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Evaluation of the EU Strategy on adaptation to climate change

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the implementation of the EU Strategy on adaptation to climate change

{COM(2018) 738 final} - {SEC(2018) 472 final} - {SWD(2018) 460 final}

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1. INTRODUCTION

Purpose and scope

This document sets out the results of the evaluation of the 2013 EU Strategy on adaptation to climate change (the Strategy).[1] The Strategy indicates that in 2017, the European Commission had to report to the European Parliament and the Council on the state of its implementation and propose its review, if needed. This evaluation intends to inform future work on the Strategy on the progress made, and to serve as background to the Report it accompanies.

It assesses whether the Strategy is fit for purpose, based on its performance up-to-date, to deliver on its 3 objectives and 8 actions in different policy sectors at local, national and transnational level. In accordance with the Better Regulation Guidelines[2], the following evaluation criteria are used: relevance, effectiveness, efficiency, coherence and EU added value.

It covers the period 2013 to mid-2018[3] and all EU Member States. The document is largely based on an external evaluation carried out by consultants[4], complemented by internal assessments, recent evaluations (e.g. of the LIFE[5] and Covenant of Mayors[6] programmes and of the Climate-ADAPT platform[7]), and a broad consultation process described in Annex II.

The evaluation focuses on the direct results of the Strategy (e.g. the extent to which adaptation has been mainstreamed into EU financing of projects) rather than on the activities triggered by those results (for instance the outputs of the financed projects).

2. BACKGROUND TO THE INTERVENTION

Description of the intervention and its objectives

Need for action

In Europe, land temperatures in 2007-2016 were around 1.6°C warmer than in pre-industrial times. Particularly high warming has been observed since 1960 over the Iberian

[1] Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions: An EU Strategy on adaptation to climate change, COM(2013) 216 final. The Strategy Communication was accompanied by a series of thematic SWDs, listed in Annex IV.

[2] Commission Staff Working Document: Better Regulation Guidelines, SWD(2017) 350 final.

[3] The evaluation roadmap defined the period to be evaluated as 2013 to December 2016. Considering the large amount of recent and highly relevant evidence that became available after December 2016, in this document the evaluated period is extended to mid-2018.

[4] Ricardo, IEEP, Trinomics, and Alterra. Study to support the evaluation of the EU Adaptation Strategy, Ricardo/ED62885 Final Report, Study for the European Commission, 2018.

[5] LIFE (L'Instrument Financier pour l'Environnement) evaluation: http://ec.europa.eu/environment/life/publications/lifepublications/evaluation/index.htm

[6] Covenant of Mayors in figures: 8-year assessment, Publications Office of the European Union, Luxembourg, 2017.

[7] 'Sharing adaptation across Europe', EEA Report No 3/2018, European Environment Agency, 2018

Peninsula, in mountain areas across central and northeastern Europe and over southern Scandinavia. The Pyrenees region is already 1.5ºC hotter than in 1960. Winter temperatures have increased the most in northern Europe, while higher summer temperatures have affected southern Europe[8]. In addition, there has already been a substantial increase in climate-related extreme events in recent years: the number of heatwaves, droughts, storms, wildfires has doubled, the number of floods has quadrupled since 1980. Climate change makes such events more likely.[9] There are also slower on-setting impacts like coastal erosion caused by sea level rise, or drought caused by changes to precipitation patterns.[10] Areas such as the EU Outermost Regions are particularly exposed to climate-related extreme events (e.g. cyclones, hurricanes, tropical tempests) and vulnerable to sea-level rise. Climate change impacts in third countries can also have spillover effects on Europe, for example by affecting trade routes and patterns and triggering climate-induced migration.

Adaptation is the process of adjustment to actual or expected climate and its effects. It seeks to moderate or avoid harm and to exploit beneficial opportunities. Well planned, early adaptation action saves lives, livelihoods, biodiversity and money later. It focuses on building response capacity, prevention and on limiting the damage as it occurs, rather than on dealing with consequences (disaster relief).[11]

At the time of the formulation of the Strategy, the economic, environmental and social costs of not adapting to climate change were estimated to range from EUR 100 billion a year in 2020 to EUR 250 billion a year in 2050 for the EU as a whole.[12] Recent studies confirm that the frequency and economic costs of extreme events are continuing to rise for specific sectors.[13]

Intervention logic

The general objective of the Strategy is to contribute to a more climate-resilient Europe by enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, developing a coherent approach and improving coordination.

In order to achieve this, it set out the following three specific objectives:

Objective 1 – Promoting action by Member States: to promote adaptation action at sub-EU level, and support and facilitate exchange and coordination, including through cross-border measures.

[8] 'Global and European Temperature', European Environment Agency, 2018.

[9] 'Extreme weather events in Europe - Preparing for climate change adaptation: an update on EASAC's 2013 study', European Academies' Science Advisory Council, 2018.

[10] Adverse effects of climate change include extreme weather events (heavy precipitation, strong wind, or heatwaves), forest fires, floods, water scarcity, sea-level-rise, biodiversity change and premature deaths due to heatwaves and increases in vector-borne diseases (e.g. from ticks and mosquitos) and food and water-borne diseases (e.g. from bacteria, viruses, parasites).

[11] Examples of adaptation measures and tools include: using scarce water resources more efficiently; adapting building codes to future climate conditions and extreme weather events; building flood defences and introducing natural water retention measures; developing drought-tolerant crops; choosing tree species and forestry practices less vulnerable to storms and fires; setting aside land corridors to help species migrate, carrying out vulnerability assessment or using insurance policy.

[12] 'Climate change, impacts and vulnerability in Europe 2012, EEA Report No 12/2012', European Environment Agency, 2012.

[13] E.g. European Academies' Science Advisory Council, ibid. More information in Annex XIII.

Objective 2 - Better informed decision making: to further the understanding of adaptation, to improve and widen the knowledge base where knowledge gaps have been identified and to enhance dissemination of adaptation-related information.

Objective 3 - Climate-proofing EU action: promoting adaptation in key vulnerable sectors: to develop initiatives to consistently and comprehensively integrate climate change adaptation considerations into sectors at EU level through EU policies.

These objectives were intended to be delivered through the implementation of 8 actions as summarised in Table 2-1 (below). The table also lists the performance indicators foreseen in the 2013 impact assessment.[14]

Table 2-1 Objectives, actions and performance indicators

Objectives	Actions (including abbreviated title)	Performance indicators
1. Promoting action by Member States *(Increasing the resilience of the EU territory)*[15]	1. Encourage all Member States to adopt comprehensive adaptation strategies (Member State strategies) 2. Provide LIFE funding to support capacity building and step up adaptation action in Europe (LIFE) 3. Introduce adaptation in the Covenant of Mayors framework (Covenant of Mayors)	1. Number of national adaptation strategies (NASs) and action plans and national climate change risk assessments 2. Number and amount of LIFE grants used for experience transfer and lighthouse projects respectively 3. Number of cities pledging to develop an adaptation strategy and of cities with more than 150 000 inhabitants in vulnerable areas with an adaptation strategy
2. Better informed decision-making	4. Bridge the knowledge gap (Knowledge gap) 5. Further develop Climate-ADAPT as the 'one-stop shop' for adaptation information in Europe (Climate-ADAPT)	4. List of knowledge gaps now, in 2017, and in 2020 + number of Horizon 2020 (H2020) and Joint Research Centre (JRC) research projects dealing with adaptation and associated budget allocated 5. Number of visitors to Climate-ADAPT, pages most visited, number of registered users, assessment of the content, databases and metadata + Number of conferences, workshops, adaptation events registered in Climate-ADAPT
3. Climate-proofing EU action: promoting adaptation in key vulnerable sectors *(Increasing the resilience of key vulnerable sectors)*	6. Facilitate the climate-proofing of the Common Agricultural Policy, the Cohesion Policy[16], and the Common Fisheries Policy (ESIF/CAP/CFP) 7. Ensuring more resilient infrastructure (Infrastructure) 8. Promote insurance and other financial products for resilient investment and business decisions[17] (Insurance and finance)	6. List of policies and legal acts where adaptation has been mainstreamed + adaptation activities by private organisations as reported in the Carbon Disclosure Project surveys 7. Amount of adaptation infrastructure investments (co-) financed by EU funds and/or public financial institutions + progress on the mapping exercise by European Standardisation Organisations (ESOs)[18] 8. No associated performance indicator in the impact assessment.

[14] Commission Staff Working Document: Impact Assessment accompanying the Communication on an EU Strategy on adaptation to climate change, SWD(2013) 132 final.

[15] The Communication labelled the specific objectives slightly differently than the Impact Assessment, but their substance is the same. The equivalent label from the Impact Assessment is shown in brackets in the table to ease comparison.

[16] "European Structural and Investment Funds" (ESIF) is the name of the funds financing Cohesion Policy in the 2014-2020 period.

[17] Promoting insurance for adaptation was included as an action in the Strategy, but there was no associated operational objective, or performance indicator, in the Impact Assessment.

[18] Before the adoption of the Strategy, the European Standardisation Organisations had already expressed their intention to revise the Guide for addressing environmental issues in product standards (CEN – Comité Européen de Normalisation - Guide 4). However, it was action 7 of the Strategy, namely the mandate from the Commission to the ESOs that initiated the identification and update of standards in the fields of energy, transport and construction.

The impact assessment also set out operational objectives in the form of aspirational targets for 2020, to be measured through the performance indicators. The Strategy itself did not reiterate those operational objectives.[19] The specific activities under each action are listed in the intervention logic graph in Annex V and detailed in Annex VII.

In terms of the expected impacts, the activities, performance indicators and operational objectives make it clear that the strategy's core mechanism is a leveraging effect through multiplier actions under the different objectives. These actions range from promoting the adoption and implementation of strategies at all levels of governance to funding research and demonstration projects, setting infrastructure standards and mainstreaming into other policies (including funding programmes).

External factors that have emerged since 2013 and have had an influence on the Strategy's impacts include the growing frequency and intensity of extreme weather events in recent years (that may be linked with global warming and which is likely to increase the costs of inaction, see section 6.1.1), and the adoption of several relevant international frameworks, in particular the Paris Agreement on climate change[20] which could affect the ambition level of EU adaptation policies in the future (see further discussion in Chapter 3).

The Strategy and its impact assessment were developed without prior intervention logic. Nevertheless, on their basis, the intervention logic in Annex V can be reconstructed to reflect the approach underlying the Strategy.

3. THE STRATEGY, EXTERNAL POLICIES AND THE INTERNATIONAL CONTEXT FOR ADAPTATION

Integration of adaptation in external policies

The Strategy focuses on the adaptation to the impacts of climate on the EU territory.[21] As such, it follows the approach adopted by most countries when developing national adaptation strategies. However, this also means that it does not make reference to any international policies or initiatives, nor does it emphasise the role of the EU's external policies in supporting adaptation actions in non-EU countries.

The 2013 impact assessment considered that international issues were covered under the development and cooperation policy and through the United Nations Framework Convention on Climate Change (UNFCCC) negotiations. There was a concern that the adoption of an EU adaptation strategy setting objectives and actions relevant for discussions on adaptation in the international framework prior to the Paris Agreement would pre-empt the EU position in negotiations. Moreover, in order to push for higher mitigation ambition among Parties, the EU international climate policy was deliberately focused on mitigation, to the extent that even the EU's Intended Nationally Determined Contribution (INDC) includes only mitigation.

[19] The operational objectives from the impact assessment are listed in Annex VI.

[20] The Paris Agreement was adopted by the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) on 12 December 2015 (ref. Document FCCC/CP/2015/10/Add.1) and entered into force on 4 November 2016.

[21] International content (on links between climate and migration) featured only in an accompanying SWD. It was a response to a request by the European Council to the Commission in the context of the Stockholm Programme on citizenship, justice, security, asylum, immigration and visa policy for 2010-2014.

The strategic choice of focusing the Strategy on domestic issues has not however reduced the importance that the EU attributes to international support for adaptation and resilience. On the contrary, the importance of mainstreaming adaptation in EU international policy has been increasingly recognized and much has been done with this purpose, in particular in the following key areas.

Development cooperation

Adaptation is recognized as one of the key cross-cutting issues in the 2017 EU's response to the United Nations (UN) 2030 Agenda for Sustainable Development, the European Consensus on Development 'Our world, our dignity, our future'[22], which sets out the main principles for the approach of the EU and the Member States to cooperation with developing countries over the next 15 years, as well as a strategy for reaching the Sustainable Development Goals. Climate change resilience in vulnerable countries is considered as an important element of sustainability. Moreover, climate change adaptation has been integrated in the EU's development programmes, be it national, regional or thematic, at all stages of the planning and implementation process. In addition to dedicated projects and programmes, climate change is systematically addressed as a cross-cutting issue to identify and address the associated risks and opportunities. The most prominent example of EU support to policy dialogue and climate action in developing countries is the Global Climate Change Alliance (GCCA+) initiative. Lessons learnt in planning for and implementing the Strategy, including scientific knowledge and tools gained, provide input for these processes.

Foreign and security policy (including migration)

During the period covered by the evaluation, recognition of the link between climate change, EU external relations and security has increased. The 2016 Global Strategy for the European Union's Foreign and Security Policy and the 2017 Joint Communication on Resilience mention climate change explicitly as a threat. Moreover, concrete steps have been taken to integrate and recognize climate change as a threat multiplier which, if not addressed, can contribute to a downward spiral of fragility and conflict. Concretely, climate change has been included amongst the 10 criteria used by the EU for assessment of early warning of conflict risk, in addition to water stress and food security.[23] For the prioritised countries, an in-depth conflict analysis is conducted which also considers climate change impacts.

Relevant to the security angle is also the progress made on recognizing and further analysing the link between climate change and human displacement, as demonstrated at the international level by the establishment of a Task Force on Displacement in the context of the UNFCCC.[24] Since 2013, EU policies on migration and external relations have increasingly taken into account climate-related disasters as potential triggers to displacement, and the increasing challenges posed by climate change in this context. Climate change adaptation is seen as an effective tool to tackle root causes of migration. Examples include: Council conclusion on Climate diplomacy in 2013[25], 2016[26] and

[22] The new European consensus on development 'Our world, our dignity, our future', European Commission, 2017.

[23] Joint Staff Working Document: EU Conflict Early Warning System: Objectives, Process and Guidance for Implementation, SWD(2016) 3 final.

[24] https://unfccc.int/process/bodies/constituted-bodies/executive-committee-of-the-warsaw-international-mechanism-for-loss-and-damage-wim-excom/areas-of-work/migration--displacement-and-human-mobility

[25] Council conclusions on EU Climate Diplomacy, Foreign Affairs Council meeting, Luxembourg, 24 June 2013

2018[27] and the 2016 Communication on Forced Displacement and Development[28]. Better understanding, on the one hand, the role of climate change and environmental degradation as factors in decisions to migrate and, on the other hand, the potential role of migration as an adaptation option, continue to be a priority under the EU's external cooperation instruments for the period 2014-2020, both through dedicated thematic lines[29] and targeted projects to develop knowledge and practices to address climate induced migration.

Disaster risk reduction, including emergency response

As part of the post-2015 development agenda, the Sendai Framework for Disaster Risk Reduction 2015-2030[30] was developed with a strong focus on risk prevention. To translate this framework into EU action, in July 2016 the Commission published an Action Plan[31] on the implementation of the Sendai Framework. Climate change adaptation and its links with disaster risk reduction are well integrated both in the Sendai framework and in the Action Plan.

An additional example include the New Urban Agenda[32], adopted in Quito in 2016 which recognizes the contribution of cities to mitigating climate change, and commits to improve the resilience of cities to disasters and climate change – these objectives are well aligned with the core vision of the Covenant of Mayors for Climate and Energy. Synergies between the Covenant of Mayors and United Nations Office for Disaster Risk Reduction's Making Cities Resilient campaign are also being sought to maximise the impact, including on monitoring, reporting and indicators.

All these achievements/developments are not a direct outcome of the Strategy: they were triggered by **external developments which have leveraged the importance and urgency of adaptation and its close relation to sustainable development, disaster risk reduction, security etc**. The main triggers are:

- The importance for the EU **to show leadership in international climate policy** and actions including by adequately responding to the increasing demands from developing countries (in political dialogues and within UNFCCC negotiations) to support climate change resilience as a component of sustainable development.
- The **growing frequency and intensity of extreme weather events** affecting EU 's partners and the likely link with global warming have put the need to address climate change (both mitigation and adaptation) and its impacts higher on the EU political agenda.
- The **Arctic's relevance in climate change adaptation and mitigation** has increased, due to recent scientific evidence on accelerated Arctic sea ice melt and its consequences for extreme weather events elsewhere on the planet. The 2016 Joint

[26] Council conclusions on European climate diplomacy after COP21, Foreign Affairs Council Meeting, Brussels, 15 February 2016

[27] Council conclusions on Climate Diplomacy, 26 February 2018

[28] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Lives in Dignity: From Aid-dependence to Self-reliance, COM(2016) 234 final

[29] Commision Implementing Decision adopting a Multiannual Indicative Programme for the Thematic Programme 'Global Public Goods and Challenges' for the period 2014-2020. C(2014)5072

[30] The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015.

[31] Commission Staff Working Document: Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030, SWD(2016) 205 final/2.

[33] JOIN(2016) 21

Communication on an integrated EU policy for the Arctic recognised the relevance of the region for climate action.[33]

- The adoption of other **major international frameworks in 2015**, and in particular the Sendai Framework for Disaster Risk Reduction, the Convention on Biological Diversity (CBD) Aichi targets[34], and Agenda 2030 and the Sustainable Development Goals[35], as well as the New Urban Agenda in 2016.

On its side, the implementation of the Strategy has contributed to a strengthening of EU's external action on climate resilience by, for instance, improving the knowledge base, and offering a test-base for adaptation options and responses that could be relevant outside EU territories.[36]

The international context and the EU adaptation strategy

The evaluation support study highlights that the context of international adaptation policy has changed: the initial assumptions on the basis of which the international setting was not included in the Strategy might not hold any more. The study points to a need to reflect on whether a clearer strategic framework is necessary to better enhance coherence and alignment between international policies, actions and processes of relevance to climate change adaptation. And in this context, whether the Strategy is the appropriate channel where this strategic framework should be included.

The following elements could bring useful insight in this direction:

- Already in 2010, the adoption of the Cancún adaptation framework foretold the importance that adaptation would gather in the future, with **the adoption of the Paris Agreement**. The Paris Agreement **raises adaptation ambition,** putting it on equal footing with mitigation in our collective response to climate change.The **Paris Agreement moreover changes the narrative**: climate change affects all countries and therefore adaptation needs to be a goal to which all Parties need to contribute. Specifically Art 7 of the Agreement asks Parties to engage on adaptation e.g. by developing plans/strategies, assessing vulnerabilities, monitoring adaptation policies and actions, sharing knowledge and lessons learnt, strengthening the scientific knowledge on climate etc. It also requires regular monitoring and revision of adaptation policies. Moreover the Paris Agreement includes adaptation in the 'ambition cycle', and in 2023: the EU, as a Party, will be asked to report on progress and actions on adaptation and eventually, if relevant, redefine ambition, by reviewing its strategies and policies. Our adaptation policy should ensure adequate alignment to this framework.

[33] JOIN(2016) 21

[34] The Convention on Biological Diversity (CBD) was adopted in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993: https://www.cbd.int/convention/text/.

[35] The 2030 Agenda for Sustainable Development and the UN Sustainable Development Goals were adopted by the United Nations General Assembly through resolution 70/1: (ref. Document A/RES/70/1, https://sustainabledevelopment.un.org/post2015/transformingourworld)

[36] For instance, the 2017 EU Submission to the UNFCCC on adaptation (see footnote **Error! Bookmark not defined.**) presents how the Strategy has promoted the use of ecosystem based adaptation in Europe, which can provide relevant information and examples to third countries with similar challenges or ecosystems, in particular the most vulnerable.

- Climate change worldwide will have consequences on the EU in the area of trade[37] (including food security), migration, and ecosystems, among others. Stakeholders expressed concern that the Strategy does not meet the EU's needs with regard to climate change impacts beyond its borders. Our adaptation policy should consider how to prepare the EU for the effects of climate change in third countries and to some extent already does, via all the policies and measures mentioned above in the area of international adaptation.

The possible scope for alignment with international policy developments since 2013 would therefore merit to be examined, as well as the potential implications for the EU of transboundary effects of climate impacts in third countries via value chains, migratory flows, trade and financial flows, for instance.

Some further details on the above-mentioned international frameworks are provided in Annex VIII section 13.

4. BASELINE / IMPLEMENTATION / STATE OF PLAY[38]

The Commission's 2009 White Paper "Adapting to climate change: towards a European framework for action"[39] identified a number of possible areas for EU action and was already instrumental in triggering reaction in the Member States. For example, the number of countries with vulnerability assessments and national adaptation strategies (NAS) started to increase already before the 2013 Strategy.[40] The Strategy built on these dynamics, its objectives and actions covered all of the areas identified in the White Paper, except international policy as explained in Chapter 3.

Objective 1: Promoting action by Member States

Action 1 Member State strategies[41]

Situation in 2013

15 Member States had adopted an adaptation strategy and/or plan.[42] The level of detail of these adaptation strategies or plans differed widely among Member States and there were important gaps. In particular:

[37] See Case Study 2 in Annex XIV. PESETA III assessments by the JRC also show that transboundary climate impacts may affect the EU via international trade, see Preliminary Projection of Economic impacts of climate change in Sectors of the EU based on bottom-up Analysis, JRC, 2018. Retrieved from: https://ec.europa.eu/jrc/en/peseta

[38] Considering that both the baseline and the state of play need to be discussed for all 8 actions, it was considered appropriate for readability to merge the two sections. The baseline description draws upon analysis carried out in preparation of the 2013 Strategy (the impact assessment, the background report to the impact assessment and various SWDs published alongside the Strategy) to describe the baseline both in terms of the actual situation prior to the launch of the Strategy and in terms of the future situation expected at the launch without the implementation of the Strategy. For Action 8, more limited information is available, as it was not addressed in the Impact Assessment.

[39] White Paper on Adapting to climate change: Towards a European framework for action, COM(2009) 147/4.

[40] 'National climate change vulnerability and risk assessments in Europe', European Environment Agency, 2018.

[41] The full title of the Strategy's actions is given in Table 2-1 in Chapter 2.

[42] Different terms are used by different Member States, but these documents essentially capture similar elements. In general, adaptation plans typically include more specific details on actions to be taken.

- The funding of adaptation options remained vague in many cases;
- Only a third of Member States had assessed impacts, vulnerabilities and adaptation options to support policy; and
- Only two Member States had made substantial progress in developing indicators and monitoring methodologies.
- Almost none of the adaptation strategies in place dealt with transboundary issues, or employment or social issues;
-

Of those Member States with no NAS at that time, most were in the process of developing one, whereas Southern and Central European countries were least advanced in the process.

Baseline

According to the Impact Assessment it was expected that without intervention, the adaptation strategies would continue varying in terms of scope (in particular on trans-boundary issues), level of ambition and agreed financing of adaptation measures. Barriers in human or financial resources to the adoption of further strategies would remain.

Implementation / State of play

The Strategy was endorsed by the Environment Council[43] who recognised the importance of NASs and called upon all Member States to shape their adaptation policies in the light of the guidelines of the Commission. Guidance for Member States on preparing NASs was published alongside the Strategy.[44] The guidance is integrated in the Climate-ADAPT adaptation tool.[45]

In collaboration with the Member States, the Commission developed the proposed 'adaptation preparedness scoreboard' largely based on the process and approaches recommended in the guidance.[46] Using the scoreboard, the Commission prepared country fiches on each Member State in an iterative consultation process.[47] The country fiches assess the Member States' adaptation policy, including the content of NASs and plans, for the following aspects:

- Institutional structure
- Quality of national vulnerability assessments

[43] 3246th Council meeting adapting conclusions on the Commission communication "An EU strategy on adaptation to climate change": Press Release – 10876/13, Council of the European Union, 2013.

[44] Commission Staff Working Document: Guidelines on developing adaptation strategies, SWD(2013) 134 final. The guidance includes detailed advice on methods for preparing an adaptation strategy, accompanied by practical examples (based on several Member States' experience), checklists, and detailed information on the range of support available at European level.

[45] First version published in March, 2012: https://climate-adapt.eea.europa.eu/knowledge/tools/adaptation-support-tool

[46] The first draft was published on Climate-ADAPT: http://climate-adapt.eea.europa.eu/eu-adaptation-policy/strategy/index_html/resolveuid/bbc416202fd844b1a09f90a2990553ae

[47] The first versions of the fiches, prepared in 2014-15, were unpublished and used to fine-tune the scoreboard. The second drafts of the Member State fiches were published as background documents to the public consultation on this evaluation in December 2017. https://ec.europa.eu/clima/consultations/evaluation-eus-strategy-adaptation-climate-change_en

- Knowledge creation (national observation systems in relevant sectors[48] and climate modelling), transfer and use
- Action plans:
  - Quality (incl. the basis used for assessment of adaptation options)
  - Actual implementation mechanisms
- Funding mechanisms
- Mainstreaming into sectoral policies, in particular:
  - Disaster risk reduction
  - Spatial planning
  - Environmental impact assessment (EIA) (how the Directive is transposed nationally)
  - Insurance policy
- Transboundary cooperation
- Monitoring mechanisms in different sectors and governance levels

The final versions of the fiches accompany this evaluation report in a separate Staff Working Document (SWD).[49]

The scoreboard's assessment of the Member State's adaptation preparedness is summarised in section 6.2.2 and is also the subject of a more detailed horizontal assessment in Annex IX.

Performance indicator: Number of NASs and action plans and national climate change risk assessments

25 of the 28 Member States had adopted NASs by early 2018. Strategies are being developed in the remaining three Member States (Latvia, Bulgaria and Croatia) but have not yet been adopted.

Action 2 LIFE

Situation in 2013

There was no LIFE sub-programme specifically allocated to climate action prior to the Strategy. However, between 2000 and 2015, EU support of EUR 152 million (EUR 307 million with co-financing) was provided to nearly 150 projects focusing fully or partly on climate change adaptation, including to the development of Cyprus' and Malta's NASs and some cross-border projects.[50]

Baseline

Without intervention in the form of a further reinforced adaptation component in the LIFE programme, it was expected that many authorities would find it difficult to find the necessary financial resources to develop adaptation strategies, organise cross-border cooperation and identify best practice across the EU.

[48] These relate for example to meteorology, floods, drought, sea level, coastal erosion, biodiversity, human/animal/plant health etc.

[49] SWD(2018)460

[50] The most common themes were: water policy with focus on scarcity and floods (43 projects), agriculture (25 projects) and urban action (22 projects). Camarsa, G., Toland, J., Eldridge, J., & et al., LIFE and Climate Change Adaptation, Study for the European Commission, 2015.

Implementation / State of play[51]

The budget under the LIFE Regulation 2014-2020 and the Multiannual Work Programme 2014-2017 is split between the Environment and Climate Action sub-programmes. The Regulation foresees that 25% (i.e. EUR 864 million) of the LIFE budget would be assigned to Climate Action, with a fairly even split between adaptation and mitigation. Since 2014, four calls for proposals were launched (2014, 2015, 2016 and 2017) and the projects from the last call started in the summer of 2018.

Performance indicator: Number and amount of LIFE grants used for experience transfer and lighthouse projects[52] respectively

As per the 2014 LIFE regulation, all LIFE grant projects involve experience transfer and replication and are classified either as pilot, demonstration, best-practice or integrated projects, which were considered the criteria for lighthouse projects.

As of April 2018, there are at least 60 ongoing adaptation-related LIFE projects worth €184 million in project cost. This includes two integrated projects in Denmark and Spain[53] that operate in a wider geographical area and serve a broader range of purposes, including adaptation. Beneficiaries estimate that 3-5 years after their completion the adaptation-related projects from 2014-2016 will impact through replication and transfer an area of 1.8 million km2, equivalent to one fourth of the EU territory.[54] LIFE projects also help other actions of the Strategy, such as urban adaptation.

In addition, under LIFE, the European Investment Bank (EIB) operates an innovative financial instrument, the Natural Capital Financing Facility (NCFF), providing loan or equity financing and technical assistance to natural capital projects. These NCFF projects aim to generate revenues or save costs while delivering on biodiversity and climate adaptation objectives. For this, the Commission provides financial guarantees in the amount of €50 million and technical support for projects in the amount of €10 million. The NCFF €125 million financing (of which almost half is already committed to two adaptation-related projects) is expected to generate an additional €400 million of public and private investment by 2021.[55]

More details on adaptation in the LIFE programme are provided in section 1 of Annex VIII.

[51] A separate mid-term evaluation of the LIFE Programme on environment and climate was recently completed (http://ec.europa.eu/environment/life/publications/lifepublications/evaluation/index.htm). The results of the report, together with other supporting literature and findings from the stakeholder interviews, provide a basis for our evaluation of Action 2.

[52] The term "lighthouse project" was used to refer to pilot, demonstration, best-practice or integrated projects under the LIFE programme in the previous multiannual financial framework.

[53] EU LIFE IP C2C CC (LIFE15 IPC/DK/000006 and LIFE16 IPC/ES/000001)

[54] Information extracted from internal databases of the Executive Agency on Small and Medium Enterprises (EASME) who manage the LIFE programme.

[55] http://www.eib.org/infocentre/press/releases/all/2018/2018-128-successful-roll-out-of-eur-400m-natural-capital-initiative-supporting-conservation-across-europe.htm

Action 3 Covenant of Mayors

Situation in 2013

Around a quarter (24%) of 100 surveyed cities in 2012 reported they had already adopted an adaptation strategy,[56] while under half believed they were still in the very early stages of work on adaptation. Cities within several Member States had formed their own networks, as a result of either national or international initiatives, but no EU-level network existed for adaptation.

Baseline

It was expected that without additional actions, regional and local adaptation strategies would continue to develop as previously. Barriers related to legal competence, and human or financial resources to the adoption of further strategies would remain.

Implementation / State of play

Performance indicator: Number of cities pledging to develop an adaptation strategy and of cities with more than 150 000 inhabitants in vulnerable areas with an adaptation strategy.

Mayors Adapt (the Covenant of Mayors Initiative on Adaptation to Climate Change)[57] was launched by the Commission in March 2014 and merged into the Covenant of Mayors initiative in 2015, introducing an integrated approach on mitigation and adaptation.

Signatories to the Covenant voluntarily commit to develop a climate vulnerability and risk assessment and an action plan for targeted adaptation options, including reporting every two years, within two years of signing up to the initiative. The Covenant office (implemented and funded by the Commission) informs, mobilises and supports local authorities, in cooperation with the Commission's JRC who prepare guidelines for the local authorities' actions. The Commission also ensures that the relevant EU funds and financial instruments can support the Covenant signatories in their actions.

By 30 April 2018, 1076 Covenant signatories from 25 EU Member States, covering around 60 million inhabitants, had committed to conduct vulnerability and risk assessments, and develop, implement and report on adaptation plans.

According to recent surveys, it is estimated that about 26% of all EU cities (both Covenant cities and non-Covenant) and 40% of EU cities of more than 150.000 inhabitants[58] have already adopted adaptation plans.[59] In general, cities in Eastern and

[56] Source: the 2013 Impact Assessment of the Strategy. The survey covered a range of cities of variable size in 21 of the EU Member States. It was found that 8% of the cities surveyed had no work planned or begun on climate adaptation, and 22% had work planned. Of the 70% that had begun work on adaptation: 1% believed that their climate adaptation programme is far advanced, 6% are moving ahead of the field, 16% are well on the way, and 47% are still in the very early stages of work on adaptation.

[57] http://www.covenantofmayors.eu/about/covenant-initiative/origins-and-development.html

[58] Source: communication with the coordinator of the study D. Reckien et al., (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28, *Journal of Cleaner Production*, 26 March 2018. The coordinator extracted this figure from the study's database.

Southern Europe have fewer local adaptation plans, whereas Central and Northern European cities often have such plans.[60]

Building on the success of the Covenant, the Global Covenant of Mayors for Climate and Energy[61] was launched in 2017 bringing together the Compact of Mayors[62] and the Covenant of Mayors in a worldwide campaign.

More details on the Covenant of Mayors are provided in section 2 of Annex VIII.

Objective 2: Better informed decision-making

Action 4 Knowledge gaps

Situation in 2013

In spite of progress achieved through national, EU and global research in addressing relevant knowledge gaps, the following gaps persisted[63]:

1. Information on projected costs and benefits of impacts and adaptation
2. Regional and local-level analyses and risk assessments
3. Frameworks, models and tools to support decision making under uncertainty[64] and to assess the effectiveness of adaptation measures
4. Monitoring and evaluation of past adaptation efforts

Baseline

Without coordinated research efforts among EU and national institutions, overlaps in research projects and knowledge gaps would not be addressed, resulting in an inefficient use of public funding for research.

Implementation / State of play

Performance indicator: List of knowledge gaps now, in 2017, and in 2020, plus number of H2020 and JRC research projects dealing with adaptation and associated budget allocated.

Regarding the indicator "List of knowledge gaps now, in 2017, and in 2020", since the knowledge gaps were formulated in an open-ended way (rather than as focused or sector-

[59] The proportion of cities with more than 150 000 inhabitants having actually reported an adaptation strategy to the Covenant of Mayors is only 3%. There seems to be a major reporting gap for reasons explained in Annex VIII section 2, and also not all cities of this size are members of the Covenant of Mayors.

[60] D. Reckien et al., (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28, *Journal of Cleaner Production*, 26 March 2018.

[61] https://www.globalcovenantofmayors.org/

[62] http://impact.compactofmayors.org/

[63] The Impact Assessment (page 14) suggested one more knowledge gap: 'Socio-economic trends that are interrelated with climatic changes', but in the end it was not listed in the Strategy. See Commission Staff Working Document: Impact Assessment, SWD(2013) 132 final.

[64] One of the key challenges for adaptation appraisal is the high uncertainty involved. The most common techniques used in economic appraisal have limitations in coping with this, and a suite of new decision support tools have emerged that advance decision-making under uncertainty. See a London School of Economics and Political Science working paper: http://www.lse.ac.uk/GranthamInstitute/publication/a-review-of-the-economics-of-adaptation-and-climate-resilient-development/

specific questions), it is difficult to assess if they have been closed. Nevertheless, evidence indicates that despite a substantial increase in the knowledge base, none of the priority knowledge gaps have been fully closed, and new gaps have emerged in sectors such as ecosystem-based adaptation, relationship to sustainable development goals, global transboundary (spillover) effects of climate change impacts and risks, adapting infrastructure and mountainous areas, long-term lack of water resources, high-end climate change, health, coastal areas, biodiversity. Regarding the indicator 'Number of Horizon 2020 and JRC research projects dealing with adaptation and associated budget allocated', in total 124 research projects, reports and articles were identified on adaptation under Framework Programme 7 (FP7) and H2020 as well as originating from JRC, European Environment Agency (EEA), service contracts of the Commission and other EU sources, involving a total budget of EUR 285 million. The most frequently addressed topics were water, nature, and agriculture.

More details on bridging the knowledge gaps are provided in section 4 of Annex VIII.

Action 5 Climate-ADAPT

Situation in 2013

Prior to the Strategy, Climate-ADAPT was already launched in March 2012 as a web portal in common ownership of the Commission and the EEA with the objectives to build a consistent and updated knowledge base, in particular:

- To facilitate the collection, sharing and use of information on climate change impacts, vulnerability and adaptation in the EU;
- to assist an effective uptake of the relevant knowledge by decision-makers; and
- to contribute to a greater level of coordination among sectors and institutional levels.

At the time of the launch, the various other relevant EU services and platforms, such as the Copernicus Climate Change Service[65] or the Disaster Risk Knowledge Management Centre[66] did not yet exist. While Climate-ADAPT experienced a high volume of users immediately after its launch in 2012, as compared with other EEA products, users needed more encouragement to make use of it, to upload relevant information and to collect data and information from local and regional levels, including private sector initiatives. National adaptation portals existed in six Member States[67] and more limited adaptation portals in eight others, but the information transfer between national and local levels was not optimal. The Strategy noted the need to improve access to information and develop interaction between Climate-ADAPT and other relevant platforms, including national and local adaptation portals.

Baseline

Funding for Climate-ADAPT was expected to continue regardless of the Strategy, but it was not expected that the portal's coverage gaps on local or regional issues would be addressed without intervention. There would also be additional costs of quality control of reporting of adaptation-related findings from EU-funded research projects. It was

[65] https://climate.copernicus.eu/
[66] https://ec.europa.eu/jrc/en/network-bureau/disaster-risk-management-knowledge-centre
[67] Austria, Germany, Denmark, Finland, Sweden and the United Kingdom.

expected that mainstreaming of adaptation in sectoral science-policy interfaces[68] would remain limited, affecting the accessibility of adaptation research to decision makers, particularly in those sectors where no science-policy interface was identified, such as energy or transport.

Implementation / State of play

Performance indicator: Number of visitors to Climate-ADAPT, pages most visited, number of registered users, assessment of the content, databases and metadata + Number of conferences, workshops, adaptation events registered in Climate-ADAPT

Climate-ADAPT had 409 565 visitors between 1 March 2013 and 31 March 2018, the most visited pages being the database, the adaptation support tools, the case studies, EU policy pages and the country pages. The number of registered users (recipients of the newsletter) amounted to about 5 000 in April 2018. The core of Climate-ADAPT are its knowledge database and webpages, which currently comprise of about 2 400 items in total. A detailed assessment of the content, databases and metadata is provided in the EEA mid-term evaluation report on Climate-ADAPT.[69] The total number of conferences, workshops and adaptation events registered was 107 between 29 April 2014 and 31 March 2018.

More details on Climate-ADAPT are provided in section 5 of Annex VIII.

Objective 3: Promoting adaptation in key vulnerable sectors

Action 6 ESIF / CAP / CFP, including general mainstreaming

Situation in 2013

Adaptation had been mainstreamed into a broad range of sectors listed in the introduction to Objective 3 in the Strategy (with legislation and policy documents adopted or Commission proposals tabled by 2013).[70] Some policy initiatives in the pipeline were also listed for imminent mainstreaming.[71] However, adaptation had yet to be mainstreamed into social and education policies, tourism, fisheries, insurance and trade, while further work was deemed necessary in energy, transport, the EU's outermost regions, disaster risk reduction, health and in particular funding programmes under the 2014-20 Multiannual Financial Framework (MFF).

[68] Science-policy interfaces aim to bridge relations between scientists and other actors in the policy process, which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making.

[69] See footnote 7.

[70] Maritime policy, inland water, transport, biodiversity, migration and mobility, agriculture and forestry, maritime spatial planning, integrated coastal management, energy, disaster risk prevention and management, research, health, and the environment. In terms of transboundary cooperation, the Floods Directive and the Water Framework Directive (WFD) had been particularly effective in the water sector; and European and pan-European early warning and detection systems for weather-driven natural disasters existed, such as the European Flood Awareness System, the European Forest Fire Information System (EFFIS) and the European Drought Observatory.

[71] Invasive alien species, green infrastructure, land as a resource, a new EU Forest Strategy, coastal zone management, and Natura 2000.

Baseline

Without the Strategy, mainstreaming activities would continue on an ad hoc basis with no adequate prioritisation.

Implementation / State of play

Performance indicator: List of policies and legal acts where adaptation has been mainstreamed

In terms of the general mainstreaming under Objective 3, it is clear that significant progress has been made in increasing awareness and explicit consideration of adaptation issues where foreseen in the Strategy, while falling short of adaptation mainstreaming that would be fully "consistent and comprehensive". In section 6 of Annex VIII, more details are given on the degree of mainstreaming in the following key sectors:

- Disaster Risk Reduction (DRR)
- Outermost Regions
- Common Agriculture Policy (CAP)
- Water policy
- Urban policy
- Energy Union

Although not within the scope of the Strategy, adaptation is actively mainstreamed also in some areas of the EU's international policy (see Chapter 3).

A full list of policy initiatives where adaptation is mainstreamed or where the Commission has made a legal proposal for mainstreaming is provided in Annex XI. The list includes information on all those initiatives that were mentioned in the introduction to the Strategy's Objective 3 "Increasing the resilience of key vulnerable sectors".

Performance indicator: Adaptation activities by private organisations as reported in the Carbon Disclosure Project (CDP)[72] surveys

In spite of the fact that the 2013 impact assessment included this performance indicator in the monitoring framework of the Strategy, none of its actions targeted the adaptation activities of private organisations in general.

The CDP surveys filled in by companies in the period covered by the evaluation did not include reporting concretely about climate adaptation activities.[73] Still, the surveys allowed measuring the extent to which companies regard climate change as a risk to their business (84 to 91% do), and at least in some sectors, they also hint at what kind of risk reduction measures they have applied (supplier diversification and engagement 41%, infrastructure and technological investment 26%).

More detailed results from CDP surveys are presented in section 7 of Annex VIII.

[72] The 2013 impact assessment designated the CDP (www.cdp.net) as the data source for the indicator on company adaptation preparedness. The CDP runs a global disclosure system that enables companies, cities, states and regions to measure and manage their environmental impacts, including aspects that allow measuring their level of preparedness for climate change. The impact assessment did not motivate the choice of this data source.

[73] For any further tracking of this objective, it would be necessary to ensure that the indicator can be properly monitored.

Mainstreaming into the EU funds

The Strategy devoted its Action 6 entirely to mainstreaming in the areas of EU funds (ESIF which include the following five funds: European Regional Development Fund (ERDF), Cohesion Fund (CF), European Social Fund (ESF), European Agricultural Fund for Rural Development (EAFRD) and European Maritime and Fisheries Fund (EMFF), and related policies such as cohesion policy, CAP and CFP), although no specific performance indicator or operational objective was linked to this action. The following advancements were made in the period covered by the evaluation:

1. Legal provisions on climate change were included in the framework governing the ESIF funds, the Common Provisions Regulation (CPR)[74], notably:
    a. A 20% EU mainstreaming objective for climate mitigation and adaptation, 20% earmarking of funding for low-carbon economy (TO4)
    b. Horizontal provision for mainstreaming sustainable development, including climate change adaptation in all programmes and investments
    c. A thematic objective (TO5) on "climate change adaptation, risk prevention and management"
    d. An ex-ante conditionality which fixed the existence of national/regional risk assessments (also of climate risks) as a pre-condition to funding under TO5, taking into account also the NAS where available
    e. detailed climate tracking methodology and common output indicators
    f. The requirement to assess and address the climate change adaptation needs and disaster resilience of major projects.[75]

    Of the points above, only paragraph b) was applied in the case of the European Social Fund. It has to be recalled that the funds are under shared management between the Commission and the Member States, so the implementation of the these provisions relies largely on national action.
2. Three guidance documents were published alongside the Strategy to help Member States authorities to consider climate adaptation effectively within the programming cycles of ESIF, CAP and CFP. [76]
3. Several guiding factsheets were produced on mainstreaming both mitigation and adaptation, listing also a set of possible adaptation actions with examples.[77]
4. The Commission provided extensive climate-related comments on all of the ESIF Partnership Agreements and most of the fund-specific programmes. In the implementation phase, it only approved major projects (those that receive more than € 50 or 75 million EU support) that were climate-proofed.

[74] Regulation (EU) No 1303/2013 of the European Parliament and the Council of 17 December 2013. Strictly speaking, the Commission proposal for the Regulation cannot be considered a result of the Strategy, as it pre-dates it. However, the implementation of the CPR clearly worked towards the objective of the Strategy's Action 6.

[75] A major project has a total eligible cost exceeding EUR 50 million (and EUR 75 million for transport projects) (https://climate-adapt.eea.europa.eu/metadata/guidances/climate-change-and-major-projects). The Commission approves such projects only if they are accompanied by "an analysis of the environmental impact, considering climate change adaptation and mitigation needs, and disaster resilience". For non-major projects, i.e. projects below the applicable threshold, the responsibility for climate-proofing investment (or the promotion of climate change adaptation stipulated by Art. 8 CPR) lies largely with the Member States.

[76] See Annex IV.

[77] Climate action in ESIF: Introduction to the series of Fact Sheets on the potential for mainstreaming of climate action and the assessment hereof, European Commission, 2015. Retrieved from: https://ec.europa.eu/.../01-climate_mainstreaming_fact_sheet-esif_introduction_en.pdf

In terms of direct funding, a recent study[78] provides an overall estimate of all ESIF allocations to climate adaptation at EUR 62.1 billion. It estimates that allocations to TO5 ("Promoting climate change adaptation, risk prevention and management") are EUR 6.3 billion and EUR 1.1 billion from the ERDF / CF and the EAFRD, respectively. It also estimates that allocations to adaptation actions through other Thematic Objectives amount to EUR 4.9 billion for the ERDF and the CF and EUR 49.8 billion for the EAFRD. However, given the nature of ESIF, there is also a significant time lag effect in this policy area, so that results and impacts cannot be fully assessed yet. Besides, the eventually realised amounts will depend on the implementation of climate action during the period 2014-2020. From the amendment of various programmes, the general impression is that the climate related expenditure including for adaptation will increase compared to the outset (i.e. at the end of the programming process in the beginning of the period 2014-2020).

Beyond the direct funding there are a number of advancement in terms of horizontal mainstreaming, such as climate-proofing of major projects and increased used of green infrastructure solutions (as opposed to grey infrastructures) across different thematic areas.

Detailed observations about the status of mainstreaming adaptation into the funds are presented in section 8 of Annex VIII.

Action 7 Infrastructure

Situation in 2013

There was no substantive requirement across sectors to consider climate risks in the analysis of the vulnerabilities and costs/benefits of projects, and in their technical characteristics, in particular due to a lack of a common methodology. Work on design standards was uneven because of the resources required to incorporate consideration of climate change adaptation in the thousands of design-standards potentially affected.

Baseline

It was expected that without further EU action, only vague consideration would be given to climate change by new infrastructural investments. Many small and medium-sized enterprises would be unable to implement necessary adaptation measures and become increasingly vulnerable to the effects of unavoidable climate change.

Implementation / State of play

Performance indicator: Amount of adaptation infrastructure investments (co-)financed by EU funds and/or public financial institutions

The key expenditure programmes funding adaptation infrastructure are the ERDF and CF.[79] Budget allocations (compared with total budget) to Thematic Objective 5

[78] COWI, Mainstreaming of adaptation into the ESIF 2014-2020, Study for the European Commission, 2017.

[79] Expenditure under other programmes particularly relevant to climate adaptation is less likely to focus on infrastructure investment, e.g., climate expenditure under the EAFRD primarily includes support to farming in areas of natural constraint, support for agri-environment-climate commitments, or support for

(Promoting climate change adaptation, risk prevention and management) are detailed in the table below.[80]

Fund	TO5, 2017 (million EUR)	Total, 2017 (million EUR)	TO5, 2018 (million EUR)	Total, 2018 (million EUR)
ERDF	430.2	5387.3	445.7	5581.5
CF	342.7	2503.0	355.4	2596.5

There are 548 major projects currently foreseen of which 178 have been approved. The eligible cost of the 178 approved projects is EUR 29.6 billion, which points towards a total eligible cost of the 548 major projects of about EUR 90-95 billion. The EU contribution for the 178 approved projects is EUR 20 billion, which points towards a total contribution for the 548 major projects of about EUR 60-65 billion. The major projects are subject to climate proofing.

However, it should be noted that some relevant climate adaptation infrastructure may be funded under other Thematic Objectives, particularly TO4 (Low-carbon economy), TO6 (Preserving and protecting the environment and promoting resource efficiency) and TO7 (Promoting sustainable transport). The legal basis does not provide a tracking methodology distinguishing between mitigation and adaptation spending under these TOs. Equally, not all investments recorded under TO5 will be relevant to climate adaptation.

As to adaptation infrastructure financed by public financial institutions, the EIB reports that in 2017, out of total climate action finance of EUR 19.4 billion, EUR 0.8 billion was spent on climate adaptation, an amount slightly inferior to two years before (EUR 20.7 billion and EUR 0.8 billion, respectively). The EIB also reports that a total of EUR 4.5 billion was spent on adaptation over the five years 2011-2015, suggesting a steady level of financing.

Performance indicator: progress on the mapping exercise by CEN-CENELEC (Comité Européen de Normalisation and Comité Européen de Normalisation en Electronique et en Electrotechnique)

On a mandate from the Commission, the ESOs compiled a list of 12 industry standards to be revised and 1 standard to be written in order to ensure that new major infrastructure projects are climate resilient. They also adopted a 'Guide for addressing climate change adaptation in standards'.[81]

More information on the work of the ESOs is available in section 9 of Annex VIII.

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organic farming; LIFE programme expenditure on adaptation includes significant investment in best practice and knowledge sharing, and so on.

[80] From the Statement of Estimates for the Financial Year 2018. See: DRAFT General Budget of the European Union for the financial year 2018, COM(2017) 400 final, and: Statement of Estimates of the Commission for 2018, SEC(2017)250.

[81] CEN-CENELEC, CEN-CENELEC Guide 32:2016, Available through: https://www.cencenelec.eu/standards/Guides/Pages/default.aspx

Other relevant initiatives

The EIA Directive was updated in 2014[82] to include vulnerability to climate change among the aspects to be considered in project impact assessments, where relevant. As mentioned above under Action 6, the CPR also requires that climate change adaptation needs and disaster resilience of the funded projects are assessed and the projects are climate-proofed. Mandatory sectoral guidelines were adopted in 2013 for Trans-European Networks for Energy and Transport (TEN-E / TEN-T), with several provisions aiming at climate-proofing.[83]

8 European financing institutions, including the Commission, the EIB and the European Bank for Reconstitution and Development (EBRD), have created a Working Group on Adaptation to Climate Change (EUFIWACC).[84] They published a guide in 2016 designed to help practitioners assess climate change risks and vulnerabilities and better integrate adaptation measures into project planning, design and implementation.[85] The Commission also published or updated several other EU guidance documents for planning infrastructure projects to include consideration of climate risk in the planning phase, including in cost-benefit analysis.[86]

Action 7 of the Strategy announces guidance on the mobilisation of ecosystem-based approaches to adaptation of infrastructure. A fact sheet was published in 2016 in the context of the implementation of the Green Infrastructure Strategy[87], discussing costs and benefits of green infrastructure in relation to adaptation and presenting good practice examples.[88] Further, work on voluntary guidelines for the design and implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction is ongoing at international level.

Action 8 Insurance and finance

While significant effort is placed at the national and European level on preventing damage caused by weather and climate related disasters, for example through adaptation

[82] Directive 2014/52/EU of the European Parliament and the Council of 16 April 2014.

[83] Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013, and Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013. See in particular recitals 22, 23, 33 and 34, and articles 3(t), 5.1(e), 5.1(g), 5.4, 10.1(e), 33(h), 35, 47(d) and 50 of the latter Regulation.

[84] EUFIWACC consists of the Agence Française de Développement (AFD), the Council of Europe Development Bank (CEB), EBRD, the European Commission's Directorate-General for Climate Action (DG CLIMA), the EIB, KfW Development Bank (KFW), the Nordic Investment Bank (NIB) and the Dutch Development Bank (FMO).

[85] Integrating Climate Change Information and Adaptation in Project Development: Emerging Experience from Practitioners, EUFIWACC, 2016. http://www.eib.org/attachments/press/integrating-climate-change-adaptation-in-project-development.pdf

[86] Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient, European Commission, 2016.
Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, European Commission, 2013.
Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment, European Commission, 2013.
Climate Change and Major Projects, European Commission, 2016.
Guide to Cost-Benefit Analysis of Investment Projects, European Commission, 2014.

[87] Trinomics et al., Supporting the Implementation of Green Infrastructure: Final Report, Study for the European Commission, 2016.

[88] Trinomics et al., ibid.

strategies, climate proofing of investments, national risk assessments and other disaster and climate risk policies, not all risks can be averted. This residual risk affects all areas of society and can be addressed in different ways, through self-insurance, public aid, voluntary insurance schemes or mandatory insurance required by law.[89] Insurance policies raise awareness of climate risks and may also provide the right incentive to invest into preventive action.

Situation in 2013

Disaster risk insurance had a low market penetration rate, which negatively affected not only the insurance sector but also the economic value of the insured and non-insured assets that remained vulnerable.

Insurance aimed towards natural and manmade disasters was addressed by the Commission in a Green Paper[90] published alongside the Strategy. The aim of the paper was to raise awareness and to assess whether action at EU level could be appropriate to improve the market for disaster insurance in the EU.

Baseline

It was assumed that without further policy intervention, the market penetration rate of disaster risk insurance in Member States would remain low. A JRC Technical Report[91] that was published before the launch of the Strategy indicates that for floods only a fifth of the Member States had high insurance penetration rates, and almost half of the Member States had a low to medium insurance penetration rate.

Implementation / State of play

There was no associated performance indicator in the 2013 impact assessment against which progress could be measured. From the Strategy itself, it can be inferred that progress was to be achieved by:

1) Encouraging insurers to support climate risk reduction and climate risk management measures;
2) Improving the market penetration of natural disaster insurance;
3) Using insurance pricing and other financial products
    i) for risk-awareness, prevention and risk mitigation;
    ii) for long-term resilience in investment and business decisions.

[89] Tort law applies in case some agent can be held accountable for the damage, and entitles individuals to receive compensation from that specific agent; state/public aid involves a compensatory wealth transfer from the public sector splitting up losses among the entire society; finally, insurance involves a capitalization process that hedges individuals against residual risk. *Source:* Initiative on Climate Change policy and Governance, Insurance schemes in the agriculture sector to address climate change impacts. Reflection No. 46/March 2016, 2016.

[90] See footnote 14.

[91] 'Natural Catastrophes: Risk relevance and Insurance Coverage in the EU EUR 25013 EN - 2011', JRC, 2012.

Insurance

The Commission completed a study in 2017 on the insurance of weather and climate related disaster risk.[92] The study has increased the knowledge of insurance as a tool in adaptation and disaster risk reduction, by mapping the national insurance markets in 12 Member States.

Observed trends

According to this study, currently, risk transfer does not constitute an integral part of adaptation approaches in many Member States, in spite of the fact that the insurance industry's risk pricing can allow efficient scoping in terms of where risk reduction is required. Member States apply diverse systems of insurance, which represents a challenge to an increased market-penetration of risk transfer mechanisms across Europe.

Two studies commissioned by the EU[93] looked into insurance as a risk management tool in agriculture. The studies recommend the integration and further support to risk management instruments in the framework of the agricultural policy, to strengthen capacity to implement, manage and control such instruments, and to better link vulnerability, funding and insurance as a risk management tool.

With regard to DRR and adaptation to climate change, the EU Action Plan on the Sendai Framework includes actions on insurance, which foresee, inter alia, to follow up to the Green Paper on the insurance of natural and man-made disasters, published together with the EU Adaptation Strategy.[94]

There were some concrete activities in relation to insurance and climate adaptation, notably an expert group[95] was created to consider how to collect better data on losses, as it is easier to convince people to take adaptation actions when shown that this can reduce losses.

Other financial products and services

Insurance companies are important institutional investors into climate resilient infrastructure.

