Council of the European Union

Brussels, 28 October 2026
(OR. en)

**15079/26**
**ADD 7**

**Interinstitutional File:**
**2026/0336 (COD)**

**CLIMA 598**
**ENV 1326**
**ENER 716**
**COMPET 1265**
**PROCIV 201**
**CODEC 2008**

**COVER NOTE**

| | |
|---|---|
| From: | Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director |
| date of receipt: | 28 October 2026 |
| To: | Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union |
| No. Cion doc.: | SWD(2026) 731 annex |
| Subject: | PART 5/5 COMMISSION STAFF WORKING DOCUMENT<br>IMPACT ASSESSMENT REPORT<br>EU Framework for Climate Resilience<br>*Accompanying the document*<br>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) |

Delegations will find attached document SWD(2026) 731 annex.

Encl.: SWD(2026) 731 annex

EUROPEAN
COMMISSION

Brussels, 27.10.2026
SWD(2026) 731 final

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 enviromnent due to wildfires (hotspot region: southern Europe) | Urgent action needed | +++ | +++ | +++ | Medium | Medium | Co-owned |
| Population/built enviromnent 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).

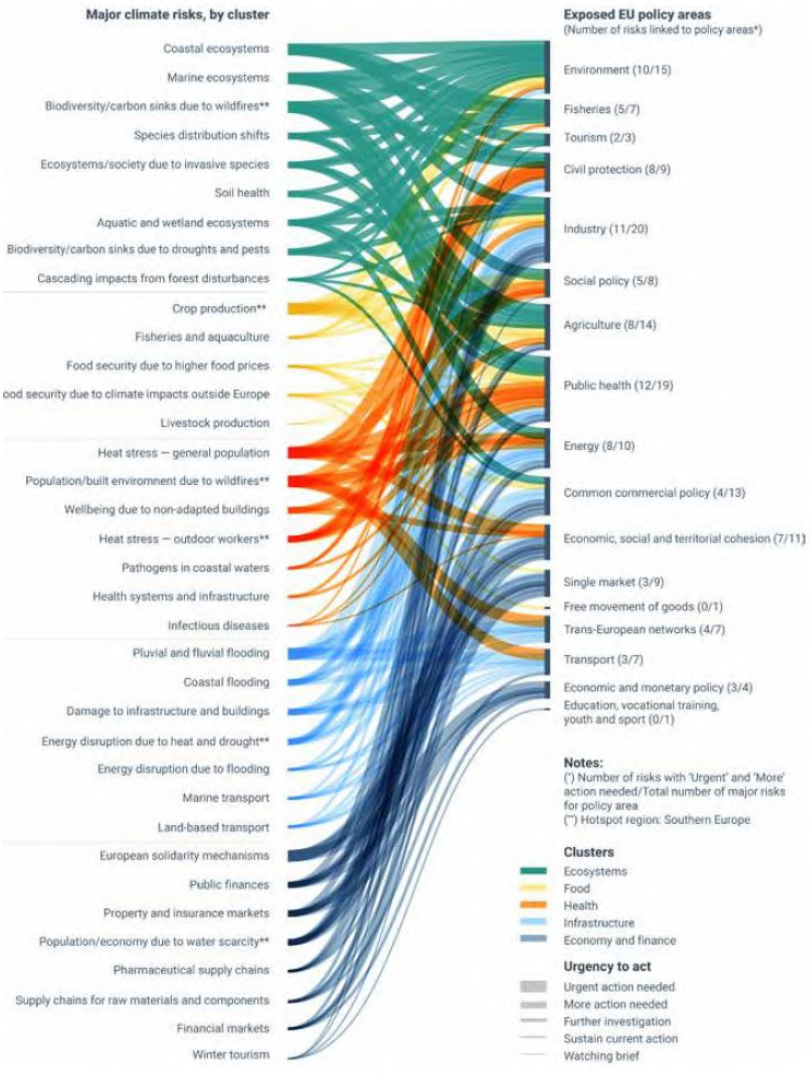
## Policy preparedness 2: EUCRA estimated exposure of EU policy areas to the major risks, and key national-level policies

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.

