed by DG ENER
[298] (European Commission, 2024a; Trinomics, 2016)
[299] Approx. EUR 1.2 million (The EEA and Norway Grants, nd)
[300] Approx. EUR 1.6 million (European Commission, nd)
[301] (Ministerul Mediului, Apelor și Pădurilor, 2024)

activities under this centralised coordination mechanism required around EUR 2 million, and administrative and staff costs estimated at EUR 1.65 million.[302]

These **direct costs will vary across Member States**, depending on their existing policy baselines, specific administrative and governance structures, and geographic or population size.

Option C would achieve the lowest possible residual risk in the long-term. This is balanced with lowered cost-efficiency as bridging that gap at the margins becomes more difficult and consequently more expensive. **For competitiveness, Option C has mixed impacts**. On the one hand, it could strengthen long-term investor confidence and reduce exposure to severe climate shocks by forcing more robust planning and investment. On the other hand, it creates regulatory requirements which may exceed the administrative capacity of authorities and project promoters in the short term. Here the opportunity cost of stimulating demand and in turn helping mature a market for resilience solutions is limited by the loss of competitive innovation environment through an overly prescriptive approach. This could constrain the EU's competitiveness by limiting the effectiveness and efficiency of responses to climate-related damages.

Extensive and detailed regulatory frameworks may reduce competitiveness gains by disincentivising locally tailored solutions and slowing innovation. Given the significant variation in regional exposure and capacity, **a uniform approach that does not account for local conditions risks misallocating capital, increasing costs, and weakening the development of adaptive industries such as insurance, engineering, and climate risk analytics**. Reduced optimisation would see a reduction on the investment return, which may reach as much EUR 6 for every EUR 1 input.[303] In this context, **over-standardisation may lead to reduced asset efficiency and maladaptive investments, ultimately affecting negatively the EU's long-term growth potential and undermining its competitiveness in the face of escalating climate risks.**

[302] (Ministerie van Financiën, 2025)
[303] (European Environment Agency, 2026d)

Sectoral examples of the use of direct measures from the intervention

Agriculture and forestry: Avoidable losses could be moderated if Option C led to more uniform adaptation in agricultural and forestry systems. Prevention measures focused on the wildland-urban interface may have BCRs of 2-3:1. The addition of fuel breaks in forested areas had a BCR of 12:1.[304]. Local specificities, which are critical for finding the right balance between wildfire prevention and suppression, are difficult to address appropriately within Option C.[305]

Health and wellbeing: Option C would likely reduce heat-related impacts because harmonised climate and health indicators, stronger compliance requirements and more systematic integration of climate resilience checks would support earlier and more uniform preparedness across MS. The broad EUCRA conclusion that heat stress becomes a critical risk by 2050 would remain, but the avoidable burden could plausibly be reduced by approximately 58-70%.[306]

***Infrastructure and the built environment*:** Mandatory climate resilience checks, harmonised climate projections and stronger uniform integration across sectors would reduce the probability that new infrastructure and public investments continue to lock in avoidable exposure. Under Option C, coastal flood damage could be reduced by 76-86% with a BCR if 6.2-15.6:1. River flood damage could also be reduced by as much as 58%.[307]

Finance and insurance: Under Option C, the baseline macro-fiscal risk trajectory could plausibly be reduced, because, once implemented, it would force more uniform integration of resilience across sectors, raise the minimum level of action, and leave laggards less room to delay or underperform. This could further reduce the transmission of climate impacts into public finances through infrastructure, services, territorial development, productivity, insurance and wider financial spillovers.[308]

Distributional effects

Social, security and environmental outcomes would benefit from stronger and uniform obligations. As this option establishes a legal framework with a high degree of harmonisation and coherence of climate resilience across policies at EU and Member State levels, it could help reduce territorial blind spots, ensure earlier consideration of transboundary and cascading risks, and support a more systematic integration of social and environmental considerations. It could furthermore contribute to more consistent environmental protection levels across the Union, including transboundary resources. Option C has the potential to limit negative distributional effects which may occur under lower levels of intervention. The introduction of detailed parameters for assessing

[304] (World Bank Group, 2024)
[305] Depending on the local context, fire suppression can result in fuel accumulation on the ground and lead to more severe fires in the long run. Controlled burning – fighting fire with fire, known also as 'fore paradox' – is sometimes a more successful strategy. (Kreider et al., 2024)
[306] Evidence from the World Bank 2010), and the shows that adaptation effectiveness depends strongly on spatial and sectoral heterogeneity, and that uniform approaches can lead to inefficiencies and maladaptation. To capture this effect, a 10–25% range penalty is applied here.
[307] (COACCH, 2019)
[308] (United Nations Development Programme, 2025)

tolerable levels of residual risk would incentivise more precautionary and consistent management of natural resources. In the long term, these could enable coherent restoration and conservation efforts.

However, this option's benefits only materialise if the significant asymmetries in the relative burden between Member States are addressed. For example, while large economies such as Germany and France carry the highest absolute totals, smaller Member States such as Estonia and Latvia face investment needs exceeding 1.6% of GDP, compared to an EU average of 0.6%.[309] This raises questions of fairness and solidarity. Without prescriptive measures to address these disparities, some countries risk underinvesting in resilience, increasing vulnerability and potential reliance on assistance.

A highly standardised approach must be balanced against reduced flexibility for local arrangements. This may limit effectiveness in some contexts, as resilience measures need to reflect diverse regional and sectoral conditions. This could weaken local ownership and implementation in certain areas. Work has shown that uniform approaches to funding climate adaptation in urban areas tends to concentrate funding into specific early adopters while **leaving little room for local variation in climate adaptation measures**. The highly prescriptive approach[310] could stifle innovative solutions to climate change and work against the development of tailored financial products which will be required to finance more widespread climate adaptation. In sum, Option C could slow, stop and even reverse environmental degradation and impacts in the long-term, if the challenges in implementation are addressed.

7 HOW DO THE OPTIONS COMPARE?

This chapter compares the three policy options by evaluating their core measures.[311] This analysis focuses primarily on the short to medium term horizon (until 2050). However, given the topic, long-term considerations are also included for a more comprehensive comparison. All measures across the three policy options respond to the four SO of the initiative. However, their expected outcomes vary in terms of EU added value, effectiveness, cost-efficiency and distributional effects. Table 8 and Table 9 summarise this comparison.

EU added value

All three options generate EU added value, but to different degrees and through different mechanisms. Option A primarily adds value by improving the enabling framework for climate resilience, including guidance, shared tools and enhanced knowledge exchange. However, its Union-wide impact remains uneven, due to voluntary uptake, which lowers the level of implementation overall and preserves the fragmentation of preparedness for climate impacts. Options B and C strengthen the EU added value with the use of binding requirements. Option B establishes a common framework with binding minimum requirements while preserving flexibility for national and local specificities. A highly harmonised and centralised approach of Option C maximises convergence, comparability and enforcement, and is particularly effective in addressing transboundary and systemic risks, however it may raise subsidiarity concerns.

[309] (European Commission. DG CLIMA et al., 2026)
[310] (Venner, García-Lamarca et al., 2025)
[311] A detailed table with all measures per policy option can be found in Annex 13

Effectiveness

Option A is somewhat effective in the short term, as it can be implemented quickly but is limited in addressing the fragmented climate resilience in the EU and Member States. This is consistent with evidence that soft, behaviourally oriented measures based on "best effort" alone are insufficient to drive sustained action, and they should complement rather than substitute regulatory tools.[312] Even in scenarios where the risks are well known and understood, it is likely that with an "opt-in" scheme presented by Option A, some Member States and policies would continue with higher level of climate risk. It is consistent with the European Court of Auditors' findings after the 2018 wildfire in Greece, which carried a high death toll, that though a response capacity had been built and the risk well understood, not enough preventative action had been taken.[313]

In the long term, Option C has the potential to deliver the highest long-term effectiveness through uniform and comprehensive integration of climate resilience across sectors and Member States. However, as this option implies the biggest changes of public and private structures, including a fast increase in administrative know-how and capacity, and reduced flexibility to incorporate local conditions, its effectiveness in the short to medium term is lower than for Option B. Highly prescriptive regulation can also lead to a "one-size fits all" approach, compromised intervention and even maladaptation. A uniform approach to regulation risks promoting simplified measures, which neglect local conditions and become detrimental to both adaptation and cross-sectoral interaction.

By addressing key elements of SO 1 and 2, while allowing a flexible approach on the implementation across sectors and governance levels, and triggering an effect on the private sector and population, Option B leads to more systematic, anticipatory and coherent decision-making in the short to medium term, while also allowing for greater levels of tailoring at a local level, and generating increasing effectiveness gains over time.

Cost Efficiency and Competitiveness

The options differ markedly in their cost-efficiency when both short-term costs and long-term, direct and indirect benefits are considered. In the short-term, Option A is the least costly in direct budgetary terms, with limited EU and Member States expenditure required and low administrative burden. Both Options B and C involve upfront administrative, compliance and investment design costs, with Option C scoring higher due extensive harmonisation, regulatory changes and compliance requirements across sectors and governance levels.

When looking at the medium to long-term benefits, Option A is constrained by limited and uneven uptake, meaning that a large share of potential benefits from avoided climate damages and improved investments do not take place. While Option C can deliver substantial long-term benefits and lower residual risks, its cost-efficiency in the medium term is lower than Option B, due to higher administrative burden. Due to the slower implementation, the regulatory uncertainty of Option C might lower its effectiveness in the short to medium-term. Even if Option B has moderate direct short-term administrative and compliance costs due to adjustments to governance systems, planning, progress monitoring and assessment and integrating climate resilience by design in public expenditure, these

[312] (European Commission. Joint Research Centre., 2025b; OECD, 2017)
[313] (European Court of Auditors, 2021)

are outweighed over time by significant benefits, including avoided damages, economic potential (job creation, productivity etc.), reduced maladaptation and more efficient allocation of resources.

By providing a foundation for greater protection and more harmonised resilience actions, the framework is likely to indirectly underpin opportunities for European investors and industry to develop and deploy novel climate resilience technologies in Europe and beyond. Option B is the best placed of the three policy options to maximise this benefit and take advantage of this multibillion-euro market[314], with positive impacts on European competitiveness and creating an opportunity for the EU to be a world leader in resilience technologies.

The degree to which the initiative will impact competitiveness of the Union varies across the policy options. Option A's voluntary approach improves information but cannot create the stable, uniform policy environment that investors need to commit capital to climate resilience solutions at scale. Growth in the climate resilience solutions market under Option A would be fragmented; concentrated in the most capable regions and firms, leaving the broader market underdeveloped.

Option C is the only Option which addresses it directly, but risks the opposite problem in which over-prescription reduces the space for locally tailored innovation, may misallocate capital through uniform treatment of structurally different contexts, and could constrain the development of adaptive industries such insurance, engineering and climate risk analytics that thrive on differentiated local knowledge. The over-standardisation may lead to reduced asset efficiency and maladaptive investments, ultimately dampening long-term growth potential.

Option B is designed to navigate around both of these pitfalls. Its binding minimum requirements to public authorities provide the regulatory certainty that unlocks private investment while its flexibility preserves the space for differentiated locally appropriate solutions that are the source of European comparative advantage in many resilience sectors. The indirect result is a framework that:

- **Creates uniform demand** across the single market without crowding out innovation;
- **Provides stable policy signals** to long-term investors in resilience infrastructure and technology;
- **Reduces maladaptation risk**, improving the quality and efficiency of public and private capital allocation by respecting the subsidiarity principle and local circumstances;
- **Positions EU firms as first movers in global resilience markets**, with a tested domestic base to expand and export from.

Distributional effects

Under Option A, impacts are likely to remain uneven, as stronger Member States and actors are better positioned to act on improved information and guidance, while lower-capacity regions, municipalities, SMEs and vulnerable populations may lag behind. Even when awareness of current and future climate risks is improved through enabling measures, such as awareness campaigns or improvement of existing climate resilience tools, socioeconomic disparities are maintained and can widen in the long-term. It is likely that the benefits of an initiative which relies on information and guidance will apply to those with the highest climate literacy rather than those most in need, in turn leading to a widened resilience

[314] (McKinsey, 2025b)

gap between societies and population cohorts.[315] Consequently, the lost potential of this distributional gap would lower the overall impact of the increased measures across the EU.

Both Options B and C improve distributional effects by embedding risk ownership, a reference warming trajectory, improved planning, progress monitoring and assessment and just resilience into legal frameworks. The clearer allocation of responsibilities and more systematic integration of climate risks enable better identification of protection gaps and support more targeted measures for vulnerable groups and regions. While differences in implementation capacity may persist, overall disparities are expected to narrow over time making both of these an improvement over Option A.

Table 8: Comparison of the policy options

Measures	SO addressed	Option A		Option B		Option C	
EU Added value							
All measures combined	SO1, SO2, SO3, SO4	+		++		+++	
Effectiveness							
		Short/med	**Long**	**Short/med**	**Long**	**Short/med**	**Long**
Climate resilience objectives, trajectory, duty to consider & risk ownership	SO1, SO2	+	+	++	++ to +++	++	+++
Climate risk management in sector policies, climate resilience by design	SO1, SO2, SO3	+	+	++	++ to +++	+	+++
CRAs; planning & implementation; progress and monitoring	SO1, SO2	+	+	++	++ to +++	+	+++
Horizontal enablers	SO2, SO3, SO4	++	++	++	++	+++	+++
Cost-efficiency & competitiveness							
Climate resilience objectives, trajectory, duty to consider & risk ownership	SO1, SO2	+	+	++	++	- to ++	+ to +++
Climate risk management in sector policies, climate resilience by design	SO1, SO2, SO3	+	+	++	++	- to +	+
CRAs; planning & implementation; progress and monitoring	SO1, SO2	+	+	++	++	+	++ to +++
Horizontal enablers	SO2, SO3, SO4	+	+	++	++	++ to +++	++ to +++
Distributional effects							
Climate resilience objectives, trajectory, duty to consider & risk ownership	SO1, SO2	-	(+)	+	(+ to ++)	+	++
Climate risk management in sector policies, climate resilience by design	SO1, SO2, SO3	-	(+)	+	(+ to ++)	(+ to ++)	(++)
CRAs; planning & implementation; progress and monitoring	SO1, SO2	-	(+)	+	(+ to ++)	+	++
Horizontal enablers	SO2, SO3, SO4	- to +	(+)	+	(+ to ++)	+	(+ to ++)
Summary comparison of options		+	+	**++**	**++ to +++**	+ to ++	+++

Option C offers the strongest potential for uniform and equitable adaptation outcomes across the Union in the public and private sectors, as binding and standardised requirements reduce territorial gaps and ensure better long-term environmental safeguards, however it risks limiting local innovation in climate

[315] For example EU initiatives aimed at providing information and guidance on retail financial instruments: (European Commission, 2023c)

adaptation actions in some instances. Overly prescriptive policy which introduces uniform treatment risks widening the gap between Member States by failing to consider individual contexts, misallocating resources and negatively impacting climate resilience capacity building. Past examples show that overprescription in other policies areas has previously led to economic divergence within the EU and required subsequent policy reform.[316]

Option B facilitates concrete support through information, guidance and specified indicators (which must be adhered to) while also allowing for local initiatives to address climate resilience gaps. As a result, it has the most positive distributional impact, narrowing the gap between Member States, societies and population groups.

Cross-sectoral impacts

Overall, Option A is easiest to adopt, but it is the least transformative. While Option C strongly addresses all SO and would provide significant positive direct impacts, its rigidity and the significant administrative capacity needed for timely implementation makes this unlikely to be practicable. Option B, although more modest in addressing SO 3 and 4, would ensure that SO 1 and 2 prompting action by public authorities operationalised more quickly in the short to medium term with downstream impacts on the private sector and population.

Option B consistently fares best when compared across a range of expected sectoral impacts.

While research on the cost-effectiveness of climate resilience and adaptation measures is inherently imprecise, context specific, and under-researched, Annex 13 (Table 5) shows some examples of available evidence in sectors such as health, agriculture, forestry and flooding to provide indication of the scale. These estimates are given as ranges and averages because they depend on policy details, how things are put into practice, local conditions, and differences between policy sectors. The initiative does not prescribe such sectoral decisions. There are specific local, national and EU processes in place to determine appropriate policy actions and investment decisions.

For example: on wildfires[317], the Commission has put forward a Communication on integrated wildfire risk management[318] and the Council has adopted recommendations that represent current political distribution of responsibilities and potential actions at EU and national level, indicating that decisions on management approaches are defined at national level. The Framework cannot know such choices, and therefore will not assume specific, sectoral policy decisions to be applied across the Union. Instead, it assumes that if the decisions are based on appropriate understanding of climate risks when weighing costs and benefits of the risk management options, they are likely to lead to more resilient choices before events.

With these caveats in mind, the evidence supports the conclusion that across the three policy options, Option B appears to be the best formulated to address both current and future climate risks and make the EU and its Member States more climate resilient.

[316] For example: uniform industrial emissions reductions burdens were noted to disproportionately impact certain member states and certain regions (COM(2019) 640 final)

[317] See also for policy mix https://civil-protection-knowledge-network.europa.eu/eu-overview-risks/natural-disaster-risks/forest-fires-wildfires

[318] (European Commission. DG ECHO, 2026a)

Table 9: Comparison of the policy options – more detailed overview with examples

*Examples of key sectoral/ thematic impacts in the table below are based on Table 5 from Annex 13

	Option A	Option B	Option C
Direct Admin costs	**Very Low** • **EU:** One-off studies < EUR 0.5M ; Navigator & Viewer EUR 80k/yr total ; support ~€10m/yr . • **MS:** < €10M for voluntary update NAS/NAP and CRA; no new mandatory compliance costs.	**Moderate** • **EU:** criteria < EUR 1M; EUR 4–5M/cycle support; EUR 2B/yr public funding; Navigator & Viewer EUR 80k/yr total ; support ~€10m/yr . • **MS:** EUR 2–4M per MS for national policy package (incl. CRA, NAS/NAP, Monitoring)	**High** • **EU:** criteria > EUR 1M; > EUR 4–5M/cycle support; • **MS:** revision of NAP/NAS > EUR 1.5M; boader adaptation knowledge and platforms > EUR 3M
Time until Full Operation	**~ 1-3 years** Quickly implemented but limited in long-term scope.	**~ 3-6 years** Operationalised quickly enough for immediate impact.	**More than 6 years** Slower implementation creates near-term regulatory uncertainty.
Short-to-Medium Effectiveness (Until 2050)	Relies on voluntary "opt-in," leaving many areas at high risk.	Drives systematic, anticipatory, and coherent action across sectors.	Hampered by heavy structural shifts and capacity lag.
Long-Term Effectiveness (Post-2050)	Soft, "best effort" measures fail to drive sustained action.	Generates increasing gains as tailored local actions scale over time.	Uniform integration offers maximised theoretical protection.
Distributional Fairness	Favors highly capable regions; vulnerable areas lag behind.	Balances minimum mandates with space for local needs.	Reduces territorial gaps but risks uniform misallocation.
Examples of key sectoral/thematic impacts*	**Fragmented & Modest** • **Health & wellbeing:** Early warning BCR of 131 but lack of unified approach lead to heterogeneous outcomes . • **Floods:** Information can limit damage by up to 25% . • **Wildfires:** Support tools yield BCRs of 6–39; limited systemic/EU action so far. • **Agriculture:** Better uptake of climate information can lead to modest improvements in drought preparedness in willing regions.	**Optimised & High-Value** • **Health:** Heat-related mortality by 2050 could be reduced by 77% compared to a baseline trajectory • **Floods:** 83% of flood damages avoidable with certain adaptation measures; BCR of 8.3–14.9 at EU mean • **Wildfires:** Wildland-urban interface measures may have BCR 2-3, and with fuel breaks BCR of 12 . • **Agriculture:** N/A	**High Protection at High Cost** • **Health:** Greening of 35% of EU's urban area - net benefits EUR 364 bn through reduced cost of cooling • **Floods:** ~95% coastal flood impacts avoidable via harmonised methodology . • **Wildfires:** Compromised by failure to address critical local specificities . • **Agriculture:** 8% water savings annually at EU level, based on best national application efficiency.
Core Trade-offs	**Upfront Savings vs. Unmitigated Losses:** Saves administrative budget today, but leaves a massive share of avoidable climate damage to occur under the baseline trajectory.	**Investment vs. Flexibility:** Costs moderate capital upfront to gain regulatory certainty, unlocking private markets while preserving space for local implementation	**Centralised Control vs. Rigid Inflexibility:** high upfront costs with later entry into force, short-medium economic losses not avoided; and suppresses local innovation/ implementation.
	Outputs/Outcomes: MSs fragmented approaches continue as establishing trajectory/ assigning climate risk ownership is voluntary; improvement of availability of tools but usage varies; awareness and capacity gap widens across the EU	**Outputs/Outcomes:** trajectory and climate risk ownership embeded, and harmonised methodologies/reporting reduces duplications and fragmentation across MSs and incentivises single market for climate resilience; improvement of awareness of risks and solutions, which also triggers action for private sector and population	**Outputs/outcomes:** maximisation of EU-wide convergence but creates a rigid "one-size-fits-all" approach that causes over-standardisation; harmonisation of methodologies/reporting guarantees comparability but generates severe admin burdens; awareness increases for public, private sectors and population

8 PREFERRED OPTION

Overall preference for policy option B

Based on the analysis in chapters 6 and 7, **Option B 'Setting new, essential ground rules, flexible delegation and enablers to trigger transformative change' is identified as the preferred option.** It is expected to be the most effective for reaching the GO - making EU and Member State economies and societies more climate resilient – producing overall better impacts across all time horizons, and at the same time for improving the achievement of the SO.

This option is most likely to generate the urgent transformational action needed for tackling the projected short to medium term climate impacts, and for enhancing the Union's capacity for preparing and coping with the expected longer-term warming levels and their consequences. By bridging these immediate needs with future adaptive capacities, Option B mirrors the progression of short-, medium- and long-term outcomes defined within the underlying Theory of Change and using the behavioural change evidence to support assumptions.

The **EU-wide use of a common reference warming trajectory, the clearer attribution of climate risk ownership** (each supported by 70% of the OPC respondents), the creation of a general **duty to consider climate risks,** and the requirement to prepare **regular and harmonised climate risk assessments** (OPC support 65%) would, in the short to medium term, prompt more systemic and consistent government action along the entire adaptation policy cycle, and provide a stronger public sector mandate and greater discipline in climate risk and opportunity management.

The inclusion into the law of a **common reference warming trajectory** for climate risk management decisions would be an **essential element**. It would ensure more consistent public policy and action across all sectors and levels of government, supporting infrastructure appraisals, guiding risk assessments, informing planning and implementation, and providing a basis for monitoring and progress tracking. Geographically, it would provide a minimum standard to be 'more climate resilient together', enhance comparability across borders, strengthen cooperation, and improve policy coherence between Member States.

The completion and strengthening of the adaptation policy cycle will also include **improved and simplified monitoring, progress tracking, reporting and learning at national and EU levels,** to allow adjusting policies and decisions over time to the evolving climatic situation, improving results, increasing the level of preparedness, and ensuring democratic accountability.

Overall, these regulatory elements would reduce the fragmentation of public policy action on climate resilience, integrate climate resilience more consistently in government action, and systematically improve public and private decision-making. To help the public sector put them into practice, Option B would also include a **strong capacity building and enabling effort** marked by peer-to-peer learning mechanisms, best practices exchanges among Member States, and the provision of **dedicated digital and other support tools** (like the European climate viewer), would contribute to this outcome. Over time, this would progressively reduce exposure and vulnerability to rising climate hazards.

The new, harmonised adaptation policy cycle will apply to EU and Member State authorities, ensuring that all relevant sector policies contribute to climate resilience 'by design', from the outset. However, the resulting more systemic and coherent set of public policies would over time also have **major beneficial effects on economic and societal actors at large**. For instance, they would create a fast-growing demand for climate resilience solutions in the housing property, construction and renovation

sector, opening vast commercial potential and new markets, and protecting people and assets better against climate impacts such as the devastating June 2026 heatwave. Another example would be the better comparability of climate risk assessments across countries, which would help multinational businesses take investment decisions and decide on their location strategies.

Better regulatory certainty and policy harmonisation would **support innovation and investment in climate resilience products and services, including in SMEs**, as better risk management and fewer climate losses would at least partly offset the higher costs (see Chapter 6.2). This shows a favourable balance between burden, avoided losses and competitiveness.

Policy uptake, implementation and compliance assurance will not just rely on enforcement measures but they will be the product of increased levels of awareness of climate risks, more clarity on public authorities' responsibilities, better democratic accountability, hands-on support tools, limited yet clear reporting and assessment provisions of the Governance Regulation and the European Climate Law, with structured and phased technical dialogues between the Commission and Member States along the adaptation policy cycle for early feedback and timely corrective action.

The benefits from the climate risk management decisions and the increased policy coherence generated by Option B can be expected to outweigh the moderate administrative and technical costs over time, making this **overall a cost-efficient option**. Improving methodologies and coordination of CRA would create moderate costs, that would be offset by better targeted investments and reduced maladaptation risks. Similarly, moderate costs for better planning and implementation would bring more efficient adaptation investments and better allocated resources, improving competitiveness. Upfront costs for improving progress assessments and monitoring, whilst being higher, would guide necessary adjustments and allow cost-efficient decisions, supported also by progress reports prepared by the Commission. The availability of digital and other support tools would also strengthen decision making, create climate resilience across all policy sectors, and enhance competitiveness.

Option B is **cost-efficient over time**. It not only increases near-term compliance and investment-design costs, but brings efficiency gains and lowers resource needs thanks to more coherent and uniform application, including across policy sectors, improves the quality of expenditure and reduces future losses from maladaptation and poorly designed assets**.**

Compared to a more prescriptive, top-down approach, Option B is also expected to pay **more attention to subsidiarity** by ensuring **greater national ownership** and allowing **much better flexibility** to match actions and decisions efficiently to specific (sub)national conditions and needs. For example, economic considerations may drive action in some contexts, while social or environmental values are more influential in others. Option B would thus enable Member States to match the implementation of the new ground rules with their administrative systems, sector structures, and territorial and climatic conditions. Effectiveness would still be ensured because, compared with the baseline, climate resilience policy and action in Member States would move from a partially voluntary and fragmented approach to a more systemic, harmonised and disciplined but still flexible and adjustable one.

Effective implementation of climate resilience policies depends not only on policy design but also on institutional capacity, coordination and organisational readiness. Evidence indicates that an "all-of-society" approach demands clear roles and responsibilities, enhanced coordination and robust capacity-building in public administrations.[319] Therefore, **the most advantageous approach is to also**

[319] (Clark et al., 2025)

include some elements of options A and C into the overall preferred Option B - based on the relative advantages of their assessed impacts - to take advantage where these offer higher flexibility, faster delivery, more behaviour change and better implementation. Table 10 summarises the final design of the preferred policy option.

Some measures from Option A were thus included for their proven **effectiveness in driving behavioural change**. For example, information campaigns work best when delivered by credible messengers, paired with emotionally engaging messaging and backed by practical support.[320] To ensure real impact, these measures must be embedded in decision-making and paired with clear expectations. However, soft policies like these should support, not replace, regulatory action. [321] At the same time, some measures from Option C were included to make the key aspects of Option B more immediately operational. (see Table 6 in Annex 13 for more details)

How this option addresses the identified problems and problem drivers

This option will set new requirements for EU and the Member State levels. Importantly, these **go beyond the scope of the current –fragmented and insufficient - climate adaptation policies**, requiring **strong transformational action across all relevant policy sectors**, addressing the identified problems in an efficient and cost-effective way.

Introducing common climate resilience objectives, establishing a reference warming trajectory and duty to consider, accompanied by clear attribution of risk ownership can be **expected to address several problem drivers simultaneously**. By creating a common understanding of future climate conditions across the Union, the methodological barrier of unclear vision, objectives and indicators is addressed, thereby **contributing to addressing Problems 1 and 2**. Attribution of risk ownership could help overcoming the institutional barriers.

Climate risk management measures (e.g. climate risk assessment, adaptation plans) in sector policies, accompanied by climate resilience by design principle will support further incorporation of future climatic conditions into policies and investments, **address the climate risk assessment barriers**, as well as **information and know-how barriers**. Climate resilience by design would systematically lower the vulnerabilities of built environment, including by climate-proofing and better spatial planning. Taken together these measures could further support incorporating climate resilience in asset valuations, improve insurability and address to some extent overall market failures. Climate risk management approach would operationalise anticipatory and preventive resilience action, thereby addressing, albeit to a different extent and sometimes indirectly, all three identified problems.

Climate adaptation planning and monitoring, to be undertaken by public authorities, will further **address the institutional, methodological, information barriers and market failures**. They will be accompanied by enablers, such as European climate viewer, which should give the private sector and the population both the information on the hazards, as well as tools that would support them in their own planning and decisions. The availability of information on future climate impacts through the EU climate viewer will support better risk awareness and perception also among the population. The just resilience angle would ensure the vulnerable groups are supported.

Based on the types of policy measures, balancing clarity with flexibility, and the distribution of competences, the most suitable delivery mechanism for achieving the SO (chapter 4) is a

[320] (Hine et al., 2016; McLoughlin et al., 2023b)
[321] (OECD, 2017)

combination of a proposal for a Regulation, complemented by a Commission Communication, with possible complementary guidance to support the Regulation if needed.

Table 10: Overview of preferred option

Core elements	SO	Policy measure(s)	Union / Commission operationalisation	MS operationalisation	Drivers addressed	Intended result / output
Climate resilience objectives, trajectory, duty to consider & risk ownership	SO1, SO2	B0, B1, B2, B3, C12	- A common Union objective is set, which is applied by the Commission to all relevant Union policies and decision-making processes - Commission uses the common trajectory as a reference point for future climatic conditions in policymaking and implementation - Through internal coordination, lead services for key risks are identified within the Commission (risk ownership)	- MSs define their own but aligned corresponding objective(s) - and possible targets, tailored to their national circumstances - MSs use the trajectory as a reference point for future climatic conditions in national policymaking and implementation	- Institutional, policy and governance barriers: policies not reflecting future climatic conditions; unclear, overlapping, incomplete climate resilience governance at EU & MS levels; unclear climate risk ownership - Methodological, evidence and informational barriers: unclear vision, objectives, targets and indicators	- Shared understanding (e.g to reduce loss of life and economic damages) - common vision on what the purpose of action is - Common understanding and consistent consideration of future climate conditions across the Union - Clear allocation of responsibilities and democratic accountability
Climate risk management in sector policies, climate resilience by design principle	SO2, SO3	B2, B4, B5, B10, B11, C13	- The principle is implemented across sectoral EU policies, which take into account the trajectory, so current and future climate risks are considered	- MSs identify responsible ministries, agencies, or other public authorities which are key policy risk owners, and decide on tolerable residual risk and solutions to address climate risks (risk ownership)	- Institutional, policy and governance barriers: policies not reflecting future climatic conditions; unclear, overlapping, incomplete climate resilience governance at EU & MS levels; limited integration of climate resilience in sectoral decision-making processes; unclear climate risk ownership - Methodological, evidence and informational barriers: climate risk assessment barriers; progress monitoring and assessment barriers - Information and know-how barriers - Market failures	- Common concept to ensure consideration of climate risks in policies and for operationalising anticipatory and preventive resilience action across sectors at Union and MS level
CRAs, planning and implementation; progress and monitoring	SO1, SO2	B2, B6, B7, B8, B9, C12	- EUCRA is conducted to identify key risks to EU policies and possible management options - Commission develops a EU adaptation plan to address identified risks across and within policy areas, based on information provided by the EUCRA and complemented by sectoral climate risk analysis, and other tools (e.g. climate hazard viewer) - Commission monitors implementation and progress using common KPIs, indicators and streamlined reporting approaches - Progress monitoring and assessment results inform future EU coordination, policy evaluations and revisions, and planning updates	- National climate risk assessments are conducted using common parameters and methodologies, and are complementary with EUCRA - MSs prepare or strengthen their national strategies/plans/strategic plans addressing identified risks, based on national climate risk assessment, sectoral climate risk analysis, the EUCRA, and other tools (e.g. climate hazard viewer) - MSs progress based on revised reporting requirements under the Governance Regulation, establish national indicators, while seeking alignment with the KPIs - Progress monitoring and assessment results inform policy evaluations and revisions of national strategic plans and adjustments in implementation of	- Institutional, policy and governance barriers: policies not reflecting future climatic conditions; unclear, overlapping, incomplete climate resilience governance at EU & MS levels; limited integration of climate resilience in sectoral decision-making processes; unclear climate risk ownership - Methodological, evidence and informational barriers: climate risk assessment barriers; climate adaptation planning and design barriers; progress monitoring and assessment barriers - Information and know-how barriers - Behavioural failures	- Comparable and coherent identification of climate risks, including transboundary ones. - Structured, anticipatory and proactive management of climate risks. - Comparable progress tracking across the Union. - Continuous improvement of climate resilience and adaptation governance
Horizontal enablers	SO2, SO3, SO4	A12, A13, A14, B12, C18	- Commission uses climate viewer to inform planning and policy-making processes	- MSs population and private sector use climate resilience navigator to understand which tools are at their disposal - Population and private sector can use viewer to inform their planning and policy-making processes	- Information and know-how barriers - Behavioural barriers	- Increased awareness for public and private sector, and population - Improved data and tools availability and accessibility

Core legislative framework

The assessment shows that the current baseline, notably the legal framework established by the European Climate Law and the Governance Regulation are not sufficient to address the overall problem.

The Governance Regulation was designed to support planning for and tracking progress with climate and energy targets, thus its sectoral focus is centred around energy and climate policies and reporting. Harmonising preparedness for climate impacts at the EU and Member States requires proper climate risk management across a wide range of sectors. Therefore, a climate risk-based governance model that addresses sectoral preparedness gaps and cross-sectoral coordination would be more effective (more details in Annexes 10 and 14).Reflecting the severity of the potential consequences without further action, the limited feasible scope and chain of impact that the Integrated Framework would address, the time delay of seeing the impacts of Option A would mean running behind the increasing risks. Therefore, targeted legal proposal is needed to speed up progress and get ahead of the increasing risks.

The proposal will establish a forward-looking common legislative framework with **a shared objective for the EU and Member States to manage short, medium and long-term climate risks to strengthen climate resilience (B0).**

To reach this overarching objective, the EU and Member State will be required to take the necessary actions and measures. Member States will retain flexibility on how to develop and operationalise national objectives, provided these remain consistent with and contribute to the EU-level objective. **It will also require the setting of corresponding thematic and horizontal objectives and, where appropriate, quantified targets** in relevant EU and national legislation, strategies and plans, building on the Global Goal on Adaptation (B0). A **reference warming trajectory** (B1), defined as expected global temperature increases over specific time horizons (e.g. 1.5°C by 2030, +2°C by 2050, and +3°C by 2100) will serve as the baseline for climate risk management decisions and actions. This trajectory would be based on a clear methodology for its definition and for its periodic reviews and updates. The EU and each Member State will operationalise and contextualise this trajectory for the purpose of generating decision-relevant information at appropriate geographic scales. The related methodology and numerical values of the trajectory will be defined in the legislation to be proposed, with an empowerment to the Commission for its review.

The legislation will establish horizontal principles to guide decision-making and resource allocation. It will introduce a general **duty for** relevant **Union and Member States' authorities** to **ensure that horizontal and sector policies and their measures and investments consider the climate resilience objective** including by using the reference warming trajectory, and avoid intolerable levels of residual climate risk (B2). It will require the identification and allocation of **risk ownership among public authorities** (with responsibilities allocated between and within the Union, at horizontal and sector level, and its Member States, and between and within governance levels in Member States), and the assessment of the acceptability of residual risks (B3). To ensure that public funding embeds climate resilience in a robust manner, the principle of **climate resilience by design**[322] will be established (B4). The principle of **climate resilience by design** will also be applied when reviewing relevant horizontal and sector legislation at EU and national, level, supported by the identification of priority policy areas and measures for action (B5). Member States will be recommended to support regional and local authorities in mobilising private finance in line with this principle (B10). At EU level, all relevant **sector policies** will be required to have and implement sectoral or thematic strategies/plans based on a common methodology that includes the use of reference warming trajectory and climate risk assessments (C13).

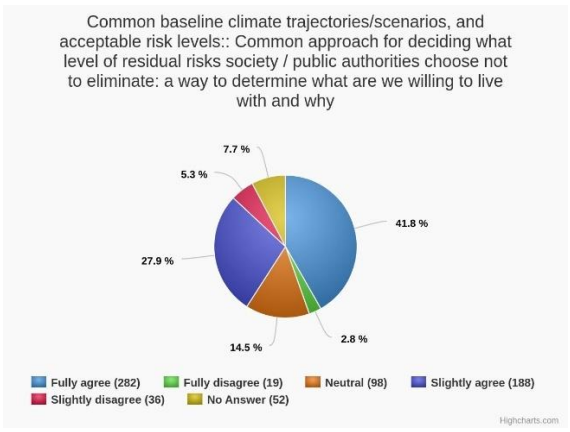


Figure 6: OPC result on having common baseline for climate trajectories/scenario and acceptable risk levels

The Framework will strengthen the requirements for **CRA**. At EU level, the EUCRA will be codified as regular exercise, supported by a set of minimum requirements, including frequency, common parameters and the use of the reference warming trajectory (B6). Sectoral risk assessments at EU level will integrate consideration of climate risks. National assessments will have to consider key risks identified at EU level, including those of transboundary nature (B7).

To improve coherence between **planning and implementation**, and building on Article 5 of the European Climate Law, the Framework will establish common parameters and requirements for climate resilience planning and policies at both EU and Member State level (B8), including the identification of risk owners. The **current setup for the planning on adaptation under the European Climate Law and the Governance Regulation will be simplified**. Member States will need to prepare only one strategic planning document, which would function as the equivalent of the current national adaptation strategies (NASs) and plans (NAPs) under the European Climate Law.

Climate resilience planning will be informed by CRA and address residual risks, and guided by the Union strategic plan on climate resilience, replacing the EU Adaptation Strategy. In addition, the assessment of climate risk management options will explicitly evaluate the acceptability of residual risks (C12).

Progress monitoring and assessment will be improved through an improved and streamlined framework, with a defined set of high-level indicators to assess collective progress at EU level, alongside flexibility for Member States to develop national indicator sets. It will improve the alignment and use of existing reporting processes across policy areas over time (B9), thereby strengthening the assessments of progress under the European Climate Law.

Foreseen interactions with the Governance Regulation and European Climate Law

For reasons of simplification, the Integrated Framework **would not create a new, stand-alone planning instrument** (for details see Annex 14). Instead, the proposed strategic plan would function as the equivalent of the current national adaptation strategies and plans, which the European Climate Law already requires to adopt and implement.

On the Governance Regulation side, simplification is expected for Member States' planning. For **reporting**, **the initiative would rely on Governance Regulation**, requiring the minimum necessary alignment with the proposed Framework, rather than creating new reporting obligations. This keeps administrative burden low while ensuring that reporting can incorporate the needs of the Integrated Framework.

Similarly, **progress assessment would be channeled through the Climate Law assessment cycle**, under which the Commission already assesses collective progress on adaptation and reviews the consistency of Union and Member States measures with ensuring progress on adaptation.

Simplification could focus on streamlining multiple obligations related to existing horizontal policy instruments, reducing unnecessary reporting requirements, avoiding duplication in reporting and progress assessments, and strengthening links with sectoral policies. **These changes would support a more coherent and implementation-focused climate resilience governance, while preserving the ability to monitor action and assess progress.**

More details on the simplification of planning, reporting and progress assessment requirements, and interactions between the proposed Framework and the above-mentioned legislation can be found in Annex 14.

Supporting and enabling elements

In addition to the legislation, the preferred option includes several supporting measures. Improving access to and sharing of existing knowledge and digital **decision-support tools** will be a central element of the Framework. This will be supported by EU-wide awareness campaigns targeting the population (A13). Climate-ADAPT will be revamped to reflect the structure and needs of the Framework and to support its provisions (B12).

Two new tools will be created: a navigator of existing climate resilience tools, to help users identify and use relevant existing tools (A12), and a European climate viewer to facilitate access to climate data for non-expert users at different levels of geographic detail, consistent with the reference warming trajectory and CRA requirements (A14). For the Commission, it will be required to systematically use the viewer in planning and policy-making processes (C18, A14).

Overall delivery on the objectives and addressing the problems

Overall, the preferred option contributes to the GO by establishing a coherent framework which promotes anticipatory policymaking. By combining a reference warming trajectory, strengthened risk assessments, clearer governance arrangements and improved planning and progress monitoring, it embeds climate resilience as an operational and measurable component in policymaking, investment planning and implementation across all levels and sectors. The identification and allocation of risk ownership, together with the assessment of the tolerable level of residual risks (B2, B3), will deliver on SO 1 (climate risk ownership is clarified at EU and Member States across all governance levels and sectors).

All three problems identified have an overlapping set of drivers, therefore the majority of the preferred measures therefore target the common drivers and contribute to SO 2 (policy and implementation decisions of climate risk owners consider current and future climate risks and support climate resilience). Setting a shared climate resilience objective for horizontal and sectoral policies in the EU and Member States, alongside requirements to define objectives in relevant legislation, strategies and plans (B0), establishing a reference warming trajectory (B1) and introducing the duty to consider climate risks (B2) and the obligation to identify risk owners will ensure that current and future risks are systematically taken into account across policies. The integration of the climate resilience by design principle, combined with strengthened CRA and improved planning, implementation and progress monitoring and assessment (B2, B4, B5, B6, B7, B8, B9, B10, B11, C12, C13) will enable public authorities at EU and national levels to develop and implement better and more harmonised climate-resilient policies and actions.

The corresponding SO 3 (Private sector actors are aware and enabled to better identify and manage their current and future climate risks) and SO 4 (EU population is aware and enabled to better identify and manage its current and future climate risks) are also addressed. Measures that address SO1 and SO2 will drive improvements in the implementation of the primary EU-level mechanisms to strengthening private sector (notably single market and competitiveness policies) and overall population preparedness (notably actions under PUS chapter on Population Preparedness, which foresees targeted actions to strengthen societal readiness by mid-October 2026). The information and know-how barriers will be addressed by providing improved access to information through existing platforms and new tools (A12, A14, B12, C18), together with awareness-raising campaigns (A13), which will support more informed decision-making and implementation, therefore empowering the EU's private sector and population to better prepare and be more climate resilient.

The proposal will improve and harmonise EU preparedness for climate impacts– with anticipatory approach built into all relevant policies, and with businesses and population able to make climate risks part of their reasoning and incorporate in their decisions. The proposed approach is comprehensive (Chapter 5). It will drive improvement through creating essential framework

conditions for lower economic, social and environmental consequences of climate impacts by empowering the policies, resilience decisionmakers, private sector and population. As such, the proposed approach is not designed to directly lead to a reduction of the consequences of climate change, which are dependent on multiple other factors outside the scope of this initiative. At the same time, the expected losses without additional measures are high and significantly exceed the costs of the proposal (Chapters 6-7). While the benefits are not directly quantifiable, the examples presented in the document show benefits of integrating adaptation considerations in policy and investment decisions. Current implementation of adaptation projects and measures at local and regional level (see Annex 15) could be scaled-up to increase the overall climate resilience of the Union. The benefits of uniform approach (e.g. efficiency gains, avoiding duplications, fragmentation and inconsistencies) of harmonising the adaptation policy cycle, preparing policies for future climate, as well as raising awareness and building adaptive capacity are well established in qualitative terms.

The cumulative effect points to the conclusions that the step change from Option A's voluntary guidance approach to Option B's binding minimum framework is where the greatest additional resilience gains lie. With Option C, additional gains are real but concentrated further into the long term and contingent on implementation capacity. (For overview of all detailed measures of Preferred option, see Table 6 in Annex 13)

8.1 Application of the ‘one in, one out’ approach

The ‘one in, one out’ approach was considered in relation to the preferred policy option. The initiative does not introduce any mandatory administrative or compliance obligations on companies compared to the baseline. The preferred policy option targets primarily the policy gap problem, thus any changes in private sector will come indirectly, triggered by changes in sector policies and by raising societal awareness and enabling preparedness of the private sector.

Overall, the preferred option is not expected to lead to additional administrative costs for businesses or citizens.

9 HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The Commission and the Member States will need to regularly monitor the implementation of the Regulation to be proposed and other elements of the package. Monitoring will be based on key performance indicators (KPIs) to be agreed and on relevant data available through Union and national monitoring and reporting arrangements, complemented, where necessary, by additional verified sources of information. It will cover progress on common objectives, policy uptake, implementation of measures under the Framework, and progress towards specific objectives.

The initiative is not targeting directly sectoral policies, which will be adjusted accordingly by the risk owners. Sectoral KPIs should be developed within relevant policies as a consequence of the proposed act. These may include, for example: share of agricultural area under productive, sustainable and climate-resilient agriculture; share of infrastructure climate -proofed or covered by resilience investments; share of population covered by heat-health action plans or climate-related health warnings systems; or net balance between newly sealed and unsealed urban areas. The results will be used to assess progress, support implementation, follow-up and inform further

policy development. The timing and frequency of monitoring will consider the availability of datasets in relevant processes, including annual, biennial and five-yearly data.

The KPIs proposed for monitoring the implementation of the initiative are listed and described in Annex 7.

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ANNEX 1: PROCEDURAL INFORMATION

1. Lead DG, Decide Planning/CWP references

The Directorate-General (DG) for Climate Action (CLIMA) was leading the preparation of this initiative and the work on the Impact Assessment in the European Commission.

The planning entry was approved in Decide Planning under the reference PLAN/2025/1038 (for the plan/ communication) and PLAN/2025/1040 (for the law). It is included in the 2026 Commission Work Programme under the policy objective 'A new plan for Europe's sustainable prosperity and competitiveness'.