The Capital Markets Union (CMU)[96] aims to enable new forms of funding including for infrastructure, by bridging the information gap between investors and businesses and ensuring the flow of private capital to sustainable projects.

Through amendments to delegated acts under the Solvency II Directive[97] in 2015 and 2017, the Commission facilitated the risk-based investments of insurance companies into

[92] Insurance of weather- and climate-related disaster risk: Inventory and analysis of mechanisms to support climate prevention in the EU, European Commission, 2017.
[93] The study quoted under footnote 92 and a Study on risk management in EU agriculture, European Commission, Forthcoming.
[94] See the EU Sendai Action Plan, available at: http://ec.europa.eu/echo/sites/echo-site/files/1_en_document_travail_service_part1_v2.pdf
[95] The Disaster Loss and Damage Working Group https://drmkc.jrc.ec.europa.eu/partnership/Science-Policy-Interface/Disaster-Loss-and-Damage-Working-Group
[96] https://ec.europa.eu/info/business-economy-euro/growth-and-investment/capital-markets-union_en

infrastructure projects. In March 2018, the Commission's action plan on financing sustainable growth[98] announced EU legislation[99] on a classification system for sustainable[100] economic activities, on the labelling of green financial products, on investors' and asset managers' duties on sustainability and transparency on risks, and on insurer's duties to take into account their clients' sustainability preferences when advising them. Institutional risk management policies and banks' capital requirements would also have to consider climate risks.

Insurance and financial markets are also addressed in the adaptation preparedness scoreboard described under Action 1 above, where an indicator checks whether "adaptation is mainstreamed in insurance or alternative policy instruments, where relevant, to provide incentives for investments in risk prevention".

More information on the role of insurance and financial services is available in section 10 of Annex VIII.

5. METHOD

The evaluation of the Strategy was based on ten evaluation questions linked to the five criteria defined by the Better Regulation Guidelines. These questions were broken down into sub-questions and developed as operational questions appropriate for stakeholder responses. An evaluation matrix describing this process is included in Appendix 4 of the evaluation support study. In addition, the analysis of the criteria built on the intervention logic represented graphically in Annex V.

The external support study collected data and provided an analysis of the evidence from the consultation activities and the literature.

Methods for gathering evidence

Evidence for the evaluation support study was gathered through a wide combination of data sources: a literature review[101], a targeted survey and an open public consultation[102], interviews, workshops[103] and 4 case studies. A summary of methods used for gathering

[97] Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II). The Solvency II Directive provides for coordination of prudential laws, regulations and markets for insurance and reinsurance across EU member states, with the purpose of reducing differences and supporting an internal EU market in these products. Prudential requirements primarily address the way financial institutions are governed and their liquidity and capital reserves.

[98] Communication from the Commission to the European Parliament, The European Council, The European Central Bank, The European Economic and Social Committee and the Committee of the Regions, COM(2018) 97 final.

[99] Subject to the results of a future impact assessment.

[100] Sustainability understood also in terms of resilience against climate risks.

[101] General literature review complemented by reviews of adaptation preparedness scoreboards for EU Member States, Nationally Determined Contributions (NDCs) relating to adaptation for states that are not members of the EU, and of a list of EU legislation and guidance documents and guidelines where climate adaptation is currently mainstreamed, or has potential to be mainstreamed.

[102] A targeted online stakeholder survey conducted in June-July 2017 and an open public consultation in 24 languages on the Commission's EUROPA website from 7 December 2017 to 1 March 2018. https://ec.europa.eu/clima/consultations/evaluation-eus-strategy-adaptation-climate-change_en

[103] Two stakeholder workshops and an interactive exercise with the members of the Working Group on Adaptation under the Climate Change Committee of Member States

evidence is provided in Appendix 3 of the evaluation support study and a synopsis of the consultation activities can be found in Annex II. The original plan for the consultation activities were described in the stakeholder consultation strategy[104]; the plan was generally followed, except for some changes in the timeline.

In drafting this document, the Commission services also relied on internal data collection and on the Member States' adaptation preparedness scoreboard foreseen in the Strategy, including a horizontal assessment of Member States adaptation strategies.

Evaluation method

A significant amount of information was gathered through the consultation activities. This information was triangulated i.e. cross-checked against other evidence, and analysed to provide for as solid as possible results.

These results and subsequent recommendations, contained in the draft external report, were presented to stakeholders in the context of the Open Public Consultation and during the 2nd stakeholder workshop. This "reality-check" provided additional robustness to the final results of the evaluation.

The Impact Assessment identified the situation in 2013 before the Strategy was launched. It also identified planned inputs, outputs and activities, expected results and operational objectives. It did not quantify in terms of the performance indicators what the future position would be in the absence of the Strategy, and therefore it did not prepare the ground for a quantitative counterfactual analysis. Furthermore, the impacts of the Strategy are expected to arise as a result of voluntary actions being taken by multiple actors. In this context, the evaluation had to rely as much as possible on measuring the progress in the indicators foreseen in the Impact Assessment. Thus, the method used to address the evaluation questions is a theory-based approach, comparing the current state of play to points of comparison derived from the expected results and operational objectives of the Impact Assessment. There is no possible comparison with what would have been the situation in the absence of the Strategy.

It should also be noted that the analysis has used both qualitative and quantitative data to determine the progress of the different indicators and the impact of certain actions considered in the evaluation.

Limitations and robustness of the findings

The main limitation of the evaluation was the lack of a quantified counter-factual scenario, i.e. what would have happened in the absence of the Strategy. The Impact Assessment included some statements on the expected future situation if the Strategy had not been adopted. However, due to the nature of adaptation policies, and notably the fact that measures are mostly taken at local or regional level, it would not be possible to present a robust quantitative counterfactual scenario that would only reflect the absence of EU action..

Attempts were made to develop an ad hoc counterfactual for the evaluation, but they did not provide a solid comparison tool. This is due to the broad scope of the evaluation (8

[104] Stakeholder Consultation Strategy. Evaluation of the EU Adaptation Strategy, European Commission, 2017.

diverse and wide-ranging actions), the large amount of factors affecting implementation, the voluntary nature of the commitments under the Strategy and the lack of extensive data sets on policy outcomes.

However, the lack of counterfactual did not prevent the evaluation to be robust in its analysis and findings. The evaluation was underpinned by a large number and variety of evidence gathering methods, which provide a solid basis for drawing conclusions. The number of individual views collected on specific issues was sometimes low, because adaptation is a relatively new and marginal topic in many areas, so there are a limited number of experts in the field able to formulate opinions on technical and specialist questions. Still, the quality of the evidence collected during the evaluation support study can be considered mostly as medium to high, with some variance across the different evidence-gathering actions.[105]

Moreover, the original objectives of the Strategy focused on setting processes and procedures, while the evolving context and progress in climate adaptation strategies point to the need for effective implementation and quality adaptation strategies resulting in effective impacts on society and economy. The Strategy did not include appropriate performance indicators to measure its effectiveness in terms of societal and economic impacts and no such indicators exist currently at EU scale. This limitation has hampered the measurement of the overall impact of the Strategy's effects, including on the different stakeholders. The evaluation did not develop ad hoc indicators since they require long-term collection of data. The EEA and also the Commission in the context of the new Multiannual Financial Framework have started some preparatory work on indicators that could be useful input to future monitoring of adaptation action (more information in section 3 of Annex VIII).

6. ANALYSIS AND ANSWERS TO THE EVALUATION QUESTIONS

6.1. Relevance

6.1.1. To what extent do the objectives and actions of the Strategy (still) respond to needs within the EU and at international level?

Since the adoption of the Strategy, evidence has continued to accrue that climate-related extremes are more frequent and intense in Europe: the total reported economic losses caused by climate-related extremes in Europe during the 1980–2015 period amounted to over €433 billion[106]. Inaction would result in large economic costs, even under conservative climate change scenarios. These and other cost estimates are detailed in Annex XIII.

Projections of impacts of climate change in Europe can vary widely, depending on the level of warming as well as socio-economic conditions that define exposure and vulnerability of our future societies. For example, in the absence of further investments in coastal adaptation, the present expected annual losses of 1.25 billion EUR due to coastal flooding is projected to increase by 2 to 3 orders of magnitude by the end of the century,

[105] A detailed assessment of the quality of the evidence gathered in the evaluation support study is provided in Annex XII. All in all, there is sufficient evidence to support conclusions for the evaluation.

[106] EEA Report No 15/2017, "Climate change adaptation and disaster risk reduction in Europe" (2017), section 4.5 p. 110.

ranging between 93 and 961 billion EUR depending on the socio-economic pathway.[107] Unfortunately, comparisons across sectors and between estimates before the strategy and today are difficult as parallel studies are currently taking place with different assumptions, scopes and timelines, and some of them are only at its initial stages.

Impacts to society from global warming will be largely connected to changes in extreme climate events due to their disproportionate rise compared to the corresponding change in climatological averages. Therefore, the Strategy's objective to increase the EU's climate resilience is more important than ever in order to limit the costs of unavoidable and projected climate change.

Already the current level of climate change makes it necessary to adapt. While the Paris Agreement's temperature goal is to keep global warming well below 2°C and pursue efforts to limit the increase to 1.5°C, this is not matched by current commitments of the Parties (consistent with around 3°C). It is difficult to say what the 'dangerous' level of global warming may be for each region as warming is not uniform globally and impacts can vary strongly between regions. For instance, Europe generally experiences higher warming than the global average, i.e. it will experience more than 2°C of warming even if the 2°C goal is achieved. Warming over all European regions will occur, with slightly weaker warming over North-Western Europe but a more intense warming (up to +3°C) in Northern and Eastern Europe in winter and in Southern Europe in summer[108].

As discussed in Chapter 3, the Strategy's relevance progressed since 2013 also as a result of new international policy developments that recognise the increased importance of adaptation at EU and global level. For instance, the Paris Agreement includes adaptation in its 'ambition cycle': in 2023 the parties will be asked to report on progress and actions on adaptation and eventually, if relevant, redefine ambition, by reviewing their strategies and policies.

The relevance of the strategy is also affected by the consequences on the EU of climate change in third countries through trade, migration, food security, ecosystems etc.

Relevance by action

Action 1 Member State strategies: Three Member States have not yet adopted adaptation strategies, and the scoreboard analysis shows that those Member States who have adopted one are mostly lagging behind on implementation and monitoring. Stakeholders agree there is a need for continued stimulus to keep the topic high on the agenda and ensure proper implementation of the national strategies.

Action 2 LIFE: In the public consultation that supported the LIFE mid-term evaluation, 96% of respondents agreed that there is a need for a specific European programme for the environment and climate action financed at EU level.[109] In its response to the mid-term evaluation, the European Committee of the Regions recommended maintaining and

[107] Vousdoukas et al. 2018, Climatic and socioeconomic controls of future coastal flood risk in Europe. Nature Climate Change 8: 776–780, https://doi.org/10.1038/s41558-018-0260-4

[108] Robert Vautard et al 2014 Environ. Res. Lett. 9 / 034006

[109] Ecorys, Support for an external and independent LIFE Mid Term Evaluation Report: Final Report, Study for the European Commission, 2017.

strengthening LIFE's sub-programme on climate action in the 2nd LIFE Multiannual Work Programme and post-2020.[110]

Action 3 Covenant of Mayors: there is a continuing need for adaptation action to be taken at sub-national and local level, also in light of recent evidence that the impacts of climate change are already being felt across cities and urban areas in Europe. As population and infrastructure are concentrated, extreme weather tends to cause more damage in urban areas, which makes cities more vulnerable to climate change impacts. Unless action is taken soon, according to some estimates the economic costs from extreme weather events to EU cities could reach over EUR 190 billion annually by 2070.[111] The stakeholder survey and interviews identified a continuing need for support for knowledge sharing and capacity building (e.g. conferences and workshops, online platforms, guidelines), as well as financial support for adaptation actions. Some stakeholders argue that other forms of support should also be put at work to help local adaptation, such as to assess impacts and vulnerability, or to establish communities of practice.

Action 4 Knowledge gaps: As outlined in Chapter 4 and Chapter 6.2 under the effectiveness criterion, progress has been made in addressing the knowledge gaps identified in the Strategy but some key gaps remain, and new gaps have appeared, so the action remains relevant.

Action 5 Climate-ADAPT: Web statistics confirm that the number of users of Climate-ADAPT have increased ever since the start of monitoring in March 2013, which is in itself a sign of the platform's relevance. Several interviewees indicated that Climate-ADAPT is the place where people start looking for information, distinguishing itself from other such platforms by providing a broad overview of the state of play in a comparative and structured way. The Climate-ADAPT draft evaluation report[112] finds that the website succeeds in collecting and sharing relevant information in Europe by involving a wide range of information providers, citing the case studies presented in the platform as particularly relevant tools.

Action 6 ESIF / CAP / CFP, including general mainstreaming. There is a strong consensus among stakeholders that there continues to be a need to climate-proof investments supported by EU funds, research and innovation, and key vulnerable sectors such as coastal protection, energy infrastructure, agriculture, forestry, biodiversity, spatial planning, transport and communication, urban development, public health and water. It is also necessary to ensure strengthening synergies and coherence with policies that share similar objectives, like disaster risk reduction/civil protection. There is a constantly renewed need to mainstream adaptation across the policy spectrum, as it is primarily a cross-sectoral matter and as such which needs to be present both in emerging new policies and in the ones that are periodically revised or are cyclical by nature.

Action 7 Infrastructure: The EEA's latest assessment of climate change impacts and vulnerability in Europe[113] highlights the vulnerability of construction and buildings, as well as energy and transport infrastructure to extreme events due to high temperatures,

[110] Press Release: Local leaders call for a budget increase of EU's major environment programme LIFE, European Committee of the Regions, 2017. Retrieved from: http://cor.europa.eu/en/news/Pages/Local-leaders-call-for-a-budget-increase-of-EUs-major-environment-programme-LIFE.aspx

[111] E3G, Underfunded, underprepared, underwater? Cities at risk, 2014.

[112] See footnote 7.

[113] 'Climate change, impacts and vulnerability in Europe 2016, *Report No 1/2017*', European Environment Agency, 2017.

increased precipitation, sea-level rise, floods, wind and storms. This is underpinned by a 2015 JRC study[114] which assessed the climate risks to critical infrastructure[115] (industry, energy, transport, social, environment, tourism, and Information and Communication Technology infrastructure) in the EU, with current sectoral damages of EUR 3.4 billion per year projected to triple by the 2020s, multiply six-fold by mid-century, and rise to EUR 38 billion per year by the 2080s. Southern and south-eastern European countries will suffer the greatest impact. The study shows that benefits (or avoided damage) of climate-proofing critical infrastructure outweigh the costs. This all points to the continued relevance of adapting infrastructure, a conclusion on which there is consensus also among stakeholders. One of the case studies developed on the adaptation of energy infrastructure (see Case Study 4 in Annex XIV) reveals how both public and private stakeholders begin to think long-term and apply effective adaptation measures such as underground cabling.

Action 8 Insurance and finance: Most survey respondents considered that the market of insurance and other financial products for resilient investments is still under-developed, while such products are closely related to disaster risk reduction. Of weather and climate related losses in Europe from 2011-16, only 42% were insured.[116] The approach to disaster insurance, which is also a means to involve the private sector in adaptation, is very different in each EU country. Insurance companies have been reluctant to feed damage information into disaster risk models for use in public private cooperation[117], as gathering this data requires resources and expertise, and the quality and level of detail of these data provide a stronger basis for insurance companies in optimising their business model. A third party could play an enabling role in matching the knowledge that is needed for the design of preventive measures with available loss data. The sector would thus benefit from facilitative action at the EU level.

6.1.2. How relevant is the Strategy for the different stakeholders at local, regional, national and supra-national level?

The consequences of climate change will significantly affect a wide range of the population both in number and in type, so preventive action is of general relevance, as it is perceived by stakeholders. However, the Strategy has been addressing particular sectors and levels of governance specifically, for whom there is more direct relevance.

The Strategy is relevant for Member States (Action 1), as it has acted as a stimulus to develop NASs and helped to keep adaptation high on the political agenda. The results from the open public consultation show that encouraging Member States to take action is one of the statements for which the strongest support exists among the respondents. The strategy is relevant also for capacity building and stepping up adaptation action at the regional and local levels (Action 2 and 3), Action 3 being mainly devoted to the local level, while encouraging support from the regional and national levels. As governments at regional and local levels often have fewer opportunities for funding research, it is quite

[114] 'Risk assessment methodologies for critical infrastructure protection. Part II: A new approach, Report EUR 27332 EN', JRC, 2015.

[115] Defined as assets and systems that are essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact as a result of the failure to maintain those functions.

[116] NatCatSERVICE. Retrieved from: https://www.munichre.com/en/reinsurance/business/non-life/natcatservice/index.html

[117] Under strict conditions, collaborations have been established between reinsurers and EEA, and between reinsurers and the JRC.

relevant to generate and disseminate knowledge to them, for example through Climate-ADAPT (Action 5). Knowledge at the supra-national level, among others on river basins and mountain ranges, can help to enhance cross-border cooperation. But research projects (Action 4) and Climate-ADAPT, as they create and disseminate knowledge, are relevant for all stakeholder groups. In particular, the Joint Programming Initiative (JPI) on Climate Change, supported by H2020, continues to make use of the Strategy as one of the main drivers in its efforts to help coordinate efforts in adaptation research amongst the Member States, and beyond, through its international collaboration, coordination and support actions (e.g. SINCERE).

Climate-proofing of EU policies (Action 6) is highly relevant for the development of adaptation capacity of different sectors in the EU, such as water, agriculture and forestry sectors. Without a consistent and centralised effort across different stakeholders and levels, these sectors would experience a varying degree of readiness for the challenges of a changing climate.

The Strategy was also assessed as relevant for the private sector and businesses notably by ensuring more resilient infrastructure and promoting insurance and financial products despite disagreement from some respondents to the open public consultation (Action 7 and 8). In principle, insurance and financial products have good potential to involve the private sector in adaptation, as companies can weigh the costs of insurance against the costs of taking adaptive measures themselves.

6.2. Effectiveness

6.2.1. To what extent have the objectives been achieved during the period 2013-2018? [118]

This subsection examines to what extent the objectives have been achieved within the meaning of the performance indicators established in the 2013 impact assessment. It is based on the facts and observations of Chapter 4 Baseline. While the indicators are process-oriented, in further subsections a limited analysis of the effectiveness of the actions of the Strategy in terms of results is also provided (for more information on this limitation, please refer to Chapter 5).

Looking at the period 2013 to March 2018, none of the three specific objectives can be considered as fully fulfilled, although substantial progress has been made in each. With the exception of Objective 1a, all operational objectives relate to impacts to be achieved by 2020. See Annex VI for a full description of the objectives.

Specific Objective 1 "Promoting action by Member States"

- Operational Objective 1a was largely fulfilled by 2017 and is on track to be achieved in 2018 with regard to all Member States having adopted NASs. Ten Member States have adopted NASs since 2013, bringing the total to 25 out of the 28 Member States. Strategies are being developed in the remaining three Member States but have not yet been adopted. Information on regional and local strategies

[118] Contrarily to the scope of the original evaluation question as presented in the 2016 evaluation roadmap, the scope of the evaluation is extended to March 2018 in an effort to cover as long a period as possible.

is less readily available and requires judgement of where they are "appropriate", hence, the evaluation is inconclusive about their achievement.
Objective 1a does not include targets associated with the performance indicators for number and amount of LIFE grants, so the achievement of the operational objective with respect to this indicator cannot be determined. However, as described in Chapter 4, there are numerous ongoing adaptation-related LIFE projects which all involve experience transfer and can be classified as 'lighthouse' projects.

- Operational Objective 1b includes a target that, by 2020, all cities of more than 150 000 inhabitants have adopted an adaptation strategy. The figures presented in Chapter 4 show that there has been substantial but insufficient progress, with around one fourth of all EU cities (of all sizes) having adopted an adaptation strategy to date, suggesting the target may not be fully met by 2020. As regards cities of more than 150 000 inhabitants in particular, 40% are estimated to have adopted an adaptation strategy.

Specific Objective 2 "Promoting better informed decision-making"

- Operational Objective 2a seeks closure of all priority knowledge gaps identified in 2013. Although the knowledge base has increased substantially, none of the four priority knowledge gaps identified in the Strategy have been closed, strictly speaking. Knowledge increases and evolves but gaps may always exist. Furthermore, new knowledge gaps are emerging.

  Objective 2a does not include targets associated with the performance measures for number and value of adaptation-related H2020 and JRC projects, so the achievement of the operational objective with respect to this indicator is indeterminable. However, as described in Chapter 4, numerous adaptation-related research projects have been launched since 2013.

- Operational Objective 2b has been achieved in advance of the target date of 2020, as Climate-ADAPT has made information on climate change adaptation more easily accessible for decision-makers, including Member States, local authorities and firms. Targets were not set for associated performance measures for Climate-ADAPT in relation to numbers of visitors, pages most visited and number of registered users, but in Chapter 4 evidence of substantial progress was presented from these respects. The performance measure assessing Climate-ADAPT's content, databases and metadata will be fulfilled by EEA's evaluation of Climate-ADAPT, which will be published in 2018.

Specific Objective 3 "Promoting adaptation in key vulnerable sectors"

- Operational Objective 3a establishes a target that by 2020, adaptation considerations have been mainstreamed in a consistent and comprehensive way in key EU policies. Significant progress has been made but there is still some way to go before mainstreaming of adaptation in key EU policies can be described as "consistent and comprehensive".
  Objective 3a includes a performance measure that there should be a list of policies and legal acts where adaptation has been mainstreamed, which has been fulfilled by work undertaken for this evaluation (see Annex XI).
  Objective 3a includes a performance measure, without target, for the Carbon Disclosure Project (CDP) surveys, so the achievement of the operational objective with respect to this indicator is indeterminable. Besides, private organisations do

not provide sufficiently detailed information in the surveys on climate adaptation action.

- Operational Objective 3b, on climate-proofing new major infrastructure investments by 2020, has been achieved: in the 2014-2020 programming period, approval of major projects funded by the ESIF is subject to "an analysis of the environmental impact, considering climate change adaptation and mitigation needs, and disaster resilience".

  Objective 3b includes a performance measure regarding the amount of adaptation infrastructure investments (co-) financed by EU funds and/or public financial institutions, which does not have a target, so the achievement of the operational objective with respect to this indicator cannot be determined. Evidence was presented in Chapter 4 that the key expenditure programmes likely to fund infrastructure are the ERDF and the CF. Expenditure on climate adaptation from total climate action finance reported by the EIB in 2017 suggests that financing for adaptation has not increased since 2015, an amount slightly inferior to two years before (EUR 20.7 and EUR 0.8 billion, respectively).

- Objective 3b has an associated performance measure for progress on the mapping exercise by ESOs. As evidenced in Chapter 4, good progress has been achieved through the publication of a standardisers' guide to adaptation and through the shortlisting of standards to include adaptation provisions.

As indicated in Chapter 4, there is no associated operational target or performance indicator for Action 8 on insurance and finance. The progress towards the Commission's aim specified in the Strategy will be assessed qualitatively in the next section.

6.2.2. To what extent has each of the eight actions of the Strategy contributed to these achievements?

While each of the eight actions of the Strategy has had its specific and distinguishable impact on adaptation preparedness in the EU, it should not be underestimated that the existence of a strategy at EU level also exercised a general, intangible political drive in the relevant policy fields and at all levels of governance across the EU. The effect cannot be quantified, but stakeholder feedback confirmed its existence during the consultation.

Action 1 Member State strategies

It is difficult to establish with certainty the extent to which the Strategy has been effective in encouraging development and adoption of new NASs, as most Member States were already developing them at the time of the Impact Assessment. Other factors may have also been important, such as the Paris Agreement (discussed in Section 6.2.3 on drivers) and ex-ante conditionalities under the EU funds (in Section 6.4.1 on coherence). Nevertheless, it might be inferred that the actions under the Strategy have been effective in encouraging Member States to adopt NASs and plans, given that 25 Member States have now adopted them and the remainder are developing them. This conclusion was supported by the majority of the interviewed stakeholders, including government experts from eight Member States who argued that the Strategy played a role in ensuring increased political interest from the Member States to adopt NASs and plans, where they were not already in place, and to revise existing strategies and plans. Some stakeholders noted an increase in quality of the plans since the publication of the guidelines accompanying the Strategy.

However, there appear to be significant gaps in the effectiveness of Member States implementation of their strategies, with resources for the follow-through of commitments in some cases being reduced or withdrawn, or in other cases not identified.[119] The review of Member States NASs and plans (both adopted and in the making) in relation to the Commission's 'adaptation preparedness scoreboard' suggests that:

- Most Member States have progressed on:
    - Coordination (23 have horizontal coordination mechanisms involving different sectors)
    - Stakeholder involvement (26 Member States) and
    - Transboundary cooperation (27 Member States).
- Half or more of Member States already have access to suitable data (14), have developed scenarios (23), and undertaken risk assessments (22), and most other Member States are making progress in these respects.[120]
- Less than half of the Member States have built up capacity to address adaptation (14 Member States) or funding for climate resilience (9 Member States), other Member States, with few exceptions, are progressing on these issues.
- Less than half of Member States have addressed climate change in relation to many aspects of implementation and review, including consideration of climate change in disaster risk plans (9), land use planning (15), major projects (13), and national (11), sectoral (14) and sub-national (9) monitoring and reporting. As regards monitoring and reporting, only five Member States have started to develop and use a comprehensive set of process or outcome based indicators to monitor implementation of adaptation strategies and plans.

A more complete overview of the adaptation scoreboard's indicator assessments is included in Annex IX.

Stakeholders generally feel that the Strategy has been more effective in encouraging preparatory activities, i.e. preparing the ground, assessing risks, identifying options, and less effective in promoting assessment of options, implementation and monitoring and evaluation.

Stakeholder views on the assistance provided by the Commission were mixed, with strong agreement that the Commission had provided an online platform on adaptation, methodologies (e.g. guidelines) and technical information (e.g. research), but less agreement about support to capacity building. Views were also mixed on the question whether the developed adaptation strategies responded to the expected impacts and needs, although there was a high level of agreement that the strategies have been effective in enhancing the preparedness and response capacity of Member States. Interviewees from national authorities suggested that whether Member States have actually used the Commission's guidelines for strategies depended largely on whether the Member States in question had pre-existing adaptation strategies and governance mechanisms.

[119] This conclusion is also supported by a report commissioned by the European Public Service Union "Public services and adaptation to climate change", from September 2017, available at: https://www.epsu.org/article/epsu-feature-adaptation-climate-change

[120] National climate change vulnerability and risk assessments in Europe, 2018, European Environment Agency.

Stakeholders emphasised the role of adaptation strategies in raising awareness, supporting inter-ministerial and inter-sectoral exchange, collaboration and action, and the importance of having vulnerability assessments in place.

Integration of climate change adaptation in national risk assessment and cooperation between DRR and climate change adaptation communities have not yet occurred in most of the Member States.

The scoreboard suggests that NASs were in general not effective in identifying and addressing macro-regional and cross-border risks; although to some extent European Territorial Cooperation (ETC) programmes under the ESIF were able to address this shortfall.

Research suggests[121] that the existence of national plans facilitates the adoption of plans at the local level by acting as guidance documents, although this effect is by no means always evident, as in 2018 74% of cities across Europe still had no adaptation plan.

Action 2: LIFE funding

The LIFE Programme and its sub-programme in Climate Action have contributed to the objectives of the Strategy. Stakeholder feedback suggests that LIFE is acting as an effective catalyst, providing and disseminating solutions and best practices. The LIFE Mid-Term Evaluation[122] suggests this is also evident in nature projects, in addition to climate change adaptation projects.

Nevertheless, in spite of the potentially large impact of the ongoing projects through replication and transfer, the LIFE funding does not match the scale of the climate change challenge according to stakeholders. This view has been supported by the Committee Of Regions (CoR)[123], which has recommended the continuity of the programme for the period post 2020 and a significant increase in the funds for the mitigation and adaptation projects.

The priorities of the ongoing LIFE climate change adaptation projects relate to the Strategy and are focused on vulnerable areas and sectors. According to the LIFE mid-term evaluation, the two integrated projects in Denmark and Spain (see Chapter 4) can potentially aid adoption and implementation of NASs and complementary regional or local strategies (objective 1).

Since 2014, all LIFE projects include measures for dissemination of information and are required to demonstrate potential for transferability in line with the performance indicator identified by the LIFE Impact Assessment. Stakeholders agreed that the programme contributes to knowledge transfer and sharing of best practices (objective 2). However, monitoring focuses on projects individually and is thus ineffective in assessing the programme's role in knowledge transfer and capacity-building across the EU.

The LIFE mid-term evaluation indicated that further action is needed on the facilitation of replication and the promotion of performance indicators that would allow

[121] Reckien, D. F., The influence of drivers and barriers on urban adaptation and mitigation plans — An empirical analysis of European cities, PLoS ONE, 10(8): e0135597. doi:10.1371/journal.pone.0135597.
[122] See footnote 5
[123] Opinion Factsheet: Mid-term evaluation of the Programme for the Environment and Climate Action (LIFE) 2014-2020, CDR 4126/2016, Committee of the Regions, 2017.

measurement beyond outputs in order to improve the effectiveness of the action. This is addressed in the Commission's proposal for the new LIFE regulation under the next multiannual financial framework (2021-2027).

Action 3: Covenant of Mayors

Even though other drivers may also have been encouraging cities to adopt adaptation strategies or plans (see section 6.2.3), the importance of cities' membership of the Covenant of Mayors for Climate and Energy (Covenant) appears to have been the strongest positive influence[124], especially in countries where autonomous local climate plans are rare and cities are not required by national legislation to adopt such plans.[125]

According to an evaluation of the Mayors Adapt initiative carried out in 2014, through consultation of several local authorities' representatives, the Covenant has been successful in securing local political commitment for adaptation beyond political election cycles.[126] The Covenant has also improved peer-to-peer information exchange, access to information about funding for adaptation and technical assistance, for example through the Urban Adaptation Support Tool, on issues such as methods for vulnerability and risk assessment and cost-benefit analysis of adaptation measures.

The Covenant's common methods for monitoring and evaluating the implementation of local adaptation plans have been effective in building the technical capacity of local authorities.

While it is the cities that commit to act, the Covenant is also working on providing greater support to regional, provincial and sub-national authorities that can in turn help cities perform better.

Recently, an opinion of the CoR[127] and a resolution of the European Parliament[128] have both expressed their support for the Covenant. The Covenant has enabled to push ahead with establishing a Global Covenant of Mayors, as described in section 2 of Annex VIII.

Action 4: Knowledge gap

There was strong agreement among targeted stakeholder survey respondents to the statement that "in general, the Strategy has helped to reduce knowledge gaps on adaptation in the EU". Respondents also identified sources of knowledge supported by the EU (e.g. Climate-ADAPT, LIFE adaptation projects, EEA reports, Copernicus, Coordinated Downscaling Experiment and JRC's PESETA[129]).

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[124] See footnote 121

[125] Such as Cyprus, Slovenia, Latvia, Belgium, Ireland, Italy, Malta, Portugal, Romania and Spain, according to D. Reckien et al., (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28, *Journal of Cleaner Production*, 26 March 2018.

[126] Millieu, Mid-term evaluation of the urban adaptation initiative within the framework of the Covenant of Mayors: Final Report, Study for the European Commission, 2014.

[127] Communication from the Committee of the Regions: Towards a new EU climate change adaptation strategy – taking an integrated approach, CDR 2430/2016.

[128] European Parliament Resolution on the role of EU regions and cities in implementing the COP 21 Paris Agreement on climate change, 27 February 2018, 2017/2006(INI).

[129] Projection of Economic impacts of climate change in Sectors of the EU based on bottom-up Analysis (PESETA), https://ec.europa.eu/jrc/en/peseta

Interviewees noted there will always be knowledge gaps. The conclusions of JRC's PESETA III, which will be published by the end of 2018, will help further reduce some gaps. Some of them are already available, and are included in Annex XIII. In particular, work is still needed on the benefits of adaptation and also co-benefits in other areas, not only losses avoided. The JPI Climate, an EU-wide consortium involving 20 Member States benefiting from a H2020 grant, has mapped research gaps in relation to climate services[130]. One key FP7 project for adaptation, High-End Climate Impacts and Extremes,[131] has worked on a set of global and regional views of different worlds at 1.5, 2, 4 and 6°C not only for Europe, but also for Northern Sub-Saharan Africa, and South Asia.

The most vulnerable European regions (e.g. Outermost Regions, Mediterranean regions, mountains) warrant enhanced approaches.[132] Fundamental gaps also persist in the identification of the expected impacts and vulnerability of sectors, for example the application of climate projections in disaster risk assessments. Regarding the knowledge gap on frameworks, models and tools to support decision-making, much work has been done in 39 studies, of which many have become available on the Climate-ADAPT website.[133] H2020, under its Societal Challenge 5, has funded several projects and studies on "climate change services" to address these issues. Less work has been done to close knowledge gaps associated with monitoring of adaptation: only eight EU studies have been identified and monitoring of adaptation actions still seems to be in its infancy.

Respondents also mentioned what has been useful for the uptake by policy makers of research results: the development of state-of-the-art reports on available knowledge, science-policy forums, workshops, events and web pages. However, there is normally a delay between research undertaken and its use by policy-makers to inform decision-making.

Action 5: Climate-ADAPT

The intended target audience of Climate-ADAPT are governmental organisations, and those who support them in the development and/or implementation of climate change adaptation strategies and actions such as research institutes. The EEA's separate evaluation of Climate-ADAPT[134] has shown that the majority of the actual users are indeed from these intended target groups. The evaluation also showed that the platform is used across all governance levels in Europe from city/local level to sub-national, national, transnational to the European level. However, some specific user groups are not yet sufficiently reached, i.e. experts at EU level and across Europe who are faced with adaptation challenges in vulnerable sectors, users from Eastern and Central European countries, as well as users less experienced on adaptation.

The EEA concludes that Climate-ADAPT has been an effective source of knowledge (including the knowledge generated through FP7, H2020, LIFE and Interreg) for feeding into a variety of policy processes. It has primarily been used to inform development of

[130] The 2015 European research and innovation roadmap for climate services (https://publications.europa.eu/fr/publication-detail/-/publication/73d73b26-4a3c-4c55-bd50-54fd22752a39) refers to climate services as customised climate-related tools, products and information that will enable climate-smart, strategic decisions at various levels for a range of end-users (businesses, the public sector, and individuals), enabling a more systemic approach to risk management.

[131] https://www.helixclimate.eu/our-research/

[132] https://climate-adapt.eea.europa.eu/data-and-downloads#b_start=0

[133] http://climate-adapt.eea.europa.eu/knowledge/tools/adaptation-support-tool

[134] See footnote 7

supporting documents (including case studies and impact and vulnerability assessments) but also, more directly, the development of adaptation plans and strategies, as well as decision making at all stages of the adaptation policy cycle.

It is used to identify the "state of the art" of adaptation in Europe, to develop tailor-made products for various policy processes, and as a starting point to extend searches. Hence, it has become a "first-stop shop" for adaptation information in Europe. A challenge for the future effectiveness of the platform is to identify its links and complementarities with other knowledge platforms at EU-level[135], particularly in relation to climate services, disaster risk management, biodiversity and green infrastructure.

The dissemination and networking activities in relation to the platform brought about a steady increase in visitors since its creation.

Finally, the EEA's evaluation identified five core content elements (EU policy; country strategies and actions; adaptation support tools; database; case studies and adaptation options) of Climate-ADAPT that should remain a focus for future developments of the platform.

The Open Public Consultation of the Strategy's evaluation confirmed that Climate-ADAPT has been an important and useful information source in climate change adaptation work.

Action 6: ESIF/CAP/CFP

The review of literature and the consultation activities indicate that the Commission's technical guidance on how to further integrate adaptation into the CAP, Cohesion Policy and the CFP has led to progress but has not yet proved effective in promoting comprehensive and consistent mainstreaming. Indeed, the legal provisions came in late 2013 and various guidance documents were prepared and published in April 2013 in parallel with Member States preparation of their Operational Programmes and Rural Development Programmes (RDPs). Because of this parallel timing the guidance documents could not be exploited to their full potential to influence the development of the Member State Operational Programmes and RDPs. Alongside the Public consultation, two recent studies on the mainstreaming of EU funds[136] state that adaptation differs across EU funds:

- Adaptation seems to have been mainstreamed to a much larger scale than mitigation in the **CAP** (i.e. agriculture and forestry) despite the fact that very few measures supported by the EAFRD have an explicit adaptation objective. This is to a large extent due to the tracking methodology at priority (and related focus area) level, hence including measures such as natural resource conservation/management not directly targeted at adaptation but with adaptation co-benefits. Targeted stakeholders considered that a more robust methodology and mechanisms to monitor the extent to which the CAP and its funding are supporting climate action objectives is needed.

[135] For example: Copernicus Climate Services (https://climate.copernicus.eu/), Disaster Risk Knowledge Management Centre (drmkc.jrc.ec.europa.eu), Oppla (https://oppla.eu),

[136] COWI. (2016). *Mainstreaming of climate action into ESI Funds*. Brussels: European Commission; COWI. (2017). *Mainstreaming of adaptation into the ESIF 2014-2020*. Brussels: European Commission.

- Under the **ERDF** and **CF,** a substantial amount of funding was directed at adaptation-related investments. Furthermore, major projects were only approved by the Commission if they were climate-resilient.[137] Yet, the stakeholder consultation suggested that further work on adaptation mainstreaming is needed in order to minimize negative impacts of infrastructural projects on rivers, streams and coastal areas, by prohibiting the reduction of storage capacity of flood plains and avoiding new risks in case of flooding.
- Compared to ERDF and CF, the focus on adaptation seems to be minor in the **EMFF** and **ESF**, which will be discussed in section 6.2.3.

Recent mainstreaming successes in EU funds include the increase of the climate earmarking in the Commission's proposals for the next Multiannual Financial Framework 2021-27 (increased from 20% to 25%), with more specific objectives per fund, e.g. 30% for ERDF and 37% for CF. The Commission also proposed to make adaptation spending more traceable in that framework (e.g. in the proposal for a Common Agricultural Policy Strategic Plans Regulation, see discussion in section 8 of Annex VIII).

As discussed in Chapter 4 and Annex XI, the Commission has actively worked towards mainstreaming of adaptation into the policy initiatives listed in the Strategy and also beyond, with tangible results.

There are still some areas where there is scope for mainstreaming, for instance:

- Human, Plant and animal health.
- Ecosystem-based approaches to adaptation.
- As regards DRR:
    - The development of a shared science/knowledge base and of a common vocabulary, for example to support the integration of climate change scenarios in risk management plans and risk assessments.
    - The communication between DRR and climate change adaptation communities.
    - The integration with 'build back better' policies and actions.
- Outermost Regions[138]
- International policies (trade, security)

Action 7: Infrastructure

The work of the ESOs on revised and new standards is still ongoing and has not had the chance yet to contribute to the achievement of the infrastructure resilience objective.

It is also too early to assess the impact of CEN-CENELEC's guide for addressing climate change adaptation in standards adopted in April 2016. Initial feedback has been positive with several hundred views and downloads of the guide after its publication, supported by webinars and workshops in several countries. The guide was offered to the International Organisation for Standardisation (ISO) and the International Electro-technical Commission for their possible adoption. ISO has since used several of the

[137] See footnote 75.

[138] Communication from the Commission to the European Parliament, The Council, the European Economic and Social Committee, The Committee of the Regions and the European Investment Bank: A stronger and renewed strategic partnership with the EU's outermost regions, COM(2017) 623 final.

CEN-CENELEC guide's approaches in drafting a new ISO guide on climate mitigation and adaptation.

The Commission's guidance documents on ensuring more resilient infrastructure that were published alongside the Strategy have been used for, among others, designing climate resilient infrastructure investments, providing advice on guidelines to developers of projects, and integrating climate in Strategic Environmental Assessment (SEA) and EIA. Some sectors are well engaged, such as the water sector and the transport sector. Others, such as the waste sector or broadband sector, are less advanced. Still, the fact that of the 21 respondents in the targeted stakeholder survey only 8 knew about the Commission's guidance document for project managers[139] and 2 have actually used them suggests that there is room for improvement in the awareness and actual use of these guidance documents. User feedback on the quality of the guidance was mixed: a private consultancy found them useful, while an expert providing technical assistance to project developers in the context of JASPERS[140] considered the language was a bit too technical.

The climate proofing of major projects has demonstrated that it is quite possible for infrastructure investments to include a climate vulnerability and risk assessment, and to identify, appraise and integrate relevant adaptation solutions. The approach included technical assistance (JASPERS) to the Member States combined with guidance and training from the Commission and the EIB. Additionally, there are examples from the Member States where the same approach – based on a climate vulnerability and risk assessment – has been applied at network level to address climate hotspots (e.g. main roads network).

The guide from the EUFIWACC[141] was published in 2016 and has already triggered the development of climate resilient metrics and other methodologies that facilitate the integration of adaptation in investment decision-making, mainly by Multilateral Development Banks.

Evidence presented in Chapter 4 shows that the level of financing for adaptation infrastructure by public financial institutions has remained steady following the publication of the Strategy in 2013. The long lead time for project finance would suggest that more time is necessary for immediate impact to be visible.

Action 8: Insurance and finance

The 2017 study issued by the Commission has provided an overview of successful cases, practices, general principles and recommendations of managing climate risk in insurance.[142]

However, Action 8 of the Strategy has not directly resulted in increased market penetration of natural disaster insurance, but improved overall resilience and implication

[139] See footnote 86.

[140] JASPERS: Joint Assistance to Support Projects in European Regions, European Commission, EIB and EBRD, 2018. Retrieved from: http://ec.europa.eu/regional_policy/en/funding/special-support-instruments/jaspers/

[141] Integrating Climate Change Information and Adaptation in Project Development: Emerging Experience from Practitioners, EUFIWACC, 2016. http://www.eib.org/attachments/press/integrating-climate-change-adaptation-in-project-development.pdf

[142] See footnote 92

of the insurance sector in climate risk management may indirectly enhance market access.

The study resulted in a better understanding of the potential of risk-based insurance pricing. However, to unleash this potential, significant regulatory changes in capital requirements, solvency and insurance distribution would be necessary, and this work is still in an early stage of development. The promotion of a market for disaster risk insurance may have led to the greater use of financial products, and internalisation of climate costs, but it is not possible to determine how important the contribution of the Strategy has been.

Some stakeholders, like the Federation of European Risk Management Associations (FERMA)[143] said they were not aware of follow-up on the Commission's side since the Green Paper on Insurance. Stakeholders had in general mixed views on how effective the Commission's activities have been to promote insurance and other financial products for resilient investment and business decisions.

The Action Plan on Financing Sustainable Growth, described in Chapter 4, was adopted in March 2018, and it is equally relevant for the Commission's aim to use the potential of financial products for risk management and resilience in investment and business decisions. Even more recently, in May 2018, the Commission has followed up with three concrete proposals: a unified EU classification system of sustainable economic activities ('taxonomy'), disclosure requirements on how institutional investors integrate environmental, social and governance in their risk processes and, finally, a new category of benchmarks to compare the carbon footprint of investments. A technical expert group set up by the Commission is now dealing with four topics linked to the Action Plan, (taxonomy, low carbon benchmarks, an EU green bonds standard and climate-related disclosures). However, as the Action Plan was only adopted in March 2018, it is too early to judge its effectiveness in promoting the aim. The initiative is planned to bring forward further legal proposals until the 2nd half of 2019 and implementation of some of the measures will hopefully start as of 2020.

6.2.3. What drivers and barriers (expected or unexpected) contributed to or stood in the way of implementation of the EU Adaptation Strategy and how did they affect it?

Action 1: Member State strategies

Drivers:

- experience of extreme weather events;
- knowledge of economic, environmental and social costs of inaction (appears to have less influence than experience of climate impacts);
- integration of adaptation and mitigation;
- the establishment of the global adaptation goal by the Paris Agreement;
- Starting from 2007, LIFE funding included projects to turn adaptation strategies into plans at the national and sub-national levels, such as for Cyprus, completed in April 2017. They acted as drivers for the adoption and implementation of strategies even prior to the publication of the Strategy in 2013.

[143] See for example FERMA. The association represents 22 member associations in 21 countries, with 4800 risk managers (https://www.m.eu/).

Barriers:

- The majority of the respondents to the open public consultation agreed that Member States tend to provide reactive response to climate threats, instead of more long-term, proactive planning.
- The landscape in terms of monitoring and evaluation of the implementation of the national strategies is heterogeneous and incomplete at EU and Member State level. The issue is analysed further in section 3 of Annex VIII.

Action 2: LIFE

Drivers

A tripling of the budget for Climate Action under LIFE (25%, i.e. EUR 864 million) compared to the LIFE+ Programme in 2007-2013.

Barriers:

The LIFE mid-term evaluation has highlighted that integrated projects are complex and need public-private partnership models or grant funding to be viable.

With regard to the Natural Capital Financing Facility **(**NCFF), key barriers appear to be:

- The scarcity of affordable finance for Small and Medium-sized Enterprises (SMEs);
- Low or risky profitability of projects. It has taken time for the EIB, investors and project promoters to understand how adaptation projects such as flood defences or urban spaces can generate revenue or cost savings from goods that are freely available for people to use. The mid-term evaluation suggests this could be an area where support through the NCFF instrument in combination with LIFE grants for integrated projects or ERDF grants would merit further investigation;
- From the perspective of the EIB, lack of technical assistance in developing viable business models for complex innovative projects may be a barrier to the provision of loans by the NCCF. Therefore, the EIB continues to build its capacity to support climate change adaptation, including through providing technical assistance for project development under the NCFF support facility.

Stakeholders noted that:

- The complexities of applying for applying for LIFE funding may be a substantial barrier to its uptake;
- The funds made available for adaptation were still far from what would be needed, and in particular compared to the support available under the regional funds. There is insufficient public and private finance to leverage with LIFE funding.

Action 3: Covenant of Mayors

Drivers:

- According to research[144], while membership of the Covenant of Mayors has the highest correlation with the availability of local adaptation plans, membership of other climate and sustainability city networks (such as the International Council for Local Environmental Initiatives (ICLEI), C40[145]) as well as adaptive capacity[146] and Gross Domestic Product GDP per capita also correlate positively. Cities' current capacity to engage in climate actions was a more important driver of adaptation planning than anticipated climate change impacts and vulnerabilities. Adaptive capacity was most strongly associated with GDP per capita, which was in turn significantly lower in cities at high risk of climate change impacts. Nevertheless, the stakeholder survey suggests that knowledge of the costs of inaction may still have a greater influence on decision makers at sub-national or local level than at a national level. This in turn suggests that cost-benefit analyses may be more beneficial when they are relevant to local decisions;
- The larger the city gets, the more often they have an autonomous adaptation plan;[147]
- The presence of national regulation has a significant impact on local climate planning. In countries where local climate plans are compulsory[148] there are 5 times more cities with adaptation plans.[149]

Stakeholders noted that:

- The adoption of a NAS or plan often catalyses action at a subnational or local level;
- Several adaptation-related EU or national projects have helped to foster local adaptation[150];
- The experience of extreme weather events also acted as a catalyst.

[144] See footnote 121

[145] www.iclei.org; www.c40.org

[146] The Intergovernmental Panel on Climate Change (IPCC) defines adaptive capacity as "a system's ability to adjust to climate change (including climate variability and extremes), to moderate potential damage, to take advantage of opportunities or to cope with consequences". See McCarthy, J.J. et al., (2001). Climate change 2001: Impacts, adaptation and vulnerability. *Cambridge University Press*, Cambridge, United Kingdom.

[147] Reckien et al., (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28, *Journal of Cleaner Production*, 26 March 2018.

[148] Denmark, France, Slovakia and the United Kingdom

[149] Even in countries where local adaptation plans are compulsory, not all cities have had the time to comply with this obligation. See Reckien et al., (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28, *Journal of Cleaner Production*, 26 March 2018.

[150] Future Cities, http://www.future-cities.eu/; Ramses, http://www.ramses-cities.eu/; BASE, http://base-adaptation.eu/; TURAS, http://www.turas-cities.org/; SEAP-Alps, http://seap-alps.eu/hp2/Home.htm

Barriers:

A report on the Mayors Adapt initiative identified the following barriers[151]:

- Adopted urban and local adaptation strategies and plans are generally not shared, which reduces the transfer of best practice;
- Cities working on adaptation do not always become members of adaptation initiatives, as they may perceive that a need for additional reporting outweighs potential benefits. Encouraging support from national public bodies such as ministries or national energy agencies (the so-called National Coordinators, within the Covenant) will, therefore, be crucial;
- Limited resources meant materials and tools could only be made available in English, which created language barriers.

Stakeholders noted the existence of the following barriers:

- Insufficient financial resources;
- The challenge of translating results of cost-benefit analyses to a local level;
- Lack of awareness and relevant technical expertise among staff of local authorities;
- Uncertainties in climate change projections, which would have to be further downscaled to be useful at the local level.

Action 4: Knowledge gaps

Drivers:

The majority of respondents to the targeted stakeholder survey agreed that a range of other research activities supported at national or local level, not directly related to the Strategy, have also helped to address key knowledge gaps.[152]

Barriers:

- Institutional barriers – The way in which themes are separated and structured within the Commission complicate the joint design of research and innovation programmes, which has meant some knowledge gaps have not yet been sufficiently addressed, e.g. in relation to health and climate change, a thematic area relevant to all four knowledge gaps identified in the Strategy;
- Lack of interest in some Member States, for whom climate change adaptation is not a political priority. For example, there are large differences among Member States in the number of proposals on climate change submitted in the context of H2020;

[151] Sarah Hendel-Blackford et al., (2017). *Implementation of the urban adaptation initiative [Mayors Adapt] within the framework of the 'Covenant of Mayors',* 12 May 2017, unpublished, available on request.

[152] For example, in the Netherlands there have been recent efforts to enhance knowledge on water resources, including water security issues with respect to increases in water scarcity, drought and flood risk, and increasing water temperatures affecting water quality and biodiversity. http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2018-the-geography-of-future-water-challenges-2920.pdf

- Insufficient interactions between scientists and practitioners – adaptation is still seen as a science-led issue. In the EU15, formal mechanisms for interaction between scientists and practitioners exist, less so in the rest of the EU;
- Access to data – Member States either do not collect data on past losses, are reluctant to share it, or make data difficult to compare due to methodological differences. The lack of data was perceived in the targeted stakeholder survey as a serious barrier to assess vulnerability and potential impacts;
- A need for greater cooperation between policymakers across Member States – by contrast, researchers are generally willing to cooperate and work together. Related points made by respondents to the targeted stakeholder survey were that Member States have different historical backgrounds and natural resources and that there is a lack of integrated approaches and methodologies.

Stakeholders also highlighted the following barriers:

- Researchers struggle to translate their research into results that can be used by decision makers and non-specialists. In particular, it is challenging to convey and manage uncertainty;
- Access to research funding at national level – direct research is not eligible for funding by the LIFE programme and is limited to H2020, which (apart from the European Research Council) is focused on large projects with partners from different Member States. It may be difficult to secure funding for country-specific research;
- The complexities of combining adaptation across sectors and with mitigation are challenging;
- Sectoral or local decision-makers do not know where to find relevant research results unless they have been involved in its development.

Action 5: Climate-ADAPT

The EEA[153], who maintains the Climate-ADAPT website, identified the following drivers and barriers.

Drivers:

- Increasing interest from politicians and practitioners in adaptation;
- The increasing importance of adaptation for the international policy agenda.

Barriers:

- Difficulty in engaging Commission services which could contribute to the website development and dissemination other than DG CLIMA –The establishment of an advisory group for Climate-ADAPT is a positive step but came only in 2016, whereas the platform started in 2012. The various new thematic platforms launched in the EU[154] need to be coordinated with the development of existing platforms, including the Biodiversity Information

[153] See footnote 7.
[154] E.g. On green infrastructure and nature-based solutions

System for Europe, Water Information System for Europe and the Disaster Risk Knowledge Management Centre;

- Evolution of the Covenant of Mayors initiative – The launch of Mayors Adapt in 2014 and the subsequent merger with the Covenant of Mayors initiative, as well as extension of the latter into a global initiative in 2016, has led to difficulties in Climate-ADAPT implementing the specific Information Technology needs of the related adaptation support tool and provision of information on cities' actions in collaboration with the Mayors Adapt;
- Limited annual resources for maintaining the platform.[155]

Action 6: ESIF / CAP / CFP

Drivers:

EU level:

- The establishment of the 20% climate mainstreaming target and the development of a climate expenditure tracking methodology, even if concerns were raised that mainstreaming in all projects and all sectors may not have been fully implemented by managing authorities at investment levels;[156]
- The connections made between adaptation, risk prevention and civil protection in Cohesion policy, which have helped to raise awareness among more actors in the Member States;
- The obligation in the CPR for the Commission to approve major projects only if they are climate resilient;
- The revision of the EIA Directive in 2014 imposing climate vulnerability assessments of projects where relevant. The transposition deadline for this Directive was 16 May 2017.

National level:

- NASs;
- Extreme weather events, floods and forest fires.

Barriers:

- Many adaptation measures need to be applied at the local and regional level, and concern a multitude of actions that cannot be summarised in one performance indicator. As such, it is much more difficult to establish high-level political targets for adaptation than for mitigation;

[155] One project manager, other staff within EEA's Impacts, Vulnerabilities and Adaptation Group for a limited amount of their time, one person in information technology, and EUR 200 000 annually on content development through the European Topic Centre on Climate Change impacts, vulnerability and Adaptation (ETC/CCA). In addition, The Commission has provided various contracts to support dissemination and use of Climate-ADAPT, as well as for development of functionalities through information technology contracts.

[156] Stakeholder workshop organised under the Commission's service contract on "Climate mainstreaming in the EU Budget: preparing for the next MFF". For further details, see: Ricardo, IEEP, Trinomics, and Alterra. Study to support the evaluation of the EU Adaptation Strategy, Ricardo/ED62885 Final Report, Study for the European Commission, 2018

- The lack of focus on adaptation and of relevant targets within the Europe 2020 Strategy[157] has made it difficult to drive adaptation actions at the same level as for mitigation;
- ESF and EMFF do not specifically address TO5 ("Promoting climate change adaptation, risk prevention and management") in spite of impacts on vulnerable population, employment and fish stocks. The lack of climate integration in the EMFF and ESF was also emphasised by the European Court of Auditors (ECA), and acknowledged by the Commission in its answer (while considering the different potential contributions of each of the funds according to its primary missions)[158].
- There is a knowledge gap on spill-over effects from third countries, the understanding of which would be a first step towards considering effective mainstreaming of adaptation into the EU's trade policy (see also section 4 in Annex VIII and Case Study 2 in Annex XIV).

Stakeholders in the energy, transport and construction sectors identified the following barriers:

- Uncertainties relating to climate impacts and extreme events (frequency and magnitude);
- Need for climate proofing standards;
- No legal obligation to consider climate risk (or very limited).