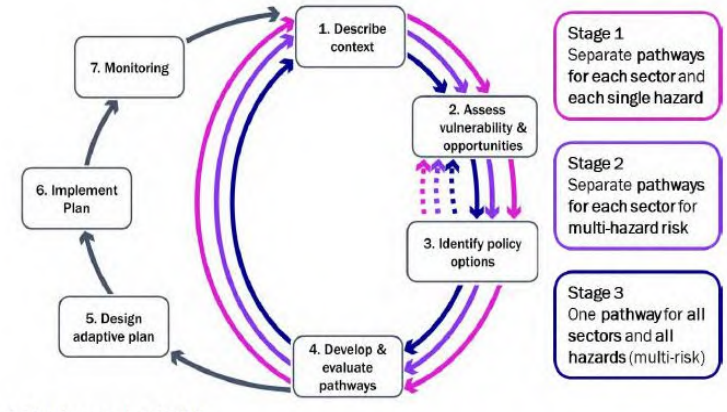
For reference, EUCRA provides evidence regarding specific policies in the example format:

**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 1 Gaps in current horizontal Union climate adaptation policies**

| **EU Strategy on Adaptation to Climate Change**<br><br>(*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<br><br>**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<br><br>"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 2 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.

---

[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.

---

[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].

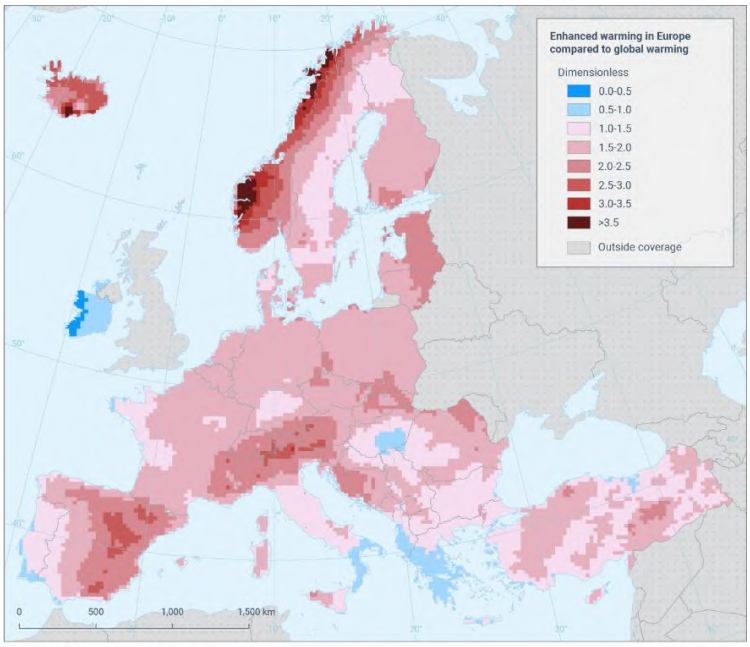



**Figure 1** Enhanced warming in Europe compared to global warming. Figure 2.3 from the EUCRA report.

[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 3 Detailed description of policy options and measures**
**(M) = mandatory obligation; (V) = voluntary**

| Key elements | OPTION A<br>Better implementation and incremental change through raised awareness, guidance, tools and education | OPTION B<br>New, essential ground rules, flexible delegation and enablers to trigger transformative change | OPTION C<br>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<br>**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

| Key elements | OPTION A<br>Better implementation and incremental change through raised awareness, guidance, tools and education | OPTION B<br>New, essential ground rules, flexible delegation and enablers to trigger transformative change | OPTION C<br>Comprehensive central rule-setting and oversight for immediate and uniform application across sectors |
|---|---|---|---|
| | | | **C1 (M)**: establishes common minimum requirements for translating the global warming trajectory into nationally relevant climate projections<br>**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<br>**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<br>**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<br>**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<br>**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<br>**B5 (M):** Duty to ensure climate resilience by design when reviewing relevant EU legislation | **B4 (M):** requirement to apply climate resilience by design to public funding<br>**C5 (M):** requirement for MS to actively support regional and local authorities in mobilising private finance for resilience investments<br>**C20:** For COM, current climate adaptation tool in the Better Regulation toolbox would |