2. Organisation and timing

The planned adoption date (Q4 2026) is included in the Commission Work Programme adopted on 21 October 2025.

An inter-service coordination group (ISCG) was established for preparing this initiative. Until the re-submission of this impact assessment, the ISCG met six times: 21 February 2025, 11 June 2025, 25 September 2025, 21 January 2025, 26 March 2026 and 30 June 2026.

The ISCG gathered representatives from the Commission's Secretariat-General, Legal Service and 31 other Directorates-General: AGRI, BUDG, CNECT, COMM, COMP, DEFIS, DIGIT, EAC, ECFIN, ECHO, EMPL, ENER, ENEST, ENV, ESTAT, FISMA, GROW, HERA, HOME, HR, INTPA, JRC, MARE, MENA, MOVE, REGIO, RTD, SANTE, SG REFORM, TAXUD, TRADE. The EEAS and EEA also participated.

During the six meetings, the ISCG was consulted on the substance of the policy package, on the questionnaire for the public consultation, and on the impact assessment. The Group was also debriefed on the results of the Call for Evidence, the Public Consultation, and on relevant meetings with the Council, the European Parliament and the RSB. A written consultation took place in July for comments on the revised impact assessment.

[ISCG: Placeholder for period between the RSB opinion until adoption of the package]

3. Consultation of the RSB

On 30 June 2025 a first upstream meeting was organised to discuss the impact assessment. The RSB members and DG CLIMA discussed the scope and process of the impact assessment, and the political significance and complexity of the initiative.

On 11 February 2026 a second upstream meeting took place, focusing more specifically on the assessment of impacts and the draft policy options and measures.

A draft Impact Assessment was submitted to the RSB on 22 April 2026, and the meeting with the Board took place on 20 May 2026. Following a negative opinion, a revised report was submitted on 10 July 2026. On 07 September 2026, the Board shared a positive opinion with reservations.

To address the feedback given by the Board, the following changes were made to the Impact Assessment report and its annexes:

Comments by the Board	**Main modifications made in the report to address them**
(1) The evidence behind the problem of insufficient physical preparedness and the interplay between policies and physical preparedness are not clearly presented.	Section 2 was streamlined to avoid repetitions. Additional examples from EUCRA were added to the section, to better illustrate the gaps in physical preparedness across sectors/policies and Member States.
(2) The causal link between options and expected effects, including possible secondary consequences for private actors, is only partially demonstrated.	At the beginning of section 5, more details on the methodology to assess residual risk and risk tolerance were added, to better explain how risk owners would consider and decide on them. However, the text cannot be too explicit on the specific methodology, as the assessment of risk will vary across risk owners, depending on their sectors/ policy areas, assets, and evidence available on risks and solutions to address them. The consequences for private sectors in the description and impacts of the policy options are only partially demonstrated as the evidence is limited and is highly dependent on follow-up intervention from the different policy areas/ risk owners. Evidence was added wherever possible. In section 5, a brief description was added on the timeframe and enforcement of each policy option, and details on the impacts of those can

	be found in section 6 and in the comparison table in section 7. In the description of policy option C, details were added to better explain what a climate resilience check under the Better Regulation toolbox would work and what would be its added value. As this measure is not part of the preferred option, it only features in the description of policy option C in section 5.
(3) The costs and the benefits are not presented sufficiently clearly.	Section 6 was improved to illustrate more clearly the costs and benefits of the different policy options. Further breakdown of the costs for the Navigator of tools and Climate Viewer was added to the text. Annex 3, including the table on burden reduction, has been updated to reflect the changes in the text. The text throughout the section was also improved to better illustrate which costs/benefits stem directly from the proposed initiative and which ones are expected from follow-up interventions (indirect).
(4) The coherence of the initiative with the post-2030 climate and energy package is not sufficiently assessed, including as regards potential overlaps, unnecessary administrative burden and enforcement.	Additional text was added to section 8 on the links between the proposed Framework, the European Climate Law and the Governance Regulation. The detailed description of those foreseen interactions, simplification of various aspects (planning, reporting, etc) and reduction of duplications can be found in Annex 14.

4. Evidence, sources and quality

For this Impact Assessment, the Commission has gathered data from various sources mainly public opinion and academic research. The Commission conducted a Call for Evidence and open public consultation to enable different stakeholders to share their perspective, and also collected feedback through Commission expert groups, such as the Reflection Group on Mobilising Climate Resilience Financing and the Industrial Forum (detailed in Annex 2, Synopsis Report).

Various reports underpin the analysis. The first EUCRA provides quantitative inputs for the Impact Assessment, synthesising current data on climate risks in the EU. Commission reports, such as

Assessment of EU and Member States adaptation needs or Assessing the Macro-Fiscal Risks from Climate Change or The Macroeconomic and Fiscal Impact of Climate Change in the EU: A Stylised Approach also provided qualitative and quantitative data.

Besides the consultations and these reports, the Commission used data and knowledge available in published reports authored and reviewed by experts in the field of climate change, climate risks, and resilience, such as the IPCC, ESABCC and the EEA. Furthermore, they relied on academic research from the Commission, notably the JRC, Copernicus and other academic sources outside of the Union institutions.

Alongside other academic papers and policy reports, they formed the scientific basis of the Impact Assessment, through giving an overview of the current state of climate change and potential future risks in Europe, hence providing the foundation for the policy options given in the report.

Decision-relevant evidence was also collected drawing from real-life experiences and discussions amongst regional and local authorities (as well as other stakeholders) and Horizon Europe projects within the EU Mission on Adaptation to Climate Change (see Annex 15).

More details on how the evidence was collected, its sources and quality are available in Annex 4 (Analytical methods).

External expertise:

To support the Commission in undertaking an impact assessment for the proposal of a European Integrated Framework for climate resilience, in line with the Commission's Better Regulation guidelines, a framework contract was signed: CLIMA/A4/FWC/2023/0002/RAMBOLL, specific contract with Ramboll leading a consortium including CE, Fundacion Tecnalia Research & Innovation and Ecologic Institute.

The concrete tasks of the contractor included support in all steps on the impact assessment, including to the public and stakeholder consultations, and data collection. These tasks are detailed in a supporting report.

ANNEX 2: STAKEHOLDER CONSULTATION (SYNOPSIS REPORT)

1. Overview of consultation activities

As part of the support to the new European climate resilience framework, a number of consultation activities were carried out to make stakeholders and the general public aware of the initiative, and to gather their input on the proposed aspects of the new framework, and any additional views or suggestions they may have.

The types of consultation activities were as follows:

- Call for Evidence
- Open Public consultation
- Special groups of the Commission
- Public events and conferences
- Meetings and seminars

1.1 Detection of campaigns

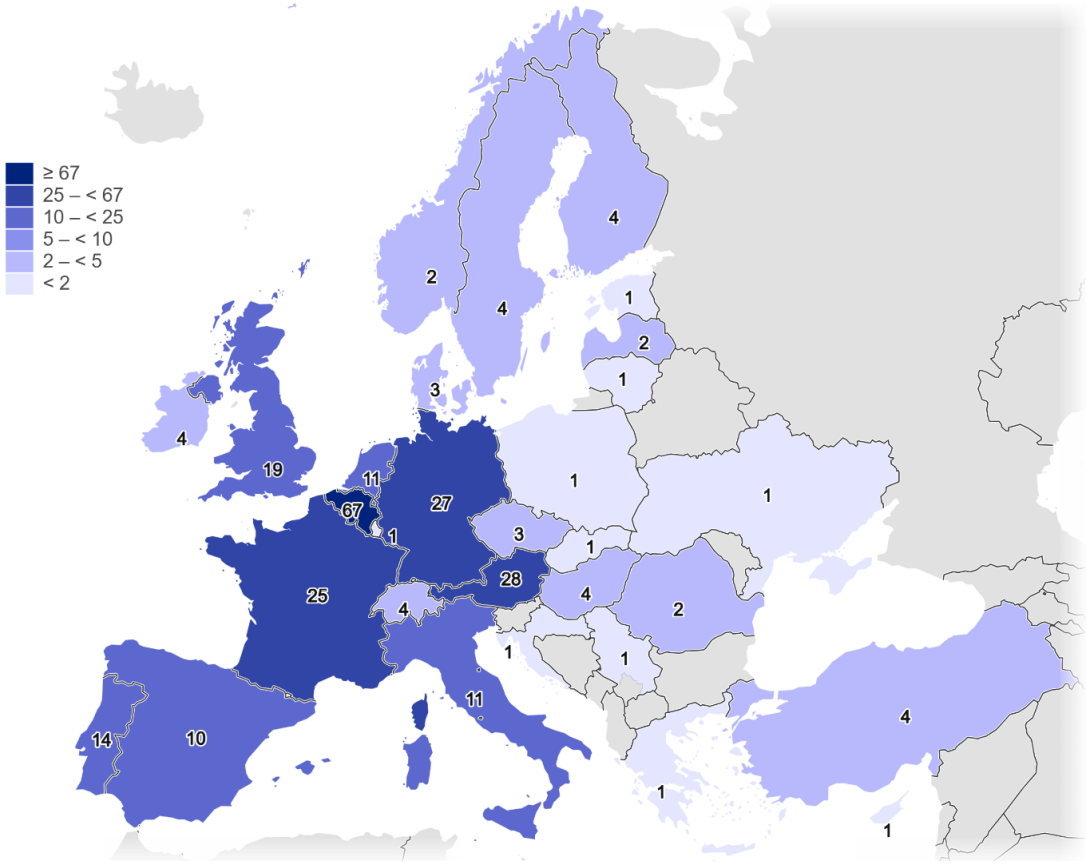
In line with the rules for feedback and suggestions, a suitability check was conducted to detect organised campaigns that could have the effect of distorting the results of the call for evidence and the public consultation, with no exclusions in both cases. All contributions were reviewed for duplicates, accuracy, and signs of coordinated responses or campaigns. For the call for evidence no exact, identical full-text submissions were found. For the public consultation 5 out of the 675 responses were considered duplicates and their second response was removed or the least complete one. One set of responses received additional scrutiny as it came from a person with the same name but a different email and organisation. Despite some similar answers, both submissions were accepted. In terms of potential campaigns, different groups of people had the same/similar answers to some of the open-ended questions (mostly groups of two people, but also one group of five, one group of four, and three groups of three). Since none of these groups with similar/same responses were comprised of ten or more people (threshold determined in the BRG) no campaigns were identified and no additional responses were removed.

2. Call for Evidence

The Call for Evidence was open from the 24 July 2025 to 4 September 2025 on the Commission's 'Have your say portal'[323].

2.1 Who replied to the Call for Evidence

Figure 1: Call for Evidence - Distribution of respondents by country of origin (n=233)

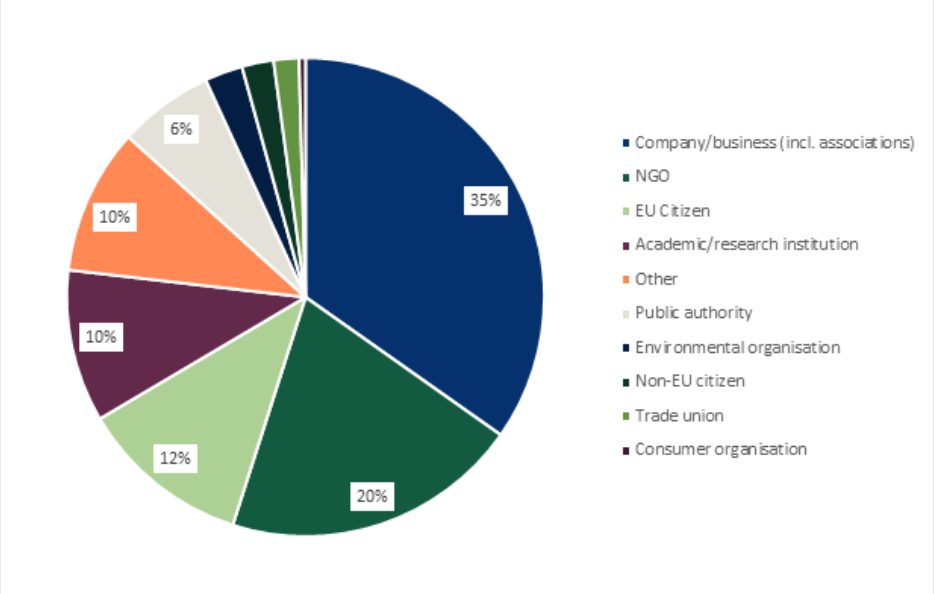


A total of 233 feedback instances were validated. 89% of responses (207 out of 233) were provided by stakeholders from the EU Member States.[324] The remaining 26 responses were provided by participants outside the EU.[325] The highest number of responses came from Belgium (29%, 67), followed by Germany (12%, 27), as indicated in Figure . In addition, 141 responses included an attached PDF, of which 97 were tailored responses (1-5 pages) and 23 were external publications (5-50+ pages).

[323] (European Commission, 2025c)
[324] At least one response was received from each EU Member State apart from Bulgaria, Malta and Slovenia.
[325] India (2), Norway (2), Senegal (1), Serbia (1), Switzerland (4), Türkiye (1), United Kingdom (12), United States (3).

Companies/businesses (including associations) constituted the largest share of respondents (35%, 81), followed by NGOs (20%, 47), EU citizens (12%, 27), and academic/research institutions (10%, 24). The remaining 54 respondents were categorised as other (23), public authorities (15), environmental organisations (6) non-EU citizens (5), trade unions (4), and consumer organisation (1)., as indicated in Figure .

Figure 2: Call for Evidence - Distribution of respondents by user type (n=233)



2.2 Overview of responses

The responses to the call were downloaded from the 'Have your say' portal and organised in a data frame, with links to their attached PDF if applicable. The content of the response and the attached documents were translated when not originally in English using machine translation. The content was then analysed, and flagged with keywords and topics, to facilitate compilation of responses.

The overall sentiment showed a broad support for the integrated EU framework, with some disagreements focusing on the depth of the EU legal obligations versus subsidiarity. The five most frequent priorities (mentioned in ≥60 % of responses) were related to the following:

- Stable, predictable, long-term EU funding and blended-finance tools for adaptation.
- Harmonised risk-assessment standards with shared climate scenarios.
- Resilience-by-design criteria for all public spending and procurement.
- Nature-based solutions (NbS) as default first line of defence.
- Systematic integration of health, incl. heat-health, into all plans.

Correspondingly, the most cited hazards were drought and water scarcity (47%), extreme heat (45%), flooding/coastal hazards (38%) and wildfire/forest risk (31%).

3. Open Public Consultation

The public consultation was open from 1 December 2025 to 23 February 2026.

3.1 Who replied to the Open Public Consultation

675 responses were submitted to this public consultation through the EU Survey portal with 670 passing the suitability check, as outlined in Section 0. 91% of the responses (610 out of 670) were provided by stakeholders from the EU Member States, with at least one response provided by a participant from each Member State. The rest of the responses were provided from participants outside the EU[326]. The highest number of responses came from Belgium (18%, 122), followed by Germany (13%, 89) as indicated in Figure 3.

Additionally, a total of 31 individuals/companies complemented their responses or contributed separately their views through position papers and/or additional material.[327] These documents were taken into account for the analysis of open-ended questions, where relevant, or as additional views to the specific topics of the consultation presented in Section 0.

The majority of respondents (28%, 187) were EU citizens, followed by companies/ businesses (including associations) (24%, 159) and public authority representatives (15%, 98). Other respondents represented NGOs (14%, 96) as indicated in Figure 4: Open Public Consultation - Distribution of respondents by user typeFigure 4.

[326] Albania (2), Armenia (3), Bosnia & Herzegovina (2), Chile (1), Ethiopia (1), India (3), Kenya (1), Kosovo (1), Moldova (1), Nigeria (1), North Macedonia (2), Norway (5), Pakistan (1), Philippines (1), Serbia (1), Sudan (1), Switzerland (4), Türkiye (4), Ukraine (1), United Kingdom (19), United States (5).

[327] Out of the 31 companies/individuals that sent position papers/additional material, 1 of them was a duplicate, while 3 of them were a PDF version of responses already inputted in the EU Survey platform. Two additional survey responses were also sent and were considered for the open-ended analysis; however, they were not included in the quantitative analysis as they were shared separately and were not part of the consolidated dataset taken from the EU Survey platform. Including these responses would have required manual data entry which would have had minimal impact on the overall findings. Other position papers/material were whole reports where only their executive summary was analysed for the purposes of this summary. In cases where the position papers were in a different language than English, these were translated using a machine translator and were then analysed.

Figure 3: Open Public Consultation - Distribution of respondents by country of origin (n=670)

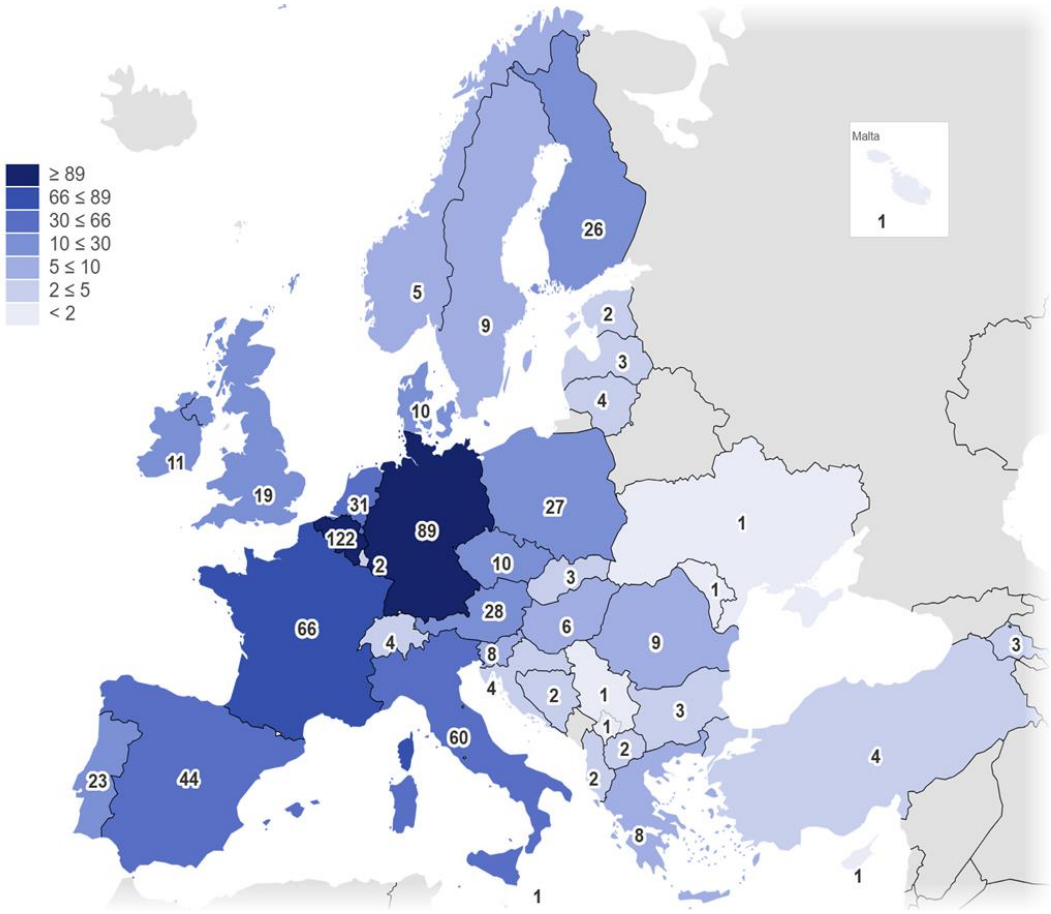
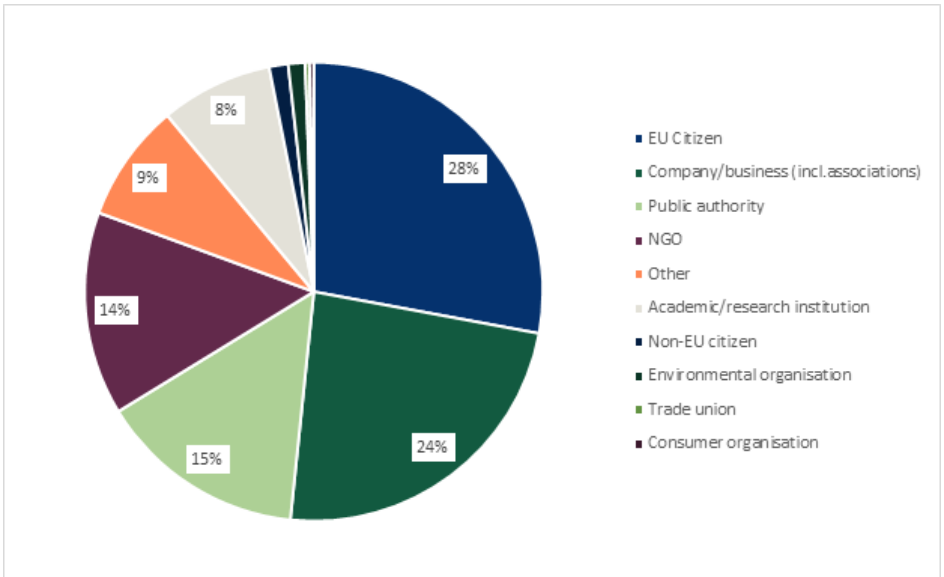


Figure 4: Open Public Consultation - Distribution of respondents by user type (n=670)



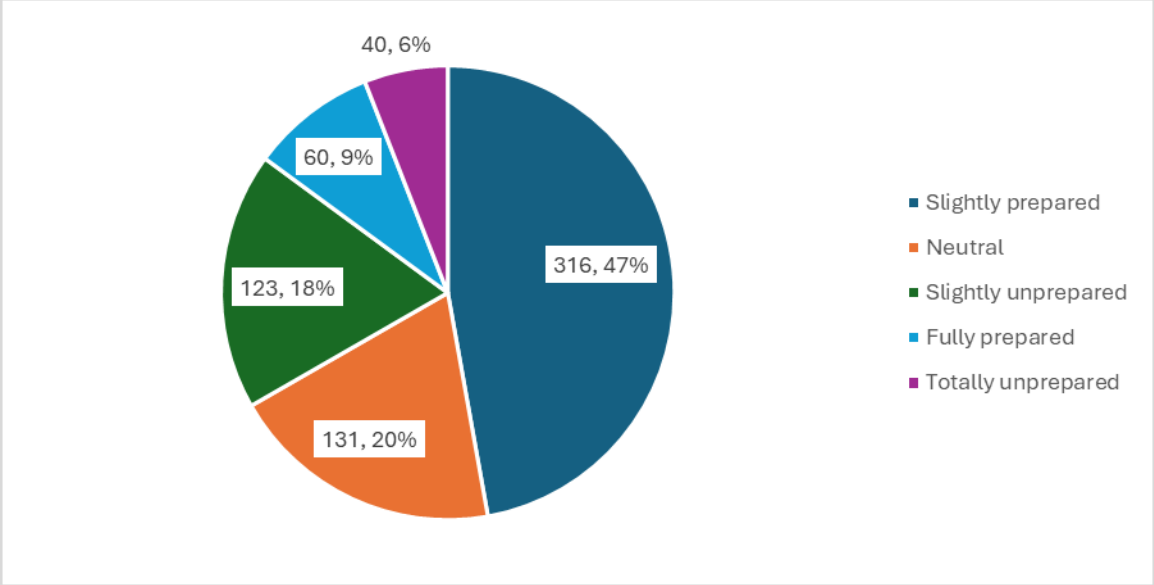
3.2 Main findings of the consultation

3.2.1 General questions

When asked how well informed they consider themselves about the potential impacts of climate change majority of respondents selected that they are fully informed (60%, 398 out of 670) followed by slightly informed (32%, 212). 13 respondents noted that they are totally uninformed.

When asked how well prepared they consider themselves to face the potential impacts of climate change the majority responded that they consider themselves slightly prepared (47%, 316) as shown in Figure 5.

Figure 5: How prepared do you consider yourself to face the potential impacts of climate change (n=670)



394 respondents explained their answer mentioning, among other, the following aspects affecting their preparedness:

- There is a gap between awareness and knowledge, and implementation
- There is insufficient investment, financing, and incentives
- Fragmented policies and weak coordination across levels of governance
- Infrastructure, systems and regulations are not adapted yet to future climate risks

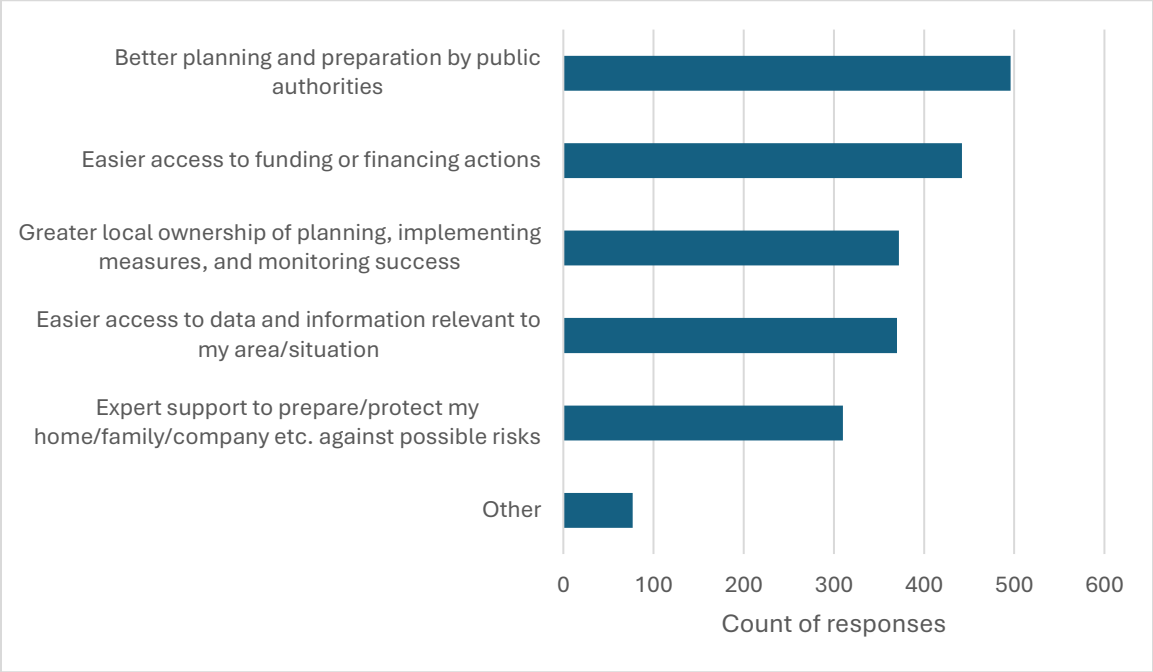
Regarding whom they consider to be primarily responsible for managing the physical impacts of climate change, the majority selected all options[328] (60%, 383), followed by national governments

[328] This included individual citizens, businesses and private actors, local and regional authorities, national governments and the European Union.

(14%, 87) and local and regional authorities (11%, 71). 36 respondents (6%) selected the EU as primarily responsible.

In the multiple-answers question 'what would help you become better prepared for the impacts of climate change' the most selected option was better planning and preparation by public authorities (selected 496 times), as indicated in Figure 6.

Figure 6 Which of the following would help you become better prepared for the impacts of climate change? (n=670)



Concerning policy actions that would most help improve risk awareness and preparedness for climate change impacts the most common responses were grouped in the following themes:

- Closing information gaps and being transparent on climate risk and insurance
- Standardise data with common EU baseline scenarios
- Implementing 'resilience by design' in all sectors
- Mandate climate stress tests especially for public investments
- Provide direct incentives for adaptation actions

3.2.2 Climate resilience by design

For the section on 'Climate resilience by design' participants were asked which sectors they consider most important for integrating this principle (open-ended question), the following were mostly mentioned:

- Infrastructure and built environment

- Water management and hydrological systems
- Agriculture and food systems
- Energy systems
- Health and social systems
- Urban and spatial planning
- Financial and insurance sector

Similarly, regarding policy areas or EU legislative frameworks that should prioritise embedding this principle (open-ended question) respondents mentioned the following, among other:

- Infrastructure, construction and spatial planning policies such as EPBD, TEN-T/TEN-E
- Public funding, EU budget and procurement such as through the Cohesion policy, ERDF, InvestEU, and the MFF
- Agriculture, land use and environmental policy such as through the CAP, Nature Restoration Law, LULUCF regulation
- Water policy such as through the Water Framework Directive, the Flood Directive and the Water Resilience Strategy
- Energy and climate policy frameworks such as through the EU Climate Law, EU Adaptation Strategy, RED and the Energy Efficiency Directive
- Finance, insurance and disaster risk reduction such as through the EU Taxonomy, CSRD, and the EU Civil Protection Mechanism

Finally, participants were asked to note any existing policies or legislation that prevents them from taking effective action (open-ended question) with most respondents pointing to systemic issues such as fragmented governance, short-term funding rules, outdated standards and low incentives, instead of mentioning specific policies or legislation.

3.2.3 Legislative framework for climate resilience

Regarding the legislative framework questions, respondents were asked to select their level of agreement to including the specific aspects and requirements in the legislative proposal (Likert scale question), with results outlined below:

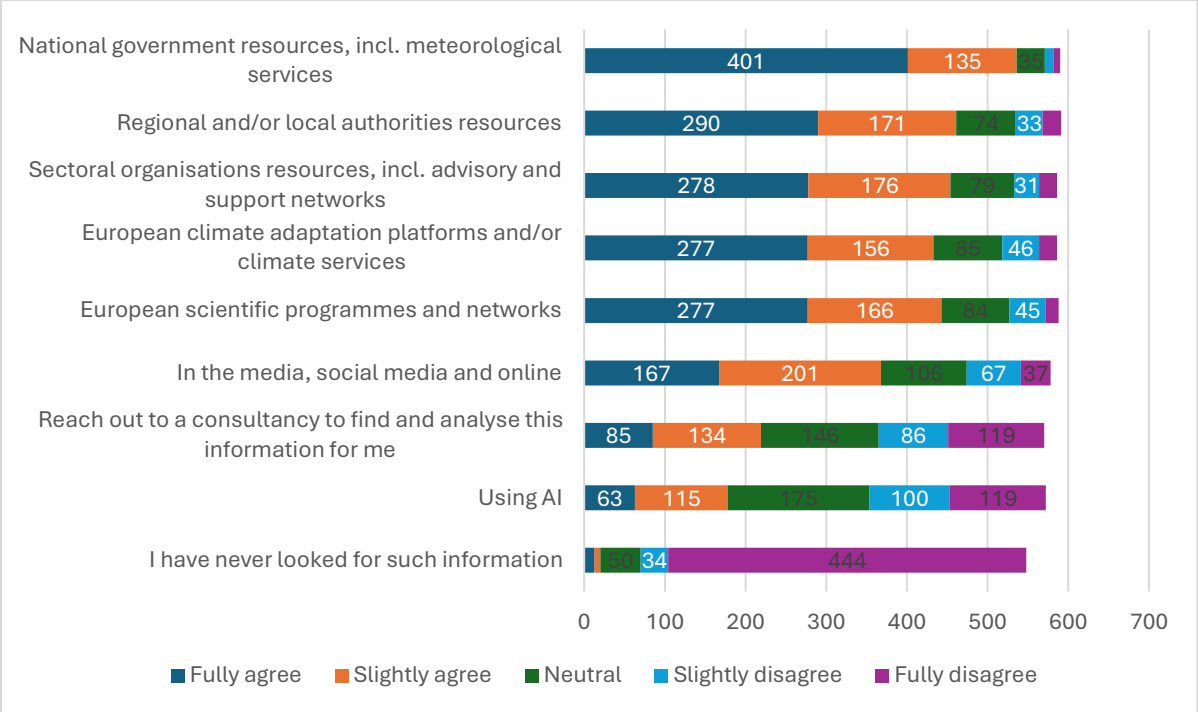
- **Common baseline climate trajectories/scenarios and acceptable risk levels:** 389 (58%) respondents selected that they fully agree that determination of the levels of global warming or a similar common baseline for adaptation decisions should be included in the proposal.
- **Climate risk assessments:** 479 (72%) respondents selected that they fully agree that the development of CRAs that would also cover the most affected policy sectors at national level should be included.

- **Adaptation planning and determination of risk owners:** 503 (75%) respondents selected that they fully agree that robust obligation on the EU/Commission to prepare and implement an EU adaptation strategy and plan should be included.
- **Complementing action at EU level by Member States' action:** 500 (75%) respondents selected that they fully agree that Member States carrying out evaluations at appropriate levels to identify regions and groups of people that are particularly vulnerable to climate change should be included.
- **Monitoring, reporting, evaluation and learning:** 428 (64%) respondents selected that they fully agree that incorporation of corresponding resilience progress indicators into existing sector legislation to avoid duplication and new reporting requirements should be included.

3.2.4 Decision-support tools for climate resilience

For the section on decision-support tools, respondents were asked to note their level of agreement on where they look for information about how climate change could affect them or their activities (Likert scale question), with the majority (60%, 401 out of 670) selecting full agreement with national government resources, as shown in Figure 7.

Figure 7: Where do you look for information about how climate change could affect you or your activities? (n=670)



Regarding what information would help them determine if and how to take action (Likert scale question) the majority (70%, 461) fully agreed with 'estimates of future impacts of extreme or unseasonal weather on my community and me in terms of health and well-being, and economic

activities', followed by 'benefits of specific adaptation solutions in reducing impacts on health and well-being and specific economic activities' (69%, 460), and 'estimates of future severity of extreme or unseasonal weather in the area where I live or work' (64%, 429).

Moreover, concerning the development of a user-friendly web-based tool for non-experts (Likert scale question), 411 (61%) respondents selected that they fully agree that such a tool would be beneficial for them, while 126 (19%) participants slightly agreed. They noted 'visual presentation of information e.g. on a map' (74%, 496), 'clear link between climate risks and adaptation solutions' (74%, 494), and 'ability to download data or summary reports' (66%, 444) as possible helpful features.

3.2.5 Protecting people and supporting regional and local action

The next section included open-ended questions on measures for protecting people and supporting regional and local action. Participants were asked to note what policy measures should the EU and Member States take to achieve the following, with common responses summarised in grouped categories:

Table 1: To ensure that the most vulnerable groups and geographical areas receive adequate support and are protected from the disproportionate impacts of climate change

EU	Member States
Target funding to vulnerable regions and populations	Identify vulnerable groups and territories
Develop harmonised vulnerability mapping and risk data and improve coordination and knowledge sharing for technical support	Implement targeted adaptation and social protection measures
Embed just resilience principles in EU policy	Strengthen local and regional adaptation planning
Strengthen resilience of essential infrastructure and services	Invest in resilient infrastructure
Support nature-based solutions	Promote participatory and inclusive governance

Table 2: To protect people's health against the impacts of climate change

EU	Member States
Mainstream health into all climate and sectoral policies	Implement national climate-health action plans
Strengthen early warning, surveillance and data systems	Strengthen and climate-proof health systems
Set common standards, guidelines and binding requirements	Protect vulnerable populations

Increase targeted funding for prevention and resilience	Adapt urban environments, buildings and infrastructure
Support research, innovation and knowledge-sharing	Improve awareness, training and community preparedness

Table 3: To provide greater support to regional and local stakeholders

EU	Member States
Simplify and increase direct access to funding	Provide funding and devolve resources to local areas
Provide harmonised data, tools and methodologies	Build local capacity and technical expertise
Scale up technical assistance and capacity building	Strengthen coordination and governance
Strengthen knowledge sharing and peer learning	Empower local actors and ensure participation
Improve coordination and multi-level governance	Provide data, remove barriers and enable implementation

Table 4: To specifically support the EU's outermost regions in adapting to climate change, considering their particular exposure to extreme weather events and their unique geographical and socio-economic contexts

EU	Member States
Create dedicated, simplified EU funding tailored to outermost regions	Develop dedicated, place-based strategies
Invest in resilient infrastructure and basic services	Invest in resilient infrastructure and basic services
Strengthen climate data, risk modelling and early warning systems	Strengthen local capacity and governance
Support risk-sharing and insurance solutions	Enhance regional emergency preparedness and response
Promote nature-based solutions and ecosystem restoration	Empower communities and ensure participation

Regarding most pressing barriers that should be removed to enable action at regional/local levels (multiple-answer question), 494 (74%) selected the ‘insufficient funding or financing for regional and local measures, including access to dedicated national and EU funds’ as one of their choices, while 385 participants (58%) selected the ‘insufficient institutional capacity to absorb funding and develop a project pipeline’.

Lastly, regarding how could the EU Mission pilot be leveraged or replicated to support action by all European regional and local stakeholders (multiple-answer question), ‘connect EU funding opportunities with the relevant stakeholders to scale up the regional and local climate adaptation solutions developed within the Mission’ was selected as one of the options the most by participants

(69%, 461 times), while 'encourage Member States to dedicate financial resources to support regional and local action' was selected 426 times (64%).

3.2.6 Competitiveness – harnessing innovation opportunities

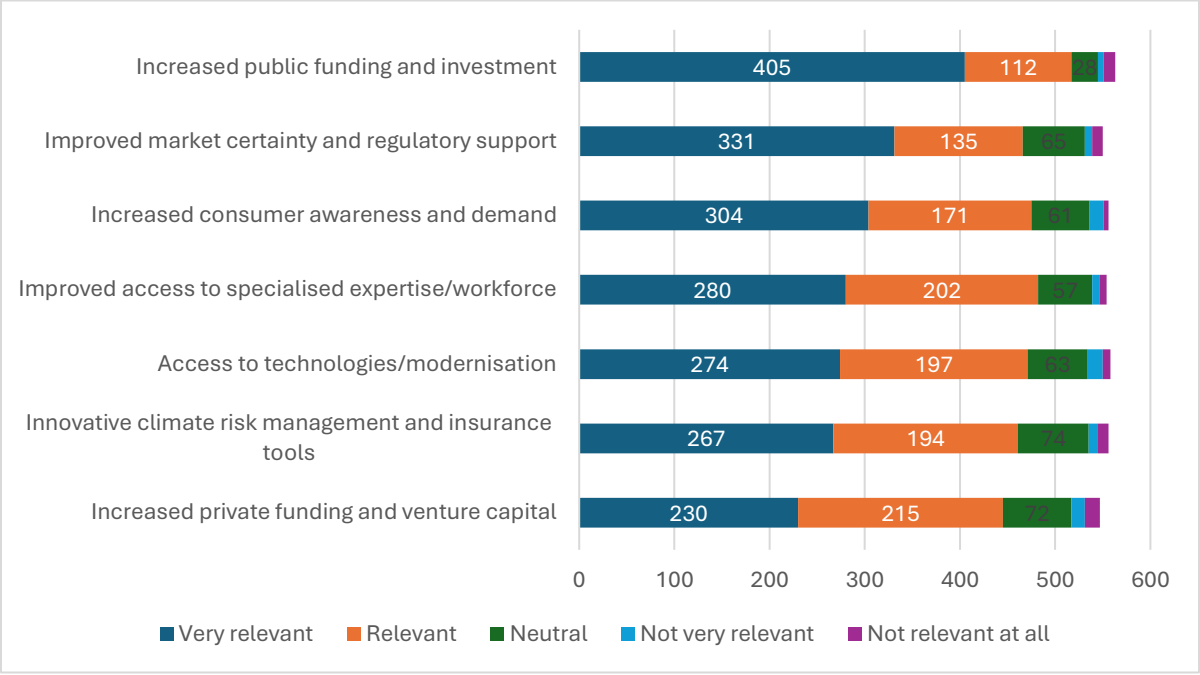
Regarding competitiveness, respondents were asked to note the climate resilience technologies/innovations that they need to develop or scale up to make their sector/industry more competitive (open-ended question), with the following being mentioned, among other:

- Climate data, risk modelling and digital intelligence
- Climate resilient infrastructure, materials and construction
- Nature-based solutions and ecosystem-based approaches
- Resilient energy systems and storage
- Water management and efficiency technologies
- Early warning, monitoring and predictive systems

Regarding measures that could improve the competitiveness and innovation of climate-resilience products/services (Likert scale question), 405 out of 670 participants (60%) selected increased public funding and investment as very relevant, while 331 (49%) selected improved market certainty and regulatory support as very relevant, as indicated in

Figure .

Figure 8: What measures could improve the competitiveness and innovation of climate resilience products/services in your sector/industry the most? (n=670)



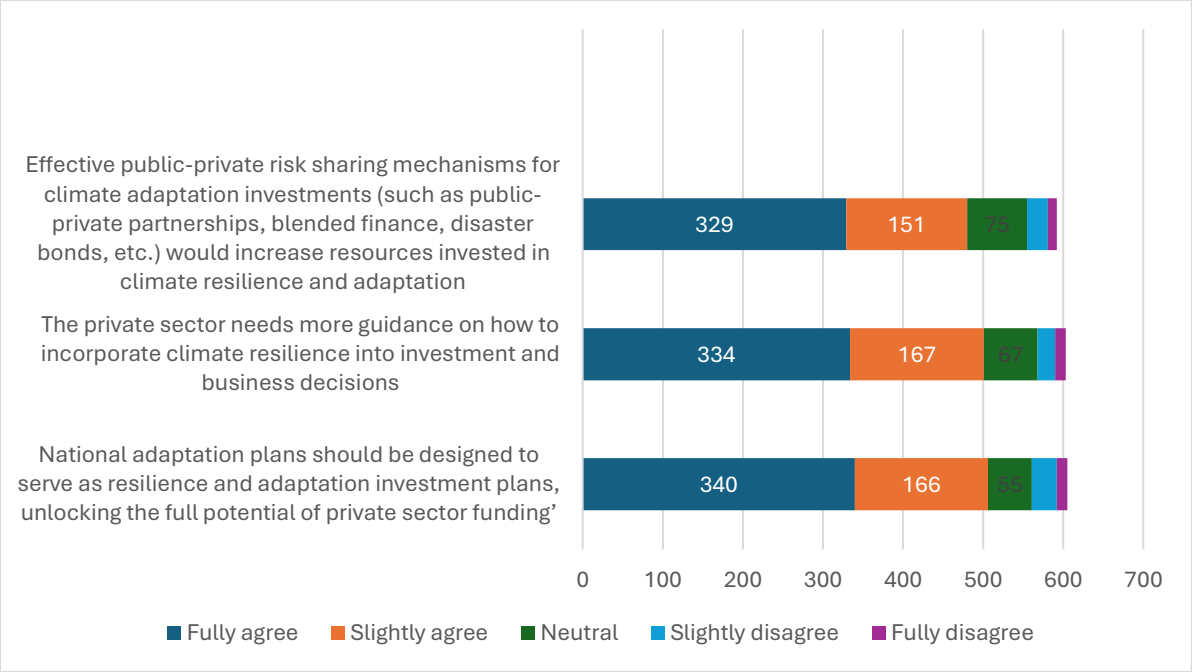
3.2.7 Finance and insurance

For the finance and insurance section respondents were asked to consider the public sector's role in funding climate resilience through two specific questions:

- "Is it necessary to integrate climate resilience considerations in fiscal planning and financial decisions at all levels of the public sector as well as in the private sector?" 586 out of the 670 respondents (87%) said yes, 24 (4%) said no, while the rest did not provide an answer.
- "Would incorporating climate resilience considerations in investments, including public spending and procurement limit economic losses from climate events?" 572 respondents (85%) said yes, 34 (5%) said no, and the rest did not provide an answer.

Concerning private-sector investments, participants were invited to provide their level of agreement to specific remarks (Likert-scale question) as indicated in Figure .

Figure 9: Private-sector investments and climate resilience (n=670)



A series of open-ended questions followed where respondents first had to note the key obstacles for scaling up investments strengthening climate resilience and adaptation, with their main points summarised below:

- High upfront costs and weak incentives
- Lack of reliable and harmonised climate risk data
- Difficulty measuring and monetising resilience benefits
- Regulatory complexity and policy uncertainty
- Insufficient capacity and limited private-sector engagement

- For the open-ended question, what policy measures would help overcome the above obstacles and boost climate resilience finance, respondents noted the following, among other:
- Harmonise methodologies and standardise metrics and data to increase comparability
- Introduce more de-risking mechanisms, financial instruments and targeted public funding
- Harmonise regulatory frameworks and make them clearer and more stable to have long-term policy certainty
- Integrate resilience into public policy and investment e.g. in public procurements and planning
- Improve pricing of risk and incentives

When asked if the existing EU accounting framework duly reflects the climate physical risks in the valuation of assets (open-ended question), the majority broadly agreed that EU accounting frameworks systematically underestimate and misprice risk, rely on historical data and/or short-time horizons, are inconsistent in methodologies and standardisation in risk assessments, valuation methodologies, metrics and assumptions, have a weak integration with sustainability reporting, while adaptation investments are undervalued. Therefore, they are calling for mandatory forward-looking risk integration, harmonised methodologies, stronger disclosure, and recognition of adaptation value to correct asset mispricing and improve resilience investment.

Regarding their opinion on other existing policy/regulatory frameworks and if they duly account for the climate physical risks (open-ended question), the majority of replies broadly agreed that risks are only partially accounted for due to fragmentation across sectors, weak enforcement of non-binding agreements, and data and methodology gaps in sectoral planning. Thus, they are calling for mandatory risk assessments, binding resilience standards, harmonised methodologies, and stronger alignment of funding, planning, and financial systems to embed "resilience-by-design" across sectors.

For the climate risk insurance component respondents were asked to show their level of agreement on the following two remarks (Likert scale question):

- Location-specific comprehensive information on climate hazards could improve insurance uptake: 384 respondents (57%) fully agreed, while 99 (15%) slightly agreed.
- Climate risks insurance products need to be clearer on the hazards they cover: 316 respondents (47%) fully agreed, while 147 (22%) slightly agreed.