They were joined by other vulnerable sectors (agriculture, forestry, fisheries) in pointing to:

- The lack of collaboration between sectors. In one of the case studies developed for this evaluation (see Case Study 1 in Annex XIV), stakeholders in the fight against forest fires identified a need to further enhance coherence between climate change adaptation and disaster risk reduction across all levels of governance (global, European, national levels);
- Insufficient funding.

Action 7: Infrastructure

Drivers:

- The obligation in the ESIF CPR for the Commission to approve major projects[159] only if they are climate resilient;
- The revision of the EIA directive imposing climate vulnerability assessments of projects where relevant;

[157] COM(2010) 2020 final.

[158] For instance, the ESF contributes indirectly to this thematic objective through its own objectives: promoting employment and social inclusion, investing in education and training and enhancing institutional capacity of public authorities and stakeholders and efficient public administration.

[159] A major project has a total eligible cost exceeding EUR 50 million (and EUR 75 million for transport projects) (https://climate-adapt.eea.europa.eu/metadata/guidances/climate-change-and-major-projects). The Commission shall approve such projects only if it is accompanied by "an analysis of the environmental impact, considering climate change adaptation and mitigation needs, and disaster resilience".

- The involvement of some European cities in two non-EU initiatives, '100 resilient cities'[160] initiative and the 'Making Cities Resilient'[161] campaign;
- The EIB's requirements set out in the Bank's Environmental and Social Handbook[162] which all projects must fulfil to secure finance. The Handbook provides that proposed projects undergo a climate vulnerability assessment and apply adaptation measures to ensure the sustainability of the project if necessary.

Barriers:

- The translation of adaptation expertise into local languages is needed for stakeholders in the private sector;
- Apart from major projects, other EU-funded infrastructure projects under shared management are not subject to such prior approval by the Commission.

Stakeholders from the energy, transport and building/construction sector listed:

- lack of awareness;
- lack of standards/guidelines;
- lack of data and the degree of uncertainty in impacts;
- a knowledge gap in the private sector between high-level projections and more specific information needs to understand the risks.

Action 8: Insurance and finance

This section is based on the views of two international organisations in the insurance sector[163] as well as on expertise available to the Commission services.

Drivers:

- The presence of insurance pools and systems controlled by the state, which affects demand on the part of industry;
- The maturity of natural disaster insurance markets. In some Member States (e.g. France, United Kingdom) the market is mature, as the countries have historically dealt with these issues, while in other European countries relevant insurance products have only been introduced more recently;
- Cost-effective insurance seems to be facilitated by a tradition of collaboration between public and private sector risk managers, in some cases shaped by some form of public reinsurance support for catastrophic losses;
- Under the Cohesion Policy, national and/or regional risk assessments for disaster management (including in relation to climate risks) are a precondition for funding[164]. Where relevant, there is a requirement to consider the NASs. In particular, the EU Solidarity Fund specifies that payments are limited to non-

[160] http://www.100resilientcities.org/
[161] https://www.unisdr.org/we/campaign/cities
[162] European Investment Bank, Environmental and Social Handbook, 2013.
[163] Federation of European Risk Management Associations (FERMA, see footnote 143) and the Geneva Association, an international think tank of the insurance industry (www.genevaassociation.org).
[164] With the exception of the European Social Fund.

insurable damages[165]. This way, EU disaster risk management incentivizes risk reduction;

- In the promotion of a market for disaster risk insurance, other financial mechanisms may also act as drivers, for example, the regulation in France obliging banks to disclose climate risks associated with their assets.

Barriers:

- A lack of coherence between national insurance markets, which makes a simple approach to integrate insurance in disaster risk reduction and adaptation challenging;[166]
- Difficulty to compare market penetration rates among Member States, as data collection is not standardised, and especially data related to commercial activities is often unavailable;
- There is low general awareness of climate risks;
- Insufficient reliance on public-private partnerships where governments' risk prevention and response can benefit from the insurance sector's knowledge of risks;
- Disaster risk management and climate adaptation are mostly dealt with in different ministries in the Member States;
- Member States often focus on extreme weather events when they happen but are not necessarily planning ahead. Risk assessments usually only span 2-5 years while climate projections are longer term. Research projects modelling short- to mid-term climate change could help Member States and insurers to link disaster risk strategies to climate change adaptation;
- Insurance risk models are traditionally based on historic trends of increase of insured and non-insured losses related to climate events, while they lack well-developed scenarios including future increases in damage;
- To date, insurance companies have been reluctant to structurally share detailed information. This problem could be overcome by appointing a third party playing an enabling role in designing insurance and risk transfer products that are capable of addressing climate related risk transfer;
- To date, natural disasters have been covered by annual insurance contracts, while insurers should seek to explore provision of longer-term contracts instead of annual ones;
- To date, there is no clear classification or typology of investments that contribute to adaptation to climate change;
- The profitability of adaptation-related projects is low or risky and there is a lack of technical assistance to such projects (see discussion under Action 2 above).

[165] Regulation (EU) No 661/2014. The EU Solidarity Fund specifies in its article 3.3: Payments from the Fund are limited to financing measures alleviating non-insurable damage and shall be recovered if the cost of repairing the damage is subsequently met by a third party.

[166] Three broad types of insurance markets exist in Europe (voluntary, semi-voluntary and mandatory). Depending on how risks of extreme weather events were historically reflected in national insurance markets, insurance can serve two main types of societal objectives: (1) widespread coverage at a low premium, and (2) incentivising stakeholders to manage their own risk. This variation has resulted in contrasting penetration rates of the three broad insurance market types; the market penetration is not high for mandatory insurance markets, for example.

6.2.4. What effects has the Strategy produced so far for different stakeholders, e.g. according to socio-economic background and vulnerability?

The Strategy's objectives and associated actions are directly relevant to Commission services, Member State authorities, regional and local authorities, researchers, and private decision makers. The same is true of the Impact Assessment's operational objectives and performance measures, which did not aim to measure the Strategy's societal impacts. This question, therefore, extends beyond the normal scope of the evaluation.

The targeted stakeholder survey elicited too low a response to inform any meaningful differentiation of the Strategy's effects on different stakeholders. The public consultation questionnaire led to a higher response; however, it still includes answers from only 217 private individuals from 22 Member States. This is too small a sample for drawing societal conclusions.[167]

The actions taken by the stakeholders directly targeted by the Strategy are expected to exercise a multiplier effect (as explained in the Intervention Logic section of Chapter 2) and thus result in wide-ranging indirect impacts across society. The Strategy foresees that adaptation action will bring new market opportunities, jobs and benefits in such sectors as agricultural technologies, ecosystem management, construction, water management and insurance. For example, mainstreaming of climate change adaptation in the CAP by policy and decision makers will provide benefits to farmers through reducing climate sensitivities and increasing their adaptive capacities to cope with climate change.

Appropriate performance indicators would be necessary to measure specific impacts on stakeholders or sectors. They would also need to be monitored over a longer period of time than the 5 years since the adoption of the Strategy, because most of the effects envisaged by the Strategy are longer-term. While the cohesion policy funds under the 2014-2020 MFF already include indicators on e.g. the number of people protected from floods and forest fires, the time lag effect with regard to reporting does not allow drawing meaningful conclusions on impacts. Similarly, at the time of the mid-term evaluation of other programmes such LIFE or H2020 that this evaluation looked at, final results from implemented projects were not yet available, and any figures in those evaluations were based on estimated results from projects in their inception phase. After the ESIF funded projects of the current multiannual financial period come to an end, it will be possible to aggregate some societal indicators. Still, a more consistent analysis with a wider scope will be needed to effectively map the socio-economic impacts of adaptation policies.

[167] Also, compared to citizens contacted randomly for a survey like Eurobarometer, a significant part of the individuals having voluntarily chosen to fill in the public consultation questionnaire likely did so because of an interest in the topic, which means that the sample may not be representative of the EU population's average knowledge and interest in climate adaptation.

6.3. Efficiency

6.3.1. How adequate were the resources for the overall implementation of the EU Adaptation Strategy and how proportionate were those resources across its eight actions?

Administrative costs directly resulting from the Strategy are low and mostly limited to the Commission[168], with notable exception of funding programmes that are co-financed by other (e.g. national) entities. Costs for other stakeholders resulting from the Strategy are voluntary in the majority of cases and linked to access to EU funds.

A summary of the resources spent on implementation with a focus on the administrative costs of the actions of the Strategy is presented in the table in section 11 of Annex VIII. It does not include costs voluntarily incurred by stakeholders to benefit from instruments under the umbrella of the Strategy (such as LIFE, H2020, ESIF/CAP/CFP).

For Actions 1, 3, 5, 6, 7 and 8 the costs have been limited to preparing guidance, maintaining web portals, covering the human resources costs for coordination (such as for the outsourced Covenant of Mayors) and the organisation of conferences. Much of the work, such as mainstreaming into other policy areas, was carried out as part of the Commission's core activity (e.g. meeting with Member State experts in the framework of expert groups on adaptation or Standing forestry committee). In these cases, due to the leverage effect, the actions can be considered as highly cost-efficient.

Actions 2 (LIFE) and 4 (mainly H2020) are making direct use of funding programmes where the costs of implementation of the strategy were higher because of the financing of demonstration and research projects.

Overall, we can conclude that the benefits linked to the Strategy (described in detail in Chapter 6.2) are tangible and are achieved at low costs thanks to the multiplier effects of its actions in terms of guidance, coordination, dissemination, demonstration, mainstreaming into other policies and funds. However, most of the operational objectives of the Strategy have targets fixed for 2020, while the funding programmes used under some actions are multi-annual and subject to their own evaluation processes. This results in difficulty at this point in time to judge the efficiency of resource use in the different actions of the Strategy.

Some specific observations can be made on the efficiency of selected Actions.

Action 1 Member States: The cost of developing the guidance for the Member States on adaptation strategies was negligible compared to the fact that several Member States highlighted the usefulness of the guidance and its political importance in stimulating adaptation policy. Although the exact role of the Strategy is unclear, being one of multiple drivers, the increased number of strategies adopted and low costs point to a cost-efficient use of resources.

Action 2 LIFE: The LIFE mid-term evaluation estimated that for the entire LIFE Programme, including the adaptation priority area under the Climate Action sub-programme, the anticipated results of LIFE projects would have a societal benefit of

[168] In this section, of the costs incurred by the Commission, only those are considered that were estimated in the 2013 impact assessment. Otherwise, running EU adaptation policy is part of the core business of the Commission and as such is not monetised.

EUR 1.7 billion, which was four times the overall LIFE budget for 2014. The LIFE mid-term evaluation however underlined that it is premature to determine whether the LIFE programme provides value for money at an early stage of implementation, basing their analysis on a series of projects selected under the 2014 calls for proposals. Moreover, the external study supporting the mid-term evaluation has concluded that the LIFE management structure appears to be less costly than the management structure of other EU-funded programmes.

Action 3 Covenant of Mayors: The annual resource commitments from the Commission are relatively low and appear to be adequate and efficiently used, given the increasing number of cities committing to the adaptation aspects of the Covenant of Mayors.

Action 4 Knowledge gaps: As none of the knowledge gaps identified in 2013 have been fully bridged, it is too early to more precisely estimate the adequacy of resources regarding bridging knowledge gaps. Nevertheless, stakeholders agreed that the Strategy has helped to reduce knowledge gaps on adaptation in the EU. The majority of funds were channelled through H2020, which was subject to an in-depth interim evaluation in May 2017; that interim evaluation concluded the research framework programme is in general efficient.[169]

For Action 5 Climate-ADAPT: The recorded growth in information materials on Climate-ADAPT and visitor numbers in the last years suggest that the resources are having a positive impact. Further collaboration with Commission Services would help to improve overall efficiency in how knowledge inputs are collated on Climate-ADAPT. Overall, resources appear to be adequate at present but, to continue to grow the Climate-ADAPT user base and accommodate the ever-growing volume of content, resources may need to increase in future, even if greater efficiency in collation can be achieved.

6.3.2. How do the different stakeholders view the monitoring of the implementation of the EU Adaptation Strategy? Which aspects are perceived as an unnecessary burden, if any, and to what extent?

The open public consultation also tested a preliminary conclusion that the monitoring and administrative burden of the Strategy was very light. When asked, 65% of respondents were neutral or undecided, and most of the remainder agreed it was very light. It is difficult to judge whether the non-agreeing respondents were referring to administrative burden directly stemming from the Strategy (such as reporting requirements under LIFE projects) or to burden imposed by the mainstreaming into EU funds whose use has to be monitored anyway under the ESIF framework.

In any case, no positive evidence of unnecessary burden was found. The ECA noted that there is a lack of adaptation-related indicators and that monitoring and audit of adaptation actions is both more difficult and carried out far less than for mitigation.[170] [171]

[169] Commission Staff Working Document: In-Depth Interim Evaluation of Horizon 2020, SWD(2017) 220 final. And: Commission Staff Working Document: Executive Summary of the Interim Evaluation of Horizon 2020, SWD(2017) 222 final.

[170] 'Spending at least one euro in every five from the EU budget on climate action: ambitious work underway, but at serious risk of falling short', European Court of Auditors, 2016.

[171] 'Landscape review. EU action on energy and climate change', European Court of Auditors, 2017.

The monitoring activities related to Action 2 LIFE, Action 4 Knowledge gaps (H2020) and Action 6 ESIF/CAP/CFP are largely common to the respective support programmes they are part of. Only any adaptation-specific issues are mentioned below. Actions 5, 7 and 8 have no monitoring carried out by stakeholders.

Action 1 Member State strategies - Outside the scope of the Strategy, the Monitoring Mechanism Regulation[172] (Art. 15) obliges Member States to report to the Commission on their 'national adaptation planning and strategies, outlining their implemented or planned actions to facilitate adaptation to climate change' by 2015 and every 4 years thereafter. This is a strong legal obligation on reporting, but it does not stem from the Strategy itself. This information is published on the country pages of Climate-ADAPT where Member States can provide interim voluntary updates. It serves as a source of information for the Commission's monitoring of the implementation of Action 1 primarily through the adaptation scoreboard. This is a document created and maintained by the Commission, Member States are only asked to comment on its draft versions, which represents a light monitoring and reporting burden.

For Action 3, the monitoring of adaptation under the Covenant of Mayors has resulted in costs being incurred by the managing office (funded by the Commission), by JRC of the European Commission and by the cities themselves (voluntarily). The Covenant of Mayors requires signatories to submit a progress report monitoring implementation every two years following submission of their action plan. The template for Sustainable Energy and Climate Action Plans (SECAP) contains an adaptation scoreboard that enables local authorities to conduct a self-assessment of their adaptation status. Involvement in the Covenant of Mayors is voluntary and therefore does not impose mandatory administrative burden.

Under Action 6 ESIF/CAP/CFP, managing authorities are required to provide financial information to the Commission on the amount of allocations and spending for different types of investments (i.e. categories of intervention), each of which has specific climate-related weighting. The methodology[173] for this differs between the ERDF/CF, EAFRD and EMFF. The mainstreaming methodology for the European Agricultural Guarantee Fund (EAGF) is defined in another regulation. The methodology currently does not fully differentiate between allocations for climate mitigation and adaptation (it provides detailed view of the different categories of intervention and their climate relevance but there is no explicit split whether these are related to climate adaptation or mitigation as many times measures effecting mitigation also have a positive impact on adaptation).

Many measures that are good for mitigation also entail co-benefit for adaptation and vice-versa. Hence an identification of measures exclusively supporting mitigation or adaptation objectives would neither be desirable nor feasible. This however does not prevent from tracking expenditures supportive of mitigation and adaptation objectives separately, even if a certain proportion of such expenditures is then counted twice.

Adaptation activities by private organisations reported to the CDP do not provide sufficiently detailed information on climate adaptation action, hence, it would be valuable to develop a more relevant indicator to monitor adaptation mainstreaming by businesses.

[172] Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013.
[173] Commission Implementing Regulation (EU) No 215/2014 of 7 March 2014.

6.4. Coherence

6.4.1. How well does the Adaptation Strategy fit together with other relevant EU legislation and policies, or similar initiatives at international, national or regional level? Are there any gaps or inconsistencies between policies? Are there components to be further developed or added to increase coherence of actions?

Coherence with other EU policies and initiatives

The array of impacts of a changing climate across all areas of human activity, and across all policy areas, means that it requires a cross cutting and multi-sectoral approach. Mainstreaming adaptation into other policy areas is a major tool in adaptation policy, and by definition is aimed at ensuring coherence. One of the Strategy objectives is the climate-proofing of vulnerable sectors, and most of its actions pursue the delivery of adaptation in other policy instruments and sectors.

Table 6-1 – Key areas of synergy between adaptation and other EU policies

Adaptation action	Other EU policy	Observed synergy
Action 1 – Member State strategies	Disaster Risk Reduction Civil Protection	Long-term prevention Preparedness scoreboard and indicators Active coordination of the two policies
Action 3 – Covenant of Mayors	European Urban Water Agenda	Common objectives
	European Green Leaf and Green Capital Awards	Common objectives
	Disaster Risk Reduction	Common indicators (urban level)
	Urban Agenda of the EU	Climate Adaptation Partnership
Action 6 – Climate-proofing EU funds	EU budget and funding programmes	Commitment for 20% climate spending (but issues with tracking adaptation separately and trade-offs)
Action 7 – Resilient infrastructure	Energy and transport	TEN (Trans-European Networks) Guidelines have adaptation provisions

Further information on these areas of synergy is provided in section 12 of Annex VIII.

Coherence with international policies and initiatives

Coherence with action at the international level was discussed in Chapter 3.

Coherence with national and regional policies and initiatives

Coherence with national priorities needs to address both the wide range of different situations and priorities among the 28 Member States, and to recognise the Commission's lower level of influence in areas of policy without detailed EU legislation. The design of the Strategy clearly helps to avoid incoherence in the sense of conflict between legal requirements, as it relies on voluntary measures at national and sub-national level, supported by guidance for such measures and a monitoring of progress by the Commission.

Stakeholders participating in a break-out session of the first workshop in April 2017 noted that national-level coherence had in part been facilitated by the mainstreaming of adaptation in EU policy in a range of sectors and that sectoral coherence benefited from an EU-wide approach.

The Commission's guidance on the preparation of NASs, and the adaptation scoreboard developed under Action 1, include several areas which reflect on the level of coherence within national and sub-national policies, but also in transboundary issues. This guidance is coherent with the efforts needed at national level for more coordination between adaptation and other policy areas, and stakeholders suggest that the Strategy has had a helpful impact on improving this coordination.

Assessing coherence at sub-national level is more complicated. The Covenant of Mayors initiative to some extent helps to overcome this complexity, although its coverage is not yet sufficiently wide to ensure coherence of action at local level.

The lack of coordination within Member States suggests that there is a need for further action to help administrations overcome behavioural and other barriers to coordination.

One further area of added value stems from the positive reinforcement of national strategies through cross-border or transnational cooperation by simultaneous implementation of adaptation policies in neighbouring countries. An example is in the EU Strategy for the Danube Region (EUSDR)[174]. The specific case study on the EUSDR (see Case Study 3 in Annex XIV) reveals how shared biophysical climate risks can prompt informal and lasting cooperation between administrations, without institutional or financial burdens. The EUSDR helped participating countries identify and respond to transboundary adaptation challenges, particularly through improved dialogue and exchange of information.

Internal coherence

There is a strong evidence of coherence between several actions within the Strategy. Action 5 (Climate-ADAPT) is meant to present information on adaptation action in the EU, it also offers information linked to several other actions, such as Action 4 on knowledge gaps and Action 3 on the Covenant of Mayors. Since 2007, nine LIFE projects under Action 2 have supported the development of climate adaptation strategies or plans under Action 1 (total budget: EUR 16 million). The coherence between efforts under Action 6, through the use of ex ante conditionalities in the ESIF and the encouragement of NASs under Action 1 has already been noted. The focus on climate-proofing of major projects is building on the objectives of both Cohesion Policy (Action 6) and resilient infrastructure (Action 7). Similarly, the development of risk management tools under the CAP 2014-2020 and the foreseen emphasis announced in the Communication on the Future of Food and Farming[175] is coherent with the broader insurance objective of Action 8.

The implementation of Action 4 has increased the rate of development of climate services that identify and quantify climate risks and impacts. The Copernicus Climate

[174] http://www.danube-region.eu/

[175] Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions: The Future of Food and Farming, COM(2017) 713 final.

Change Services (C3S) is one such recently introduced service, which in synergy with Action 8, can usefully complement the insurance industry's expertise. In recent years, the insurance industry has also started to integrate geo-location and weather projections into their underwriting of risks.

A more comprehensive identification of links between actions could have improved coherence even further. There might have been greater coherence had there been more centralised management of the 20% climate mainstreaming target for the 2014-2020 EU budget with greater separate attention to adaptation, as recommended by the ECA in 2016.[176]

6.5. EU added value

6.5.1. What is the added value of addressing climate adaptation at EU level, in addition to the vertical and horizontal cooperation at national level?

The Strategy has proved effective in making significant progress towards its objectives up to 2020. It has generated added value, while the right of initiative remained at the appropriate levels of governance, in accordance with the principle of subsidiarity.

There appears to be less added value where action was already underway prior to the Strategy, although most elements of the Strategy appear to add at least some value, compared with horizontal and vertical actions at Member State level.

The clearest added value appears to be in areas where the EU is encouraging identification and bridging of knowledge gaps and EU wide research (Objective 2 – Actions 4 and 5, and also Action 2), and in areas where the EU is responsible for integrating adaptation into its own policies (Objective 3 – Action 6, obviously, as no other entity than the EU could do this). Through climate mainstreaming into ESIF, which is implemented by Member States under shared management, it is also possible for the EU to influence policy making and budget allocation in Member States towards climate action. There would be even more EU added value if adaptation was mainstreamed also in areas where the EU has exclusive competence, such as trade and fisheries (the reasons for the absence of mainstreaming in these areas are discussed in section 6.2.3). In relation to Action 8, the main EU added value appeared to be in taking up a facilitative role in overcoming the main hurdles for public-private cooperation, starting with increased understanding of insurance markets in Member States through the insurance study and two thematic workshops organised by the Commission.[177] Thus, increased market-penetration of risk transfer mechanisms across Europe was supported by EU action without unifying or harmonising the national insurance markets.

In general, the consultation indicates that while stakeholders such as governments at different levels would have certainly worked independently on adaptation without EU intervention, there would neither have been equivalent progress nor a collective approach without its encouragement. The majority of stakeholders agreed that equivalent progress would not have been made in the absence of the Strategy in particular for Actions 3 to 6.

[176] See footnote 170.
[177] See footnote 92.

Specific details on the EU added value of the Strategy's actions are provided below.

Action 1 Member State strategies. As pointed out in Chapter 4, adaptation strategies had been drafted in 15 Member States before the launch of the Strategy. A 2014 EEA report[178] noted that 19 of the European countries surveyed identified "EU policies" as a driver for adaptation action, second only to extreme weather events (28 countries). While it is less clear what proportion of this can be attributed to the Strategy or to other policy drivers, it seems likely that the process of discussing the Strategy, and entering into the commitments set out in the 2013 Council conclusions, had an impact on the political salience of the subject. The presence of common guidelines for national strategies and an assessment framework in the form of the adaptation preparedness scoreboard also provided added value as EU-level coordination activities. For example, the guidelines have been used by Member States that had not previously developed NASs or by others when developing subnational or sectoral adaptation plans.

Action 2 LIFE. The mid-term evaluation[179] Reported that stakeholders largely acknowledged (95%) the catalytic role that LIFE is playing for better solidarity and responsibility-sharing in preserving the common good of the EU's environment and climate, leading to less costly implementation of environmental and climate change policies. Notably, the added value of LIFE is that EU funding enables project beneficiaries to deliver results that in most cases would either not be realised at national, regional and/or and in particular at local level, or would be pursued at slower pace and on a lesser scale. This is especially so for Member States that have fewer financial mechanisms in place or when these mechanisms are difficult to access. Stakeholder interviews revealed that the added value was in providing funding for adaptation at a local level for which local authorities may have difficulty in finding other sources. For instance, a specific LIFE integrated project in Denmark has the possibility to mobilise hundreds of millions of EUR of complementary funding, assisting implementation of the relevant adaptation strategy.

Action 3 Covenant of Mayors. The Covenant, as an EU-level network of local authorities, enables peer-to-peer learning among European local authorities coming from different Member States but facing similar climate risks. It has increased local ownership of the EU Strategy for adaptation, providing impetus to the delivery of the EU's climate and energy objectives in general. The Covenant provided access to Europe-wide adaptation knowledge produced and disseminated because of the Strategy, and in particular on the knowledge gaps the Strategy identified. Through the Covenant, the EU has been of direct assistance to local authorities and experts, in particular by optimising links with EU funding opportunities to carry out adaptation projects. The Covenant of Mayors offered a uniform level of support, sometimes making up for gaps in national support: the value of the Covenant of Mayors is particularly high in countries where similar national networks are absent[180]. In addition, the launch of the Global Covenant of Mayors for Climate and Energy, has offered European cities further benefits and a voice at international level.

Action 4 Knowledge gaps Results from the targeted stakeholder survey strongly support that there is added value in H2020 and work undertaken by the JRC in addressing adaptation knowledge gaps. The availability of EU funding supports significant research

[178] 'National adaptation policy processes in European Countries – 2014', European Environment Agency, 2014.
[179] LIFE evaluation: http://ec.europa.eu/environment/life/publications/lifepublications/evaluation/index.htm
[180] See footnote 126

calls, complementing and contributing to global research and innovation efforts. The contribution of H2020 funded research to the Intergovernmental Panel on Climate Change (IPCC) reports is significant and important.[181] In addition, many climate change impacts are continent wide (e.g. the last major floods in Europe covered several countries): in this context, the action by the Commission in addressing knowledge gaps through H2020 and the work of the JRC are identified as important in accelerating progress in the understanding of the issues at hand.

Overall, in combination, the targeted stakeholder survey, literature and interviews provide good evidence of strong added value from the work on knowledge gaps at EU level. There is also a continuing need for assessment reports from EEA, which are one of the recognised ways to disseminate research results in an understandable way for policymakers. Over 85% of 157 respondents to the open public consultation agreed or strongly agreed that one of the areas of clearest added value of acting at EU level is in bridging knowledge gaps. Action 5 is linked to this endeavour.

Action 5 Climate-ADAPT. An evaluation by the EEA of Climate-ADAPT notes that Climate-ADAPT adds value by providing an EU reference point for the state-of-the-art of adaptation in Europe. The literature, targeted stakeholder survey and interview evidence gathered under this evaluation also point to good evidence of added value through provision of background information, peer-to-peer learning and a source of inspiration. There is an indication that this may be more notable at transnational and national scale, than at sub-national or city scale.

Action 6 Mainstreaming. The EU is responsible for integrating adaptation into its own policies, so the added value of the Strategy is inherent to Action 6. Without the Strategy, an equivalent amount of progress would not have been made in climate proofing key EU policies such as agriculture and cohesion. However, it needs to be stressed that part of the responsibility lies with Member States, under the shared management of ESIF.

Action 7 Infrastructure. European Standardisation Organisations reported in the context of this evaluation that, although they had started considering standards, the process would have been much slower and would not have been so coordinated without the Strategy.

Action 8 Insurance and resilient businesses. Various stakeholders from the insurance and risk management industry indicated the importance of integrating insurance in climate risk management. The main benefit of the Strategy is the fact that the Commission has the opportunity to facilitate coordination of this public-private cooperation. Without the Strategy, the benefits of public-private cooperation, such as the consideration of good practices in national insurance schemes and better use of disaster data, would not have been as explicit as they are now.

[181] The IPCC's 5th Assessment Report included around 1,000 quotes to FP6, FP7 and Horizon 2020 projects' outputs (papers). See: Interim evaluation of H2020 (Societal Challenge 5) https://publications.europa.eu/en/publication-detail/-/publication/148b3b8f-50ae-11e7-a5ca-01aa75ed71a1/language-en (page 69)

7. CONCLUSIONS

The objective of this evaluation is to examine the actual implementation and performance of the EU adaptation strategy (Strategy) between 2013 and early 2018, and to report to the European Parliament and Council.

The evaluation covered the relevance, effectiveness, efficiency, coherence and EU added value of the Strategy. These criteria were examined in an external study[182] based on available evidence and the information gathered through consultation activities, including an open public consultation. Stakeholders are broadly supportive of EU action in the field of adaptation. They recognised the greatest added value in mainstreaming into other EU policies and in encouraging action at all levels of governance. They also highlighted the need to close knowledge gaps and to better integrate adaptation with climate mitigation and external policy. In general, consultation activities showed no strongly diverging views or conflicting interests between the different categories of stakeholders.

The evaluation concludes that the Strategy remains highly relevant, although recent research has revealed pressing adaptation needs, for example with regard to high-end climate change and the vulnerability of the EU to climate change in third countries (the closure of related knowledge gaps should receive more emphasis in the future). The Strategy is also quite coherent with policies at other levels of governance, although less so as regards international policies. A mix of qualitative and quantitative assessment found that the Strategy was effective, although more work needs to be done to implement and monitor national strategies, promote local action, bridge newly emerging knowledge gaps, complete mainstreaming in EU policy and foster the use of insurance and financial instruments in adaptation. The analysis of effectiveness was also hampered by the fact that the Strategy's performance indicators focus on processes, no indicators are available to assess its socio-economic impacts, and no such indicators exist currently at EU scale. The Strategy seems efficient, imposing administrative costs only on the Commission. Finally, there is clear added value of the Strategy at EU level.

The Strategy delivered on its objectives, with progress recorded against each of the eight individual actions. In particular:

- The Strategy shifted some **political focus towards adaptation** issues and the need for prevention and preparedness, and it increased awareness among a broad range of EU, Member State, and sub-national policymakers. As a result, a wider range of stakeholders acknowledges the urgency of adaptation action nowadays.
- The Strategy **promoted strong action by Member States** and was one of the drivers leading 25 out of 28 Member States to adopt NASs, most of them including good preparatory provisions such as horizontal coordination mechanisms, stakeholder involvement and transboundary cooperation.
- At **the local level**, the Covenant of Mayors increased urban preparedness, bringing adaptation actions close to the citizens and delivering on the objectives of the Strategy by means of a bottom-up, multilevel governance approach. The increase in the number of cities having effectively reported adaptation strategies/plans within the Covenant has been so far small, but this may be due to the absence (until very recently) of an online reporting platform. Survey-based estimates indicate that, overall, more than one-quarter of EU cities have such a policy document. Extreme weather causes more damage where population and

[182] See footnote 4.

infrastructure are concentrated, and therefore, local authorities remain at the forefront of climate shocks.

- **LIFE's targeted funds** acted as an effective catalyst, providing and disseminating solutions and best practices on the ground. Evidence points at the need to increase LIFE resources devoted to adaptation.
- It **increased the production and availability of valuable knowledge**, in particular as regards high emission scenarios. Climate-ADAPT, in particular, has become the Strategy's vehicle to disseminate information on adaptation to decision-makers at various governance levels and organisations supporting them. This has allowed decision-makers to make use of increasing adaptation knowledge for developing adaptation strategies and actions and to reduce uncertainty, but not to the point of closing all the gaps identified in 2013. Furthermore, as in many other scientific fields, new gaps have emerged. The focus may need to switch from gaps to decision-making processes that integrate uncertainty, such as adaptation pathways.[183] It would be also relevant to reinforce the cooperation between researchers and decision-makers, notably for practical solutions on the ground.
- **Mainstreaming** of adaptation as part of climate objectives in key EU policies or sectors was generally thorough (the most notable exceptions being the areas of trade and fisheries), including the way to track such progress. This was certainly the case for Disaster Risk Reduction, the European Regional Development Fund, the CF and CAP, even if a complete separation of mitigation and adaptation spending is not possible due to co-benefits and synergies.
- As regards **infrastructure**, major projects are now required to be climate proof. Further work on preparedness and standards is ongoing, but might not deliver results before 2020.
- There was **EU added value** in having a Europe-wide policy instrument: equivalent progress would not have been possible in the absence of the Strategy. This was most apparent in the production and dissemination of knowledge and in their integration of adaptation constraints in key EU policies. The evaluation suggests that there might be further EU added value if adaptation is mainstreamed in areas where the EU has exclusive competences, such as trade and fisheries.
- Finally, in terms of **internal coherence,** evidence suggests that there are synergies between several of the eight actions of the Strategy, even though the Strategy did not expressly seek synergies between its actions.

There are lessons to be drawn from the evaluation with regard to potential gaps in the Strategy or to step up efforts in areas where the Strategy was less successful:

- The focus of the Strategy adopted in 2013 was on the EU, although already in 2010, the adoption of the Cancún adaptation framework[184] foretold the importance that adaptation would gather in the future: in 2015 the Paris agreement enshrined adaptation as a global goal. The possible scope for **alignment with international policy developments** since 2013 would therefore merit to be examined, as well as the potential implications for the EU of

[183] The concept of adaptation pathways focuses on the processes of decision making, rather than the outcome; it emphasises the adaptive nature of the decision process itself in the face of high uncertainty and complexity.

[184] The Cancun Adaptation Framework was adopted in 2010 through the UNFCCC Decision 1/CP.16 (ref. document FCCC/CP/2010/7/Add.1).

transboundary effects of climate impacts in third countries via migration, trade and financial flows.

- While it succeeded in spreading the adoption of **national strategies, there is margin to improve** implementation and monitoring, for example by developing meaningful indicators to monitor the socio-economic impacts of national strategies and to assess the value of the prevention and management of risks linked to climate change. This extends also to local level and adaptation strategies in the context of the Covenant of Mayors.
- Progress in the adoption of **local adaptation strategies has been slower than expected**. Better downscaling of adaptation knowledge might be required, notably on socio-economic impacts and possible responses. In addition, the national context may have an influence, e.g. whether and how national governments make urban adaptation compulsory or not, and the complexity of the inter-linkages between government levels. Where there were binding measures at national level the percentage of local authorities in the EU with a local adaptation strategy was higher.

- As regards **mainstreaming**, there are opportunities for enhanced action in certain sectors and funds, such as:

    - Coastal protection, green infrastructure and ecosystem-based adaptation measures.

    - Disaster Risk Reduction, notably on integration of climate change, its impacts and adaptation practices in methodologies and indicators, science/knowledge for risk assessment, metrics and dialogue between practitioners from both fields.

    - Foreign trade (with a view to tackling possible spillover effects from third countries via supply chain).

    - The EMFF and the ESF.

- Given the **private investments** required to adapt to climate change, there is a need to involve further business and insurers in view of increasing climate risks. The Strategy may not have been as effective as expected in this field, but a new impetus has been provided by the recent adoption of the Action Plan on Financing Sustainable Growth, whose effects are not considered in this evaluation.

In conclusion, the Strategy has proved effective in making significant progress towards its objectives up to 2020, while there is still some efforts needed in a few areas.

Annex I Procedural information

1. LEAD DG, DECIDE PLANNING/CWP REFERENCES

- Directorate-General for Climate Action (DG CLIMA)
- 2016/CLIMA/011

2. ORGANISATION AND TIMING

The evaluation has been steered by DG Climate Action since 20 July 2016[185] under the scrutiny of an inter-service group comprising of representatives of DG AGRI, DG BUDG, DG COMM, DG DEVCO, DG EAC, DG ECFIN, DG ECHO, EEAS, DG ENER, DG ENV, DG FISMA, DG GROW, DG HOME, JRC, DG MARE, DG MOVE, DG NEAR, DG REGIO, DG RTD, SG, DG SANTE, SJ, DG TAXUD and DG TRADE.

External consultants carried out an evaluation support study between December 2016 and April 2018.[186] The Inter-service Group followed closely the drafting of study in four meetings during 2017 and 2018.

3. EXCEPTIONS TO THE BETTER REGULATION GUIDELINES

None

4. EVIDENCE, SOURCES AND QUALITY

Source of evidence

Evidence for the evaluation support study was gathered through a wide range of data sources:

- Literature review
- A targeted survey (114 responses)
- An open public survey (386 responses)
- Interviews (43 interviews with about 50 stakeholders)
- Workshops (2 workshops)
- 4 case studies

Quality of evidence

[185] Ares(2016)4032796
[186] See footnote 4

The evaluation gathered both quantitative and qualitative data from different sources and stakeholders. The results are found robust through the triangulation of different data, but to a varying degree depending on the sources.

The quality of the evidence gathered in the evaluation support study is discussed in Annex XII.

Quality of the evaluation support study

The Inter-service Group endorsed the quality assessment of the final report evaluation support study in its meeting of 17 May 2018. The inter-service group concluded that the report overall complies with the contractual conditions and relevant professional evaluation standards. The following problems were highlighted:

- Minor gaps can be observed, for example the situation on EU funds in 2013 was not covered in the Baseline section of the report.
- The analysis sometimes relies on views from individual stakeholders, but given that the consultation solicited only limited feedback on certain topics not well covered by literature, this was unavoidable. The report remains transparent on the strength on the evidence.
- It would have been preferable to further improve the linkages between the conclusions and the recommendations.
- In spite of repeated flagging of the problem, the report is still repetitive in many cases. Also, more information could have been left for the appendices.

The identified issues were tackled in this SWD by eliminating repetitions and superfluous details from the text and adding analysis done internally by the Commission services, for example on modelling of future climate impacts.

In addition, the following changes in content were implemented compared to the study:

- The background study concluded that there have been no activities under Action 8 (adaptation for insurance and businesses) apart from a Commission study on the topic of insurance. This was a difficult action to evaluate as unlike other actions, it did not have specific operational objectives established in the impact assessment. However, internal follow-up research in the Commission services revealed there were also some other activities, and most recently the Action Plan on Financing Sustainable Growth in March 2018, when contractors could no longer consider its analysis in the background report. This is reflected in the discussion of Action 8 in Chapter 4 on baseline, implementation and state of play.
- The background study acknowledged that mainstreaming of adaptation in the common fisheries policy had been more limited than in other flagship policies such as agriculture and cohesion, but did not analyse the possible reasons, consequences and future action further. The SWD provided this analysis in section 6.2.3.

5. CONSULTATION OF THE REGULATORY SCRUTINY BOARD

The initial draft of the evaluation was submitted to the Regulatory Scrutiny Board on 30 May 2018. Previously an informal consultation of the Board had taken place on 2 May 2018. The Board issued a quality checklist on 22 June and held its scrutiny meeting on 27 June 2018. They issued a positive opinion with comments on 29 June. The table below presents how the Board's comments were addressed in the evaluation.

In the first part of the table, paragraphs from the Board opinion and the quality checklist box entries covering the same issues are grouped together, because actions were taken that simultaneously respond to them. In the second half of the table, the remaining checklist box entries are addressed in their original order.

Source of the comments: • **Board opinion paragraphs: B(1) to (4), C(1) to (5)** • **Technical boxes of Board checklist 1 to 5**	**Response from DG CLIMA**
B(1) The report does not explain why it draws more optimistic conclusions than the ones of the support study. In particular, the conclusions on relevance do not take into account several findings of the external study that call for changes of the current strategy. **C(3)** The report should explain the reasons for differences in assessment with the underlying study. The study seems to have a more critical approach to many deliverables of the Strategy, in particular in the area of insurance. **Box 5. Validity of conclusions and relevance for further action** **Hyphen 1** The report should explain where and why it draws different conclusions than the support study.	In the relevance discussion of Chapter 7 Conclusions, reference was added to the further needs that the Strategy could address. Annex I Procedural information now explains what has changed from the study as compared to the report, in particular in the area of insurance.
B(2) The report assesses effectiveness on the basis of processes only, and much less on the quality of adaptation actions, leading to overly positive conclusions on the overall success of the adaptation strategy. **C(2)** Consequently, the assessment of the effectiveness should be more nuanced. The report should clarify that the original objectives focused on setting processes and	Chapter 5 Method now explains the evaluation's limitation related to the availability of process indicators only. A description was added to Chapter 4 Baseline under Action 1 on how the adaptation preparedness scoreboard also looks at the content and implementation of the National Adaptation Strategies. The analysis of the effectiveness of

procedures while the evolving context and progress in climate adaptation strategies point to the need for effective implementation and quality adaptation strategies. **Box 1 Design and methodology** **Hyphen 3** The report should elaborate on the general approach taken, i.e. to only look at how the actions to develop a more climate-resilient Europe have developed rather than assessing the actual results and the cost of funding (e.g. in sectoral funding). **Box 2 Effectiveness and efficiency** **Hyphen 2** The report should more critically look into the quality of national strategies, not only their number/existence. One of the central evaluation questions concerned whether a revision of the Strategy is necessary. While the Strategy does not impose anything on Member States, its effectiveness should be judged also on the quality of national provisions and their stage of implementation. **Box 5 Validity of conclusions and relevance for further action** **Hyphen 2** Why does the report not conclude on the lack of effectiveness concerning the socioeconomic dimension?	Action 1 under section 6.2.2 was updated to reflect the latest version of the horizontal assessment of the country fiches. Chapter 7 Conclusions was amended to be more reserved on achievements under effectiveness due to the methodological constraint linked to process indicators.
B(3) The report does not sufficiently integrate the international context and developments into its analysis. **C(1)** The report should better present the context of the Strategy and better link it to international initiatives. Building on that, the assessment of the continued relevance of the original objectives of the Strategy should be put in perspective of the developments and evolving knowledge on climate change and climate adaptation since 2013. Given these developments, the conclusion that the Strategy continues to be relevant cannot be justified solely on the need to establish climate adaptation processes and procedures at the EU and Member State level. **Box 1 Design and methodology** **Hyphen 5** What is the rationale for excluding the international dimension of climate change	The analysis of the international dimension is now regrouped and streamlined in a new separate Chapter 3, instead of being scattered and less visible throughout the document. This Chapter explains better the reasons for excluding international policy from the Strategy and provides a concise overview of international developments since 2013. A reference was also introduced in the relevance discussion in Chapter 7 Conclusions to the problem of climate extremes presented in the Relevance section 6.1.1.

from the scope of the Strategy, in particular given its interdependence with the international activities and events, such as the 2015 Paris Agreement and the fact that the international dimension was part of the EU Adaptation Strategy package (SWD 2013(138))? **Box 5 Validity of conclusions and relevance for further action** **Hyphen 3** How can the report conclude on the need to examine alignment with international policy development, if this has been taken out of the scope?	
B(4) Monitoring and evaluation arrangements are not properly assessed to support the conclusions. **C(4)** As the context of the Strategy has evolved substantially, the report needs to elaborate on the monitoring and evaluation framework. The report should clarify whether existing monitoring and evaluation arrangements, including the revision of the monitoring mechanism Regulation, are still relevant or whether they need further improvement to capture socio-economic impacts, for example. This applies particularly to the new focus on implementation and substantive elements of the climate adaptation strategies at all levels. **Box 1 Design and methodology** **Hyphen 2** The report should also document any efforts to develop indicators that would help measure the societal impact. Such indicators would seem to require long-term data collection efforts. As the report will feed into the future revision of the Strategy, it should include a discussion on how to fill the identified data gap. What is the role of the EU vs Member States in developing monitoring and evaluation tools? **Box 2 Effectiveness and efficiency** **Hyphen 4** The study acknowledges the lack of information on the socioeconomic dimension on the ground. Socioeconomic trends	A presentation of ongoing work on new indicators was added to the section on limitations in Chapter 5 Method. Under Section 6.2.3 Drivers and barriers and in related Annex VIII section 3, an explanations was added on the respective responsibilities and activities related to monitoring at the EU and at the MS level. An addition to Section 6.2.4 on effects on different stakeholders explains that meaningful results from the ongoing funding programmes are not yet available to draw conclusions on socio-economic impacts.

interrelate with climate change but were not part of the Strategy's focus, when dealing with the action 4 on knowledge gaps. The report however builds on a need to map the socio-economic impacts of adaptation policies. It seems that this mapping is (exclusively) based on the stakeholder consultation. Is there any other evidence of impact? The report cites a lack of socioeconomic performance indicators as a reason why this impact is not measured. However, the report refers to the end of the ESIF, CAP and CFP to aggregate some societal indicators. Can more information be extracted from (mid-term) evaluations of relevant programmes (such as ESIF, CEF, H2020, LIFE, Cohesion policy programme) to serve this purpose? Why does the report not conclude on the lack of effectiveness concerning the socioeconomic dimension?	
C(5) The report should present stakeholders' views in more detail throughout the document. **Box 1 Design and methodology** **Hyphen 4** The quality of the evidence seems variable with regard to the different objectives/actions as clearly indicated in the text and annexes. As it often relied on stakeholder views, these should be presented in more detail, both in various sections and in conclusions.	Chapter 5 Method now specifies that some of the (newly added) stakeholder views in the study emanate from a small number of stakeholders. Stakeholder views were added to those sections of Chapter 6 Analysis where so far no references to such views had been made. In the beginning of Chapter 7 Conclusions, we explain about the specificity of this policy area as the interest of the stakeholders are rarely contradictory, so there is less scope in presenting differing views.
Box 2 Effectiveness and Efficiency **Hyphen 1** The Strategy is meant to work as a leveraging instrument working via multiplier actions under the different objectives. Therefore, it is difficult to assess its contribution given that there are several external drivers and there is no clear counterfactual. As reported on p. 31, stakeholders find that the Strategy has been more effective in encouraging preparatory	There was already a statement on the observed discrepancy between preparatory and implementing action in Chapter 7 Conclusions.

activities and less in promoting assessment of options, implementation and monitoring and evaluation. This view needs to be reflected in the conclusions as well.	
Box 2 Effectiveness and Efficiency **Hyphen 3** The evaluation could give more attention to the need for local adaptation action: While the Covenant of Mayors is counted as a success, only 26 % of cities have adopted an adaptation plan, independent of whether they part of the Covenant or not. Only 3 % percent of cities with more than 150 000 inhabitants have registered an adaptation strategy with the Covenant.	The wording in Chapter 7 Conclusions now explains about the discrepancy between the reported and the estimated number of local strategies and about its possible reason, which at the same time underpins and moderates the positive claims on the success of Action 3. Chapter now also mentions the discrepancy between, on the one hand, Eastern and Southern European Member States and, on the other hand, Central and Northern European Member States regarding the proportion of local adaptation plans.
Box 2 Effectiveness and Efficiency **Hyphen 5** The report states that Action 8 (insurance) has so far not been very effective but that this may change following the adoption of the very recent proposal on sustainable finance. Regardless whether this initiative makes a difference to a climate-resilient Europe, there are few references in the report to other recent Commission proposals in areas that seem relevant to the Strategy (e.g. MFF).	A short description was added to Action 6 under Section 6.2.2 on how adaptation was mainstreamed into the Commission proposal on the new Multi-Annual Financial Framework 2021-2027. Section 6.2.2 also gives more details under Action 8 on the future implementation of the Action Plan on Sustainable Finance.
Box 3 Relevance and EU added value **Hyphen 1** Action 6 of the Strategy focused on mainstreaming climate adaptation in various policy areas, which was the task for EU itself. The report identifies areas where significant progress has been made, but neither the main report nor Annex VIII mention fisheries or trade as the areas where no progress has been observed. Therefore, the gap analysis seems not complete and the narrative of section 5.5 is not consistent with conclusions of the report. The reasons for not including climate adaptation in the missing areas should be explained.	Section 6.2.3 to drivers and barriers to effectiveness already explained under Action 6 the reasons for insufficient mainstreaming into fisheries policy. An explanation for similar lack of mainstreaming into trade was added. The answer to Checklist Box 5 Hyphen 4 below explains how the mismatch of Section 6.5 EU added value and Chapter 7 Conclusions concerning the mainstreaming gap in trade and fisheries was addressed.
Box 3 Relevance and EU added value	Section 6.1.1 on relevance now gives the reasons of the ongoing need under

Hyphen 2 The Strategy's objective to mainstream climate adaptation in various policies appears to have been a kind of one-off type. As climate adaptation has been internalised in these policies (has been mainstreamed), one could question the relevance of keeping this objective of the Strategy, at least for LIFE, ESIF and CAP.	Action 6 for mainstreaming into other policy areas.
Box 3 Relevance and EU added value **Hyphen 3 Sentences 1 to 3** Given the partly voluntary nature of the Strategy, there is no obligation for Member States to establish their national climate adaptation strategies. Nevertheless, the Strategy seems to exert oversight on what Member States are putting in place. This issue could be better developed in the report.	The institutional setup in relation to the adaptation preparedness scoreboard was already presented in detail Chapter 4 Baseline under Action 1.
Box 3 Relevance and EU added value **Hyphen 3 Sentences 4 & 5** The report should report what adaptation efforts the EU and the member states have committed to under the Paris Agreement. It should discuss how this affects the importance of the adaptation strategy.	The new Chapter 3 on international policy includes an explanation of the nature of the EU and Member State commitments under the Paris Agreement.
Box 5 Validity of conclusions and relevance for further action **Hyphen 4** The conclusions of the report on the EU value added do not reflect the narrative of the analysis. While section 5.5 states that EU added value is obvious for Action 6 (mainstreaming of climate adaptation into various EU policies), there is no discussion that this value added would have been even greater if the scope of policies considered were wider and included trade and fisheries as well, as suggested in the conclusions. **Hyphen 5** The statement in conclusions related to the very positive experience with climate mainstreaming needs to be reconciled with the conclusion on EU value added. **Hyphen 6** The conclusion that "*the Strategy promoted strong action by Member States*" needs to be reconciled with what is presented in section 5.3.1 (p. 47) where it is stated that "*the exact role of the Strategy in this respect is*	Adjustments were made to **section 6.5** and Chapter 7 Conclusions to resolve the inconsistencies identified by the Board.

unclear, being one of multiple drivers". In addition, the national strategies seem not to be well developed, so the narrative on the success of the Strategy should be toned down.	
Box 6 Presentation **Hyphen 1** The report is proportionate, clear and reader-friendly. It usefully documents progress since 2013, but provides only limited aid to policy making regarding whether a revision of the strategy is necessary.	The SWD focused entirely on the backward-looking evaluation. The accompanying report to EP and Council will elaborate on the need to revise the Strategy or not.
Box 6 Presentation **Hyphen 2** Even though the report contains a glossary, acronyms should be spelled out when used for the first time in a given section. To improve fluency of the narrative, acronyms should be used sparingly.	The practice of introducing and using acronyms was revised and corrected. Acronyms are used more sparingly and at their first use they are always spelled out, for less known acronyms even every time they first appear in a section.

Annex II Stakeholder consultation

1. Objectives of the consultation

The current EU Adaptation Strategy (the Strategy) was published in April 2013 in response to the climate risks that Europe is and will increasingly face. The Strategy committed the Commission to report to the European Parliament and the Council on the state of its implementation. The evaluation was needed in order to comply with this requirement and assess the progress made since 2013.

As indicated in the Consultation Strategy and in line with the Better Regulation Guidelines, the objective of the Stakeholder Consultation in relation to the EU Adaptation Strategy evaluation is to draw upon existing evidence to deliver a high quality and credible evaluation study by allowing interested parties to provide their feedback and experiences of implementing the Strategy thus far. This includes identifying specific case studies or further evidence, lessons learned, knowledge, financing and capacity gaps, obstacles and factors of success, and suggestions for improvement.

2. Consultation activities and methodology

2.1. *Activities*

As defined in the Consultation Strategy, a combination of in-depth surveys, interviews of interested stakeholders, an open public consultation and stakeholder workshops have been used to gather evidence.

a) Stakeholder surveys – The targeted stakeholder survey ran from July to August 2017. It was available in English and comprised multiple choice and free text questions. Survey invitations were sent to 370 stakeholders involved, directly or indirectly, in the implementation of the Strategy. In addition, the invitation was sent to all registrants for the 3rd European Climate Change Adaptation Conference, held in Glasgow (850 attendees). The structure of the questionnaire allowed the participants to focus on the Actions under the Strategy that were of primary interest to them.

b) Stakeholder interviews – 43 interviews were held with about 50 stakeholders who had been actively involved in different aspects of the implementation of the Strategy. 35 of the interviews covered the 8 Actions with questions relating to the five evaluation criteria of relevance, effectiveness, efficiency, coherence and EU added value. Respondents could choose to respond on one or on more actions and could choose the questions on which they wished to focus. A further 8 interviews contributed to the development of four case studies on:

- Fire preparedness and the impact of climate change
- Spillover effects from climate change impacts occurring outside the EU
- The Danube macro-regional strategy (EUSDR) and its contribution to action at Member State level
- Adaptation of infrastructure in the energy sector.

c) Open Public Consultation – An open public consultation was available from 7th December 2017 to 1st March 2018 (12 weeks) on DG CLIMA's website[187]. Initial multiple choice questions were for all respondents including private individuals. Sections with multiple choice questions on interim conclusions from the study in support of the evaluation[188] were available to expert stakeholders. All respondents could add comments in a free text field and upload a document or position paper.

d) Stakeholder workshop – Two workshops were organised to present the evaluation and gather new evidence to elicit further feedback on draft conclusions.

- 5 April 2017 – Over 90 stakeholders participated. It served to briefly present the Strategy and obtain feedback on its implementation and to guide the further development of the evaluation.
- 23 January 2018 – To present and discuss interim conclusions and recommendations from the study. This was previously foreseen for October 2017, but it was postponed in order to discuss the preliminary results of the evaluation. Around 120 stakeholders participated in this second event.

2.2. *Stakeholder groups participating*

In the context of the Strategy evaluation, a broad scope for the stakeholder consultation was necessary to ensure that all relevant and interested stakeholders had the opportunity to express their opinions and to contribute to the evaluation.