| Key elements | OPTION A<br>Better implementation and incremental change through raised awareness, guidance, tools and education | OPTION B<br>New, essential ground rules, flexible delegation and enablers to trigger transformative change | OPTION C<br>Comprehensive central rule-setting and oversight for immediate and uniform application across sectors |
|---|---|---|---|
| | | **B10 (V):** Guidance for MS to support regional and local authorities in mobilising private finance which applies the climate resilience by design principle<br>**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. | be upgraded into a detailed and mandatory "climate resilience check"<br>**C6 (M)**: Existing EU sectoral legislation and policy documents revised to embed the climate resilience by design principle<br>**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<br>**A7 (V):** further refinement and augmentation of EUCRA would remain open ended in response to political needs and preferences<br>**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<br>At national level, to ensure sectoral coverage either:<br>**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<br>**C9 (M)**: clearly defined roles for EU, national and sectoral assessments to ensure alignment and coherence<br>**B6 (M):** EUCRA becomes a regular exercise codified in EU law. EU and MS CRAs would be supported by a set of minimum requirements<br>**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 | **B8 (M):** Building on Article 5 of the European Climate Law, establish a set of | **C11 (V):** harmonised and standardised approach, 2023 COM Guidelines on |

| Key elements | OPTION A<br>Better implementation and incremental change through raised awareness, guidance, tools and education | OPTION B<br>New, essential ground rules, flexible delegation and enablers to trigger transformative change | OPTION C<br>Comprehensive central rule-setting and oversight for immediate and uniform application across sectors |
|---|---|---|---|
| | **A10a:** new EU climate resilience strategy<br>**A10b:** no new EU climate resilience strategy | 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 | NAP/NAS upgraded and its implementation assessed<br>**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<br>**C12 (M):** assessment of climate risk management options explicitly evaluate the tolerance of residual risks in assessment of climate risk management options<br>**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<br>**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 |

| Key elements | OPTION A<br>Better implementation and incremental change through raised awareness, guidance, tools and education | OPTION B<br>New, essential ground rules, flexible delegation and enablers to trigger transformative change | OPTION C<br>Comprehensive central rule-setting and oversight for immediate and uniform application across sectors |
|---|---|---|---|
| **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<br>**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<br>**A12 (V)**: new Navigator of climate resilience tools to help users identify and use relevant existing tools at European, national and transnational level<br>**A13 (V):** EU-wide awareness campaigns targeting the population<br>**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 | **B12 (V)**: Climate-ADAPT modified to reflect the structure and needs of the new framework and to support its key provisions<br>**A12 (V)**: new navigator of climate resilience tools<br>**A13 (V)**: EU-wide awareness campaigns targeting the population<br>**A14 (V)**: new European climate viewer<br>**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. | **C17 (M):** Climate-ADAPT transformed into a central platform supporting implementation, monitoring and compliance with the legal provisions<br>**A12 (V):** new Navigator of climate resilience tools<br>**A14 (V):** new European climate viewer<br>**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<br>**C19 (M):** MS required to integrate common climate resilience indicators into their public national tools |

**Table 4 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].<br>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]<br>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.<br>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]<br>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]<br>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]<br>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]<br>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]<br>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]<br>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]<br>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)

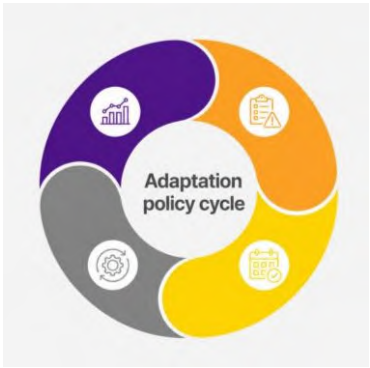
## Table 5 Detailed measures of the preferred policy option

| 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<br>B3: Common parameters for identifying and allocating risk ownership among public authorities, and framework to assess the sector specific acceptability of residual risks<br>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<br>B4: Integration of the climate resilience by design principle in public funding<br>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<br>B10: Recommendation to MS to support regional and local authorities in mobilising private finance, in line with the climate resilience by design principle<br>B11: Guidance for private sector to apply key concepts (e.g. use of the common reference warming trajectory, climate resilience by design)<br>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<br>B6: EUCRA becomes a regular exercise codified in EU law, supported by a set of minimum requirements<br>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<br>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<br>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<br>A13: EU-wide awareness campaigns targeting the population<br>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<br>B12: Climate-ADAPT revamped to reflect the structure and needs of the new framework and to support its key provisions<br>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 6 Interactions between the current horizontal Union climate adaptation policies and key elements of the planned Integrated Framework

| **EU Strategy on Adaptation to Climate Change**<br><br>(*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<br>- 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.*<br><br>**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<br><br>**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<br><br>"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.