In terms of what policy/regulatory measures – based on market-based mechanisms – do they propose to address the increasing insurance gap and improve access to affordable insurance (open-ended question), respondents noted the following, among other:

- Public-private risk sharing mechanisms
- Risk-based pricing combined with incentives for adaptation
- Improved climate risk data and transparency
- Development of innovative insurance products

- Targeted affordability support

Regarding what kind of risk pooling and transfer mechanisms would be most suitable to increase insurance cover for secondary perils in the EU (open-ended question), participants mentioned the following, among other:

- Risk pooling mechanisms at EU, national and/or regional levels
- Public-private partnerships
- Reinsurance mechanisms
- Capital-market instruments e.g., catastrophe or resilience bonds
- Parametric insurance for secondary perils

On how insurers in the Union can access new capital to back climate-related policies (open-ended question), with participants noting the following points, among other:

- By mobilising capital markets and institutional investors by scaling up insurance-linked securities, developing resilience-linked bonds, creating a European resilience bond market, and improving data standardisation
- Reformulating regulatory frameworks to increase insurers' ability to deploy their own capital towards adaptation and resilience
- Expanding public-private risk-sharing and blended finance e.g., through EU-level guarantee mechanisms
- Harmonisation of data, metrics and creation of bankable pipelines for adaptation projects

To the question on how to mobilise private investor interest in insurance-linked investment vehicles (open-ended question), respondents mentioned:

- Closing the measurement and data gap by developing EU-wide climate risk datasets
- Creating attractive and credible risk-return profiles
- Using public capital strategically to de-risk early markets
- Providing regulatory clarity and a scalable EU market framework
- Linking insurance-linked investment vehicles with sustainable finance and resilience policy

On if there is a need for a European marketplace for pooling climate-related risk (open-ended question), with the broad agreement being yes but only if it is designed to complement existing systems and actively support risk reduction and not just redistribute losses. According to respondents such a European marketplace can manage systemic and cross-border risks, unlock additional capital, improve liquidity, scale and price discovery and strengthen EU strategic capacity.

The final question of the consultation was a multiple-answer one, asking respondents to select what policy measures would be needed to avoid climate insurance protection gaps from having negative repercussions on financial or macroeconomic stability, with participants selecting

‘Promote innovative climate risk diversification and/or transfer approaches to mitigate the concentration of risk within specific sectors or regions’ 294 times (44%), and ‘Encourage market-based solutions that connect those who can afford to finance risk with those seeking climate risk coverage’, 266 times (40%).

3.2.8 Additional remarks from position papers and supplementary material

Supplementary materials and position papers broadly reinforced the main consultation findings outlined above, while providing additional technical detail and sector-specific recommendations. Key cross-cutting points included:

- **Finance and insurance alignment (mentioned in 11 papers):** linking insurance with adaptation, scaling up public-private financing, and improving regulatory clarity and data to support investment and competitiveness.
- **Need for a more operational EU framework (mentioned in 9 papers):** clearer, measurable and time-bound targets, common reference trajectories, stronger alignment across policies, and improved multi-level governance with a key role for local and regional actors.
- **Social fairness (mentioned in 9 papers):** ensuring affordability and targeted support for vulnerable groups, and better integration of social and climate policies.
- **Data and risk assessment (mentioned in 8 papers):** improving availability of high-quality, interoperable, and location-specific data, including better integration of scientific disciplines (e.g. geoscience) into decision-making.
- **Sectoral and local focus (mentioned in 8 papers):** highlighting specific needs in sectors such as buildings, housing, agriculture and water, alongside calls for stronger local capacity, simplified funding access and practical implementation support.
- **Prevention and resilience-by-design (mentioned in 7 papers):** embedding resilience in planning, infrastructure, buildings and public investment, with a stronger focus on long-term risk reduction.
- **Nature-based solutions and ecosystems (mentioned in 3 papers):** prioritising restoration and ecosystem-based approaches as core, cost-effective resilience measures.

4. Additional Consultation Activities

Following the Better Regulation Guidelines, the Open Public Consultation and the Call for Evidence were complemented by additional consultation activities, designed to engage all relevant stakeholders and to target potential information gaps.

Consultation methods such as conferences, public events, special groups of the Commission, and bilateral meetings were used to gather inputs and collect information from Member States, other European Union bodies, and relevant stakeholders.

4.1 Consultations with Member States

Discussions with representatives were held in the **Working Party on the Environment (WPE)** at the EU Council, allowing early signalling of Member States' positions. Complementary exchanges took place within the **European Climate Policy Group (ECPG)**, collecting the views of Member States officials responsible for climate governance and allowing strategic coordination across EU and national processes.

National adaptation experts and practitioners' views were convened through the **Working Group on Adaptation (WGA)**. Six dedicated "deep dive" sessions were organised under this group, allowing Member States to explore different elements of the initiative in detail and share practical considerations from national systems. These structured dialogues were complemented by **bilateral meetings**, offering space to discuss country-specific issues, administrative realities and detailed technical questions.

Engagement also extended to **Member State-hosted events**, such as the CERAC event presenting Belgium's climate risk assessment[329].

4.2 EU-level institutional consultations

Engagement with the **European Parliament** was carried out through the **Committee on Environment, Public Health and Food Safety (ENVI)**, complemented by a series of **bilateral meetings** and participation in relevant **parliamentary events**. These exchanges, supported by Parliament's reports, provided early political signalling and helped ensure alignment with the institution's emerging priorities.

Dialogues were held with the **Committee of the Regions** and the **European Economic and Social Committee**, allowing for territorial perspectives and socio-economic considerations to be reflected. Opinions by these Committees contributed to the development of this impact assessment.

Exchanges with other EU entities, such as the **European Environment Agency (EEA), European Investment Bank (EIB)** and the **European Scientific Advisory Board on Climate Change (ESABCC)**, as well as their respective reports also fed into the initiative.

In addition, exchanges and workshops took place with different services of the Commission to gather information on specific topics.

4.3 Consultations with EU initiatives

Continuous exchanges with a number of EU associated initiatives that contribute to the EU's climate resilience agenda took place.

[329] (Cerac, 2026)

From 2022 to 2024, the Commission's **Climate Resilience Dialogue** held nine plenary meetings and various subgroups meetings, ending with the publication of the final report. The Dialogue focused on how to increase climate resilience in the EU and addressing the climate protection gap, with a focus on adaptation measures.

The **Reflection Group on Mobilising Climate Resilience Financing**, which brought together industrial actors and public and private financial institutions, met six times between 2024 and 2025. It culminated in the publication of a final report highlighting the scale of climate-related economic losses in the EU and the need for collective action to mobilise financing for resilience[330].

In September 2025, a presentation on climate resilience and competitiveness was done at the **Industrial Forum**, to gather insights from EU industry experts and representatives on climate resilience solutions and technologies. A European roundtable on managing climate risks was also organised, which included high-level representatives, national and local authorities, civil society, financiers, insurers, farmers, business, research and media.

In February 2026, DG CLIMA also organised a hybrid event with over 30 Youth representatives to gather their insights about climate resilience and the upcoming Integrated Framework.

To draw on the experience of local and regional authorities, particularly regarding implementation challenges and support needs at subnational level, engagements took place with:

- **EU Mission on Adaptation:** through the Mission newsletter, the Mission Board meetings, and events such as the Fourth Mission Forum and Regional Forums.
- **Covenant of Mayors:** through their events, community stories and engagement actions.
- **Climate Pact:** through the Community talks (May 2024 and October 2025) on climate resilience, and events, such as the Climate Pact Going Local Talks, Climate Action Days and Together in Action 2026

Cloose cooperation with the **European Climate and Health Observatory** throughout the development of the initiative ensured alignment with analytical work underway and data developments.

Together, these interactions provided valuable opportunities to test emerging ideas, gather targeted insights and ensure coherence with related strands of work.

4.4 Consultations with other stakeholders

Participation in stakeholder events formed an important part of the consultation activities.

Starting in January 2025 and continuing until the submission of this impact assessment, representatives of a wide range of organisations hosted events and meetings at which the initiative

[330] (European Commission. DG CLIMA, 2025c)

was presented, its objectives were outlined, and participants were encouraged to contribute to the call for evidence and the open public consultation.

These exchanges also enabled the collection of preliminary views, concerns and practical insights shared by stakeholders. These inputs were noted and considered alongside written contributions submitted through the formal consultation channels.

These consultations included a wide range of sectors and groups: from academia to industry, from NGOs to trade unions. A non-exhaustive overview is provided in table below (alphabetical order):

Stakeholder/ event	**Sector**
Bentley systems	Industry
Business Europe	Economy
Climate Action Network (CAN) Europe	Climate/ Environment
COPA – COCEGA	Agriculture
Copenhagen Malmö Port, World Maritime University, Union of the Baltic Cities, City of Malmö/ *Future-proofing our port cities conference*	Transport/ industry
De Tijd, L'Echo/ *Future of Europe conference*	Policy
Economist Impact/ *9th Sustainability Summit for SE Europe and the Mediterranean "Seeking a new balance amidst a derailed green transition"*	Climate/ Energy
EIOPA	Insurance
EU Biodiversity Platform	Environment
Eurelectric	Industry
Eurocities	Urban environment
European Aluminium	Industry
European Council of Young Farmers (CEJA)	Agriculture
European Environment Information and Observation Network (EIONET)	Climate
European Policy Centre /*Brussels Economic Security Forum*	Security/ Defence
European Red Cross	Humanitarian aid/ health
Fundamental Rights Agency	Human rights
Ghent University/ *12th European Environmental Law Forum (EELF) Conference*	Academia
Health and Environment Alliance (HEAL)	Health
IDDRI	Economy/ Climate/ Energy
Institute for Climate Economics (I4CE)	Economy
Insurance Europe	Insurance
International Energy Agency (IEA)/ Roundtable on energy infrastructure resilience	Energy/ Climate
International Organization for Migration (IOM)	Migration
OECD	Economy

Pontifical Academies of Sciences and Social Sciences/ *Vatican Pan-European Conference on Climate Resilience*	Academia
SGI Europe	Economy
SMEUnited	Economy
WWF	Climate/ Environment

ANNEX 3: WHO IS AFFECTED AND HOW?

1. Practical implications of the initiative

The initiative does not impose direct regulatory obligations or compliance costs on businesses or citizens. Its primary impacts are on EU institutions and Member State authorities, through strengthened coordination, common methodologies, and the systematic integration of climate resilience into policy design, planning and funding.

For public authorities (EU and national levels), this entails some adjustment and administrative costs (for e.g. implementing the reference warming trajectory, conducting more comprehensive climate risk assessments, applying climate resilience check, etc). Some measures are expected to build on existing processes, and others to streamline processes, thereby minimising additional burden in the medium to long term.

Businesses and citizens are affected indirectly, through improved policy governance and coherence, and consequently, more climate resilient infrastructures, services and investments, and reduced exposure to climate-related risks over time.

2. Summary of costs and benefits

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	*Amount*	*Comments*
Direct benefits		
Improved clarity on duties and climate risk ownership; reduced fragmented approaches to climate resilience and preparedness. EU: clearer EU-level framing of what climate resilience should achieve; more outcome-oriented governance; more coherent use of climate assumptions across legislation, preparedness planning, infrastructure appraisal and risk assessments; stronger and more operational horizontal governance. MS: more consistent national planning and	No quantitative data available, as benefits will depend on the implementation by different actors and across sectors/thematic areas. See "comments" for qualitative assessment.	The operationalised climate resilience by design principle would allow to make public spending decisions taking into account current and future climate risks, reducing the likelihood of future damages and vulnerability of assets. The preferred option improves effectiveness by requiring defined goals, objectives and targets and by supporting a more outcome-oriented approach, though without fully harmonised indicators and EU benchmarks. The preferred option changes the default expectation so climate risks, residual risks, considerations are taken into account in policy design, investments.

stronger accountability for adaptation progress; aligned future/vision at different levels of governance; clearer allocation of responsibilities across ministries, regulators and levels of government; stronger transboundary cooperation and consultation. Private sector: clearer policy signals for adaptation investment and innovation Population: n/a		
Increased policy coherence, integration of climate resilience across sectors/thematic areas. EU: more operational and legally relevant sectoral follow-up with a common methodology; climate resilience systematically integrated into revision of priority legislation and related documents MS: clearer expectation to integrate climate resilience into sectoral policy design and implementation; more consistent and coherent integration of climate resilience across governance levels Private sector: clearer guidance, and more predictable framework conditions for long-lived investment, business continuity and preventive action Population: n/a	As quantification of benefits is limited, the assessment has been based on some specific examples available. For e.g., where the baseline points to annual coastal flood losses of around EUR 10.9 billion in 2050 under a moderate mitigation pathway, and EUR 14.1 billion under high emissions, the preferred option could bring these down significantly. In Denmark, the Cloudburst flood management system to prevent surface flooding is providing approx.. a net EUR 400 million in benefits at national level – the preferred option could scale up these benefits if implemented across different MS. Analysis by JRC on flood adaptation measures shows that the return on investment per EUR is the following: strengthening dikes – EUR 2-2.9; flood water storage EUR 2.9 – 3.5; building protections EUR 5.20.	Sectoral effects are broader and more durable because authorities must integrate climate resilience into decisions rather than relying on voluntary uptake. The preferred option ensures climate resilience is considered in legislations and policies at the EU and national levels.

Improved and more consistent methodologies and information; better assessment of implementation and collective progress on climate resilience EU: clearer framework for monitoring implementation and assessing collective progress; more structured and streamlined MREL; reduced duplication of tools, more coherent use of data and methodologies, greater convergence effects in policy cycles; stronger EU-wide evidence base and better comparability for synthesis and prioritisation. MS: more regular, decision-relevant and comparable national CRAs, providing stronger basis for planning and budgeting; improved planning requirements, clearer processes, better vertical coordination and more consistent implementation across governance levels; stronger indicator frameworks, better alignment, more outcome-based monitoring and clearer feedback into policy revision; more accessible and more usable climate information to support decision-making processes. Private sector: better public risk information for investment timing, business-continuity planning and preventive action. Population: easier access for non-experts to climate-risk information; stronger climate resilience awareness and preparedness.	No quantitative data available. See “comments” for qualitative assessment.	The preferred option does not start from scratch, but would improve/streamline existing processes and fill some gaps. The benefits are not quantified in this case, but gradual integration of climate resilience across governance levels and sectors, and repeated policy cycles under a common framework will lead to better implementation and more efficient resource allocation over time. Outcome-oriented indicators would improve the ability to detect maladaptation earlier, reduce ineffective investments and allocate resources more efficiently. Reusing and connecting existing processes, rather than creating a parallel resilience bureaucracy, is also expected to reduce unnecessary burden. The new tools under the preferred option will also improve access to clear climate information, and support policy decision-making. The baseline shows that 85% of EU citizens see climate change as a serious problem and 81% support climate neutrality by 2050, yet 52% say traditional media do not provide clear information on climate causes and impacts, 49% find it hard to distinguish reliable information from disinformation, and 65% say they need more information to prepare for disasters and emergencies such as heatwaves, floods and storms. The preferred option is expected to reduce duplication, improve accessibility and support more coherent governance.

Indirect benefits		
1. Overview of benefits (total for all provisions) – preferred option		
Indirect benefits are mostly related to the successful implementation at the public sector level, and triggering effects for the private sector and population. Private sector: more predictable funding resulting from predictable climate resilience planning and stable investment environment; better standards which reflect the changes in the policies; clearer communication on climate risks resilience solutions leads to innovation, market growth, competitiveness. Population: better identification of vulnerable groups and services as climate resilience is integrated at policy level across different sectors; better protection of such groups due to increased levels of preparedness, clearer communication on climate risks/ early-warnings, and more climate resilient infrastructures and services	Quantification on the indirect benefits is limited. Some examples based on certain assumptions are presented below. The preferred option is expected to reduce macro-fiscal risk by making infrastructure, public services, health preparedness, territorial planning, ecosystem buffering and public/private investment more resilient through a common integrated framework. For e.g. if considering a 3% climate-proofing uplift (i.e. additional costs for climate proofing investments under the MFF) on at least 50% of a proposed next EUR 2 trillion MFF implies around EUR 15 billion additional cost over the MFF period (around EUR 2 billion/year), but about EUR 60 billion in lifetime benefits through avoided repair costs, fewer disruptions, lower maintenance, longer asset life and reduced stranded-asset risk at EU level. Through the preferred option measures (e.g. duty to consider, the trajectory) and integration of climate resilience across policies and investments, it will generate predictable requirements and demand for climate resilience solutions/products/services. Global investors estimate that annual revenues from climate resilience solutions will more than quadruple in size from USD 1 trillion in 2024 to USD 4 trillion by 2050. In some modelled scenarios, it is estimated that climate adaptation/resilience measures can reduce the annual costs of damage in economic and human terms by 66% - with the preferred option, which includes a more coordinated approach to climate resilience, these benefits could increase.	
*2. Administrative cost savings related to the 'one in, one out' approach**		
(direct/indirect)	No quantified administrative cost savings identified for the private sector / businesses (n/a).	The preferred option does not impose direct private-sector obligations, and the main effects for firms are indirect, via better framework conditions, comparability, resilience-by-design and investment conditions rather than through reduced regulatory or reporting burdens. Accordingly, the evidence base does not provide a quantified estimate of private-

		sector administrative cost savings for OOIOO purposes.

(1) Estimates are gross values relative to the baseline for the preferred option as a whole (i.e. the impact of individual actions/obligations of the preferred option are aggregated together); (2) Please indicate in the comments column which stakeholder group is the main recipient of the benefit;(3) For reductions in regulatory costs, please describe in the comments column the details as to how the saving arises (e.g. reductions in adjustment costs, administrative costs, regulatory charges, enforcement costs, etc.;)

II. Overview of costs – Preferred option

		Citizens/Consumers/Households		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent	One-off	Recurrent
Climate resilience objectives, trajectory, duty to consider and climate risk ownership	Direct adjustment cost	n/a	n/a	n/a	n/a	no detailed quantified estimate	no detailed quantified estimate
	Direct administrative cost	n/a	n/a	n/a	n/a	EU: more than EUR 1 million to develop guidance, common criteria and methodologies MS: no detailed quantified estimate	EU: low hundreds of thousands of euros per update cycle. MS: targeted update costs, but no detailed EU-wide quantified estimate.
	Indirect cost	n/a	n/a	n/a	n/a	no detailed quantified estimate	no detailed quantified estimate
Climate risk management in sector policies, climate resilience by design	Direct adjustment costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	If 3% average climate-proofing cost uplift to at least 50% of the proposed EUR 2 trillion next MFF, additional resilience investment around EUR 15 billion over the MFF period, or

							about EUR 2 billion/year
	Direct administrative costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	Additional administrative costs for funding-screening / approval are described as minimal relative to the underlying investment effects.
	Indirect costs	n/a	n/a	no detailed quantified estimate.	main costs arise indirectly through earlier and more systematic resilience-by-design / investment-design choices.	no detailed quantified estimate.	no detailed quantified estimate.
Climate risk assessments (CRAs)	Direct adjustment costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	no detailed quantified estimate.
	Direct administrative costs	n/a	n/a	Minimal direct cost increase identified; no detailed quantified estimate.	n/a	EU EUCRA: around EUR 2 million; MS national CRA: limited evidence; around EUR 350,000 – 750, 000	no detailed quantified estimate.
	Indirect costs	n/a	n/a	n/a	no detailed quantified estimate.	no detailed quantified estimate.	no detailed quantified estimate.
Planning and	Direct adjustment costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	no detailed quantified estimate.

implementation	Direct administrative costs	n/a	n/a	n/a	n/a	EU plan: around EUR 0.5 – 1.5 million MS national plan: limited evidence; around EUR 400,000 – 1.2 million	Transboundary cooperation is expected to create moderate administrative costs for coordination, joint planning, data sharing and governance arrangements, but no detailed quantified estimate is given for Option B.
	Indirect costs	n/a	n/a	limited indirect planning / information costs possible; no direct quantified estimate	no detailed quantified estimate.	no detailed quantified estimate.	no detailed quantified estimate.
Progress monitoring and assessment	Direct adjustment costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	no detailed quantified estimate.
	Direct administrative costs	n/a	n/a	n/a	n/a	EU: limited evidence. Reportnet3 set-up cost EUR 3.5 million MS: limited and variable evidence. Light national system: around EUR 100,000 – 300,000 Full, comprehen	Limited evidence. EU Reportnet 3 platform-related support and operations around EUR 1 million/ year MS: variable/limited evidence. Finland example: around EUR 300,000/ year for maintenance

						sive system: around EUR 1-2 million	
	Indirect costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	no detailed quantified estimate.
Horizontal enablers	Direct adjustment costs	n/a	n/a	n/a	n/a	Revamp of Climate-ADAPT: EUR 1–2 million over 3 years.	no detailed quantified estimate.
	Direct administrative costs	n/a	n/a	n/a	n/a	EU: set-up costs for Navigator of climate resilience tools and European climate viewer around few hundred thousand EUR for each. MS: n/a	EU: maintenance costs for Navigator around EUR 50,000/year (which includes staff costs – for e.g. additional tools, review of tools, updating database, replies to user requests); for Viewer around EUR 30,000/year (EUR 10,000 for user support, EUR 10,000 for technical maintenance, EUR 10,000 for data curation and documentation). MS: n/a

	Indirect costs	n/a	n/a	n/a	n/a	no detailed quantified estimate.	no detailed quantified estimate.

(1) Estimates (gross values) to be provided with respect to the baseline; (2) costs are provided for each identifiable action/obligation of the preferred option otherwise for all retained options when no preferred option is specified; (3) If relevant and available, please present information on costs according to the standard typology of costs (adjustment costs, administrative costs, regulatory charges, enforcement costs, indirect costs;).

III. Contribution to the administrative burden reduction targets – Preferred option(s)					
Administrative costs [M€]	**New recurrent costs (INs)** (nominal values per year)	**Removed recurrent costs (OUTs)** (nominal values per year)	**Net cost (INs – OUTs)** (nominal values per year)	**New one-off costs (INs)** (annualised total net present value over the relevant period)	**Removed one-off costs (OUTs)** (annualised total net present value over the relevant period)
All businesses	0	0	0	0	0
- in which SMEs	0	0	0	0	0
Public administrations	EU level: EUR 1.1 – 1.3 million Member State: n.q	n.q	n.q.	EU level: EUR 7.2 – 8.4 million Member State: EUR 0.85 – 2.5 million	n.q
Citizens	0	0		0	0

The evidence base makes this table hard to populate robustly because the initiative's impacts are mostly indirect. The preferred option mainly works through governance, planning, common frameworks, tools and enabling conditions, rather than by imposing clear, countable new reporting formalities on firms or citizens. Existing quantified evidence is therefore much stronger on broader adjustment / implementation costs and avoided losses than on administrative burden in the strict 'one-in, one-out' sense.

That said, the preferred option still has clear economic benefits through increased, more coherent and more accelerated resilience. As explained in more detail in the competitiveness check, this is considered the "best-balanced option", with the "strongest balance between burden, avoided losses and competitiveness", and as strongly cost-effective over the long term because it improves framework conditions, comparability, resilience-by-design and investment certainty.

The new one-off costs are presented as estimated ranges, based on the examples and evidence provided, for both EU and Member State level. At national level, these depend whether a Member State can build on existing structures or must establish new systems. Removed one-off costs and recurrent costs are not quantified, as these depend on pre-existing administrate structures and on the specific implementation decisions taken, both at EU and national levels.

The preferred option does not impose direct private-sector obligations, and the main costs arise instead through earlier and more systematic resilience-by-design, adaptation and investment-design choices. This also includes SMEs, which should mainly benefit from better information, knowledge, comparability and risk visibility, even though smaller firms may face heavier short-term adjustment challenges if they decide to adapt and no specific SME support is foreseen in the current design.

3. Relevant sustainable development goals

IV. Overview of relevant Sustainable Development Goals – Preferred Option(s)		
Relevant SDG	**Expected progress towards the Goal**	**Comments**
SDG no.13 – Climate action	Strengthened adaptive capacity and climate resilience by establishing a shared EU–MS objective, a common reference warming trajectory, regular climate risk assessments (EUCRA), mandatory climate resilience checks, and systematic integration of resilience into policy design, funding and legislation.	Strong synergies with SDG 11 (cities), SDG 9 (infrastructure) and SDG 16 (institutions) through resilience-by-design and improved governance
SDG no.11 – Sustainable Cities and Communities	Improved planning coherence, multi-level governance, resilience-by-design in public funding, enhanced access to climate data (viewer, navigator), and awareness campaigns strengthen preparedness of cities and regions.	Synergies with SDG 13 (climate action) through reduced exposure and vulnerability. SDG 10 (reduced inequalities) via improved territorial coherence. Potential trade-off if local capacity constraints limit effective uptake.
SDG no.9 – Industry, Innovation and Infrastructure	Improved sustainability of infrastructure and investment by integrating climate resilience considerations into funding, planning, and regulatory processes. Innovation support in climate risk tools and data infrastructure, enabling the design and operation of resilient infrastructure.	Strong synergies exist with SDG 13 (climate action) and SDG 11 (sustainable cities and communities) through climate-resilient infrastructure development
SDG no.8 – Decent Work and Economic Growth	Supported by reducing climate-related disruptions, improving investment predictability and avoiding maladaptation.	Strong synergy with SDG 9 (infrastructures) and SDG 13 (climate action) through resilient supply chains and infrastructure.
SDG no.10 – Reduced Inequalities	Reduction of territorial and information asymmetries in climate preparedness by improved coordination across governance levels, support for regional and local authorities, awareness campaigns, and accessible tools	Synergies with SDG 11 (sustainable cities) and SDG 13 (climate action) where resilience measures are effectively implemented. Potential trade off due to unequal administrative capacity in some regions.
SDG no. 12 – Responsible Production and Consumption	Indirect progress by embedding climate risk management and resilience-by-design into public funding, legislation reviews and policy planning. Improved information, risk awareness and long-term planning assumptions, supporting more sustainable investments.	Synergies with SDG 13 (climate action) and SDG 9 (infrastructure), as climate-resilient design and planning reduce resource waste, premature asset obsolescence and costly retrofits.
SDG no.17– Partnerships for the Goals	Strengthening of partnerships between EU institutions, Member States, regional and local authorities, and the private sector by establishing common objectives, shared methodologies, interoperable data tools, and coordinated planning processes for climate resilience.	Synergies with SDG 16 (strong institutions) through improved governance and policy coherence. A trade-off is that coordination requirements may increase administrative complexity in the short term.
SDG no.3 – Good health and well-being	Reduced climate-related health risks by strengthening adaptive capacity and resilience through coordinated action, systematic climate	Strong synergies with SDG 6 (clean water and sanitation), SDG 11 (sustainable cities and communities) and SDG 13 (climate

	risk assessments, and the integration of climate resilience into public health planning and infrastructure.	action) through reduced exposure to climate-sensitive health risks, resilient health systems, and improved urban environmental conditions.
SDG no.14 – Life below water	Enhanced resilience of marine ecosystems by embedding climate resilience into policy design and funding, supporting adaptive management of oceans and coastal areas in response to climate-driven risks such as warming, acidification, and sea-level rise.	Strong synergies with SDG 12 (responsible consumption and production), SDG 13 (climate action) and SDG 2 (zero hunger) through sustainable resource use, climate-resilient marine management, and the protection of fisheries and food security
SDG no.15 – Life on land	Improved conservation/ restoration of terrestrial ecosystems by integrating climate resilience considerations into policies and funding mechanisms, enabling ecosystems to better withstand and adapt to climate impacts.	Strong synergies with SDG 2 (zero hunger), SDG 6 (clean water and sanitation) and SDG 13 (climate action) through resilient ecosystems supporting sustainable agriculture, water regulation, and biodiversity conservation under changing climate conditions.

ANNEX 4: ANALYTICAL METHODS

1. Literature review

The analysis of the economic, social and systems impact of climate change is based on a review of scientific literature, including reports by authoritative bodies, such as IPCC. The results from the JRC PESETA IV and TRACE studies, investigating the effects of climate change impacts on the EU at sectorial and regional levels, as well as how impacts can be reduced with adaptation policies, and from the DG ECFIN on the macroeconomic and fiscal impacts of climate change in the EU, assessing the risks and costs of climate change in Europe, are also included.

Annex 1 summarises which type of evidence was used for this impact assessment. Annex 8 and the supporting report 16 include information on the observed and projected impacts of climate change, namely on health, water scarcity, flood risks, infrastructure, and on the land system.

2. Assessment of impacts

The analysis of the impacts of policy was then assessed with the following considerations in mind:

- Positive and negative impacts can occur in all dimensions laid out in the better regulation toolbox, namely economic, social and environmental impacts.
- Overall, impacts can be classified in positive and negative impacts.[331]
- The impacts can be described qualitatively as narratives; some positive and negative impacts can be quantified, and some of the quantified ones can be monetised.

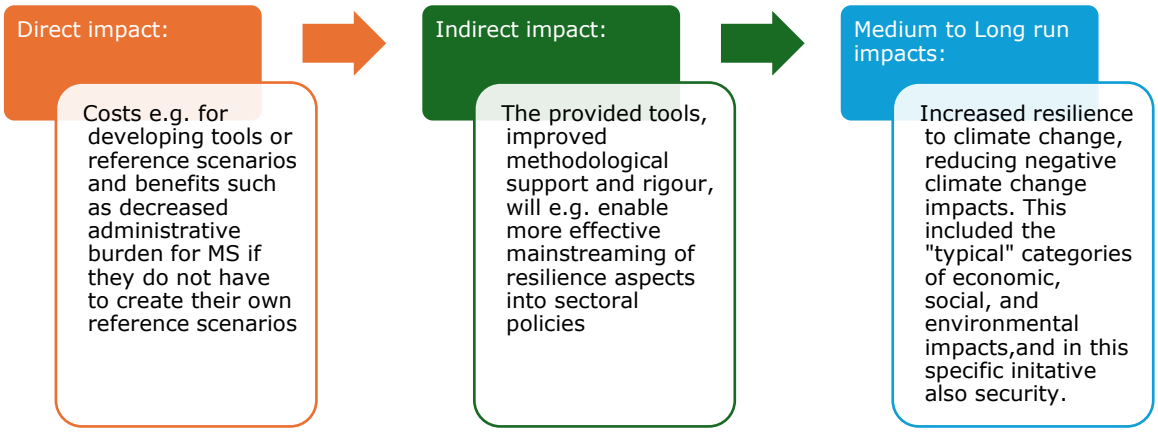
In the impact assessment, many of the short-term negative impacts of the policy options are administrative costs. Some of these have been quantified based on estimates taken from the administrative costs of recent similarly sized initiatives.

The medium to long-run positive impacts, however, consist in broad terms of stronger resilience and, consequently, this will reduce negative consequences from climate change such as irreversible biodiversity loss or rising social inequalities. Those items (more resilience and reduced negative consequences from climate change) are challenging to assess and describe in quantitative terms, and even more so in monetary terms.

In addition, many of the medium to long-run positive impacts will be indirect since planned measures under the Integrated Framework such as better monitoring and planning in itself do not generate benefits but rather create the conditions for better resilience. This is illustrated in the Figure below.

[331] Keeping in mind that a positive impact for one stakeholder group could be a negative impact for another one.

Figure 1: Typical expected logic chain of the impacts



Individual assessment of impacts of course considers great complexities on a case-by-case basis. For example, when addressing drivers related to the private sector preparedness the chain could involve: change EU legislation (this initiative) → change sector legislation → change national legislation/implementation → change financial incentives to private sector → change behaviour in decisions → improved resilience.

The methodology appendices to the supporting report provides a short overview of the extent to which those different types of impacts have been covered in past relevant impact assessments. This is provided as reference, as well as to showcase the challenges that are linked to the assessments of the impacts.

On their own, the single measures individually have limited overall impact on resilience. Instead, the indirect impacts stem from the overall policy options which, through a coherent and broad set of measures, collectively address the problems.

A final challenge, holding true for both negative and positive impacts, is that this initiative is very broad. It aims to create change within several large societal groups (public authorities, public sector, households); and, through the “resilience by design” provisions, it also aims to create change in all relevant economic sectors. Thus, the challenge consists of scoping well what impacts to focus on.

The methodology appendices to the supporting report provides a conceptual overview of how assessments were constructed.

3. Timelines and scenarios

The assessment of impacts need to be developed towards a specific time horizon in comparison with the baseline.

It is suggested to use one time horizon[332] leading to 2050, which is the target date set by the EU Adaptation Strategy for the EU to be a "climate-resilient society, fully adapted to the unavoidable impacts of climate change". For assessments towards this time horizon, we can describe developments in more detail and with more certainty.

In general, the often long-time horizons of policies within the field of climate change adaptation need to be taken into account in the assessment of impacts, but also in the design of the policy options (e.g. using speed and practicality of implementation of the policy options as a potential differentiator).

4. Detailed methodology for the assessment of impacts

- ***Step 1 – Develop the baseline***

The baseline as guided by the Better Regulation toolbox is a "no-policy-change scenario" (Tool #16). Against this all impacts of the policy options for the Integrated Framework are compared. As explained in Tool #16 in more detail, the no-policy-change scenario includes all relevant existing EU-level and national policies that are assumed to remain in force, plus relevant Commission proposals even if not yet adopted. It should also take external factors into account such as expected socio-economic, technological, market and societal developments (e.g. ageing, GDP and urbanisation trends, digitalisation).

In this initiative, that means the baseline should depict how EU resilience develops under the assumption that there is no Integrated Framework.[333]

Against those overall assumptions each specific driver is assessed qualitatively for how it will likely develop in the future. An example of this can be seen below:

Table: Fictional policy option as example – detailed baseline per driver

Driver	Baseline
Monitoring, evaluation & learning: Performance of adaptation action not monitored efficiently.	2050 • EU & national authorities: Maintain fragmented reporting systems, mainly counting outputs (plans, projects, spending); a few frontrunners develop more outcome-oriented indicators, but no common EU resilience indicator set exists. • Sectors & operators: Some critical sectors (e.g. major infrastructure, finance) track selected resilience outcomes; most actors focus on compliance reporting, with ad-hoc evaluations after major events. • Regions & municipalities: Large cities and better-resourced regions build basic dashboards; many smaller or rural authorities still lack staff, tools and data for robust MEL.

[332] The methodology appendices to Annex 13 includes two time horizons, 2050 and 2100.
[333] Discussed in more detail in the methodology appendices to the supporting report

Driver	Baseline
	High-capacity sectors / countries: Run advanced, near-real-time MEL systems and scenario analysis, but largely within their own silos.
Limited climate risk awareness, perception and action among public, private sectors and households.	2050 • Large companies & financial sector: Integrate physical climate risk in parts of investment planning and stress-testing, mainly for major assets and portfolios. • SMEs & primary producers: Mostly reactive; few formal adaptation or business-continuity plans; risk information used sporadically and often only after shocks. • Households: Awareness higher after repeated extreme events; many adopt basic measures (e.g. simple protection, emergency kits), but deep adaptation (retrofits, relocation, comprehensive insurance) remains limited, especially for low-income groups.

It is difficult to quantify some of these impacts because the uncertainty in potential loses at the baseline. However, whenever possible qualitative analysis has been quantified.

Based on the overall assumptions and the description of drivers under the baseline, this is then paired with high-level qualitative narrative of how the identified *problems* will likely further develop under the same conditions. Where available, these are also underpinned with quantitative indicators (e.g. for problem 3, quantitative indicators relating to the competitiveness or preparedness of private sector actors).

- ***Step 2 – Identify and select the most significant impacts***

This identifies the most significant economic and social impacts from the selected policy measures and options. Aligning with Tool #18 of the Better Regulation Toolbox "*given the need to consider impacts across the economic and social pillars [and to] ensure that the subsequent assessment focuses on the most important impacts for each specific case, in line with the principle of proportionate analysis.*"[334]

- ***Step 3 – Assess the most significant impacts 335***

Each option is then assessed in the following terms: EU added value, efficiency, cost effectiveness, sectoral insights, and distributional effects. This provides clarity on why it is in the best interest of the EU to act in this specific manner; how effective the policy is likely to be; how cost-beneficial it is; how it impacts specific high-level sectors; and how it is likely to interact with distributional effects, quantifying and monetising these wherever possible.

[334] "Tool #18: Identification of impacts". See: https://commission.europa.eu/law/law-making-process/better-regulation/better-regulation-guidelines-and-toolbox/better-regulation-toolbox_en

[335] Several Tools from the Toolbox (Tools 56 – 69) are relevant for this subtask which are all listed under chapter 8 of the Better Regulation Toolbox (Chapter 8 – Methodologies for analysing impacts in impact assessments, evaluations and fitness checks)

5. Administrative cost impacts

One large aspect of this is to assess the administrative costs – and administrative cost savings – stemming from the policy measures. This is done through the standard cost model (SCM). The approach for this is presented in the text box below. This is an abridged version of the detailed description of the SCM in the better regulation toolbox.[336]

Text box: Overview of the SCM

Phase 1: Preparatory analysis

It is in his preparatory phase that the basis for the assessment of administrative costs is laid down. Administrative costs consist of two elements: business-as-usual costs and administrative burdens. It is only the latter that is measured in the original SCM, since these refer to activities conducted due to the legal obligation, whereas the business-as-usual activities would also be conducted if the obligations did not exist.

Initially the SCM method is applied to break down regulation into a range of manageable processes and cost parameters that can be measured, with particular emphasis on a quantitative assessment (in value) of the costs of applying the current rules. Next, hypotheses of the expected direct and indirect benefits stemming from each procedure are established in relation to the target groups identified for the regulation. The measurement of administrative burden itself and therefore also the mapping is considered by activity level as it breaks down the activities to the IOs by their data requirements, which is expressed in administration activities. Finally, a choice about data sources and data collection methods is made.

Phase 2: Data capture and standardisation

Following the mapping of processes, costs and identification of the target groups, data is collected to identify the number of entities affected. This phase is additionally concerned with collection of data on time, costs, and frequency of each administrative activity of entities affected by the policy option.

Phase 3: Calculation and reporting

In the final phase, the total administrative burden of the entities investigated is assessed through the core equation of the SCM (see below).

$$\textbf{Administrative cost} = \Sigma\, P_N \times Q_N - \Sigma\, P_R \times Q_R$$

where P (for Price) = Tariff x Time; Q (for Quantity) = Number of businesses x Frequency; and N – new obligations, R – removed obligations at EU/national level

Price represents the costs incurred by businesses and is constructed on the basis of labour costs, and the time required for carrying out the administrative activity, measured in hours. The labour cost is the gross salary of those performing the action plus overhead costs of 25%.

When appropriate, outsourcing is included in the average cost per action. This is particularly relevant to administrative costs carried by small businesses as these are more likely to outsource the administrative activities. Costs of equipment and supplies acquired solely to comply with information obligations refer to acquisition price and depreciation period (service life of 'x' years). In the case of the fisheries sector and fisheries management, this could, for example, relate to IT costs. Total administrative burdens are measured only for the entities investigated only and therefore need to be extrapolated to the EU level.

[336] See Tool #58 (EU Standard Cost Model).

6. Other impacts

In practice, the complexity of the problem and the diversity and high number of policy impacts means it is difficult to develop a comprehensive quantitative assessments for each. Instead, wherever possible, quantification has been made using policy examples implemented in MS in their efforts towards climate adaptation and resilience. The learnings from these policies interact with the level of intervention underlining proposed policy options in this initiative to estimate a quantitative outcome. A further degree of detail on quantifying other impacts is available in the methodology appendices to the supporting report.

7. The comparison of policy options

After the impacts have been assessed, this information is used to compare the policy options. There are different approaches that can be taken for this.[337]

After evaluating the most significant impacts of different options, the analysis compares them in terms of EU added value, effectiveness, cost-efficiency, and distributional effects. As full quantification is limited by available data a multi-criteria decision analysis (MCDA) approach has been taken. This accommodates multiple criteria, including both quantitative and qualitative factors, making it especially suitable for complex decisions and enhancing transparency and comprehensiveness. Consequently, as already discussed in the proposal, the MCDA would be the most relevant framework for the comparison of impacts in the context of the Integrated Framework.

This information is then summarised in a structured matrix format for presentation and easy high-level comparison of options. An overview of the proposed criteria is provided in the proposed comparison matrix below.

8. Sectoral Focus

Overall, the scope of the Integrated Framework is sector-agnostic: its provisions apply across all sectors, and the impact assessment (IA) therefore remains comprehensive.

However, to illustrate the expected changes in a more tangible way, analysis on a limited set of focus areas and sectors has been used to provide concrete examples throughout the IA. This selection is not meant to suggest that other sectors or areas are less affected or less important in the transformation towards resilience; rather, it is a pragmatic approach to manage the inherent complexity of the topic, balancing the need for a coherent overall narrative with the ability to add depth through targeted sectoral illustrations.

[337] As discussed in the introduction to Tool #62. Multi-criteria decision analysis and also in more detail in methodology appendices to the supporting report

In addition, the IA places particular emphasis on two cross-cutting dimensions of resilience that will feature prominently in the assessment: (1) the systemic nature of climate change, affecting all areas of society and the economy, and (2) the impacts of climate change and adaptation efforts on social stability and justice.

Focus Areas/Sectors	Dimensions
- **Agriculture and food security** - **Health and wellbeing** - **Infrastructure and built environment (incl. energy, transport and tourism)** - **Finance and insurance**	- **Systemic risks** - **Social and just resilience**

Proposed comparison matrix

Criterion	*[Definition]*	Policy option 1	Policy option x
Summary of key impacts	*A concise synthesis of the most significant environmental, security, economic and social impacts of each policy option compared to the baseline (2040/2100) – including their direction (positive/negative), order of magnitude and main groups/territories affected.*	[Qualitative summary, supported by available quantitative information] [Semi-quantitative rating]	…
Effectiveness	*The extent to which a policy option is expected to achieve the specific and general objectives of the initiative given the direct and indirect behavioural changes it triggers and across the two time horizons (2040 and 2100).*	[Qualitative summary, supported by available quantitative information] [Semi-quantitative rating]	…
Cost-effectiveness and competitiveness	*Covers the relationship between the expected resilience benefits (e.g. avoided damages, reduced disruptions, better preparedness) and the costs of each option, including administrative and compliance costs for public authorities and businesses, as well as any public expenditure, in line with the Better Regulation focus on efficiency. It also reflects impacts on competitiveness, especially for EU firms and SMEs*	[Qualitative summary, supported by available quantitative information, per stakeholder group] [Semi-quantitative rating]	…
Coherence	*The degree to which each option is internally coherent (its measures reinforce rather than contradict each other) and externally coherent with existing and planned EU and national policies.*	[Qualitative summary, supported by available quantitative information] [Semi-quantitative rating]	…
EU-added value / proportionality	*Assesses why EU action (in the particular option) is preferable to purely national or local action and whether the type and intensity of intervention is*	[Qualitative summary, supported by available	…

Criterion	*[Definition]*	Policy option 1	Policy option x
	proportionate to the scale of the climate risks and expected benefits. It looks at: • *EU added value: cross-border and systemic risks, economies of scale in data, analytics and standards, internal market and financial-stability considerations, and the ability of the framework to support Member States beyond what they could do alone.* • *Proportionality: whether the option does not go beyond what is necessary to achieve the objectives, uses the least burdensome instruments compatible with those objectives, and leaves appropriate flexibility to Member States.*	quantitative information] [Semi-quantitative rating]	
Distributional effects (incl. considerations on just resilience)	*How the costs, burdens, risks and benefits of each option are distributed across Member States, regions, sectors, and social groups, including vulnerable groups (e.g. low-income households, climate-exposed workers, rural communities, outermost regions).* *This includes territorial and social distributional analysis (as in the relevant BR tools) and explicit consideration of "just resilience": whether the option helps to reduce or exacerbate inequalities in climate risk exposure and in access to protection, finance and support, now and over time.*	[Qualitative summary, supported by available quantitative information] [Semi-quantitative rating]	…

As can also be seen in that matrix template, in addition to summarising the information qualitatively, for the policy options for each criteria a semi-quantitative rating to facilitate comparison has been used. The proposed framework is shown in the following Table.

Legend of signs to be used in the comparison table

Sign	Legend
- / --/ ---	Low to high negative impact expected
+ / ++ / +++	Low to high benefits or savings
0	No measurable or significant impact expected
()	Brackets, in combination with the above, to show if impacts are potential
From / to	If there is uncertainty as to the range of impacts, a range (of the first two above) is indicated

ANNEX 5: COMPETITIVENESS CHECK

1. Overview of impacts on competitiveness

Dimensions of Competitiveness	Impact of the initiative (++ / + / 0 / - / -- / n.a.)	References to sub-sections of the main report or annexes
Cost and price competitiveness	(++)*	2.2.2; 6.1; 6.2; 6.3; 7; 8; annex 3, annex 6, supporting report (3.2.2, 3.3, 3.4.3, 7.3, 7.4, 8)
International competitiveness	(++)*	2.2.2; 6.1; 6.2; 6.3; 7; 8; annex 3, annex 6, supporting report (3.2.2, 3.3, 3.4.3, 7.3, 7.4, 8)
Capacity to innovate	(+)*	2.2.2; 2.3.4; 6.1; 6.2; 6.3; 7; 8; annex 3, annex 6, supporting report (3.2.2, 3.3, 3.4.3, 7.3, 7.4, 8)
SME competitiveness	(+)*	2.2.2; 6.1; 6.2; 6.3; 7; 8; annex 3, annex 6, supporting report (3.2.2, 3.3, 3.4.3, 7.3, 7.4, 8)

*In brackets, as impact of the initiative on these dimensions is indirect.

2. Synthetic assessment

The preferred option is expected to have an overall positive effect on competitiveness. The competitiveness angle is analysed in this impact assessment through the lens of the unprepared private sector, which is also (but not only) caused by fragmented climate resilience in the EU and MSs, as these insufficient efforts by public authorities and businesses undermine EU competitiveness and the functioning of the single market. Unmanaged physical risk raises production costs, deters investment, disrupts supply chains, and narrows the fiscal space available for education, research and innovation. Delays in managing climate risk lock in vulnerabilities and leave EU firms losing ground to global competitors that are already investing in resilience.