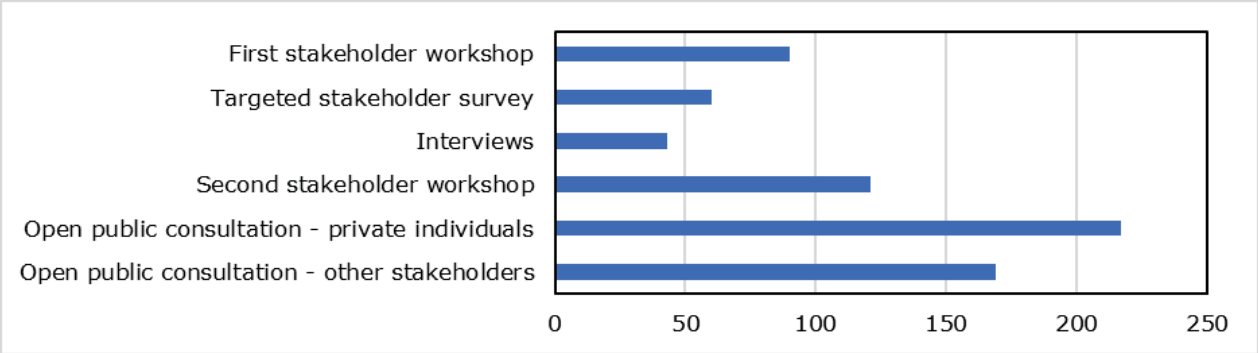
Six groups of stakeholders were identified in the mapping of the Consultation Strategy, which were used throughout the consultation activities in order to maintain a balance between different stakeholders. The figures below show the number of participants by consultation activity and by stakeholder type. [189]

[187] Available at https://ec.europa.eu/clima/consultations/evaluation-eus-strategy-adaptation-climate-change_en

[188] These were published alongside the open public consultation. See: Ricardo, IEEP, Trinomics, and Alterra. Study to support the evaluation of the EU Adaptation Strategy, Summary interim findings, 2017. Available at: https://ec.europa.eu/clima/sites/clima/files/consultations/docs/0035/summary_interim_findings_en.pdf

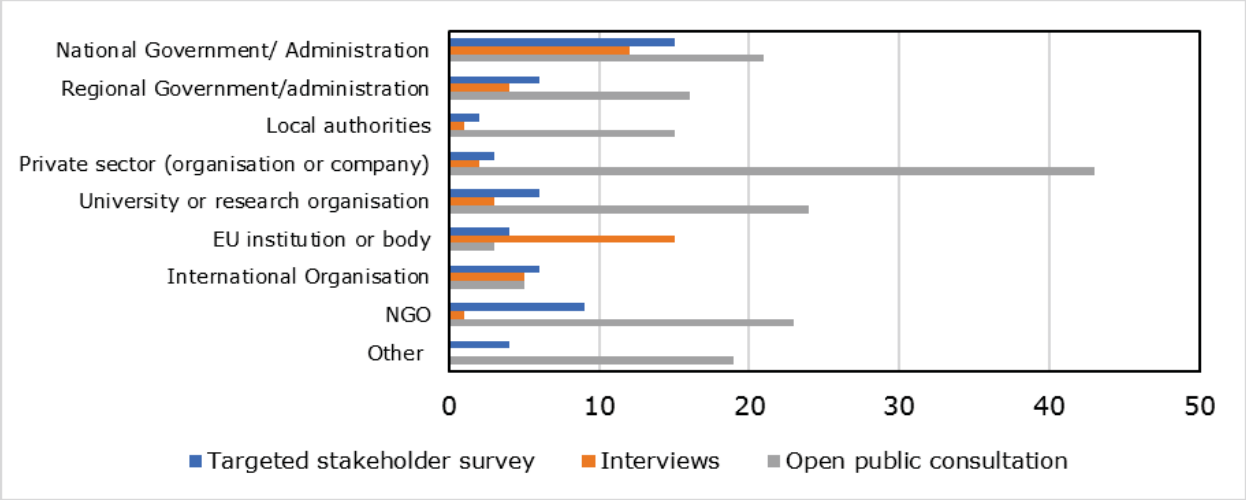
[189] Please notice that in the figure 2 local and regional authorities are separated, nevertheless they are generally considered together in the evaluation, except when differences exist.

Figure II-1. Number of respondents by consultation activity



Source: External Support evaluation study

Figure II-2. Participants by stakeholder type for three consultation activities



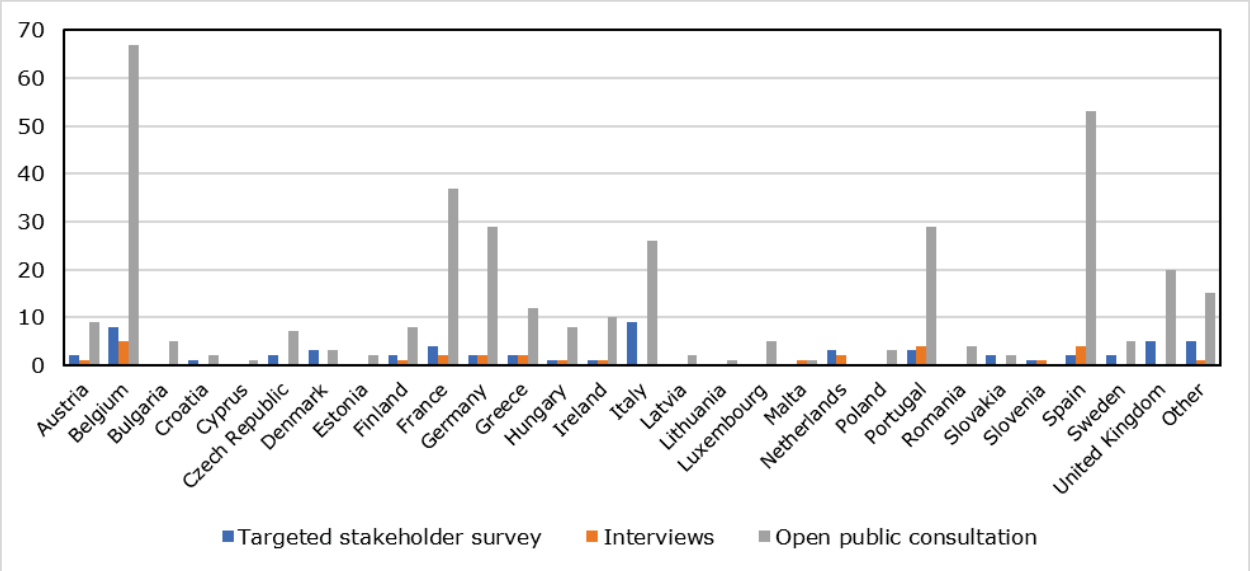
Source: Own analysis of participation by consultation activity. Note that, in addition, 217 private individuals responded to the open public consultation.

Despite the fact that interviews were conducted with all types of stakeholders, the majority of them were from the National government/Administration and EU institutions due to the technical nature of the interviews and the necessity to obtain reliable evidence to proceed with sections related to efficiency and effectiveness.

In the case of the Open Public Consultation, the large majority of stakeholders (56%) were private individuals and the three largest countries by representation of respondents were Belgium (17%), Spain (14%) and France (10%).

Besides the balance between the interests of different stakeholders, the consultation aimed at ensuring a geographical balance by providing opportunities to all stakeholders across Europe to participate in the consultation activities.

Figure II-3. Participants by Member State for three consultation activities



Source: Own analysis of participation by consultation activity. Note that the 15 EU interviews are not ascribed to a Member State – the remaining 28 are in this figure

2.3. *Methodology*

The Open Public Consultation was published in 23 languages in EU Survey, an online survey-management system, during 12 weeks and actively advertised in the DG CLIMA's website and social networks of the Commission.

Quantitative information was collected and analysed using spreadsheets and the results were divided by stakeholder in order to identify coincidences and contradictions between different groups. For the Open Public Consultation, comparisons were made between groups with 20 or more responses – National Governments/ Administrations, private sector, university or research organisations, and NGOs. One further group combined the response from regional governments/ administrations and from local authorities to give a sub-national group (as foreseen in the Better Regulation Guidelines).

Qualitative information was received from: the stakeholder workshops, interviews, the many free text responses to the targeted stakeholder survey, the open text response to the open public consultation and the papers uploaded for the targeted stakeholder survey and open public consultation (analysed in the report).

The information collected was analysed according to the five evaluation criteria: relevance, effectiveness, efficiency, coherence and EU added value. Moreover, responses were further assessed by Strategy Objective / Action and by stakeholder type.

3. Results

3.1. *Targeted Stakeholder Survey*

In total, 114 stakeholders responded to the survey questionnaire of which 54 respondents only indicated their organisational type and their country, which left 60 responses to analyse. The questions and responses were organised by Action and focused on the effectiveness, coherence and efficiency criteria.

Figure II-4. Number of respondents of the Targeted Stakeholder Survey from each organisational type

Organisational type	Number of respondents
National Government body	15
Sub-national Government	6
Municipal/city Government	2
Private sector	3
University	6
Research organisation	5
EU institution or body	4
Other international organisation	6
NGO	9
Other[190]	4

On effectiveness, a total of 14 respondents to the targeted stakeholder survey provided specific examples of barriers to EU activities promoting adaptation in key vulnerable sectors (Agriculture, Forestry, Energy, Transport, Construction, Fisheries). Overarching barriers that some respondents identified as applying to several sectors include:

[190] Those that self-identified as "Other" are: an EU network of regional authorities, a local government association in a Member State region, a regional development agency; and a research institute with a focus outside the EU

- Level and scale of available information on climate impacts and uncertainties of extreme events (frequency and magnitude) – energy, transport and construction sectors
- Need for climate proofing standards – energy, transport and construction sectors
- Attitudes towards climate change, lack of collaboration between sectors – all six sectors
- Insufficient EU initiatives to promote adaptation – energy and transport sectors
- Funding – all six sectors
- No obligation to consider climate risk (or very limited) – energy, transport and construction sectors.

The majority of stakeholders considered that the Strategy had a clear added value since they affirmed that in the absence of the Strategy the same level of progress could not have been achieved, mainly for actions 3 to 6. For the rest, only around 20-40 stakeholders responded per action. This gives small numbers for each stakeholder group, and no major difference between their views was discerned.

3.2. *Stakeholder interviews*

Interviews provided evidence on all evaluation criteria. All types of stakeholder are represented in the interviews, nevertheless the majority of stakeholders came from public institutions (EU, Member State or sub-national).

Figure II-5. Number of respondents of the Targeted Stakeholder Survey from each organisation type

Organisation type	Total number of responses	Evaluation criterion				
		Relevance	Effective-ness	Efficiency	Coherence	EU added value
National, Sub-national and Municipal Government bodies	16	15	16	11	11	13
EU Institutions or bodies	14	11	11	9	12	11
Other stakeholders	12	11	11	5	6	8
Total	**42**	**37**	**38**	**25**	**29**	**32**

On relevance, the stakeholder interviews highlighted that there is a need to close new knowledge gaps. Examples of such gaps highlighted by stakeholders included: adaptation

in mountainous areas, climate impacts outside the EU that have implications for the EU, long-term lack of water resources and coastal issues, biodiversity, and high-end climate change (i.e. greater than 2ºC). The latter was also reflected by responses to the public consultation (90% of 158 respondents agreed or strongly agreed that there is a need to address the impact of high-end climate change).

On effectiveness, the interviews provided evidence that the Strategy played a role in ensuring increased political salience of the need for Member States to adopt strategies and plans where they were not already in place. The interviewees also suggested that the use of the adaptation ex ante conditionalities for European Structural and Investment Funds programmes was an effective mechanism for ensuring Member States adopted NASs.

Responses to interviews and the targeted stakeholder survey provided additional evidence on the adequacy of resources and how proportionate they were for each of the eight actions. Overall, numerous stakeholders highlighted the cross-cutting nature of adaptation and, thus, agreed that mainstreaming of adaptation objectives into sectoral policies is a necessity. A recurring policy area where coherence with adaptation was seen as essential is disaster risk reduction.

Recommendations included the potential value of enhanced discussion on regional-level adaptation challenges facing neighbouring Member States.

Eight further interviews were conducted to develop the 4 case studies listed in section 2.1.

3.3. *Open Public Consultation*

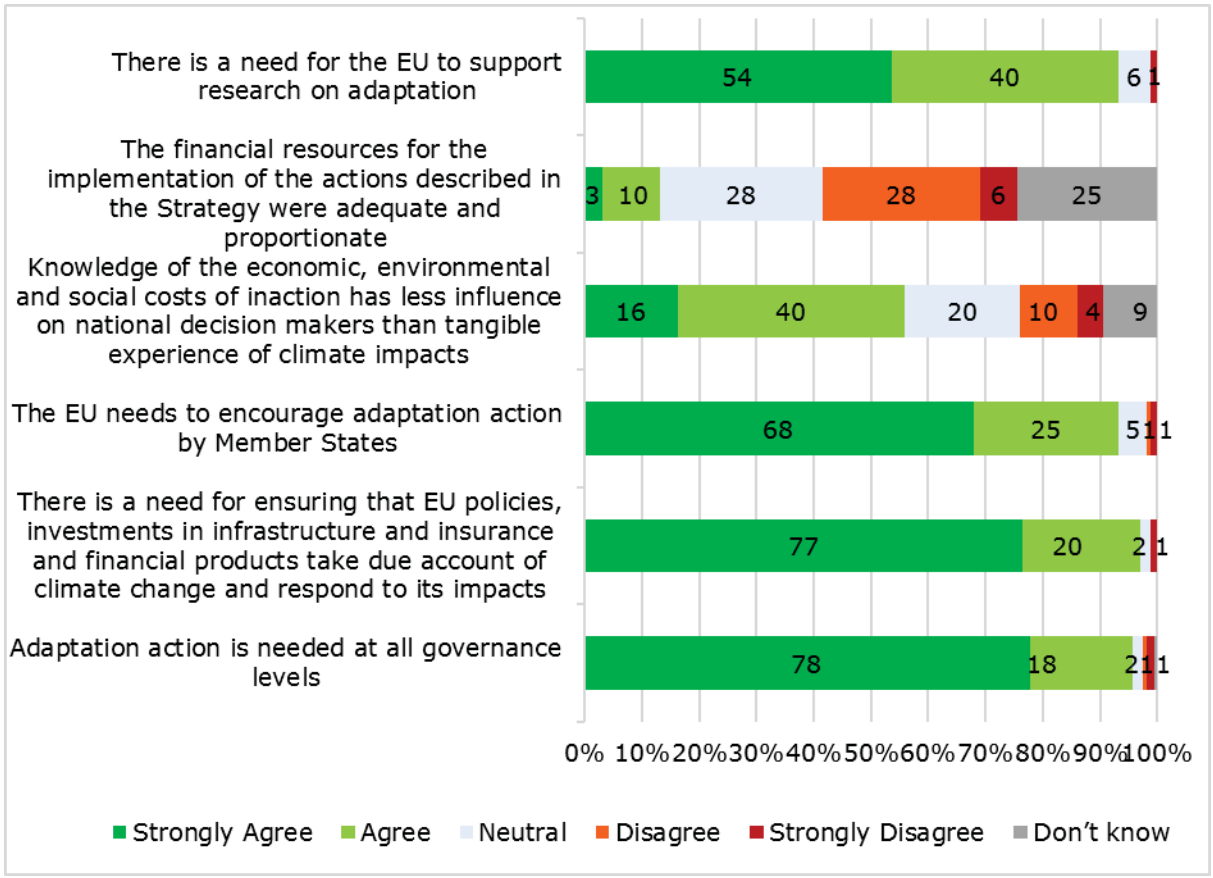
The survey was split between part 1 and parts 2-4, with part 1 targeted to all citizens and parts 2-4 targeted to those with professional experience with adaptation. There were in total 386 responses. Parts 2-4 were answered by 159 respondents (41% of the total).

The respondents had the opportunity to explain their experience with events attributed to climate change, and they identified a total of 1 651 events, the majority related to abnormally warm overall temperatures. Regarding knowledge of the EU's strategy on adaptation to climate change, most respondents considered they had a good (32%) or limited (30%) knowledge. Only 12% of the stakeholders thought that they had a very good knowledge of the strategy and 10% had never heard of it. The knowledge was significant regarding programmes dealing with adaptation action, where 67% of stakeholders knew about H2020.

The relevance of EU-level action was found significant with 93% of respondents believing that it is necessary to combat adaptation to climate change. The responses on the generic aspects of Adaptation were generally supportive. The strongest agreement was found for the conclusions "Adaptation action is needed at all governance levels" and "The EU needs to encourage adaptation action by Member States".

The respondents found the Strategy relevant; since they see the need of further action to address remaining knowledge gaps and to align EU adaptation policy with international developments.

Figure II-6 Responses in the open public consultation to interim conclusions that relate to relevance of the EU Adaptation Strategy



Source: Results from open public consultation. 160 respondents

On effectiveness, there was disagreement between stakeholder's results: regional and national authorities were more positive considering aspects as adaptation mainstreaming than the overall average.

Overall, on coherence, respondents replied positively to the conclusions. Nevertheless, stakeholders considered that there was still a need to better integrate adaptation concerns into the climate mitigation policy or the EU external policy areas. NGOs and Private Sector disagreed more compared to public authorities on the consideration that 'progress has been made in integrating adaptation concerns into a wide range of EU policy areas'.

The respondents almost exclusively agreed with the conclusions about EU added-value. This highlights that many believe in the importance of the Strategy and EU action for adaptation to climate action. Furthermore, most stakeholders more strongly agreed that the greatest value of EU action is through mainstreaming adaptation into its own policies.

Finally, out of the 386 stakeholders involved in the public consultation, 239 submitted an answer to the open question and 27 position papers were received. An extensive summary can be found in appendix 2E of the external support study.191 The position

[191] Published on the website of the Evaluation of the EU's Adaptation Strategy https://ec.europa.eu/clima/events/articles/0119_en

papers were analysed and were taken into account during the evaluation as part of the evidence.

3.4. *Stakeholder Workshops*

The first workshop (5th April 2017) provided significant input on the three priorities identified in the 2013 Strategy. There was agreement on:

- The need for research to be made available in forms that decision-makers could use.
- The need for better understanding of social and cultural barriers to adaptation.

The effectiveness and coherence of the evaluation were the main elements discussed throughout the workshop: it was considered that the Strategy promoted action from some Members States (not all) and contributed to promote coherence in action.

The main findings of the evaluation were presented in the second workshop (23rd January 2018). The recommendations of the external support study were supported by the large majority of members who assisted in the workshop, except on the alignment with International obligations under the Paris Agreement and its alignment with the Global Stocktake in 2023 (this recommendation was reconsidered in the final study). This second stakeholder workshop was useful to promote participation in the parallel Open Public Consultation. There were no major contradictions between the results provided by the workshop and the rest of the consultation activities.

4. Identified campaigns and ad-hoc contributions

No campaigns have been identified in the context of the Open Public Consultation.

Several documents and position papers were provided in association with the open public consultation. These were noted in the relevant consultation reports (appendix 2E of the external support study) and included as part of the evidence base for this work. Nevertheless no ad-hoc documents were received outside the consultation activities.

5. Feedback from the roadmap

There was no feedback received on the roadmap of the evaluation. Therefore, there were no significant changes applied to the consultation activities in comparison with the original roadmap.

In summary, information from the consultation forms a major part of the evidence considered in the evaluation. Evidence is compared with that from other strands of the consultation and also with results of the literature review to identify the overall level of agreement or divergence of the evidence. The results of the open public consultation, in particular, provide sufficient responses from key groups of stakeholders to consider whether there is agreement or divergence by stakeholder type.

Annex III Acronyms

Acronym	*Meaning*
ACP	African, Caribbean and Pacific states
C3S	Climate Change Services
CAP	Common Agricultural Policy
CBA	Cost-benefit analysis
CBD	Convention on Biological Diversity
CDP	Carbon Disclosure Project
CEN	Comité Européen de Normalisation
CENELEC	Comité Européen de Normalisation en Electronique et en Electrotechnique
CF	Cohesion Fund
CFP	Common Fisheries Policy
CIS	Common Implementation Strategy
CMU	Capital Markets Union
CNCs	Core Network Corridors
COP21	2015 United Nations Climate Change Conference, COP21 in Paris, France
CoR	Committee of Regions
Covenant	Covenant of Mayors for Climate and Energy
CPR	Common Provisions Regulation
CRR/CRD	Capital Requirements Regulation and Directive
DCI	Instrument for Development Cooperation
DG AGRI	Directorate General for Agriculture and Rural Development of the European Commission
DG BUDG	Directorate General for Budget of the European Commission

DG CLIMA	Directorate General for Climate Action
DG COMM	Directorate General for Communication
DG COMP	Directorate General for Competition of the European Commission
DG DEVCO	Directorate General for International Cooperation and Development of the European Commission
DG EAC	Directorate General for Education, Youth, Sport and Culture of the European Commission
DG ECFIN	Directorate General for Economic and Financial Affairs
DG ECHO	Directorate General for European Civil Protection and Humanitarian Aid Operations (ECHO) of the European Commission
DG ENER	Directorate General for Energy of the European Commission
DG ENV	Directorate General for Environment of the European Commission
DG FISMA	Directorate General for Financial Stability, Financial Services and Capital Markets Union of the European Commission
DG GROW	Directorate General for Internal Market, Industry, Entrepreneurship and SMEs of the European Commission
DG HOME	Directorate General for Migration and Home Affairs of the European Commission
DG MARE	Directorate General for Maritime Affairs and Fisheries of the European Commission
DG MOVE	Directorate General for Mobility and Transport of the European Commission
DG NEAR	Directorate General for Neighbourhood and Enlargement Negotiations of the European Commission
DG REGIO	Directorate General for Regional and Urban Policy of the European Commission
DG RTD	Directorate General for Research and Innovation of the European Commission

DG SANTE	Directorate General for Health and Food Safety of the European Commission
DG TAXUD	Directorate General for Taxation and Customs Union of the European Commission
DG TRADE	Directorate General for Trade of the European Commission
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EASME	Executive Agency for Small and Medium-sized Enterprises
EbA	Ecosystem based Adaptation
EBRD	European Bank for Reconstruction and Development
ECA	European Court of Auditors
EDF	European Development Fund
EEA	European Environment Agency
EEAS	European Union External Action Service
EFFIS	European Forest Fire Information System
EFSI	European Fund for Strategic Investments
EIA	Environmental Impact Assessment
EIB	European Investment Bank
Eionet	European Environmental Information and Observation Network
EMFF	European Maritime and Fisheries Fund
ERDF	European Regional Development Fund
ESF	European Social Fund
ESIF	European Structural and Investment Funds

ESOs	European Standardisation Organisations
ETC	European Territorial Cooperation
ETC/CCA	European Topic Centre on Climate Change impacts, vulnerability and Adaptation
EU	European Union
EU15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom
EUFIWACC	European Financing Institutions Working Group on Adaptation to Climate Change
EUR	Euro
EUSALP	The European Union Strategy for the Alpine Region
EUSBSR	The European Union Strategy for the Baltic Sea Region
EUSDR	EU Strategy for the Danube Region
EWS	Early Warning System
FERMA	Federation of European Risk Management Associations
FP6	Framework Programme 6
FP7	Framework Programme 7
FRMP	Flood Risk Management Plans
GCCA+	Global Climate Change Alliance
GDP	Gross Domestic Product
GI	Green Infrastructure
GMES	Global Monitoring for Environment and Security
H2020	Horizon 2020
ICLEI	International Council for Local Environmental Initiatives
ICPDR	International Commission for the Protection of the Danube River

Interreg	European Territorial Cooperation
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
JASPERS	Joint Assistance to Support Projects in European Regions
JPI	Joint Programming Initiative
JRC	Joint Research Centre
LIFE	L'Instrument Financier Pour L'Environnement
MCA	Multi-criteria analysis
MFF	Multiannual Financial Framework
NAP	National Adaptation Plan
NAS	National Adaptation Strategy
NCFF	Natural Capital Financing Facility
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organisations
PESETA	Projection of Economic impacts of climate change in Sectors of the EU based on bottom-up Analysis
RDP	Rural Development Programme
SEA	Strategic Environmental Assessment
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SG	Secretariat-General of the European Commission
SJ	Legal Service of the European Commission
SMEs	Small and Medium-sized Enterprises
SWD	Staff Working Document
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network

UIA	Urban Innovative Actions
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
URBACT	European exchange and learning programme promoting sustainable urban development
WFD	Water Framework Directive

Annex IV List of SWDs supporting the Strategy Communication in 2013

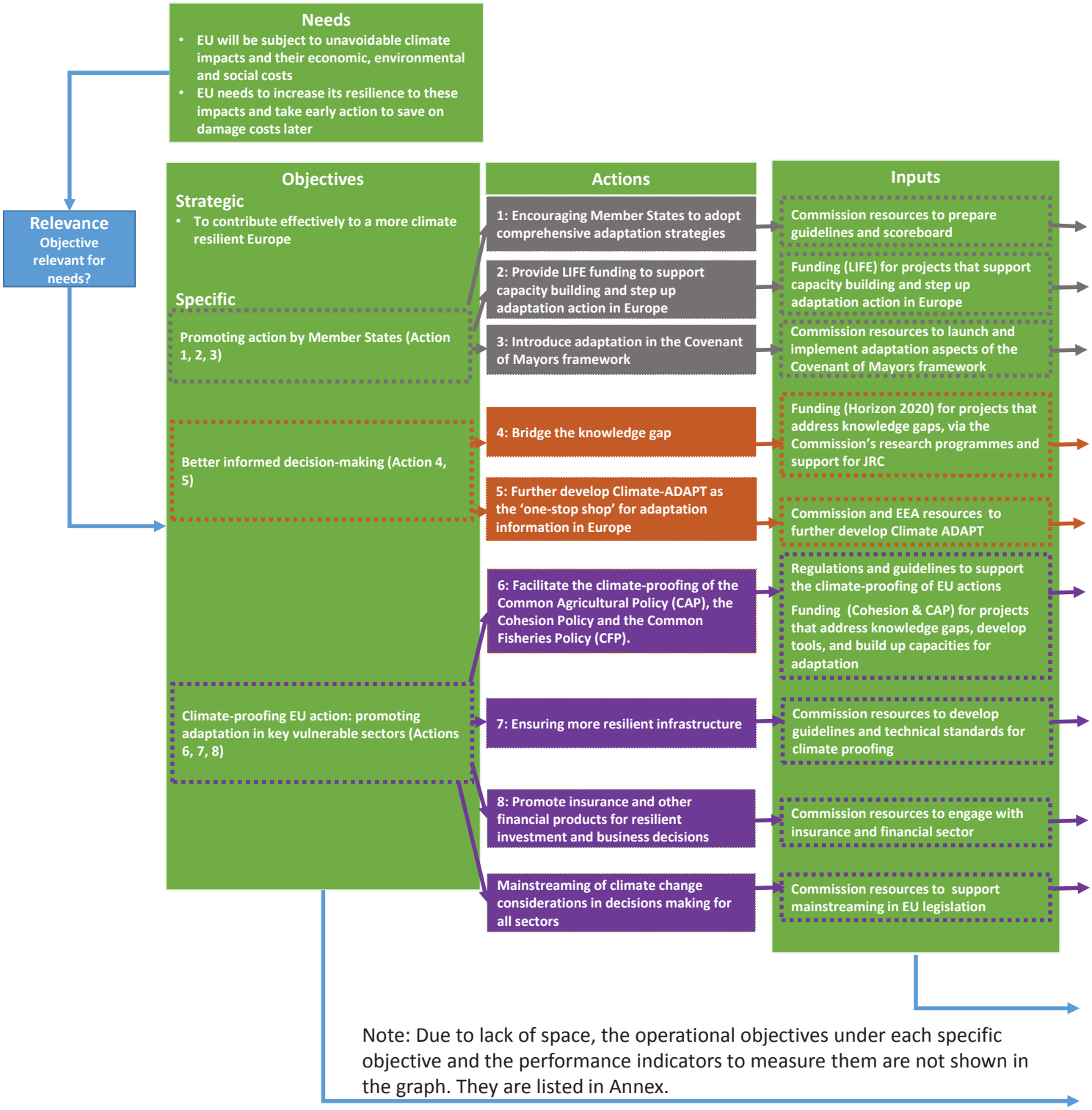
The documents provide further information on certain elements of the Strategy and respond to some specific commitments made in the Strategy, e.g. to prepare guidelines on developing adaptation strategies. The supporting documents are:

- Impact Assessment of the EU Strategy on Adaptation to Climate Change
- SWDs on
    - Climate change adaptation, coastal and marine issues
    - Adaptation to climate change impacts on human, animal and plant health
    - Adapting infrastructure to climate change
    - Climate change, environmental degradation, and migration
    - Technical guidance on integrating climate change adaptation in programmes and investments of Cohesion Policy
    - Principles and recommendations for integrating climate change adaptation considerations under the 2014-2020 rural development programmes
    - Guidelines on developing adaptation strategies.

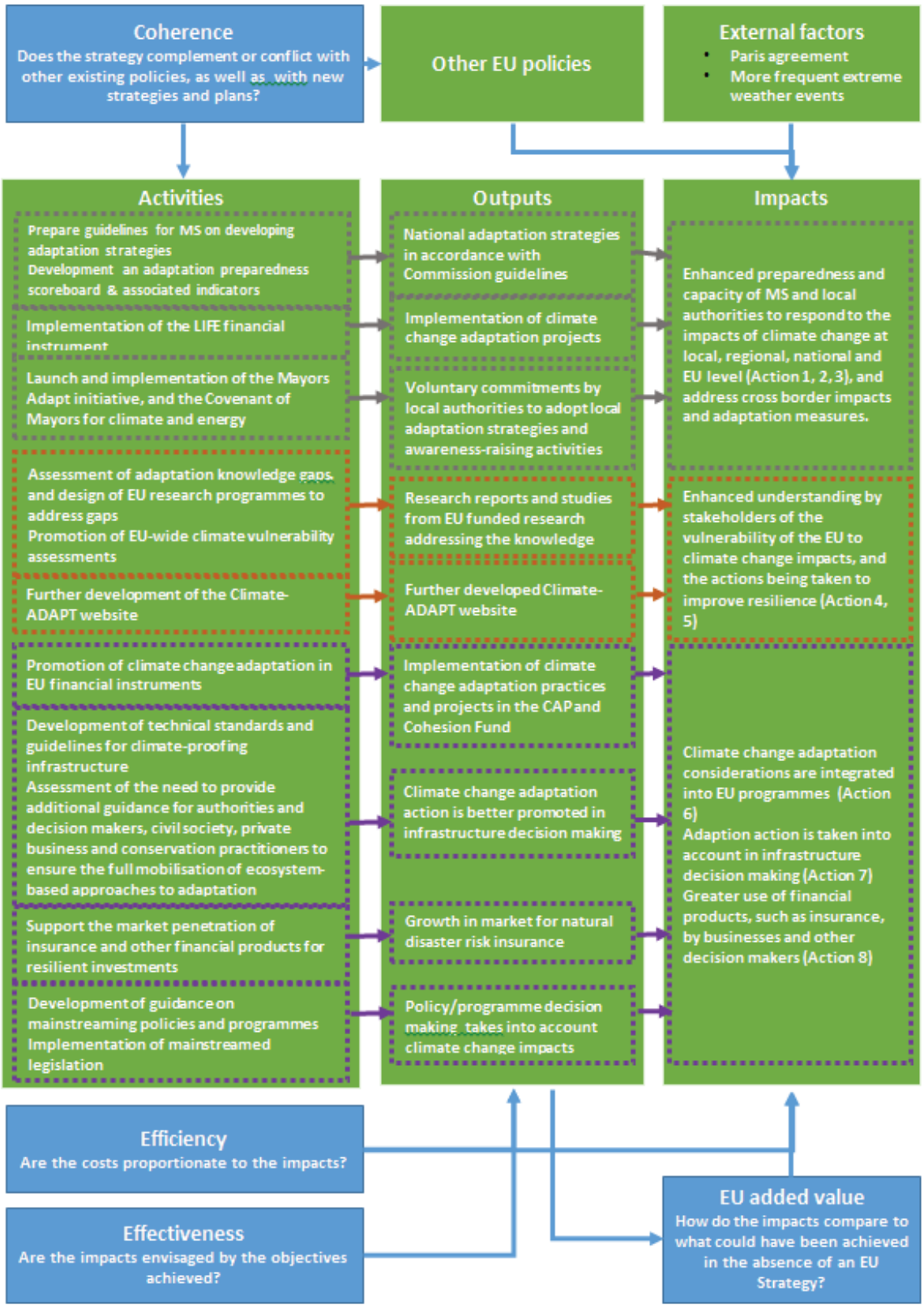
In addition, a Green Paper on the insurance of natural and man-made disasters was launched in parallel with the Strategy. The Green Paper sets out the potential for the European Union to facilitate and support the development of markets for disaster risk insurance.

The EU Adaptation Strategy package also included the 'Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient'.

Annex V Intervention logic of the EU's Adaptation Strategy (reconstructed)



Note: Due to lack of space, the operational objectives under each specific objective and the performance indicators to measure them are not shown in the graph. They are listed in Annex.



Annex VI Operational objectives and performance indicators in the 2013 impact assessment

The Strategy did not commit to achieving the operational objectives listed in the impact assessment and did not mention the related performance indicators. Furthermore, it listed the specific objectives in a different order and numbering than the Impact Assessment. In order to be in line with the Strategy's numbering of the specific objectives, the operational objectives are renumbered in the list below. Their original number in the Impact Assessment is shown in parenthesis.

Objective 1: Increasing the resilience of the EU territory[192]

Operational Objective 1a (2a): by 2017, all Member States have adopted adaptation strategies, complemented by regional or local adaptation strategies, where appropriate

- Number of NASs and action plans and national climate change risk assessments
- Number and amount of LIFE grants used for experience transfer[193]

Operational Objective 1b (2b): by 2020, cities of more than 150 000 inhabitants have adopted an adaptation strategy

- Number and amount of LIFE grants used for lighthouse projects[194] on adaptation
- Covenant of Mayors (ongoing): number of cities pledging to develop an adaptation strategy
- Number of cities of more than 150 000 inhabitants in vulnerable areas with an adaptation strategy

Objective 2: Better informed decision making

Operational Objective 2a (1a): by 2020, priority knowledge gaps[195] identified in 2013 have been closed

- List of knowledge gaps now, in 2017, and in 2020
- Number of H2020 and JRC research projects dealing with adaptation and associated budget allocated

Operational Objective 2b (1b): by 2020, communication tools allow for available information on climate change adaptation to be more easily accessible for decision-makers, including Member States, local authorities and firms

- Number of visitors to Climate-ADAPT, pages most visited, number of registered users, assessment of the content, databases and metadata
- Number of conferences, workshops, adaptation events registered in Climate-ADAPT

[192] This objective is labelled in the Strategy as "Promoting action by Member States" but is essentially the same objective.

[193] These are projects that share experience and foster capacity building in relation to the development of national and regional adaptation strategies.

[194] See footnote 52.

[195] The key knowledge gaps that were identified are: information on damage and adaptation costs and benefits; regional and local-level analyses and risk assessments; frameworks, models and tools to support decision-making and to assess how effective the various adaptation measures are; and, means of monitoring and evaluating past adaptation efforts.

Objective 3: Increasing the resilience of key vulnerable sectors[196]

Operational Objective 3a: by 2020, adaptation considerations have been mainstreamed in a consistent and comprehensive way in key EU policies

- List of policies and legal acts where adaptation has been mainstreamed
- Adaptation activities by private organisations as reported in the Carbon Disclosure Project (CDP) surveys

Operational Objective 3b: by 2020, new major infrastructure investments are climate-proofed

- Amount of adaptation infrastructure investments (co-)financed by EU funds and/or public financial institutions
- Progress on the mapping exercise by CEN-CENELEC[197].

[196] This objective is labelled in the Strategy as "'Climate-proofing' action at EU level" but is essentially the same objective.

[197] The European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC).

Annex VII Inputs, activities and outputs related to the 8 actions of the Strategy

Action 1: Encourage all Member States to adopt comprehensive adaptation strategies

This action encourages all Member States to adopt comprehensive adaptation strategies. Encouragement has been provided through the following activities, and associated outputs:

- Provision of guidelines to help Member States formulate adaptation strategies, which were published alongside the Communication
- Development of an 'adaptation preparedness scoreboard', which identifies key indicators for measuring Member States' level of readiness.
- A commitment was also made that, in 2017, the Commission would assess action being taken in the Member States and if progress is deemed insufficient, the Commission would consider proposing a legally-binding instrument.

It was expected, when the Strategy was prepared, that the encouragement provided by the Commission in relation to Action 1 would contribute towards all Member States adopting an adaptation strategy, complemented by regional and local adaptation strategies, by 2017.

Action 2: Provide LIFE funding to support capacity building and step up adaptation action in Europe (2013-2020).

Action 2 concerns the creation of the Climate Action sub-programme under the 2014-2020 LIFE funding programme for the environment. The sub-programme covers climate change mitigation, climate change adaptation, and climate governance and information. Through the creation of the Climate Action sub-programme, the aim was to substantially increase the LIFE funds available to combat climate change.

It was expected when the Strategy was prepared that additional funding would be directed towards climate adaptation projects in comparison to the situation without the Strategy. It was also expected that this funding would lead to better informed decision-making via the identification and implementation of relevant cross-sectoral and cross-border lighthouse projects. Other expected outcomes included the strengthening of existing networks and collaborations between Member States and associated countries and other third countries.

Action 3: Introduce adaptation in the Covenant of Mayors framework

Action 3 focuses on cities and urban areas, as they have an important role in low-carbon and climate-resilient development across Europe. The action concerns the support provided by the Commission to the launch of Mayors Adapt (the Covenant of Mayors Initiative on Adaptation to Climate Change), through which local authorities can make a voluntary commitment to adopt local adaptation strategies and awareness-raising activities. The initiative was launched by the Commission in March 2014.

It was expected, at the time the Strategy was prepared, that the encouragement provided by the Commission in relation to this action would contribute towards all cities of more than 150 000 inhabitants adopting an adaptation strategy, by 2020.

Action 4: Bridge the knowledge gap

Action 4 concerns two activities undertaken by the Commission:

- To work further with Member States and stakeholders to refine the adaptation knowledge gaps identified in the Strategy and identify relevant tools and methodologies to address them. The findings were to be fed into the programming of H2020, the EU's 2014-2020 framework programme for research and innovation, and were to address the need for better interfaces between science, policy making and business
- To promote EU-wide vulnerability assessments considering, inter alia, the cross-sectoral EU overview of natural and manmade risks that the Commission was to produce in 2013. The Commission was, in particular, to support the JRC to undertake a comprehensive review of what global climate change will mean for the EU.

It was expected, at the time when the Strategy was prepared, that the activities led by the Commission in relation to this action would contribute towards filling the priority knowledge gaps identified in 2013 by 2020.

Action 5: Climate-ADAPT website

Action 5 concerns activities by the Commission and EEA to further develop Climate-ADAPT as the 'one-stop shop' for adaptation information in Europe. This includes improving access to information and developing interaction between Climate-ADAPT and other relevant platforms, such as national and local adaptation portals (2013/2014).

Climate-ADAPT started in 2012. It aimed to facilitate collection and dissemination of information to assist effective uptake by decision makers and to contribute to more coordination between sectoral policies and between institutional levels. Climate-ADAPT has since evolved into an information portal to support Europe in adapting to climate change, co-managed by the EEA and DG CLIMA. It provides information on adaptation strategies, case studies and specifically designed tools that support adaptation planning and decision making.

As part of the further development of Climate-ADAPT, the Strategy describes how special attention will be given to cost-benefit assessments of different policy experiences and to innovative funding, through closer interaction with regional and local authorities and financial institutions. The Strategy also indicates that work on the inclusion of the future Copernicus climate services (previously known as GMES – Global Monitoring for Environment and Security) will start in 2014.

It was expected, at the time the Strategy was prepared, that the further development of Climate-ADAPT would allow available information on climate change adaptation to be more easily accessible for decision-makers, by 2020. It was also expected that the further development of Climate-ADAPT, linking in with other relevant platforms and developing associated guidance, would result in avoided costs for both the EEA and other database managers for data integration into Climate-ADAPT. This was also expected to reduce costs for end-users to compile and process data (the 'one-stop-shop' principle). Another expectation was that the inclusion of the Copernicus Climate Service

in Climate-ADAPT would allow a better assessment of local and sectoral vulnerabilities and, therefore, provide additional data for proper climate risk assessments. Furthermore, it was expected that by supporting the exchange of information between science and policy, Climate-ADAPT would encourage and stimulate new research and development, as well as innovation, in the field of climate change adaptation across a broad spectrum of sectors in the EU as well internationally.

Action 6: Facilitate the climate-proofing of the Common Agricultural Policy, the Cohesion Policy and the Common Fisheries Policy

Action 6 focuses on key EU financial instruments and policy areas, which cover: the CAP, delivered through the European Agricultural Guarantee Fund (EAGF) and the EAFRD; Cohesion Policy, which is delivered through the ERDF, the ESF and the CF; and the CFP. These instruments are jointly managed[198] by the Commission with the Member States. They involve significant additional financial contributions from national budgets and an important role for Member States in spending the funds on the ground once the framework is decided with the Commission.

The Strategy committed the Commission to provide guidance on how to further integrate adaptation into the CAP, Cohesion Policy and the CFP. This guidance was published alongside the Commission's Communication on the Strategy. The guidance was designed for managing authorities and other stakeholders involved in programme design, development and implementation during the 2014-2020 budget period.

This action was to be led by the Commission with the aim of contributing towards the comprehensive and consistent mainstreaming of adaptation in EU policies by 2020.

Action 7: Ensuring more resilient infrastructure

Action 7 concerns a three-pronged approach to ensure the development of more climate resilient infrastructure and commits the Commission to the following activities:

To launch a mandate for European standardisation organisations to start mapping industry-relevant standards in the area of energy, transport and buildings and to identify standards that need to be revised to achieve better inclusion of adaptation considerations.
To provide guidelines to help project developers working on infrastructure and physical assets to climate-proof vulnerable investments. These guidelines were launched alongside the Strategy.
To explore the need for additional guidance on ecosystem-based adaptation for authorities and decision makers, civil society, private business and conservation practitioners.

It was expected when the Strategy was prepared that that the activities led by the Commission in relation to Action 7 would help to ensure that major infrastructure investments are climate-proofed by 2020.

[198] Referred to as "shared management"

Action 8: Promote insurance and other financial products for resilient investment and business decisions

This action concerns the activities to be undertaken by the Commission, as part of the Strategy, to promote insurance and other financial products for resilient investments and business decisions.

In relation to insurance, the Commission's 'Green Paper on the Insurance of Natural and Man-made Disasters', adopted as part of the Strategy's package, was a first step towards encouraging insurers to improve how they help to manage climate change risks.

In relation to other financial products, the Strategy envisaged further engagement with commercial banks on adaptation financing and exploring market-based approaches, such as payments for ecosystem services.

No clear expectations were stated when the Strategy was prepared as to how the market for insurance and other financial products for resilient investment would develop as a result of the above activities. However, it is implicit that these activities would enhance the development of the market.

Annex VIII Complementary information on the initiatives under the Strategy

1. LIFE

As of April 2018, there are at least 60 ongoing adaptation-related LIFE projects targeting implementation across a combined area of the size of Germany (more than 350 000 km^2). Although some participants in the public consultation meeting for this evaluation expressed concern that geographical coverage of LIFE projects since 2014 has been uneven, the LIFE mid-term evaluation notes that adaptation-related projects have a wide geographical coverage: Spain, Italy, Greece, Belgium, France, Germany, Netherlands, Poland, Portugal, Slovakia and Estonia. A total of 44 of ongoing (April 2018) projects under the LIFE Climate Action sub-programme are categorised to climate change adaptation in the LIFE projects database.[199] Summary details of these 44 projects are provided in the table below. There are also approximately 17 adaptation-related projects in other programme strands, such as nature, environment resource efficiency and climate change mitigation, with a total value of approximately 43 million EUR[200].

Table VIII-1: Breakdown of LIFE projects per theme

Sector	No. of projects	Total project costs (EUR)	Commission contribution (EUR)
Agriculture/forestry/tourism	11	24 188 350	14 380 392
Ecosystem based approaches	3	11 598 012	6 555 248
Health and wellbeing	1	3 337 611	1 938 969
Industry	2	4 134 838	2 436 391
Mountain/Island areas adaptation	4	8 482 383	4 959 631
Urban adaptation/planning	11	37 392 556	17 705 057
Vulnerability assessments/adaptation strategies[201]	3	28 565 314	17 139 247
Water (incl. flood management, coastal areas, desertification)	6	23 914 899	10 481 390
Governance and information	3	6 343 007	3 509 300
Total	**44**	**141 613 963**	**73 657 356**

[199] http://ec.europa.eu/environment/life/project/Projects/index.cfm
[200] EASME calculations based on 60% of the 2014-2016 figures
[201] Includes two integrated projects

The new LIFE programme includes 'integrated projects' within the action grants, which are designed to operate at a large geographic scale and "function as multi-purpose delivery mechanisms (e.g. creating environmental benefits and capacity-building) and are expected to exploit synergies and ensure consistency between various funding sources of the EU".[202] Climate change adaptation is one of the targeted themes for integrated projects, which are intended as a vehicle for implementation of adaptation strategies and action plans. To date, two adaptation-related integrated projects have been funded in Denmark and Spain. [203]

In addition to integrated projects, LIFE has also directly supported other adaptation actions under the Strategy. For example, since 2014, the programme has supported eleven urban adaptation projects (Table VIII-1, above), six of which (total budget EUR 15.4 million) are helping to implement Mayors Adapt and Covenant of Mayors commitments. An innovative financial instrument, the Natural Capital Financing Facility (NCFF), was introduced to the LIFE programme in 2015 (Multiannual Work Programme 2014 – 2017) and is implemented by the EIB. The NCFF provides financing (loan or equity) and technical assistance for natural capital projects that can generate revenues or save costs while delivering on biodiversity and climate adaptation objectives[204]. The EIB aims at an investment of 100 to 125 million EUR, with the EU contribution of 50 million EUR for guarantees and 10 million EUR for the support facility. At the moment, two out of the three ongoing projects are related to climate adaptation with a total estimated investment of 56.6 million euros, of which the EIB investment is 17.5 million EUR. The Commission contributes with 8.7 million EUR for guarantees and technical support for the two operations.

2. Covenant of Mayors

Urban areas are particularly vulnerable to climate change impacts, due to the often increasing concentration of population and infrastructure, the ageing population as well as the high proportion of artificial surfaces (which increases the risks of floods and heat waves). The increasing frequency of extreme weather events (such as floods or heat waves) can have dramatic economic and social consequences for our cities.

In order to address this challenge, Mayors Adapt (the Covenant of Mayors Initiative on Adaptation to Climate Change)[205] was launched by the Commission in March 2014, as a flagship programme to promote and facilitate urban adaptation planning. Mayors Adapt drew on experience and expertise developed under the 2012-2013 'EU Cities Adapt' pilot project.

In October 2015, Mayors Adapt and the Covenant of Mayors initiatives were merged, and the Covenant of Mayors for Climate and Energy (Covenant) was officially launched, introducing an integrated approach on mitigation and adaptation and a robust methodology to assess the risks and vulnerabilities associated with climate change and track effectiveness of adaptation action.

[202] See footnote 109
[203] See footnote 53
[204] http://www.eib.org/products/blending/ncff/index.htm
[205] http://www.covenantofmayors.eu/about/covenant-initiative/origins-and-development.html

Signatories to the Covenant voluntarily commit to develop a climate vulnerability and risk assessment and an action plan for targeted adaptation options within two years of signing up to the initiative. This political commitment includes reporting every two years on the implementation progress of their plans.

Between 2013[206] and 2018, the Commission implemented and funded the Covenant of Mayors Office (for the amount of funding, please refer to section 11 in this Annex). These two actors inform, mobilise and support local authorities in taking climate mitigation and adaptation action. The Commission and the Covenant Office raise awareness -including on access to financial opportunities-, encourage political commitment from local authorities to take action, promote their local commitments and actions via the Covenant's communication channels, assist Covenant signatories with any questions via a helpdesk, technical guidance, including for monitoring and reporting, capacity-building events and webinars, facilitates peer-to-peer networks and exchange of experiences and good practices, implement a city twinning programme, online discussion forums, and networking events. The Commission and the Covenant Office also engage other governance levels and stakeholders (States, regions, provinces, national / thematic agencies or organisations, etc.) and co-ordinate work with third parties. The Commission's JRC cooperates with the Office to provide comprehensive technical guidelines, templates and feedback to local authorities for the preparation, implementation and monitoring[207] of the latter's commitments.

More specifically on facilitating access to funding, this has been one of the key priorities of the Covenant. [208] Information on funding opportunities is made available on a regular basis through various means, such as website news items, capacity building events, webinars, Covenant Investment Forums, as well as the informative material, such as the Quick reference guide on financing opportunities (March 2016)[209], leaflets, fact sheets and most recently the Interactive funding guide available in 23 EU languages since March 2018. [210] The pool of financial experts is established to generate more knowledge on innovative financing opportunities and projects to be available for local authorities.

The Commission mobilises financial and political support for signatories at EU level. Indeed, regarding financing, part of the EU funds and financial instruments (i.e. European Fund for Strategic Investments (EFSI), European Structural and Investment Funds, Urban Innovative Actions (UIA), URBACT, LIFE, LIFE Natural Capital Financing Facility, and H2020 support the implementation of the commitments from Covenant signatories on climate change adaptation. The Commission also contributes to providing advice and technical assistance in view of financing local climate change adaptation projects, e.g. through the Urban Investments and Advisory Platform new

[206] 2008, for climate change mitigation.

[207] At the start of 2017, in consultation with the signatories, the Covenant of Mayors Office developed an updated and integrated monitoring and reporting framework, which includes mitigation and adaptation reporting requirements. For the content/structure see here: https://www.covenantofmayors.eu/IMG/xls/SECAP_Template_EN.xls

[208] See footnote 126

[209] Quick Reference Guide, Covenant of Mayors for Climate & Energy, 2016. Available: https://www.covenantofmayors.eu/IMG/pdf/Quick_Reference_Guide_-_Financing_Opportunities_updated2016.pdf

[210] http://www.covenantofmayors.eu/support/funding.html

dedicated urban investment advisory platform and the Joint Assistance to Support Projects in European Regions (JASPERS).[211]

Regarding political support for signatories at EU level, the Commission contributes to this through, for instance, its high-level representatives publicly encouraging and supporting local and Covenant signatories' climate change mitigation and adaptation commitments and actions, regularly meeting the EU Covenant Board (representing the Covenant community) as well as cities' and regions' representatives, and participating in conferences for local authorities organised or not by the Commission (e.g. the Covenant high-level Ceremony of 22/02/2018[212]), the Commission supporting the Urban Agenda for the EU including the climate change adaptation theme, and the Commission supporting the creation of the EUROPA's Cities topic one-stop shop webpage including the adaptation theme[213].

Outputs produced by the initiative and shared by signatories are disseminated more widely via the Covenant of Mayors website[214] and the Climate-ADAPT platform.

By 22 December 2017, within the Covenant of Mayors initiative, 9 264 signatories (local authorities) from 53 countries (including 28 EU Member States), covering 252 million inhabitants, had committed to the Covenant of Mayors (mitigation and/or adaptation).

From these local authorities, since the launch of Mayors Adapt in March 2014 and by 30 April 2018, 1076 signatories from 25 EU Member States, covering around 60 million inhabitants, had committed to conduct vulnerability and risk assessments, and develop, implement and report on adaptation plans. Out of these signatories, 21 (2%) had submitted a full local adaptation action plan (i.e. including a strategy and a climate risk and vulnerability assessment). There has been linear progression since 2014 in the number of signatories and submitted adaptation plans.[215] At the moment of writing this document, the number of submitted full adaptation strategies is low due to the fact that the Covenant online reporting platform for adaptation is not yet fully ready. Once this online reporting platform will be officially launched, we can expect an increase of submissions of local adaptation plans, which may well mean estimates based on current trends are overly pessimistic.

A 2017 survey of just above 500 EU municipalities also found that 28% of municipalities had a climate adaptation action plan and of those that did not, only 42% intended to introduce one in an undetermined future (the remaining 17% did not intend to introduce one and 42% did not know).[216] A 2018 analysis of the local climate plans of 885

[211] The EUROPA Cities topic webpage, Climate adaptation in cities, Funding opportunities and advice, https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities/priority-themes/climate-adaptation-cities_en#funding-opportunities-and-advice.

[212] https://www.covenantofmayors.eu/news-and-events/news/1518-10-years-of-european-covenant-of-mayors.html

[213] https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities/priority-themes/climate-adaptation-cities_en

[214] www.covenantofmayors.eu

[215] From March 2014 to April 2018 (50 months, or 4.2 years), the average rate of signatories' adhesions to the Covenant is of around 256 per year (1076 signatories divided by 4.2 years). From March 2016 (moment from when the first signatories had to start submitting their adaptation plans) to April 2018 (26 months, or 2.2 years), the average rate of adaptation plans' submissions to the Covenant is of around 10 per year (21 submissions divided by 2.2 years).

[216] Covenant community's needs for SE(C)AP design and implementation, Covenant of Mayors for Energy & Climate, 2017.

representative cities of EU-28 (both Covenant cities and non-Covenant cities) similarly concluded that about 26% of EU cities had adopted adaptation plans.[217] It suggested "that, in countries where autonomous local climate [mitigation and/or adaptation] plans are rare and cities are not required by national legislation to develop plans, such as Cyprus, Slovenia, Latvia, Belgium, Ireland, Italy, Malta, but also Portugal […], Romania […] and Spain […], international networks such as the Covenant of Mayors raise the awareness, build the capacity and, often through EU-funded projects, provide the expertise and the funding necessary to develop local climate plans." 11% of the cities of the analysis' sample have an adaptation commitment within the Covenant.

A survey[218] conducted by the Covenant Office in early 2017 that consulted municipalities, provinces, regions and national ministries identified barriers to city-level action:

- Cities are less aware and less equipped for climate change adaptation than climate change mitigation. Among the three pillars of the Covenant of Mayors, the area where respondents from cities declare that they need the most support is climate adaptation (45.1%), followed by climate mitigation (37.0%) and access to energy (17.9%);
- Access to financial resources remains the greatest barrier to climate action: scarcity of financial resources appears as a central issue for 84% of municipalities and for almost 55% of provinces, regions and national ministries. Cities need in particular specific support regarding access to European Structural Investment Funds, and the EU funding programmes such as LIFE, Urban Innovative Actions and URBACT;
- A lack of technical expertise and political support were the next most prevalent barriers for cities: assistance is needed for both planning and implementation of climate action, including designing an integrated approach to mitigation and adaptation. 55.8% of municipalities, and 73.4% of provinces, regions and national ministries indicate strong needs for designing an integrated approach for mitigation and adaptation.

Based on the identified needs, the Covenant Office has developed a capacity building strategy and work plan that has translated these findings into concrete actions, such as capacity-building and awareness-raising workshops, webinars, city twinnings, and the interactive funding guide,[219] all tailored to the identified needs.

Building on the success of the EU Covenant and its gradual extension to EU's neighbourhood, Africa, Americas and Asia based on financial support from the European Commission, the Global Covenant of Mayors for Climate & Energy[220] was officially launched in 2017 bringing together the Compact of Mayors[221] and the Covenant of Mayors. It offers a worldwide multi-stakeholder alliance of cities committed to climate and energy action, with the support of founding partners, in particular city networks, and through several regional secretariats, supported by the European Union, that deliver technological and methodological support.

[217] See footnote 147
[218] See footnote 216
[219] https://www.covenantofmayors.eu/support/funding.html
[220] https://www.globalcovenantofmayors.org/
[221] http://impact.compactofmayors.org/

3. Monitoring and evaluation on adaptation action at EU and Member State level

The following can be observed about EU- and Member State-level efforts in developing monitoring and evaluation of adaptation action.

EU:

- Climate vulnerabilities (and logically the appropriateness of adaptation action) are difficult to compare between EU Member States due to local specificities.

- There was a clear role foreseen for the Commission to develop an EU-level adaptation preparedness scoreboard (Action 1)

- The Structural Funds under the 2014-2020 MFF already include indicators on the number of people protected from floods and forest fires, however too few projects have been fully implemented yet to draw meaningful conclusions on impacts.

- In addition, the mainstreaming efforts under the Strategy have enabled the inclusion of much improved indicators in the recent MFF proposals, e.g. the CAP proposal.

    - The current 2014-2020 CAP includes measures to support climate adaptation. Measures are chosen in support of priorities and focus areas. There is, however, no adaptation-specific priority or focus area.[222] This created both a difficulty in clearly identifying and tracking adaptation action.
    - The proposed future CAP now includes a specific objective, as well as impact and result indicators that are directly and exclusively related to adaptation.
    - They will help ensure consistent monitoring and reporting of climate adaptation efforts in agriculture across Member States, while taking into account national specificities.

Member State:

- The Monitoring Mechanism Regulation (outside the framework of the Strategy) requires Member States to report to the Commission on their adaptation activities, without setting a mandatory format for such reporting. The reporting is published on the Climate-ADAPT platform managed by the EEA.

[222] Climate adaptation is split between "risk prevention and management", "restoring, preserving and enhancing ecosystems related to agriculture and forestry" and "promoting resource efficiency and supporting the shift towards a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors".

- The Commission guidelines on Member State strategies state that the NASs should also include monitoring and evaluation tools at national level.

- Whereas all NASs do foresee such monitoring and evaluation tools, Member States are monitoring and evaluating their strategies to a varying degree, depending on where they are in the adaptation policy cycle.

    - For example, Germany will complete the evaluation of their 2008 strategy in 2019.

    - In the case of the Netherlands, the 2007 NAS was evaluated in 2012, which led to the conclusion that the 2007 NAS did not address all relevant implications of climate change. This in turn contributed to the conception of the Dutch NAS 2016.

    - National Adaptation Plans (NAPs) implementing the strategies add a further layer of complexity to monitoring.

- Further improvement and sharing lessons learnt is probably possible. The EEA will publish a paper in 2018 and a full report in 2019 or 20 on how evaluation processes can improve adaptation practices at country-level.

    - This is a learning and dissemination exercise looking at five countries which have used evaluation indicators (further countries have expressed interest in joining the exercise).

    - The report also looks into links between indicators at national level and the relevant indicator developments under the Sendai Framework for Disaster Risk Reduction 2015-2030, the Paris Agreement and the Sustainable Development Goals.

    - It will also examine how data collected by EUROSTAT can be used for different adaptation purposes.

In the future, the reporting requirements under the Monitoring Mechanism Regulation will be replaced by the provisions of the recently adopted Energy Union Governance Regulation.[223] The role of the adaptation preparedness scoreboard also needs to be re-defined in this new context. This should be an occasion to enhance and further harmonise the monitoring and evaluation framework for adaptation policy at EU and national level.

[223] COM(2016) 759: Proposal for a Regulation of the European Parliament and of the Council on the Governance of the Energy Union, amending Directive 94/22/EC, Directive 98/70/EC, Directive 2009/31/EC, Regulation (EC) No 663/2009, Regulation (EC) No 715/2009, Directive 2009/73/EC, Council Directive 2009/119/EC, Directive 2010/31/EU, Directive 2012/27/EU, Directive 2013/30/EU and Council Directive (EU) 2015/652 and repealing Regulation (EU) No 525/2013

4. Bridging the knowledge gaps

Four knowledge gaps were identified in the Strategy[224]:

- Information on projected costs and benefits of impacts and adaptation
- Regional and local-level analyses and risk assessments
- Frameworks, models and tools to support decision making within uncertainty and to assess the effectiveness of adaptation measures
- Monitoring and evaluation of past adaptation efforts

The evaluation assessed how much effort was put into each broad knowledge domain and where possible, how much financial input was invested in it. To assess which sectors of society were assisted with knowledge production, all research items were ascribed to sectors (e.g. water, nature, health etc.). From several studies on remaining knowledge gaps, the evaluation then inferred if the effort for each domain so far is perceived as sufficient; and if new knowledge domains have emerged for society to be able to move towards adaptation action.

As means for addressing the knowledge gaps, the Strategy indicated H2020 and the JRC, the latter especially, would provide a comprehensive EU-wide vulnerability assessment. The 'Horizon 2020 Work Programme 2014-15' was adopted in December 2013 to promote EU-wide vulnerability assessments, considering, inter alia, the cross-sectoral EU overview of natural and manmade risks that the Commission produced in 2013. The H2020 work programmes 2014-2015 and 2015-2016 explicitly mention the Strategy.

In close collaboration with the European Environmental Information and Observation Network (Eionet) and its 33 member countries, the EEA gathers data and produces assessments on a range of topics related to the environment[225]. More specifically EEA supports and informs policy development and implementation in the area of climate change impacts, vulnerability, and adaptation by means of data, information/indicators, and assessments[226]. In these activities EEA is supported by the European Topic Centre on Climate Change Adaptation (ETC/CCA), funded by EEA[227].

The EEA report on 'Climate change, impacts and vulnerability in Europe 2016'[228] provides an overview as well as valuable analysis of knowledge gaps remaining in 2018, which have been mapped against the knowledge gaps identified in the Strategy. This analysis was based on a range of sources (including IPCC, JPI and EU projects), but it was not fully comprehensive.

A study assessing available knowledge in three thematic areas was also completed for the Commission in 2017 (vulnerability assessment, ecosystem-based adaptation, infrastructure adaptation).[229] Since 2011 the JRC has been supporting the European

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[224] The Impact Assessment of the Strategy suggested one more knowledge gap ('Socio-economic trends that are interrelated with climatic changes'. See Commission Staff Working Document: Impact Assessment, SWD(2013) 132 final, page 14.

[225] https://www.eea.europa.eu/ and https://www.eea.europa.eu/about-us

[226] https://www.eea.europa.eu/themes/climate-change-adaptation and the multi-annual and annual work programmes

[227] http://cca.eionet.europa.eu/

[228] See footnote 113

[229] Ecofys, Assessing Adaptation Knowledge in Europe: Vulnerability to Climate Change / Ecosystem-Based Adaptation / Infrastructure Resilience in the Transport, Energy and Construction Sectors, study

Commission in analysing the socio-economic costs and benefits of climate change and adaptation to it in different sectors (JRC PESETA projects). The evidence to date indicates that despite progress in understanding, knowledge gaps remain in the areas identified in the Strategy (notably as regards benefits of adaptation in other areas) and new ones have emerged, as adaptation is a fast evolving and complex field.

Table VIII-2 Remaining knowledge gap components

Key knowledge gaps identified in the Strategy 2013	Areas where further research is still needed
Information on projected costs and benefits of impacts and adaptation	• Knowledge on effective adaptation solutions
Regional and local-level analyses and risk assessments	• Enhanced approaches to regional- and local-level adaptation issues • Robust, integrated (across sectors and geographical and governance scales) impact, vulnerability and adaptation assessments
Frameworks, models and tools to support decision making within uncertainty and to assess the effectiveness of adaptation measures	• Climate services providing the best available climate data to support adaptation • Decision-making and policymaking support tools and assessments, including on the costs and benefits of impacts and adaptation • Ways to deal with uncertainties
Monitoring and evaluation of past adaptation efforts	• Monitoring systems and tools

The 2017 knowledge assessment study identified new gaps in the following two sectors:

Ecosystem based Adaptation (EbA)**	• Demonstration of transferability of existing evidence in terms of contexts or relevant climate hazards, as evidence is highly context specific • Effectiveness and efficiency of EbA at larger scales of implementation (e.g. river basins) • Demonstration and quantification of co-benefits of EbA

for the European Commission, 2017. Available: https://ec.europa.eu/clima/policies/adaptation/what/knowledge_en#tab-0-1

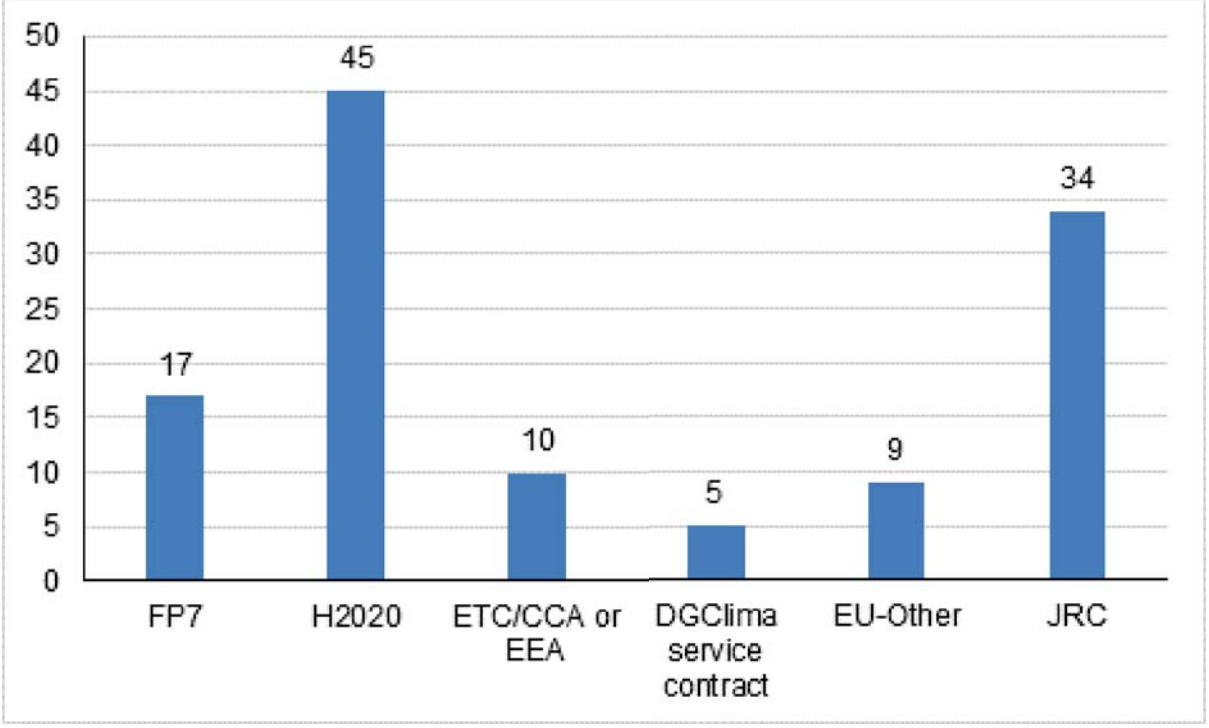
Infrastructure**	• Higher resolution projections of climate data need, up to below 1 km which can be beyond the current boundaries of climate modelling • Assessment of competing land-use objectives and optimal land-use options (for example, in terms of water resources, flood management, renewable energy production) • Better understanding of the transport sector's current and future vulnerabilities across modes, including inter-modal vulnerability assessments and • the potential for integrated adaptive solutions across and beyond the transport sector • Developing, selecting and applying adaptation indicators and the appropriate monitoring system at city level to assess progress in adaptation and the effectiveness of measures • Improve understanding on how to combine climate and non-climate data for infrastructure planning • Better understanding on how to evaluate and address dependencies and interdependencies within and across infrastructure sectors (also includes water and Information and Communication Technology), in particular with social and environmental sector, and how cascade effects impact vulnerability

Further new gaps identified by the EEA and other stakeholders are listed in Chapter 6.1 under the relevance criterion. They include:

- Interdependencies, synergies and trade-offs with other relevant sustainable development goals
- Enhanced communication, shared learning and co‑creation of knowledge.
- Spillover effects of impacts and adaptation within EU and at the global level. The case study on spillover effect from climate change impacts outside the EU (see Case Study 2 in Annex XIV) also highlights the need to review existing evidence and invest in this field.
- Adaptation in mountainous areas
- Long-term lack of water resources
- High-end climate change
- Gaps in research topics such as health, coastal areas, biodiversity.

124 research items (defined as research reports, projects and programmes) have been identified that were published in 2013 or later, and are focused on adaptation to climate change. Figure VIII-1 provides a breakdown of the 124 research items by source.

Figure VIII-1 Number of adaptation-focused projects and reports since 2013



Source: Own analysis

Expenditure on adaptation-related research includes:

- The seventeen FP7 projects identified that addressed adaptation to climate change had a total budget of EUR 106 million.
- A total of EUR 275 million has been committed to H2020 adaptation research projects starting between 2014 and 2017 (generally ending 3-5 years later). This amounts to 0.6% of the total H2020 budget 2014–2020.[230]
- It is estimated that EUR 10 million was spent by JRC on adaptation since 2013, which equates to about 0.8% of the total JRC budget for this period. It is not possible to identify the exact proportion of JRC's total budget made available for adaptation-related research over the period 2013 – 2016, as it cuts across several different parts of JRC and there is no specific budget head.

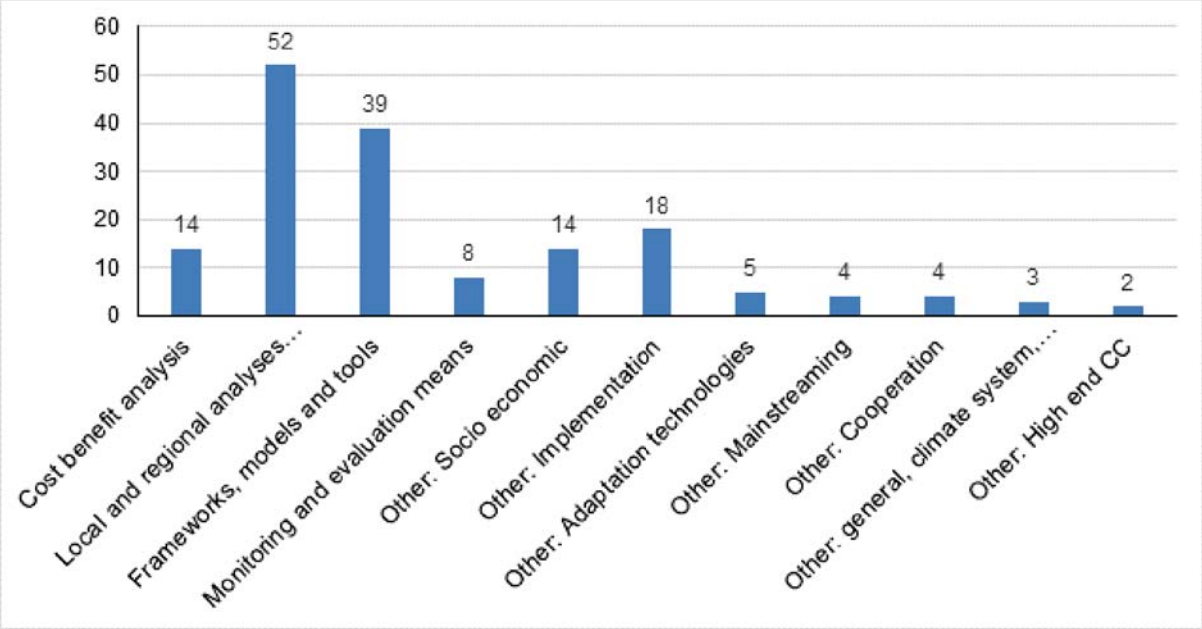
The EEA prepares assessments based on information provided by its member countries as well as from climate adaptation research and other information sources. EEA also funds the European Topic Centre on Climate Change Adaptation (ETC/CCA) to support its work programme on adaptation. Expenditure by EEA on all work on climate change impacts, vulnerability and adaptation is not available. But specifically for Climate-ADAPT, an estimate was calculated for the combined expenditure of EEA and the Commission of about 2.7 million EUR, for the period 2013-2016, based on EEA information.

Figure VIII-2 shows the 124 research items categorised according to the knowledge gaps identified in the Strategy that they address. A total of 50 items are related to newly emergent knowledge gaps: mainstreaming; cooperation; adaptation technologies; and a

[230] Factsheet: Horizon 2020 budget, European Commission, 2013. Retrieved from: https://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_horizon2020_budget.pdf

more generic category, including issues relating to the climate system and resilience. Although they are not strictly within the pre-formulated knowledge gaps of Action 4, they are related to other actions in the Strategy, so it seems reasonable to assume that they result from the Strategy.

Figure VIII-2 Research projects and reports addressing the four knowledge gaps or other emerging knowledge gaps

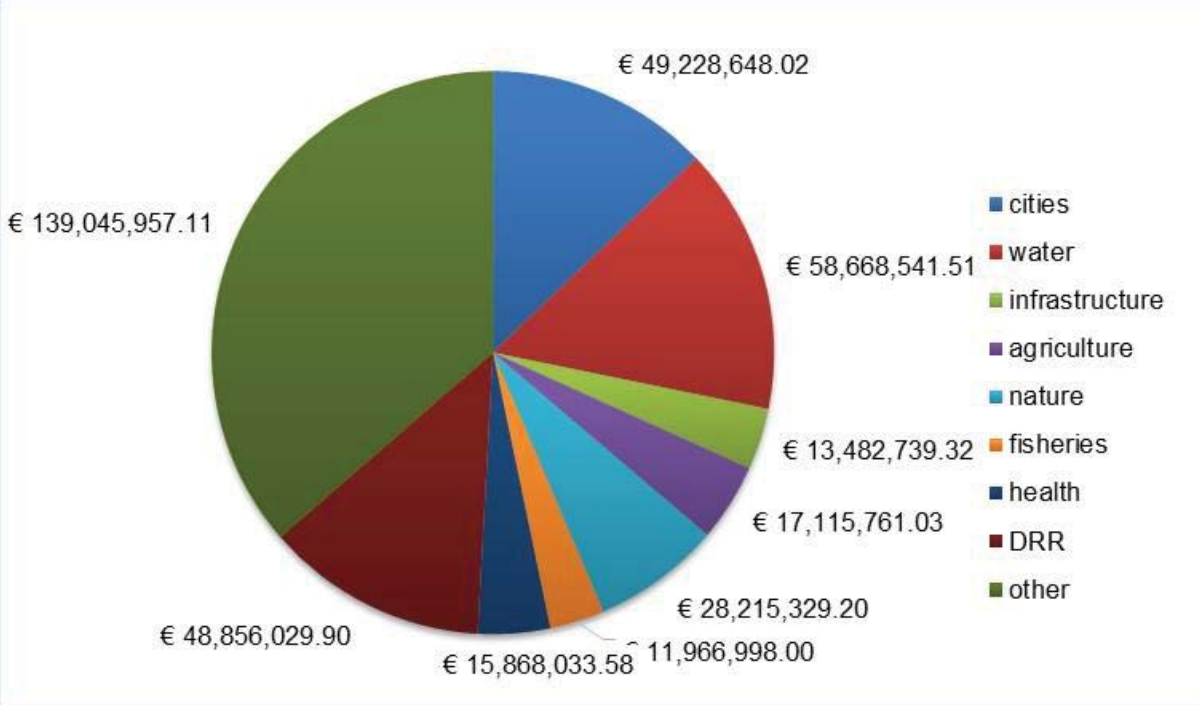


Source: Own analysis

Each of the 124 research items have been ascribed to the sector to which they primarily relate: cities, water, infrastructure, agriculture, nature, fisheries, health, disaster risk reduction, or 'other' (broad projects or programmes, encompassing many sectors). The most frequently addressed sectors were water (27 items), nature (25 items), and agriculture (24 items). A total of 30 items were categorised as 'other'.

Taking costs identified in H2020 grants as a proxy for spending per domain, most addressed water, cities, and Disaster Risk Reduction (DRR). Other research funding is spent by JRC, other EU directorates, Member States, and others, for which detailed data on expenditure was not found. The budget for the JRC reports could not be retrieved, as JRC does not monitor this amount separately, however, JRC estimates the total amount at Euro 10 million between 2013 and 2017.

Figure VIII-3 Total expenditure per domain



Source: Own analysis

In summary, 45 H2020 projects and 34 JRC reports dealing with adaptation have been identified. The total budget for the H2020 projects starting between 2014 and 2017 is EUR 275 million. A further EUR 148 million has been committed for 2018-2020.

The European Climate Change Adaptation conference series, launched in 2013 following the publication of the Strategy, has gained a significant momentum since its inception, and had become the de facto European forum of excellence for adaptation scientists and practitioners.

5. Climate-ADAPT

The information on the Climate–ADAPT portal is collected by the EEA, and the European Topic Centre on Climate Change Adaptation (ETC/CCA), from a range of information sources, including EU-funded research projects, Interreg, LIFE, national policy pages, and reports from NGOs and sector networks. These documents are submitted monthly to the database and subjected to a strict quality control process carried out by the EEA and the ETC/CCA. Currently, a total of 76 case studies describe implementation of adaptation actions and information on 40 adaptation options have been gathered. Country pages present the information on the state of play on adaptation in each Member State, which was reported under the Monitoring Mechanism Regulation in 2015 and was updated on a voluntary basis in 2016-2017. A total of 84 city profiles of selected Covenant of Mayors and Mayors Adapt signatories have been included.

The EEA mid-term evaluation report on Climate-ADAPT includes a set of use cases of Climate-ADAPT[231] which gives an overview of who is using Climate-ADAPT and what for. For example, the UK health sector has used Climate-ADAPT information to create a risk and adaptation plan for the health sector in England, while the City of Bologna has used Climate-ADAPT information to develop the Bologna Urban Adaptation Plan and guidelines for medium-sized Italian cities.

6. Key policy initiatives where adaptation was mainstreamed

During the period covered by the evaluation, adaptation was mainstreamed in EU and international **disaster risk reduction** polices. In 2013, the EU Civil Protection legislation was revised to ensure better response to natural and man-made disasters. Climate change was integrated in the new legislation as one of the reasons for the increasing severity and complexity of disasters and included as a component of the EU assessment of risks and in trainings for civil protection personnel. Since early 2014, much effort has been put in mainstreaming adaptation in the implementation of the Civil Protection Mechanism legislation and in all its annual work programmes. In 2017, a new Commission proposal for the Union Civil Protection mechanism was adopted: it recognizes a fundamental role for prevention in disaster risk management, and includes consideration of climate change impacts as a key component of effective prevention and preparedness.

Synergies between climate change adaptation and DRR were also enhanced in the implementation of EU cohesion policy funds, in particular the ERDF and the CF. Climate and disaster proofing are built into the appraisal of major projects for cohesion policy support. Moreover, risk assessments are a precondition for funding from the ERDF and CF.National climate change adaptation strategies are required, where appropriate, to inform national risk assessments. Currently work is ongoing to integrate climate change adaptation in the disaster risk reduction peer review system to promote policy development and actions relevant to disaster risk reduction. Climate change adaptation has also been mainstreamed in the work plan and in most outputs of the Disaster Risk Management (DRM) Knowledge Centre (launched in September 2015).

From an international angle, Commission Services have worked to integrate climate change adaptation in the Sendai framework for disaster risk reduction (adopted in March 2015). Much of the work done on cities, infrastructure, insurance, knowledge and loss and damage directly contributes to the implementation of the EU Action Plan on the Sendai Framework. Adaptation is also well anchored in the work of the European Forum for Disaster Risk reduction (co-lead by the EU Commission and United Nations Office for Disaster Risk Reduction) which aims to create a safer Europe by reducing risks and vulnerability and supports Europe's contribution to the Sendai framework.

As regards the **EU's Outermost Regions**, the Commission adopted in October 2017 a new strategy[232] committing to consistently taking into account these regions' specificities in all EU policies. This entails taking into account the particular constraints of these regions when designing the selection criteria and types of financial support. The Commission has committed to implementing a number of initiatives to cater for the climate vulnerabilities, which compound their specific limitations in terms of e.g. remoteness, small size, insularity and socio-economic problems. Certain French

[231] https://climate-adapt.eea.europa.eu/help/climate-adapt-use-cases/climate-adapt-use-cases/
[232] See footnote 138

Outermost Regions were affected by hurricanes in 2017 (such as Saint-Martin, 95% of its French part having been destroyed by hurricane Irma).

In terms of **EU water policy**, the Blueprint to safeguard Europe's water resources was adopted in 2012 with the long-term objective to ensure the sustainability of all activities that impact on water. It recognised the challenges brought about by climate change and pointed to a number of means to preserve EU water resources. Blueprint actions included inter alia the development of a Green infrastructure strategy[233] that includes a specific chapter on adaptation, the development of a SWD on Agriculture and sustainable water management[234], and a current proposal for "Minimum quality requirements for reused water in the EU".[235]

In a separate process, the Floods Directive foresaw upon its entry into force in 2007 the mandatory integration of climate change projections into their flood risk assessments, maps and plans by the 2nd cycle of its implementation (2016-2021). 14 Member States had already included climate change in their Preliminary Flood Risk Assessments and 16 in their Flood Hazard and Risk Maps by 2011 and 2013 respectively on the basis of readily available information in the 1st cycle of implementation (2010-15).

The Commission is currently in the process of assessing the Flood Risk Management Plans (FRMPs) in parallel with the River Basin Management Plans. A report summarising the findings of these assessments will be published in the 2nd half of 2018 and will make reference to climate change. Over the 2nd cycle of implementation (2016-2021) Member States are required to take into account the likely impact of climate change on the occurrence of floods, thus putting a stronger requirement compared to the 1st cycle.

The main EU initiative in **urban policy**, the Urban Agenda for the EU is progressing with the objective to include and better recognise the urban dimension in policies. Climate adaptation is one of the priority themes under the Urban Agenda for the EU and has been mainstreamed into its key elements, such as the EU One Stop Shop for Cities, the Urban Data Platform, Urban Innovative Actions, and the Urban Investments and Advisory Platform. A Climate Adaptation Partnership was launched in July 2017[236] and is currently preparing an action plan to be adopted by the end of 2018. Synergies with other Urban Agenda for the EU Partnerships are sought, including those on: Sustainable Use of Land and Nature-Based solutions; Circular Economy; Air Quality; and Energy Transition.

Adaptation was also mainstreamed into the Commission's 2016 proposal on the Governance of the **Energy Union**.[237] The proposal, which had been foreseen in the 2015 Energy Union Strategy[238], specified the Member States' reporting requirements on

[233] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Green Infrastructure (GI) – Enhancing Europe's Natural Capital, COM(2013) 249

[234] Commission Staff Working Document: Agriculture and Sustainable Water Management in the EU, SWD(2017) 153 final

[235] Proposal for a Regulation of the European Parliament and of the Council on minimum requirements for water reuse, COM(2018) 337 final

[236] https://ec.europa.eu/futurium/en/climate-adaptation

[237] See footnote 223.

[238] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank: A

adaptation policy in greater detail than the current Monitoring Mechanism Regulation, which it should replace in an effort to align with adaptation reporting under the Paris Agreement. The energy and climate related reporting in the EU will be also simplified, as it is regrouped under the same law. The draft regulation, on which the European Parliament and the Council reached an informal agreement in June 2018, equally ensures that the National Energy and Climate Plans to be submitted by the Member States in the future include climate adaptation components where applicable.

Climate change adaptation has actively been mainstreamed in EU **development cooperation** policy and actions. Strengthening climate change resilience, in particular in most vulnerable countries is considered as an important component of EU development cooperation and is therefore integrated in all the relevant EU policy documents (for example Agenda 2030, and the European Consensus on Development).

Operationally, support to climate change adaptation is integrated into:

- Development cooperation programs with partner countries (Instrument for Development Cooperation, DCI and European Development Fund, EDF) in sectors as energy, agriculture, water, forestry, disaster risk reduction, etc.
- Regional envelopes (EDF and DCI budgets), for example in Latin America (EuroClima) or in programmes on disaster risk reduction.
- Financed through dedicated thematic programmes, such as the Global Climate Change Alliance + (GCCA+)

Finance for climate change has increased in the past years from EUR 9.5 billion in 2013 to EUR 20.2 billion in 2016. To date, the European Commission is one of the major donors for adaptation finance: in 2017, more than 50% of the climate change finance was dedicated to adaptation projects.

During the period covered by the evaluation, awareness was raised on the link between climate change, EU **external relations and security**. In the past couple of years concrete steps have been made to integrate and recognize climate change as a threat multiplier which if not managed well can spur a downward spiral of fragility and conflict. Concretely, climate change has become an important part of the External Action Service strategic reflections[239] and it has been integrated in the External Action Service work on security and conflict prevention. The EU Conflict Early Warning System (EWS) assesses the risk of emergence, re-emergence and escalation of violent conflict in the coming four years. Climate change has over the last 2 years been a priority theme for conflict prevention and fragility assessment in the EWS. For the countries that are prioritised by the EWS, an in-depth conflict analysis is conducted which also looks at climate change impacts.

Relevant to the security angle is also the progress made on recognizing and further analysing the link between climate change and human displacement, as demonstrated at the international level by the creation of a Task Force on Displacement in the context of

Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, COM(2015) 080 final

[239] Such as the EU Global Strategy and A Strategic Approach to Resilience in the EU's External Action

the UNFCCC.[240] In 2013, a Commission Staff Working Paper on Climate Change and Migration was adopted together with the EU Adaptation Strategy. This paper provides an overview of the research and data currently available on the interlinkages between climate change, environmental degradation and migration.

Since 2013, EU policies on migration and external relations have increasingly taken into account climate change as a trigger to displacement and climate change adaptation as an effective tool to tackle root causes of migration. Examples include: Council conclusion on Climate diplomacy in 2013[241], 2016[242] and 2018[243] and the 2016 Communication on Forced Displacement and Development[244].

Environmentally induced migration continues to be a priority under the EU's external cooperation instruments for the period 2014-2020. The Programme on Global Public Goods and Challenges[245] includes a migration and asylum component which includes a commitment to deliver on improving understanding of the impacts of climate change and environmental degradation on migration flows and the potential of migration to contribute to climate change adaptation. Moreover, the EU financed a number of projects to develop knowledge and practices to address climate induced migration.

The 2017 Joint Communication[246] on Resilience developed to define an approach to address the challenges identified in the EU's Global Strategy for the European Union's Foreign and Security Policy[247] builds on the 2013-2020 Resilience Action Plan[248] and is aligned with EU commitments to the 2030 Agenda[249]. It consider economic resilience as an important area for the overall resilience of the EU, with climate change as a cross-cutting disruptive element, mentioning financial contingency measures, sustainable and inclusive investment, and promotion of a circular economy to protect vital services and facilities in case of instability. The EU is to "work with the European Investment Bank, other International Financial Institutions, business sector organisations and social partners to enhance investment frameworks for economic and social resilience", notably by "promoting risk transfer through risk financing mechanisms such as insurance and contingency credit".

How the topic of adaptation was mainstreamed in EU funds (CAP, CFP, ESIF) is analysed in more detail in section 8 below.

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[240] https://unfccc.int/process/bodies/constituted-bodies/executive-committee-of-the-warsaw-international-mechanism-for-loss-and-damage-wim-excom/areas-of-work/migration--displacement-and-human-mobility

[241] Council conclusions on EU Climate Diplomacy, Foreign Affairs Council meeting, Luxembourg, 24 June 2013

[242] Council conclusions on European climate diplomacy after COP21, Foreign Affairs Council Meeting, Brussels, 15 February 2016

[243] Council conclusions on Climate Diplomacy, 26 February 2018

[244] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Lives in Dignity: From Aid-dependence to Self-reliance, COM(2016) 234 final

[245] Commision Implementing Decision adopting a Multiannual Indicative Programme for the Thematic Programme 'Global Public Goods and Challenges' for the period 2014-2020. C(2014)5072

[246] Joint Communication on 'A Strategic Approach to Resilience in the EU's external action' JOIN(2017) 21 final

[247] Shared Vision, Common Action: A Stronger Europe. European Commission, 2016

[248] Commission Staff Working Document: Action Plan for Resilience in Crisis Prone Countries 2013-2020, SWD(2013) 227 final

[249] Council conclusions on A sustainable European Future: The EU response to the 2030 Agenda for Sustainable Development, 20 June 2017

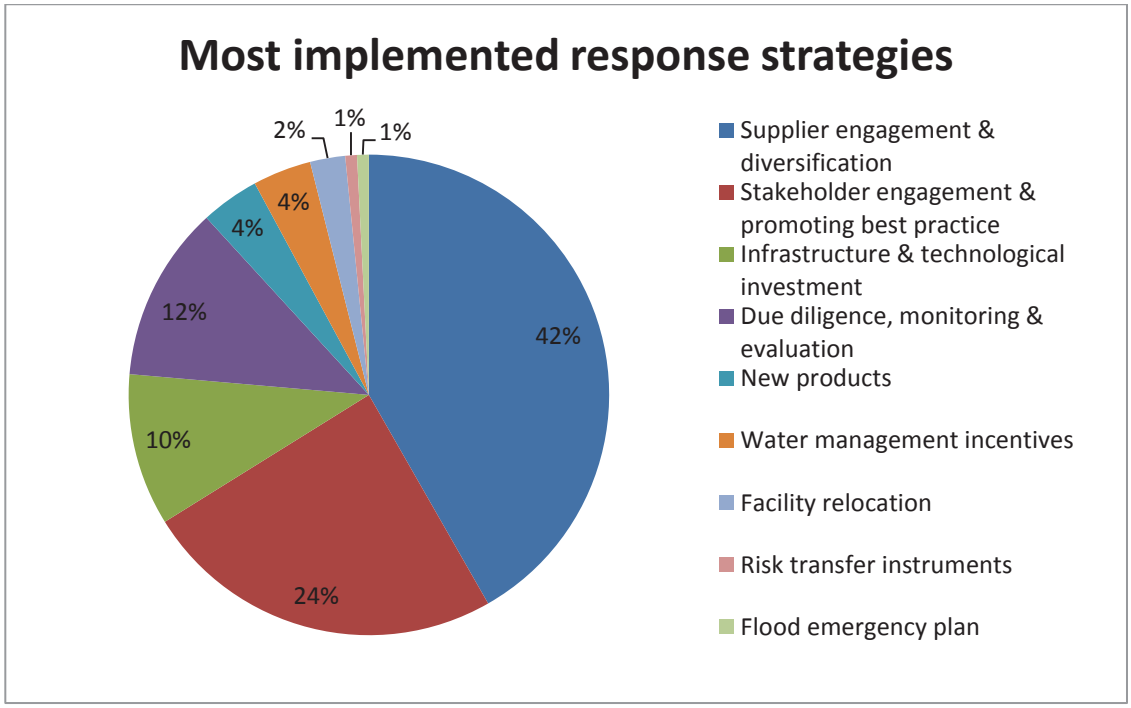
7. Carbon Disclosure Project survey results on companies and climate risks

The 2017 company questionnaires for climate change, forestry and water undertaken by Carbon Disclosure Project (CDP) did not extensively report on climate adaptation activities on a company level. Consequently, the level of analysis on adaptation activities by private organisations is limited by the generic framing of questions, and the overlap between climate adaptation practices and conventional risk management strategies.

Accounting for the analytical limitations, the 2017 climate change questionnaire still found cases of climate impacts capable of impact on businesses. Inter alia, the questionnaire found that 84% of the 764 surveyed companies had identified inherent 'physical climate parameters' with the potential to generate a substantive change to the business operations, revenue or expenditure. Similarly, in the 2017 questionnaire for the CDP Forests Program found an even higher climate relevance of identified operational risks, with 40% of identified operational risks having a direct climate relevance, and an additional 51% with an indirect climate relevance. The Forests Program questionnaire further suggests that companies consider such operational risks to be likely to occur, with 78% of companies indicating risks to be medium – high likelihood of affecting their operations (CDP Forests Program 2017 questionnaire).

CDP's 2017 Water Information Request found that 93% of companies undertake water-related risk assessments. 85% of surveyed companies indicate inherent water risks with an ability to affect business production and continuity (CDP 2017 Water Information Request). The assessment of adaptation actions and risk mitigation strategies is rendered difficult by the overlap between these actions and more conventional business risk mitigation strategies. Supplier engagement and diversification represents the most commonly adopted response strategy (41% of actions), with 26% of strategies incorporating made up of infrastructure & technological investment, due diligence, monitoring & evaluation, facility relocation, risk transfer instruments and flood emergency plans (see figure below).

Figure VIII-4. Most commonly implemented response strategies reported by companies through the CDP 2017 Water Information Request



For 2018 the CDP is restructuring the questionnaires to enable more direct linkages to climate change mitigation and adaptation actions. Through these changes, it is anticipated that companies will be able to report in greater detail on activities such as new service developments, land management practices and supplier engagements with concrete mitigation and/or adaptation benefits.

8. EU funds for climate resilience

Common Agriculture Policy

According to a 2016 study[250], the EAFRD is the only ESIF where there seems to be a greater focus on adaptation actions compared to mitigation objectives. While this seems to enhance the status of Action 6 of the Strategy, there are two important caveats. Firstly, while adaptation seems to be well acknowledged into Rural Development Programmes (RDPs), it seldom appears as the objective having presided over the choice of the specific measures. This is especially so due to the difficulty to separate mitigation and adaptation related measures in agriculture and forestry sector, as those measures offer co-benefits. Adaptation is considered by virtually all RDPs. It is more to the fore in those regions that are already being affected by extreme weather events. While many measures (e.g. targeting biodiversity, soil, and water use) have the potential to support climate adaptation, whether they are implemented will need to be assessed by an ex post evaluation of programmes. Secondly, the tracking methodology developed for the EAFRD raises concerns about over-estimations. The European Court of Auditors has suggested an alternative and more conservative use of the Commission's climate markers. It concluded that this could reduce the overall climate allocations under the EAFRD by 42%.[251] The Commission took note of the suggestions while emphasising that the tracking methodology needs to remain stable during the current MFF for reasons of predictability, consistency and transparency. However, ways of fine-tuning the tracking methodology for the EAFRD may be considered for the post-2020 programming period without increasing the administrative burden.

More broadly, climate mainstreaming is supported under the EAFRD by the requirement for RDPs to spend at least 30% on a range of climate and environmental measures.[252] Nevertheless, this minimum requirement includes measures which do not appear to have a significant impact on the achievement of climate objectives.[253] It is also notable that while rural development measures provide scope to fund adaptation that directly benefits farm businesses (for example, support for more efficient irrigation systems) and delivers wider public benefits (e.g. land management practices which reduce flood risks), programmes appear to focus on the former.

The European Agricultural Guarantee Fund (EAGF), which funds the CAP's direct payments, is not part of ESIF. Climate considerations are included via the greening component (30% of total direct payments) and cross-compliance (basic requirements to access direct payments). According to the Commission's calculations around 20% of direct payments can be considered climate relevant. The European Court of Auditors (2016) suggests that assumptions used for this estimate lack sound justification, in

[250] See footnote 78
[251] See footnote 170
[252] Article 59.6 of Regulation (EU) No 1305/2013 on support for rural development by the EAFRD
[253] Ricardo Energy & Environment, IEEP, Trinomics, Climate mainstreaming in the EU Budget: preparing for the next MFF. Final report, 2017

particular, for measuring the climate relevance of the non-greening component. With the application of more conservative estimates, they identify that the total contribution can be reduced by EUR 9 billion from EUR 47.1 billion to EUR 38 billion.[254] The Commission's response to the report states that it considers its methodology suitably conservative and does not lead to an overestimation. The principal climate relevant impact of the greening measures is carbon sequestration represented by the permanent grassland measure. Diversification and ecological focus areas can also support adaptation. Certain elements of the cross-compliance requirements related to biodiversity, soil, water also indirectly contribute to adaptation. Cross-compliance has helped to encourage adaptation actions to some degree. There is an ongoing evaluation[255] by the Commission of the impact of the CAP on climate change and greenhouse gas emissions, which is expected to also provide evidence on adaptation actions in the CAP.

Cohesion Policy

Both the ERDF and the CF provide contributions to the climate adaptation objectives under the adaptation Thematic Objective (TO5), under low-carbon economy (TO4) and also in other Thematic Objectives due to the horizontal mainstreaming. The ESF does not target TO5[256]. The climate tracking system applied under the Cohesion Policy, in particular the ERDF and the CF, is the most sophisticated. The climate markers are applied to a thematic list of 123 intervention codes[257] at the point when expenditure is committed by the managing authorities. For the 2014-2020 programming period, the intervention codes have been revised. A code specifically focusing on adaptation actions (code 087: "Adaptation to climate change measures and prevention and management of climate related risks e.g. erosion, fires, flooding, storms and drought, including awareness raising, civil protection and disaster management systems and infrastructures") was introduced, to which a 100% climate marker was applied. Furthermore, a separate code (100: "Outermost regions: support to compensate additional costs due to climate conditions and relief difficulties") was put in place to track adaptation actions in outermost regions but only counts as 40%.

According to the study[258] estimates, which build on the amount of allocations for the relevant intervention codes, EUR 6 billion has been allocated to adaptation objectives under the Cohesion Policy with EUR 3 billion each for ERDF and CF. This accounts for

[254] For more details of the calculations, see 'Spending at least one euro in every five from the EU budget on climate action: ambitious work underway, but at serious risk of falling short', European Court of Auditors, 2016, p.30.

[255] See more at: Evaluation of the impact of the CAP measures on climate change and greenhouse gas emissions, European Commission, Ares(2017)2886183

[256] As the ESF supports social and employment objectives, climate change is not considered to be a primary objective. Thus, it does not cover TO5. Nevertheless, in order to better capture the potential contribution of the ESF to climate objectives (e.g. through investment in low-carbon skills), a secondary theme (01: "low-carbon, resource efficient economy") was established. At the same time, its relevance seems to be greater for mitigation actions than for adaptation.

[257] Commission Implementing Regulation (EU) No 215/2014 of 7 March 2014 laying down rules for implementing Regulation (EU) No 1303/2013 of the European Parliament and of the Council laying down common provisions on the European Regional Development Fund, the ESF, the CF, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the ESF, the CF and the European Maritime and Fisheries Fund with regard to methodologies for climate change support, the determination of milestones and targets in the performance framework and the nomenclature of categories of intervention for ESIF.

[258] See footnote 78

11.2% of the total ERDF and CF allocation. Furthermore, another EUR 4 billion was estimated to provide indirect climate (mitigation and adaptation) benefits. The review of the Operational Priorities showed that nearly half of them addressed climate change adaptation at the high strategic level of the Operational Priorities, which then translate into specific objectives and actions. Most adaptation relevant allocations targeted flood protection measures. Other allocations include actions on drought and heatwaves and less frequently on specific sector-related actions (e.g. energy efficiency in buildings and making transport infrastructure climate-resilient).

More broadly, climate change objectives (both mitigation and adaptation) are further supported in Cohesion Policy by the legal provisions for the ESIF (e.g. horizontal mainstreaming, ex ante conditionalities, major project assessments and common output indicators).

Adaptation objectives are also an important component of the European Territorial Cooperation (ETC) goal, which is supported by the ERDF. The ETC has been further strengthened in the 2014-2020 programming period through closer alignment with the macro-regional strategies and greater recognition and encouragement of Member States to cooperate at the macro-regional and sea-basin level. More than 20% or almost EUR 2 billion of the ETC programmes expenditure is expected to contribute to climate change objectives. Adaptation is emphasised in these programmes: with 75% of all cooperation programmes including adaptation as part of their strategy, and a particularly high level of support for adaptation in cross-border programmes (as opposed to transnational and interregional programmes). In addition to the cooperation programmes themselves, territorial cooperation is also being pursued by the EU macro-regional strategies (e.g. the EU Strategy for the Danube Region or the EU Strategy for the Alpine Region – see Case Study 3 in Annex XIV). In many cases, the macro-regional strategies have a targeted focus on adaptation actions.

Support from the CF can be only applied in a limited number of Member States[259]. Those Member States which cannot receive funds from the CF made a greater use of the EAFRD for their adaptation actions, although the actual adaptation impacts of these actions are not always clear (see comment above in section on climate-proofing the CAP). Another interesting aspect is the urban dimension of Cohesion Policy. This is primarily supported by the ERDF but also receives support through CF and ESF. To strengthen the role of the ERDF in sustainable urban development, a target of 5% was set as a minimum share of ERDF that needs to be spent directly on integrated urban strategies by the cities. Furthermore, the emphasis on cities in ERDF investments have been increased, as about EUR 15 billion from the ERDF is planned to be directly managed by cities. At the same time, the EEA has highlighted that "although climate change adaptation is not a major focus in this, the support for green infrastructure might be considerable, as a major emphasis is on urban rejuvenation and brown field regeneration".[260] While green infrastructure has the potential to deliver adaptation benefits, in the ERDF and CF Operational Programmes most of the green infrastructure actions were described only in general terms, rather than in the more explicit terms used

[259] Support from the CF can be only used by Member States whose Gross National Income (GNI) per inhabitant is less than 90 % of the EU average. Also, the CF can only intervene in a few TOs, which explains why it appears to be more concentrated on adaptation than ERDF.

[260] 'Building resilient cities key to tackling effects of climate change', European Environment Agency. 2016.

for other types of investment (for example, investments to achieve water quality goals). Thus, implementation of these actions is uncertain.

In addition to the 5% ear-marking for integrated urban strategies, ERDF allocations to TO4 (”Supporting the shift towards a low-carbon economy in all sectors”) shall be at least 20% in more developed regions, 15% in transition regions, and 12% in less developed regions.[261] A similar ear-marking is not in place for the adaptation objective. (TO5), but there is also possibility to finance low-carbon strategies, including mitigation-related adaptation measures under TO4. Finally, climate considerations integrated into decisions on major projects supported by the ERDF and CF, as a result of the legal provisions on assessment of such projects, are also expected to have a positive impact on climate adaptation and climate resilience.

Common Fisheries Policy

As mentioned above, the thematic objectives set in legislation for ESIF include TO5, which explicitly addresses climate adaptation and risk management. However, the legislation for the EMFF[262] does not specifically address TO5, indicating a lesser focus on climate adaptation actions. Nevertheless, the study found that some of the measures (e.g. the protection and restoration of marine biodiversity, and the adaptation of fishing gear to altering conditions) under the EMFF have the potential to deliver adaptation objectives.

At the same time, the climate tracking methodology for EMFF is not developed in great detail. Furthermore, the ECA (2016) notes that Member States were not required to report on climate expenditure until 2016 and, as such, the accuracy of Commission estimates cannot be verified. It states that the current legal framework shows that “direct and clear references to climate change objectives, both mitigation and adaptation, are still rare and, as a result, the fisheries fund had not widened the scope of its contribution to climate action”. Indirect contribution of EMFF to climate adaptation objectives cannot be tracked given the lack of detailed tracking methodology.

Overall expenditure on adaptation

An indicative split between adaptation and mitigation – based on the outcome of the programming exercise – is presented below in Figure VIII-5 from a study[263] undertaken for the Commission as part of the mainstreaming of climate action[264] into the European Structural and Investment Funds in the programming period 2014-2020.

[261] Article 4 of Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006.

[262] Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014

[263] COWI, Mainstreaming of adaptation into the ESIF 2014-2020, Study for the European Commission, 2017: Main Report (https://ec.europa.eu/clima/sites/clima/files/budget/docs/report_maindtreaming_adaptation_en.pdf); Annex A with Case Studies (https://ec.europa.eu/clima/sites/clima/files/budget/docs/report_maindtreaming_adaptation_en.pdf); Country Summaries for EU28 (https://ec.europa.eu/clima/sites/clima/files/budget/docs/report_maindtreaming_adaptation_annex_b_en.pdf)

[264] See footnote 78

Many measures that are good for mitigation also entail co-benefit for adaptation and vice-versa. Hence an identification of measures exclusively supporting mitigation or adaptation objectives would neither be desirable nor feasible. This however does not prevent from tracking expenditures supportive of mitigation and adaptation objectives separately, even if a certain proportion of such expenditures is then counted twice.

Figure VIII-5

EU Support and climate related expenditures - EUR Billion. [% of total]					
	EU support	Climate related	Of which		
			Direct mitigation	Direct adaptation	Supportive measures for both
ERDF and ETC	196.7	**37.9**	30.8	3.4	3.6
		[19.3%]	[15.7%]	[1.7%]	[1.8%]
CF	63.4	**17.6**	13.4	3.0	1.3
		[27.8%]	[21.1%]	[4.7%]	[2.0%]
ESF and Youth Employment Initiative	88.9	**1.2**	1.2	-	-
		[1.3%]	[1.3%]	-	-
EMFF	5.7	**1.0**	1.0	-	-
		[18.2%]	[18.2%]		
EAFRD	99.0	**56.5**	5.4	7.5	43.6
		[57.1%]	[5.5%]	[7.6%]	[44%]
Total	453.7	**114.2**	51.9	13.9	48.5
		[25.4%]	[11.4%]	[3.1%]	[10.8%]

9. Adaptation-related work in the European Standardisation Organisations

CEN-CENELEC were expected to map relevant EU standards that could ensure that new major infrastructure projects are climate proofed. In May 2014, the Commission gave the European standardisation organisations (ESOs) a mandate[265] to develop tools to consider climate change in a systematic way in European standardisation, to identify standards

[265] Commission Implementing Decision of 10.12.2014 on a standardisation request to the European standardisation organisation, C(2014) 7912 final

relevant for adaptation to climate change in the three priority infrastructure sectors[266] identified in the Strategy, and to revise those standards or to develop new ones as appropriate. The first phase of the work under the mandate was completed at the beginning of 2017 and resulted in a shortlist of 12 standards to be revised and 1 standard to be written under the second phase, which started at the beginning of 2018 and is expected to take about four years. CEN-CENELEC will then consider whether the process should be extended to other standards. The technical committees are currently asking for more detailed information on climate change projections data. In addition, the 'Guide for addressing climate change adaptation in standards'[267] was adopted in April 2016 by CEN-CENELEC. The guide applies to product- (including design), service-, infrastructure- and test standards, and is intended to be applicable to both "climate-influenced products" (i.e. products whose fitness for purpose may be affected if climate change is ignored) and "climate resilience products" (i.e. products whose main aim is to reduce vulnerability to climate hazards). The guide is primarily intended for authors of standards.

10. Insurance and financial services

Currently, risk transfer does not constitute an integral part of adaptation approaches in many Member States, in spite of the fact that the insurance industry's risk pricing can allow efficient scoping in terms of where risk reduction is required. Member States apply diverse systems of insurance, which represents a challenge to an increased market-penetration of risk transfer mechanisms across Europe.

The Strategy's evaluation study noted that ideally risk transfer and insurance solutions are an integral part of a comprehensive approach to climate adaptation and risk management. There is growing evidence that countries with widespread market-based insurance coverage do recover faster from the financial impacts of extreme events. While the benefits of risk transfer tools, such as insurance, are increasingly being recognised globally, there is still a large, and in some places growing insurance coverage gap, as the difference between total damages due to natural catastrophes and damages covered by insurance is increasing. On average, more than two thirds of the economic losses from natural hazards remain uninsured globally[268]. The gap in EU countries could be as high as 50%, given the level of development and concentration of people and assets in high-risk zones.

Two studies commissioned by the EU[269] looked into insurance as a risk management tool in agriculture. One provides an analysis of current agricultural risks and available risk management instruments in agriculture and recognises climate change as a growing risk; the other looks into insurance against weather and climate-related risks focusing on private property and agriculture. The two studies point to uneven availability and uptake of climate-related risk insurance among Member States, as well as differences in signalling and risk prevention capacity of the different instruments. Both point to multi-peril crop insurance as an interesting avenue, but to the low uptake of such risk management tools. The studies recommend the integration and further support to risk management instruments in the framework of the agricultural policy, to strengthen

[266] Energy, transport and buildings.
[267] https://www.cencenelec.eu/standards/Guides/Pages/default.aspx
[268] See footnote 113
[269] See footnote 92

capacity to implement, manage and control such instruments, and to better link vulnerability, funding and insurance as a risk management tool.

Having regard to Disaster Risk Reduction and adaptation to climate change, the EU Action Plan on the Sendai Framework includes actions on insurance.[270]

There were some concrete activities in relation to insurance and climate adaptation, notably an expert group was created to consider how to collect better data on losses, as it is easier to convince people to take adaptation actions when shown that this can reduce losses.

Financial services are the major source of investments made in new infrastructure, which should be climate resilient. For example, the insurance sector not only provides insurance to assist in recovery from damages, it also relies on investing the premiums it receives to generate an income to cover future claims (risk transfer). As a result, the insurance sector is the largest institutional investor in infrastructure in Europe, with more than EUR 10 trillion of assets under its management.

The Capital Markets Union (CMU)[271] seeks to create the enabling conditions for new forms of funding to be developed and strengthened for small firms, as well as for long-term and infrastructure investment. It aims to use financial innovations to bridge the information gap between investors and businesses. The CMU also seeks to mobilise private capital to fund sustainable investment by identifying ways to create financial regulation that accelerates the shift of private capital toward environmentally and socially sustainable projects.

As part of the CMU efforts, the Commission also established and supported the work of a High-Level Expert Group on Sustainable Finance, which produced a final report in January 2018.[272] The main findings of the Group were based around priority actions, many of which were taken on board by the Commission, who in March 2018 proposed an EU action plan on financing sustainable growth.[273] Some relevant actions and proposals in the new action plan are:

- Subject to the results of its impact assessment, a Commission legislative proposal on the development of an EU classification system for sustainable economic activities.
- Creating EU labels for green financial products to enable investors to identify investments easily that comply with green or low-carbon criteria. The Commission will propose a delegated act on the content of the prospectus for green bond issuances.
- Subject to the results of its impact assessment, a Commission legislative proposal to clarify institutional investors' and asset managers' duties on sustainability and to increase transparency of end-investors, including transparency on their strategy and climate-related exposures.
- Requiring insurance and investment firms to advise clients on the basis of their preferences on sustainability. Subject to the results of their impact assessment, the

[270] See footnote 94
[271] https://ec.europa.eu/info/business-economy-euro/growth-and-investment/capital-markets-union_en
[272] Financing a sustainable European economy, European Commission, 2018. Available: https://ec.europa.eu/info/sites/info/files/180131-sustainable-finance-final-report_en.pdf
[273] See footnote 98

Commission will propose delegated acts regarding the suitability assessment in the Insurance Distribution Directive and the Markets in Financial Instruments Directive

- Work towards incorporating climate risks into institutions' risk management policies and on the potential calibration of banks' capital requirements in the Capital Requirement Regulation and Directive to take into account climate change-related risks while safeguarding financial stability and ensuring coherence with the EU taxonomy.
- Enhancing transparency in corporate reporting; with a proposal to revise the guidelines on non-financial information to further align them with the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures[274]. Subject to the result of its impact assessment, the Commission will draft a proposal requiring asset managers and institutional investors to disclose how they consider sustainability factors in their investment decision making process.

Regarding infrastructure investments, a delegated act[275] under the Solvency II Directive[276] was amended in September 2015. These amendments are aimed at making it cheaper for EU insurance companies to invest in qualifying infrastructure projects by establishing and calibrating investment risk categories for such projects. The Commission has also introduced measures[277] to review risk calibrations for investment in infrastructure corporates[278]. In order to encourage private investment by banks in infrastructure, the Commission proposal to amend the Capital Requirements Regulation and Directive (CRR/CRD IV)[279] would create a more risk-sensitive regulatory environment to promote high-quality infrastructure projects and reduce risks for investors.