The preferred option improves competitiveness mainly through better framework conditions, as no obligations are imposed to the private sector. It is therefore expected to improve competitiveness indirectly by changing governance, decision-making, investment conditions and resilience by design in public and sectoral frameworks.

On cost and price competitiveness, the preferred option has some short-term cost implications, but these are mainly linked to adaptation and investment-design choices rather than direct private-sector compliance under this initiative.

On international competitiveness, the preferred option is positive because it improves the level playing field within the Union and the resilience of cross-border economic activity. Chapter 7

states that it has “strong EU added value” because it reduces fragmentation in how climate-risk ownership is defined and managed, supports comparability, and improves handling of transboundary/internal-market issues. This is relevant for firms operating across borders, including those that invest, insure assets or run supply chains in several MSs, as well as for infrastructure-dependent sectors exposed to cascading risks. The assessment does not identify direct trade barriers or direct product-market disadvantages for EU firms. Rather, it points to positive effects on resilience, investment certainty and long-term operating conditions. It also points to a role for standardisation, where the EU could become a new frontrunner.

On capacity to innovate, the preferred option is expected to have a positive effect. The assessment explicitly finds that it supports innovation in resilient products and services. This is consistent with the problem analysis, which notes that undercapitalising resilient infrastructure and climate-smart technologies can forfeit first-mover advantages in growing global markets.

Global annual revenues from climate resilience solutions including flood defences, heat-resilient infrastructure, early warning systems, smart cooling, drought-resistant agriculture, climate-risk analytics are projected to grow from USD 1 trillion in 2024 to USD 4 trillion by 2050. European firms are well positioned to capture a substantial share of this market, but only if there is consistent domestic demand to scale against.

Recent research provides a picture of how a demand pipeline is expected to emerge in Europe.[338] The study maps windows when adaptation works within Europe are particularly desirable and impactful for European competitiveness, 25 such windows are open now. These include:

- Major dams across Europe which are already past their 100-year design life. These are mostly concentrated in Spain (15) and Germany (7). A further 23 will reach end-of-life by 2030, 92 by 2040, and 144 by 2050 with each representing a procurement opportunity for upgraded, climate-resilient infrastructure.
- Two of Europe's largest storm surge barriers: MOSE in Italy and the Maeslant Barrier in the Netherlands will reach functional thresholds before 2100, requiring replacement or substantial upgrade. The MOSE faces closure frequency constraints as early as 2050–2060 under current assumptions.
- A resource-driven opportunity window is currently open across Europe for hybrid flood risk management which analysis under a 3 °C warming scenario finds to be more cost-effective than reliance on individual measures.

These opportunities are scheduled, capital-intensive public procurement decisions. The benefit of the initiative will be to be to ensure that these decisions are made strategically, creating a consistent, predictable demand that EU resilience industries can plan and invest against. A fragmented and uncoordinated national approach is likely to dissipate the opportunity which resilience action holds for European industry and technology.

By providing clearer long-term signals, improving resilience integration and using standardisation as a channel for mainstreaming, the preferred option should support innovation in climate services, resilient design, data and analytics, infrastructure solutions and related business models.

[338] (Di Fant et al., 2026)

The SME competitiveness will depend on a matter on factors. SMEs have no direct obligations under the preferred option and should benefit from improved information, knowledge, comparability and risk visibility. At the same time, SMEs are less able than large firms to absorb the cost of adaptation measures, especially where these require significant upfront investment or specialist expertise. SMEs are especially affected by fragmented tools and weak access to usable climate-risk information, while the assessment indicates that short-term adjustment costs may fall more heavily on SMEs. However, depending on implementing measures by the private sector and some capacity building, the preferred option is likely to improve SME preparedness over time Overall, the effect on SME competitiveness is therefore assessed as positive.

3. Competitive position of the most affected sectors

Given the horizontal nature of the initiative, the competitiveness effects are not concentrated in one single sector.

For this initiative, a fully-fledged quantitative benchmarking of the current competitive position of all affected sectors against non-EU competitors is not available. This is proportionate, given that the main competitiveness effect of the preferred option is horizontal and framework-related rather than a direct intervention in one specific product market. The evidence nevertheless supports a clear conclusion: by improving comparability, integrating climate resilience by design, improving governance and policy coherence, cross-border coordination and long-term investment conditions, the preferred option should strengthen the competitiveness of the most affected sectors over time. Climate resilience also presents a market opportunity to develop and scale up solutions to increase the EU’s preparedness to face current and future climate risks.

ANNEX 6: SME CHECK

OVERVIEW OF IMPACTS ON SMES

Relevance for SMEs
Based on SME filter, this initiative was identified as relevant for SMEs[339] and analysed as such. (See additional information)

(1) IDENTIFICATION OF AFFECTED BUSINESSES AND ASSESSMENT OF RELEVANCE
Are SMEs directly affected? *(Yes/No)* In which sectors?
No - Preferred option does not impose direct obligations/impacts on SMEs
Estimated number of directly affected SMEs
N/A
Estimated number of employees in directly affected SMEs
N/A
Are SMEs indirectly affected? *(Yes/No)* In which sectors? What is the estimated number of indirectly affected SMEs and employees?
Yes. The European Union and its Member States are insufficiently prepared to manage climate risks and SMEs are indirectly affected across multiple sectors due to policy unpreparedness for climate impacts across the EU. For example, floods – being the most frequent and economically damaging hazard - cause physical damage, business interruptions and supply chain disruptions. Heatwaves also affect SMEs, especially in outdoor, labour-intensive, and heat-sensitive activities, as well as in tourism and hospitality. Droughts increasingly impact water-intensive sectors, such as chemicals, textiles and food processing. SME-specific loss data is limited as most databases only report at aggregate sector or national level.[340] For example, SMEs that operate in or support critical infrastructure sectors (e.g., transport, telecommunications, health) are more vulnerable to systemic and compounding risks, with SMEs recommending the development of shared standards for climate adaptation.[341] The uncertainty and lack

[339] https://ec.europa.eu/docsroom/documents/63274
[340] (sme united, 2025)
[341] (Ministry of Economic Affairs and Employment of Finland et al., 2025)

of clear definitions around climate risk management and expectations by public authorities is also a challenge SMEs face.[342]

Together with the lack of established methodologies, the need to rely of multiple, overlapping information sources and limited availability and high costs of data providers[343] makes SMEs disproportionately affected when compared to large companies, for example.

As the preferred option imposes obligations to EU and MS public authorities across sectors and policies, once those are implemented, then they will affect SMEs. Section "(3) assessment of impacts on SMEs" describes how the preferred option will affect indirectly SMEs.

(2) CONSULTATION OF SME STAKEHOLDERS

How has the input from the SME community been taken into consideration?

Input was collected through the Call for evidence, Open Public Consultation and bilateral exchanges (annex 2).

The most mentioned elements from SMEs were the need for access to data, financial support, especially for small and micro enterprises, and clarification of responsibilities between EU, national and subnational authorities.

More details on the overview of replies by SMEs to the Open Public Consultation can be found in "Additional information", and how the initiative will address them in sections (3) assessment of impacts on SMEs and (4) minimising negative impacts on SMEs.

Are SMEs' views different from those of large businesses? *(Yes/No)*

No. SME's views do not differ from those of large businesses regarding what the initiative should address. However, they differ in their needs: SMEs typically have more limited capacity to manage climate risks and are more vulnerable to disruptions from extreme weather events, as they often lack business continuity plans and access to affordable insurance coverage.

(3) ASSESSMENT OF IMPACTS ON SMES[344]

What are the estimated direct costs for SMEs of the preferred policy option*?* (Fill in only if step 1 *flags direct impacts)*

Qualitative assessment

N/A

Quantitative assessment

N/A

[342] (EFRAG, 2025)
[343] (European Commission. DG GROW et al., 2024)
[344] The costs and benefits data in this annex are consistent with the data in annex 3. The preferred option includes the mitigating measures listed in section 4.

What are the estimated direct benefits/cost savings for SMEs of the preferred policy option[345]?
Qualitative assessment
N/A
Quantitative assessment
N/A
What are the indirect impacts of this initiative on SMEs? *(Fill in only if step 1 flags indirect impacts)*
The preferred option will have indirect impacts on SMEs, mainly through better policy coherence, improved information and market signals. As EU and MS public authorities better align their policies and decisions with the climate resilience objective and apply the reference warming trajectory, sector-specific policies and tolerable risk levels should be defined. These changes will likely trickle down to SMEs operating in affected sectors, requiring them to adjust their operations if they are not doing so yet. This might entail some adjustment costs but will most likely increase the amount of avoided losses from climate events. Small and micro enterprises might face some financial constraints to fully integrate information into investment decisions. The integration of the climate resilience by design principle into public funding and policies will also shape SMEs investment decisions and influence their access to finance. At the same time, improved and more coordinated climate risk assessments – including regular EUCRA and improved methodologies at national and EU level – will provide clearer information on sectoral and cross-sectoral risks, helping SMEs better understand and manage their climate risks. The preferred option also includes the development of new digital tools – the climate navigator and climate viewer – which will be open-access and can support SMEs by offering more accessible and granular climate risk data for non-experts. These developments can also create innovation and market opportunities, by signalling demand for climate resilience technologies and services. Successful examples are already being developed at the EU level across various sectors, but with the initiative, European SMEs, including start-ups, can further develop, scale up and/or adopt these products to strengthen their climate resilience and competitiveness.

(4) MINIMISING NEGATIVE IMPACTS ON SMES
Are SMEs disproportionately affected compared to large companies? (*Yes/No)* **If yes, are there any specific subgroups of SMEs more exposed than others?**
No.

[345] The direct benefits for SMEs can also be cost savings.

Have mitigating measures been included in the preferred option/proposal? (Yes/No)
Yes. By including qualitative assessment of measures impacts on SMEs, the preferred option was also considered the best in terms of benefits for SMEs in the short to long term. The preferred option provides better regulatory certainty and policy clarity, which would support innovation and investment in climate resilience products and services as better risk management and fewer climate losses would at least partly offset the higher costs for SMEs. Besides the measures mentioned in (3) assessment of impacts on SMEs, which will provide clarity in terms of climate risk assessments, policy coherence, and provide improved open-access data, the preferred option also includes guidance to private sector on how to apply key concepts introduced by the initiative, such as climate resilience by design, common reference warming trajectory).
CONTRIBUTION TO THE 35% BURDEN REDUCTION TARGET FOR SMES
Are there any administrative cost savings relevant for the 35% burden reduction target for SMEs?
N/A

ADDITIONAL INFORMATION

When the initiative was announced, it was identified as relevant for SMEs. However, during the preparations of this impact assessment (including discussions with the ISCG), the policy gap was identified as the main problem to be addressed. As mentioned in chapter 8 of the SWD and other annexes (for e.g. Annex 3, 5), the preferred option does not impose any direct regulatory obligations or compliance costs on businesses, including SMEs. Its primary impacts are on EU institutions and Member State public authorities, through strengthened coordination, common methodologies, and the systematic integration of climate resilience into policy design, planning and funding.

Therefore, only some qualitative overview of indirect impacts to SMEs is presented. Below is a summary of the replies received specifically from SMEs to the Public Consultation, which has informed our initiative and the information provided in this annex.

Open Public Consultation – replies by SMEs

Most noted findings:

1) Make sure SMEs have access to data and stay up to data. There should be no information deficit
2) Financial support for SMEs to make the transition especially small/micro
3) Clear communication on tasks, expectations and collaboration between EU - MS and local

Detailed results:

Fields of activity in which you operate:

- Climate mitigation and adaptation (32.71%)
- Energy (25.23%)
- Financial and insurance (25.23%)
- Construction and real estate (24.30%)
- Biodiversity and nature protection (18.69%)
- Water and Waste (17.76%)
- Other (14.95%)
- Manufacturing (13.08%)
- Agriculture (10.28%)
- Forestry and Fishing (9.35%)
- Research (7.48%)
- Education and Training (7.48%)
- Telecommunication (4.67%)
- Defence and Security (3.74%)
- Wholesale and retail trade (3.74%)
- Mining and quarrying (3.74%)
- Arts, sports and recreation (2.80%)
- Health, care and social services (2.80%)
- Hotel (2.80%)
- Food services (1.87%)
- IT (1.87%)
- Public Administration (1.87%)
- No Answer (1.87%)
- Content production and distribution (0.93%)
- Publishing (0.93%)

How prepared do you consider yourself to face the potential impacts of climate change?

- The majority says they are slightly prepared (57.0%)
- Only 7.5% Says they are fully prepared

Which of the following would help you become better prepared for the impacts of climate change?

- Better planning and preparation by public authorities (75.70%)
- Easier access to funding or financing for my/our actions (75.70%)
- Easier access to data and information relevant to my area/situation (64.49%)
- Greater local ownership of planning, implementing measures, and monitoring success (55.14%)
- Expert support to prepare / protect my home / family / company etc. (48.60%)

Please name the three policy actions that would most help you improve your risk awareness and preparedness for climate change impacts

- Increasing funding and financial incentives for adaptation measures
    - Specific funding for risk level audit and climate change adaptation work
- Improving accessibility and transparency of climate risk data and information
    - Keep SMEs up to date
- Support from national throughout the process to help local businesses while harmonizing the risk assessment methodology.
    - National adaptation plans could stimulate progress in regional and local adaptation measures
    - Clear long-term direction

Which sectors are most important for integrating the principle of 'climate resilience by design'?

- Building, construction, infrastructure
- Water management
- Agriculture
- Transport
- Urban planning

Are there any existing policies or legislation that prevent you from taking effective action to be better prepared for the impacts of climate change?

- The main barrier is not 'a single policy' but instead the fragmentation and lack of policy coordination and structural obstacles
- The biggest obstacle for businesses is legislative inconsistency
- Funding constraints that slow implementation
- Current focus on ex-post relief then ex-ante

There is support for the common baseline climate trajectories/scenarios and acceptable risk levels (55%+ fully agree, 24%+ slightly agree)

- The common baseline climate trajectory should constitute a common baseline without preventing certain organisation from using alternative references depending on their exposure and activities
- Make sure to adapt to Member States differences

There is majority support for the development of climate risk assessments

- But maintain flexibility for local and national contexts, taking into account the differences between not only MS but also at the local level
- Climate risk assessment should not be static but take into account the nonlinear nature of climate change

There is majority support for defining climate resilience, adaptation planning and the determination of risk owners

- Make sure that the tasks for risk owners are clearly identified
- If private companies are appointed as risk owners, they should be supported with either information and/or financial support

There is high majority support (70%+) for complementing action at the EU level by Member State action, in compliance with the subsidiarity principle

- Take care of vulnerable communities and groups
- Try to address climate adaptation in current legislation, try to avoid new legislation

There is majority support for the development of performance indicators for both the EU and Member States as well as improved monitoring, reporting, evaluation and learning

- Using existing indicators where possible is key
- Streamline monitoring with limited performance indicators that are as clear as possible

Please specify other measures with transformational effects that the Commission should include in its legislative proposal on climate resilience

- Early detection for floods / wildfires / forest / pests / diseases
- Integrate climate resilience agenda with security resilience agenda, especially in the case of energy grids and local energy sources
- The package should not consist of large bureaucratic burdens for the private sector.
- Mainstreaming climate resilience into policies, planning and investments
- Prioritize nature-based solutions

What policy measures should the EU and Member States take to ensure that the most vulnerable groups and geographical areas receive adequate support and are protected from the disproportionate impacts of climate change?

- Implement 'just resilience' criterion across all major funding programs
- Create vulnerability maps (either by EU of MS)
- Member states could carry out standardised social-vulnerability assessments

What measures should the EU and Member States take to protect people's health against the impacts of climate change?

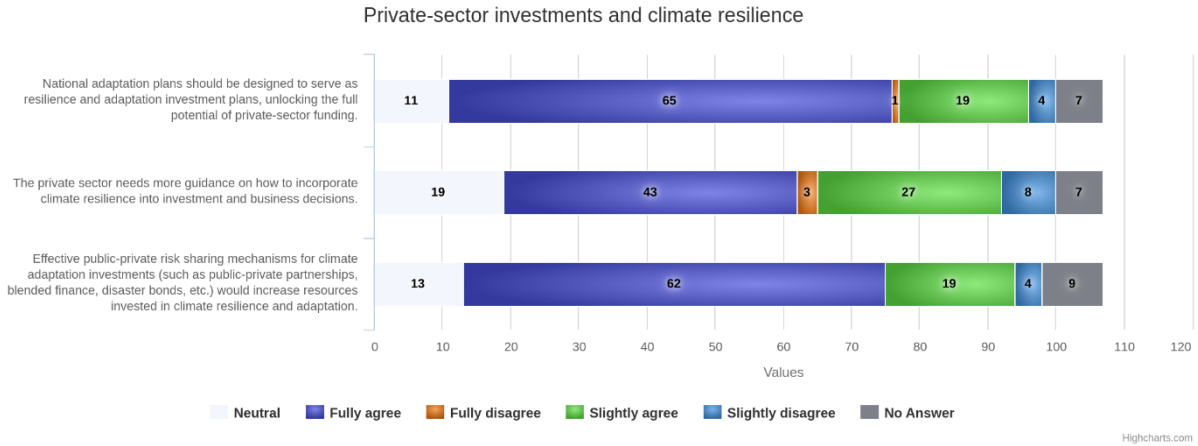
- Strengthen early warning systems and health surveillance
- Promote climate-resilience health infrastructure and services
- Integration of climate-health risks into national health strategies and emergency preparedness plans

What measures could improve the competitiveness and innovation of climate resilience products/services in your sector/industry the most?

- Increased public funding and investment (76% very relevant)
- Improved market certainty and regulatory support (69% very relevant)
- Increased consumer awareness and demand (51% Very relevant)

In your sector / industry / area, what are the climate resilience technologies/innovations that you need to develop or scale up to make your sector/industry more competitive?

- Risk data and modelling
- Cooperation between sectors, institutions and government
- (other answers were extremely sector specific going into specific technologies etc.)
- Overwhelming support of integrating and incorporating climate resilience consideration spending/funding/financial decisions in all levels of the public and private sector (90%)



What are the key obstacles for scaling up investments strengthening climate resilience and adaptation?

- Small scale companies or farmers cannot afford major investments
- There needs to be reliable information regarding risks to make the right investment choices
- Lack of standardized metrics and quantification of adaptation benefits

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PART 2/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

European Integrated 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)

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ANNEX 7: INDICATORS PROPOSED FOR MONITORING AND EVALUATING THE IMPLEMENTATION OF THE INITIATIVE

As stated in chapter 9 ('How will actual impacts be monitored and evaluated?'), this annex describes the proposed key performance indicators (KPIs) for monitoring the implementation of the initiative.

Monitoring of progress of the preferred option will rely on a limited set of KPIs, covering both process and progress aspects. It needs to be designed to be proportionate and based primarily on information reported in existing processes and those under development to avoid additional reporting obligations as much as possible. The baseline for each KPI will be established at the start of the implementation of the package, based on the latest available reporting (if any) and other relevant data sources. The Commission will carry out an evaluation of the effectiveness, efficiency, coherence, proportionality and subsidiarity of the initiative and present a report on the main findings to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions six years after the entry into force of the legislative act, which may result in a proposal to review it.

Some general caveats in monitoring and evaluating climate resilience and adaptation policies, which will affect monitoring and evaluation of the initiative, need to be pointed out. The main constraint is shortage and quality of data. At Union level, the evidence base on uptake of climate resilience and adaptation policies and actions is not fit-for-purpose and is evolving. At MS level, the main data source is reporting under Article 17 and 19 of the Governance Regulation. Beyond that, data sources remain limited: international indicators are currently under development, EU-level indicators are not yet established, and national indicators are not comparable and scalable to Union level. Additional data will be obtained from related Union monitoring and reporting processes, although these do not always capture climate resilience. This points to the need to agree on KPIs that can already be operationalised with additional, new KPIs to be developed over time.

The proposed set of KPIs has been designed with due regard to the interaction between the proposed Regulation, the Governance Regulation and the European Climate Law. The planned review of the Governance Regulation offers an opportunity to streamline and improve the reporting requirements and strengthen the evidence base. The European Climate Law provides for five-yearly assessments by the Commission of Union and national progress on climate adaptation, while leaving flexibility as regards the data sources, methods and scope to be applied. It can be used for the needs of the monitoring of the initiative but would benefit from more uniform data.

The KPIs proposed below are meant to be used to monitor the implementation of the initiative and are subject to developments in the relevant data collection and reporting processes.

Table 1 KPIs for monitoring the implementation of the initiative

General objective/ To make EU and its Member States more resilient to current and future climate risks				
Indicator		*Unit of measurement*	*Data source*	*Frequency of measurement*
Annual economic losses caused by weather-and climate-related events in the Member States, disaggregated by sectors and themes as feasible		M EUR	EEA	Annual
Share of climate-related economic losses uninsured		%	EIOPA	Annual
Climate-related contingent liabilities and fiscal costs in the Member States		M EUR	Published by Member States under the budgetary processes according to Council Directive 2011/85/EU Article 14.3	Annual and multiannual
Number of deaths caused by weather and climate-related events		Number	EEA / EM-DAT (international disaster database) / National Health registries	Annual
Specific Objective 1/ Climate risk ownership is clarified at EU and Member States across all governance levels and sectors				
Operational Objective	*Key Performance Indicator*	*Unit of measurement*	*Data source*	*Frequency of measurement*
EU&MS adaptation strategies and plans (AS/AP) identify public authorities that are responsible for addressing climate risks identified in climate risk assessments	Share of climate risks addressed in adaptation strategies and plans (AS/AP) with clearly assigned responsible public authorities	%	To be established (Governance Regulation does not cover this at present)	Biennial
EU&MS adaptation strategies and plans (AS/AP) identify expected level of residual risks, based on the estimated benefits of the measures in AS/AP	Number of adaptation strategies and plans (AS/AP) that include an explicit consideration of residual risk	Number	To be established (Governance Regulation does not cover this at present)	Biennial

Specific Objective 2/ Policy and implementation decisions of climate risk owners consider current and future climate risks and support climate resilience				
Operational Objective	*Key Performance Indicator*	*Unit of measurement*	*Data source*	*Frequency of measurement*
The Commission and MS integrate reference warming trajectory in policy decisions	Number of Member States applying the reference warming trajectory in national adaptation strategies and plans (NAS/NAP) and climate risk assessments	Number	To be established (Governance Regulation does not cover this at present)	Biennial
	Share of Commission policy initiatives supported by impact assessments that apply the reference warming trajectory	%	Internal review of Commission impact assessments' climate consistency checks	Biennial
EU&MS adaptation planning considers principles of good governance	Adopted adaptation strategies and plans (AS/AP) aligned with the common parameters and requirements for planning	Number	To be established (Governance Regulation does not cover this at present)	Biennial
	Number of Member States whose adaptation strategies and plans (AS/AP) include thematic and horizontal objectives	Number	To be established (Governance Regulation does not cover this at present)	Biennial
	Number of Member States whose adaptation strategies and plans (AS/AP) set quantified targets	Number	To be established (Governance Regulation does not cover this at present)	Biennial
Public authorities/risk owners integrate climate resilience in policies	Number of published sectoral risk assessments and adopted sectoral plans at MS level that respectively assess and address climate risks	Number	To be established (Governance Regulation does not cover this at present)	Biennial
EU&MS monitoring and evaluation frameworks and assessments provide an overview of progress on individual measures in adaptation strategies and plans (AS/AP), their	Share of identified measures in adaptation strategies and plans (AS/AP) with defined indicators to assess progress	%	To be established (Governance Regulation does not cover this at present)	Biennial

effectiveness, and of collective progress				
Increased climate resilience investments in line with the climate resilience by design principle	Value of EU funded projects having undergone climate resilience proofing	M EUR	Multiannual Financial Framework	Annual
	Value of economic losses of EU funded projects caused by weather- and climate-related events.	M EUR	Reporting by MS during the durability period of completed projects under the MFF	Annual
Policies, capacity and tools developed to increase awareness of risks, impacts and climate resilience solutions	Number of accesses to EU climate risk and resilience tools	Number	Web analytics and surveys of Climate-ADAPT, Climate Viewer and Navigator	Annual
	Number of Member States with identified primary open-access tool providing climate risk related information for public sector decision-making	Number	To be established (Governance Regulation does not cover this at present)	Biennial
Specific objective 3/ Private sector actors are aware and enabled to better identify and manage their current and future climate risks				
Operational Objective	*Key Performance Indicator*	*Unit of measurement*	*Data source*	*Frequency of measurement*
Increase awareness of physical impacts of climate change and their consequences	Share of EU companies taking measures to address physical impacts of climate change	%	EIB investment survey	Annual
Improve access to knowledge/ data on climate risks that is easy to understand and applicable to own situation	Share of EU companies using climate risk/ resilience tools	%	EIB Investment survey, SME Envoy network reports	Annual
	Number of European infrastructure/management/other standards updated to include requirements on climate risk assessments or standardising climate services and technical solutions for climate resilience	Number	Data reported by European Standardisation Organisations	Annual
Specific Objective 4/ The EU population is aware and enabled to better identify and manage its current and future climate risks				
Operational Objective	*Key Performance Indicator*	*Unit of measurement*	*Data source*	*Frequency of measurement*

Improve individual awareness/perception of climate risks and awareness of appropriate climate resilience solutions	Eurobarometer indicator on climate awareness and perception	%	Eurobarometer surveys	Every 2 years

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PART 3/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

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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

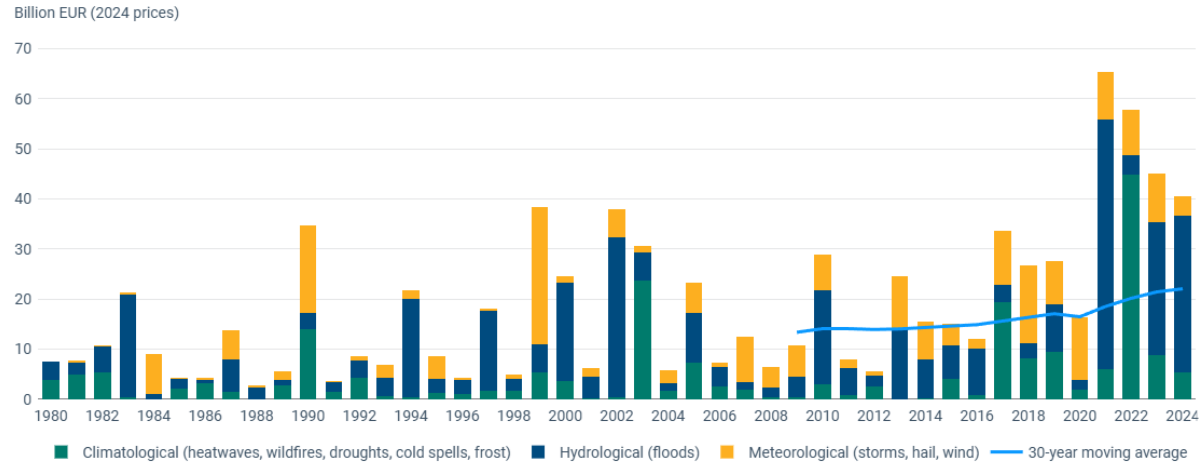
upward price pressure (particularly in food) that can be non-linear, persistent, and difficult for regulators to offset through conventional monetary policy tools[6].

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

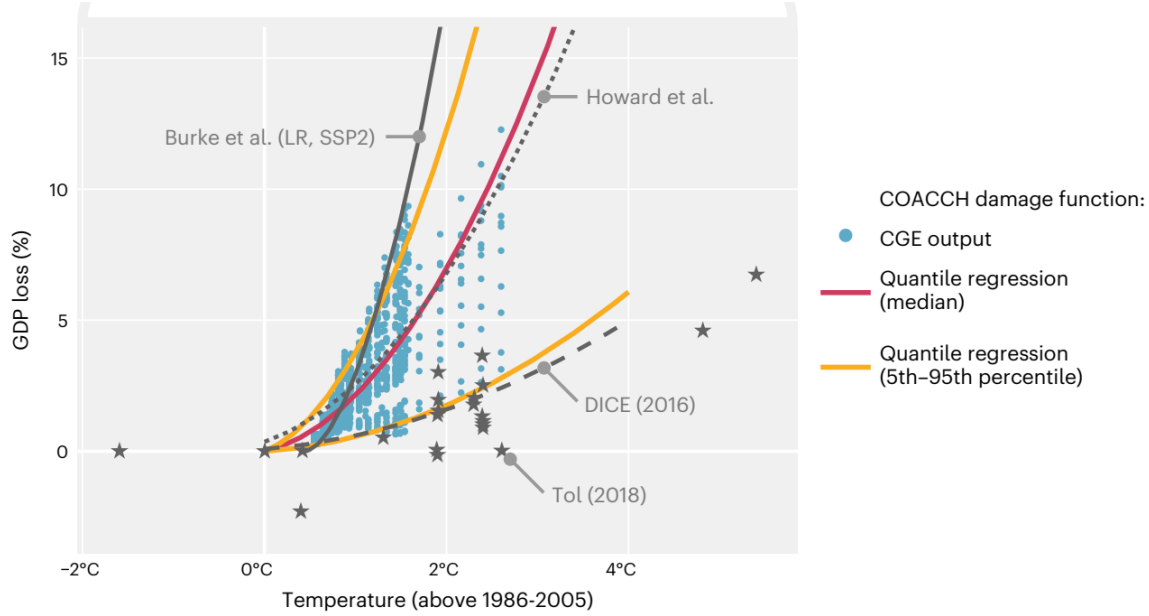
Conservative estimates indicate that climate damages could cost EU GDP by up to 1% annually already in the next few years, with damages strongly increasing afterwards, reaching up to

[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,

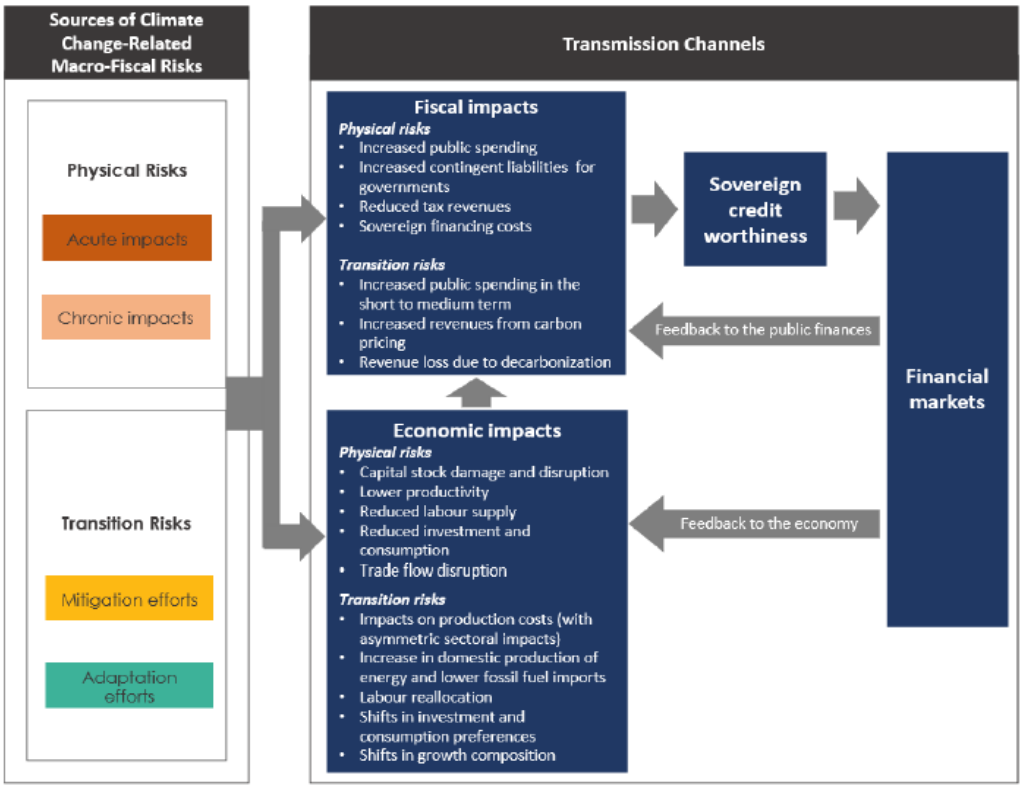
[8] 2040 target IA
[9] See SWD(2024) 63 final, Part 2/5, Annex 7, Section 3 (for example Figure 31).
[10] Adrien Bilal and Diego R. Känzig, "The Macroeconomic Impact of Climate Change: Global vs. Local Temperature," NBER Working Paper 32450 (2024), https://doi.org/10.3386/w32450
[11] van der Wijst, KI., 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)**

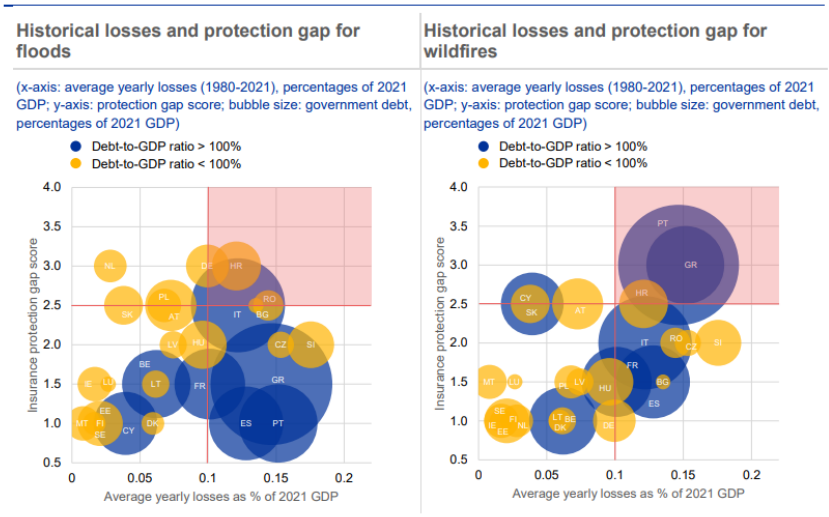


***Source**: Salmon-Genel (2025), Assessing the Macro-Fiscal Risks from Climate Change: Concepts, Methodological Approaches, and Insights from Country Practices.. See similar: The Fiscal Impact of Extreme Weather Events: Stress Tests for EU Countries*

[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**

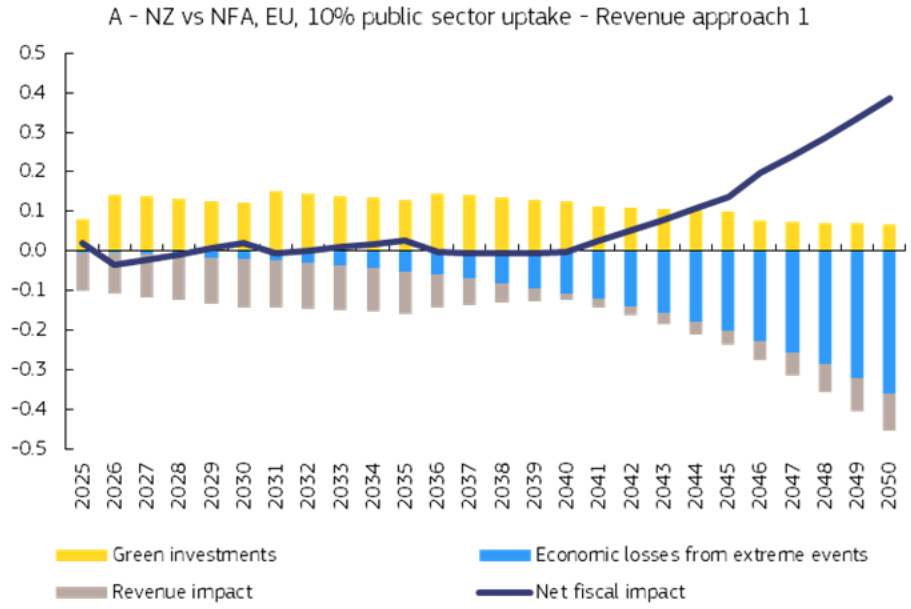
Debt-to-GDP projections					
Spain	**2021**	**2023**	**2024**	**2032**	**2032 change**
Baseline	120.6	116.9	120.3	126.1	
1.5°C scenario	120.6	116.9	125.4	130.6	4.5
2°C scenario	120.6	116.9	126.2	131.3	5.2
Romania	**2021**	**2023**	**2024**	**2032**	
Baseline	49.3	53.2	54.3	76.9	
1.5°C scenario	49.3	53.2	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

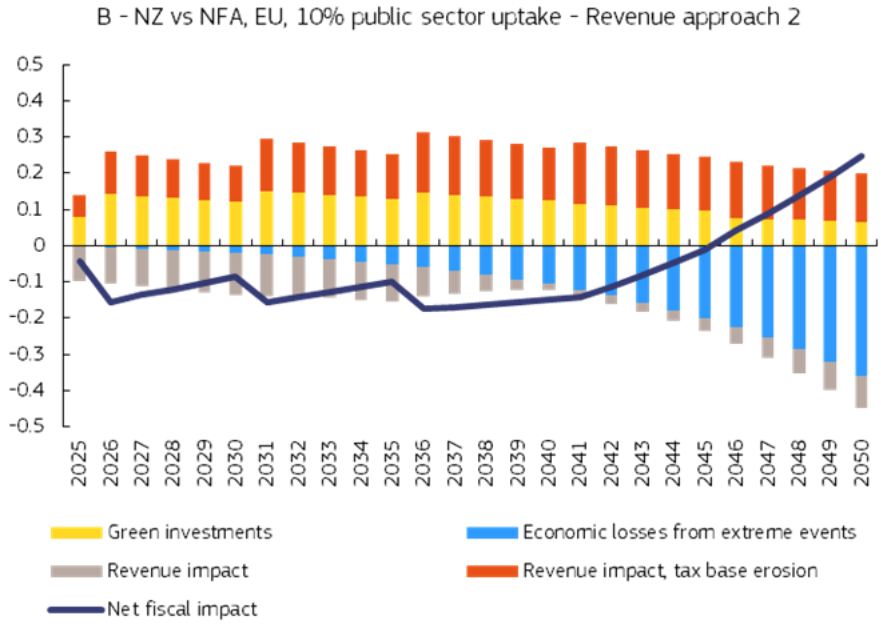
Note: The 2032 change measures the difference, in 2032, between debt-to-GDP in the 1.5°C and 2°C scenarios, respectively, compared to the European Commission's 10-year baseline debt-to-GDP projections (i.e. based on the Autumn forecast 2021).

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.

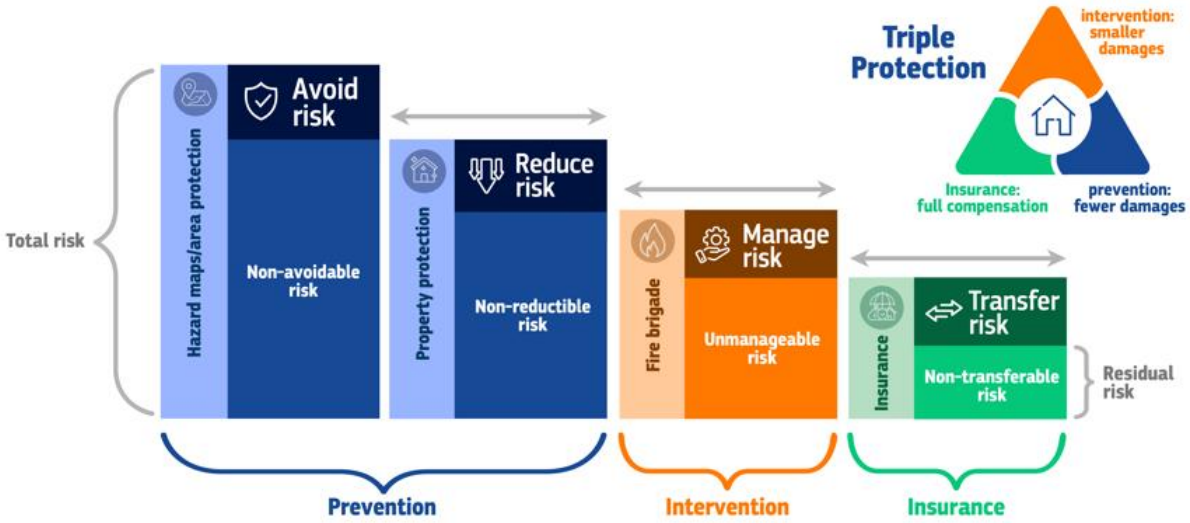
Source: Gagliardi (2025), The Macroeconomic and Fiscal Impact of Climate Change: A Stylised approach

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

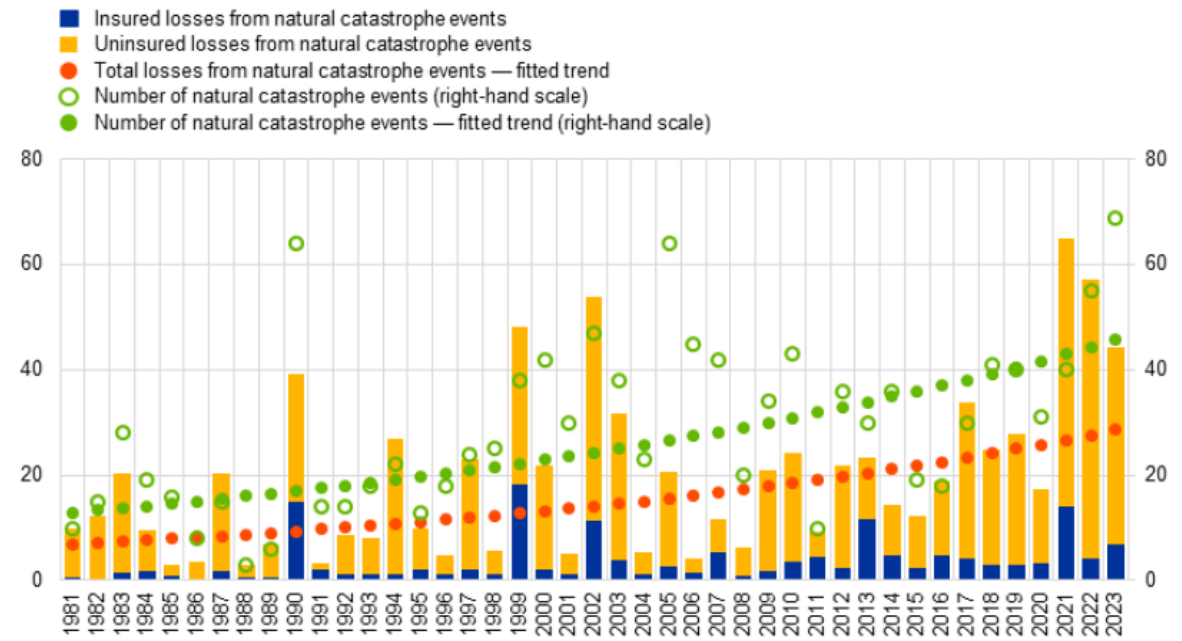


[15] https://climate.ec.europa.eu/document/download/4df5c2fe-80f9-4ddc-8199-37eee83e04e4_en?filename=policy_adaptation_climate_resilience_dialogue_report_en.pdf

[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)



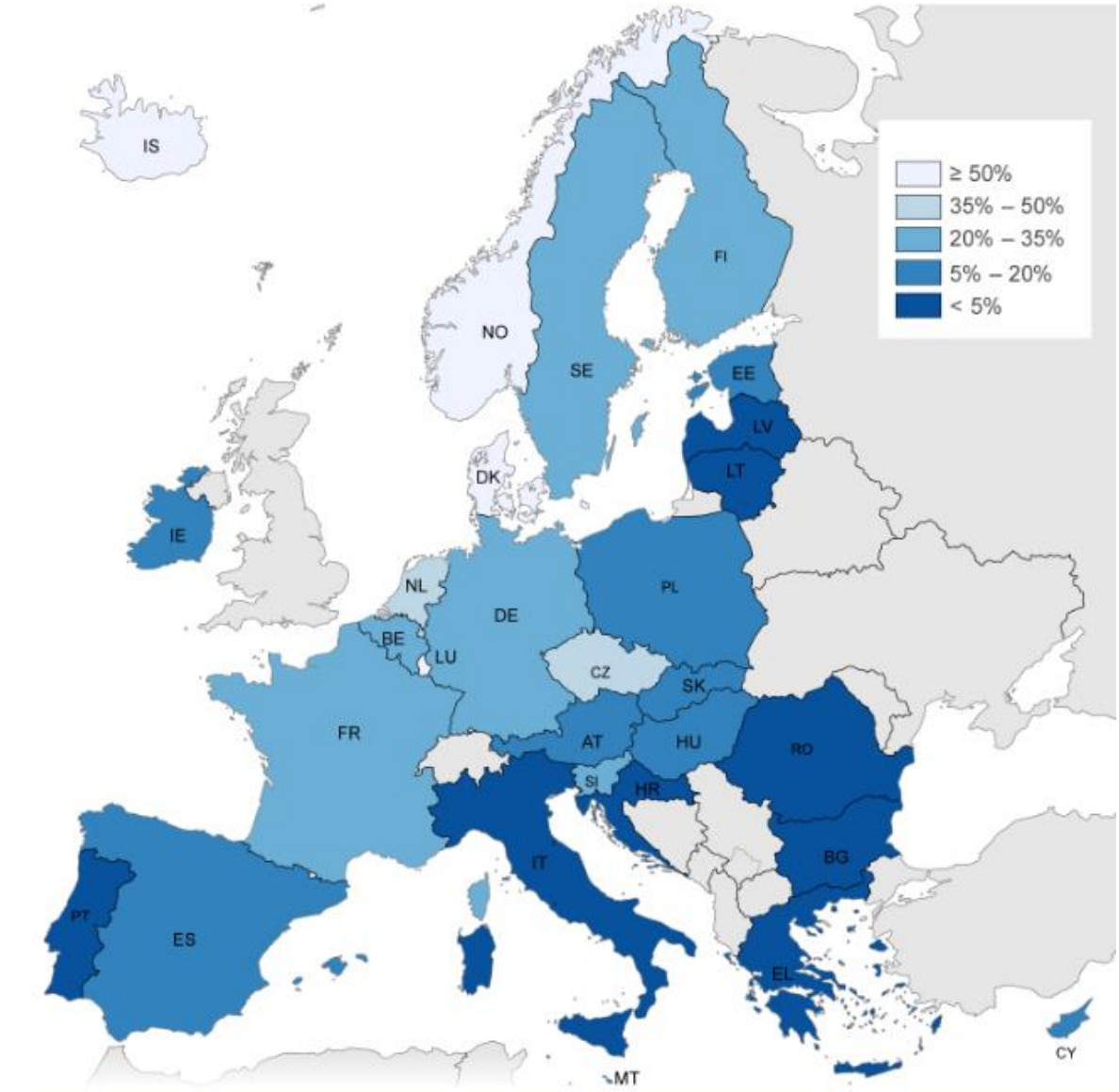
Sources: CATDAT (Risklayer GmbH – Europe Climate related impact Analysis Project), EIOPA's Dashboard on insurance protection gap for natural catastrophes – European Union (europa.eu) and EM-DAT.
Notes: The two fitted trends depict exponential trends fitted to the annual time series of the number of and 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

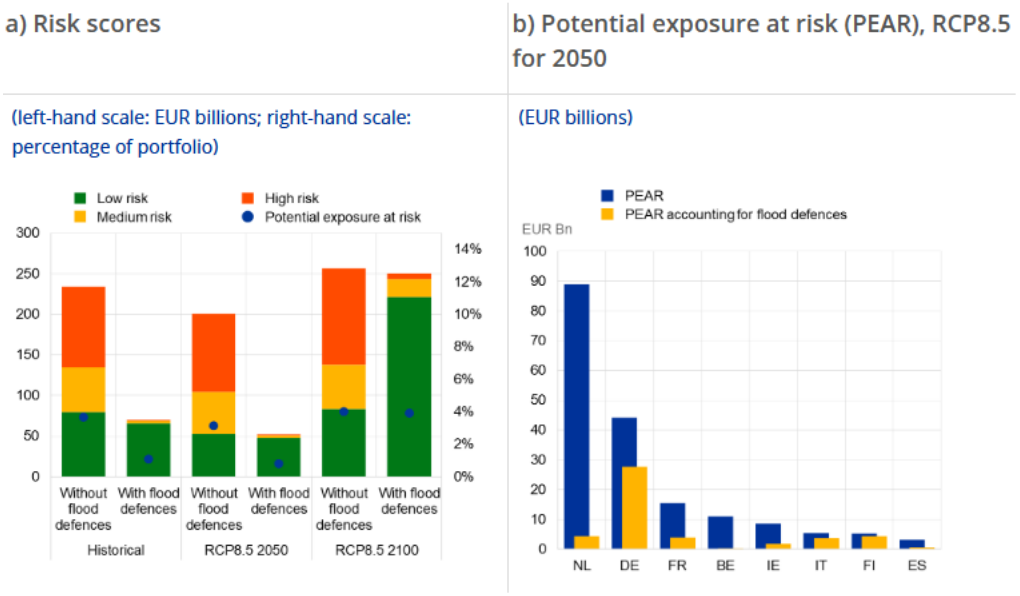
(1980-2023, percentages)



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



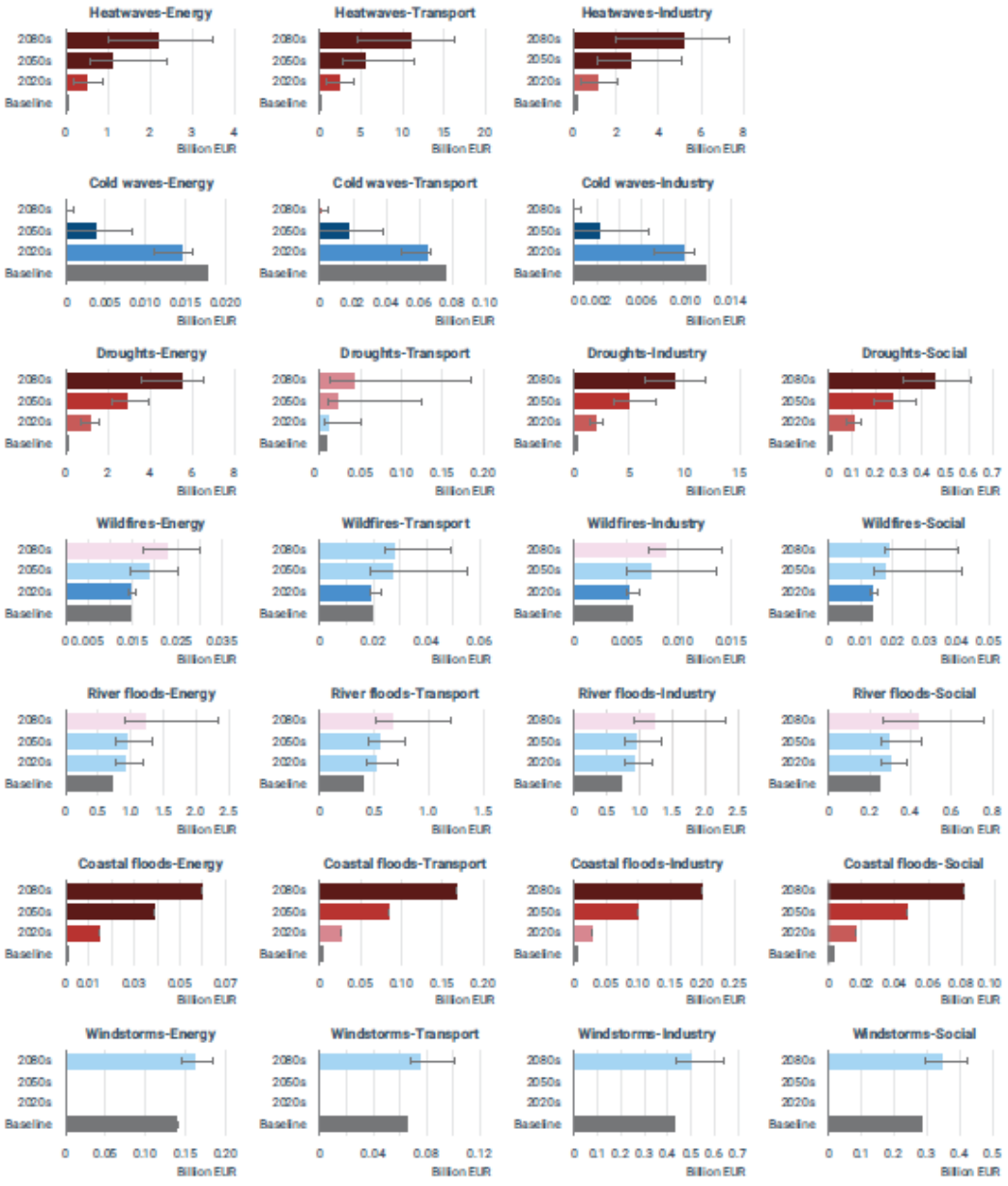
Sources: ESCB calculations based on data from AnaCredit, RIAD, SHSS, Delft University of Technology (TUD), and the JRC.
Notes: Portfolio exposures cover loans, debt securities and equity portfolios of euro area financial institutions vis-à-vis non-financial corporations. Financial institutions include 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.

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SWD(2026) 731 final

PART 4/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

EU Frameowork of 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}

TRACE: Projected economic damages and mortality in EU under different climate scenarios

The maps presented here display a selection of outcomes from the TRACE (Territorial Risk Assessment of Climate in Regions of Europe) project, which focuses on assessing climate risks at the regional level across Europe (EU-27, Norway, Switzerland, and the UK), with NUTS-3 resolution (1,366 regions). The research examines 47 climate risks under various global warming scenarios projected for 2050. In particular, central and upper estimates of these impacts are provided for warming levels of 1.5°C, 2°C, and 3°C in 2050.

These maps highlight two major impact areas: the effects on human mortality due to non-optimal temperatures and poor air quality, and the direct economic impacts of climate change. Economic impacts are further classified by sectors—agriculture, residential, industry & commerce, coastal ecosystems, transport, and energy—and include the projected effects due to labour productivity losses.

The following table details the climate risks included under each of the sectors of the assessment.

Economic impacts

Agriculture
Damage to agriculture from river flooding
Damage to agriculture from coastal flooding
Agriculture losses due to drought
Damage to agriculture buildings due to drought-induced soil subsidence
Damage to agriculture from windstorms
Damage to agriculture from wildfires
Agriculture labor productivity losses

Industry and commerce
Damage to buildings/assets from river flooding
Damage to buildings/assets from coastal flooding
Productivity losses due to drought (lack of water)
Damage to buildings due to drought-induced soil subsidence
Damage to buildings and assets from windstorms
Damage to buildings and assets from wildfires
Labor productivity losses

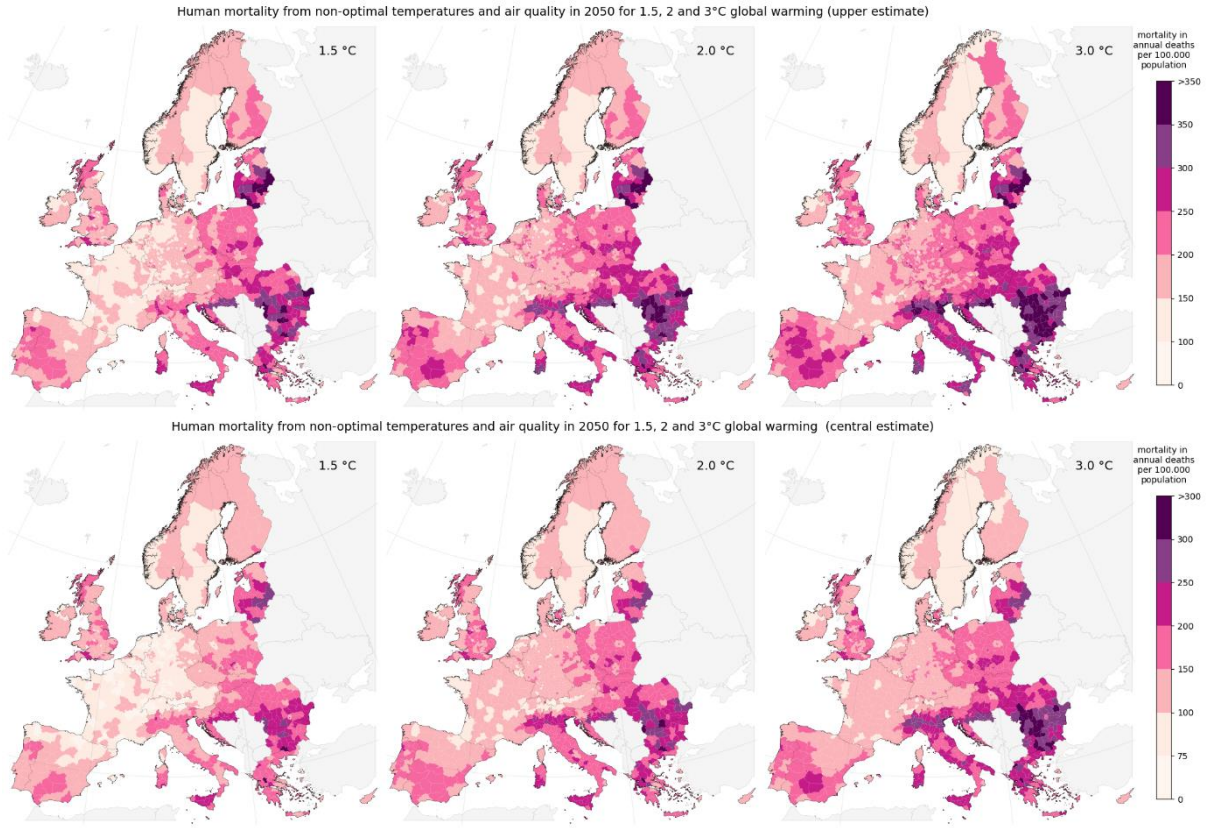
Energy
Damage to buildings/assets from river flooding
Damage to buildings/assets from coastal flooding
Losses energy production due to drought
Damage to energy buildings due to drought-induced soil subsidence
Energy labor productivity losses
Damage to buildings/assets from wildfire

Residential
Damage to houses/assets from river flooding
Damage to houses/assets from coastal flooding
Damage to houses due to drought-induced soil subsidence
Damage to houses/assets from windstorms
Damage to houses/assets from wildfires
Construction labor productivity losses

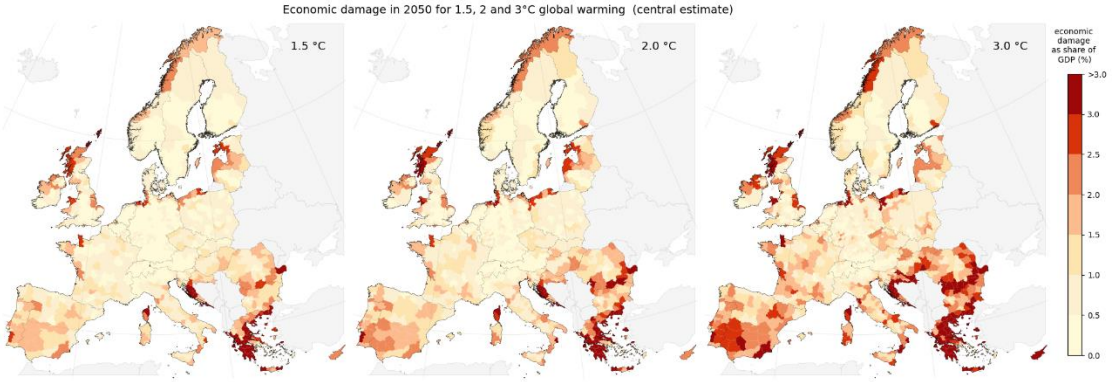
Transport
Damage to infrastructure from river flooding
Damage to infrastructure from coastal flooding
Navigation impacts from drought
Damage to infrastructure due to drought-induced soil subsidence
Damage to infrastructure from windstorms
Damage to infrastructure from wildfire
Labor productivity losses
Heat impacts on rail and road infrastructure

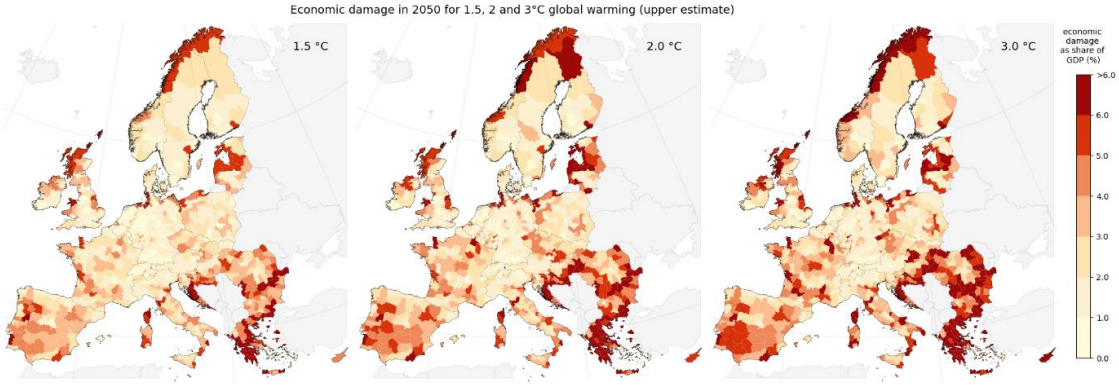
Ecosystems
Loss ecosystem services from coastal erosion

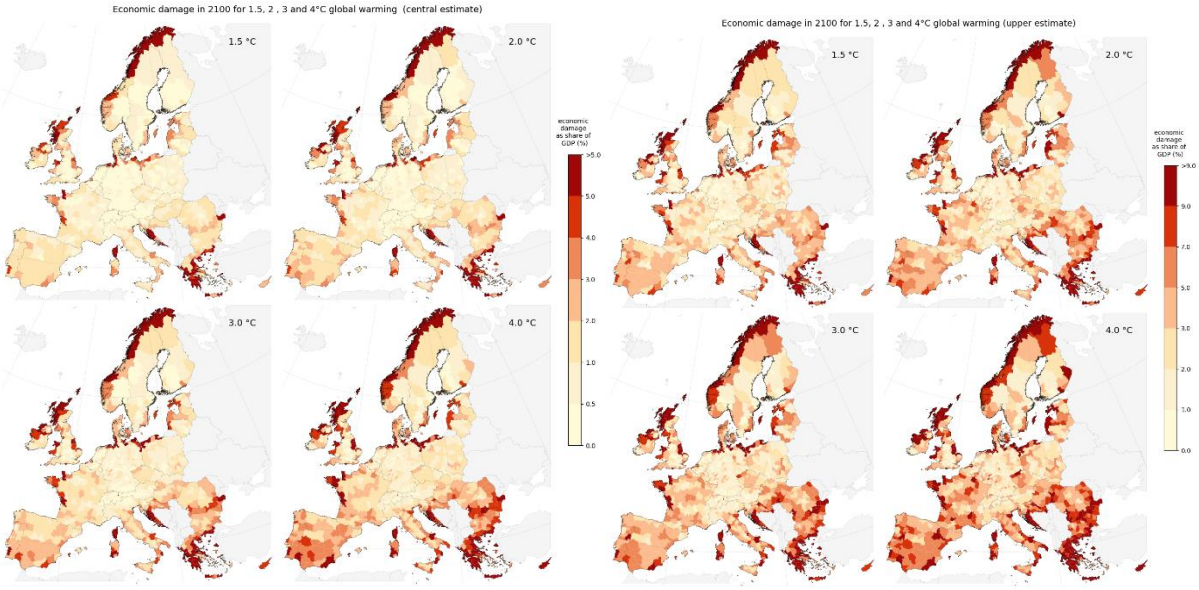
Human mortality from non-optimal temperatures and air quality in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate



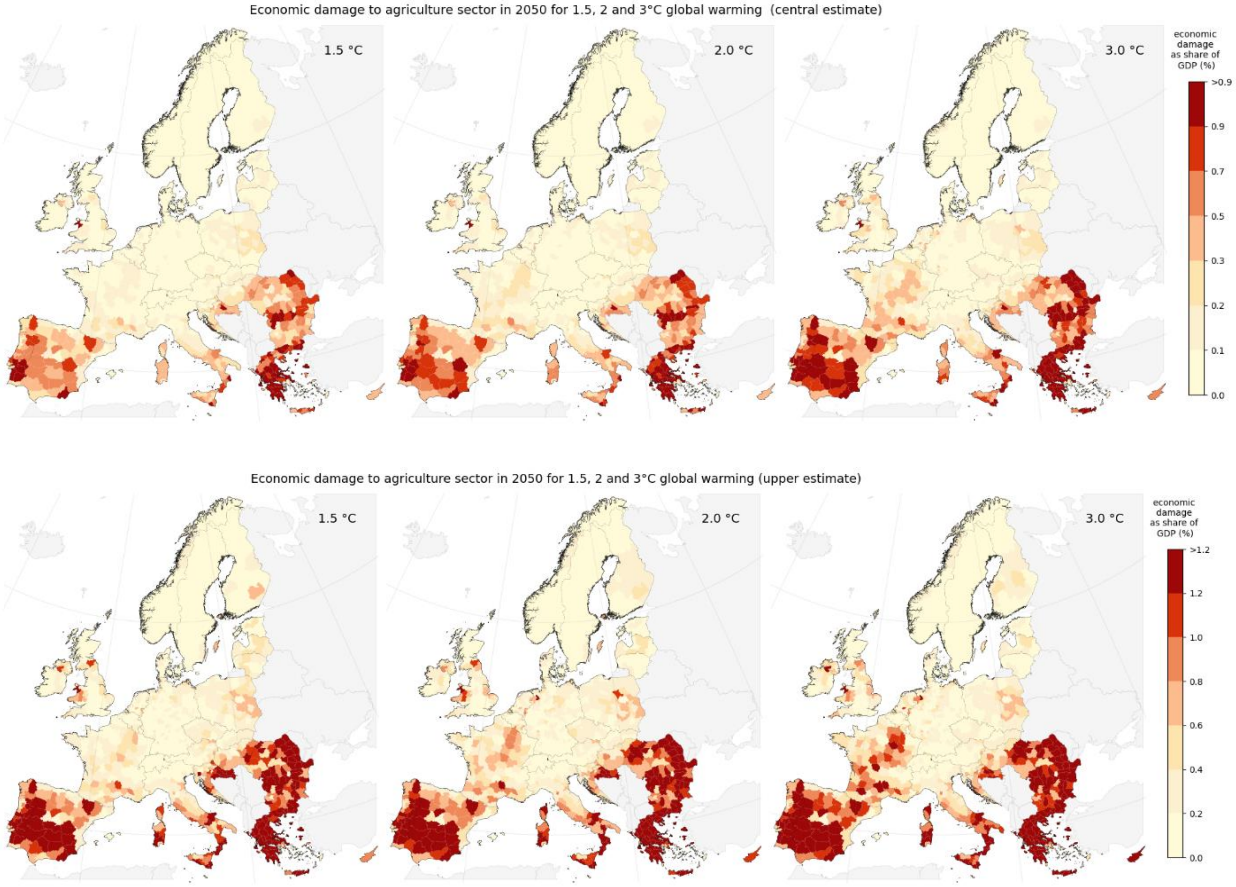
Economic damage in 2050 and 2100 for 1.5, 2 and 3°C global warming, central and upper estimate



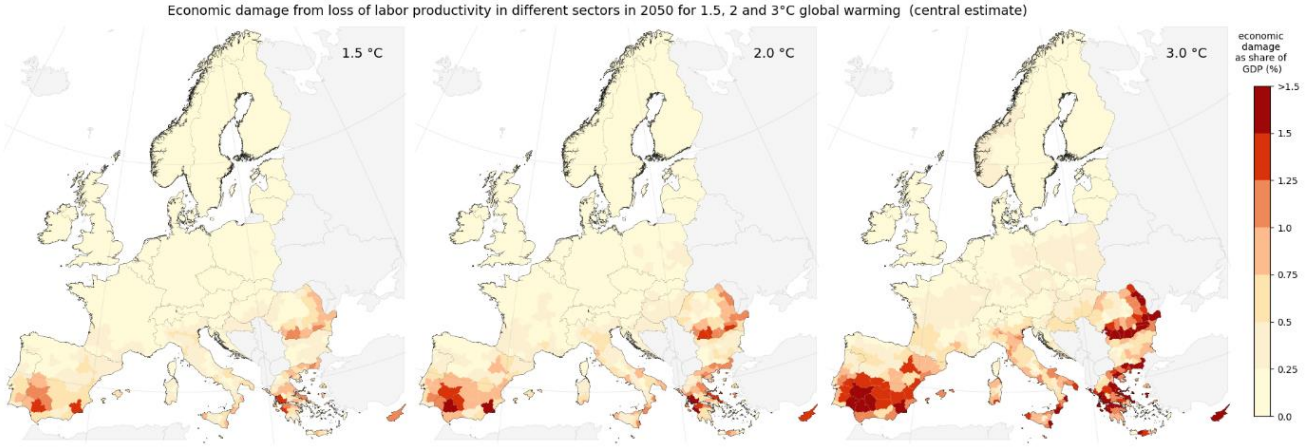


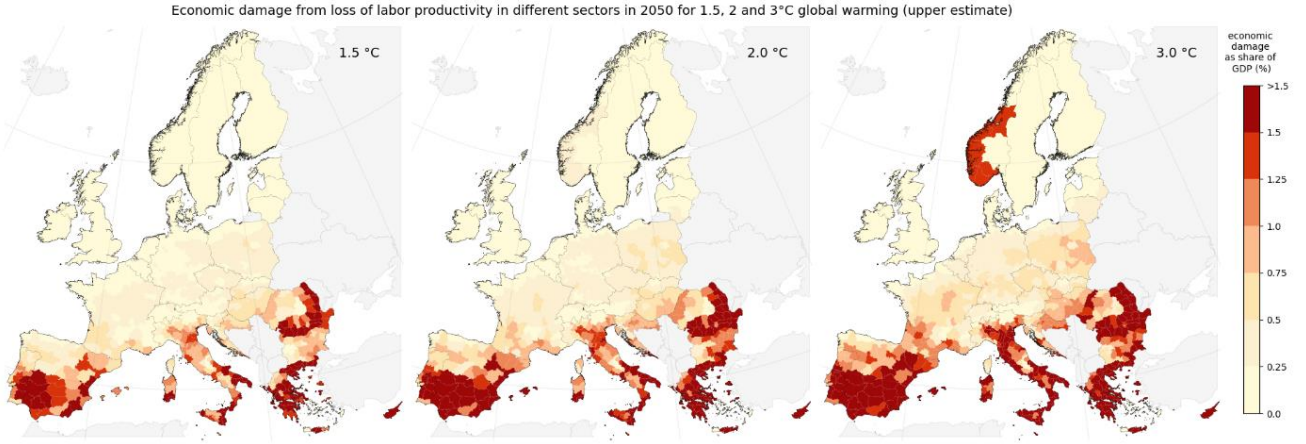


Economic damage to agriculture sector in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate



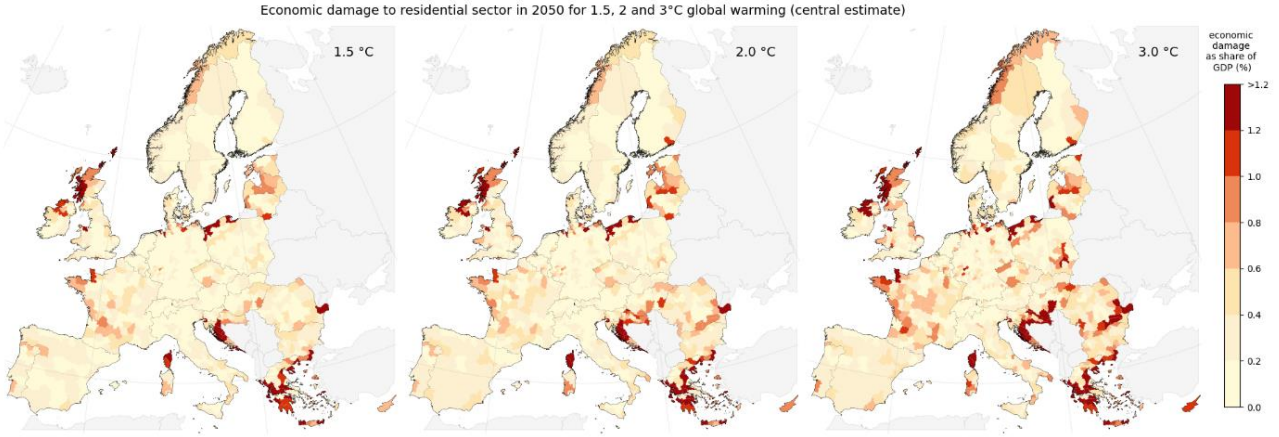
Economic damage from loss of labour productivity in different sectors in 2050 for 1.5, 2 and 3°C global warming , central and upper estimate

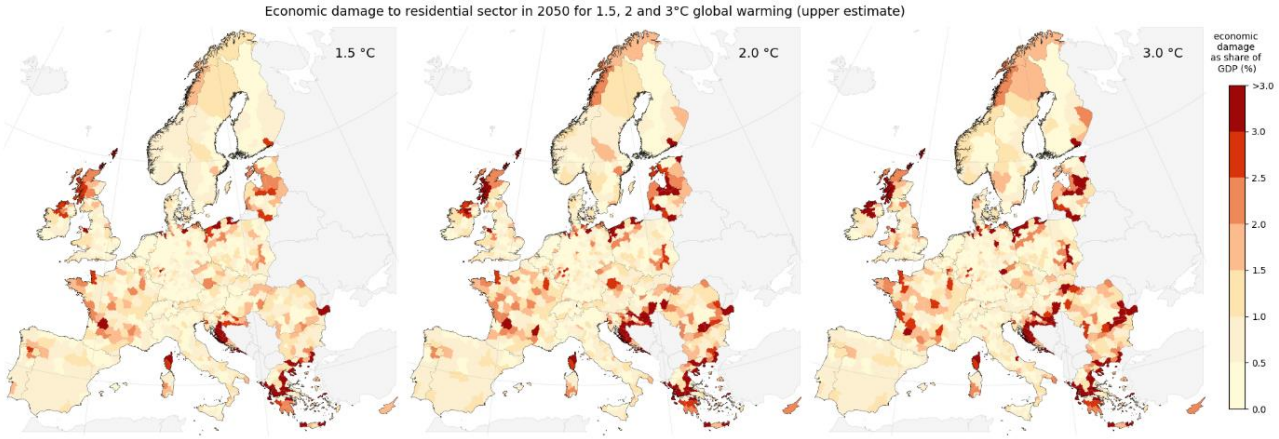




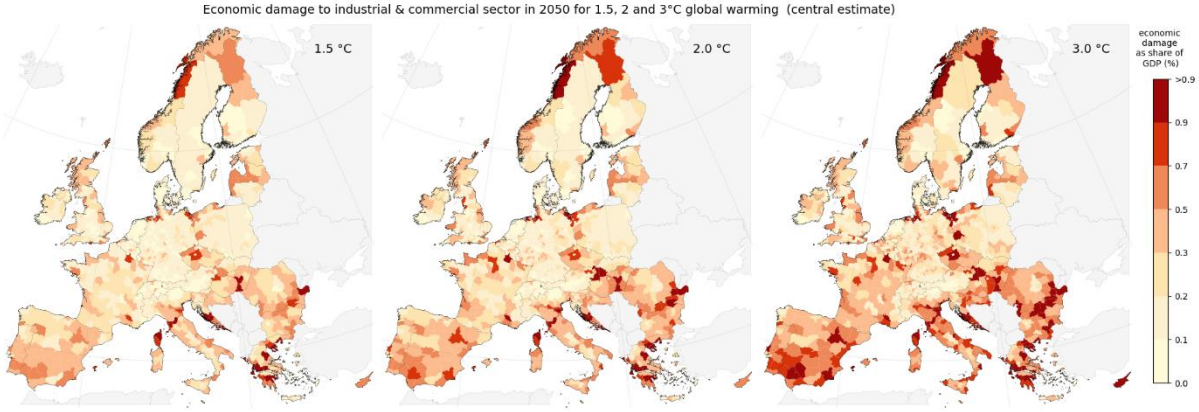
Note: the maps above represent the damages due to labour productivity losses. They are the result of the aggregation of the realted losses across the six economic sectors presented at the table at the beginning of this section.

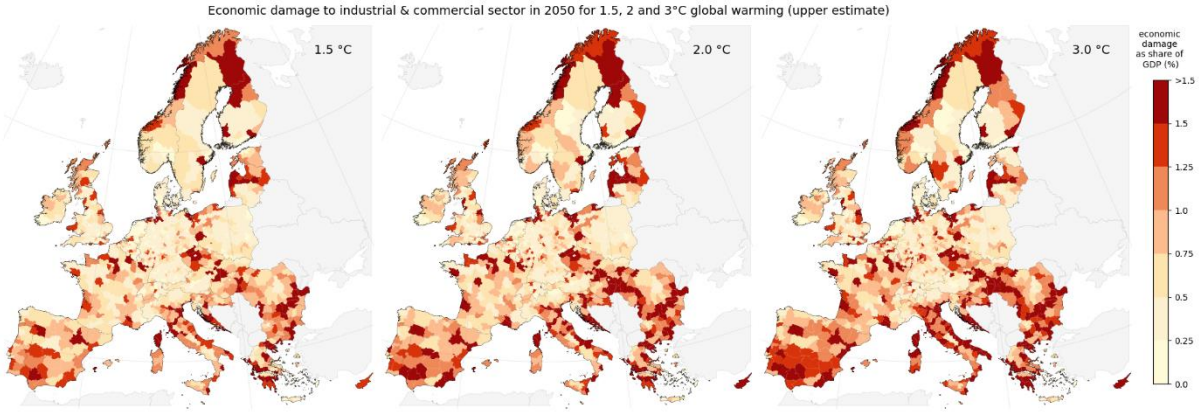
Economic damage to residential sector in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate



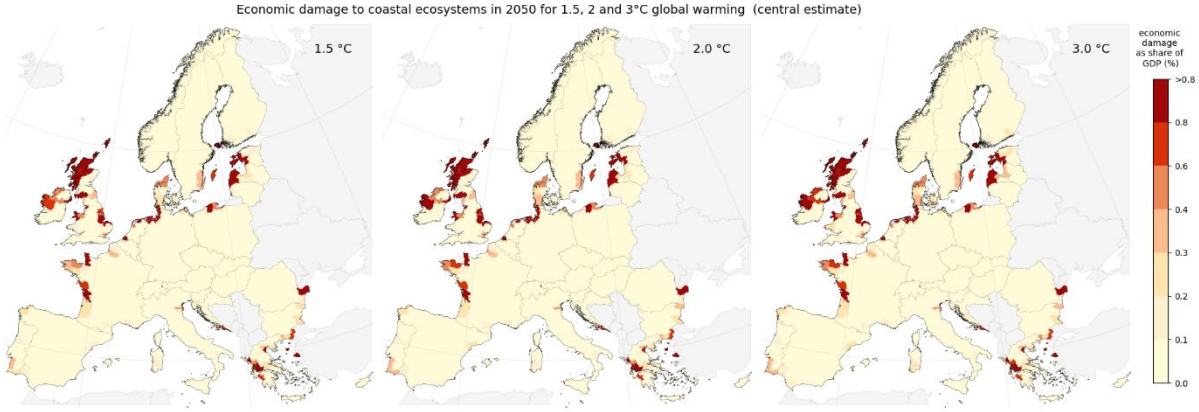


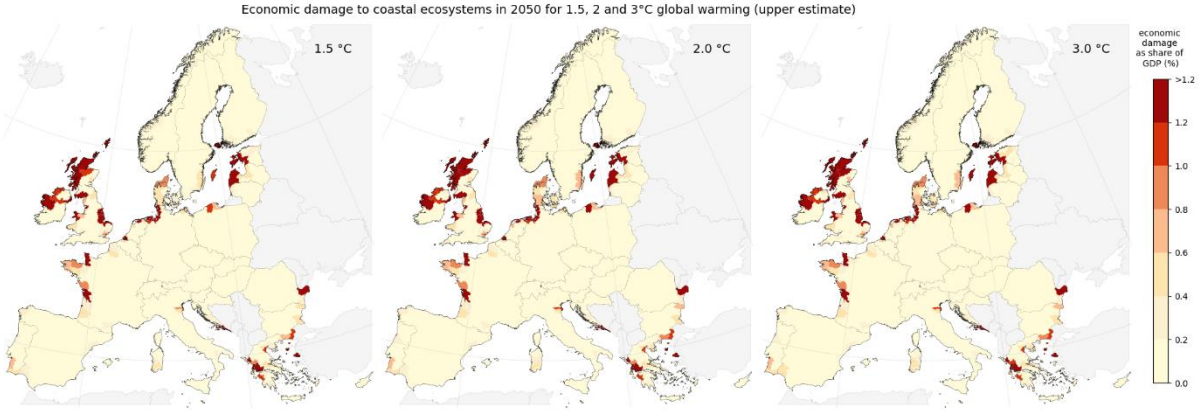
Economic damage to industrial & commercial sector in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate



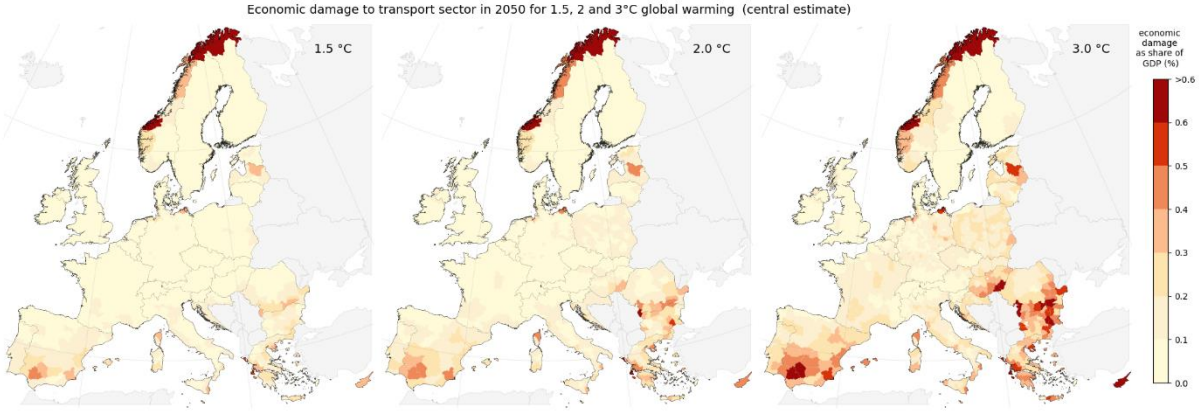


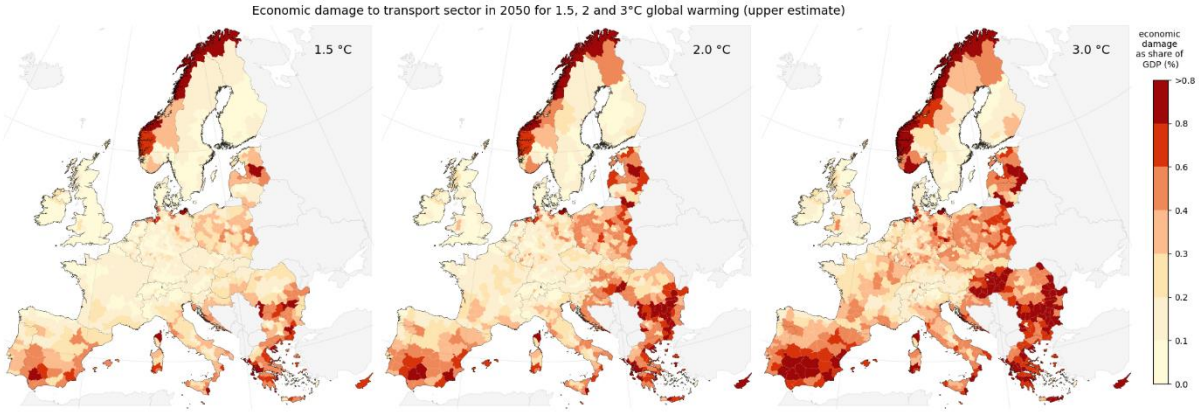
Economic damage to coastal ecosystems in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate



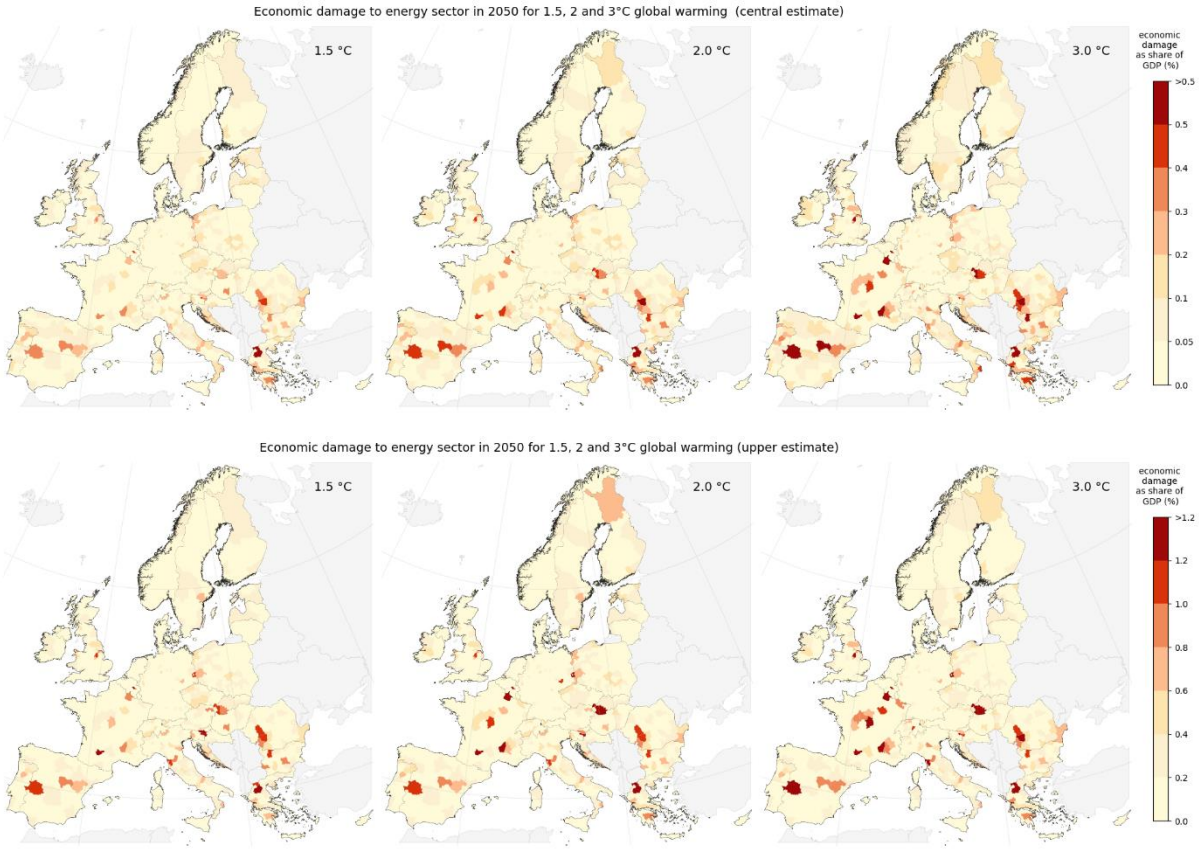


Economic damage to transport sector in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate





Economic damage to energy sector in 2050 for 1.5, 2 and 3°C global warming, central and upper estimate



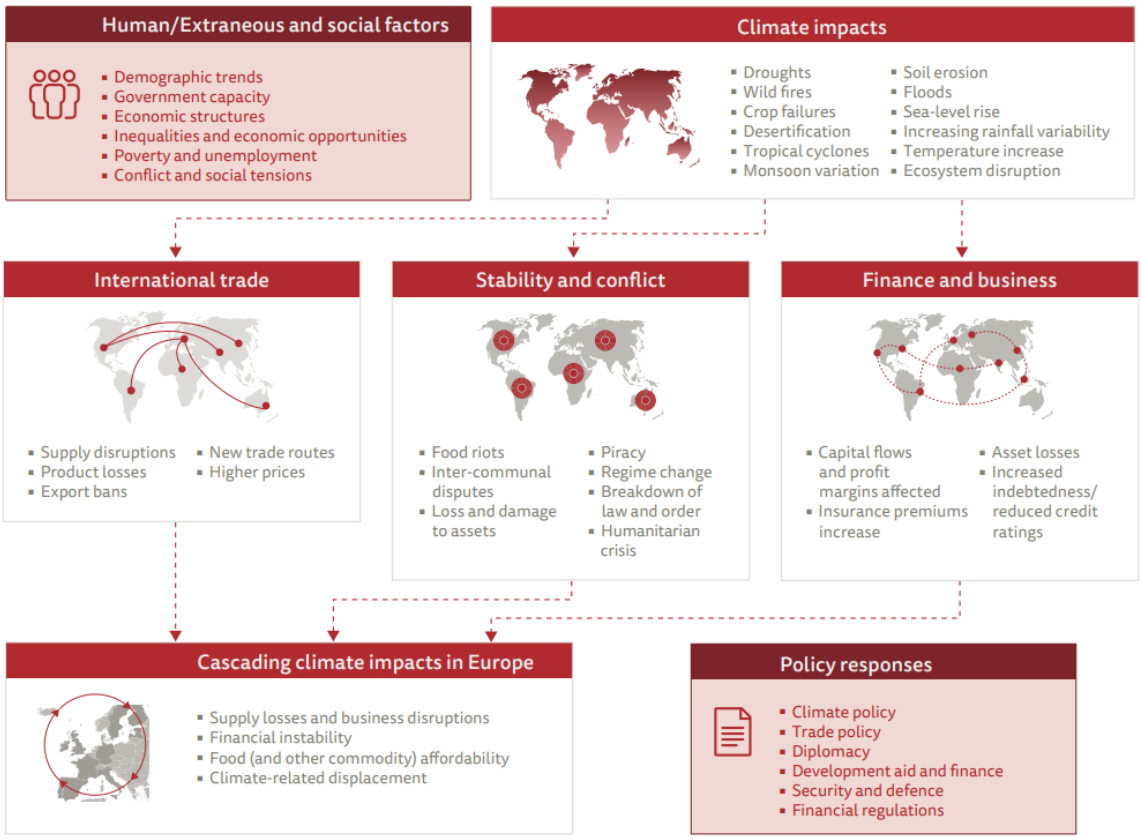
International dimension and systemic risks

Impacts of climate change, both extreme weather events and gradual climatic changes, can have cascading effects that cross borders and continents. The effects can further cascade and escalate through political and security relations, international trade, supply chains, financial markets, international aid as well as migration.[1] As a strongly interconnected actors, the EU is hence not only exposed to the regional effects of a changing climate, but to the transboundary impacts of climate risks materialising elsewhere.[2] For example, European companies with assets and operations in affected areas may see shocks influence capital flows, profit margins and insurance premiums, with potential knock-on effects for the banking sector and national economies.