[274] https://www.fsb-tcfd.org/

[275] Commission Delegated Regulation (EU) 2016/467 of 30 September 2015 amending Commission Delegated Regulation (EU) 2015/35 concerning the calculation of regulatory capital requirements for several categories of assets held by insurance and reinsurance undertakings.

[276] See footnote 97

[277] Commission Delegated Regulation (EU) 2017/1542 of 8 June 2017 amending Delegated Regulation (EU) 2015/35 concerning the calculation of regulatory capital requirements for certain categories of assets held by insurance and reinsurance undertakings (infrastructure corporates).

[278] Infrastructure corporates are a new asset class created in EU rules which represent infrastructure businesses which are already operational (in contrast to infrastructure projects), for example airports, which may have additional investment requirements to expand or redevelop their infrastructure.

[279] These are the Capital Requirements Directive and Capital Requirements Regulation which set out regulations for the prudential requirements of the banking sector to ensure that it can better absorb economic shocks and continue to finance economic activity and growth. The rules were updated in 2013, the so called CRR/CRD IV package, with the amendments part of the response to the financial crisis.

11. Summary of costs related to the Strategy

Summary of costs per year and action, EUR millions

Action	Resource inputs / burdens	Prior to 2013	2013	2014	2015	2016	2017	Total
A1 Member State adaptation strategies	Commission	0.04 [280]	Commission's core activity Interviews suggest Member States' resources for scoreboard update are negligible.					**0.0**
	MS							**0.0**
A2 LIFE funding	Commission							**190.1** [281]
	MS			Voluntary contributions as co-funding				**0.0**
	Private			Voluntary contributions as co-funding				**0.0**
A3 Covenant of Mayors	Commission [282]	0.87	0.53	0.56	0.6	0.55	0.80	**3.9**
	MS			9.84	9.84	9.84	9.84	**39.36**
A4 Knowledge gaps	Commission		> 225.5					**225.5** [283]
	MS		Voluntary contributions as co-funding					**0.0**
	Private		Voluntary contributions as co-funding					**0.0**
A5 Climate-ADAPT [284]	Commission	0.13	0.25	0.12	0.25		0.0.15	**0.9**
	MS							**0.0**
	EEA		0.37	0.37	0.37	0.47	0.37	**1.95**

[280] A large, complex study was conducted by the Commission in 2011 to prepare the Strategy. A subtask estimated to cost EUR 35k was dedicated to support the development of the guidance for preparation of national adaptation state, which was published at the same time as the Strategy in 2013.

[281] The total funding for adaptation allocated in the LIFE Multiannual Work programme for 2014-2017.

[282] Figures for the Commission relate to 4 contracts implemented since 2011 to fund the adaptation dimension of the Covenant of Mayors/Mayors Adapt. The figures also include the first year of a 3-year administrative arrangement between DG CLIMA and the JRC to fund the latter's support to the Covenant of Mayors for EUR 400 000 (for 2017, EUR 0.65 million for the work of the Covenant of Mayors Office and EUR 0.13 million for the work of the JRC). The Commission also funds local mitigation in the EU, and beyond, under the Covenant of Mayors and the related work of the JRC.

[283] The figures are totals based on an analysis of specific adaptation-themed projects and contracts funded by H2020. Other projects funded by FP7, EEA, JRC, DG CLIMA were also identified but without accurate estimates of costs, therefore, whilst relevant these are not included, except for noting that the total will be greater than (>) the EUR 225 million in the table.

[284] Data provided by EEA including a list of Commission funded contracts for Climate-ADAPT 2013-2017 for information technology development and Capacity building and knowledge assessments. Also included an assessment of EEA staff and financial resources, totalling 2 Full-time equivalent (1 Full-time equivalent = assumed to have EUR 75 000 annual cost) and other resources.

Action	Resource inputs / burdens	Prior to 2013	2013	2014	2015	2016	2017	Total
A6 Climate proofing	Commission	0.49[285]						**0.5**
	MS		No data available					**0.0**
A7 Resilient infrastructure	Commission	0.11[286]						**0.1**
	Private							**0.0**
A8 Insurance[287]	Commission							**0.0**
Total	Commission							**422.7**
	MS							**39.36**
	Private							**0.1**

Notes and sources: *Gaps in the table signify that no data was found for this specific item, although in reality there may still have been relevant costs incurred.*

[285] Single contract issued by the Commission for preparing guidelines for the implementation of Action 6 by managing authorities, covering ESIF/CAP/EARDF. Guidelines for the CFP were not in the scope of that study or in the Impact Assessment and are, therefore, excluded.

[286] The cost represents a contract to prepare the guidelines for project managers.

[287] No costs are included as these were not estimated in the Impact Assessment. Although under this action, a Green paper on insurance was published together with the Strategy in 2013, the costs of its development are unaccounted, as green papers constitute the core business of the Commission.

12. Coherence with other EU policies

Action 1 focuses on the development of strategies and plans to promote resilience at Member State level. The work carried out within this action is very relevant and coherent with EU objectives and legislation on disaster risk reduction. For example, the support and knowledge developed on risk and vulnerability assessments, as an important step of adaptation planning, is in line with the objective in the Union Civil Protection Mechanism legislation on disaster risk management planning and risk assessment . The scoreboard developed by the Commission to assess preparedness in Member States and its indicators are closely linked to those developed under the Hyogo Framework for Action[288]. Moreover, the coordination of disaster risk management and adaptation policies is explicitly mentioned in the scoreboard. Coherent monitoring and evaluation practices are important for DRR and adaptation. Joint work on indicators is of high relevance, for instance, in the implementation of the Paris Agreement and the Sendai Framework.

In November, the Commission adopted a Communication to Strengthen EU disaster Management. The Communication highlights the importance of prevention as part of the disaster risk management cycle, as well as the need to reinforce coherence with other key EU policies acting, inter alia, in the field of climate change adaptation. In the recent Commission proposal for the EU civil protection mechanism legislation, Member States are requested to produce prevention and preparedness plans which need to include longer-term prevention efforts, looking at the overall adaptation to the increasing impacts of climate change.

Action 3 is focusing on the implementation of the Covenant of Mayors for Climate and Energy initiative. High level of coherence was maintained with other legislative instruments and urban initiatives, in the areas of water, environment and disaster risk reduction. For example, the European Urban Water Agenda, the European Green Leaf and Green Capital Awards initiatives, the new tool for cities assessing their environmental performance, the 2017 Action Plan for nature, people and economy, just to mention a few, are implemented in close cooperation with Action 3. Coherence with disaster risk reduction policy is fostered in particular through indicators. The indicators of the Covenant of Mayors were developed in due consideration of indicators adopted for the Sendai DRR framework.

Furthermore, the urban dimension of the many EU policies is gaining importance after the establishment of the Urban Agenda for the EU, within which the newly established Climate Adaptation Partnership started a potentially new area of work. All these new developments offer opportunities to reap further benefits from more coordination and mainstreaming of urban adaptation action.

Actions 6, 7 and 8, under the Strategy's "Climate-proofing EU action" objective, are focused on key areas of the EU's budget. They show a high level of coherence between adaptation priorities and the relevant policy areas. For Action 6, the literature review suggested it complements (and is reinforced by) the high-level political commitment to spend at least 20% of the EU budget on climate objectives given that the CAP, Cohesion Policy and the CFP make up around 70% of the total EU budget. However, current work

[288] The HFA is a 10-year guideline to reduce vulnerabilities to natural hazards. It was endorsed by the UN General Assembly in the Resolution A/RES/60/195 following the 2005 World Disaster Reduction Conference.

on the mainstreaming process in relation to the EU budget suggests that the absence of a coordinating mechanism to focus the 20% of expenditure on the priorities most likely to deliver climate outcomes, and the lack of a distinction between mitigation and adaptation investment, limits the impact of the 20% commitment.[289] This is a complex undertaking, because there are synergies and trade-offs between adaptation and mitigation to be considered when tracking expenditure or developing policy, such as:

- Sustainable management of ecosystems to implement simultaneously mitigation and adaptation actions, for example, by conserving forests to protect natural stores of carbon within trees and decrease soil erosion or water flows.
- Urban densification is good for mitigation but may exacerbate vulnerability by increasing heat island effects and heat impacts (in turn driving up cooling demand). Similarly, increased use of biomass can affect land and water availability for green infrastructure or nature-based solutions.

There is a need to better track expenditure under the CAP and Cohesion Policy that delivers real adaptation benefits. While there is a tendency to simply assume that appropriately labelled CAP and Cohesion Policy expenditure is relevant to adaptation, there is scope to better define how the spending should contribute to resilience both generally in the Strategy and in the specific programme legislation.

Action 7 (ensuring more resilient infrastructure) is translated into a set of guidelines, which have clear potential to improve coherence in practice. Ensuring coherence between adaptation and new infrastructure at the EU level is a complicated task given the potential long-term lock-in effects.

13. Coherence with international policies

This section presents in more detail the relevance of different international frameworks for EU adaptation policy, as a complement to Chapter 3.

The Convention on Biological Diversity (CBD) has undertaken extensive work related to ecosystem-based approaches to climate change adaptation and disaster risk reduction.[290] Two of the CBD's Aichi targets (10 and 15)[291] aim at minimizing the impact of climate change on ecosystems. Voluntary Guidelines on ecosystem-based adaptation and disaster risk reduction are under preparation for adoption at CBD COP XIV in November 2018.

In 2015, the Agenda 2030 and the UN's 17 Sustainable Development Goals[292] for 2030 were adopted, many of which are either directly or indirectly relevant for climate change adaptation (e.g. Goal 13 on climate action, Goal 11 on sustainable and resilient cities) and towards which the related actions under the EU Adaptation Strategy contribute.

The mainstreaming of climate change adaptation in the EU's development policies is coordinated and ensured at all stages of the planning and implementation process. In addition, the main channel for EU support to policy dialogue and climate action in developing countries is the Global Climate Change Alliance (GCCA+) initiative. The overall objective of the GCCA+ is to foster policy dialogue and cooperation on climate

[289] See footnote 253
[290] CBD COP X/33; COP XII/20; COP XIII/4; technical series reports 41, 85 amongst others
[291] https://www.cbd.int/sp/targets/
[292] https://sustainabledevelopment.un.org/

change between the EU and developing countries which are most vulnerable to climate change and to contribute to their action to address climate change. The GCCA+ is evolving with the aim of contributing to the sectoral implementation of NDCs, thus also covering mitigation actions, along the lines of the UNFCCC Paris Agreement. It will nevertheless also continue supporting National Adaptation Plans (NAPs) and Disaster Risk reduction strategies.

Lessons learned in planning for and implementing the Strategy, including scientific knowledge and tools gained, provide input to the process. In addition, the core principles promoted by the Strategy – such as mainstreaming climate risks and vulnerabilities in planning, developing national and sub-national plans, promoting risk transfer mechanisms – are well aligned with core principles of EU development cooperation.

It should also be noted that the CBD's Aichi Targets, adopted under the CBD's Nagoya Protocol on Access and Benefit-sharing, particularly Targets 10 and 15, emphasise climate impacts and resilience, and that action under the Strategy contributes towards their delivery.[293] As part of the post-2015 development agenda, the Sendai Framework for Disaster Risk Reduction 2015-2030[294] was created with seven targets and four priorities of action. To translate this framework into EU action, in July 2016 the Commission published an Action Plan[295] on the implementation of the Sendai Framework.

[293] https://www.cbd.int/sp/targets/

[294] The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015.

[295] Commission Staff Working Document: Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030, SWD(2016) 205 final/2.

Annex IX Horizontal assessment of the adaptation preparedness country fiches

1. Background and objectives

The European Commission adopted the Communication: "An EU Strategy on Adaptation to Climate Change" in April 2013[296]. The Communication states that "The overall aim of the EU Adaptation Strategy is to contribute to a more climate-resilient Europe. This means enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, developing a coherent approach and improving coordination." The Strategy defines three objectives and eight actions to meet this aim. Action 1 is to "Encourage all Member States to adopt comprehensive adaptation strategies" and includes a commitment that "By 2014, the Commission will develop an adaptation preparedness scoreboard, identifying key indicators for measuring Member States' level of readiness."

The Commission's discussions with Member States on the adaptation preparedness scoreboard began in 2013. A detailed draft scoreboard methodology was subsequently developed, largely based on an approach recommended in the Commission guidelines on developing adaptation strategies[297], and was published on the Climate-Adapt website[298]. This methodology was used by the Commission in 2015 to undertake an unpublished pilot assessment and produce a national scoreboard of each Member State's performance.

Based on the lessons learned from the pilot phase, the Commission revised the scoreboard methodology by streamlining the indicators and defining criteria for assessing them, categories of information sought and guidance to enable a consistent approach to analysing the state of play in Member States. The Commission consulted Member States on the modified scoreboard methodology (see Annex X) and carried out a second assessment, as part of the evaluation of the EU Adaptation Strategy in 2017-2018. The resultant draft country fiches, including the national scoreboards, were published in December 2017, in conjunction with the public consultation on the evaluation of the EU Adaptation Strategy.

A further review of the national scoreboards and country fiches was undertaken in April and June 2018 to take account of recent developments and to ensure the quality and coherence of the country fiches. The final documents accompany this evaluation as a separate Staff Working Document.[299]

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[296] European Commission (2013). Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions: An EU Strategy on adaptation to climate change, COM (2013) 216 final. Brussels: European Union. Available from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0216&from=EN

[297] European Commission. (2013). Commission Staff Working Document: Guidelines on developing adaptation strategies, SWD (2013) 134 final. Brussels: European Commission. Available from: https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/swd_2013_134_en.pdf

[298] See: https://climate-adapt.eea.europa.eu/metadata/guidances/guidelines-on-developing-adaptation-strategies

[299] See footnote 49.

2. Method

The adaptation preparedness scoreboard methodology addresses 11 main performance areas in relation to the five steps of the adaptation cycle (see Figure IX-1 below). The scoreboard methodology and detailed indicator list can be found in Annex X. A country fiche was developed for each Member State that provides:

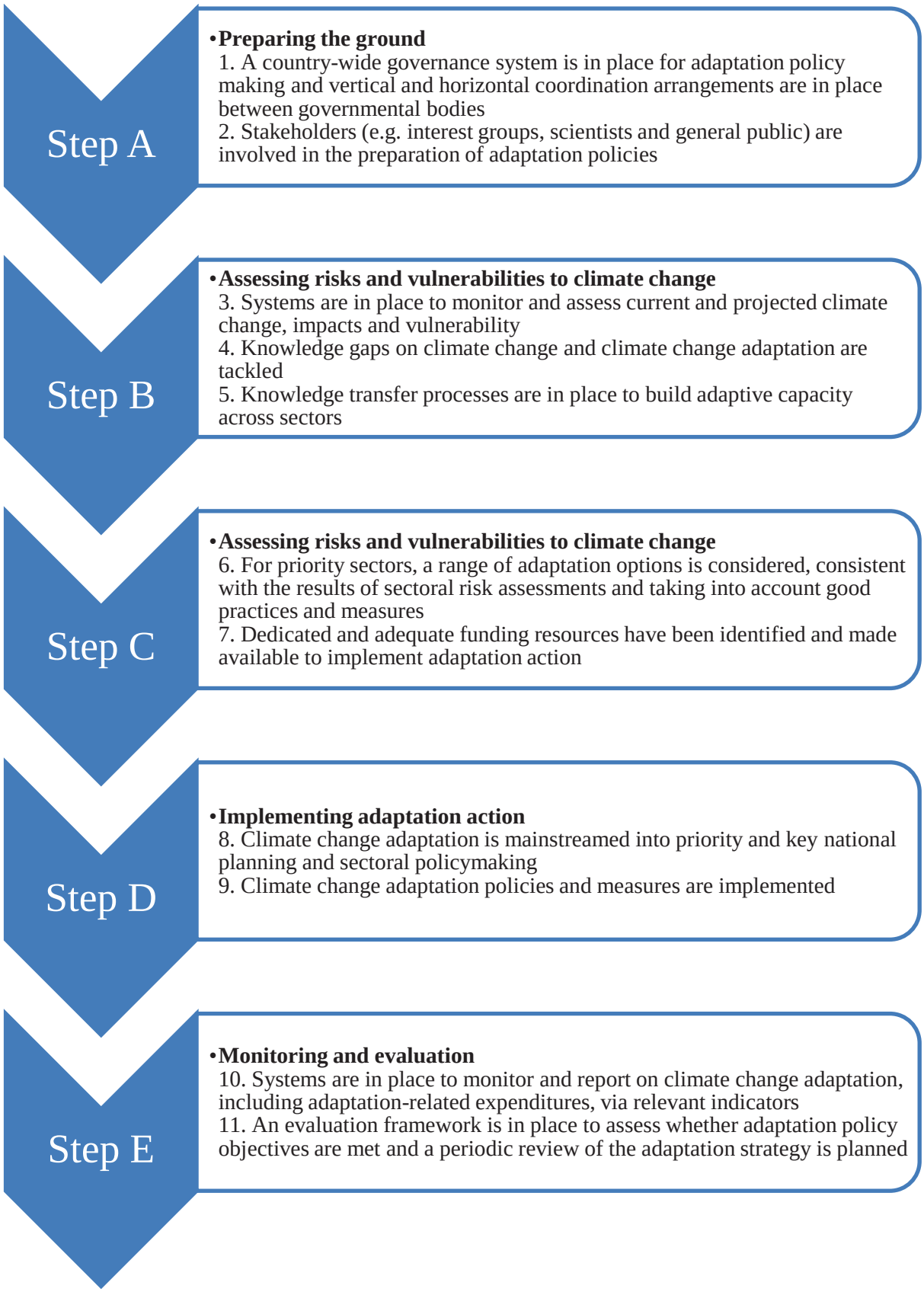
- Contextual data on the national adaptation policy framework for each Member State, including dates when national adaptation strategies (NAS) and national adaptation plans (NAP) were adopted and revised
- A narrative in relation to each of the indicators based on the criteria for assessing them. The status of each of the indicators was assessed in relation to this narrative as either already having been met ("Yes") or, for some indicators, as progressively being met by ongoing implementation ("In progress"), or as not met ("No")
- A summary table of the status of all indicators (the national adaptation preparedness scoreboard).

The information used to produce the country fiches was drawn from a review of relevant literature and, in many cases, interacting with Member State representatives.

The narrative and assessment of status in relation to each indicator were reviewed horizontally across all 28 Member States using the scoreboard methodology (see Annex X) to check that the nature and level of information and scoring were consistent.

The information on the national policy frameworks, the narrative associated with the indicators and resultant scores in the final country fiches were used as a basis for this horizontal assessment of the adaptation preparedness of Member States.

Figure IX-1. The adaptation preparedness scoreboard's 11 main performance areas in relation to the five steps of the adaptation policy cycle



Methodological limitations

The country fiches were the result of a desk-based exercise, so their accuracy is entirely reliant on the availability of published information and on the input received from Member State representatives.

The scores for each indicator ("Yes", "No", or "In progress") assess the state of play within each country. They should only be considered at a Member State level alongside the narrative that accompanies them in the country fiches. While effort was made to ensure consistency across fiches in the assessment of each individual indicator, scores should not be directly compared across the Member States. The assessment of status requires subjective assimilation of a number of factors, including availability of information, so two countries with a "Yes" in relation to the same indicator may have different national situations leading to that assessment. Nevertheless, some of the indicators with the simplest criteria (e.g. Indicators 1a and 8a, see Annex X) may be more comparable and aggregable than those that have numerous, complex criteria and information requirements (e.g. Indicators 6a, 6b and 9a).

The scoreboard methodology only provides an option for some specific indicators to be scored as "In progress". Scoring the other indicators definitively, as "Yes" or "No", was challenging where insufficient information was published and further verifiable information could not be readily provided by Member State representatives.

Scores were based on strategies, plans and policies that were already adopted. No account was taken in the scoring of proposed documents in development or consultation at the time of the assessment. This was the case even where proposals were described in the country fiches and the adoption of strategies, plans or policies was potentially imminent.

In developing this horizontal assessment, it was important to bear in mind these limitations in the way that the country fiches were produced and national scoreboards were determined. It is equally important that they are borne in mind by readers of this report to avoid over interpretation of the results, analysis and conclusions.

3. Results and analysis

The dates when Member States[300] adopted and revised a NAS and/or a NAP[301] provide important context for the interpretation of the scoreboard assessment (Table IX-1). A total of 25 Member States have adopted an NAS. Although Bulgaria, Croatia and Latvia have not yet adopted a NAS, the documents are drafted and likely to be adopted in 2018.

[300] Country codes used throughout section 3 are explained in section 5 of this Annex.

[301] Different terms are used by different Member States, but these documents essentially capture similar elements. In general, an NAS provides overarching objectives while a NAP includes more specific details on actions to be taken.

Table IX-1. Adoption of first NASs and NAPs

Year	Adoption of 1st NAS	Adoption of 1st NAP
2005	FI	
2006	ES, FR	ES (1st NAP)
2007	NL (1st NAS)	
2008	DE, DK, HU*	
2009		ES (2nd NAP)
2010	BE, PT (1st NAS)	HU (1st NAP only for 2009-2010)
2011	LU*	DE, FR
2012	AT (1st NAS), IE (1st NAS), LT, MT	AT (1st NAP), DK
2013	PL, RO (1st NAS), UK*	ES (3rd NAP), LT (1st NAP), UK
2014	SK	FI
2015	CZ, IT, PT (2nd NAS)	
2016	EL, NL (2nd NAS), RO (2nd NAS), SI	LT (2nd NAP), RO
2017	AT (2nd NAS), CY, EE	AT (2nd NAP), BE, CZ, CY, EE
2018	IE (2nd NAS), SE	IE, LT (3rd NAP), SK, NL
To be adopted/ draft available	BG, HR, LV	BG, EL, HR, IT, LU, LV, PT, SI

** The revision of the first NAS is currently ongoing and is expected to be completed in 2018.*

An analysis is set out below in relation to each step of the adaptation policy cycle and each of the 11 main areas of performance. Member States that have achieved positive scores in relation to indicators are listed wherever there are less than 10 of them or for indicators where such information may be important to those Member States that are yet to make progress in that specific regard. Listing of Member States in this way should not be interpreted as meaning that their actions in relation to an indicator are comparable; inevitably different Member States' relevant actions vary widely, as noted under 'Methodological limitations' (above).

Step A: Preparing the ground for adaptation

1. A country-wide governance system is in place for adaptation policy making and vertical and horizontal coordination arrangements are in place between governmental bodies

All Member States have a central administration body officially in charge of adaptation policy making.

Systematic coordination across sectors at a national level is in place in 23 Member States, and is applied in relation to drafting of the NAS and subsequent implementation.

Currently, there is systematic coordination across national, regional and local levels of administration in only 16 Member States (BG, DE, EE, EL, ES, FI, FR, HU, IE, IT, LT, NL, PT, RO, SK, UK), but progress is being made in a further 10 to enable lower levels of administration to influence policy making. In almost all of these Member States (22 out of 26) where vertical coordination is in place in some form, the involvement of sub-national governance levels does not seem to have a sectoral focus. Vertical coordination can take place not only during the drafting of the NAS but can also be sustained during implementation. Involvement in both drafting and implementation has taken place in 16 Member States (AT, DE, DK, EE, EL, ES, FI, FR, IE, IT, LT, NL, PT, RO, SK, UK). Box 1 presents a selection of good examples of how vertical coordination mechanisms support adaptation sub-nationally.

Box 1. Vertical coordination mechanisms: supporting sub-national adaptation

The extent of vertical coordination has important implications for the level of involvement of sub-national governance bodies in adaptation policy making. For instance, in Germany, a working group on climate adaptation under the Conference of Environmental Ministers meets twice a year to provide opportunity for the federal states to input into policy-making at the national level, to exchange experiences of NAS processes at the federal-state level, and to coordinate joint activities. Similarly, vertical coordination among national, regional and local authorities is achieved in Greece through the National Climate Change Adaptation Committee, which includes representatives from the Union of Greek Regions and the Central Union of Greek Municipalities. In Ireland, a network of four Climate Action Regional Offices has been established to drive climate action at regional and local levels by building expertise and capacity within the 31 local authorities. A complex vertical coordination structure is also in place in France to involve inter-communal and regional governance levels in adaptation policy-making and implementation. Sweden also has established a vertical coordination mechanism to support adaptation policy-making at the sub-national level, although the mechanism is different in nature compared to those in other Member States, as a result of Sweden's highly devolved governance structure. Since 2009, the administrative boards of the regions have been responsible for coordinating adaptation at regional level and supporting the adaptation work of local authorities. In March 2018, the Swedish Meteorological and Hydrological Institute (SMHI) published new step-by-step guidance for municipalities working

on climate adaptation.[302]

While the involvement of sub-national governance levels does not seem to have a sectoral focus in most Member States, vertical coordination puts a specific emphasis on flooding issues in Denmark. In 2013, after mandating municipalities to develop their adaptation action plans, the Danish Government established a national task force with detailed and specific expertise in local adaptation issues, which developed web-based mapping of flood, rainfall and storm-surge risk for various time horizons, modelled according to IPCC 2007 scenarios. A team of subject specialists on adaptation, flooding, and erosion was also established by the Danish Environmental Protection Agency and Coastal Authority with the aim to advise, guide, support, and help coordinate municipalities in implementing adaptation solutions. Latvia is another example of a country where vertical coordination has a sectoral focus. Latvian municipalities and planning regions are involved in the development of climate adaptation policy in the following sectors: civil protection and emergency planning, building and infrastructure, biodiversity and ecosystem services, and agriculture, fishery and forestry.

At the city level, involvement in the EU Covenant of Mayors for Climate and Energy[303] provides a sound mechanism to foster city-level adaptation policy making. In some cases, this is augmented by further support from national initiatives. For instance, the Spanish Network of Cities for Climate was created in 2009 by the Spanish Federation of Municipalities and Provinces and the Spanish Ministry of Environment to coordinate, foster and provide technical support and to contribute to the translation of the national climate and energy objectives at the local level. Another good example is provided by the Ministry of the Environment of the Czech Republic, which has officially committed to providing strategic guidance, financial and technical support to local authorities that are signatories to the Covenant. The Ministry has, therefore, been recognised by the European Commission as a Covenant National Coordinator.

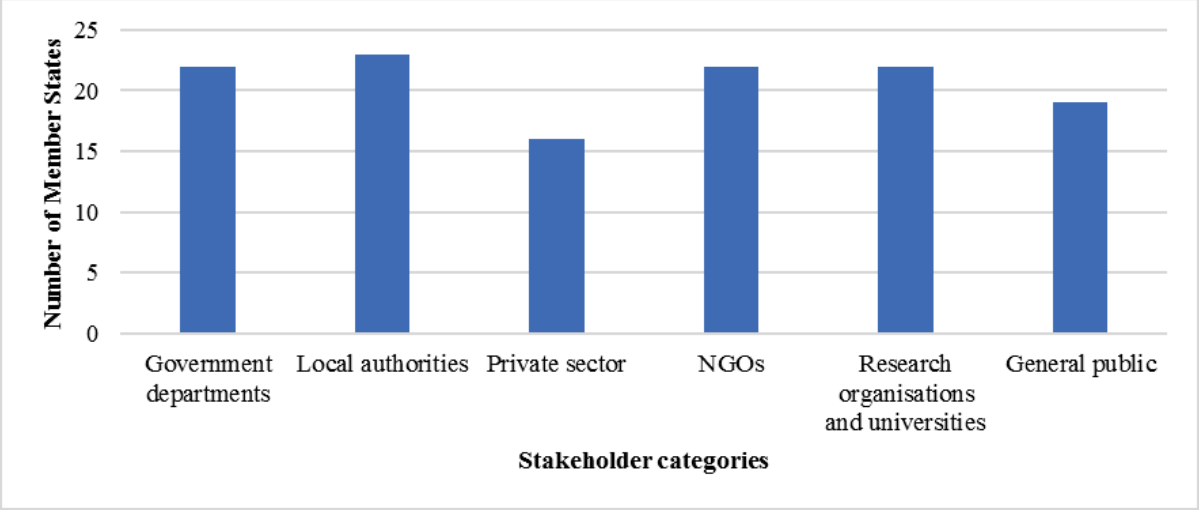
2. Stakeholders (e.g. interest groups, scientists and general public) are involved in the preparation of adaptation policies

With only two exceptions, all Member States have a dedicated process in place to facilitate stakeholders' involvement in the preparation of adaptation policies. Most country fiches indicate that a wide range of stakeholders have been consulted, including the private sector, non-governmental organisations, research organisations and universities, as well as the general public, in addition to government departments and local authorities (Figure IX-2).

[302] See: http://www.klimatanpassning.se/en/news-archive/new-guide-will-help-municipalities-with-adaptation-to-climate-change-1.132803

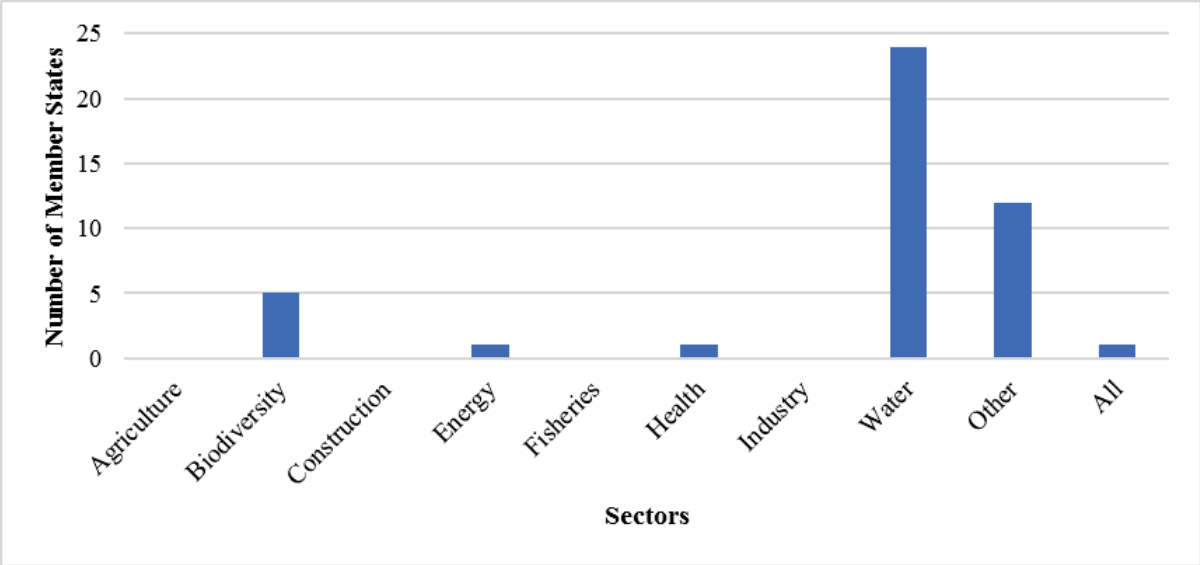
[303] See: www.covenantofmayors.eu

Figure IX-2. Types of stakeholders involved in the preparation of adaptation policy



All but one Member State integrated transboundary cooperation to address common challenges with relevant countries, almost invariably with regard to water, and more occasionally with regard to biodiversity, energy, health and "other" issues, including mountain ranges (Figure IX-3). The extent of transboundary cooperation and whether it is driven by the NAS/NAP varies between Member States, with 15 of the Member States having addressed this dimension in the NAS/NAP. Other drivers include international initiatives (e.g. the International Commission for the Protection of the Danube River, and the Alpine Convention), and EU initiatives (e.g. EU macro-regional strategies) and projects. Examples of transboundary cooperation are presented in Box 2.

Figure IX-3. Sectoral transboundary cooperation on adaptation issues



Box 2. Examples of transboundary cooperation

The Czech Republic provides a unique and interesting example of transboundary cooperation, as it consulted with the Slovak authorities during the development of the Czech NAS. Transboundary cooperation on adaptation has also been fostered by the British-Irish Council. In 2018, the Council's 15th ministerial meeting focused on how shared challenges on climate adaptation can be jointly

tackled. Portugal also sets a good example in this regard, as one of the thematic focal areas of the NAS is international cooperation. A specific working group was established to foster this action and, particularly, to establish an Iberian cooperation system. An EU co-financed LIFE project, the SAHARA project[304], supports this action.

In addition to LIFE funding, the EU Cohesion Policy supports transboundary adaptation projects (via Interreg projects). About 1,470 territorial cooperation projects dealing with climate change, risks management and sustainable management of natural resources have been identified[305], nearly 15% of more than 9,816 projects funded during the programming period 2007-2013. For example, relevant projects include the Climate Change, Impacts and Adaptation Strategies in the Alpine Space project (ClimChAlp), the Adaptation Strategies in Transboundary Areas project (STRADA), and the Climate Change Capitalisation project (C3-Alps) in which AT, DE, IT, FR, SI (CH and LI) are involved. In addition, the Pyrenees Climate Change Observatory (OPCC) provides a knowledge platform about adaptation to climate change in the Pyrenees covering FR and ES bordering regions and Andorra.[306]

During the summer of 2017, the Interact network launched a thematic network on Climate Change and Risks[307] in order to support the Interreg projects. This network brings together practitioners from the Interreg community, regional stakeholders, experts and other EU programmes and knowledge communities active in the field of climate change and risks. Its overall goal is to facilitate the exchange of practices and lessons learnt and to gain further knowledge.

EU-driven transboundary adaptation action is translated through the four macro-regional strategies[308] that involve 19 Member States. For instance, the EU Strategy for the Danube Region puts a special focus on adaptation to extreme weather events and provides an important platform to foster cooperation between AT, BG, CZ, DE, HR, HU, RO, SK and SI on joint monitoring and flood management. At the same time, this cooperation has benefitted from the prior existence of the International Commission for the Protection of the Danube River[309] (ICPDR) under which a specific adaptation strategy was adopted in 2012. The existence of other international river basin committees (e.g. on the Meuse or the Sava) also foster joint climate adaptation actions in other Member States.

In addition to extensive transboundary cooperation on river basins, multiple initiatives exist for mountain ranges and for biodiversity. While these initiatives cover a wide range of issues adaptation to climate change is also addressed. For

[304] See more about LIFE projects at: http://ec.europa.eu/environment/life/project/Projects/index.cfm
[305] Based on the KEEP database: https://www.keep.eu/keep/ – a comprehensive database regarding the territorial cooperation projects and beneficiaries in Europe
[306] See more about Interreg projects at: https://www.interregeurope.eu/discover-projects/
[307] http://www.interact-eu.net/contact?field_fields_of_expertise_tid=All&field_networks_tid=81
[308] The EU Strategy for the Baltic Sea Region, the EU Strategy for the Danube Region, the EU Strategy for the Adriatic and Ionian Region and the EU Strategy for the Alpine Region. See: http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/
[309] See: http://www.icpdr.org/main/

example, transboundary cooperation between AT, DE, FR, IT, SI and LI and CH is fostered by the EU-Strategy for the Alpine Region (EUSALP), and climate adaptation is specifically considered by the 'risk governance' and 'green infrastructure' action groups. Furthermore, international conventions on the Alps[310] and Carpathians[311] are in place. There is also transboundary cooperation with non-EU Members on biodiversity and adaptation issues in Northern Europe. The Fennoscandia Green Belt initiative supports a joint nature conservation cooperation between Finland, Norway and Russia and, among other foci, on threats to ecosystem services from climate change.

Finally, there is a wide range of trilateral initiatives focused on adaptation issues. Examples include the cooperation between Benelux countries (BE, NL and LU), which have cooperated on climate change issues since 2014, the trilateral Wadden Sea cooperation between DK, DE and NL, and the cooperation agreements between CY, EL and Egypt, and CY, EL and Israel. In 2017, the latter focused on the exchange of knowledge and know-how on adaptation policy monitoring, evaluation and good practice at regional and local scales.

Step B: Assessing risks and vulnerabilities to climate change

3. Systems are in place to monitor and assess current and projected climate change, impacts and vulnerability

A total of 14 Member States have established observation systems to monitor climate change, extreme climate events and their impacts, and systems are being developed in all of the other Member States. According to the country fiches, Member States collect data on climate impacts in relation to multiple types of variables. Those most commonly captured are sectors affected (14 Member States), costs (12 Member States), and number of people affected (six Member States: BE, FR, IT, LU NL, RO).[312]

Climate change scenarios and projections are available at national level for 25 Member States, and at a sub-national for 10 Member States. Only three Member States rely solely on international data. Climate change scenarios and projections are being used to assess future economic, social and environmental impacts in at least 23 Member States, with others steadily making progress in this respect.

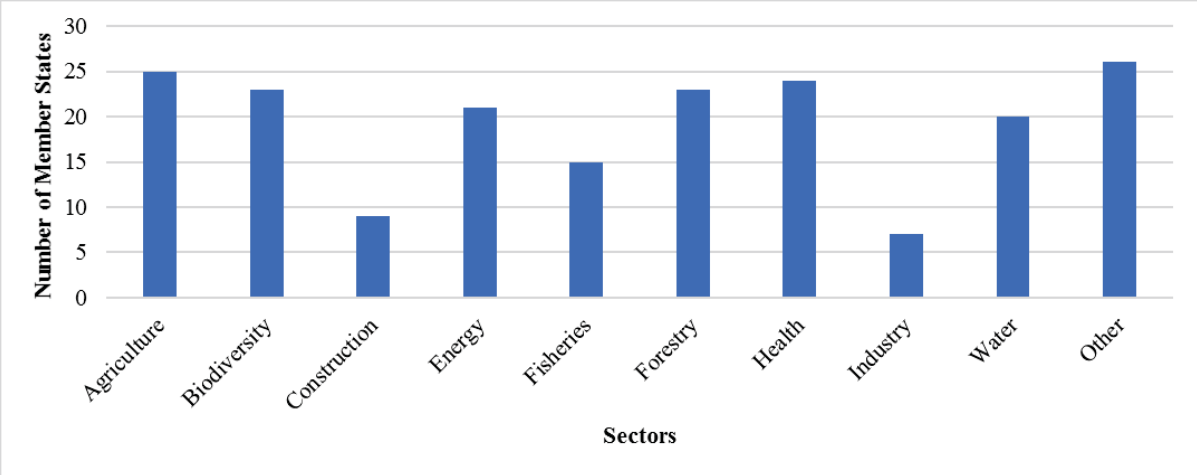
Sound climate risk and/or vulnerability assessments for priority sectors are being undertaken to support adaptation decision making by at least 22 Member States, with all but one of the other Member States making progress in that regard. The frequency with which different sectors are addressed is shown in Figure IX-4. In addition to those sectors specified in the figure, small numbers of Member States addressed a wide range of "Other" individual sectors or themes, including: coastal; desertification; disaster risk management; economy; finance; ICT networks; infrastructure; insurance; land use; maritime; mountains; natural environment; society; soil; spatial planning; tourism; urban; and waste management. Three Member States (DE, SI, UK) were identified as having assessed all vulnerable sectors. Climate risk and/or vulnerability assessments are:

[310] See: http://www.alpconv.org
[311] See: http://www.carpathianconvention.org/
[312] Climate impact monitoring is not in place in five Member States.

coordinated centrally in 22 Member States, although in six of these countries further assessments have been driven by independent research projects or scientific organisations; sector driven in three countries (PL, PT, SE), albeit independently in one case; and carried out as a wholly independent research project in NL.[313]

A recent European Environment Agency (EEA) report[314] concluded that a variety of approaches is used for impact and vulnerability assessments, including literature review, dedicated research programmes and projects, model-based studies and stakeholder-driven processes. Most of the assessments have a broad scope, with up to 19 different sectors and thematic areas covered, such as in the case of FI and UK. The EEA report found that similar categories to those cited in Figure IX-4 (below) are addressed in the assessments.

Figure IX-4. Categories of sectors where climate risk/vulnerability assessments are undertaken[315]



Transboundary risks are taken into account in a coordinated manner by three Member States across all or a wide range of sectors (DE, FI, PT) when undertaking climate risk and/or vulnerability assessments. A total of 19 Member States are assessing transboundary risks primarily in relation to the water sector. Consideration of transboundary risks is driven by the NAS in three Member States (UK, plus FI and PT also being driven at a project level) whereas in other countries it is sector-driven or implemented at a project level.

4. Knowledge gaps on climate change and climate change adaptation are tackled

Work is being carried out to identify, prioritise and address the knowledge gaps in 15 Member States (Figure IX-5, below, categorises the knowledge gaps identified in these country fiches). A further 11 countries have identified knowledge gaps but there seems to be limited activity to address the gaps through further research and work. In most of

[313] It has not been possible to establish whether or not information on climate risk and/or vulnerability assessments is coordinated for one Member State.

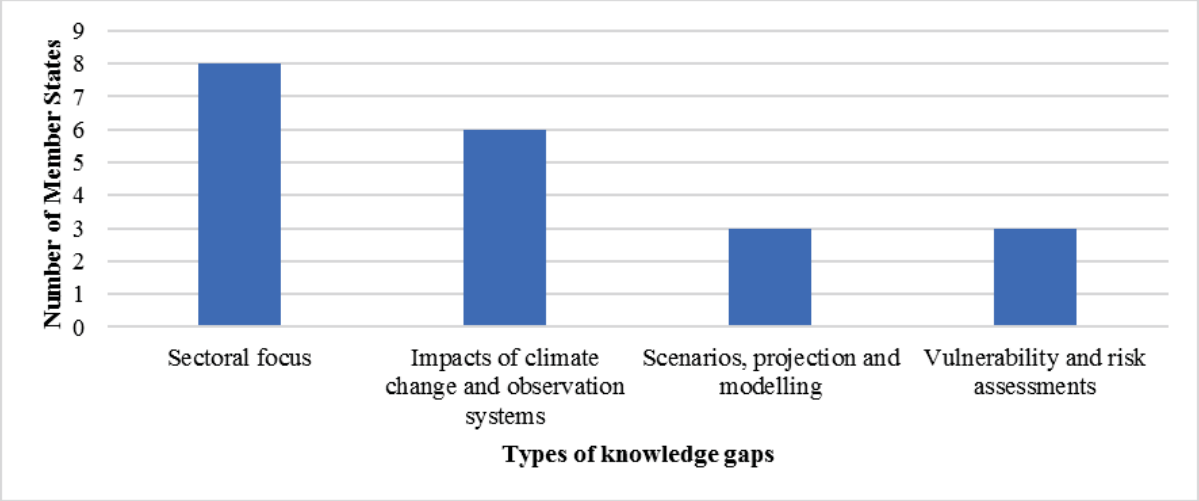
[314] EEA, 2018, National climate change vulnerability and risk assessments in Europe, 2018, European Environment Agency, EEA Report 1/2018, ISSN 1977-8449 (https://www.eea.europa.eu/publications/national-climate-change-vulnerability-2018)

[315] It has not been possible to establish the sectoral coverage of climate risk/vulnerability assessments undertaken for one Member State.

the countries, the NAS includes actions related to knowledge but one-off projects are the primary driver in four countries.

Box 3 (below) summarises principles emerging from the country fiches for good practices in addressing climate change and climate adaptation knowledge gaps. In the EEA report on national impact and vulnerability assessments[316], most mentioned knowledge gaps and themes where additional knowledge needs remain today are the consideration of non-climatic factors, cross-sectoral interactions and cross-border impacts, common metrics for impacts and vulnerabilities, uncertainties, long-term adaptation and targeted communication.

Figure IX-5. Types of knowledge gaps identified in countries where work is ongoing to address them



Box 3. Principles for good practices in addressing knowledge gaps

Principles for good practices emerging from the country fiches include:

- Member States taking responsibility.

  National authorities initiate and fund research programmes in order to invest in evidence-based adaptation. Examples: AT, BE, DE, DK, ES, FI, FR, PT, SE, UK.

- Linking research and policy to ensure timely results.

  Waiting for research results need not be a barrier to implementation. In several Member States, knowledge development occurs together with the policy process, starting with awareness raising, development of scenarios and vulnerability analysis, progressing to applied research and technological development, and supporting application of results in

[316] EEA, 2018, National climate change vulnerability and risk assessments in Europe, 2018, European Environment Agency, EEA Report 1/2018, ISSN 1977-8449 (https://www.eea.europa.eu/publications/national-climate-change-vulnerability-2018)

practice. Examples: AT, BE, DE, DK, FI, NL, UK.

- Breadth of knowledge development enables identification of key vulnerabilities.

  Many Member States identify sectoral vulnerabilities, setting priorities that matter most to their economies or are most relevant to their geographical situation. Examples: AT, FR, HR, IE, SI, UK.

- Research responsibilities are shared between researchers and other stakeholders.

  Several countries structure research programmes to coordinate effort and enable input from research institutes, sub-national governments, non-governmental organisations and the private sector. Examples: AT, BE, DE, DK, FI, NL, UK.

- Addressing knowledge gaps is a path-dependent, self-reinforcing process.

  Investment in the development of knowledge on climate change and climate adaptation seems more likely in countries that already have a strong research base, including a high-level meteorological office. Larger Member States with greater critical mass are better able to close knowledge gaps. Examples: DE, FR, UK. Smaller countries and countries with a small research budget make progress by becoming involved in European research projects and by cooperating with countries that face similar issues. Examples: MT, PT, SI.

5. Knowledge transfer processes are in place to build adaptive capacity across sectors

Adaptation-related data and information (e.g. climate projections, vulnerability and risk assessments, adaptation tools) are available to all stakeholders, including policy makers, in 17 Member States. At least some stakeholders have access to such information in a further nine Member States. A total of 19 of these countries have a national web-based platform for disseminating information. In addition, at least one of the countries without a national platform has a regional platform covering part of the Member State. In 2014[317], only 12 Member States had a dedicated adaptation platform, while also transnational regions such as the Alpine, Baltic Sea or Pyrenees regions had a publicly available adaptation platform.

Coordination of associated capacity-building activities (including education on climate adaptation concepts and practices, and dissemination of training materials), usually driven by the NAS or NAP, is established in half of Member States. However, systematic actions on capacity building are being pursued in a further 11 countries.

[317] EEA, 2015, Overview of climate change adaptation platforms in Europe, European Environment Agency, EEA Technical Report 5/2015, ISSN 1725-2237 (https://www.eea.europa.eu/publications/overview-of-climate-change-adaptation)

Box 4 (below) summarises principles emerging from the country fiches for good practices in relation to knowledge transfer, including capacity building. The challenges are similar to the ones detected in the 2015 EEA report on adaptation platforms[318]: engaging with stakeholders, identifying relevant information and knowledge, effective presentation and linking platforms across sectors, scales and platforms. Nevertheless, funding and sustaining a platform and technical, structural and design elements of an adaptation platform were also mentioned as challenges.

Box 4. Good practices in knowledge transfer

Provision of a national website on climate change and climate adaptation is an obvious response to the need to facilitate knowledge transfer. It is an option currently being pursued by all but two Member States, however, the comprehensiveness and applicability of the information provided by such online platforms is highly variable. Good practices emerging from the country fiches address two challenges:

- How to make knowledge accessible and applicable?

  Member States address this challenge by:

  - Promoting uptake of knowledge by making information available in the local languages. Examples: AT, DK, EE, ES, FI, FR, HU, LV, NL, PT, SE, UK;
  - Presenting inspirational and practical case studies. Examples: AT, DK, FI, FR, PT, SE; and
  - Using interactive websites to encourage input and to promote collaboration between different stakeholders. Examples: DK, ES, FR, HU, PT.

- How to guide non-scientific users through multiple sources of information?

  Information on climate change and adaptation arising from more than two decades of research is now available, which is disseminated by numerous international and national websites, inside and outside the EU[319]. Some Member States have sought to develop national websites that provide an overview and waymark information. Examples: DE, UK.

In addition to disseminating information, Member States can promote knowledge transfer through capacity building, which:

- Is especially relevant for sub-national governments, as demonstrated by the country fiches. Examples: AT, DE, DK, IE, PT, SE, UK.
- Can be targeted to vulnerable sectors, such as forestry or health.

[318] See footnote 317

[319] The Evaluation of the EU Adaptation Strategy (2018) indicates that the EEA Climate-ADAPT website plays an important role in structuring adaptation information. Interviewees from national governments, in particular, noted that Climate-ADAPT is used as a starting point and, as it is interactive, it can be used by Member States to share their experiences.

Examples: CZ, DK, EE, ES, HR, PT, UK.

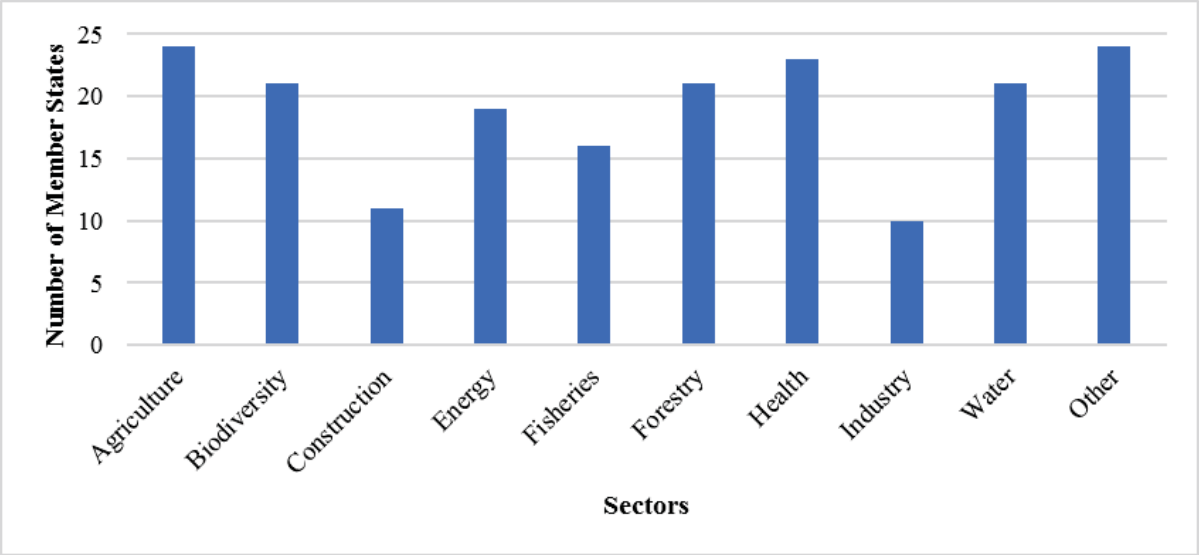
- Can include use of workshops that function as a two-way communication channel, alerting national stakeholders to new sub-national issues and vice versa. Examples: DE, ES, SE, UK.
- Some countries are seeking to achieve through interactions with the general public and schools. Examples: AT, CZ, DK, EE, FI, HR, IE, PT.

Step C: Identifying adaptation options

6. For priority sectors, a range of adaptation options is considered, consistent with the results of sectoral risk assessments and taking into account good practices and measures

Detailed risk and/or vulnerability assessments have been used by 25 Member States to identify adaptation options for at least a majority of priority sectors. The frequency with which different sectors are addressed is shown in Figure IX-6. In addition to those sectors specified in the figure, small numbers of Member States have addressed a wide range of "Other" individual sectors or themes, including: coastal; desertification; disaster risk management; economy; finance; ICT networks; infrastructure; insurance; land use; maritime; mountains; natural environment; society; soil; spatial planning; tourism; urban; and waste management. Six Member States (FR, NL, PL, PT, RO, SK) were identified as having assessed all priority sectors.

Figure IX-6. Risk assessments and adaptation options identified for priority sectors[320]



The selection of adaptation options appears to be based on robust methods (e.g. multi-criteria analyses and/or stakeholder consultations, see Box 5) in 24 Member States, which have also identified priority actions per sector. Four Member States have yet to progress robust identification and prioritisation of adaptation options.

[320] Sectoral information on risk assessments and adaptation options is not available for one Member State.

Box 5. Prioritising options using multi-criteria analysis and stakeholder input

Prioritisation of adaptation options is important for the efficient and effective use of limited adaptation resources. Combining the use of multi-criteria analysis (MCA)[321] with literature, modelling, and stakeholder and/or expert input is a good way to achieve more robust outcomes. A selection of examples of Member States adopting such combined approaches are presented here.

In Croatia, a host of potential adaptation measures were identified during the development of the NAS. The measures were discussed with more than 130 stakeholders during a series of workshops, and MCA was used to prioritise each of them as a 'very high, high or medium priority' for implementation. As a result, 79 sectoral measures were selected, and divided into the five foci of the NAS. These measures were then aligned with spending priorities and programmes and 42 included as 'very high priority' measures in the draft NAS.

In Cyprus, the prioritisation of more than 200 adaptation measures, identified across the 11 sectors in the NAS, made use of stakeholder opinion surveys, which were then processed and evaluated using a MCA. Eight criteria were used in the MCA: 1) Efficiency of the measure; 2) Environmental concerns; 3) Supporting the prevention of climate change impacts; 4) Urgency for implementing the measure; 5) Usefulness of implementation irrespective of climate change; 6) Technical viability; 7) Economic viability; and, 8) Public acceptance. The MCA produced alternative adaptation scenarios based on different weightings of system vulnerabilities, evaluation criteria and stakeholder types. The highest performing options across the scenarios were taken forward in a 'sustainable adaptation scenario' and included in the NAS. Performance was ranked equally between the technical, environmental and social criteria, whilst economic aspects were evaluated in a separate cost-benefit analysis (CBA).

In the Czech Republic, adaptation options were selected using expert judgement and prioritised by different ministries and thematic working groups using an MCA. Measures were ranked according to four criteria: 1) multiple adaptation effects to tackle the impacts of climate change; 2) spill-over social, economic or mitigation impacts; 3) impact on the environment and ecosystems; and 4) financial needs for implementation. Criterion 1 was assessed by the thematic working groups and attributed a weight twice as important as the other three criteria, which were evaluated by external consultants. Based on the MCA, measures were categorised into priority one measures and priority two measures.

Similar combined approaches have also been used in Estonia, the Netherlands and the UK (England) among others.

[321] MCA is an analytical approach that allows for quantitative and qualitative criteria to be analysed within the same single framework. It can be combined with weightings to produce rankings and/or scoring of the options being assessed to support decision making.

There has been less progress in coordinating disaster risk management and climate adaptation. Mechanisms are in place to ensure coherence between the two policies in only 10 Member States, although are in progress in 13 of the other countries (see Figure IX-7 below).