With their potential to lead to far reaching and unforeseen effects – potentially affecting political and social stability worldwide, these transboundary risks have been increasingly recognised as a systemic risk for the EU endangering its security and prosperity in the short and long run.[3]

[1] (Auer et al., 2025; Hildén et al., 2020)
[2] (Hildén et al., 2020; West et al., 2021)
[3] (Auer et al., 2025; Clark et al., 2025; Council of the European Union. European External Action Service, 2021; Harris et al., 2026; Knaepen et al., 2022; West et al., 2021)

Figure: Examples of European exposure to cascading climate impacts.



Source: Hilden, et al. 2020

In the past, cross-border and cascading climatic impacts have taken governments and business by surprise increasing the risk for adverse impacts and limiting local, national and EU-level resilience.

While some policies and strategies such as the Climate Change and Defence Roadmap or the European Green Deal already feature transboundary climate change impacts, improved policy coherence and a comprehensive nexus approach in addressing interconnected vulnerabilities in policies across all sectors is needed.[4]

This starts with recognising these cross-border impacts of climate change, monitoring current international dependencies, such as critical resource dependencies (e.g. critical minerals, technologies or fertiliser) and developing an understanding of climate change risk and resilience in critical sourcing countries and strategic partners.

[4] (Auer et al., 2025; Hildén et al., 2020; Knaepen et al., 2022)

The EU has already acted on this need with the CASCADES project, which aimed to understand the conditions under which conditions climate risks propagate and may adversely affects European stability.[5]

Furthermore, the Corporate Climate Change Adaptation Supplier-of-Suppliers Sustainability Project aims to reveal the hidden climate risks in supply chains for improving European resilience to cascading supply chain risks.[6]

[5] (European Commission, 2019)
[6] https://sdglabs.ai/projects/3ca3s

Potential benefits of climate resilience – sectoral examples

Ecosystem Resilience and its compounding mitigation effects

Ecosystem investment carries some of the highest aggregate returns, reflecting the cross-sectoral co-benefits that healthy ecosystems deliver — flood attenuation, drought buffering, carbon sequestration, water quality, and support for agricultural productivity. The Commission's own Impact Assessment for the Nature Restoration Law estimated EU-wide restoration costs at approximately €7.4 billion per year, with a benefit-cost ratio of bet 4 – 38:1.

More targeted evidence reinforces this:

- **Greece (floodplain and natural water retention restoration):** Restoring natural floodplains and river retention areas delivers a BCR of 2.5, alongside ecological benefits including improved water quality, groundwater recharge, and reduced drought risk. [7]
- **Wetland restoration (EU-wide):** Studies show wetland restoration reduces annual maximum peak flows by 12–24%, lowers occurrence of high flow events by up to 45%, increases low flows in summer by up to 21% (reducing drought risk), and reduces nitrogen exports by 38–50% and phosphorus exports by 52–67% — delivering measurable value to downstream agriculture and water systems. [8]

Realising returns at the upper end of the 4–38:1 Nature Restoration Law range depends on ecosystem investment being coordinated with the sectoral planning decisions that determine where ecosystem services are most needed. The duty to consider climate risk across policy and investment decisions is the mechanism that drives this coordination; **risk ownership frameworks clarify which authority is responsible for maintaining the ecosystem functions that underpin returns in agriculture, water and flood management**, preventing the free-riding that currently leaves ecosystem investment chronically underfunded relative to its cross-sectoral value.

Food Sector Returns

Agriculture accounts for more than half of total drought losses in Europe (approximately €4.8 billion annually) and faces accelerating exposure as drought frequency and severity increase under all warming scenarios.[9] The investment case for food sector adaptation is in part a case for arresting ongoing productive capacity depletion: over 60% of European soils are currently assessed as unhealthy, with degradation costs estimated at €40.9–72.7 billion per year from erosion, nutrient loss, compaction and contamination alone.[10] While robust benefit-cost ratios for food sector adaptation remain difficult to quantify given the challenge of monetising ecosystem co-benefits and the absence of standardised assessment frameworks, available

[7] (European Commission. Joint Research Centre., 2020b)
[8] (Aubert et al., 2022)
[9] (European Environment Agency, 2026)
[10] (European Environment Agency, 2026)

European evidence trends consistently positive. EEA analysis of 51 farm transitions across Europe found that climate-resilient practices such as reduced tillage can deliver production cost reductions of around 40%, diesel savings of around 50%, and labour reductions of 25–30%, connected to lower dependence on external inputs and restored soil-water functions.

The food sector's returns depend on farmers having access to reliable climate risk information and the agronomic guidance to act on it. The duty to consider climate risk in agricultural planning and rural investment decisions is the mechanism through which public investment is directed toward the practices with demonstrated returns. **Climate resilience by design in food system infrastructure, from irrigation networks to storage and supply chain logistics, ensures that capital investment in the sector is not rendered obsolete by the climate conditions it will face over its operational life**. Risk ownership can also improve conditions where drought losses fall on uninsured farmers and cascade to rural economies and food supply chains, the absence of clear risk allocation discourages the anticipatory investment that the BCR evidence justifies.

Health Sector Benefits

The health sector offers some of the most striking benefit-cost ratios in the adaptation literature, driven primarily by the low cost but high mortality-reduction impact of heat-health early warning systems (HHWS). EEA analysis drawing on studies across European capital cities — including Madrid, London and Prague — estimated BCRs for heatwave warning systems ranging from 11:1 to 3,700:1, depending on the valuation method, time horizon, and climate scenario applied. Even at the lower end of this range, heat-health warning systems represent among the highest-return public health investments available.

Peer-reviewed assessment of HHWS across Europe consistently classifies them as 'no-regret' or 'low-regret' adaptation, with BCR greater than 1 under both current and projected future climate conditions. Benefits are realised through reduced heat-related mortality and morbidity, reduced healthcare utilisation, and reduced public health system costs — particularly for elderly and vulnerable populations.

Urban infrastructure investments that deliver health co-benefits alongside temperature reduction show more moderate but consistently positive returns:

- **Berlin (urban green infrastructure — tree drains, facade greening, green roofs):** BCR of 1.09–1.91, accounting for reduced heat-related hospitalisations and mortality. [11]
- **Austrian cities — Mödling, Klagenfurt and Salzburg (green infrastructure with high-albedo surfaces):** BCR of 1.27–2.68, generating billions in localised social and health benefits. [12]

[11] (Johnson, Exl et al., 2021)
[12] (Johnson, See et al., 2021)

- **Nitra, Slovakia (urban transformation to community gardens):** Social return of €2.15–€4.27 per €1 invested, beyond direct temperature reduction benefits. [13]
- **Ireland (social housing retrofit — fabric-first approach):** BCR of 1.43–1.92 when indirect societal benefits including improved health outcomes and reduced public maintenance costs are included. [14]

The exceptional returns on heat-health warning systems which are achievable at very low cost relative to avoided mortality are unrealised where no authority has a clear duty to act. **The duty to consider climate risk in public health and urban planning decisions converts these no-regret investments from optional additions into standard practice.** Climate resilience by design in urban infrastructure procurement, building codes and public space planning similarly ensures that the moderate but consistent BCRs on green infrastructure are captured systematically rather than project by project.

For climate-sensitive infectious diseases, the evidence similarly supports early prevention and preparedness as highly cost-effective adaptation measures. Research concludes that integrated surveillance systems combining epidemiological, entomological and climatic data enable earlier outbreak detection, allowing vector control and public health interventions to be deployed before widespread transmission occurs. These approaches can in turn reduce outbreak size, healthcare costs and productivity losses, particularly for mosquito-borne diseases such as dengue, chikungunya and West Nile virus, which also carry a rising global economic burden.[15]

Economic and Financial Returns

The economic and finance sector represents the smallest investment requirement in Table 2 but performs a structurally distinct function in enabling more effective mobilisation of investment flows in all other sectors. CGE modelling[16] from across Spain, Austria and the Netherlands provides indicators of fiscal returns to adaptation.[17] In Spain, adaptation reduces GDP losses from 0.69% to 0.22% under expected annual climate impacts by mid-century, with government revenue rising 1.01% relative to a no-adaptation baseline. This is driven primarily by avoided productivity losses and stronger consumption tax revenues. Austria shows comparable results where GDP losses fall from 0.51% to 0.09% and government revenue rises 0.71%. The cumulative adaptation debt stock implied by these investments remains modest at 0.10% of GDP in Spain and 0.99% in Austria by 2050 confirming that the fiscal commitment involved is manageable relative to the returns generated. The case of the Netherlands highlights a

[13] (Vačková et al., 2025)
[14] (Colclough, 2021)
[15] (Roiz et al., 2024) https://linkinghub.elsevier.com/retrieve/pii/S0048969724032017; (World Health Organisation, 2017) https://cdn.who.int/media/docs/default-source/searo/india/health-topic-pdf/9789241512978-eng.pdf?sfvrsn=7294b7b5_2
[16] Computable General Equilibrium (CGE) modelling is a frequently used quantitative methodology for evaluating the effects of various economic scenarios on different parts of the economy. Estimations are for risk impacts are most likely underestimations due to underlying assumptions of the models, hence benefits of adaptation can be even higher then estimated here.
[17] (Preinfalk et al., 2026)

particular problem in adaptation returns accounting. Modelling shows that high flood protection costs reduce fiscal space under expected annual damages, but this result reverses sharply under tail-risk conditions. Under severe and rare but increasingly likely flood conditions, adaptation limits GDP losses to 0.18% compared with 16.02% without it and raises government revenue 33.7% relative to the no-adaptation scenario. The implication is that governments **evaluating adaptation against expected annual costs alone are systematically underinvesting relative to the fiscal risk-adjusted optimum** and that the 75% insurance protection gap, which leaves uninsured climate losses to fall on public balance sheets, compounds this problem.

Quantified BCRs for this category are sparse in the EU literature, returns are realised primarily through indirect channels: improved risk pricing in insurance and financial markets, reduced credit default risk, avoided fiscal costs from uninsured losses, and faster economic recovery after climate events. The major benefit of this sector is enabling value: risk assessment infrastructure, climate disclosure frameworks, and financial risk management tools are preconditions for the efficient allocation of the much larger investment flows in the other sectors.

Defence and Security

What distinguishes climate preparedness in defence and security from the other sectors examined above is that there has historically been a low level of data collection on both investment requirements and returns in this space. Unlike infrastructure, health or food, where investment needs and indicative benefit-cost ratios can be drawn from a growing body of European evidence, the JRC and European Defence Agency noted as recently as 2023 a paucity of quantitative studies on the impacts of climate change on military installations and an absence of systematic guidance for assessing climate risk and resilience in defence. No equivalent of the sectoral investment needs estimates underpinning Table 2 exists for defence. Many EU military installations may currently be operating under unknown climate risk, with climate hazards, energy system dependencies and cascading infrastructure failures not yet systematically assessed across Member States' defence estates.

There are significant recent developments in this space. A growing body of analysis and political consensus encourages climate risk assessment systematically. Defence investment must be climate-proofed by design, and civilian and military resilience planning must be coordinated. At the 2025 Hague Summit, NATO allies committed to investing 5% of GDP annually in defence and security-related spending by 2035, with up to 1.5% of GDP explicitly designated for civil preparedness, resilience, critical infrastructure protection and supply chain resilience. The Integrated Framework's duty to consider climate risk across public investment decisions, common risk assessment standards, and risk ownership frameworks provide exactly the infrastructure which would ensure ownership of risk and resilience by design which can be used to effectively mobilise increased funding toward climate-proofed assets and dual-use capability, grounded in evidence rather than assumption, and closing the data gap that has

historically prevented this sector from making the investment case that the others in this analysis can now make.

Cross Cutting Measures

Cross-cutting investments including integrated early warning and monitoring systems, climate risk data infrastructure, and capacity building are embedded within the sectoral returns described above but should also be acknowledged separately. EEA analysis identifies early warning systems as a class among the highest-return adaptation investments in the literature, with the heatwave warning system BCR evidence (11:1 to 3,700:1) representing the upper bound of documented adaptation returns across all sectors. Multi-hazard early warning systems that serve multiple sectors simultaneously have similarly high aggregate returns relative to their modest operating costs.

The high returns on early warning and monitoring systems are contingent on those systems being shared, interoperable and built on common risk data. None of this emerges from fragmented national approaches. Climate resilience by design, applied to data infrastructure and monitoring investment, and a common risk assessment standard underpinning the duty to consider, are what convert isolated high-performing pilot systems into the EU-wide early warning capability that realises returns at scale.

The degree to which the success of these investments vary is dependent on the reach and efficacy of the actions themselves.

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COMMISSION

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PART 5/5

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 9: POLICY PREPAREDNESS ANALYSIS BASED ON EUCRA

This Annex provides an overview of the policy preparedness of the key EU policies. It complements the evidence referred to in the SWD section 2.1 regarding consequences of inaction and related annex 8 that covers expected evolution of damages without further policy measures. The relationship of physical preparedness and policy preparedness[1] is presented in section 5.2 of the Impact Assessment:

> *While talking about the preparedness of the European economy and society and it is important to distinguish here between policy preparedness and physical preparedness/resilience. Since EUCRA analysed policy characteristics (policy horizon, policy readiness, risk ownership) and translated them into urgency classes, it provided the best available comprehensive proxy for policy preparedness. The economic losses and fatalities data reflect physical preparedness. Policy and physical preparedness are closely interlinked, with policy preparedness being often a condition and a driver for physical preparedness. If addressed together, they can improve and harmonise the overall preparedness for climate impacts.*

The available evidence regarding sector policy preparedness is not directly comparable due to the use of differing data categories in information sources, but it illustrates the gaps, fragmentation and duplications in the policy frameworks and implementation at sector level, which constitute "regulatory failure", as explained in section 2.3.1.3 of the Impact Assessment. It also complements the information provided Annex 10 about the policy preparedness of the current adaptation policy framework. This also shows how the initiative would be coherent with existing policies, and create basis for strengthening coherence across other policies while also streamlining approaches.

It is structured in a cascade from wider view to more granular. It first provides overall assessment of policy readiness, then the assessment of exposure of key policy areas to major risks, and then refer to the available evidence regarding individual policies, all based on the EUCRA.

Policy preparedness 1: estimated overall policy readiness to address risks

To present policy preparedness of specific policies, the annex uses EUCRA evidence that identifies risks in the five EUCRA risk clusters, links these to broad policy areas. The EUCRA analysis of policy characteristics (policy horizon, policy readiness, risk ownership) and the translation of this into **Urgency classes is the best available comprehensive proxy for current policy preparedness against the major risks**. It takes into account the lead times from policy decisions

[1] Additional information in Annex 4 and the supporting report

to changes in physical preparedness; it looks at the "paper potential" of the existing policies and considers implementation evidence where available; it also looks at the policy risks ownership distribution between EU and MS. The assessment explicitly recognises that limited evidence is available regarding national level, and limited assessment of EU level policies and their implementation. Given the importance of both for a coherent assessment of preparedness, it therefore has used a default "medium" policy readiness in its assessment, indicating *limited consideration of climate hazards, short-term focus, lack of proactive actions, or a lack of clear targets*[2].

Table A2.3 Description of urgency categories used in EUCRA

Urgency to act	Description
Urgent action needed	The combination of catastrophic risks and insufficient policy readiness calls for urgent new, stronger or different action in the coming years to reduce climate risks. Such actions include policymaking, implementation, capacity building or enabling the environment for adaptation, over and above those already planned.
More action needed	The severity of risk and the limited level of policy readiness calls for more action to be implemented. It is crucial to initiate processes that strengthen adaptation action to avoid critical impacts of climate change.
Further investigation	The available knowledge is insufficient to call for specific new action. Priority should be given to gathering additional evidence regarding the severity of the risk as well as policy readiness, e.g. through dedicated research, monitoring or policy evaluation.
Sustain current action	Current or planned levels of activity are appropriate, but continued implementation of these policies or plans is needed to ensure that the risk continues to be managed in future. A monitoring and evaluation process should be in place to evaluate policy effectiveness, with a view to continuous improvement.
Watching brief	The evidence in these areas should be kept under review, with continuous monitoring of risk levels, so that further action can be taken if necessary.

Based on this proxy evidence, the **EUCRA risk assessment can be referred to as a baseline for both physical preparedness under current policies (in Risk severity columns) and policy preparedness (in the Urgency to act column)**. It is important to note that EUCRA2 (foreseen Q4 2028) methodology is expected to strengthen the analysis of all aspects including policy characteristics which would provide a more appropriate baseline for assessment.

[2] (European Environment Agency, 2024), chapter 20.3.2 Policy readiness analysis and its limitations

Table 18.1 Risk assessment for 36 major climate risks for Europe

Climate risks	Urgency to act	Risk severity			Policy characteristics		
		Current	Mid-century	Late century (low/high warming scenario)	Policy horizon	Policy readiness	Risk ownership
Ecosystems							
Coastal ecosystems	Urgent action needed	+++	+++	+++	Medium	Medium	Co-owned
Marine ecosystems	Urgent action needed	+++	+++	++	Medium	Medium	EU
Biodiversity/carbon sinks due to wildfires (hotspot region: southern Europe)	Urgent action needed	+++	++	++	Medium	Medium	Co-owned
Biodiversity/carbon sinks due to wildfires	More action needed	+++	++	++	Medium	Medium	Co-owned
Biodiversity/carbon sinks due to droughts and pests	More action needed	+++	++	++	Long	Medium	Co-owned
Species distribution shifts (*)	More action needed	+++	++	++	Medium	Medium	Co-owned
Ecosystems/society due to invasive species	More action needed	+++	++	++	Medium	Medium	Co-owned
Aquatic and wetland ecosystems	More action needed	+++	++	++	Medium	Medium	Co-owned
Soil health (*)	More action needed	+++	++	++	Medium	Medium	Co-owned
Cascading impacts from forest disturbances	Further investigation	+	+	+	Long	Medium	Co-owned
Food							
Crop production (hotspot region: southern Europe)	Urgent action needed	+++	++	++	Short	Medium	Co-owned
Crop production	More action needed	+++	++	++	Short	Medium	Co-owned
Food security due to climate impacts outside Europe (*)	Further investigation	++	++	+	Short	Medium	EU
Food security due to higher food prices	Further investigation	++	+	+	Short	Medium	Co-owned
Fisheries and aquaculture	Further investigation	++	+	+	Short	Medium	Co-owned
Livestock production	Watching brief	++	++	+	Short	Medium	Co-owned
Health							
Heat stress — general population	Urgent action needed	+++	+++	+++	Long	Medium	National
Population/built environment due to wildfires (hotspot region: southern Europe)	Urgent action needed	+++	+++	+++	Medium	Medium	Co-owned
Population/built environment due to wildfires	More action needed	+++	++	++	Medium	Medium	Co-owned
Wellbeing due to non-adapted buildings (**)	More action needed	++	++	++	Long	Medium	Co-owned
Heat stress — outdoor workers (hotspot region: southern Europe)	More action needed	+++	+++	+++	Short	Medium	Co-owned
Heat stress — outdoor workers	Watching brief	+++	+++	+++	Short	Medium	Co-owned
Pathogens in coastal waters	Further investigation	+	+	+	Medium	Medium	Co-owned
Health systems and infrastructure	Further investigation	+++	++	++	Medium	Medium	National
Infectious diseases	Sustain current action	+++	++	++	Short	Advanced	Co-owned
Infrastructure							
Pluvial and fluvial flooding	Urgent action needed	+++	+++	++	Long	Medium	Co-owned
Coastal flooding	More action needed	+++	+++	+++	Long	Advanced	Co-owned
Damage to infrastructure and buildings (**)	More action needed	++	++	++	Long	Medium	Co-owned
Energy disruption due to heat and drought (hotspot region: southern Europe)	More action needed	++	++	++	Medium	Medium	Co-owned
Energy disruption due to heat and drought	Further investigation	++	++	+	Medium	Medium	Co-owned
Energy disruption due to flooding	Further investigation	++	++	++	Long	Advanced	Co-owned
Marine transport	Further investigation	++	++	++	Medium	Medium	Co-owned
Land-based transport	Further investigation	++	++	++	Medium	Medium	Co-owned
Economy and finance							
European solidarity mechanisms	Urgent action needed	+++	++	++	Short	Medium	Co-owned
Public finances	More action needed	++	++	++	Medium	Medium	Co-owned
Property and insurance markets	More action needed	++	++	++	Medium	Medium	Co-owned
Population/economy due to water scarcity (hotspot region: southern Europe)	More action needed	++	++	++	Medium	Medium	Co-owned
Population/economy due to water scarcity	Further investigation	++	++	++	Medium	Medium	Co-owned
Pharmaceutical supply chains (*)	Further investigation	++	+	+	Short	Medium	EU
Supply chains for raw materials and components (*)	Further investigation	++	++	++	Short	Medium	EU
Financial markets	Further investigation	+	+	+	Short	Medium	Co-owned
Winter tourism	Sustain current action	+++	+++	++	Medium	Advanced	National

Legends and notes

Urgency to act
- Urgent action needed
- More action needed
- Further investigation
- Sustain current action
- Watching brief

Risk severity
- Catastrophic
- Critical
- Substantial
- Limited

Confidence
Low: +
Medium: ++
High: +++

(*) Wide range of evaluations by authors and risk reviewers.
(**) Urgency based on high warming scenario (late century).

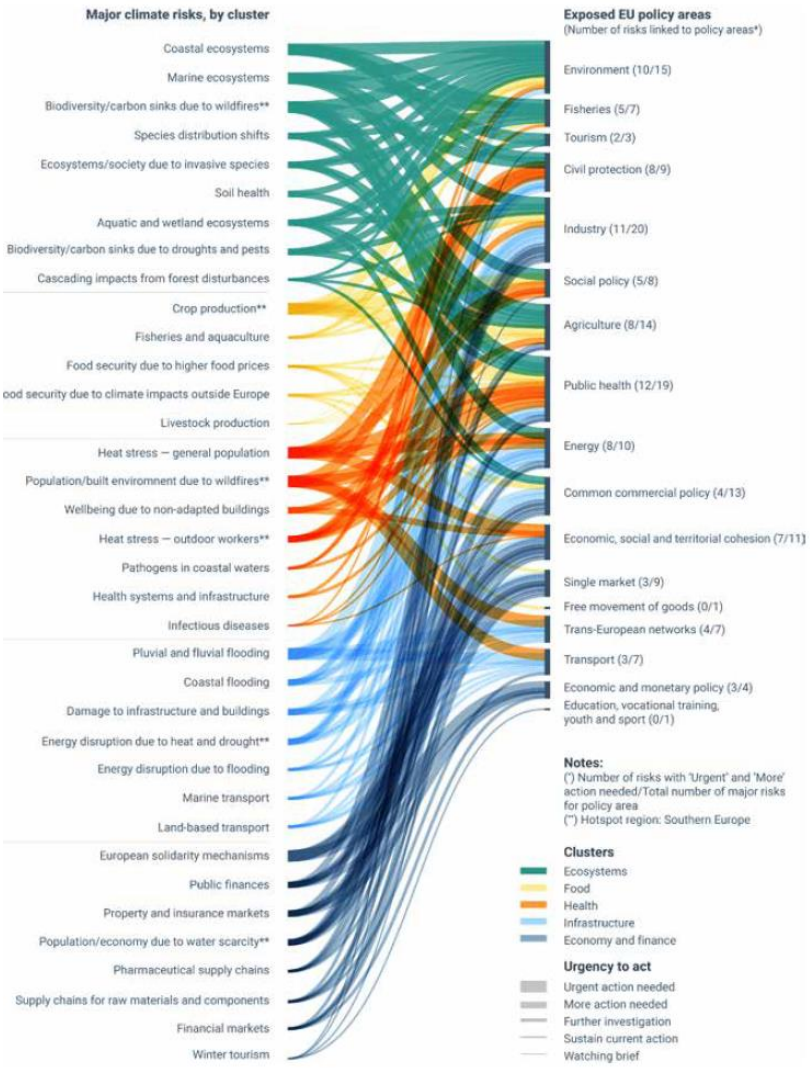
Policy preparedness 2: EUCRA estimated exposure of EU policy areas to the major risks, and key national-level policies

Exposure of EU policy areas

Based on evidence of current policies across the full EUCRA analysis which also identifies individual policies, its Chapter 20 provides an **overall assessment of the exposure of EU policy areas**. It shows that risks are some policy areas are exposed to multiple climate risks, and that each risk is shared between multiple policy areas.

This underpins EUCRA message that the complex risk ownership is a factor that holds back adaptation measures.

Figure 20.1 Exposure of EU policy areas to major climate risks for Europe



Notes: The figure presents the exposure of 17 EU policy areas to the major climate risks identified in this report. The selection of EU policy areas is based on the TFEU and focuses on those policy areas in which the EU has exclusive, shared or supportive competences (as defined in TFEU Articles 3, 4 and 6).

Source: EEA.

Exposure of national policies

EUCRA policy assessment does not systematically cover national policies. It does recognise broadly that *there are several critical areas where integration of adaptation by Member States is lacking, including infrastructure and the economy*, and that there are *significant governance barriers are hindering progress on mainstreaming adaptation /which/ relate to departmental silos between different governance structures that prevent effective coordination, constrained administrative capacity and lack of accessible tools.* It **identifies a range of nationally-owned policy categories that are exposed**, such as

- Spatial planning and infrastructure (built environment, coastal management)
- Building codes / zoning
- Heat-health action plans
- Public health policy and healthcare organisation
- Energy policy (in some Member States)
- Transportation policy
- Forest management
- Environmental monitoring (nutrients, algal blooms)
- Civil protection and emergency preparedness
- National adaptation strategies and plans (NAS/NAP)
- Taxation and social policies (food security, vulnerable groups)
- Economic and industrial strategy
- Fiscal policy / public finance management
- Financial regulation and monetary affairs
- National adaptation funding mechanisms
- Vector and infectious disease control programmes

Policy preparedness 3: EUCRA evidence regarding individual policies

As identified above, for each identified key risk chapter, EUCRA mentions around 120 specific EU-level policies, and identifies 84 EU policies that could be used to address the risks. The EUCRA Chapter 21 provides for each risk a 1st - order list of key current EU solutions policies, links to key exposed policies to the major risks. As noted above, the policy readiness assessment in EUCRA was tentative, it did not cover national policies, was not comprehensive regarding EU policies, and did not seek to quantify the potential benefits including co-benefits. Therefore this cannot be considered a sufficient basis for assessing preparedness of individual policies. At EU level, the assessment of the potential choices for individual policies has not been done separately. Such assessments will continue to take place in the context of existing impact assessment processes.

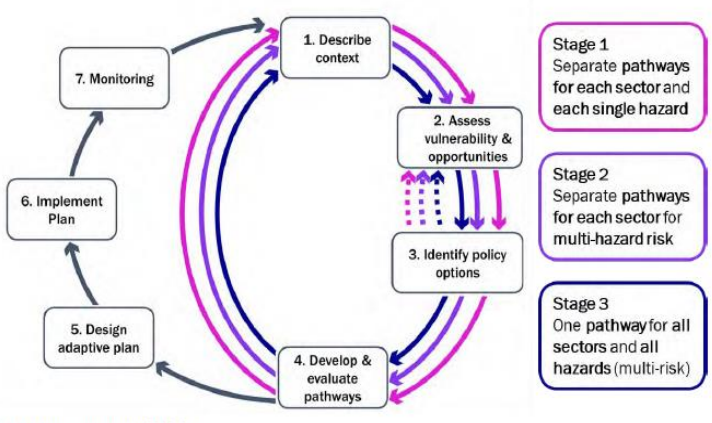
For reference, EUCRA provides evidence regarding specific policies in the example format:

Table 21.3 Major risks of the health cluster and linkages to policy

Major risk and urgency class	Key exposed EU policy areas	Key current EU solution policies
Risk to human health from heat stress increased by climate change	Public health; civil protection; economic, social and territorial cohesion; energy; social policy	EU4Health programme; EU adaptation strategy; health emergency preparedness and response; Critical Entities Resilience Directive; EU renovation wave; Energy Performance of Buildings Directive; technical guidance on the climate proofing of infrastructure in the period 2021-2027; emergency framework regarding medical countermeasures; Drinking Water Directive; legal mandate of the Health Emergency Preparedness and Response Authority (HERA) and the European Medicines Agency and their initiatives

The supporting report (more precisely Appendix 4) provides an indicative prioritisation of the policies it identified per each cluster on the basis of EUCRA.

The methodological difficulty of identifying individual key solution policies is underlined in EUCRA, which throughout stresses the interconnections between risks and the solutions. There are scientific approaches to dealing with complexity and to optimise how different sector and policy interests could be balanced. However these need as input a series of value judgements and assumptions, which compound when added up. One example of such approach is the Dynamic Adaptive Policy Pathways for Multi-Risk (DAPP-MR) approach developed under the MYRIAD[3] project. The Integrated Framework is expected to improve the accessibility



Schlumberger et al. (2022)

[3] https://dashboard.myriadproject.eu/methods/multi-risk-pathways/

of such tools across the EU, but will not prescribe their use for specific decisions in policy sectors.

ANNEX 10: CLIMATE RESILIENCE GAPS IN ADAPTATION POLICIES AND SECTORAL POLICIES

This annex explains in more detail the currents gaps in horizontal adaptation policies and sectoral/ thematic policies in addressing climate resilience.

Adaptation policies

Climate resilience and adaptation are areas of shared EU competence, with action required at both Union and Member State level. At Union level, the current horizontal climate resilience governance framework combines binding and non-binding policy instruments. The legally binding European Climate Law and Governance Regulation are complemented by the non-binding EU Strategy on Adaptation to Climate Change (established under the Climate Law as a Communication) the Commission Communication on managing climate risks, and with ad hoc knowledge products as the Commission guidelines on Member States' national adaptation strategies and plans and EUCRA.

EU Strategy on Adaptation to Climate Change

The EU Strategy on Adaptation to Climate Change is a non-binding instrument that sets out the Union vision to become a climate-resilient society by 2050. The original strategy dates from 2013 and was revised in 2021 to consider the Paris Agreement's temperature goal of 1.5°C and puts forward a multitude of actions for the Commission. After its adoption, climate projections for Europe have however evolved significantly and now indicate stronger warming. In addition, no European climate risk assessment was available at the time of the revision of the strategy, and it therefore does not address climate risks in a comprehensive manner nor identify responsible actors.

The strategy's non-binding nature means that it cannot create enforceable obligations on the Union and the MSs to cater for climate impacts in a coherent way, nor can it establish harmonised approaches or ensure systematic consideration of climate risks in sectoral policies. **The Strategy does not constitute a solid overall framework due to its aspirational nature and the fact that it is based on outdated assumptions. So far, it has resulted only in limited progress in horizontal climate resilience and sectoral policies.**

The first Union level progress assessment of 2023 by the Commission highlighted weaknesses in translating the EU Adaptation Strategy into measurable and sufficiently rapid resilience outcomes. It noted that several of the actions were still to advance. The assessment could not provide conclusions on how climate resilient the Union was due to absence of progress tracking, robust assessment frameworks, persistent data gaps and because adaptation measures are outpaced by the physical climate impacts.

European Climate Law

The 2021 European Climate Law is a Regulation establishing the main legal foundation for horizontal climate adaptation action at Union and MS level, with some links to sectoral policies. It sets out a general obligation to ensure continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, in accordance with Article 7 of the Paris Agreement. It also requires the Commission to adopt and regularly review the Union adaptation strategy, and MS to adopt, implement and review national adaptation strategies and plans, based on robust climate change and vulnerability analyses, progress assessments and indicators. The Law contains provisions for five-yearly assessments by the Commission of Union progress and measures, and of national measures.

While the Law creates a binding legal basis for climate adaptation, it does not provide a sufficiently comprehensive and operational framework to ensure coherent and effective climate resilience action across the Union. The Law does not specify the future climate conditions to which the Union and MSs should adapt or set specific objectives or targets. The current provisions on climate risk assessments and strategies and plans remain general and are not sufficient to ensure systematic consideration of climate risks in Union sectoral policies and across MS. Provisions on participation, governance and transboundary cooperation are not adaptation-specific, while the provisions on progress assessment do not provide an adequate basis for evaluating implementation, effectiveness and outcomes.

The Commission assessment of Member States' adaptation progress under the European Climate Law showed already in 2023 that, while national climate adaptation frameworks were in place, major weaknesses remained in their operationalisation and implementation. Overall, key gaps concerned insufficient climate risk and investment needs assessments, lack of dedicated budgets, use of outdated scientific data, weak interinstitutional coordination and integration of nature-based solutions in strategic and sectoral policies, and missing indicators for monitoring of actions and results. Due to lack of harmonised approaches under the Law across all steps of the climate adaptation policy cycle, the Commission could not assess the real progress on the ground towards enhanced climate preparedness and resilience. Rather, the assessment focused on processes and administrative arrangements. Furthermore, the Commission could not assess relative progress at MS level nor could have it aggregated in a meaningful manner. In view of this, the Commission identified needs for more evidence-based harmonisation of assessment criteria. These findings were repeated in the 8th Environment Action Programme Mid-Term Review.

Governance Regulation

The 2018 Governance Regulation provides the EU framework for **planning** and **reporting** on climate and energy policies, structured around key areas including GHG emissions and removals, share of renewable energy sources (RES) and energy savings due to energy efficiency (EE). It requires MSs to set out their planned policies and measures in integrated national energy and climate plans (NECPs) and long-term strategies (LTSs). Second, it requires regular reporting on

progress in implementing those plans and achieving the agreed national targets. In this way, the Governance Regulation links forward-looking planning with systematic progress reporting across the five dimensions of the Energy Union: decarbonisation, including greenhouse gas emissions and removals and renewable energy; energy efficiency; energy security; internal energy market; and research, innovation and competitiveness. **In relation to adaptation, it requires adaptation goals to be reflected in NECPs "where applicable" and sets the reporting channel through which Member States provide information on horizontal national adaptation actions, as well as on some sectoral actions.**

However, the Governance Regulation has not been sufficient to support the level of climate resilience needed across the Union and MSs and is not fit to become the primary governance framework for climate resilience and adaptation.

As the Governance Regulation was designed to support the EU's 2030 climate and energy framework and delivery of the 2030 targets, **it was not adopted to steer a comprehensive and iterative climate adaptation policy cycle.** Due to the design of climate and energy targets, progress can be assessed against quantified and measurable objectives. Monitoring and reporting methodologies tend to be more standardized. **Climate adaptation does not follow the same architecture. There is no quantified and measurable EU target for climate resilience and adaptation, nor national targets**. Progress towards climate resilience cannot be captured primarily through target delivery, emissions accounting or technology deployment. It depends instead on whether climate risks are identified, whether preparedness is improved, and whether climate resilience is strengthened across territories, sectors and governance levels. This makes climate adaptation less suited to an instrument whose core function is to track delivery against quantified climate and energy targets.

Practice shows that adaptation goals in NECPs are absent, general or insufficiently defined. **The 2024 Commission report on the review of the Governance Regulation and the and the 2025 EU-wide assessment of the final updated NECPs confirm that climate adaptation remains insufficiently addressed in the national planning.** NECPs often refer to national adaptation strategies and plans rather than systematically integrate climate risks, vulnerabilities and adaptation needs into energy and climate planning. While the Regulation has improved the completeness and quality of Member States' reporting on adaptation to some extent, gaps and inconsistencies persist in the scope and quality of information reported under Article 19(1), and adaptation reporting lacks indicators to track progress. **The 2025 EU-wide assessment of the final updated NECPs reconfirmed that adaptation remains insufficiently integrated.** Only some MSs adequately address preparedness and climate resilience in the NECPs, and the Commission's adaptation related recommendations have been taken up only partially.

Further, Member States are not required to take into account national climate risk assessments when preparing NECPs. As a result, adaptation may be formally covered but is not systematically embedded in the planning and decision-making process. This also limits the effectiveness of progress assessment. Where adaptation goals are vaguely defined and where reporting quality

remains uneven, the Commission has a limited basis to assess whether real progress has been achieved, even within the narrow scope of energy-related sectors covered in the NECPs. **In conclusion, relying on the NECP structure would keep climate resilience and adaptation considerations too narrow, energy and mitigation-centered and insufficiently granular.**

Instead, climate resilience and adaptation require a climate risk-based governance model. This starts with the identification of climate risks and the assessment of preparedness gaps across Member States. Policy design must then focus on actions and measures to reduce risks before climate impacts materialise. Monitoring should assess whether these have improved climate resilience across sectors and levels of governance.

The requirements under the Governance Regulation, including public consultation, multilevel climate and energy dialogue, regional cooperation and the Commission assessment can provide limited entry points for climate adaptation considerations. However, they are designed around climate and energy, focusing on stakeholders from these fields. Stakeholders from sectors such as agriculture, transport, health, environment and other relevant sectors outside the scope of NECPs are not represented. **As a result, climate adaptation may be covered formally, but is not systematically embedded in the planning, consultation and decision-making processes**.

The **sectoral scope** of the Governance Regulation is centered around energy system transformation and greenhouse gas emissions accounting and reductions. In practice, this means that NECPs primarily address energy and greenhouse gas-related issues, including for e.g. electricity and transmission infrastructure, market integration or energy poverty. Long-term strategies (LTSs) similarly focus on long-term greenhouse gas emission reductions and removals, including sectoral pathways for electricity, industry, transport, heating and cooling, buildings, agriculture, waste and land use, land-use change and forestry (LULUCF).

This scope can accommodate only limited climate resilience and adaptation aspects that directly link to the energy system, such as climate impacts affecting energy security, cooling water availability for power plants or biomass availability for energy. **However, it does not reflect the full sectoral scope of climate resilience**. Expanding NECPs to cover the full climate resilience and adaptation agenda across all EU sector policies would risk overburdening an already complex instrument whose effectiveness depends on maintaining a manageable scope.

Climate resilience and adaptation needs can be hardly adequately addressed in an instrument primarily designed around energy system transformation, emissions trajectories and climate mitigation targets. **It requires an all-sectors-encompassing approach, extending well beyond energy and sectors currently covered by climate acquis.** A broad set of sectors and policy areas need to be addressed to ensure preparedness and progress towards climate resilience, for e.g. **crisis management** (including civil protection and emergency management, security and defence); **ecosystems** (including biodiversity, forestry, marine and coastal areas, water management, land-use and spatial planning); **food** (including agriculture and rural development); **health**; **infrastructure** (including the built environment, energy, transport, urban development,

information and communications technologies, cultural heritage); and **economy and finance** (including finance and insurance, industry, tourism and fisheries).

Adaptation responses are also territorially specific. They must reflect national, regional and local circumstances, including geography, climate conditions, settlement patterns, infrastructure, economic structure and institutional capacity. A degree of variation across Member States, regions and localities is therefore necessary for effective adaptation.

Table 2 Gaps in current horizontal Union climate adaptation policies

EU Strategy on Adaptation to Climate Change (*not legally binding)	**Governance Regulation (GovReg)**	**European Climate Law (ECL)**
Objectives		
Heading 2: (Forging a climate-resilient Union): "Long-term vision" of the EU to become a climate-resilient society in 2050	-	**Article 5(1):** MS and COM to ensure continuous progress on adaptation
Common reference global warming trajectory		
-	-	-
Duty to consider climate risks		
-	-	**Article 6(4)** The Commission shall assess whether draft measures or legislative proposals, including budgetary proposals, are consistent with ensuring progress on adaptation. When making its draft measures and legislative proposals, the Commission shall endeavour to align them with the objectives of the ECL.
Climate risk assessments		
-	-	**Article 5(4):** MS to base adaptation strategies and plans on "robust climate change and vulnerability analyses…"
Adaptation plan/strategy		
-	-	**Article 5(2)***:* COM to adopt and regularly review Union strategy

Heading 8 (Improving adaptation strategies and plans): Voluntary COM guidance to MS (also covering risk assessments)	**Article 4(a)(1)(iii) and Annex I***:* MS to include in NECPs info on adaptation goals "where applicable"	**Article 5(4):** MS to adopt, implement and review national adaptation strategies and plans + some limited guidance
-	**Annex IV**: MS to include in Long-term strategies information on "adaptation policies and measures"	-
Monitoring and reporting		
-	**Article 17:** MS to report biennially progress on national energy and climate plans, incl adaptation goals **Article 19(1):** MS to report biennially on national adaptation actions pursuant to Annex VIII and UNFCCC and Paris Agreement	**Article 5(4)**: MS to report national adaptation actions under GovReg 19(1)
-	**ANNEX VIII:** Reporting requirements on national adaptation actions	-
Assessment of progress		
-	-	**Article 6(1) and (2):** COM to assess regularly collective progress by MS and consistency of Union measures
-	-	**Article 7(1) and (2):** COM to assess regularly consistency of national measures and to issue recommendations
Indicators		
-	-	-
Transboundary cooperation		

Heading 8 (Improving adaptation strategies and plans)**:** COM to "stimulate cooperation" regionally and across borders	**Article 12:** MS to cooperate with each other on NECPs, no clear reference to adaptation	-
Just resilience		
Heading 9 (Fostering local, individual, and just resilience) acknowledges that achieving resilience in a just and fair way is essential	-	**Article 5(3):** Policies on adaptation 'shall focus, in particular, on the most vulnerable and impacted populations'
Guidelines		
-	-	**Article 5(5):** COM to adopt guidelines for climate risk identification, classification and management in projects and programmes (one-off)

NOTE: The table compares the content and scope of climate adaptation-relevant policies. It does not assess legal force.

Coverage of key dimensions of the initiative in selected sectoral and thematic EU policies

With the context and caveats provided in Annex 9, the below provides a preliminary mapping of selected EU sector policies and their current alignment with the main elements of the integrated framework.

It is important to underline that the choice of which sectors, and which policies are a priority is a value-decision of what and how the Commission could prioritise. **The selection below does not represent such a prioritisation or ranking of policies. It reflects the authors appreciation of the EUCRA evidence regarding what could be some of the impacted and/or influential policies in each EUCRA cluster.** A more complete and structured assessment is expected to be part of the next EUCRA, currently in preparation by the EEA, and due in 2028.

The table below shows that, on paper, most policies have some potential to address climate resilience considerations. At the same time, it is not an indication whether and how well they currently deliver on the key dimensions of the initiative as identified in report. **There is no comparable assessment available; the evidence presented Annex 9 regarding high risks in broader policy categories remains the primary indication of limited effectiveness and efficiency of policies.**

Table 3 Indicative mapping of readiness of select EU policies to deliver on the key elements of the initiative

Rating scale — Solid: explicitly and operationally addressed with binding or clear obligations. Partial: mentioned or implied but without binding requirements, specific targets, or enforcement mechanism. Absent: not addressed.

Cluster	Policy / Instrument	Binding?	a. Scope	b. Objectives / Targets	c. Future Climate	d. Scenarios	e. Responsibility	f. Planning	g. Monitoring	h. Review
CLUSTER 1: CRISIS MANAGEMENT TOOLS										
Crisis Mgmt	Preparedness Union Strategy (JOIN(2025)130)	No	Solid	Partial	Partial	Absent	Partial	Partial	Partial	Absent
Crisis Mgmt	UCPM — COM(2025) 548 [proposed]	Yes*	Solid	Partial	Partial	Partial	Partial	Solid	Partial	Absent
Crisis Mgmt	Cross-Border Health Threats (2022/2371)	Yes	Partial	Partial	Absent	Absent	Partial	Partial	Absent	Solid
Crisis Mgmt	EU Solidarity Fund / SEAR	Yes	Partial	Absent	Absent	Absent	Partial	Absent	Absent	Absent
CLUSTER 2: ECOSYSTEMS (nature, biodiversity, water, forests)										
Ecosystems	8th Environment Action Programme (2022/591)	Partly	Solid	Solid	Solid	Absent	Partial	Absent	Partial	Absent
Ecosystems	Water Resilience Strategy (COM(2025)275)	No	Solid	Solid	Solid	Partial	Partial	Partial	Partial	Absent
Ecosystems	Floods Directive (2007/60/EC)	Yes	Solid	Solid	Solid	Partial	Solid	Solid	Partial	Partial
Ecosystems	Water Framework Directive (2000/60/EC)	Yes	Partial	Solid	Partial	Absent	Solid	Solid	Solid	Partial
Ecosystems	Nature Restoration Law (2024/1991)	Yes	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Partial
Ecosystems	Marine Strategy Framework Dir. (2008/56)	Yes	Partial	Partial	Absent	Absent	Solid	Solid	Solid	Solid
Ecosystems	EU Forest Strategy 2030 (COM(2021)572)	No	Solid	Solid	Solid	Absent	Solid	Partial	Partial	Solid
CLUSTER 3: FOOD										

Cluster	Policy / Instrument	Binding?	a. Scope	b. Objectives / Targets	c. Future Climate	d. Scenarios	e. Responsibility	f. Planning	g. Monitoring	h. Review
Food	CAP (Reg. 2021/2115 & 2021/2116)	Yes	Partial	Solid	Partial	Absent	Partial	Solid	Solid	Solid
Food	Common Fisheries Policy (Reg. 1380/2013)	Yes	Partial	Solid	Partial	Partial	Solid	Solid	Solid	Partial
Food	Water Reuse Regulation (2020/741)	Yes	Solid	Solid	Solid	Partial	Solid	Solid	Solid	Solid
Food	Groundwater Directive (2006/118/EC)	Yes	Partial	Solid	Absent	Absent	Solid	Solid	Solid	Partial
Food	Soil Monitoring Directive (2025/2360)	Yes*	Partial	Solid	Partial	Absent	Partial	Partial	Solid	Absent
CLUSTER 4: HEALTH										
Health	EU OSH Strategic Framework 2021–2027	No	Partial	Partial	Partial	Absent	Partial	Absent	Absent	Absent
Health	OSH Framework Directive (89/391/EEC)	Yes	Partial	Partial	Absent	Absent	Partial	Partial	Absent	Partial
Health	Energy Performance of Buildings Dir. (2024/1275) & linked	Yes	Partial	Absent	Partial	Partial	Partial	Partial	Absent	Solid
Health	HERA (Commission Decision 2021)	No	Partial	Partial	Partial	Absent	Partial	Partial	Absent	Partial
CLUSTER 5: INFRASTRUCTURE										
Infrastructure	Critical Entities Resilience Dir. (2022/2557)	Yes	Solid	Solid	Partial	Partial	Solid	Solid	Solid	Solid
Infrastructure	EIA Directive (2011/92 + 2014/52)	Yes	Partial	Partial	Partial	Absent	Partial	Partial	Absent	Partial
Infrastructure	European Standardisation (mixed)	No*	Partial	N.A.	Partial	Partial	Partial	N.A.	N.A.	Partial
Infrastructure	Public Procurement Directives (2014/24+25)	Yes	Partial	Partial	Partial	Absent	Partial	Absent	Absent	Partial
Infrastructure	Drinking Water Directive (2020/2184)	Yes	Solid	Solid	Partial	Absent	Solid	Solid	Solid	Solid
Infrastructure	Urban Wastewater Treatment Dir. (2024/3019)	Yes	Solid	Solid	Solid	Partial	Solid	Solid	Solid	Solid
Infrastructure	Security of Supply Framework (current)	Yes	Absent	Absent	Absent	Absent	Partial	Partial	Partial	Partial

Cluster	Policy / Instrument	Binding?	a. Scope	b. Objectives / Targets	c. Future Climate	d. Scenarios	e. Responsibility	f. Planning	g. Monitoring	h. Review
Infrastructure	TEN-T Regulation (2024/1679)	Yes	**Solid**	**Solid**	**Solid**	**Partial**	**Partial**	**Solid**	**Partial**	**Solid**
Infrastructure	TEN-E Regulation (2022/869)	Yes	**Solid**	**Partial**	**Solid**	**Partial**	**Partial**	**Absent**	**Solid**	**Solid**
CLUSTER 6: ECONOMY AND FINANCE										
Economy/Finance	Budgetary Frameworks Dir. (2011/85 + rev.)	Yes	**Partial**	**Partial**	**Partial**	**Absent**	**Partial**	**Partial**	**Partial**	**Partial**
Economy/Finance	CSRD (Dir. 2022/2464 + ESRS 2023/2772)	Yes	**Solid**	**Solid**	**Partial**	**Partial**	**Partial**	**Partial**	**Solid**	**Solid**
Economy/Finance	Solvency II (revised Dir. 2025/2)	Yes	**Solid**	**Solid**	**Partial**	**Solid**	**Partial**	**Solid**	**Solid**	**Solid**
Economy/Finance	CRR3/CRD6 (Reg. 2024/1623 / Dir. 2024/1619)	Yes	**Solid**	**Solid**	**Partial**	**Partial**	**Solid**	**Partial**	**Partial**	**Solid**
Economy/Finance	Credit Rating Agencies Reg. (1060/2009)	Yes	**Partial**	**Absent**	**Absent**	**Absent**	**Partial**	**Absent**	**Absent**	**Partial**
Economy/Finance	Critical Raw Materials Act (2024/1252) & SCAN	Yes	**Partial**	**Partial**	**Partial**	**Absent**	**Solid**	**Partial**	**Partial**	**Partial**
Economy/Finance	Tourism Strategy 2026 [forthcoming]	No	**Solid**	**Absent**	**Partial**	**Absent**	**Absent**	**Absent**	**Absent**	**Absent**
Economy/Finance	EU Integrated Wildfire Risk Mgmt Strategy 2026	No	**Solid**	**Partial**	**Solid**	**Partial**	**Partial**	**Partial**	**Partial**	**Absent**
Economy/Finance	Coastal Strategy (COM(2026)530)	No	**Solid**	**Solid**	**Solid**	**Partial**	**Partial**	**Absent**	**Absent**	**Absent**
Economy/Finance	Islands Strategy (COM(2026)520)	No	**Solid**	**Solid**	**Solid**	**Absent**	**Partial**	**Absent**	**Absent**	**Absent**

ANNEX 11: DEFINITIONS

This annex provides more details on some important concepts used in the main text which, due to the text length limit, could not be fully explained there.

Climate risk ownership

Risk ownership, in the EU adaptation context, refers to the **distribution of responsibilities between public authorities for policy decisions** (including implementation choices) that have the potential to reduce exposure or vulnerability to climate risks in their primary domain and for other policies. This relates to the **division of responsibility along two axes:**

- **Between** the Union and its Member States, and **between governance levels** within Member States.
- **Within the governance levels of Union and/or Member States, as for example reflected in the** policy mandates of the different government departments.

Risk ownership is strongly related to **accountability**. It **does not refer to the ownership of financial risks**, which are distributed across public and private stakeholders.

Tolerable residual risk

Tolerable residual risk refers to the potential losses (of life, value, etc) that are acceptable to the decisionmaker, based on the significance of potential impacts from climate hazards and the expected reduction in exposures and/or vulnerability that would be achieved with the planned actions/measures (residual). It reflects the desired level of protection in the context of uncertainties in available evidence, constraints (financial, technical, political etc) and value priorities. The use of the concept is also described in the Better Regulation Tool 14.

Climate resilience by design

Climate resilience by design is part of the concept of Preparedness and Security by design. It means **embedding climate resilience considerations into the design phase** of EU legislation and policy decisions as well as investment and financing decisions. **Reducing exposure and/or vulnerability under plausible future climates** from the outset, it seeks to ensure that increasing hazard events do not become unexpected or compound crises. It does not mean total protection against climate risks. The approach is **anticipatory** and complements the disaster risk management measures that deal with the residual risks. A policy, societal system, activity, physical asset or organisation is climate resilient by design if:

- It considers climate risks that could materialise in its lifetime using plausible climate scenarios and the Reference Warming Trajectory; and
- Its design and implementation include appropriate adjustments and/or measures allowing to avoid unacceptable climate risks; and

- Those adjustments and/or measures do not unduly decrease the resilience or sustainability of other activities, physical assets or organisations (which would be considered as maladaptation).
- The principle should be utilised in policy planning, implementation and monitoring, via the range of available policy instruments for the Union and Member States, including legislation, standardization, coordination, incentives, investments and awareness raising. The responsibility for developing the exact method for climate resilience by design for a specific sector or region should be with the risk owners.

Just resilience

Just resilience is a set of policies, measures, and guiding principles intended to **tackle systemic inequalities in the transition towards a climate-resilient society**, in line with the principles of the European Pillar of Social Rights. It ensures that vulnerable individuals and social groups benefit from climate adaptation efforts fairly and are not disproportionately burdened by climate impacts, by integrating fair access to opportunities, resources and inclusion in decision-making processes for climate adaptation policies, while recognising diverse values and leaving no one behind.

Unequal burden refers to the **unequal exposure to hazards and distribution of climate impacts and risks** due to, pre-existing inequalities and differences in adaptive capacities and capabilities (including e.g. social-economic, demographic, historical and intersectional injustice), that result in exacerbated impacts and increased vulnerabilities for certain population groups[4].

′Leaving no one behind′ in adaptation action, refers to the **distribution of benefits and burdens of adaptation responses** among all social groups and encompasses fair and transparent processes including the fair distribution of political power and participation in policymaking, avoiding maladaptive outcomes and targeting the underlying causes of pre-existing inequalities[5].

Vulnerabilities to climate risks and adaptation action are based on characteristics such as age (children, youth and elderly), health (including physical abilities, and disabilities), gender as well as socio-economic status, type of occupation, and group-based vulnerabilities (including indigenous peoples, migrants and ethnic minorities)[6].

The 2021 European Climate Adaptation Strategy highlights that "achieving resilience in a just and fair way is essential so that the benefits of climate adaptation are widely and equitably shared." Furthermore, the 2023 Commission Guidelines on Member States′ adaptation strategies and plans urges Member States to prioritise "socially equitable adaptation measures." At international level, within the UAE framework for Global Climate Resilience[7] parties will need to consider gender

[4] EEA, 2025. Social fairness in preparing for climate change: how just resilience can benefit communities across Europe | Publications | European Environment Agency (EEA)
[5] EEA, 2025. Social fairness in preparing for climate change: how just resilience can benefit communities across Europe | Publications | European Environment Agency (EEA)
[6] EEA Report 01/2024. European Climate Risk Assessment – Chapter 19 Social justice and cohesion European Climate Risk Assessment | Publications | European Environment Agency (EEA)
[7] Decisions under 2/CMA.5 and CMA.6

responsive, participatory and human rights approaches and ensure intergenerational equity, social justice and social inclusion in their adaptation efforts.

‘Climate resilience’ and ‘climate adaptation’

Climate resilience refers to the capacity of social, economic, and environmental systems to anticipate and manage climate impacts, minimise their damage, and recover or reorganise in ways that maintain their essential functions, identity, and structure, while also retaining the capacity for adaptation, learning, and transformation. To safeguard societal wellbeing, economic activity, and a healthy environment, people, communities, and governments must be equipped to address the unavoidable impacts of climate change. This resilience – the ability to withstand adverse climate conditions – can be achieved through adaptation actions such as strengthening disaster response and recovery capacities, climate-proofing critical infrastructures and essential services, enhancing climate information and early-warning systems, and integrating long-term planning.

Climate adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects. It encompasses changes in processes, practices, and structures designed to moderate potential damages or to benefit from opportunities associated with climate change. Adaptation measures can include building flood defences, establishing early-warning systems for extreme weather, cultivating drought-resistant crops, or reconfiguring business operations and policy frameworks.

ANNEX 12: REFERENCE GLOBAL WARMING TRAJECTORY FOR EUROPEAN CLIMATE RISK MANAGEMENT DECISIONS

In the preparations for the European Integrated Framework for Climate Resilience, feedback from the Council, Member States and other stakeholders has called for considering the establishment of common temperature reference scenarios/trajectories for climate risk management decisions as one of the avenues for encouraging more systemic and proactive action across the EU. This was noted in the 2025 Council Conclusions, and feedback to the Call for Evidence and to the Open Public Consultation (Annex 2).

This Annex outlines the policy rationale and the scientific evidence used to inform the reference global warming trajectory proposed in this Impact Assessment.

The 'reference global warming trajectory' is defined as a set of global warming levels each achieved around a specific future time horizon. For brevity, the 'reference global warming trajectory' is also referred to as 'reference warming trajectory', 'reference trajectory' or 'trajectory' in the following text.

Policy rationale for a reference global warming trajectory

The need for a shared climatic reference for adaptation decisions

Robust climate risk assessments are essential to inform decision-makers about the risks stemming from a range of possible climate futures and associated uncertainties, and are thus a precondition for decisions that can reduce climate risks and enhance climate resilience. There are established methods for considering the full range of climate scenarios in climate risk assessments (CRAs), reflecting the uncertainties around possible changes to the climatic system and their possible impacts[8]. Climate scenarios are here defined as encompassing the range of future scenarios used in CRAs, including emission scenarios, global warming level-based scenarios, and scenarios representative of future climatic conditions. At the same time, the complexity and breadth of climate scenarios is one of the factors that is holding back the integration of climate resilience considerations into relevant policy and investment decisions.

The reference global warming trajectory, on the other hand, will give decision-makers and society at large a clear reference point against which to calibrate decisions, ensuring a shared foundation for climate resilience across the EU. By providing a shared understanding of the future global warming levels that society needs to be prepared for, the reference global warming trajectory will specifically help decision-making by:

- Communicating with clarity about the need to prepare and adapt to a more adverse climate which cannot be assumed to resemble the past.

[8] IPCC (2014), Integrated Risk and Uncertainty Assessment of Climate Change Response Policies, in Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on ClimateChange.
https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter2.pdf

- Simplifying the integration of climate considerations in policy and investment decisions in areas that are exposed to climate risks, such as infrastructure, buildings, energy, etc., at all governance levels.
- Promoting consistency, comparability and compatibility of adaptation decisions across sectors and countries.

Global warming is regarded as the most suitable choice of parameter to set a common reference for EU climate risk management decisions, because:

- It is the universally accepted metric for monitoring the pace of climate change and projecting the potential benefits of global emission reduction efforts.
- It is a well-defined physical quantity for which, despite existing uncertainties, models perform well in reproducing its recent past and current evolution. Although the pace of future change varies across models (see section 2.4), there is full agreement that global mean temperatures will keep increasing with continued emissions.
- From a practical point of view, it is already used in several climate risk assessments and national adaptation plans across the EU, and the global scientific community provides regular estimates of its current levels and future projections.

Global warming is quantified via Global Warming Levels, which are defined as changes in multi-decadal global near-surface air temperature over land and ocean compared to the pre-industrial average computed over the period 1850-1900[9].

Empowering decision-making

Translation into localised climatic changes

Setting a reference global warming trajectory within the Integrated Framework will promote an EU-wide common understanding of the global warming levels we all need to at least prepare for.

Still, regional and local manifestations of climate change, whether related to changes to mean and extreme temperature or other climatic variables like precipitation, and the resulting impacts will vary greatly across the EU and within Member States. The trajectory based on global warming levels does not in itself convey the expected climate changes and impacts at EU and national scales, and as such is not operational, meaning it cannot be readily considered in risk assessments and planning.

To achieve meaning and useability in each specific context, the trajectory will have to be translated into corresponding (e.g. national, local) relevant values for a range of climatic variables at the appropriate spatial and temporal resolutions. For these implementation steps, dedicated research, analysis, data and methodologies needs to be developed by relevant European and national bodies. There would be benefits in doing this translation through a coordinated and cooperative approach between relevant actors.

[9] IPCC (2021), The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Chapter 1. https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-1/

Implementation flexibility

The EU and each Member State should ensure that the reference warming trajectory is embedded into relevant decision-making processes. It should be considered as the baseline in adaptation decisions, building on its integration in risk assessments.

Depending on contextual considerations, such as specific vulnerabilities, the timeframe of policies and investments and value associated with losses, adaptation decisions can and should also consider more adverse possible climatic futures, including tipping points as relevant, and timescales beyond the end of the century (for example, for sea level rise). The decisions also need to reflect uncertainties in projected warming levels, as the projections for near-and medium-term under various scenarios point to a small range of warming outcomes, while the projections for end of century have a wider range.

The EU Institutions should embed the trajectory into their policies and plans in a way that is appropriate to the geographic and sectoral coverage of the decisions.

Need for review cycle

The reference warming trajectory should be reviewed regularly on timescales that are supportive of the EU and national adaptation cycles. The review should be in line with the evolution of observed warming trends, climate science and global emission policies, and consider relevant assessments (e.g. the Intergovernmental Panel on Climate Change (IPCC) Assessment Reports (AR), United Nations Environment Programme (UNEP) Emissions Gap Report, European Climate Risk Assessment (EUCRA) as well as the advice of the European Scientific Advisory Board on Climate Change (ESABCC).

An independent scientific entity needs to be identified to conduct the review to ensure integrity of the trajectory.

Evidence informing the choice of a reference global warming trajectory

Paris Agreement global warming targets

The Paris Agreement seeks to keep the long-term global temperatures well below 2 °C and pursue efforts to limit it to 1.5 °C above pre-industrial levels. This goal refers to global averages assessed over decades, in line with the GWL definition, as shorter periods are influenced by natural variability and bias the assessment of the true long-term trend[10].

In 2023, the IPCC AR6 indicated that reaching the 2030 emissions levels implied by NDCs as submitted by Autumn 2021 would lead long-term global warming to likely exceed 1.5 °C during

[10] UNFCCC (2023) Report of the Conference of the Parties on its twenty-seventh session, held in Sharm el-Sheikh from 6 to 20 November 2022. Addendum. Part two: Action taken by the Conference of the Parties at its twenty-seventh session, FCCC/CP/2022/10/Add.2., Decision 21/CP.27, paragraph 5.https://unfccc.int/sites/default/files/resource/cp2022_10a02E.pdf

the 21st century (high confidence)[11]. Latest observations show that the breach of 1.5°C is fast approaching. 2024 was confirmed to be the first calendar year when average global temperature exceeded 1.5 °C above pre-industrial levels.[12;13] Recent estimates suggest long-term exceedance of 1.5°C will happen already by 2030[14;15].

In 2023, IPCC AR6 also indicated that limiting warming to 2 °C by the end of the 21st century would require deep global GHG emissions reductions already in the 2020s[16].

Latest comprehensive assessment of global warming projections

The IPCC is the most authoritative voice on the state of scientific knowledge on climate change. Through regular Assessment Reports (AR), the IPCC provides comprehensive assessments of the scientific consensus on climate change, mitigation and adaptation. The IPCC specifically provides an assessment of the status of observed warming and climatic changes and of the scientific consensus on climate science, including key aspects of the climate system connecting GHG emissions with projected warming and other climatic changes both globally and regionally. The IPCC also provides an assessment of global mitigation progress, mitigation gaps and challenges to reaching the Paris Agreement targets, and provides a range of quantitative 'scenarios' to map the range of possible climatic futures depending on plausible emission, land use and socio-economic pathways.

[11] IPCC (2023) Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. doi: 10.59327/IPCC/AR6-9789291691647.001; paragraph A.4.3.

[12]Copernicus Climate Change Service (2025) 2024 is the first year to exceed 1.5°C above pre-industrial level. https://climate.copernicus.eu/copernicus-2024-first-year-exceed-15degc-above-pre-industrial-level

[13] As the world is fast approaching the 1.5°C long-term global warming level on a sustained basis, and with 2024 the first year that exceeded 1.5°C above the pre-industrial level (1850-1900), there is ever increasing interest in how we will know whether and when 1.5°C warming since pre-industrial has been reached or exceeded with respect to a long-term average. Several approaches are under consideration by the WMO and international scientific community. See section on 'Monitoring global temperature for the Paris Agreement' in the State of the Global Climate 2024 (https://wmo.int/publication-series/state-of-global-climate/state-of-global-climate-2024) and a recent comprehensive methodological community overview building on the IPCC 6th assessment (https://doi.org/10.5194/essd-2025-825 [preprint]) for a detailed overview of challenges and methodological considerations.

[14] Forster, P.M. et al. (2025) 'Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence', Earth Syst. Sci. Data, 17, pp. 2641–2680. https://doi.org/10.5194/essd-17-2641-2025

[15]Bevacqua, E., Schleussner, C.-F. and Zscheischler, J. (2025) A year above 1.5 °C signals that Earth is most probably within the 20-year period that will reach the Paris Agreement limit. Nature Climate Change, 15(3), pp. 262–265. https://www.nature.com/articles/s41558-025-02246-9

[16] IPCC (2023) Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland, pp. 1-34. doi: 10.59327/IPCC/AR6-9789291691647.001; paragraph A.4.3.

The latest IPCC AR6 Summary for Policy Makers of the Synthesis Report[17], published in 2023, indicates with medium confidence[18] that

- Mitigation policies implemented by the end of 2020, not counting Nationally Determined Contributions (NDCs), are projected to result in global warming of 3.2°C by 2100, with very likely range spanning between 2.2°C to 3.5°C [19](A.4.4).
- Implementation of mitigation policies as per the NDCs submitted by 11 October 2021 until 2030 and that assume no increase in ambition thereafter, lead to a median global warming of 2.8°C by 2100, with very likely range of 2.1°C to 3.4°C (A.4.3).

IPCC AR6 does not provide 2050 GWL estimates for current policies or NDCs, however it provides 2050 estimates for a range of emission scenarios. The medium emission scenario (SSP2-4.5) estimates for GWL by 2050 is of 2.1°C, with very likely range of 1.5°C to 3.0°C[20]. SSP2-4.5 median GWL by 2100 is of 2.9°C (very likely range of 2.1°C to 4.0°C) [21] which is close to the GWL estimate for current mitigation policies reported above (A.4.4).

IPCC Assessment Reports are published every six to seven years and are based on peer-reviewed literature as available before a cut-off date, usually about a year before publication. The last assessment cycle of the IPCC (AR6) began in 2015 and concluded in 2023, with literature cutoff date in early 2021. Work toward the seventh assessment cycle (AR7) formally began in 2024, and publications are expected between 2028 and 2029, with additional approved reports expected for 2027. Given the rapid pace of observed climate change, the evolving nature of emission policies and pledges, and the constant evolution of climate science, some of the evidence provided by IPCC ARs can become outdated before the next assessment report is published.

Latest updates on global warming projections

To complement the IPCC's comprehensive assessments, updated climate reports are published on a more frequent basis (often every one to two years) by UN agencies, intergovernmental agencies, and independent research institutes and networks. These reports provide more up-to-date assessments on the current status of observed warming and progress on mitigation. These sources include, amongst other: The UNEP Emission Gap Reports, Climate Action Tracker updates and the Network for Greening the Financial System (NGFS) scenarios.

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[17] IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

[18] In IPCC calibrated language, confidence levels synthesizes the author teams' judgments about the validity of findings as determined through evaluation of evidence and agreement.
https://www.ipcc.ch/site/assets/uploads/2017/08/AR5_Uncertainty_Guidance_Note.pdf

[19] The range in square brackets corresponds to the 5-95% interval of modelled outcomes (the IPCC 'very likely' range).

[20] Lee, J.-Y et al (2021). Future Global Climate: Scenario-Based Projections and Near-Term Information. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the
Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 553–672, doi:10.1017/9781009157896.006

[21] Lee, J.-Y et al (2021). Future Global Climate: Scenario-Based Projections and Near-Term Information. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the
Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 553–672, doi:10.1017/9781009157896.006

UNEP Emission Gap Report

The UNEP Emission Gap Report provides regular updates on the assumptions about projected cumulative GHG emissions in line with implemented policies and NDCs based on latest commitments[22].

In its latest 2025, UNEP provided the following estimates for GWL by 2100. If mitigation efforts implied by climate policies in 2025 are continued, global warming by 2100 will be limited to below 2.8°C (uncertainty range of 2.1–3.9°C) with a 66% chance[23]. If a 50% chance is considered, this estimate slightly decreases to 2.6°C by 2100 (uncertainty range 1.9-3.6°C). This median projection can be more readily compared with IPCC estimates (reported in section 2.2). UNEP finding suggests a reduction in warming estimates considering 2025 mitigation policies (median 2.6°C) versus 2021 mitigation policies (median 3.2°C as per IPCC AR6), although these estimates cannot be directly compared since different methodologies are used.

If unconditional NDCs submitted by 30th September 2025 are fully implemented by 2035 and similar efforts continue, the median projected global warming will reach 2.3°C by 2100 (uncertainty range of 1.8–3.1°C). This also suggests a reduction in warming estimates using 2025 unconditional NDCs (2.3°C) versus 2021 unconditional NDCs (2.8°C as per IPCC AR6), with the same caveat on comparing these estimates as per the paragraph above.

If conditional NDCs submitted by 30th September 2025 are implemented in full, these would keep the median projected global warming at 2.1°C by 2100 (uncertainty range of 1.8–3.0°C), leading to a further reduction compared to unconditional NDCs.

For GWL by 2050, UNEP reports that the central warming projections for all these emission scenarios (current policies, unconditional and conditional NDCs) see GWL surpassing 1.5°C by several tenths of a degree by 2050, with a 21–33% chance that warming will exceed 2°C.

Other updates

In addition to UNEP, other initiative and bodies provide GWL projections updates, which are broadly in line with UNEP's estimates.

Climate Action Tracker update based on 2025 current mitigation policies projects that GWL will reach a median of 2.6°C by 2100, with an uncertainty range of 2.1–3.3°C[24;25]. For short-term pledges (2030 and 2035 NDCs), the median warming is still of 2.6°C by 2100, with a 66% chance warming will be 2.8°C or higher and a 10% chance it will be 3.5°C or higher.

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[22] UNEP (2025). *Emissions Gap Report 2025: Off target – continued collective inaction puts global temperature goal at risk.* https://www.unep.org/resources/emissions-gap-report-2025

[23] The warming range provided by UNEP gap report reflects here the uncertainty due to quantification of emissions from current policies. The 66% chance captures the likelihood of global warming resulting from those emissions levels staying below the mentioned value, based on a reduced-complexity climate model calibrated to CMIP6 models used in IPCC AR6.

[24]Climate Action Tracker (2025) CAT thermometer. https://climateactiontracker.org/global/cat-thermometer/

[25] Climate Action Tracker's GWL estimates are derived from the probabilistic MAGICC7 climate model, a reduced-complexity model often used by IPCC, for key scientific publications and by a number of Integrated Assessment Models.

The Network for Greening the Financial System (NGFS) estimates based on NGFS Current Policies scenario from 2024 gives a GWL central estimate of 3.0°C by 2100, while this estimate amounts to 2.3°C for NDCs submitted by March 2024[26].

Uncertainties in the connection between emission scenarios and global warming level projections

Scientific understanding of the Earth system is not perfect, nor there is a perfect modelling toolbox to represent it. Despite significant advancements, models still can disagree on the extent to which some Earth system processes will affect global temperatures and models do not yet fully represent all relevant processes. This leads to uncertainties on how projections of GWL evolve under a given emission scenario. Among the key sources of these uncertainties are a range of climate feedbacks (including related to clouds, ice-albedo, land-atmosphere interactions) and climate tipping points. Below the evidence for climate sensitivity (which includes climate feedbacks relevant to global warming) and tipping points uncertainty and their effect of GWL projections is summarised.

Climate system sensitivity

A key uncertainty in GWL evolution under a given emission scenario concerns how strongly the climate system responds to increasing GHG concentrations. If the climate system is more (less) sensitive than the current central estimate, specific GWLs could be reached sooner (later) than expected under a given emissions pathway.

The Earth's climate sensitivity is usually defined as the global long-term equilibrium temperature response to a doubling of atmospheric CO_2 concentration. Climate sensitivity is important to assess warming and impacts, since a climate model having a higher climate sensitivity means it warms faster under the same emission scenario.

According to IPCC AR6 estimates, the climate sensitivity value is very likely to lie in an interval ranging from 2 °C to 5 °C (90-100% probability), with a likely range of 2.5°C to 5°C (66-100% probability). This range of estimates across climate models is a result of how the different models represent relevant processes and feedbacks, including the climate-carbon-water cycle[27], the aerosol-cloud formation interaction[28], climate–ice sheet processes, land use and land cover representation and interaction with the atmosphere, and more. There are also feedbacks not currently represented in most climate models that could lead to additional global warming, such as the warming that would be expected from emissions induced by permafrost thaw.

Recent research has improved observational constraints on climate sensitivity, helping narrow the plausible range of estimates through the use of observations compared with earlier assessments. At the same time, some of the latest global climate models underpinning AR6 (leading to the range provided above) have higher climate sensitivity and thus project a much warmer world than previously expected in AR5. Overall, despite a narrowing of the range of climate sensitivity in

[26] Network for Greening the Financial System (2025) NGFS Climate Scenarios Technical Documentation. https://www.ngfs.net/system/files/2025-01/NGFS%20Climate%20Scenarios%20Technical%20Documentation.pdf

[27] Lamboll, R.D., et al. (2023) Assessing the size and uncertainty of remaining carbon budgets. *Nat. Clim. Chang.* **13**, 1360–1367 . https://doi.org/10.1038/s41558-023-01848-5

[28] Virtanen, A.et al. (2025) High sensitivity of cloud formation to aerosol changes. *Nat. Geosci.* **18**, 289–295. https://doi.org/10.1038/s41561-025-01662-y

recent years, GWL of 4°C or above cannot be ruled out even under current policy emissions scenarios[29].

Tipping points

Some components of the climate system, such as ice sheets, permafrost, or major ecosystems, may respond to warming in non-linear and irreversible ways if certain thresholds are crossed[30;31;32]. These processes are not always fully represented in current models, and as a result some of them introduce additional uncertainty into long-term global warming projections for a given emission scenario.

The term tipping points broadly refers to abrupt and irreversible (on human time scales) shifts of key systems of the Earth, such as the Amazon and Boreal forests, the Atlantic Meridional Overturning Circulation (AMOC), ice sheets, permafrost and glaciers. Crossing some of these tipping point elements can lead to more carbon emissions (e.g. destabilisation of permafrost) or decrease the capacity of the biosphere to absorb emissions from human activities (e.g. degradation of the Amazonian and Boreal forests), which would profoundly affect long term global warming, as well as global and regional climate change and would involve complex cascading effects.

While their likelihood and timing remain uncertain, many climate tipping points would accelerate ongoing trends of warming[33]. Efforts to understand and characterise such complex processes are ongoing and therefore cannot be here included in an assessment of how they would impact GWL estimates for a given emission scenario. Managing this uncertainty requires a flexible approach that allows GWL adjustment, as the evidence and knowledge about tipping points grows including on the timescales of their impacts (these considerations would be part of the review cycle proposed in).

[29]Hausfather, Z. (2025) An assessment of current policy scenarios over the 21st century and the reduced plausibility of high-emissions pathways, Dialogues on Climate Change, 2(1), pp. 26–32. https://journals.sagepub.com/doi/10.1177/29768659241304854

[30] Lenton, T.M. et al. (2019) Climate tipping points - too risky to bet against, Nature, 575, pp. 592–595. https://www.nature.com/articles/d41586-019-03595-0

[31] Deutloff, J., Held, H. and Lenton, T.M. (2025) High probability of triggering climate tipping points under current policies modestly amplified by Amazon dieback and permafrost thaw, Earth Syst. Dynam., 16, pp. 565–583. https://esd.copernicus.org/articles/16/565/2025/

[32] Boers, N. et al. (2025) Destabilization of Earth system tipping elements, Nature Geoscience, 18(10), pp. 949–960. https://www.nature.com/articles/s41561-025-01787-0

[33] Some tipping points, such as a potential collapse of the Atlantic Meridional Overturning Circulation (AMOC) may induce a regional cooling trend, all the while global warming continues.

Europe's climate change under specific global warming levels

Observed climate change in Europe

The climate in Europe has already changed significantly[34]. Europe has warmed considerably, and more rapidly than the global average. Average European land warming in the decade 2015 to 2024 was 2.19-2.26°C higher than pre-industrial levels, compared to a global warming of 1.24-1.28°C over the same period[35]. This higher warming is due to land areas (in Europe or elsewhere) warming faster than oceans, with the latter also included in the global mean. Even so, Europe is the fastest-warming continent on Earth to date, because of the proportion of European land in the Arctic (which is the fastest warming region on Earth), the loss of ice and snow cover, and because of changes in atmospheric circulation patterns that favour more frequent summer heatwaves in Europe, in particular in western Europe[36,37].

While Europe has warmed overall, the increase has not been uniform across all regions. The most pronounced warming to date has occurred in areas closer to the Arctic, over the Alps and in the Iberian Peninsula (Figure 1).

The relationship between global warming levels and European patterns of change in other climate variables, such as precipitation and wind changes, is considerably more complex than for temperature. For example, Europe is seeing an overall increase in precipitation as the planet warms, but the change varies by region: while northern Europe is becoming wetter in winter and drier in the summer, southern Europe is getting drier, especially in winter[38].

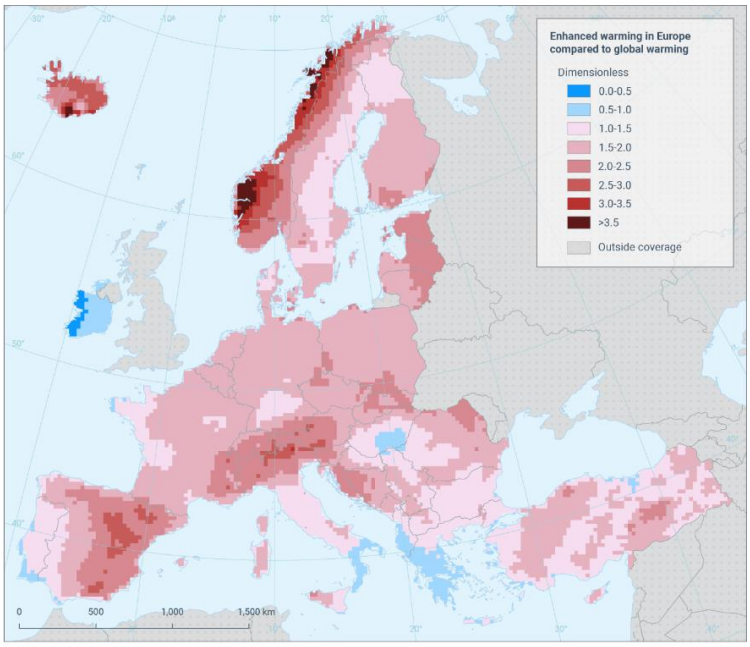


Figure 1 Enhanced warming in Europe compared to global warming. Figure 2.3 from the EUCRA report.

[34] EEA (2024) European Climate Risk Assessment https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment

[35] European Environment Agency (2025) Global and European temperatures. https://www.eea.europa.eu/en/analysis/indicators/global-and-european-temperatures

[36] EEA (2024) European Climate Risk Assessment. https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment

[37] Copernicus Climate Change Service (C3S) and World Meteorological Organization (WMO) (2025) European State of the Climate 2024. https://doi.org/10.24381/14j9-s541

[38] EEA (2024) European Climate Risk Assessment. https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment

Further information on observed climate change in Europe can be found in Chapter 2 of the first European Climate Risk Assessment[39].

Future European warming under given GWLs

Europe has to date warmed more than the respective GWL, as mentioned in section 2.5.1. This trend of considerably faster warming in Europe compared to the global average is projected to continue in the foreseeable future, although it is not clear at which rate[40].

The ESABCC report provides estimates, from the mean of climate models, for European[41] warming by 2050 at around 2.4°C in low emissions pathways (SSP1-2.6), 2.8-2.9 °C in medium to high emissions pathways (SSP2-4.5 and SSP3-7.0) and 3.3 °C in very high emissions pathways (SSP5-8.5). By 2100, the average estimates for Europe correspond to around 2.5 °C in low emissions pathways, 3.9°C in medium emissions pathways, 5.6 °C in high emissions pathways and 6.9 °C in very high emissions. [42]

Focusing on EU-27 only, the CMIP6 models considered in the Copernicus Interactive Climate Atlas project a warming in the EU-27 of 3.9°C, with a 5-95% model range spanning 3.2°C to 4.5°C, for a GWL of 3°C[43]. This estimate is largely consistent to what is reported by the ESABCC under the medium emission pathway (SSP2-4.5) for their broader geographic definition of Europe.

Those regions in Europe that experienced greater (lesser) warming in recent decades are projected to also experience a greater (lesser) warming in the future. The highest level of warming is projected across north-eastern Europe, northern Scandinavia and inland areas of Mediterranean countries. The lowest warming is expected in western Europe, especially in the United Kingdom, Ireland, western France, Benelux countries and Denmark[44].

Uncertainties in future European climate change under given GWLs

Establishing reference GWLs provides more clarity on the level of corresponding European climate change expected, with generally more intense changes corresponding to higher GWLs. However, a GWL does not provide full scientific certainty on the spatial and temporal details of

[39] EEA (2024) European Climate Risk Assessment. https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment

[40] ESABCC (2026) Strengthening resilience to climate change. Recommendations for an effective EU adaptation policy framework. https://climate-advisory-board.europa.eu/reports-and-publications/strengthening-resilience-to-climate-change-recommendations-for-an-effective-eu-adaptation-policy-framework

[41] Europe here is defined as comprising the 38 EEA countries

[42] ESABCC (2026) Strengthening resilience to climate change. Recommendations for an effective EU adaptation policy framework. https://climate-advisory-board.europa.eu/reports-and-publications/strengthening-resilience-to-climate-change-recommendations-for-an-effective-eu-adaptation-policy-framework

[43] Copernicus Climate Change Service (2026) Copernicus Interactive Climate Atlas (custom visualisation). https://atlas.climate.copernicus.eu/atlas/6UAT8o6X.

[44] IPCC (2021) Summary for policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, pp. 3–32. https://doi.org/10.1017/9781009157896.001

the expected climatic changes for Europe. Uncertainty in this context means that different climate models currently give different outcomes for Europe under a given GWL.

The aspects of European climate change where regional (and global) models currently disagree most relate to changes in precipitation and atmospheric circulation. For many climate variables these discrepancies can become larger at smaller spatial scales. A summary of projection uncertainties for Europe due to model discrepancies under a given GWL and/or emission scenario is provided in Chapter 2 of the first European Climate Risk Assessment.

One main reason for disagreement across models lies, once more, in the still imperfect knowledge and modelling toolbox for representing the global climate system. To this global-scale uncertainty, the regional level uncertainty associated with regional and smaller-scales processes must be added. Regional models are needed to translate global climate models outputs (often run at 100km scales) into regional and national scale climate data (at higher spatial resolutions, e.g. ranging from 50km to below 10km to even 1km). However, running higher-resolutions models and/or applying statistical 'downscaling' methods means making more modelling choices, which further amplifies uncertainties.

Prudent and precautionary approach

The choice of future reference global warming levels anchors a general expectation of the risk levels to adapt to, and as such needs to reflect the risk tolerance of the decisionmaker. The precautionary principle indicates that the EU should take measures to protect society even when evidence is not certain, as is the case with future climate change. The European Climate Law also puts forward the need for prudential management of material physical climate risks when planning, developing, executing and monitoring projects and programmes.

The evidence presented in previous sections reports on the currently central projections for global warming, but also highlights the potential for much more adverse (or more moderate) changes. Such uncertainty is difficult to embed into policy decisions. A decision-making approach that embeds this type of uncertainty is the prudential management of insurance portfolios, which embeds long-term risks and its uncertainty in pricing by looking at potential losses and the value assigned to these. The ESABCC report draws attention to the need for a prudent management of risks.

The overall principle for cross-cutting decisions, such as choosing reference global warming levels for public policy, should be to err on the side of caution. Specifically, this principle points towards using the warming projections consistent with current mitigation policies as a minimum, and then ensuring solid processes to ensure that individual decisions reflect the risk profile of that specific decision.

Advice of the ESABCC

The European Scientific Advisory Board on Climate Change (ESABCC) report 'Strengthening Resilience to Climate Change. Recommendations for an effective EU adaptation policy framework', published in 2026 states that '*The EU should adopt a common reference for*

adaptation planning to prepare for a pathway to 2.8-3.3 °C of global warming by 2100 and use more adverse pathways for stress-testing.' (Recommendation 2). [45]

First, the ESABCC motivates the need for a common warming reference by stating that 'As part of the range of futures considered, a common reference for adaptation planning would help ensure a minimum level of climate resilience across the EU, while improving consistency in climate risk assessments and adaptation planning.'

Then, in terms of warming levels, the ESABCC notes that 'UNEP's projections imply global warming is likely (i.e. greater than 66% likelihood) to very likely (i.e. greater than 90% likelihood) not to exceed 2.8 °C and 3.3 °C by 2100 respectively, relative to pre-industrial levels.' (as reported in section 2.3.1). And that 'SSP2-4.5 is broadly consistent with projections by UNEP based on currently implemented policies continuing.' It also underlines that prudent risk management would require preparing for warming above the median estimate given the high severity of risks.

Finally, the report states that 'Given remaining uncertainties and the risk of climate policy delay or reversal, adaptation planning must also systematically consider more adverse emissions pathways, such as SSP3-7.0'.

Proposed global warming levels for European climate risk management decisions

Climate risk management decisions in the scope of the European Integrated Framework for Climate Resilience across the Union and Member States should prepare for a warmer world with a shared understanding of the global warming levels (GWL) to consider.

For a robust basis of decisions, the EU should refer to the latest comprehensive global assessment of mitigation progress and its translation into GWLs, and the latest developments in climate science. The complexity of the climate system, including feedback loops and tipping points that may lead to additional greenhouse gases (GHG) emissions or a reduction of ocean and/or land sinks, also means that more rapid warming is possible even if mitigation action is strengthened. In light of the severity of the downside risks, the decision of defining a reference global warming trajectory will need to reflect a precautionary, prudent approach. Finally, climate change and scientific understanding of it are dynamic, hence the trajectory will need to be regularly updated, based on authoritative scientific advice.

Based on the evidence presented in the previous sections, **a prudent approach for the EU is to use as a reference point for adaptation decisions a trajectory corresponding to GWLs above pre-industrial levels of +1.5°C by 2030, +2 °C by 2050 and +3°C by the end of the 21st century**.

The cost of under-preparedness is counted in lives and trillions; the investment in over-preparedness is paid in incrementally higher upfront costs.

[45] ESABCC (2026) Strengthening resilience to climate change. Recommendations for an effective EU adaptation policy framework. https://climate-advisory-board.europa.eu/reports-and-publications/strengthening-resilience-to-climate-change-recommendations-for-an-effective-eu-adaptation-policy-framework

ANNEX 13: OVERVIEW OF POLICY OPTIONS AND MEASURES

Table 4 Detailed description of policy options and measures
(M) = mandatory obligation; (V) = voluntary

Key elements	OPTION A Better implementation and incremental change through raised awareness, guidance, tools and education	OPTION B New, essential ground rules, flexible delegation and enablers to trigger transformative change	OPTION C Comprehensive central rule-setting and oversight for immediate and uniform application across sectors
Climate resilience objectives	**A0 (V):** Recommend EU and MS to set out climate resilience objective(s) and pursue the voluntary adaptation policy cycle and thematic targets under the Global Goal on Adaptation (GGA)[46]	**B0 (M):** Establish a shared climate resilience objective at EU and MS level to manage short, medium and long-term climate risks, to strengthen climate resilience. It would require setting of corresponding thematic and horizontal objectives and, where appropriate, quantified targets in relevant EU and national legislation, strategies and plans, building on GGA	**C0 (M):** Establish legally binding climate resilience objectives and targets for both the EU and MS
Baseline for climate resilience decisions & actions (trajectory)	**A3 (V):** EU & MSs encouraged to define a reference warming trajectory to guide their decisions and actions, while retaining discretion over the choice of trajectory and its operationalisation **A4 (V):** EU would support the development of such trajectories at Union level and help national authorities to translate them into climate projections for national and subnational levels (guidance)	**B1 (M):** Establish common reference warming trajectory, defined as expected global temperature increases over specific time horizons, to be used as a baseline for EU and MS policy decision-making. For EU, establishes GWL numerical values via legislation and process for reviewing the numerical GWL values through delegated act	**B1 (M):** Establish common reference warming trajectory, defined as expected global temperature increases over specific time horizons, to be used as a baseline for EU and MS policy decision-making. For EU, establishes GWL numerical values via legislation and process for reviewing the numerical GWL values through delegated act

[46] https://unfccc.int/documents/637073

			C1 (M): establishes common minimum requirements for translating the global warming trajectory into nationally relevant climate projections **C2 (M):** COM coordinates scientific bodies and MS authorities to produce consistent European climate projections aligned with the trajectory
Duty to consider & risk ownership	**A1 (V):** Guidance to both EU and MS to clearly define and allocate which authorities are responsible for addressing climate risks **A2 (V):** and how these risk owners are expected to consider climate resilience in their policy and implementation choices	**B2 (M)**: EU and MS authorities obliged to ensure that policies, measures and investments relevant to climate resilience are aligned with the resilience objective, make use of the reference warming trajectory, and ensure that residual climate risks are tolerable **B3 (M):** Common parameters for identification of risk ownership among public authorities, and to assess risk tolerance. **(V)** EU/ national thresholds of climate risk tolerance to be determined by risk owner.	**C3 (M):** EU and MS authorities required to align all relevant policies, measures and investments with the climate resilience objectives and the common trajectory, and to ensure the lowest possible level of residual climate risk **C4 (M):** Explicit definition of climate risk ownership attribution and establishes detailed, mandatory parameters for assessing the tolerance of residual risks for both EU and MS public authorities
Climate risk management in sector policies, climate resilience by design	**A5 (V):** Guidance for risk owners to systematically consider climate resilience in the implementation of priority sectoral policies **A8 (V):** sector-specific communication campaigns in cooperation with EU umbrella organisations	**B4 (M):** requirement to ensure that public funding supports climate resilience, through the integration of the climate resilience by design principle **B5 (M):** Duty to ensure climate resilience by design when reviewing relevant EU legislation **B10 (V):** Guidance for MS to support regional and local authorities in mobilising private finance which applies the climate resilience by design principle	**B4 (M):** requirement to apply climate resilience by design to public funding **C5 (M):** requirement for MS to actively support regional and local authorities in mobilising private finance for resilience investments **C20:** For COM, current climate adaptation tool in the Better Regulation toolbox would be upgraded into a detailed and mandatory "climate resilience check"

		B11 (V): Guidance to the private sector on applying key concepts developed for the public sector, such as the use of the common reference warming trajectory and climate resilience by design.	**C6 (M)**: Existing EU sectoral legislation and policy documents revised to embed the climate resilience by design principle **C7 (M):** selected legislative acts introduce a legal "duty to consider" climate resilience for relevant private sector actors
Climate risk assessments (CRAs)	**A6 (V):** update COM guidelines on NAP/NAS (for example guidance on the reference warming trajectory, indicators) to provide further support for MS to develop adaptation planning **A7 (V):** further refinement and augmentation of EUCRA would remain open ended in response to political needs and preferences **A9 (V)**: tailored guidance to support the integration of climate risks into sectoral European standardisation activities	**B6 (M):** EUCRA becomes a regular exercise codified in EU law. EU and MSs' CRAs with a set of minimum requirements, including frequency, use of scenarios, coverage of sectors, and analysis of adaptation options across multiple time horizons, using the reference warming trajectory as a baseline and considering more adverse scenarios At national level, to ensure sectoral coverage either: **B7 (M):** requirement for national assessments to consider key risks identified at EU level, notably those with cross-border implications	**C8 (M)**: EU and national CRAs have harmonised methodologies **C9 (M)**: clearly defined roles for EU, national and sectoral assessments to ensure alignment and coherence **B6 (M):** EUCRA becomes a regular exercise codified in EU law. EU and MS CRAs would be supported by a set of minimum requirements **C10 (M):** EUCRA also identifies inconsistencies between national CRAs regarding transboundary risks and **(V)** proposes approaches to improve coordination
Planning & implementation	**A6 (V):** For MS, an update of the COM Guidelines on NAP/NAS **A10a:** new EU climate resilience strategy **A10b:** no new EU climate resilience strategy	**B8 (M):** Building on Article 5 of the European Climate Law, establish a set of common parameters and requirements necessary for climate resilience strategies and plans at EU and MS level, ensuring that they consider climate risk management options, address residual risks, identify policy risk owners and achieve the level of coherence necessary to adequately manage transboundary climate risks	**C11 (V):** harmonised and standardised approach, 2023 COM Guidelines on NAP/NAS upgraded and its implementation assessed **B8 (M):** Building on Article 5 of the European Climate Law, establish a set of common parameters and requirements necessary for climate resilience strategies and plans at EU and MS level, ensuring that they consider climate risk management

			options, address residual risks, identify policy risk owners and achieve the level of coherence necessary to adequately manage transboundary climate risks **C12 (M):** assessment of climate risk management options explicitly evaluate the tolerance of residual risks in assessment of climate risk management options **C13 (M):** For COM, all relevant policy sectors and services required to develop and implement dedicated sectoral or thematic strategies based on a common methodology **C14 (M):** MS required to assign specific obligations to subnational authorities, including the preparation of local climate vulnerability and risk plans and the submission of local CRAs to inform national planning processes
Progress monitoring & assessment	**No changes proposed** to the existing progress monitoring and assessment provisions in the European Climate Law or the Governance Regulation	**B9 (M):** streamlined framework established with a defined set of high-level indicators to assess collective progress at EU level, **(V)** alongside flexibility for MS to develop national indicator sets. Commission would continue progress assessments under the European Climate Law, and prepare regular progress reports.	**C15 (M):** fully harmonised system covering EU, national and subnational levels, and integrating data from across sectors **C16 (M):** compulsory set of common indicators for both EU and MS, with mandatory reporting to support a robust assessment of collective progress in line with the European Climate Law
Enabling & supporting elements	**A11 (V):** incrementally enhancing the repository of climate resilience knowledge on the Climate-ADAPT platform	**B12 (V)**: Climate-ADAPT modified to reflect the structure and needs of the new framework and to support its key provisions	**C17 (M):** Climate-ADAPT transformed into a central platform supporting

	A12 (V): new Navigator of climate resilience tools to help users identify and use relevant existing tools at European, national and transnational level **A13 (V):** EU-wide awareness campaigns targeting the population **A14 (V):** new European climate viewer with climate data projections presented as a map, to facilitate access to such data for non-expert users at different levels of geographic detail	**A12 (V)**: new navigator of climate resilience tools **A13 (V)**: EU-wide awareness campaigns targeting the population **A14 (V)**: new European climate viewer **B13 (V):** climate viewer will also show the practical implementation of the reference warming trajectory and CRA requirements; and COM encouraged to use this tool systematically in policy-making processes for relevant sector policies.	implementation, monitoring and compliance with the legal provisions **A12 (V):** new Navigator of climate resilience tools **A14 (V):** new European climate viewer **C18 (M):** COM required to systematically use the viewer in planning and policy-making processes, including when conducting the climate resilience check in the Better Regulation toolbox **C19 (M):** MS required to integrate common climate resilience indicators into their public national tools

Table 5 Examples of estimated potential benefits of climate resilience measures put into practice under the policy options

	Option A	Option B	Option C
Health and wellbeing	The World Bank found heatwave early warnings to provide a mean benefit-cost-ratio (BCR) of 131 (range of 48– 246)[47]. Lack of unified approach leads to heterogenous outcomes: in Spain, the increase in the minimum mortality temperature[48] that captures adaptation impact ranged from -0.7 to +1.8°C/decade across regions[49]	Considering the 1990-2019 period, fully implemented heat-prevention plans (including heat-health early warning systems and heat health action plans) might be associated with a ~25% reduction of excess deaths. [50] Heat-related mortality by 2050 could plausibly be reduced by up to 77% compared to a baseline trajectory in integrated contexts, as evidenced from the uptake of similar programmes in France.[51]	The consistent application of the measures listed under options A and B across the EU can be expected to scale the benefits. Greening 35% of the EU's urban surface would generate net benefits worth €364 billion through reduced cost of cooling and €221 billion through reduced urban heat island effect[52]
Flood related damage and losses	Better information and early warning systems for flooding could limit infrastructure and built environment damage by as much as 25% [53].	River floods: ~83% reduction of economic losses possible through application of detention areas: from EUR 44bn to EUR 8.1bn/yr by 2100 (equal to stabilisation on current-day a risk level) with benefit-cost ratio of 4.2:1 (EUR 2.6bn/yr investment); best combined with other measures into hybrid strategies[54]	River floods: BCR of a continental scale European Flood Awareness System estimated at 400[57] Costal floods: ~95% of impacts avoidable with combined mitigation + adaptation[58] - which would require a harmonised methodology.