7. Dedicated and adequate funding resources have been identified and made available to implement adaptation action

Consistent funding is available for the implementation of adaptation actions to increase climate resilience in vulnerable sectors and in cross-cutting ways (e.g. national scenarios and climate services, capacity building, website) in only nine Member States (DE, DK, EE, ES, FR, LT, PT, RO, SE), but adaptation is financed in at least some sectors in all of the other countries, with one exception. The lack of funding that is specifically labelled for adaptation is also reflected in the fact that only 14 Member States include budget allocations in their NAS or NAP.[322]

Step D: Implementing adaptation action

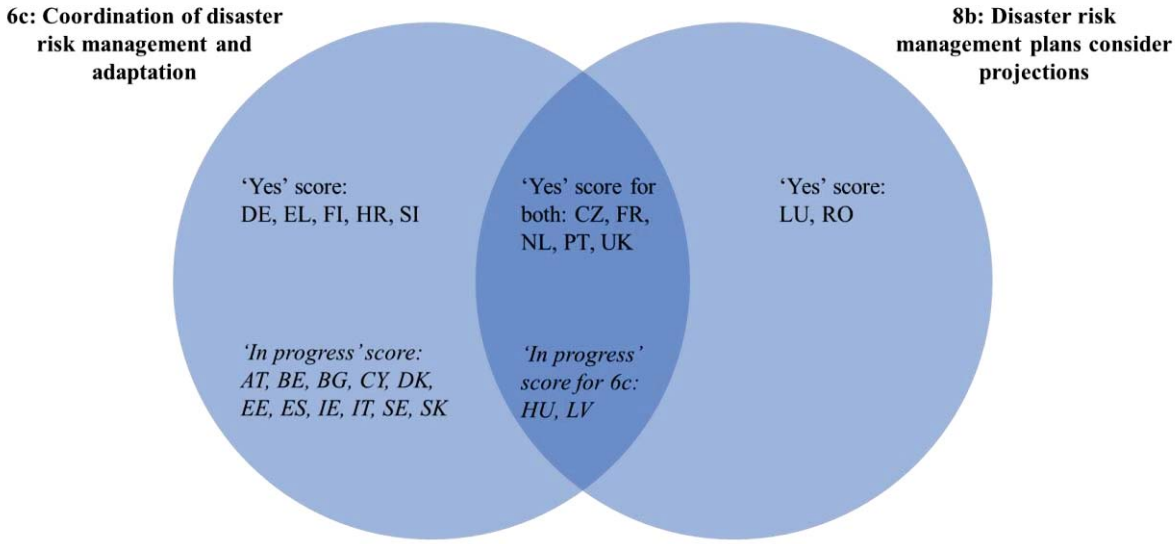
8. Climate change adaptation is mainstreamed into priority and key national planning and sectoral policymaking

The country fiches identify that climate adaptation has been considered in the national frameworks for Environmental Impact Assessment (EIA) in 21 Member States. However, only 15 Member States consider climate adaptation in Strategic Environmental Assessment (SEA).

Only nine Member States (CZ, FR, HU, LU, LV, NL, PT, RO, UK) have taken climate change impacts and projections into account in national disaster risk management plans and associated preparedness/prevention strategies. This is reflective of the current state of play in relation to coordination of disaster risk management and climate adaptation (see Point 6 above and Figure IX-7 below). Box 6 provides a selection of examples of good practice.

[322] It is unclear whether or not there are budget allocations associated with the NAS in two Member States.

Figure IX-7. Coordination of disaster risk management plans with adaptation, and consideration of climate projections



Box 6. Coordinating disaster risk reduction and adaptation

Climate change is affecting vulnerability to hazards, changing patterns of exposure and thereby having a significant impact on the risk of natural disasters, which are likely to increase in frequency and severity. Promoting coordination between strategies and actions for adaptation and disaster risk reduction, and fostering systematic integration of climate science and knowledge in disaster risk assessments and management, is crucial for a coherent response to climate and disaster risk.

A small number of Member States exemplify good practice.

Disaster risk management in France is based on plans published at the level of each department, which set out how the response to a range of risks will be organised. These plans include the identification of key climate-related risks and take account of climate change and modelling (e.g. in the relation to flood risk zones). The plans ensure that climate impacts and projections are addressed in disaster prevention and preparedness strategies and management plans.

In the Netherlands, the Dutch Safety Regions[323] are mandated to address disaster risk management on their territory and base their plans on climate

[323] These are 25 regions covering the entire country that have administrative responsibility for risk assessment and response. The emergency services (e.g. fire brigade, police and paramedics) cooperate and are organised in teams corresponding to the Safety Regions. The Safety Regions differ from the country's 12 provinces. For further information see 'Ministry of Security and Justice (nd) Safety

projections. In 2015, the 'Water and Evacuation' programme started, with the aim to improve the preparedness of the Dutch Safety Regions for the consequences of floods due to climate change. Between 2015 and 2017 instruments were developed and made publicly available to assist the Safety Regions in their preparedness for water-related disasters, including floods. The programme is monitored by the Steering Group Management Water Crises and Floods (Stuurgroep Management Watercrises en Overstromingen, SMWO). The SMWO governance structure falls under the Steering Group National Security in which Dutch Safety Regions, the Ministry of Security and Justice, the Ministry of Infrastructure and the Environment and the Dutch Water Authorities, and the Ministry of Defence take part. This structure provides a good practice example of how information sharing and appropriate actions on climate change and disaster risk prevention can be coordinated across all key agencies.

In Portugal, the national authority for civil protection (ANPC) is liaising with the work of the national platform for disaster risk reduction linked to climate adaptation and is coordinating one of the sectoral working groups that integrate with the NAS. In this way, close cooperation and articulation between disaster risk management and climate adaptation is assured. The NAS also includes a sector working group on safety of people and assets, which contributed to the ANPC's 2014 National Risk Assessment[324]. This assessment explicitly includes climate change impacts and how they may accentuate or attenuate natural, technological or hybrid risks. The NAS also acts to support disaster risk reduction at sector level, promotes good practices (e.g. early warning systems) and produces manuals on best practices for risk management and prevention.

Similar coordinated approaches are also established in a small number of other Member States, including the Czech Republic and the UK.

The EEA report on Climate change adaptation and disaster risk reduction in Europe[325] shows that there are opportunities to further enhance coherence between climate change adaptation and disaster risk reduction as both policies use the concept of resilience and this provides common ground to build on more coherent policies and actions. Example include the co-design and co-development of climate services, an area where Copernicus ('*Europe's eyes on Earth*[326]') can contribute. In addition, there are opportunities to improve and harmonise the sharing of vast amount of complementary knowledge available at websites, portals and platforms. Incomplete records of past disasters highlight the need for an improved monitoring and risk assessment as comprehensive, harmonised and interoperable disaster loss databases are needed to improve existing damage and risk models. Finally, national level coordination of

Regions Act. Available from: https://english.nctv.nl/binaries/j-18732-web-eng-wet-veiligheidsregios_tcm32-84093.pdf

[324] ANPC (2014). Avaliacao Nacional de Risco Available from: http://www.prociv.pt/bk/RISCOSPREV/AVALIACAONACIONALRISCO/Documents/2016_Avaliacao_Nacional_Riscos.pdf

[325] EEA, 2017, Climate change adaptation and disaster risk reduction in Europe: enhancing coherence of the knowledge base, policies and practices, European Environment Agency, EEA Report 15/2017, ISSN 1977-8449 (https://www.eea.europa.eu/publications/climate-change-adaptation-and-disaster)

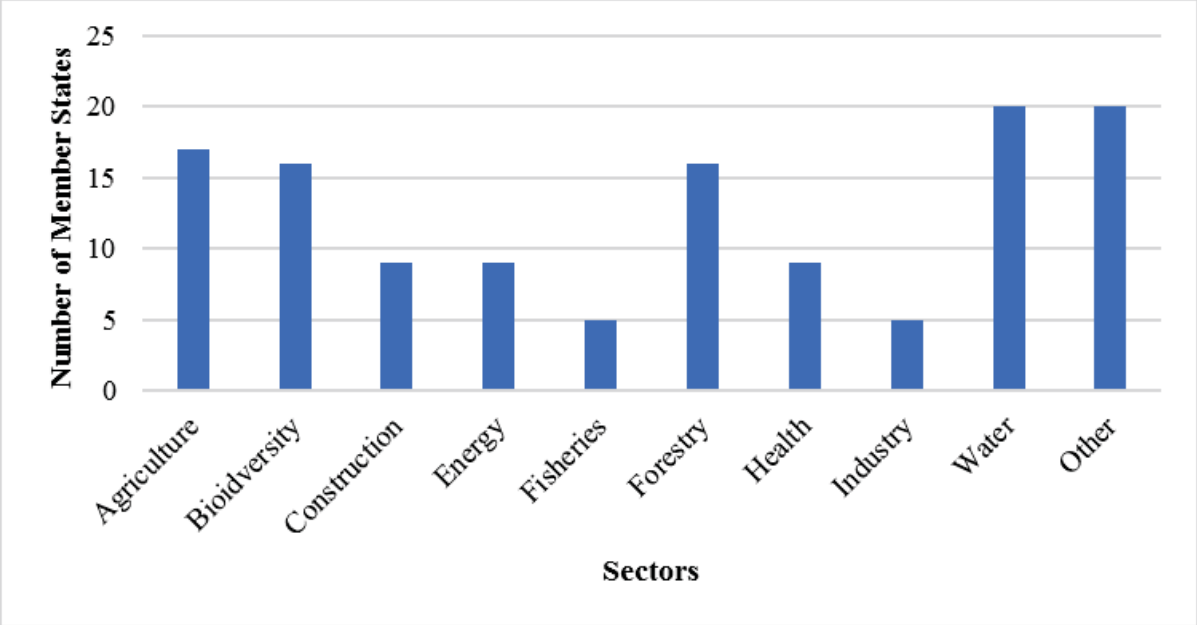
[326] http://www.copernicus.eu/

indicators needs improvement to measure progress and better understand and value the co-benefits of nature-based solutions in adaptation and disaster risk reduction.

A total of 15 Member States[327] have land use, spatial, urban and maritime planning policies that explicitly address climate impacts, and require or encourage adaptation.

Only six Member States (BE, DE, FI, SE, SK, UK) have national policy instruments that promote adaptation at sectoral level, in line with national priorities and in areas where adaptation is mainstreamed in EU policies. However, all but two of the other countries are promoting adaptation in certain sectors, with significant gaps in others (e.g. construction, energy, fisheries, health and industry) (see Figure IX-8). In addition to those sectors specified in the figure, small numbers of Member States are mainstreaming adaptation in a wide range of "Other" individual sectors include insurance or alternative policy instruments providing incentives for investments in risk prevention (DE and DK only).

Figure IX-8. Sectors in which national policy instruments promote adaptation



9. Climate change adaptation policies and measures are implemented

At least 22 Member States are implementing their NAS and/or NAP, albeit with gaps in key sectors or in some actions identified as priorities. In one Member State (FI), it is clear that the NAP and associated priorities are being implemented in a coordinated way.

Of those Member States that have progressed implementation, only 14[328] have cooperation mechanisms in place to foster and support adaptation at a local and subnational scale.

[327] BG, CZ, DE, DK, FI, FR, HU, IE, LT, LU, LV, PT, SE, SI, UK
[328] AT, DE, DK, ES, FI, HU, IE, LT, NL, PL, PT, SE, SK, UK

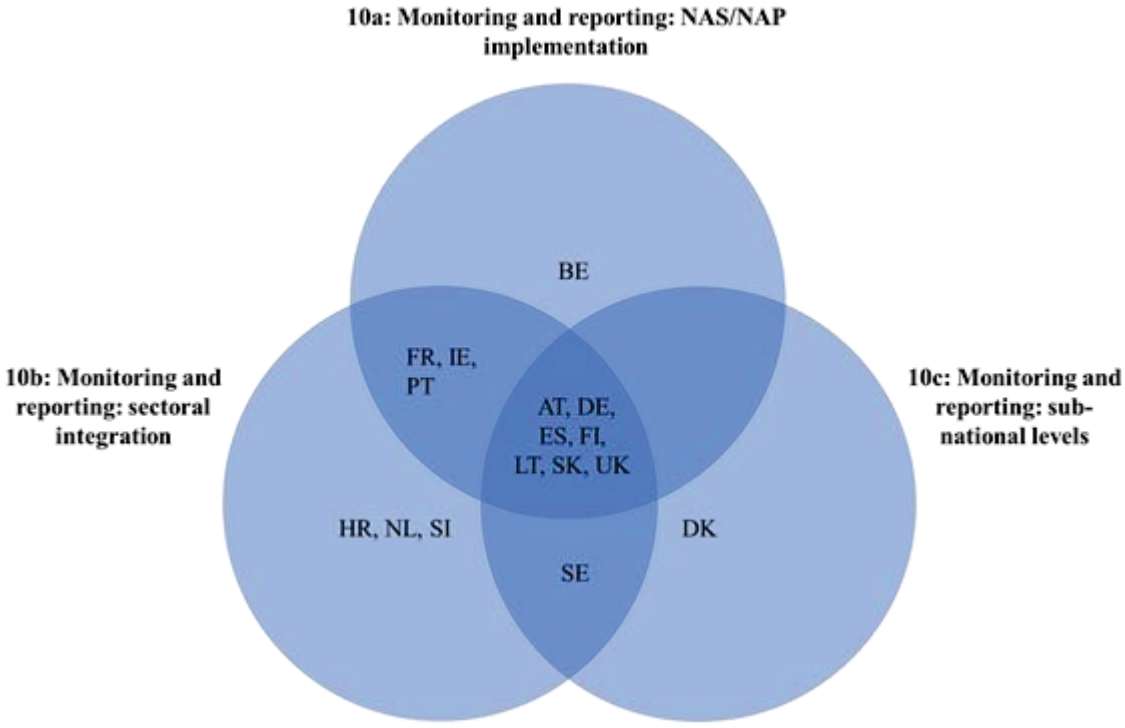
Half of the Member States have made little or no progress, as yet, in making procedures or guidelines available to assess the potential impact of climate change on major projects or programmes, and facilitate the choice of alternative options (e.g. green infrastructure). Thirteen Member States are involving stakeholders in the implementation of adaptation policies and measures.

Step E: Monitoring and evaluation

10. Systems are in place to monitor and report on climate change adaptation, including adaptation-related expenditures, via relevant indicators

A total of 16 Member States are undertaking some monitoring and reporting of adaptation activities. The extent differs to which these Member States are monitoring and reporting on: NAS and/or NAP implementation; integration of climate adaptation in sectoral policies; or regional, sub-national and local actions (see Figure IX-9).

Figure IX-9. The focus of adaptation monitoring and reporting being undertaken by Member States



11. An evaluation framework is in place to assess whether adaptation policy objectives are met and a periodic review of the adaptation strategy is planned

While 24 Member States have planned a periodic review of their NAS and/or NAP, stakeholders are actively involved in the assessment, evaluation and review of national adaptation policy in only 13 Member States. Nevertheless, the EEA reports that most countries have focused primarily on monitoring and reporting while the evaluation of adaptation policies has started recently in a handful of countries[329].

An overview of monitoring and evaluation frameworks and a selection of good practices is provided in Box 7.

Box 7. Monitoring and evaluation frameworks

Monitoring and reporting of implementation has taken place at sectoral and sub-national levels in seven Member States (AT, DE, ES, FI, LT, SK and UK). In most countries, reporting of sectoral and sub-national level implementation is covered within the central report on the implementation of the NAS/NAP with dedicated chapters on the relevant actions. On the other hand, there are three Member States (HR, NL and SI) where, even though central monitoring and reporting on the implementation of the NAS is not in place, separate sectoral progress reports are published. For instance, in the Netherlands, a progress report on the Delta Programme, covering adaptation actions related to flooding and the water sector, is published annually.

The frequency of central reporting varies; for instance, in Austria a progress report is published every five years, in Spain every three years, while in Lithuania an implementation report on the NAP is published annually by the responsible ministry. The type of monitoring information can be qualitative and quantitative. For instance, in Austria monitoring is based on a stakeholder survey ('self-assessment approach'; based on the NAP and sent to the key actors mentioned therein) and a criteria-approach ('indicator-based approach' with qualitative and quantitative data collections).

In contrast to the dissemination of monitoring results, a periodic review of the NAS/NAP is in place or planned in 24 out of the 28 Member States and is either embedded in the national climate change legislation or the NAS/NAP itself.

Fundamental conceptual and methodological challenges remain for monitoring, reporting and evaluation activities owing to a still limited experience with the use of adaptation indicators. A forthcomingworking paper of the EEA, supported by the European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation, analysed available national adaptation indicator sets. While several countries are working on adaptation indicators, and new information is expected

[329] EEA, 2015, Overview of climate change adaptation platforms in Europe, European Environment Agency, EEA Technical Report 5/2015, ISSN 1725-2237 (https://www.eea.europa.eu/publications/overview-of-climate-change-adaptation)

to be available in the near future, there are currently only a few European countries with an operational set of indicators in place (AT, FI, DE, NL, UK). The countries use indicator sets instead of single indicators and combine quantitative information with descriptive expert knowledge. There is also a clear link between the sectors covered in the NAS/NAP and in the adaptation indicator sets. Several data underpinning the indicators are either recorded continuously (e.g. water parameters) or collected from different entities (for example in the case of subnational measures), making it necessary to report them in a structured format for evaluation. While not always one-to-one, the adaptation indicator sets available contain a large amount of information that is suitable for the reporting under the Sendai Framework on Disaster Risk Reduction and the Sustainable Development Goals (SDG) indicators globally and at the EU-level (for SDG13 on Climate Action and beyond). Monitoring, reporting and evaluation experiences in for example the thematic areas of biodiversity, adaptation and international development, and sustainability have transferable lessons learned that may improve climate change adaptation evaluation practices.

Regarding the active involvement of stakeholders in the monitoring and evaluation process, 13 Member States have put in place stakeholder engagement mechanisms, which include involvement within central and sectoral committees as well as holding stakeholder workshops or discussions. For instance, in Finland, a specific group was established to monitor NAP implementation and the group involves the central coordinating ministry, other relevant ministries, research institutes, and local, regional and other relevant actors and associations.

4. Conclusions

Overall, Member States have made good progress in developing a NAS and/or NAP, or are in the process of finalising them (three Member States are in the final stages of adopting a NAS). This progress suggests that there is a now a significantly higher baseline of preparedness and adaptation policy-making than in 2013, when the EU Adaptation Strategy was launched. It also suggests that the Strategy catalysed action in Member States and particularly in those that were in earlier stages of developing an adaptation policy. The EU's facilitative role through providing guidance, funding research and adaptation action under the Strategy can be traced throughout the five steps of the adaptation policy cycle.

The aggregated scoreboard for the 28 Member States is provided in Figure IX-10 (below). It indicates a difference in progress by Member States across the five steps of the adaptation policy cycle. While most Member States have made good progress with the first three steps (A. Preparing the ground for adaptation; B. Assessing risk and vulnerabilities; and C. Identifying adaptation options), many have yet to implement adaptation actions and undertake monitoring and reporting. Larger Member States and those that adopted a NAS earlier than others (see Table IX-1 above) have made more progress. Progress in relation to some indicators is also influenced by administrative culture and geography. For instance, not all Member States wish to coordinate sectoral adaptation actions under a single strategy and the need for detailed transboundary arrangements is less relevant for more isolated Member States.

Conclusions on each step of the adaptation policy cycle are provided below:

Step A: Preparing the ground for adaptation

All MS have a basic governance structure for adaptation policy-making. Although some degree of vertical coordination is in place in almost all Member States to enable sub-national stakeholders to influence policy development and implementation, this does not seem to have a sectoral focus. Nevertheless, most country fiches indicate that a wide range of stakeholders have been consulted in the preparation of adaptation policies.

While the extent of transboundary cooperation, and whether it is driven by the NAS/NAP, varies between Member States, almost all are planning to address common challenges with relevant countries; invariably with regard to water. It is clear that international initiatives (e.g. the International Commission for the Protection of the Danube River, and the Alpine Convention), EU initiatives (e.g. the macro-regional strategies) and EU-funded projects are important in helping to prepare the ground for cooperation.

Step B: Assessing risks and vulnerabilities

Climate change scenarios and projections are widely available at national level. They are being used in most Member States to undertake sound, centrally-coordinated assessments of climate vulnerabilities, risks, and future economic, social and environmental impacts, with other Member States making progress in this respect.

While most Member States have included actions related to knowledge in their NAS and have identified adaptation knowledge gaps, there seems to be limited activity to address these gaps in almost half of the Member States.

Adaptation-related data (e.g. climate projections, vulnerability and risk assessments, adaptation tools) are available to at least some stakeholders in almost all Member States, and disseminated by a majority of them via a national web-based platform. However, coordination of associated capacity-building activities is less advanced and established in fewer than half of Member States.

Step C: Identifying adaptation options

Most Member States have used detailed vulnerability and/or risk assessments in combination with robust methods (e.g. multicriteria analyses and/or stakeholder consultations) to prioritise sectoral adaptation options. However, notably, less than half of Member States have mechanisms in place to coordinate disaster risk management and climate adaptation.

EU funds play an important role in enabling funding to be made available nationally for implementation of adaptation actions in at least a few sectors in almost all Member States. Nevertheless, there is a lack of reliable funding, with only half of Member States having budgets attached to their NAS or NAP.

Step D: Implementing adaptation action

Although most Member States have begun implementing their NAS and/or NAP, around half or more of Member States are yet to ensure that:

- Climate adaptation is considered in Strategic Environmental Assessments

- Synergies with disaster risk reduction are progressed
- Land use, spatial, urban and maritime planning policies encourage adaptation
- Adaptation is integrated into insurance policies
- Cooperation mechanisms are established to foster local and subnational action
- There is appropriate consideration of potential climate impacts on major projects or programmes and of alternative options, including green infrastructure
- Stakeholders are involved in implementing adaptation policies.

Step E: Monitoring and evaluation

While most Member States have planned a periodic review of their NAS and/or NAP, their monitoring and reporting is not yet robust and there is a need to develop stakeholder involvement (including of subnational levels) in their assessment, evaluation and review.

Figure IX-10. Aggregated scoreboard for the 28 EU Member States[330]

[330] For a more detailed explanation of what each indicator means and how its value is determined, please refer to the scoreboard methodology in Annex X.

5. Country codes of EU Member States

Country codes are used in Section 3 (Results and analysis) of this Annex in accordance with the rules of the EU Interinstitutional Style Guide[331]. Hence, the two-letter ISO code (ISO 3166 alpha-2) is used except for Greece and the United Kingdom, for which the abbreviations EL and UK have to be used:

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherland
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

[331] See at: http://publications.europa.eu/code/en/en-000100.htm

Annex X EU adaptation preparedness scoreboard indicator list and methodology

Policy framework

A	**Adaptation strategies**	**A1**	A NAS has been adopted
		A2	Number and scope (% of population or territory covered) of adaptation strategies adopted at relevant subnational levels, in line with national multilevel governance arrangements
B	**Adaptation action plans**	**B1**	A national adaptation action plan has been adopted
		B2	Number and scope of adaptation action plans adopted at local or relevant subnational levels
		B3	Adaptation action plans adopted at sectoral level, or embedded in sectoral strategies

Scoreboard

Adaptation policy making process	**Main area of performance**	**N°**	**Key domain of relevance**	**Criteria** for positive and "In progress" replies**,** **Categories of information** sought, and **Notes** for better focus
Step 1: Preparing the ground for	1. A country-wide governance system is in place for adaptation policy making and	1a	A central administration body officially in charge of adaptation policy making	- Country Fiches to provide details on the coordinating administration and its role

Adaptation policy making process	**Main area of performance**	**N°**	**Key domain of relevance**	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
adaptation	vertical and horizontal coordination arrangements are in place between governmental bodies	1b	**Horizontal** (i.e. sectoral) coordination mechanisms exist within the governance system, with division of responsibilities	YES = evidence that systematic coordination is in place (depending on the implementation phase) - Country Fiches to present clearly what is the case (i.e. coordination only during drafting the NAS or continued during the implementation phase) IN PROGRESS: Some coordination activity between bodies responsible for relevant sectors, but with no clear division of responsibilities, or incomplete sectoral coverage.
		1c	**Vertica**l (i.e. across levels of administration) coordination mechanisms exist within the governance system, enabling lower levels of administration to influence policy making.	YES = Idem 1b - Additionally, Country Fiches to also present details if – cooperation only in certain sectors (e.g. water); specific delegation mechanisms are in place, e.g. for devolving power & responsibilities to regions. IN PROGRESS: Some coordination mechanisms between relevant levels of administration, but with incomplete coverage or incomplete implementation.
	2. Stakeholders (e.g. interest groups, scientists and general public) are involved in the preparation of adaptation policies	2a	A dedicated process is in place to facilitate stakeholders' involvement in the preparation of adaptation policies	- Country Fiches to provide details on the processes used (e.g. public consultations, involvement in working groups etc.) - Country Fiches to indicate what categories of stakeholders have been consulted (e.g. industry representatives, organised civil society, etc.) If at the time of preparation of the Country Fiches, the policy cycle is in a stage where stakeholder involvement is not relevant (e.g. just after the adoption of a strategy or a plan), the Country Fiches should seek evidence from the last stakeholder involvement period.
		2b	Transboundary cooperation is planned to address common challenges with	YES = stable cooperation mechanisms are in place (ideally described in or driven by the NAS) - Country Fiches to present details on the specific cooperation

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
			relevant countries	mechanisms (do not have to be formal governmental processes, e.g. macro-regional strategies count as well) - Country Fiches to present details re. the specific sectors / fields of cooperation (e.g. flood risk management) - Country Fiches to present details on identified transboundary projects and/or other common initiatives (although if this is the only cooperation identified would normally not qualify for a positive assessment).
Step 2: Assessing risks and vulnerabilities to climate change	3. Systems are in place to monitor and assess current and projected climate change, impacts and vulnerability	3a	Observation systems are in place to monitor climate change, extreme climate events and their impacts	YES = observation systems are in place, records on extreme events are being kept, and these records include figures on impacts (e.g. casualties, damages, financial losses etc.) - Country Fiches to present details on what observations systems are in place for monitoring climate events, as well as their impacts. - Country Fiches to present details on what kind of records regarding climate impacts are being identified. - Country Fiches to try identifying what and how the climate-related impacts are captured (e.g. loss & damage figures, surface/areas affected, no. of people affected etc.). IN PROGRESS: observation systems are in place only in some sectors.
		3b	Scenarios and projections are used to assess the economic, social and environmental impacts of climate change, taking into account geographical specificities and are based on latest best available science (e.g. in response to revised IPCC	YES = projections are available, and based on most recent science; and are being used for assessing impacts (even if only preliminary vulnerability screenings are being carried out) *Note: Indicators 3b and 3c should be looked at together. 3b tends to have a geographical scope, while 3c has a sectoral one.* Initial analysis will present a simple schema of the coverage of scenarios and projections. In due course, further detailed information could be added by desk officers or Member States on (i) the projections available

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
			assessments)	in the Member States: source (domestic research or international sources) and how are they maintained, singular or ensembles, RCM or downscaled GCM, available resolutions; (ii) whether an overall/aggregated risk & vulnerability assessment was carried out across several sectors or one of a national coverage was done; (iii) optionally, details on any existing sub-national/regional assessments are useful for complementing the sectoral perspective IN PROGRESS: not country specific enough, old scenarios, not based on recent science
		3c	Sound climate risks/vulnerability assessments for priority vulnerable sectors are undertaken to support adaptation decision making. The selection of vulnerable sectors may be based on a lighter pre-screening vulnerability assessment.	YES = comprehensive risk & vulnerability assessments are carried out in (a critical mass of the) priority sectors identified; - Country Fiches to present details on what sectors were analysed, the level of detail in the analyses, and information on the studies supporting these assessments - Country Fiches to seek details whether the analyses were coordinated at a central level, were sector-driven carried out independently, or were separate research projects carried out independently IN PROGRESS: some evidence of good quality risk and vulnerability assessments in some sectors; but sectoral coverage is partial
		3d	Climate risks/vulnerability assessments take transboundary risks into account, when relevant	YES = transboundary risks are taken into account in a coordinated manner, ideally enshrined in NAS - Country Fiches to provide details on how and where transboundary risks were considered (i.e. for which sectors), and if this coordinated by the NAS or is sector-driven (e.g. in water management and flood risk), or project-driven IN PROGRESS: Transboundary risks are taken into account by some sectors, but gaps exist in relevant sectors.

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
	4. Knowledge gaps on climate change and climate change adaptation are tackled	4a	Work is being carried out to identify, prioritise and address the knowledge gaps	YES: gaps are identified and work is ongoing to address them (not checking if all relevant sectors are addressed) - Country Fiches to provide details on the processes employed for periodically tackling the knowledge gaps and mention if this is driven by NAS or other arrangements are in place; - Country Fiches to provide details on any preliminary identification of knowledge gaps being carried out (e.g. identified in NAS). - Country Fiches to provide details on the publicly-funded research programmes or mechanisms identified (e.g. proper prioritisation, specific research centres created); - Country Fiches to provide details on any sector-driven (e.g. water management, agriculture etc.) or project-driven (EU funds available) research for identifying knowledge gaps IN PROGRESS: gaps are only identified, no work to address them
	5. Knowledge transfer processes are in place to build adaptive capacity across sectors	5a	Adaptation relevant data and information is available to all stakeholders, including policy makers (e.g. through a dedicated website or other comparable means).	YES = highly visible sources of information on adaptation are available and contain: general climate data (e.g. climate projections), vulnerability and risk assessments, adaptation tools and examples, information on adaptation policy and related institutional and legal frameworks etc. A centralised (Climate-ADAPT type) platform is desirable, but a limited set of de-centralised sources complementing each other could also satisfy the need (provided that they are easily identifiable and well established in their specific sectors). - Country Fiches to provide details and links on the following categories: - adaptation general info - specific platforms or adaptation sections in the wider climate change platforms; - NAS/policy oriented adaptation pages; and - climate projection repositories (e.g. from the met offices or research

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				projects). - additionally, specific adaptation projects' web sites could be identified. - Country Fiches to provide details on the identified science-policy interfaces falling into one of the categories: - stable processes and/or organisations (e.g. research and/or expertise centre acting as a focal point, partnership structure between organisations, programme run by the central administration consisting of systematic meetings, workshops etc.). To mention if specific action in NAS/NAP supports this; - ad-hoc process (e.g. for drafting the NAS) IN PROGRESS: adaptation relevant data available to some stakeholders, but with significant groups not targeted.
		5b	Capacity building activities take place; education and training materials on climate change adaptation concepts and practices are available and disseminated	YES = systematic actions on capacity building, carried out in a coordinated way, usually driven by the NAS or NAP. - Country Fiches to provide details on the identified mechanisms falling into one of the categories: - systematic and coordinated activities, usually driven by the NAS or NAP (e.g. an established support service offering assistance to authorities, training programmes etc.). To mention if specific action in NAS/NAP supports this; - ad-hoc process carried out by various organisations, but not coordinated by a specific programme or action in the NAS. - Country Fiches should try to identify capacity building actions in: public administration, academia, business sector, and awareness-raising actions for the wider public. IN PROGRESS: systematic actions on capacity building but not in a coordinated manner.

Adaptation policy making process	**Main area of performance**	**N°**	**Key domain of relevance**	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
Step 3: Identifying adaptation options	6. For priority sectors, a range of adaptation options is considered, consistent with the results of sectoral risk assessments and taking into account good practices and measures	6a	Adaptation options address sectoral risks identified in 3c, the geographical specificities identified in 3b and follow best practices as defined in similar contexts	YES = detailed/elaborated risk assessments used to identify adaptation options for (a majority of) the priority sectors. *Note: The reply should be correlated with the ones for the indicators 3b and 3c.* - Country Fiches to identify whether all or only some of the priority sectors have risk assessments and adaptation options identified. If latter, to mention which sectors have detailed risk assessments; - Country Fiches to mention whether indicative adaptation actions are identified based only on lighter processes (e.g. stakeholder consultations, expert judgement); - Country Fiches could analyse the 'horizontal' actions and seek information on how they were derived (e.g. based on good practices).
		6b	The selection of priority adaptation options is based on robust methods (e.g. multi-criteria analyses, stakeholders' consultation, etc.) and consistent with existing decision-making frameworks	YES = a prioritisation mechanism is clearly indicated and/or prioritisation tools/guidance/criteria are made available for being used during project selection. - Country Fiches to indicate how selection and prioritisation of adaptation options was made: - using processes (e.g. expert judgement, consultations among organisations or with stakeholders), and/or - using tools and methodologies (MCA, CBA, guidelines for prioritisation); - Country Fiches to specify whether the prioritisation was made at the sectoral level (i.e. choosing priority actions per sector), or across sectors (i.e. choosing priority sectors for kick-starting actions), or both; - Country Fiches to indicate whether specific prioritisation tools have been published (e.g. guidelines for selection, MCA etc. which would be

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				used for all measures); - Country Fiches to identify further plans for carrying out specific prioritisation (e.g. to prioritise in the context of specific actions, sectors, geographical areas; to develop new tools (CBA, MCA) etc.
		6c	Mechanisms are in place to coordinate disaster risk management and climate change adaptation and to ensure coherence between the two policies.	YES = (at least) bi-lateral mainstreaming (i.e. DRR in NAS and climate change in DRR). Institutional arrangements supervising the exchange would be a plus, since this indicator focuses mainly on 'mechanisms' and needs to differentiate from the indicator 8b. - Country Fiches to bring details on: - how DRR planning is taking into account climate change impacts and projections; - how NAS/NAP includes DRR measures; - any institutional frameworks and/or procedures entailed for coordination (e.g. special working groups, climate change specialists involved in DRR policy-making, or DRR practitioners involved in adaptation planning). IN PROGRESS: at least one of the three is present but not all
	7. Dedicated and adequate funding resources have been identified and made available to implement adaptation action	7a	Funding is available to increase climate resilience in vulnerable sectors and for cross-cutting adaptation action	YES = actions in NAS or the relevant priority sectors receive consistent funding for implementation. Reliable multi-annual funding commitments (e.g. through ESIF) for some sectors could lead to a positive assessment, while a mere identification in NAS of indicative funding sources without clear evidence of funds disbursed should not. Country Fiches to provide details on which of the 2 cases above would apply – budgets attached to NAS/NAP or separate funding for priority sectors. If the latter, it should try to identify what are the sectors and where the funding comes from (e.g. national/regional, via line ministries, ESIF etc.). For the funding to be taken into account in the CF, adaptation

Adaptation policy making process	**Main area of performance**	**N°**	**Key domain of relevance**	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				does not have to be the main objective of the intervention, but it should feature among the stated objectives. Country Fiches to identify whether the NAS provides for funding cross-cutting adaptation action also (e.g. national scenarios and climate services, capacity building, website) IN PROGRESS: if adaptation is only financed in a few sectors or there is no funding for cross-cutting adaptation action
Step 4: Implementing adaptation action	8. Climate change adaptation is mainstreamed into priority and key national planning and sectoral policymaking	8a	Consideration of climate change adaptation has been included in the national frameworks for EIAs	- Country Fiches to provide details regarding both EIA and SEA national legislation
		8b	Prevention/preparedness strategies in place under national disaster risk management plans take into account climate change impacts and projections	YES = projected future climate extremes are factored in the DRM plans and associated risk analyses, while historical climate extremes should normally be covered by all risk analyses and DRM action plans. *Note: Attention to be granted to correlating this answer with the one given for 6c.* - Country Fiches to analyse DRM plans and the associated risk analyses.
		8c	Key land use, spatial planning, urban planning and maritime spatial/ urban planning policies take into account the impacts of climate change	YES = clear evidence that land use and spatial/urban policies at Member State level explicitly address climate impacts, and require or encourage adaptation; and evidence that the policies are followed in practice across the majority of the Member State. - Country Fiches should provide details regarding the type of mainstreaming:

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				- spatial planning, urban planning, maritime spatial planning; - geographical scope – national, regional or local.
		8d	National policy instruments promote adaptation at sectoral level, in line with national priorities and in areas where adaptation is mainstreamed in EU policies	YES = evidence of mainstreaming in sectoral policies is identified. The mere mentioning of a sector in the NAS is not enough, unless is being backed by actual policy instruments identified in that sector that include adaptation. - Provide details regarding: - what sectors are currently including adaptation considerations; - what policy instruments are promoting adaptation in each sector; - was the NAS the driver for mainstreaming in these sectors or something else triggered an autonomous adaptation (e.g. EU acquis or policy)? IN PROGRESS: individual sectoral policies promote adaptation, but coverage is patchy, with significant gaps
		8e	Adaptation is mainstreamed in insurance or alternative policy instruments, where relevant, to provide incentives for investments in risk prevention	YES = evidence of insurance (or guarantee) schemes that are incentivising investments in enhanced resilience and risk prevention is identified in both the national framework (NAS/NAP) and as being active in the field. Insurance schemes available for current extremes are available in many places, but by themselves would not qualify for a positive assessment. Furthermore, schemes for ensuring the affordability of insurance (for e.g. flood risks) do not incentivise adaptation per se. - Country Fiches to mention what specific objectives or actions on

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				insurance are contained in the NAS. - Country Fiches to provide details on how the insurance schemes are incentivising adaptation.
	9. Climate change adaptation policies and measures are implemented	9a	Adaptation policies and measures are implemented, e.g. as defined in action plans or sectoral policy documents	YES = only if coordinated implementation of NAS/NAP is underway, and clear evidence of adaptation priorities identified being put into effect. *Note: actions such as effective mainstreaming in sectors (confirmed by the indicator 8d) and further/detailed vulnerability and risk assessments should be seen as concrete implementation, provided they are required as such by the NAS/NAP* - Country Fiches should mention if national / sectoral / regional action plans are drafted, or the NAS is the only programmatic document governing adaptation - Country Fiches should provide a brief account on what actions are being implemented (e.g. mostly horizontal, sectoral – if yes, in which sectors, etc.) - Country Fiches should mention in what stage is the implementation (recently started, several years past etc.), if progress reports have been issued. - Country Fiches could mention notable examples of autonomous adaptation action being implemented IN PROGRESS: evidence that the NAS/NAP is being implemented, but with gaps in key sectors or in some actions identified as priorities.
		9b	Cooperation mechanisms in place to foster and support adaptation at relevant scales (e.g. local,	YES = only if cooperation (with regions and cities) is actually active during the implementation. From that point of view this indicator should be correlated with 9a which shows that implementation has started. If the cooperation is made possible by frameworks in place (this should be correlated with the indicator 1c on vertical integration), but no

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
			subnational)	implementation is underway the assessment should be negative. However, in this latter case a separate mention should be made in the CF. The same, if the NAS/NAP are calling for such a vertical cooperation. *Note: This indicator should be seen as focused on the adaptation actions carried out at regional and local levels, supported by formalised collaborative frameworks. It differs from indicator 1c which shows rather how regional and local levels are feeding back into the national actions (NAS, NAP).*
		9c	Procedures or guidelines are available to assess the potential impact of climate change on major projects or programmes, and facilitate the choice of alternative options, e.g. green infrastructure	YES = only if guidelines and procedures refer specifically to projects and programmes. Spatial development could be assimilated, as it forms the basis of development programmes. - Country Fiches should specify who is promoting the guidelines (i.e. government bodies, other organisations, or they are results of projects) and if they are actually used in practice (as opposed to simply being made available). - Country Fiches should note if NAS/NAP include specific actions for publishing and applying such guidelines or procedures.
		9d	There are processes for stakeholders' involvement in the implementation of adaptation policies and measures.	YES = if the involvement of stakeholders is already happening. The stakeholders are seen here as 'non-public administration' bodies. *Note: It is important to notice that this indicator refers to stakeholders actually implementing adaptation actions, not only participating in monitoring and evaluation (since the indicator 11b is specifically reserved for that)* - Country Fiches should provide details on what categories of stakeholders are involved (e.g. academia, research, business sector, NGOs etc.) and how are they involved (e.g. implementation of specific actions, steering & consultations, selection of projects etc.). - Country Fiches should note if NAS/NAP provide specific

Adaptation policy making process	**Main area of performance**	**N°**	**Key domain of relevance**	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				mechanisms/forums for involving the stakeholders.
Step 5: Monitoring and evaluation	10. Systems are in place to monitor and report on climate change adaptation, including adaptation-related expenditures, via relevant indicators	10a	Monitoring and reporting: Information on NAS/NAP implementation is monitored and the results of the monitoring are collected and disseminated.	YES = if reports on the implementation of NAS/NAP are being published. *Note: This indicator should be seen as referring to national centralised reporting on the progress of adaptation action (i.e. implementation of NAS/NAP).* - Country Fiches should provide details on the national reports: - year(s) of publication and periodicity, latest report number; - body that published the report; - type of reporting – quantitative (based on indicators), qualitative on the progress, or both; - availability of financial information on allocated budgets and the costs of actions; - sources of information – e.g. reports from sectors/stakeholders, own monitoring carried out by the central adaptation body etc.
		10b	Monitoring and reporting: The integration of climate change adaptation in sectoral policies is monitored and the results of the monitoring are disseminated.	YES = if reports on adaptation in certain sectors are being published, whether it is a centralised single report or different reports for each sector. In the latter case, the reports should cover enough sectors, as counted against the priority sectors identified in the NAS. Availability/development of indicators is a detail that should be added, but the lack of it should not result in a negative assessment. *Note: This indicator should be seen as having a sectoral focus, looking at monitoring and reporting on progress.* - Country Fiches should provide details on:

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
				- how sectoral **mainstreaming** is monitored and reported: coordinated centrally or by the sectors themselves; - what types of reports are being published: central report with details on sectors, or separate sectoral reports; - type of sectoral reports (if is the case) – are they only about adaptation, or adaptation is just a topic among others addressed in that report? (If only centralised reports are published, those are presumably pure adaptation ones).
		10c	Monitoring and reporting: Information on regional, sub-national or local action is monitored and the results of the monitoring are collected and disseminated	*Note: This indicator should be seen as having a regional/local focus, looking at specific reporting carried out by sub-national administrations. It should be looked at in correlation with indicator 1c on vertical coordination.* - Country Fiches should present if: - the sub-regional level is reporting to the national one on their progress on adaptation; or - the sub-regional level issue their own progress reports independently, addressed to the wider public; or - no formal reporting is carried out, but feedback from sub-national to national level is done via other mechanisms (e.g. sub-national presence in national coordination committees for adaptation). These mechanisms should lead to having national reports that include information on adaptation action carried out at sub-national levels.
	11. An evaluation framework is in place to assess whether adaptation policy objectives are met and a periodic review	11a	A periodic review of the NAS and action plans is planned	YES = if clear mechanisms are in place for reviewing at least one of the NAP or NAS. Full reviews NAS and NAP constitute even stronger mechanisms. - This is an important indicator to understand a central part of the adaptation governance in the Member States. As such, the Country

Adaptation policy making process	Main area of performance	N°	Key domain of relevance	**Criteria** for positive and "In progress" replies, **Categories of information** sought, and **Notes** for better focus
	of the adaptation strategy is planned			Fiches should aim to explain the following: - how is the evaluation planned and/or carried out – on NAP, on NAS, or both; - what is the frequency of the evaluations and when is the next one planned; - how is the revision planned and/or carried out – on NAP, on NAS, or both; - what is the frequency of the revisions and when is the next one planned; - how is the review timeline determined – i.e. provisions in the legislation on adaptation, in the NAS or NAP themselves, or ad-hoc revisions based on the findings of (planned) evaluations.
		11b	Stakeholders are involved in the assessment, evaluation and review of national adaptation policy	YES = if structured involvement is identified in any of the 2 processes (monitoring and review). 'Involvement' should be understood as stakeholders actively participating in monitoring and/or review, as opposed to them only providing information (via e.g. public consultations or reporting). *Note: In case reporting is identified, this should be linked to indicator 9d, as It relates to implementation.* *- Proposal: the term 'assessment' should be replaced by 'monitoring'. 'Evaluation' should be deleted, as is seen as an integral part of the 'review'.* - Country Fiches should provide details on: - how stakeholders are involved (e.g. describe what coordination/review committees are they part of). Identify whether these are central committees overseeing national adaptation action, or sectoral

Adaptation policy making process	**Main area of performance**	**N°**	**Key domain of relevance**	**Criteria** for positive and "In progress" replies**,** **Categories of information** sought, and **Notes** for better focus
				committees for priority sectors of action; - which processes are they involved in – monitoring, evaluation, revision of NAS/NAP.

Annex XI List of EU policy initiatives where adaptation is mainstreamed

Table XI-1. Initiatives where climate adaptation is mainstreamed into EU policy (in force), including updates

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	AGRI	Agriculture	Proposal for a Regulation establishing rules for direct payments to farmers under support schemes within the framework of the Common Agricultural Policy (CAP) COM(2011) 625[332]	Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the Common Agricultural Policy[333] and repealing Council Regulation (EC) No 637/2008[334] and Council Regulation (EC) No 73/2009[335]	Greening of the first pillar has introduced three requirements for farms: **crop diversification**; maintaining existing **permanent grassland**; and having **ecological focus area** on the agricultural area (Article 43). These requirements have adaptation co-benefits despite not being the primary objective of the measures. The greening requirements are in addition to cross-compliance requirements, which include minimum good agricultural and environmental conditions (GAEC) on soil, biodiversity and water.
Y	AGRI	Agriculture	Financing, management and monitoring of the common	Regulation (EU) No 1306/2013 of the European	Farm advisory system covers the requirements to be respected

[332] Proposal for a Regulation of the European Parliament and of the Council, COM(2011) 0625 final
[333] Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013
[334] Council Regulation (EC) No 637/2008 of 23 June 2008 amending Regulation (EC) No 1782/2003
[335] Council Regulation (EC) No 73/2009 of 19 January 2009

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
			agricultural policy COM(2011) 628[336]	Parliament and of the Council of 17 December 2013 of the financing, management and monitoring of the common agricultural policy[337] and repealing Council Regulations (EEC) No 352/78[338], (EC) No 165/94[339], (EC) No 2799/98[340], (EC) No 814/2000[341], (EC) No 1290/2005[342] and (EC) No 485/2008[343]	in relation to agricultural practices beneficial for the climate. The cross-compliance system incorporates in the CAP basic standards concerning the environment, climate change, good agricultural and environmental condition of land, public health, plant health and animal welfare.
Y	AGRI	Agriculture and forestry	Proposal for a Regulation of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural	Regulation was adopted and is currently in force: Regulation (EU) No 1305/2013[345] of the European Parliament and of	The EAFRD, in line with climate mainstreaming targets, requires that at least 30% of EAFRD funding goes to measures relevant for the environment and climate change. The Rural Development policy offers support to EU Members

[336] Proposal for a Regulation of the European Parliament and of the Council on the financing, management and monitoring of the common agricultural policy, COM(2011) 628
[337] Regulation (EU) No 1306/2013 of the European Parliament and of the Council of 17 December 2013
[338] Council Regulation (EEC) No 352/78 of 20 February 1978
[339] Council Regulation (EC) No 165/94 of 24 January 1994
[340] Council Regulation (EC) No 2799/98 of 15 December 1998
[341] Council Regulation (EC) No 814/2000 of 17 April 2000
[342] Council Regulation (EC) No 1290/2005 of 21 June 2005
[343] Council Regulation (EC) No 485/2008 of 26 May 2008

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
			Development (EAFRD) COM(2011) 627[344]	the Council of 17 December 2013 on support for rural development by the EAFRD and repealing Council Regulation (EC) No 1698/2005[346]	States for implementing agricultural and forest adaptation policies and priorities, offering a wide ranging set of measures that can be used and combined by Member States to address the regional and local specific impacts and vulnerabilities. The fifth Union priority for rural development is "promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors", with a focus, among the others, on adaptation related areas such as efficiency in water use, carbon conservation and sequestration.. The fourth Union priority on "Restoring, Preserving and enhancing ecosystems", focus, among the others, on the water management and prevention of soil erosion and soil management. The regulation also indicates that all priorities "shall contribute to the cross-cutting objectives of innovation, environment and climate change mitigation and adaptation." (Article 5) Climate change mitigation and adaptation and biodiversity also appear as a thematic sub-programme. (Article 7) Several measures can be used for adaptation purposes, for example: the farm advisory system, which helps stakeholders

[345] Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013

[344] Proposal for a Regulation of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD), COM (2011) 0627 final.

[346] Council Regulation (EC) No 1698/2005 of 20 September 2005

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					to improve “the economic and environmental performance as well as the climate friendliness and resilience of their holding, enterprise and/or investment” (Article 15). The agri-environment-climate measures encourage farmers to apply agricultural practices that contribute to climate change mitigation and adaptation. (Article 28) Others measure such as Investments in physical assets (Article 17), Organic farming (article 29), Areas facing natural or other specific constraints (article 31). Measures relevant for forest adaptation, including inter alia agro-forestry, afforestation, investments improving the resilience and environmental value of forest ecosystems, prevention of forest fires and natural disasters, or the forest-environmental and climate services and forest conservation that includes the conservation and promotion of forest genetic resources. Operational Groups (Art. 36, Cooperation) linked to the European Innovation Partnership for Agricultural Productivity and Sustainability, specifically considers the promotion of a climate friendly and resilient agriculture and improving processes to preserve the environment, adapt to climate change and mitigate it. It is financing several operational groups relevant for adaptation. Regulation Commission Delegated Regulation (EU) No 807/2014 lays down provisions supplementing Regulation (EU) No 1305/2013 as regards i.a. forests and forest management practices. The regulation stipulates for instance for afforestation and creation of woodland measures that "the

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					selection of species, varieties, ecotypes and provenances of trees shall take account of the need for resilience to climate change and to natural disasters […]". Programming of such measures and definition of eligibility criteria for accessing such support is however undertaken at Member State level.
Y	AGRI/ENV/GROW	Forest Policy	New EU Forest Strategy COM(2013) 659 Complemented by Multi-Annual Implementation Plan of the new EU Forest Strategy SWD(2015) 164[347]	Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a new EU Forest Strategy: for forests and the forest-based sector COM(2013) 659[348]	The EU Forest Strategy (2013) supplements the EU Adaptation Strategy as far as forests are concerned, integrating climate action in the wider coherent approach towards sustainable forest management. One of its priority areas is "Forests in a changing climate", where the Strategic objective is to enhance the forests adaptive capacity and resilience, building on the EU Strategy on Adaptation to Climate Change. A Multiannual Implementation Plan of the EU Forest Strategy was developed alongside the EU Forest Strategy. The 2015 implementation plan recommends action by Member States to "demonstrate how they enhance their forests'. The Strategy highlights the need for adaptation in forests: "Forests are vulnerable to climate change. It is therefore important to **maintain and enhance their resilience and adaptive capacity**, including through fire prevention and other adaptive solutions. The role of forests in climate action primarily appears in achieving mitigation objectives; nevertheless the opportunity for rural development support to adaptation actions is highlighted.

[347] Commission Staff Working Document: Impact Assessment, SWD(2015) 164 final
[348] Communication from the Commission: A new EU Forest Strategy: for forests and he forest-based sector, COM(2013) 0659

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					The Forest Strategy is currently under mid-term review.
N	COMP	State Aid	Guidelines on State aid for environmental protection and energy 2014-2020 [349]	Adopted and implemented	Although adaptation to climate change is not explicitly mentioned as eligible for state aid, the guidelines list aid to water re-use as an authorised measure, which has co-benefits in terms of adaptation. Aid to hydropower is only authorised if it does not have negative impacts on water systems in the meaning of the Water Framework Directive, whose implementation guidance covers climate adaptation (see related entry below in this table). Environmentally harmful subsidies (which include subsidies that lead to maladaptation, e.g. excessive water extraction) are also ineligible according to the guidelines.
N	DEVCO / ECHO	Resilience	EU Approach to Resilience – Communication, Action Plan	Joint Communication on A Strategic Approach to Resilience in the EU's External Action[350]	The Joint Communication examines different aspects of state and societal resilience, including climate and environmental resilience, migration and forced displacement and security. It proposes four building blocks to incorporate resilience into the EU's external action: • Improving analysis of risks, underlying causes and resilience factors (capacities to cope with risks and shocks, to adapt and to transform) • A more dynamic monitoring by the EU of external pressures to allow early action • Integrating the resilience approach into EU programming and financing of external assistance • EU cooperation with multilateral and bilateral

[349] Communication from the Commission: Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014XC0628(01)

[350] Joint Communication to the European Parliament and the Council: A Strategic Approach to Resilience in the EU's external action, JOIN(2017) 21 final

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					institutional partners
N	ECHO / DEVCO / NEAR	Development cooperation/ humanitarian assistance / foreign policy	Communication on Lives in Dignity: from Aid-dependence to Self-reliance. Forced Displacement and Development (COM(2016) 234 final)[351]	Follow-up by DEVCO/ECHO/NEAR and EEAS	This Communication focuses on situations of protracted forced displacement in partner countries due to conflict, violence and human rights violations, irrespective of the status of the displaced under the 1951 Refugee Convention. Elements of the new policy may also be applicable to **displacement caused by natural disasters and climatic events**, while recognising the different politics, contexts, needs and solutions.
N	DEVCO / ENV	Development cooperation	Communication on preparing an EU position on the post-2015 development agenda (COM(2014) 335)[352]	Council Conclusions adopted in 2014.	The new framework should be responsive to climate change as a cross-cutting issue.
N	DEVCO	Development cooperation	Post-Cotonou: towards a renewed partnership with the countries of Africa, the Caribbean and the Pacific	Joint communication: A renewed partnership with the countries of Africa, the Caribbean and the Pacific[353]	This Communication sets out the ideas and proposed building blocks for a renewed post-2020 political partnership with the African, Caribbean and Pacific (ACP) countries. Negative impacts of climate change are included in the list of significant problems the ACP countries are facing, with climate change remaining one of the most pressing threats to the achievement of sustainable development. One of the six priorities of the new political partnership is

[351] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Lives in Dignity: from Aid-dependence to Self-reliance Forced Displacement and Development, COM(2016) 0234 final.

[352] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A decent Life for all: from vision to collective action, COM(2014) 335

[353] Joint Communication to the European Parliament and the Council: A renewed partnership with the countries of Africa, the Caribbean and the Pacific, JOIN(2016) 52 final.