[47] (World Bank Group, 2021)
[48] When MMT increases over time, it would suggest that higher environmental temperatures would be needed to produce fatalities related to high temperatures, reflecting adaptation to local climate.
[49] (Follos et al., 2021)
[50] (Urban et al., 2025)
[51] (Callahan et al., 2025)
[52] (Quaranta et al., 2021)
[53] (Commission of the European Union. Joint Research Centre., 2015)
[54] (Dottori et al., 2023)
[57] (Pappenberger et al., 2015)
[58] (European Commission. Joint Research Centre., 2020a)

	Option A	Option B	Option C
		Costal floods: 83% of flood damages avoidable with certain adaptation measures; BCR of 8.3–14.9 at EU mean[55] Restoration of salt marshes can reduce non-storm wave heights by an average of 72%, restoration of seagrass beds by 36%[56]	
Wildfires	Decision support tools for and wildfire risk alerting systems may yield BCRs ranging from 6 to 39.[59] However, the substantial EU-level work to date on wildfire prevention know-how and early warnings has had limited impact, as shown by the 2025 wildfire season.[60] Forest owners' awareness about climate risks cannot be expected to result in tangible adaptation actions.[61]	Prevention measures focused on the wildland-urban interface may have BCRs of 2 to 3. The addition of fuel breaks in forested areas has had a BCR of 12.[62] In a US study, in the most valuable and at-risk watersheds, every dollar invested in forest restoration can provide up to seven dollars of return in the form of benefits and provide a return-on-investment of 600%.[63] To scale measures at the wildland-urban interface or in watersheds, different authorities and landowners often need to agree and coordinate.	Local specificities, which are critical for finding the right balance between wildfire prevention and suppression, are difficult to address appropriately in this option[64]
Agriculture	Better uptake of climate information, advisory tools and planning guidance could modestly	N.A.[67]	Based on the best national application efficiency, it is estimated that the EU-27 can save around 4,900 million m^3 or 8% of the abstracted water

[55] (Vousdoukas et al., 2020)
[56] (World Bank Group, 2019)
[59] (World Bank Group, 2024)
[60] (European Commission. DG ECHO, 2026)
[61] (Sousa-Silva et al., 2018)
[62] (World Bank Group, 2024)
[63] (Hjerpe et al., 2024)
[64] Depending on the local context, fire suppression can result in fuel accumulation on the ground and lead to more severe fires in the long run. Controlled burning – fighting fire with fire, known also as 'fore paradox' – is sometimes a more successful strategy.
[67] Despite careful research, no credible source of information could be identified.

	Option A	Option B	Option C
	improve crop choice, farm management and drought preparedness in willing regions.[65] If each European region could achieve at least the same performance as the EU-wide regional average of water intensity, the potential water saving by the agricultural sector could be around 12 % at the EU level[66]		for agriculture annually, with the largest water savings to be obtained in Southern Europe[68]
Level of knowledge and shared under-standing	Tools proliferate but most are not widely employed unless they are simple, align with regulation, relevant, visible and of good quality	In the Netherlands, the *Klimaateffectatlas* achieves 81% usage across municipalities, water boards and provinces after agreeing on climate stress tests on all levels of government. There is also a wider trickle down into the private sector (e.g. consulting) with 10000 unique users/month. The impact stands out within the Dutch context too, relative to other tools and the status quo ante.	Up to 100% use by public authorities possible, if legally binding use were implemented
Flexibility & adjustability	Full flexibility and adjustability, but limited additional support and capacity from business-as-usual policies	Full flexibility and adjustability, with additional support from the creation of a more enabling policy environment	Long-term adjustability, but flexibility potentially hampered by regulatory drag
Time until full operation	Approximately 1-3 years	Approximately 3-6 years	More than 6 years
Estimated cumulative impact	Moderate positive impact on agriculture, health and infrastructure, but unrealised potential	Significant positive impact on agriculture, health and infrastructure	High positive impact on agriculture, health and infrastructure, but at high cost
Estimated benefit-cost-ratio	Increased awareness alone might not lead to sufficient action	Cost-efficient implementation of measures due to duty to consider, shared understanding and limited increased harmonisation	Highest long-term returns but diminishing marginal cost-efficiency at maximum ambition

[65] (European Commission. Joint Research Centre. Institute for Environment and Sustainability., 2012)
[66] (Wolters et al., 2025)
[68] (Wolters et al., 2025)

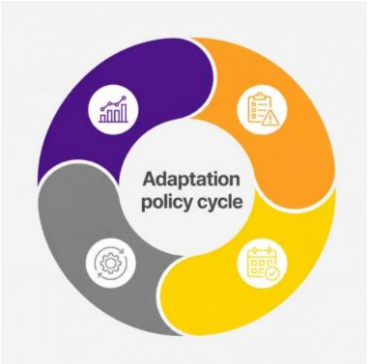
Table 5 Detailed measures of the preferred policy option

Core elements	SO	Policy measure
Climate resilience objectives	SO2	B0: Shared objective for EU and MS to address climate risks, requirements to set corresponding thematic and horizontal objectives and, where appropriate, quantified targets in relevant strategies and plans
Baseline for climate resilience decisions & actions (trajectory)	SO2	B1: Common reference warming trajectory defined as expected global temperature increases to inform decision-making. The related methodology and numerical values of the trajectory will be defined in the legislation to be proposed, with an empowerment to the Commission for its review.
Duty to consider & risk ownership	SO1/SO2	B2: General duty which requires EU and MS authorities to ensure policies, measures and investments relevant to climate resilience are aligned with the resilience objective, use common reference trajectory, and avoid unacceptable levels of residual climate risk B3: Common parameters for identifying and allocating risk ownership among public authorities, and framework to assess the sector specific acceptability of residual risks C12: In addition to B8, assessment of climate risk management options explicitly evaluates the acceptability of residual risks
Climate risk management in sector policies, climate resilience by design	SO2/SO3	B2: General duty which requires EU and MS authorities to ensure policies, measures and investments relevant to climate resilience are aligned with the resilience objective, use common reference trajectory, and avoid unacceptable levels of residual climate risk B4: Integration of the climate resilience by design principle in public funding B5: Integration of the climate resilience by design requirement when reviewing relevant EU and MS legislation, supported by identification of priority policy areas for action B10: Recommendation to MS to support regional and local authorities in mobilising private finance, in line with the climate resilience by design principle B11: Guidance for private sector to apply key concepts (e.g. use of the common reference warming trajectory, climate resilience by design) C13: For Commission, all relevant policy sectors and services required to develop and implement dedicated sectoral/thematic strategies based on common methodology
Climate risk assessments	SO2	B2: General duty which requires EU and MS authorities to ensure policies, measures and investments relevant to climate resilience are aligned with the resilience objective, use common reference trajectory, and avoid unacceptable levels of residual climate risk B6: EUCRA becomes a regular exercise codified in EU law, supported by a set of minimum requirements B7: Reinforced coordination between EU and national CRAs, including requirement for national assessments to consider key risks identified at EU level, notably those with cross-border implications
Planning & implementation	SO1/SO2	B2: General duty which requires EU and MS authorities to ensure policies, measures and investments relevant to climate resilience are aligned with the resilience objective, use common reference trajectory, and avoid unacceptable levels of residual climate risk B8: More coherent set of common parameters and requirements for climate resilience strategies and plans at EU and MS level, consider climate risk management options, address residual risks, identify policy risk owners and adequately manage transboundary climate risks C12: In addition to B8, assessment of climate risk management options explicitly evaluates the acceptability of residual risks
Progress monitoring & assessment	SO2	B9: Improved and streamlined MREL framework with a defined set of high-level indicators to assess collective progress at EU level, and requirements for MS to develop national indicator sets
Horizontal enablers	SO2/SO3/ SO4	A12: Development of new Navigator of climate resilience tools to help users identify and use relevant existing tools at European, national and transnational level A13: EU-wide awareness campaigns targeting the population A14: New European climate viewer with climate data projections presented as a map, to facilitate access to data for non-expert users at different levels of geographic detail B12: Climate-ADAPT revamped to reflect the structure and needs of the new framework and to support its key provisions C18: Commission services required to systematically use the viewer in planning and policy-making processes

ANNEX 14: FORESEEN INTERACTIONS BETWEEN THE GOVERNANCE REGULATION, EUROPEAN CLIMATE LAW AND INTEGRATED FRAMEWORK

The table shows the **current coverage** of the main elements of the adaptation policy cycle by the **Governance Regulation and the European Climate Law**, and **the proposed** coverage by the Integrated Framework.

It shows that the existing legal framework is fragmented and how the proposed Integrated Framework would address this fragmentation.



Adaptation policy cycle	Step	Element	Governance Regulation	European Climate Law	Integrated Framework
	Impact, vulnerability and risk assessment	Reference global warming trajectory	—	—	●
	Impact, vulnerability and risk assessment	EU Climate risk assessment	—	—	●
	Impact, vulnerability and risk assessment	MS Climate risk assessment	—	—	●
	Planning	Objective	—	Δ	●
	Planning	EU strategy / plan	—	●	†
	Planning	MS strategy / plan	●	●	†
	Implementation	Actions and measures	—	—	●
	Monitoring, evaluation and learning	Monitoring and indicators	—	—	●
	Monitoring, evaluation and learning	Reporting	●	—	†
	Monitoring, evaluation and learning	Progress assessment	●	●	†
	Overarching	EU Duty to consider	—	Δ	●
	Overarching	MS Duty to consider	—	—	●

*The table compares the scope of climate adaptation relevant legally binding EU horizontal policy framework.

Legend:
● yes, — no, Δ partially covered, † simplification

Several core elements of the policy cycle remain absent or only partially covered. The Integrated Framework would fill these substantive gaps. It would introduce a reference global warming trajectory, EU and Member State climate risk assessments, monitoring and indicators, and duty to consider climate risks at both Union and Member State level. **These elements are currently not covered in a comprehensive and legally binding way by the Governance Regulation or the European Climate Law.**

The table also marks four elements where **simplification** would occur. The Integrated Framework would not create a new, stand-alone **planning** instrument. Instead, it would leverage the existing European Climate Law architecture: the Union adaptation strategy and MSs national adaptation strategies and plans, which the ECL already requires to adopt and implement. On the Governance Regulation side, simplification is expected for MS planning. For **reporting**, the Integrated

Framework would rely on Governance Regulation, with the minimum necessary alignment, rather than creating new reporting obligations. This keeps administrative burden low while ensuring that reporting can incorporate the needs of the Integrated Framework. Similarly, **progress assessment** would be channeled through the European Climate Law assessment cycle, under which the Commission already assesses collective progress on adaptation and reviews the consistency of Union and MS measures with ensuring progress on adaptation.

Two elements are marked as **partially covered** under the European Climate Law. First, the **objective** is only partly addressed: the ECL already requires continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, but the Integrated Framework would introduce a common and shared adaptation objective that builds on and goes beyond this formulation. Second, the **Union duty to consider** is partially covered because ECL Article 6(4) already requires the Commission to assess whether draft measures and legislative proposals, including budgetary proposals, are consistent with the climate-neutrality objective, the 2030 and 2040 climate targets, and ensuring progress on adaptation. The Integrated Framework would build on this provision.

Simplification

While there is a need to strengthen both the horizontal climate resilience policy framework and relevant sectoral policy frameworks, there are also opportunities for simplification. Simplification could focus on streamlining multiple obligations related to existing horizontal policy instruments, reducing unnecessary reporting requirements, avoiding duplication in reporting and progress assessments, and strengthening links with sectoral policies. **These changes would support a more coherent and implementation-focused climate resilience governance, while preserving the ability to monitor action and assess progress.** They could be pursued through the forthcoming revision of the **Governance Regulation** and through future revisions of relevant sectoral policy frameworks.

The ongoing review of the Governance Regulation provides an opportunity to simplify the adaptation planning, reporting and monitoring framework, improve policy coherence and reduce duplication and administrative burden. However, the review of the Regulation would be able to address only part of the problem in so far as climate resilience planning is concerned, as its scope is limited to energy and climate policies, thus excluding other sectoral policies.

Simplification of horizontal climate resilience planning requirements

The current planning *acquis* on climate adaptation planning contains duplicative planning requirements, creating fragmentation and unnecessary administrative burden, without necessarily improving the quality or effectiveness of planning. The European Climate Law requires Member States to adopt and implement national adaptation strategies (NASs) and plans (NAPs) (Article 5(4)). The Governance Regulation requires adaptation policies and actions to be addressed in long-

term strategies (LTSs) (Annex IV) and adaptation goals to be included in national climate and energy plans 'where applicable' (NECPs) (Article 4(a)).The Integrated Framework would not introduce an additional requirement to establish a standalone planning instrument. It will instead build on the requirement established in the European Climate Law and clarify how horizontal climate resilience planning shall be operationalized to create an improved basis for policy implementation.

In parallel, the forthcoming revision of the Governance Regulation offers an opportunity to simplify the planning *acquis* by reassessing the existing requirements to integrate adaptation policies and actions into the LTSs and adaptation goals to the NECPs. Published Commission assessment (2025) of Member States' NECPs indicates that adaptation goals have hardly been integrated into NECPs across the five dimensions of the Energy Union. Member States are relying instead on NASs and NAPs as their primary instruments for adaptation planning and usually only cross-referencing them in NECPs. **The current obligation to include adaptation goals in NECPs, and adaptation policies and measures in LTSs, has therefore not worked effectively in practice and should be removed to reduce duplication**, align planning obligations with the instruments actually used by Member States, and strengthen coherence with the European Climate Law, which requires the adoption of NASs and NAPs. Once discontinued, the Governance Regulation could still address some elements of the climate risk assessment in the context of investment planning in the relevant sectors, for instance energy security.

There is scope for further simplification, as the distinction between NASs and NAPs defined in the European Climate Law is not always clear in practice and MS often use these instruments interchangeably or combine them. This current setup for planning will be simplified, as Member States will need to prepare only one 'strategic planning document', which will be the equivalent to the current policy instruments. **Encouraging MSs to develop strategic plans that integrate both functions into a single coherent policy instrument could simplify planning processes, improve policy coherence and reduce administrative burden.** At the same time, flexibility would need to be maintained to account for different national circumstances. Member States could therefore retain separate strategies and plans, or adopt sectoral, regional or other planning instruments, if these form a coherent overall framework for adaptation policy and implementation.

At Union level, following the evaluation of the EU Adaptation Strategy and considering the findings of EUCRA II and the assessment of progress under the European Climate Law, the Commission would consider these inputs in an integrated manner. **On that basis, it would prepare a Union strategic plan, equivalent in function to a renewed EU adaptation strategy defined in the European Climate Law (Article 5(2)).** This would specify Union-level priorities and actions to address identified climate risks and strengthen climate resilience across the Union.

Simplification of reporting requirements

Two main simplification opportunities have been identified. The first concerns the future reporting architecture, with an objective to establish a streamlined system under which **one reporting process serves multiple purposes. The main opportunity is to use Article 19(1) of the Governance Regulation as the single reporting channel for information required under the Governance Regulation, the European Climate Law and the future Integrated Framework.** Reporting would therefore be channeled through the existing requirement on national adaptation actions under Article 19(1), supported by Annex I to Commission Implementing Regulation (EU) 2020/1208. This is also the reporting vehicle used for biennial transparency reports under the Paris Agreement. Such an approach would avoid the creation of new reporting obligations and enable MS to report once for EU and international purposes. This would reduce duplication, improve consistency and strengthen the evidence base for assessing progress towards climate resilience across the Union.

The second simplification opportunity concerns **the removal of duplicative adaptation reporting under the Governance Regulation.** Member States currently report both on the implementation of adaptation goals in NECPs (Article 17) and on national adaptation actions (Article 19). The reporting requirement under Article 17 has provided limited added value, as it partly duplicates information already reported under Article 19. Its discontinuation would therefore streamline reporting, reduce administrative burden and address overlapping requirements. Further, if the obligation to include adaptation goals in NECPs is removed, the corresponding Article 17 reporting requirement would also no longer be needed.

The simplification would be accompanied by an update of Article 19 reporting to better capture emerging information need on implementation, results of action and outcomes. To support this, the current reporting requirements in Annex VIII, Part 1 of the Governance Regulation would need to be reviewed to ensure that requirements are fit for purpose. Any subsequent revision of Annex I to Commission Implementing Regulation (EU) 2020/1208 would have to also take account the emerging needs, alongside international developments under the UNFCCC and the Paris Agreement.

Simplification of progress assessments

The Integrated Framework would not introduce new progress assessment requirements, to avoid additional administrative burden and duplication with the European Climate Law. . Progress assessments will continue to be conducted under Articles 6(1), 6(2) and 7(1) of the European Climate Law.

Simplification through more uniform application of rules

The Integrated Framework would reduce the need for each Member State to develop its own approach on preparedness and climate resilience from scratch and would provide a shared language for climate risk assessments, planning, implementation and progress monitoring and assessment.

This would support more consistent procedures within and across national administrations, reduce interpretation gaps and create administrative efficiencies. It would also improve the scope and transparency of progress monitoring towards national and Union climate resilience objectives, while supporting more effective policy development and implementation.

A more uniform application will also reduce complexity for the Commission, for example in reviewing submissions, assessing progress, preparing country-specific recommendations and monitoring overall Union progress. Clearer and more consistent rules would improve the quality, comparability and usability of reported information, reducing the effort needed for assessment and follow-up. This would strengthen the evidence base for EU and Member State level climate resilience governance.

A common framework will help stakeholders by creating clearer expectations and a common language across authorities, sectors and levels of governance. Significant indirect simplification benefits will also arise where the Integrated Framework promotes more consistent integration of climate resilience by design into sectoral policies and reporting streams, through future revisions of sectoral legislation, as a result of the envisaged policy package. Well-designed links with EU sectoral legislation, and possible consequential amendments, where relevant, would further avoid duplication and improve coherence, although such amendments would depend on sector DGs identifying such opportunities. The policy package is expected to trigger follow-up action within the sector policies, thus avoiding that each sector policy would need to reinvent the wheel. Better vertical (between the EU and MS level) and horizontal (within the EU and MS level) policy integration must be achieved, and climate resilience must be more effectively operationalised. The results of such efforts of this can be very tangible.

Table 7 Interactions between the current horizontal Union climate adaptation policies and key elements of the planned Integrated Framework

EU Strategy on Adaptation to Climate Change (*not legally binding)	**Governance Regulation (GovReg)**	**European Climate Law (ECL)**	**Planned Integrated framework**
Objectives			
Heading 2: (Forging a climate-resilient Union): "Long-term vision" of the EU to become a climate-resilient society in 2050	-	**Article 5(1):** MS and COM to ensure continuous progress on adaptation	**Planned provision on** setting a shared objective for the EU and Member States to manage short, medium and long-term climate risks to strengthen climate resilience, going beyond general obligation of ensuring progress pursuant ECL
Common reference global warming trajectory			
-	-	-	**Planned provision on** setting common reference global warming trajectory to be used as a baseline for climate risk management decisions and actions - providing cohesion and giving a reference point for democratic accountability
Duty to consider climate risks			
-	-	**Article 6(4)** The Commission shall assess whether draft measures or legislative proposals, including budgetary proposals, are consistent with ensuring progress on adaptation. When making its draft measures and legislative proposals, the Commission shall endeavour to align them with the objectives of the ECL.	**Planned provision on** establishing duty to the public authorities to consider the climate resilience objective

Climate risk assessments			
-	-	**Article 5(4):** MS to base adaptation strategies and plans on "robust climate change and vulnerability analyses…"	**Planned provision on** COM and MS obligation to carry out EU and national level climate risk assessments regularly, common minimum requirements for the assessments, e.g. requirement to provide options for policy action
Adaptation plan/strategy			
-	-	**Article 5(2)***:* COM to adopt and regularly review Union strategy	**Planned provision on** COM and MS to adopt, implement and regularly review their climate resilience related strategic planning + common minimum requirements, e.g. obligation to address identified major climate risks, and identify and mandate risk owners, setting objectives, outlining actions and measures
Heading 8 (Improving adaptation strategies and plans): Voluntary COM guidance to MS (also covering risk assessments)	**Article 4(a)(1)(iii) and Annex I***:* MS to include in NECPs info on adaptation goals "where applicable"	**Article 5(4):** MS to adopt, implement and review national adaptation strategies and plans + some limited guidance	*On MS, see above.* **GovReg Article 4(a)(1)(iii) and Annex I***: to be deleted*
-	**Annex IV**: MS to include in Long-term strategies information on "adaptation policies and measures"	-	**GovReg Annex IV***: reference to adaptation policies and measures to be deleted*
Monitoring and reporting			
-	**Article 17:** MS to report biennially progress on national energy and climate plans, incl adaptation goals **Article 19(1):** MS to report biennially on national adaptation actions pursuant to	**Article 5(4)**: MS to report national adaptation actions under GovReg 19(1)	As GovReg Article 4(a)(1)(iii) *is to be deleted*, there will be no longer **Article 17** reporting obligation related to NECP/adaptation goals – *to be deleted*

	Annex VIII and UNFCCC and Paris Agreement		**GovReg Article 19(1):** *to be streamlined and updated to reflect the needs of the new legislation*
-	**ANNEX VIII:** Reporting requirements on national adaptation actions	-	**GovReg ANNEX VIII** to be streamlined and updated to address progress on climate preparedness and resilience
Assessment of progress			
-	-	**Article 6(1) and (2):** COM to assess regularly collective progress by MS and consistency of Union measures	**Use ECL 6(1) and (2)** for assessing progress
-	-	**Article 7(1) and (2):** COM to assess regularly consistency of national measures and to issue recommendations	**Use ECL 7(1)** for assessing progress
Indicators			
-	-	-	**Planned provision** to establish a set of high-level Union indicators
Transboundary cooperation			
Heading 8 (Improving adaptation strategies and plans)**:** COM to "stimulate cooperation" regionally and across borders	**Article 12:** MS to cooperate with each other on NECPs, no clear reference to adaptation	-	**Planned provision** (in full respect of EIA and SEA)
Just resilience			

Heading 9 (Fostering local, individual, and just resilience) acknowledges that achieving resilience in a just and fair way is essential	-	**Article 5(3):** Policies on adaptation 'shall focus, in particular, on the most vulnerable and impacted populations'	**Planned provision on** addressing just resilience aspects
Guidelines			
-	-	**Article 5(5):** COM to adopt guidelines for climate risk identification, classification and management in projects and programmes (one-off)	Climate proofing guidelines

*The table compares the content and scope of climate adaptation-relevant policies. It does not assess legal force.

ANNEX 15: EXAMPLES OF PROACTIVE CLIMATE ADAPTATION

This annex provides a list of real-life examples of proactive adaptation planning and implementation collected through the EU Mission on Adaptation to Climate Change. They reflect local and regional bottom-up approaches, in many cases triggered by increased awareness of exposure to climate hazards in response to extreme events disasters. The EU Mission on Adaptation to Climate Change aims to support at least 150 European regions and communities towards climate resilience by 2030. It focuses on helping these regions and local authorities to understand their climate risks, develop adaptation pathways, and test and deploy innovative solutions via its Horizon Europe projects. It also plays an important role in making these experiences widely known and facilitating the exchange of best practices across Europe for their potential reapplication.

The Netherlands, Groene Metropoolregio Arnhem-Nijmegen - Room for the River - Mission Charter Signatory

After major floods in 1993 and 1995 forced the evacuation of 250,000 people, the Dutch government shifted from higher dikes to a "nature-based" approach called Room for the River.

- **Investment**: €2.3 billion was spent over 10 years on 34 projects like dike relocations and secondary channels. (Room for the River)
- **Results**: During the extreme 2021 European floods, the programme managed to successfully **preventing catastrophic overflows** in major deltas. While local flooding occurred in some areas, the system successfully lowered peak water levels, e.g. by 35 cm in Nijmegen, and resulted in **zero casualties.** (The 2021 floods in the Netherlands from a river engineering perspective | Journal of Coastal and Riverine Flood Risk)
- **Replication potential:** This approach is considered worth for reapplication not only in other riverbanks in the Netherlands (e.g. Fryslan) but also in France: Remeandering and restoring a natural water course for climate adaptation in France in the historic and ecologically critical wetland of the Marais Poitevin in the heart of the Nouvelle-Aquitaine region (Mission Charter Signatory)

Poland, Silesian Voivodeship and Wroclaw City - The Racibórz Dolny reservoir – Mission Charter Signatories

In a flood-prone region in Poland a large dry reservoir was built to hold excess water during heavy rainfall and prevent flooding in downstream areas.

- **Investment:** The Racibórz Dolny reservoir has a capacity of 185 million cubic metres and covers 26 square kilometres. It is the largest flood-control reservoir in Poland. It temporarily holds excess water during periods of heightened flood risk to manage flood surges. The reservoir is part of the broader Odra River Basin Flood Protection Project (ORFPP), which main objective is to enhance flood protection for areas located in the Odra valley, from Racibórz downstream to Wrocław. The investment included improvements to the flood control structures and facilities of the Wrocław Floodway System increasing the flood carrying capacity of the Odra River channels through and around Wrocław. These flood structures were built using **sheet piles walls** from **ArcelorMittal**, making the embankment much less prone to backward erosion due to piping caused by burrowing by animals or penetration of tree roots. Those walls are not only watertight but designed to hold

back the flood without requiring greater landtake than a traditional embankment, thanks to their height above the crest design and bending strength.

- **Results:** in September 2024 the reservoir effectively managed to prevent flooding downstream from the region's heaviest recorded rainfall. Nowy Nieboczowy's village was **unharmed during these floods**, thanks to the massive new reservoir. Beyond protecting Nowy Nieboczowy, the reservoir alleviated the impact of the floods for more than 2.5 million residents in three provinces: Silesia, Lower Silesia, and Opolskie.
- **Replication potential:** The use of steel sheet piles walls holds remarkable opportunities for innovative embarkment design and construction, demonstrating an important market opportunity for the competitiveness of European technology partners.

Italy, Veneto Region - MOSE Flood Barriers – Mission Charter Signatory

Venice faced increasingly frequent "Acqua Alta" (high water) events, culminating in a devastating 2019 flood that submerged most of the city. (Venice, 2019: the "Acqua Alta" year. A focus on November events. — English)

- **Investment**: Approximately **€5-6 billion** was invested in a network of 78 movable gates at lagoon inlets (Mose - MOSE Venezia; impaginato).
- **Results**: Activated for the first time in 2020, the system saved the city from a major storm surge in November 2022 that would have otherwise caused massive damage. Since the start of the operation, the MOSE already raised more than 100 times. In 2024 alone, it protected Venice on more than thirty occasions, preventing **economic damage estimated between 200 and 400 million euros a year**. According to the Italian Ministry of Infrastructures and Transport (2025), since its implementation the MOSE has avoided damages to the city amounting to 2.6 bln EUR (link). The same tides that once would have paralysed the city now pass unnoticed.
- **Replication potential:** The Maeslantkering (Maeslant Barrier) is a major component of the Dutch Delta Works in the Netherlands. It is one of the world's largest moving structures, featuring two massive steel gates that pivot into the waterway to protect the Port of Rotterdam (Mission Charter Signatory). While already constructed from 1991-1997, in 2023 for the first time the barrier closed fully automatically at the official 3.0m threshold due to Storm Pia.

Denmark, Capital Region of Denmark - Copenhagen's Cloudburst Management Plan (Denmark) - Mission Charter Signatory

After a 2011 "cloudburst" caused over **€600 million** in damages in just two hours, Copenhagen launched a city-wide comprehensive Climate Adaptation strategy to proactively boost the whole city resilience to these kinds of events. (Cloudburst-Management-Plan; Cloudburst Management plan 2010).

- **Investment**: A **€1.9 billion** plan to implement 300 "cloudburst" projects in the whole city. Comparison with costs of inaction have been carried out in the initial phases of the decision-making process, boosting the proactive planning to build resilience. Cost-effectiveness, in addition to the need to reduce the risk of future flooding, has been a key element to ensure action. The core principle of the plan is to channel water above-ground to areas where it causes no damage. It includes measures to turn roads into rivers during heavy rainfall, and water is channelled to outlets

and retention basins. This reduces pressure on the underground sewage system. Overall, the plan includes five types of solutions: Cloudburst boulevards to transport water, pipes for underground water transportation, retention boulevards to delay water, central delays for storing water, and green roads to transport and delay water on smaller roads. Wherever possible, blue-green infrastructures are preferred to grey solutions, due to their often-higher cost-efficiency and co-benefits.

- **Results**: Implementation of the plan's projects started in 2012, it is ongoing with estimated end date 2035. Several listed adaptation projects are being implemented year by year, following a prioritization process, gradually connecting implemented solutions in a structured manner across the city. Notwithstanding the fact that the plan implementation not being yet complete, during heavy rainfall events, completed projects like Enghave Plads already proved successful in preventing local sewer overflows and flooding. Moreover, blue-green areas embedded in the plan and gradually implemented in the city, provide additional co-benefits beyond flood risk reduction. The plan is estimated to provide a **net benefit of 860 million** EUR by avoiding future damage. (C40 Cities; 03_Cloudburst-Management-Plan.pdf)

- **Replication potential:** Metropolitan Area of Milano (Italy) has launched a large programme to turn the city in a Sponge City and therefore better prepared to cope with urban flooding and heat waves. Thanks to a significant investment under the RRF programme (50 mil EUR), the City has developed a plan with 90 measures across its 32 Communes to green 300.000 m2, plan 2000 plants, 32000 bushes, with the ultimate objective to manage more than 20 million m3 of water, that are not absorbed by the soil and cause challenges linked to water run-off.

Germany, Hamburg City - Hamburg's HafenCity "Warft" Strategy - Mission Charter Signatory

The city faces natural challenges linked to water. In addition to poor load-baring subsoil, it is also a flood-prone area due to Sea Level Rise and storm surges. Rather than relying solely on traditional dikes, this major urban redevelopment area was built inspired by traditional North Sea's settlement patterns, the "Warft". (Infrastructure - Urban development - Hafencity)

- **Investment**: The whole neighbourhood is redeveloped as an artificial mound, with buildings and roads were constructed at 7.5 to 8.5 meters above mean sea level. Lower promenades were designed to be safely and briefly floodable. The activities located at the ground floor are protected by flood gates or comparable technical equipment. Meanwhile, the first floor is where the new promenades and streets are being built at a higher level, and where activities can continue during a flooding event without major disruptions.

- **Results**: In February 2022, **Storm Zeynep** caused the highest storm surge in a decade. While the lower promenades flooded as intended, the elevated residences, businesses, and emergency routes remained completely dry and functional. (PreventionWeb)

- **Replication potential:** Following the October 2024 floods, Bologna city accelerated a "sponge city" approach by improving rainwater capture at source, enhancing infiltration, and integrating green infrastructure, permeable surfaces, and retention areas into urban renewal projects. It is also upgrading its flood management system by adapting historical drainage and canal networks toward more decentralised, nature-based solutions that reduce peak runoff and increase urban water retention capacity.

Belgium, Flanders Region - Albert Canal Screw Pumps (Belgium) – Mission Charter Signatory

Flanders invested in innovative infrastructure to manage the dual risks of flooding and drought on its critical shipping lanes.

- **Investment**: Installing high-capacity screw pumps at new locks along the Albert Canal.
- **Results**: These pumps are multifunctional; they pump water back into the canal during droughts to keep ships moving and generate hydroelectricity when water is plentiful. The Albert Canal's massive Archimedes screw pumps played a critical role in maintaining the navigability of one of Belgium's busiest waterways during recent severe European droughts, particularly in 2022 and 2024. By recycling water used during lock operations back to the upper canal levels, these pumps prevent the canal from drying out when the River Meuse—its primary water source—reaches all-time lows. This prevents significant economic losses for the commercial shipping sector during dry spells.
- **Replication potential:** This solution demonstrates the effectiveness of integrating grey infrastructure with multifunctional water management objectives, combining navigation support, flood risk management, drought resilience, and renewable energy generation within a single system. Comparable approaches are being developed under the Mission, notably through projects such as NURISH, which develops replicable implementation frameworks for nature-based and hybrid water management systems across different hydro-climatic contexts.

Croatia, Zagreb Council – NbS and Green Infrastructure for local district - Mission Charter Signatory

Following a major earthquake occurred in 2020, the city of Zagreb decided to transform the recovery phase into an opportunity to address heatwaves-related risks for the city. They conducted a study to create a Heat Map analysing the temperatures gradients, starting from a district in the city centre.

- **Investment:** the study evidenced a 4°C temperature difference between existing green spaces and built areas within the same district, thus informing on the potential cooling effect embedded in implementing NbS across the city.
- **Results:** As a result, the city decided to include NbS and Green Infrastructure for the rebuilding phase following the earthquake. Several pilot projects, such as "Greening the City" or GreenScapeCE2, are being carried out, aiming at planting 1500 trees and enhance green infrastructures within the whole city, hereby mitigating heatwaves' impacts while, at the same time, harvesting their multiple co-benefits, such as on people's health and well-being.
- **Replication potential:** several regions and local actors within the Mission are replicating similar nature-based solutions to address urban heat stress, such as Bilbao, Spain or Turin, Italy.

France, Paris City – Climate Adaptation Plan – Mission Charter Signatory

Following extreme heatwaves, Paris published an adaptation plan, deploying several mesures aiming at re-greening asphalt-covered areas within the city to combat the Urban Heat Island (UHI) effect.

- **Investment**: In order to adapt to increases heatwaves, the city published its own plan called "*Paris s'adapt*", implementing several solutions across the city. For the period 2024-2030, Paris issued a €300 million Climate Bond, with €60 million (20%) specifically earmarked for adaptation projects.
- **Results**: Paris has expanded its **heat resilience measures** to combat rising temperatures, offering **1,400 designated cooling spots** across the city. From **5 July**, residents can enjoy **urban swimming** in the Seine, Canal Saint-Martin, and Bassin de la Villette, while **140 parks, gardens, and the Petite Ceinture in the 13th arrondissement remain open 24/7**. The city also provides **1,300 drinking fountains and water points**—including **175 misting fountains**—alongside **98 green spaces and 15 public areas equipped with cooling mist systems**. For recreation, **42 public pools** are open this summer, while **over 110 shade structures** in parks and **21 on streets** offer relief from the sun. To tackle **urban heat islands**, Paris is accelerating greening efforts, with **100 "school streets" set for vegetation by summer 2025** and **15,000 new trees planted** over the 2024–2025 winter. Additionally, the city funds **5,000 thermal renovations annually** in social housing to improve insulation and reduce heat exposure. These combined initiatives aim to create a cooler, more adaptable urban environment. During the pilot testing, these schoolyards were measured to be **cooler** than surrounding streets. They provided critical cooling for children and served as public "cool spots" for vulnerable residents during peak temperatures. (Climate-ADAPT)
- **Replication potential:** Other European cities like Brussels, Rotterdam and Barcelona are using Nbs to lower temperatures in their schoolyards. Numerous other projects related to de-paving and greening schoolyards are becoming available, such as Leuven (Belgium) or across numerous Spanish regions.

Slovenia, Maribor City - Maribor Heat Mitigation Plan - member of the Covenant of Mayors

Considering a projected increase of temperatures in the city and following a vulnerability analysis at the city-level, Maribor developed a comprehensive strategy and plan for building resilience to extreme heat threat. The plan includes:

- **Investment:** Maribor is implementing short, medium and long-term adaptation measures, covering built infrastructure, green spaces and water infrastructures, along with actions to improve governance, leverage innovative technologies, promote behaviour change and awareness-raising.
- **Result:** To address extreme heat, short-term measures include implementing a Heat Warning System, providing cooling centres, temporary shade, public drinking water, and safeguards for vulnerable groups. Medium-term strategies focus on public awareness campaigns, education, and training to build community resilience. Long-term solutions prioritise urban planning, such as better-insulated buildings, innovative cooling systems, and expanded green spaces through tree planting and reducing concrete, to lower temperatures. Additional efforts involve water conservation, solar energy adoption, and monitoring heat-related health risks to enhance long-term adaptability. These layered approaches aim to mitigate immediate dangers while fostering sustainable resilience.
- **Replication potential:** similar nature-based approaches to address the urban heat island are being tested out within other Mission contexts, such as in Antwerp, Belgium.

Spain, Barcelona Metropolitan Area - Barcelona's Urban Green Infrastructure – Mission Charter Signatory

Barcelona's "Green Infrastructure and Biodiversity Plan" focused on increasing tree canopy to manage both extreme heat and flash floods.

- **Investment**: Planting climate-resilient tree species and creating "superblocks" that prioritize green space over car traffic.
- **Results**: The expanded canopy has significantly reduced local temperatures and increased rainwater infiltration. Areas with higher green density experienced notably lower levels of street flooding compared to high-asphalt zones. (Barcelona Case Study)
- **Replication potential:** within the Mission context, this kind of integrated greening infrastructure planning at the city level is being replicated also by the city of Dortmund, Germany

Finland, Häme Region, Helsinki-Uusimaa Kymenlaakso Regional Council, Lapland, Ostrobothnia, Päijät-Häme, Southwest Finland Region – Finland's Underground Cable Programme - Mission Charter Signatories

To mitigate the impact of increasingly severe winter storms and snow loads on the power grid, Finnish utilities began a massive infrastructure shift.

- **Investment**: Replacing thousands of kilometres of overhead power lines with underground cables, as part of a €1.6 billion modernization effort.
- **Results**: Currently, around 66% of the Elenia DSO company's cabling is underground, with a 75 % target for 2028. The company committed to the objective of reducing the power outages period in case of storm or weather events to 6h, offering compensation to customers when that threshold is overcome. In Finland, during "Storm Hannes" in late 2025, the underground networks were crucial in preventing a "catastrophic" situation, effectively withstanding the severe storm conditions that destroyed overhead lines.
- **Replication potential:** While underground cables are normally more expensive than overhead power lines, the approach is worth replication in areas exposed to extreme weather episodes and related landslide. In Brittany Region, France, following massive outages from Storm Ciarán in 2023, Enedis launched a €390 million plan to bury 1,100km of lines by 2029 to ensure future storm resilience. In Marseille, Enedis is replacing aging "heat-impregnated" cables with synthetic-insulated versions to survive rising heatwaves. In Germany, the 700km SüdLink corridor had been designed as entirely underground, to avoid weather-related damage to high-voltage pylons and ensures supply stability for 10 million households. In Belgium, a 10km stretch near Bruges was undergrounded to protect the grid from coastal storms while also connecting offshore wind parks to the national grid. In Southern Europe (Italy & Portugal), underground lines projects are focused on heat-resilient cabling and wildfire monitoring systems to prevent grid failures during droughts and extreme heat.

Denmark, Aarhus – Aarhus Green infrastructure for stormwater management - Mission Charter Signatory

Aarhus is strengthening climate resilience in the Risvangen neighbourhood by separating rainwater from wastewater and managing runoff directly on site, deploying a series of Nature-Based Solutions that deliver co-benefits.

- **Investment:** Separating rainwater from wastewater, the Risvangen Climate Adaptation Project proposes nature-based solutions to manage pluvial flooding by slowing, storing, and infiltrating stormwater. It also integrates green recreational spaces and biodiversity enhancements while engaging local residents in co-design.
- **Results:** the pilot test effectively prevented flooding under a 40y rain event, while also preventing pollutants runoff into the bay. Modelled under an 80y rain event, the whole catchment resulted in effectively preventing flooding. It also achieved reduction in nutrients load into the Bay of Aarhus and the streams, with 70% Phosphorous reduction and 85% Nitrogen.
- **Replication potential:** within the Mission, similar solutions incorporating traditional knowledge and Nature-based approaches for sustainable water management and climate adaptation are being deployed in several Greek Islands.

Switzerland, Basel - Green Roof Initiative - The Global Infrastructure Basel Foundation participates in the Mission through P2R, Natalie and other projects consortia.

In response to rising urban temperatures and intense rainfall projections, Basel implemented a green roof incentive programme (Green roofs in Basel, Switzerland)

- **Investment**: Funded by an energy-saving levy, the city provided subsidies for green roof construction and retrofitting. The price lowered over time, and no subsidies is needed anymore.
- **Results**: Green roofs now cover a significant portion of flat roofs in the city. They have proven beneficial in **lowering indoor temperatures** during heatwaves and **absorbing rainwater** during extreme rainfall, which reduces the risk of local flash flooding.
- **Replication potential:** The LIFE@Urban Roofs project in Rotterdam, Netherlands, has been planting green roofs across the city, adding an extra 20,000 square metres to the city's green infrastructure. In Poland, the LIFE Archiclima project is helping to adapt big buildings (such as shopping centres and airports) to extreme heat: in Katowice airport pilot, greening the roofs, walls, and outdoor spaces is expected to drop the average temperatures in the surroundings by some 2°C during heatwaves.

United Kingdom, Greater London - Thames Estuary 2100 Plan – Recipient of P2R Support under the Mission

The UK developed a long-term plan to protect London from surge tides, using the Thames Barrier and other defences.

- **Investment**: Continuous investment in flood risk management across the estuary.

- **Results**: For every **£1 invested** in flood defences in the UK, roughly **£8 in damages are prevented**. This strategy has averted serious flooding in London, with indirect business benefits estimated between **£53bn and £58bn** in avoided losses.
- **The Replication**: the **Rotterdam multi-layer flood risk approach** also combines long-term adaptive planning, upgraded flood defences, and spatial planning to manage rising sea levels in a phased and flexible way.