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					protecting the environment and fighting climate change. Under this priority, the partnership should enshrine a commitment to pro-poor climate resilience policies and should include commitments on, *inter alia*, the implementation of adaptation policies. Better preparedness, reduced exposure to vulnerability, and ability to recover from disasters are considered as key to avoiding loss of lives and livelihoods. In identifying topics of common interest and action, the partnership has to build on the experience of the high ambition coalition process that paved the way for the Paris Agreement.
N	DEVCO	Development Cooperation	The New European Consensus, 30/06/2017	Adopted. 2017/C 210/01	Recognizes the increased needs for climate change adaptation in the world, and includes it as one of the objectives of EU development cooperation.
	DEVCO	Migration	Communication on Lives in Dignity: from Aid-dependence to Self-reliance. Forced Displacement and Development	Adopted 26.4.2016 COM(2016) 234 final	The Communication recognizes the link between climate change and forced displacement and also its possible impact on security.
Y	ECHO	Disaster risk prevention and management	Decision establishing a Union Civil Protection Mechanism	Decision was adopted and is currently in force: Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism[354]	In Chapter II in order to fulfil the prevention objectives the Commissions shall " establish and regularly update a cross-sectoral overview and map of natural and man-made disaster risks the Union may face, by taking a coherent approach across different policy areas that may address or affect disaster prevention and **taking due account of the likely impacts of climate change"** and **"**encourage an exchange of good practices on preparing national civil protection systems **to**

[354] Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					cope with the impact of climate change". (Article 5) Climate change adaptation is also mainstreamed into Chapter III on preparedness where it is indicated that a training network should be set up which shall aim to "enhance all phases of disaster management, **taking into account adaptation to and mitigation of climate change**" (Article 13)
N	ECHO	Disaster Risk Reduction and Humanitarian Assistance	Communication at the World Humanitarian Summit	Sept. 2015 Communication 'Towards the World Humanitarian Summit: A global partnership for principled and effective humanitarian action'. Follow up through 'Grand bargain on humanitarian financing' commitments	Summit is a UN initiative to improve humanitarian action, and one of the 4 themes is "Reducing Vulnerability and Managing Risk"
N	ECHO	Disaster Risk Reduction	Overview of natural and man-made disaster risk in the EU, SWD(2014) 134 final of 08.04.2014	To be updated in 2017. Technical report by JRC on comparison of national risk assessments already available.	Adaptation considerations are well reflected.
N	ECHO	Disaster Risk Reduction	Overview of Natural and Man-made Disaster Risks the European Union may face, EU SWD (2017) 176 final of 23.5.2017 And JRC technical report	May 2017 Commission SWD "Overview of natural and man-made disaster risks the European Union may face"	Climate change and its impact on disaster risk in EU are integrated.
N	ECHO	Disaster Risk	Risk Assessment and Mapping Guidelines for Disaster Management	Voluntary guidelines developed in support of the Union Civil Protection	Both include numerous references to climate change and climate change adaptation, e.g. taking into account climate change when preparing risk assessments and coherence with

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
		Reduction	(2010)[355] and Risk Management Capability Assessment Guidelines (2015)[356]	Mechanism	CCA measures
N	ECHO	Disaster Risk Reduction	Civil protection peer review guidance and frameworks[357]	Second round of peer reviews in 2018-19 extensively covers integration of CCA in disaster management activities	Questions on links to climate change adaptation included in the frameworks
N	ECHO	Disaster Risk Reduction	Commission Proposal to amend decision 1313/2013/EU on a Union Civil Protection Mechanism	Currently under negotiations with Council and Parliament	The proposal puts emphasis on reinforcing Member States' prevention action, with due consideration of climate change impacts and adaptation measures
N	ECHO	Disaster risk reduction	Sendai Framework Action Plan – a disaster risk-informed approach for all EU policies	SWD 2016 (205) June 2016 Updated once a year	The action plan is a compilation of activities carried out by different Commission Services which directly and indirectly contribute to the implementation of the Sendai framework, DG CLIMA's actions on adaptation of relevance to the Action plan are included.
N	ECHO/JRC	Disaster Risk Reduction	Disaster Risk Management Knowledge Centre (DRMKC)	DRMKC operational since 2015, providing science-policy interface among 10 DGs and Member States.	Climate change and its impact on disaster risk in EU is integrated. CLIMA part of Steering Group

[355] Commission Staff Working Paper: Risk Assessment and Mapping Guidelines for Disaster Management, SEC(2010) 1626 final
[356] Commission Notice: Risk Management Capability Assessment Guidelines (2015/C 261/03)
[357] www.eupeerreviews.eu

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
N	EEAS	Foreign policy	EU Global Strategy July 2016	Currently being implemented	The EU's 2016 Global Strategy on Foreign and Security Policy[358] mentions climate change explicitly as a threat and considers economic resilience as an important area for the overall resilience of the EU, with climate change as a cross-cutting disruptive element. The text of the strategy reflects climate risks, noting that "Climate change and environmental degradation exacerbate potential conflict, in light of their impact on desertification, land degradation, and water and food scarcity". Resilience to shocks is a key concept of the strategy. However, the potential contribution of action on climate adaptation in these areas is not pursued in the document although it is clearly an element in Commission action under programmes such as the European Neighbourhood Instrument, and the Development Cooperation Instrument.
N	EEAS	Foreign Policy	Joint communication on: ' A Strategic Approach to Resilience in the EU's External Action', 2017	JOIN(2017) 21 final	Climate change recognized as a threat multiplier for security and migration. Climate resilience included as an important element of societal and economic resilience.
N	FPI	Foreign policy	Partnership Instrument	Regulation (EU) 234/2014 establishing a Partnership Instrument for cooperation with third countries	The PI funds activities that support the external dimension of EU internal policies and help to address major global challenges, including climate change. Though mitigation focused, adaptation is also considered. The 2017 Annual Action Program for the PI, includes and Action Fiche for cooperation with major economies for the implementation of the Paris Agreement, with Adaptation planning, including the main pillars of the EU adaptation strategy and their key instruments being one of the four

[358] Shared Vision, Common Action: A Stronger Europe: A Global Strategy for the European Union's Foreign and Security Policy, European Commission, 2016.

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					thematic axes for intensified cooperation with the non-EU G20 members.
Y	ENER	Energy & Transport	Proposal for a Regulation on guidelines for trans-European energy infrastructure	Regulation adopted: Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013[359]	The Cost-Benefit Analyses shall consider systems resilience (including resilience to climate change); The selection criteria for Projects of Common Interest include provisions on systems resilience (including resilience to climate change).
Y	ENER / MOVE	Energy & Transport	Regulation establishing the Connecting Europe Facility	Regulation was adopted and is currently in force: Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013[360] establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010[361] and repealing Regulations (EC) No 680/2007[362] and (EC) No 67/2010[363]	The 8th recital refers to the 20% climate mainstreaming target and indicates that "it is important to ensure that climate change mitigation and **adaptation**, as well as **risk prevention and management,** are promoted in the preparation, design and implementation of projects of common interest." Reference to climate change also appears in other recitals, Article 22 ("Member States shall inform the Commission annually, if relevant through an interactive geographical and technical information system, about the progress made in implementing projects of common interest and the investments made for this purpose, including the amount of support used with a view to attaining climate-change objectives") and

[359] See footnote 83
[360] Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013
[361] Regulation (EU) No 913/2010 of the European Parliament and of the Council of 22 September 2010
[362] Regulation (EC) No 680/2007 of the European Parliament and of the Council of 20 June 2007
[363] Regulation (EC) No 67/2010 of the European Parliament and of the Council of 30 November 2009

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					Article 27 on evaluation undertaken by the EC.
Y	ENV	Biodiversity	COM(2011)244[364] on Our life insurance, our natural capital: an EU biodiversity strategy to 2020 Complemented by COM(2017) an Action Plan for nature, people and the economy	A fitness check of the nature directives was carried out by the Commission in 2015-2016, and reported in December 2016. The fitness check report was followed in April 2017 by the publication of an "Action Plan for nature, people and the economy" (COM (2017) 198 final)[365].	The 2017 Action Plan emphasises the importance of resilience to climate change. Its focus on addressing common challenges, including cross-border issues, is likely to involve a role for action on climate risks. The Action Plan and accompanying SWD mentions climate resilience co-benefits in a number of places, and suggests updating guidance and other documents to reflect them, and to encourage contributions towards climate objectives, A proposed adaptation strategy to deal with potential effects of invasive species and climate change on fisheries in the Mediterranean is also included.
N	ENV	Built environment	Level(s) - Building sustainability performance	Published - In testing phase by voluntary participants until March 2020.	Level(s) is a voluntary reporting framework that provides a common "sustainable" language for the buildings sector. It includes 6 macro objectives among which: "Efficient use of water resources particularly in areas of continuous or seasonal water stress" and looking at water reuse and rainwater harvesting; and "Adaptation and resilience to climate change" looking at health and thermal comfort under projected future climate conditions, increased risk of extreme weather events and impacts on durability and resistance of building elements; and increased risk of flooding.

[364] Communication from the Commission to the European Parliament, The Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 0244 final

[365] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: An Action Plan for nature, people and the economy, COM(2017) 0198

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	ENV	Environment	Proposed Commission Decision laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU[366]; and proposed Commission Directive amending Directive 2008/56/EC[367] of the European Parliament and of the Council as regards the indicative lists of elements to be taken into account for the preparation of marine strategies	Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU In force	Adaptation as such is not mentioned in the articles of the Directive; however, adaptation to climate change is explicitly mentioned in the preamble (whereas clause 42) as a justification for a flexible and adaptive approach to marine protection and management programmes, and for marine strategies to be updated on a regular basis. The new Commission Decision acknowledges that marine ecosystems will change and that the determination of GES needs to be periodically adapted to reflect such changes (MSFD allows this updating every 6 years): see notably Recital 13, and Art. 4.1i. The new MSFD Annex III includes parameters that are relevant for monitoring climate change effects. The general focus of the descriptors and hence GES overall is on issues other than climate change, but there are two key issues relating to climate change: a) how to determine and assess GES in a dynamic ecosystem context (hence the need to understand climatic change in our seas and distinguish this from the more 'local' and directly manageable effects of pressures that MSFD can deal with) b) whether achieving GES will bring a degree of resilience to our oceans (through reducing the adverse effects of pollution, deterioration in biodiversity and ecosystem functioning, etc.) that can help mitigate the wider effects of climate change (especially ocean acidification).

[366] Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (notified under document C(2010) 5956, 2010/477/EU

[367] http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	ENV	Environment	COM(2012) 628: Proposal for a Directive of the European Parliament and of the Council amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment[368]	Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment[369]	The review of the EIA Directive put climate change more directly in the assessment requirements. Article 3 now specifically refers to climate as a factor that needs to be taken into consideration. For Annex II projects "the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge" should be considered. Furthermore, a description of the likely significant effects of the project on the environment resulting from "the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change" should be included.
Y	ENV	Water management	Follow up to the 2012 Water Blueprint	Blueprint adopted on 12.11.2012, COM(2012) 673 and 672, Council Conclusions endorsing it adopted on 17.12.2012. Blueprint remains relevant, however the timescale for all the specific actions under the Blueprint has elapsed (other than for those stated	Climate Change adaptation considerations are reflected in several of the proposals of the Blueprint that were included and worked upon during the Work Programmes 2013-2015 and 2016-2018 of the Common Implementation Strategy (CIS) of the Water Framework and Floods Directives. This has included the drafting and adoption by Member States of a Guidance document on Ecological flows[370], and a Policy Document to promote uptake of Natural Water Retention Measures[371], a Guidance document on Integrating Water Reuse into Water Planning and Management in the context of the Water

[368] Proposal for a Directive of the European Parliament and of the Council amending Directive 2011/92/EU, COM(2012) 0628 final
[369] Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014
[370] Ecological flows in the implementation of the Water Framework Directive Guidance Document No.31, Technical Report – 2015 – 086, European Commission, 2015
[371] EU policy document on Natural Water Retention Measures, Technical Report – 2014 – 082, European Commission, 2014

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
				as "ongoing").	Framework Directive (WFD) Water Reuse, promoting best practice for the reduction of leakages[372], Integrating WFD in to the CAP, a Guidance document on Water Accounts[373] and Guidance on Exemptions to the Environmental Objectives according to Article 4(7)of the WFD[374]. In addition a pilot project to build on the knowledge base and promote the uptake on NWRM platform has been set up, running between 2014 and 2015.[375] Finally, a legal proposal for "Minimum requirements for water reuse in the EU" was adopted by the Commission on 28 May 2018.
Y	ENV	Invasive alien species	Proposal for a regulation of the European parliament and of the council on the prevention and management of the introduction and spread of invasive alien species[376]	Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species[377]	The regulation does not mention adaptation. Climate change appears in the context of increased risk of invasive alien species. Recital 2 indicates that "the risks such species pose may intensify due to increased global trade, transport, tourism and climate change". Furthermore, Article 5 requires the undertaking of a risk assessment which should include "a thorough assessment of the risk of introduction, establishment and spread in relevant biogeographical regions in current conditions and in foreseeable climate change conditions". At the same time, Article 2 specifically says that the regulation does not apply to "species changing their natural range without

[372] http://ec.europa.eu/environment/water/quantity/building_blocks.htm
[373] Guidance document on the application of water balances for supporting the implementation of the WFD version 6.1, European Commission, 2015
[374] Guidance document on Exemptions to the Environmental Objectives according to Article 4(7), European Commission, 2017
[375] www.nwrm.eu
[376] Proposal for a Regulation of the European Parliament and of the Council on the prevention and management of the introduction and spread of invasive alien species, COM(2013) 0620 final
[377] Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					human intervention, in response to changing ecological conditions and climate change".
Y	ENV	Nature Protection	Guidelines on Climate Change and Natura 2000	Guidelines on Climate Change and Natura 2000: Dealing with the impact of climate change on the management of the Natura 2000 Network of areas of high biodiversity value [378]	The whole guidance focuses on climate change and it provides a detailed assessment on **the ways in which Natura 2000 sites can offer nature based solutions to help in climate adaptation**. Furthermore, it provides detailed guidance on the **types of adaptation measures** that are needed for the Natura2000 sites, which will remain essential safe havens for Europe's biodiversity, strengthening resilience to climate changes and giving nature the necessary space to adapt to new climatic situations.
Y	ENV	Biodiversity	Communication on green infrastructure	COM(2013) 249: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Green Infrastructure (GI) — Enhancing Europe's Natural Capital. Communication adopted on 06/05/2013 [379]	The link between green infrastructure (GI) and climate change and disaster risk management are presented in a dedicated chapter within the Communication. This chapter emphasises the role of GI in climate change adaptation and it calls for greater use of ecosystem-based approaches. The Communication also refers to the EU Adaptation Strategy: "The recent EU Strategy on Adaptation to Climate Change therefore aims to explore the need for additional guidance for authorities and decision-makers, civil society, private business and conservation practitioners on ensuring the full mobilisation of ecosystem-based approaches to adaptation." A report on the review of progress in implementing the GI strategy has been carried out in 2017, and

[378] Guidelines on Climate Change and Natura 2000, Technical Report – 2013 – 068, European Commission, 2013
[379] See footnote 233

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					should be published by mid-2018...
N	ENV	EIA	Strategic Environmental Assessment (SEA) Directive (Directive 2001/42 /EC) on the assessment of certain plans and programmes on the environment	Under evaluation	The Directive is currently under evaluation until end 2019. The evaluation will also examine coherence with other policies, including climate change adaptation and mitigation. An environmental assessment for plans and programmes falling under the scope of the SEA Directive should, among others, address the likely significant effects on the environment, including climatic factors.
N	ENV	EIA	Guidance for integrating climate change and biodiversity into EIA and SEA	Guidelines published[380]	Useful tool to indicate how climate change adaptation can be included.
N	ENV	Soil protection	Guidelines on soil sealing	(SWD(2012) 101 final/2) (http://ec.europa.eu/environment/soil/sealing_guidelines.htm)	European Commission departments have prepared Guidelines on best practice to limit, mitigate or compensate soil sealing Soil sealing often affects fertile agricultural land, puts biodiversity at risk, increases the risk of flooding and water scarcity and contributes to global warming.
N	ENV	Urban environment	European Green Capital and European Green Leaf Awards	Ongoing	Recognizing the cities' achievements in green growth and environmental sustainability, including adaptation to climate change.
N	ENV	Water management	Proposal for a Regulation of the European Parliament and of the Council on minimum requirements for water reuse was adopted by the Commission on 28 May 2018.	Planned for 2018 (Commission proposal May 2018)	Climate change adaptation is one of the reasons underlying the promotion of water reuse and definition of minimum requirements.

[380] Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, European Commission, 2013; and Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment, European Commission, 2013

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	ENV	Environment	Directive establishing a framework for Community action in the field of water policy (Water Framework Directive) 2000/60/EC	Under Fitness check	DG ENV considers that climate change Adaptation is currently mainstreamed in the implementation of the Directive: As explained in the Water Framework Directive Common Implementation Strategy (CIS) Guidance 24 on "River Basin Management in a Changing Climate" although climate change is not explicitly included in the text of the WFD, the step-wise and cyclical approach of the river basin management planning process makes it well suited to adaptively manage climate change impacts. The above mentioned Guidance illustrates ways in which preparations can be made for climate change within River Basin Management Planning, including to tackle floods and droughts. A workshop in 2012 focussed on Groundwater aspects and Climate Change. According to the Guidance Document, as agreed by all Member States, the 2nd RBMPs which were due to be adopted at the end of 2015 should include climate change considerations and the designed Programmes of measures should be "climate proofed". Currently the EC is undertaking an assessment of these plans. Issues specific to flooding are primarily addressed through the Floods directive (see below). The review in 2012 of the Water Scarcity and Droughts Strategy, which was part of the Blueprint, addressed Climate Change and called for better integration of water scarcity and droughts management in the next cycles of WFD implementation. The Blueprint placed focus on the reduction of the vulnerability of water resource to different pressures (including the ones caused by climate change) and put forward several proposals to reinforce this aspect in WFD implementation. These have been followed by DG ENV and Member States under the CIS process and the 2013-2015 and 2016-2018 Work programmes (see follow-up to the Water Blueprint in the previous section). A number of actions aiming at efficiency in water use have been developed. These include Ecodesign and Eco-labelling for water using

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					appliances and development of the reference document on good practices on leakage management. There are efforts undertaken in leading Member States towards rational water management including implementation of water pricing based on recovery of costs of water services and incentives for efficient water use. It has been done through discussions and exchange of experiences, within CIS, on cost recovery and the drafting and adoption of guidance document on water accounts. The aim of the water accounts guidance is to promote a coherent framework to cross-evaluate the information on drivers, pressures and impacts on water quantity, in which climate change is expected to have relevant impacts. The Guidance on water accounts was based also on the results of 2014 grants for building water accounts, which provided useful recommendations and examples at sub-basin and basin scales. Further works on economic, hybrid and quality accounts, might be developed in the future in the form of ad hoc activities or under other working groups' activities At the same time enforcement of water pricing implementation and addressing illegal abstraction are undertaken through ex-ante conditionality assessment for accession to EU funding by Member States. In addition to the ex-ante we are active in influencing and assessing Member States' RDPs to ensure that they contribute positively towards climate change adaptation – both through the WFD agriculture working group and internal review of draft RDPs. Also in the internal review of other Operational Programs (Environment /Climate) for CF/ERDF in relation to water investments we support actions that focus on adaptation. Within LIFE work program the focus for the water priorities was placed on measures that contribute towards both mitigation and adaptation, with an emphasis on ecosystem resilience. The European Innovation Partnership on Water has

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					included Flood and Drought Risk Management as one of its priority areas, with several Action Groups working on the development of innovative approaches and solutions to deal with the effects of climate change.
Y	ENV	Environment (water management)	Directive on the assessment and management of flood risks 2007/60/EC	Under Fitness check	Climate change is already mainstreamed in the directive with explicit references, and is being mainstreamed also through its implementation: The Floods directive explicitly refers to Climate Change and requires that the Preliminary Flood Risk Assessment and the Flood Risk Management Plans (FRMPs), which are periodically reviewed and if necessary updated, take into account the likely impacts of climate change on the occurrence of floods. It is also requires that impacts of climate change shall be taken into account by the Commission in drawing Floods Directive Implementation reports. Moreover the framework set out by the directive to manage flood risks which is based on preparedness, prevention, and protection is intrinsically an adaptation framework that aims "at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods" (accounting for the impact of climate change on floods). The 1st FRMPs were due to be adopted at the end of 2015 and were to be subsequently reported to the EC by end of March 2016. Currently the EC is undertaking an assessment of these plans.

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
N	ENV / DEVCO	Sustainable Development	Communication on the post 2015 Sustainable Development Goals[381]	2015 work programme	More information needed with regards to relevance to climate adaptation.
N	FISMA	Capital Markets Union	Communication COM(2018) 97 final - Action Plan on Financing Sustainable Growth	Adopted in March 2018, presenting a number of legislative proposals on establishing a taxonomy for environmentally sustainable objectives, non-financial reporting including climate risk disclosure and a standard on Green Bonds.	Adaptation to climate change is one of the categories in the proposal for a taxonomy. More specifically, it is one of the first categories to be worked out, for which economic activities will be classified by the extent to which they contribute to adaptation as an environmentally sustainable objective.
Y	GROW	Eurocodes and standardisation	Commission Implementing Decision of 28.5.2014 on deciding to make a standardisation request to the European standardisation organisations pursuant to Article 10 (1) of Regulation (EU) No 1025/2012 of the European Parliament and of the Council in support of implementation of the EU Strategy on Adaptation to Climate Change, C(2014) 3451 final[382]	In May 2014, the European Commission gave the European standardisation organisations (ESOs) a mandate to initiate standardisation activities. Detailed information on progress on standardisation is included in the main report (see section 3.3.2.1).	The European Standardisation Organisations adopted in 2016 a shortlist of 13 standards for revision, with work beginning in 2017. The specific activity is exclusively focused on adaptation needs, and represents the mainstreaming of adaptation into standards for the areas of energy, transport, and buildings.
N	GROW	Construction /	Strategy for the sustainable competitiveness of the construction	Communication adopted	Adaptation is a cross cutting issue of the Thematic Groups put in place for the Strategy implementation.

[381] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A New Start, COM(2014) 0910 final

[382] Commission Implementing Decision of 28.5.2014, C(2014) 3451 final.

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
		Buildings	sector and its Enterprises.	COM (2012) 433	In particular, Thematic Group 1 is looking at criteria related to adaptation for financing and insuring infrastructure investments.
	GROW	Construction / Buildings	Regulation laying down harmonised conditions for the marketing of construction products (EU) 305/2011	Entered into force since July 2013	Climate change Adaptation is currently mainstreamed with the tools and empowerments already available for the implementation of the Regulation. Since the demands set on the performance of construction products can always be adapted to climate change policy needs both at EU and at national level, and since newly developed aspects within the framework of Basic Work Requirements have enhanced and enlarged the field of such adaptation, the opportunities of implementing these policy choices are open for use.
N	GROW	Tourism	Communication "Europe, the world's No 1 tourist destination – a new political framework for tourism in Europe"	Communication adopted COM (2010) 352	One of the action included in the Communication considered to: (14) Facilitate identification by the European tourism industry of risks linked to climate change in order to avoid loss-making investments, and explore opportunities for developing and supplying alternative tourism services.
N	GROW / ENV	SMEs	Communication on a "Green Action Plan for SMEs"	COM(2014) 440 adopted on 2 July 2014[383] and accompanying SWD(2014) 213[384]	Sets out EU actions that support SMEs to become more resource efficient, foster green entrepreneurship, promote business opportunities in circular economy and facilitate access to green markets

[383] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Green Action Plan for SMEs: Enabling SMEs to turn environmental challenges into business opportunities, COM (2014) 440

[384] Commission Staff Working Document: List of EU actions supporting SMEs in a green economy, SWD(2014) 0213 final

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	HOME	Migration and mobility	COM(2011)743 on The Global Approach to Migration and Mobility[385]	Migration has been a highly active area of policy over the years since publication of the adaptation strategy, with a focus on solidarity among Member States in addressing the refugee crisis. The underlying strategy for migration policy was set out in the 2015 communication "A European agenda on migration" (COM(2015) 240 final).[386] There is an ongoing fitness check of the legal migration acquis.	The "European agenda on migration" notes the importance of climate as one of the root causes that need to be addressed, implying that action on climate mitigation and on support for adaptation through external aid is part of the solution. However, there does not appear to be a systematic linkage between climate risks, migration impacts, and Community action (either in terms of preparing for refugee arrivals, or in terms of focussing EU and national aid efforts). Climate change impacts and their relevance to human mobility patterns are integrated in the ongoing work under the current fitness check of the legal migration acquis. The fitness check should be finalized by the end of the year.
N	RTD	Research	FP7/H2020 ECONADAPT	In place	ECONADAPT is an EC FP7 research project whose purpose is to support adaptation planning through building the knowledge base on the economics of adaptation to climate change and converting this into practical information for decision makers.
N	RTD	Research	HELIX	Finished	Assisting decision-makers and the research community in making adaptation more understandable and manageable by providing a set of credible, coherent, global and regional views of different worlds at 2, 4 and 6°C, and now 1.5°C.

[385] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The Global Approach to Migration and Mobility, COM(2011) 0743 final.

[386] Opinion of the European Economic and Social Committee on the 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European Agenda on Migration' (COM(2015) 240 final)

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
N	RTD	Research	COACCH	Ongoing	COACCH aims to advance a knowledge on climate change impacts and policy directly usable by stakeholder communities.
N	RTD	Public Health	Draft Communication on Improving Health Security in the EU A One Health approach to counteracting the threat from infectious diseases	Under development	CLIMA has proposed to include actions on vector management and on solutions to integrate climate data with epidemiological surveillance
	MARE	Maritime	REGULATION (EU) No 1380/2013 (Common Fisheries Policy)[387]	Adopted in 2013	The CFP focuses on sustainable use of resources and it should respect the Water Framework Directive, take a long-term approach and apply the precautionary principle.
N	MARE	Maritime policy	Marine knowledge 2020[388]	Ongoing.	Mainstreaming includes using Copernicus Climate Change services for adaptation of businesses that depend on marine resources to climate change, and a case study on coastal erosion.
N	MARE / ENV	Employment	Communication for a European Strategy for more growth and jobs in Coastal and Maritime Tourism[389]	Adopted February 2014	More information needed with regards to relevance to climate adaptation.
Y	MARE / ENV	Maritime spatial planning and integrated coastal	Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014[390]	In force	"Through their maritime spatial plans, Member States shall aim to contribute to the sustainable development of energy sectors at sea, of maritime transport, and of the fisheries and aquaculture sectors, and to the preservation, protection and

[387] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R1380
[388] https://ec.europa.eu/maritimeaffairs/policy/marine_knowledge_2020_en
[389] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European Strategy for more Growth and Jobs in Coastal and Maritime Tourism, COM(2014) 086 final
[390] Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
		management	establishing a framework for maritime spatial planning		improvement of the environment, including resilience to climate change impacts." (Article 5)
Y	MOVE	Energy & Transport	TEN-T Guidelines (Regulation (EU) No 1315/2013	Guidelines adopted	During infrastructure planning, Member States shall give due consideration to improving resilience to climate change and to environmental disasters.
N	MOVE	Transport networks	EU-led governance of Core Network Corridors (CNCs)	Specific analyses are currently being performed for each CNC (due by the end of 2017).	EU-led governance of Core Network Corridors (CNCs) are proactively paying attention to implications of climate change on CNCs, as well as the need for adaptation.
Y	MOVE	Transport	Regulation was adopted and is currently in force: Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013[391] on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU	In force	Article 5 indicates that the TEN-T network should be resource-efficient via the "adequate consideration of the **vulnerability of transport infrastructur**e with regard to a changing climate as well as natural or man-made disasters, with a view to addressing those challenges. Furthermore, Article 34 requires that "during infrastructure planning, Member States shall give due consideration to improving resilience to climate change and to environmental disasters.
Y	REGIO	Regional development	The European Union Strategy for the Baltic Sea Region (EUSBSR)	Communications concerning the European Union Strategy for the Baltic Sea Region: 10.6.2009 - COM(2009)	Climate change is in focus of the strategy Horizontal Action Climate. HA Climate covers mitigation and adaptation and ensures that the transnational cooperation between the Baltic Sea countries on climate issues is continuously prioritised and that major stakeholders are engaged in the policy debate.

[391] Regulation (EU) No 1315 of the European Parliament and of the Council of 11 December 2013

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
				248 final; 23.03.2012 - COM(2012) 128 final	
Y	REGIO	Regional development	The European Union Strategy for the Danube Region (EUSDR)	Communication concerning the European Union Strategy for the Danube Region	The climate adaptation aspects of the strategy are addressed under the environmental heading (priority area 5), with a reference to the need for "Preventive and disaster management measures implemented jointly". Cooperation in the areas of Green Infrastructure and application of long-term, ecosystem-based solutions is also promoted by the Strategy.
N	REGIO	Regional development	The European Union Strategy for the Adriatic and Ionian Region (EUSAIR)	Communication concerning the European Union Strategy for the Adriatic and Ionian Region – 17.06.2014 – COM(2014) 357 final	Climate change mitigation and adaptation as well as disaster risk management are horizontal principles for all four pillars.
N	REGIO	Regional development	The European Union Strategy for the Alpine Region (EUSALP)	Communication concerning the European Union Strategy for the Alpine Region – 28.07.2015 - COM(2015) 366 final	Climate change and risk prevention is one of the core priorities of the strategy. Action 8 focuses on risk management and climate change adaptation.
N	REGIO	Regional development	The four European Union Macro Regional Strategies	Report concerning the governance of macro-regional strategies - 20.05.2014 - COM(2014) 284 final	Commission has issued several reports concerning all the four EU macro regional strategies. In the last implementation report (2016) climate change was mentioned as one of the areas where macro-regional cooperation adds value.

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
				Report concerning the added value of macro-regional strategies - 27.06.2013 - COM(2013) 468 final Report on the implementation of EU macro-regional strategies - 16.12.2016 - COM(2016) 805 final pdf	
Y	REGIO	Regional development & Cohesion policy	'Common Provisions Regulation' on the European Structural and Investment Funds	Regulation (EU) No 1303/2013[392]	- Recalls the ambition to devote at least 20 % of the budget of the Union to climate change objectives; - Climate change mitigation and adaptation are part of the horizontal principle of sustainable development observed by each Programme; - Introduces a methodology for gathering information on the support for climate change objectives; - Establishes 11 'Thematic Objectives' for the intervention of ESIF – where TO5 is dedicated to 'promoting climate change adaptation, risk prevention and management' - Climate adaptation co-benefits from measures such as improved energy efficiency - Pre-conditions for funding (ex-ante conditionalities) also relevant. - Includes legal requirements on the climate proofing of major projects (investments in infrastructure of above EUR 50 or 75 million EU support))

[392] Proposal for a Regulation of the European Parliament and of the Council, COM (2011) 615

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
					- Fund specific regulations for ERDF, CF and ETC includes investment priorities relevant to adaptation - assessment (Application form) for major projects; - Methodology for carrying out cost-benefit analyses for major projects.
N	REGIO	Regional development & Cohesion policy	Implementing Regulation	Implementing Regulation (EU) No 215/2014[393]	- Presents the methodology for tracking the financial support for climate change objectives (mitigation and adaptation); - Presents specific 'investment fields' for adaptation actions. Provisions on climate change adaptation included in the: -
Y	REGIO	Territorial Cohesion & Urban development	The Urban Agenda for the EU	Report from the Commission to the Council on the Urban Agenda for the EU – 12.11.2017 - COM(2017) 657 final	The Pact of Amsterdam establishes an overarching Urban Agenda for the EU and was agreed by EU Ministers responsible for Urban Matters on 30 May 2016. Climate adaptation, including green infrastructure solutions, are one of its priority themes. A Partnership on Climate Adaptation was been launched in 2017 offering a unique opportunity for local authorities, Member States, European Commission and other EU organisations to work together to deliver concrete improvements on the ground (through better regulation, better funding and better knowledge). This framework offers opportunities to advance urban adaptation action in Europe as well as mainstream and align adaptation action with other Urban Agenda Partnerships, such as Sustainable use of land and Nature-Based solutions, Circular Economy, Air quality and Energy transition. The Action Plan on climate adaptation is currently under development by the CA Partnership and is planned to be adopted by the end 2018.

[393] Commission Implementing Regulation (EU) No 215/2014 of 7 March 2014 laying down rules for implementing Regulation (EU) No 1303/2013

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	REGIO	Territorial Cohesion & Urban development	Urban Innovative Action	On-going	UIA is an EU initiative funded by ERDF, aiming at testing innovative solutions at urban scale. The objective is to capitalise and disseminate knowledge to the benefits of EU cities. The 3rd call of UIA, launched in October 2017, covers the topic of "adaptation to climate change".
N	REGIO	Regional development & Cohesion policy	A stronger and renewed strategic partnership with the EU's outermost regions COM(2017) 623 final	Adopted	A number of actions are assigned to DG CLIMA and have to do with the promotion of adaptation in outermost regions, including LIFE support and the commitment to include outermost regions in any new or updated EU strategy for adaptation.
N	REGIO	Regional development & Cohesion policy	RegioStars awards	On-going	RegioStars Awards identify good practices in regional development and highlight original and innovative projects that are attractive and inspiring to other regions. There are different award categories each year with climate being often of them,
N	REGIO	Regional development & Cohesion policy	European Week of Regions and Cities	On-going	Annually organised week at which regional and urban representatives from across Europe are sharing views and approaches on how to best support smart, sustainable and inclusive growth in Europe with investments from EU cohesion policy.
N	SANTE	Health	Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law')	Adopted	The regulation requires taking into account the link between animal health and climate change, i.e. that climate change may influence the emergence of new diseases, the prevalence of existing diseases and the geographic distribution of disease agents and vectors, including those affecting wildlife.

In EU AS	Lead DG	Policy Area	Title of initiative	Status	To what extent adaptation is mainstreamed in the initiative
Y	SANTE	Plant Health	COM(2013) 267: Proposal for a Regulation of the European Parliament and of the Council on protective measures against pests of plans[394]	Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants, amending Regulations (EU) No 228/2013, (EU) No 652/2014 and (EU) No 1143/2014 of the European Parliament and of the Council and repealing Council Directives 69/464/EEC, 74/647/EEC, 93/85/EEC, 98/57/EC, 2000/29/EC, 2006/91/EC and 2007/33/EC	Recital 4 notes that "plant health is threatened by species injurious to plants and plant products which now present a greater risk of being introduced into the Union territory owing to globalisation of trade and climate change".

Table XI-2. COM legislative proposals currently with European Parliament and Council

In Strategy	Lead DG	Policy Area	Title of initiative	Status	Level to which adaptation is mainstreamed in the initiative
N		Budget	MFF 2021-2027	<<<to be completed based on legal proposals 2021-	

[394] Proposal for a Regulation of the European Parliament and of the Council on protective measures against pests of plants, COM(2013) 0267 final

				2027)	
N	AGRI	Agriculture	Review of political and legal framework for organic production	Impact assessment finalised. Commission proposal adopted in March 2014, now in co-decision.	The proposal aims to bring more harmonisation and build a level playing field for organic producers. The strengthening and harmonisation of production rules may have a positive effect on adaptation to climate change.
N	CLIMA / ENER	Energy and climate	Energy Union Governance	Agreement reached in trilogues.	The proposed Regulation on the Governance of the Energy Union includes provisions on adaptation consistent with obligations under the Paris Agreement, notably by including adaptation goals in the future National Energy and Climate Plans and through more precise reporting requirements for Member States.
N	EEAS	Arctic policy	JOIN(2016) 21 final April 2016 An integrated European Union policy for the Arctic	Currently under discussion in European Parliament	As climate change is a circumpolar challenge, the EU is ready to work with the Arctic states, indigenous peoples and relevant Arctic regional and multilateral fora to share experience, expertise and information on climate change, impacts, adaptation and resilience, with a view to developing an ambitious climate adaptation agenda for the Arctic region.
N	ENER	Energy	Proposal for a regulation COM(2016)862[395] on risk preparedness in the electricity sector and repealing Directive 2005/89/EC[396].	Part of the Clean Energy Package; Council adopted a general approach in December 2017	The regulation includes preparedness of the electricity sector for extreme weather events, listing this in Recitals 2 and 13 and including it in Article 5 on establishing a methodology for crisis scenarios in the electricity sector.
N	FISMA	Capital Requirements	Capital Requirements Regulation (EU) No	Under revision	Includes long term financing in critical infrastructure. The revision means to increase long-termism in EU prudential

[395] Proposal for a Regulation of the European Parliament and of the Council on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC, COM(2016) 862 final

[396] Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment

			575/2013		requirements for investors.
N	FISMA	Capital Markets Union/Sustainable Finance	Proposal for a regulation - COM(2018)353/978670 on the establishment of a framework to facilitate sustainable investment	Proposed by the Commission on 24 May 2018	Includes an article on adaptation as an environmental objective in the context of environmentally sustainable economic activities
N	FISMA	Capital Markets Union/Sustainable Finance	Proposal for a regulation on disclosures relating to sustainable investments and sustainability risks and amending Directive (EU) 2016/2341	Proposed by the Commission on 24 May 2018	Includes adaptation as one of the elements of non-financial disclosure obligations in the context of sustainable investments.

Annex XII Assessment of the quality of the evidence gathered in the evaluation support study

Notes below the table explain the basis for the description of the extent of evidence as high, medium or low for each type of evidence. The extent seeks to summarise both the coverage of the evidence and its depth.

Extent of each type of evidence for assessment of each evaluation question, in approximate order of data gathering

	EQ1	EQ2[i]	EQ3[j]	EQ4	EQ5	EQ6	EQ7	EQ8	EQ9	EQ10
Literature review[a]	H	(L)	(H)	H	L	(L)	M	L	H	M
First stakeholder workshop[b]	L		(M)	M	L			L		L
Targeted stakeholder survey[c]	M	(L)	(H)	H	L	(L)	0	0	M	L
Stakeholder interviews[d]	H	(L)	(H)	H	M	(L)	H	M	H	M
Second stakeholder workshop[e]	L		(H)	H	H	(H)			M	L
Interactive exercise with Working Group 6[f]				L	L					L
Case studies[g]				H	H				H	
Open public consultation[h]	H	(H)	(M)	M	L	(H)	H	0	H	H

Notes:

a. *H, Coverage of 7 or more actions; M, coverage of 6 or more actions but limited information in literature examined; L, coverage of fewer than 6 actions*
b. *H, 20 or more questions; M, 10-20 questions; L, fewer than 10 questions; 0, no questions*
c. *Key: H, 20 or more questions; M, 10-20 questions; L, fewer than 10 questions*
d. *Key: M, addressed 2-4 actions; L, addressed 1 action.*
e. *A major focus of the second stakeholder workshop was on draft recommendations from the evaluation and a high level of evidence was collected on these. Key for evidence related to evaluation questions: H, over 10 inputs; M, 5-9 inputs; L, 1-4 inputs.*
f. *This brief exercise was carried out with Member State experts participating in a meeting of Working Group 6 on Adaptation of the Climate Change Committee on 24 January 2018. The experts were asked to vote for which of the draft conclusions in relation to Evaluation Question 4, 5 and 10 they considered the most pertinent.*
g. *Case studies relate to EQ4, EQ5 and EQ9*

h. *Key: H, 3 or more questions relate to the EQ; M, 2 questions; L, 1 question relates to EQ*
i. *Assessment of EQ2 was informed by the same inputs as EQ1.*
j. *Assessment of EQ3 is informed by the inputs to EQ4*

Evidence gathering started with the literature survey and this provided limited evidence for assessment of Evaluation Questions 2, 5, 6 and 8.

The first stakeholder workshop provided valuable evidence in relation to the topics covered. However, it generally covered one action for the evaluation questions considered, so the extent of evidence was generally low.

The targeted stakeholder survey provided a moderate or high extent of evidence for Evaluation Questions 1, 3, 4 and 9. No questions were included on efficiency, and there was limited evidence for Evaluation Questions 2, 5, 6 and 10.

The stakeholder interviews were a substantial source of evidence, except for Evaluation Questions 2 and 6.

The second stakeholder workshop considered draft recommendations in detail. Contributions from the stakeholder panel and from the floor, provided additional evidence on Evaluation Questions 1, 9, 10 and particularly 4 and 5. A brief interactive exercise with members of Working Group 6 provided some limited evidence on Evaluation Question 4, 5 and 10.

Case studies were chosen to illustrate key points arising from the evaluation questions. They were developed to enhance and support the key conclusions and recommendations for the report where the evidence is currently less strong and would benefit from further illustration

The open public consultation had 385 respondents, of which 217 were private individuals and 168 other stakeholders. One section of the consultation addressed general conclusions related to draft recommendations. In a section on specific and technical conclusions, there were three or more questions relating to each of Evaluation Questions 1, 7, 9 and 10. In particular, there were sufficient stakeholder responses to consider responses by stakeholder type where appropriate, providing evidence for Evaluation Questions 2 and 6.

The greatest data limitation was with the data from the targeted stakeholder survey. Although the combined response from 60 participants allows consideration of most of the evaluation questions in detail, it does not permit partitioning of responses by stakeholder groups, as required for Evaluation Questions 2 and 6. There were 34 interviews in total, which were not intended to permit detailed assessment of evaluation questions by stakeholder type. Responses to the open public consultation have addressed this limitation in relation to EQ2 but the nature of responses does not enable provision of a response to EQ6.

Annex XIII Economic costs of climate change

Introduction

Anticipating the potential impacts of climate change and in which sectors they will be more important, is central to planning appropriate policy responses.

Unabated climate change will lead to economic costs, often known as the 'costs of inaction'. A key issue for economic analysis – and especially macro-economic analysis - is the need to use consistent and harmonised socio-economic scenarios when modelling. There are several possible combinations of mitigation and socio-economic scenarios used by different models, which explains the different timelines, scopes and warming levels mentioned below.

Economic costs in general

Globally, recent studies indicate that the economic costs of climate change may be high, even with modest climate change.[397] The costs may rise significantly with greater warming; unmitigated warming can reduce average global incomes roughly 23% by 2100 and enlarge global income inequality, relative to a scenario without climate change.[398]

Looking at the past, a recent EEA study concludes that the total reported economic losses caused by weather and climate-related extremes in the **EEA member countries** over the period 1980-2016 was over EUR 433 billion[399].

For the EU, estimations for the future have recently been made by the JRC under the PESETA III project.

The JRC PESETA III project estimates impacts from climate change for 11 sectors in the EU, analysing, for most of the sectoral studies, a high warming scenario and a 2°C warming scenario.

For 6 of those impact categories (residential energy demand, coastal floods, inland floods, labour productivity, agriculture and heat-related mortality) the potential impact on welfare (expressed as consumption) has been assessed. The impacts simulated are associated to climate change that would occur by the end of the century assuming a high warming scenario. The overall welfare loss represents 1.9% of GDP[400].

[397] ECONADAPT: 'The Economics of Climate Change Adaptation'; CIRCLE 2 http://econadapt.eu/

[398] Burke et al. 2015, Global non-linear effect of temperature on economic production. *Nature* 527: 235–239, doi:10.1038/nature15725. See also Burke et al. 2018, Large potential reduction in economic damages under UN mitigation targets Nature 557: 549–553, doi:10.1038/s41586-018-0071-9.

[399] EEA Report No 15/2017, "Climate change adaptation and disaster risk reduction in Europe" (2017), updated in 2018 as part of the EEA indicator on 'Impacts of extreme weather and climate related events in the EEA member countries'. Based on NatCatSERVICE data received under institutional arrangements.

[400] The JRC PESETA economic assessment is based on simulating what would be the impact of future climate change occurring on today's economy.

As the coverage of potential impacts is largely incomplete, the damage estimate is of course not equal to the total economic costs of climate change. These are likely to be significantly higher.

In this context, it should also be noted that estimating the costs of all climate impacts remains very challenging. It is difficult to capture, for example:

- Biophysical impacts without a monetary valuation, e.g. the effects of climate change in ecosystems services.
- The damages due to possible climate tipping points.
- The impact on the EU economy of impacts of climate change occurring in third countries (transboundary effects), including issues such as migration.

JRC PESETA III does look at some transboundary effects. It estimates the additional welfare impact in the EU associated to changes in trade flows due to climate impacts occurring in third countries for four impact areas (residential energy demand, river flooding, labour productivity and agriculture). The transboundary effect was estimated to increase the EU welfare loss by 20%.

JRC PESETA III also finds that there is a clear North-South divide in the regional distribution of climate impacts across the EU, hidden behind the results for the whole of Europe. This is evident in the effects on heat-related human mortality, labour productivity, water resources, habitat loss, energy demand for cooling and forest fires. The Mediterranean area appears to be the most vulnerable to climate change.

Below a more detailed overview is given of the estimated impacts, without adaptation policies, in all 11 PESETA III sectors.

1. Coastal areas

By 2100 annual damages could reach up to €961 billion and annual population affected could be up to 3.65 million people under a high warming scenario and socio-economic change.[401]

2. River floods

Nowadays, average annual flood damage amounts to €5.3 billion. By 2100, annual flood damage could rise up to €112 billion under a high warming scenario and corresponding socio-economic scenario.

3. Droughts

Even under 2°C warming, Mediterranean regions will experience a strong reduction in soil moisture, while North and East Europe show a future increase in soil humidity. The projected patterns of change in soil drought hazard are actually a continuation of the drying and wetting trends observed across Europe over the past 50 years: more droughts in the west of the Mediterranean region and less droughts in Central and Eastern Europe.

[401] Vousdoukas et al. 2018, Climatic and socioeconomic controls of future coastal flood risk in Europe. *Nature Climate Change* 8: 776–780, https://doi.org/10.1038/s41558-018-0260-4

4. Agriculture

Even under 2°C warming, irrigated crop yield declines for most crops and regions in Europe, in large part due to a shortening of the growing season. Yield changes for rain-fed crops depend on regional water availability and crop-specific water requirements.

5. Energy

By the end of century, under a high warming scenario, residential energy demand for heating and cooling is projected to decline by 27%. However, this positive EU average result hides strong differences between EU Member States.

6. Transport infrastructure

By the end of the century, under a high warming scenario, about 200 airports and 850 seaports of different size across the EU could face the risk of inundation due to higher sea levels and extreme weather events. Especially countries by the North Sea have the greatest number of airports at risk of coastal flooding that exceeds 1m.

7. Water resources

Under 2°C warming, annual median river flows are projected to increase in most of Europe, except for the Mediterranean, where a decrease in flow is projected in all four seasons. Southern European countries are projected to face increased water shortages. For many countries in Central Europe, the projections indicate a reduced reliance on upstream inflow to meet local water demands.

8. Habitat loss in the Mediterranean

Under a high warming scenario, 16% of the present Mediterranean climate zone may become arid by the end of the century: an area equivalent to around half of Italy.

9. Forest fires

Mediterranean soils become drier, particularly under a high warming scenario. Areas exhibiting low soil moisture extend further northwards from the Mediterranean than nowadays. The present area of high moisture surrounding the Alps decreases in size with climate change. The danger of forest fires increases with climate change around the Mediterranean, with Spain, Portugal and Turkey being the three countries with the highest danger risk.

10. Labour productivity

Under the high warming scenario, by the end of the century daily average outdoor labour productivity could decline by around 10-15% from present-day levels in several Southern European countries. Countries in northern Europe could also see some smaller declines in daily average outdoor labour productivity.

11. Heat-related mortality

Climate change-attributable impacts on heat-related mortality are also studied under PESETA III, under a high warming scenario. EU annual mortality could largely increase

by the end of the century, reaching 132,000 additional deaths/year, with most of the increase occurring in the Southern regions [402].

[402] Forzieri G, Cescatti A, Batista e Silva F, Feyen L 2017. Increasing risk over time of weather-related hazards to the European population: a data-driven prognostic study. The Lancet Planetary Health 5 (e200-e208).

Annex XIV Case studies

Four case studies were developed in the evaluation support study[403] to enhance and support the key conclusions and recommendations for the final report of the study.

Each case study was supported by a targeted literature review and up to 3 interviews with key stakeholders.

The format of each case study was tailored to its specific demands rather than adhering to a strict template.

As they constitute valuable evidence for the purposes of the evaluation SWD, they are reproduced in full in this Annex.

The case studies address:

1. Fire preparedness
2. Impacts of climate change of neighbouring countries and implications for EU trade
3. The Danube Macro-regional strategy and its contribution to action at Member State level
4. Adaptation of infrastructure in the energy sector.

[403] See footnote 4.

Case Study 1 Fire preparedness and the impact of climate change

Context and the EU response

The purpose of this case study is to support the wider evaluation of the EU Adaptation Strategy by providing evidence about forest fire preparedness and coherence with adaptation at an EU level and in Member States.

The issue of forest fire preparedness in response to climate change has received EU attention for many years. It was the focus of an EU-wide workshop in 2010, convened by Forest Europe (the brand name of the Ministerial Conference on the Protection of Forests in Europe, which is the pan-European voluntary high-level political process for dialogue and cooperation on forest policies in Europe). The workshop sought to: review current national forest fire prevention systems; identify innovative strategies, best available practices and possible policy instruments; and develop policy conclusions and recommendations for the EU.[404] Deliberations within the framework of Forest Europe eventually culminated in the establishment of a Forest Europe Expert Group on Adaptation to Climate Change in 2017. Consideration of forest fire preparedness in relation to climate change adaptation planning has progressed since this workshop at national, regional and EU levels.

The EU Adaptation Strategy recognises the importance of ensuring a coherent and coordinated approach to the impacts of climate change at local, regional, national and EU levels. In particular, the Strategy acknowledges that more needs to be done to strengthen preparedness for natural and man-made hazards, and ensure disaster risk reduction and climate change adaptation are better aligned and integrated into planning. The evaluation of the Strategy has identified that, currently, both policy areas are sometimes mainstreamed in parallel into key EU policies and strategies rather than in consort. However, with specific reference to forest fires, the EU LIFE Climate Action sub-programme has funded a number of projects that aim to address fire preparedness and climate change adaptation, including in relation to cross-border forest fires. A list of these projects and further details can be viewed by visiting the LIFE projects online database, selecting "Themes", "Risk management" and "Natural risks – Flood, Forest fire, Landslide" [405].

Portugal, Spain, Italy, Greece and the Mediterranean region of France account for around 85% of the total burnt area in Europe each year.[406] For many countries within the EU, the likely impact of climate change on the severity/frequency of forest fires will be of great importance, based on current trends and projections. It is becoming ever more a reality, as noted in the most recent EEA report on climate change impacts in Europe.[407] In 2017, it was reported that the number of wild fires in forests across Europe had more than doubled compared to the previous year. These were severe across southern Europe, with Portugal experiencing the most intense forest fires in October last year[408]. Up-to-date and

[404] Forest Europe, 2010, Assessment of Forest Fire Risks and Innovative Strategies for Fire Prevention, 4–6 May 2010 Rhodes, Greece, Workshop Report.
[405] A selection of LIFE projects funded since 2014 that address forest fires across the EU can be viewed here: http://ec.europa.eu/environment/life/project/Projects/index.cfm
[406] Forest Fires in Europe, Middle East and North Africa 2016, European Commission, 2017.
[407] See footnote 113
[408] http://www.euronews.com/2017/10/16/how-europe-s-wildfires-have-more-than-trebled-in-2017

comparable data across Europe is maintained by the European Forest fire Information System (EFFIS)[409].

The JRC PESETA II study[410] estimated that the burnt area of southern Europe would more than double with climate change.[411] Other researchers have concluded the same using current models (SREX A2), as noted in EEA's report.[412] They also cited recent findings that suggest a warmer climate across Europe will lead to a greater area becoming fire-prone with longer fire seasons. Specifically, the impact of fire events may be strongest in southern Europe.[413]

A follow-up JRC PESETA III study identified that the three countries with the highest fire risk are Spain, Portugal and Turkey; with Greece, part of central and southern Italy, Mediterranean France, and the coastal region of the Balkans also being in increasing danger both in relative and absolute terms[414]. A detailed mapping of wildfire risks by the University of Leicester (2016) found Catalonia, Madrid and Valencia are among those cities/regions that are most at risk[415]. EFFIS supports Member States' services in charge of forest protection against fires and provides Commission Services and the European Parliament with updated and reliable information on wildland fires in Europe[416].

Countries need to address forest fire preparedness by planning and implementing actions to reduce climate vulnerability and increase adaptive capacities. Research suggests that forest fire risks could be substantially reduced if further adaptation measures are introduced, including silvicultural management to increase the structural diversity of plantations and simplified forest ecosystems, prescribed burning and use of fire breaks, and behavioural changes.[417]

Feedback from consultees

Representatives from a national authority in Spain and from the Provincial Council of Barcelona, Catalonia provided input to this case study. In addition to describing the overall approach to forest fire preparedness and climate change adaptation in the Province, the latter also referred to the LIFE Montserrat project (described below), as an example of best practice.

[409] http://effis.jrc.ec.europa.eu/

[410] Projection of economic impacts of climate change in sectors of the European Union based on bottom-up analysis, see https://ec.europa.eu/jrc/en/peseta

[411] Climate impacts in Europe: The JRC PESETA II Project, European Commission, 2014.

[412] See footnote 113

[413] See footnote 113

[414] de Rigo, D., Libertà, G., Houston Durrant, T., Artés Vivancos, T., San-Miguel-Ayanz, J., Forest fire danger extremes in Europe under climate change: variability and uncertainty, EUR 28926 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN: 978-92-79-77046-3, doi:10.2760/13180, JRC10897European

[415] https://www2.le.ac.uk/offices/press/press-releases/2016/march/wildfire-map-reveals-countries-in-europe-most-at-risk-of-catastrophic-fire-damage

[416] http://effis.jrc.ec.europa.eu/

[417] Khabarov, N et al., 2014, Forest Fires and adaptation options in Europe, Regional Environmental Change 16)1, 21-30 (doi: 10.1007/s101130-014-0621-0); and European Commission, Modelling the impacts of climate change on forest fire danger in Europe Sectorial results of the PESETA II Project, 2017.

Spain has been proactive in seeking to integrate disaster risk reduction and climate change adaptation planning at the national level[418], as well as at the provincial and local levels. The EU Adaptation Strategy has been a useful guide in preparing strategies and plans where the needs of disaster risk reduction and climate change adaptation coincide. For example, the Provincial Council of Barcelona has followed EU and national-level guidance in supporting local administrations to develop supra-municipal strategies for forest fire preparedness; identifying and coordinating all actors in the territory. Importantly, by downscaling EU and national strategies, sub-national responses have been tailored to local circumstances.

The Provincial Council of Barcelona has learnt from experience that planning and monitoring is essential to forest fire preparedness. A comprehensive stakeholder engagement plan is a critical part of this process. Engaging key actors (e.g. forest owners, the fire service, local authorities and the Catalan Government) minimises barriers to preventing forest fires. The Provincial Council adopts a holistic approach to forest fire preparedness through plans in relation to land, forest management, fire prevention and surveillance, fire management and land restoration. The Provincial Council encourages and actively supports dissemination of lessons, project-level actions and success stories at the regional level and networking with other national and community projects.

The LIFE Montserrat project[419] in Spain provides evidence of ongoing adaptation actions in relation to fire risks. The Provincial Council reports that an increase in the frequency of wildfires in the Montserrat Mountain region is attributable to changes in land use and socioeconomic activities, and that climate change may have made fires more intense and severe. Increased development has led to a decline in traditional rural activities in the region while forest and scrubland areas with increased fuel load have expanded. The project is seeking to address the high fire risk in the region through nature-based solutions (e.g. sustainable forest management and livestock grazing) and increasing public awareness of the risks. The project provides additional co-benefits through conserving and restoring wildlife habitats, habitat connectivity and associated ecosystem services for people. The recent wildfires at the end of 2017 suggest that the LIFE Montserrat project is a model that is worth replicating across the Mediterranean area, i.e. creating large managed areas to prevent widespread forest fires by combining extensive forest management with extensive grazing and restoring a traditional mosaic landscape.

Considerations for the future

The stakeholders who contributed to this case study identified a need to further enhance coherence between climate change adaptation and disaster risk reduction across all levels of governance (global, European, national levels) via closer vertical and horizontal, cross-border and transnational coordination and collaboration. In particular, while the EU supports Member States through existing platforms (e.g. Climate-ADAPT), EU-wide conferences and research (e.g. LIFE, H2020) to capture and disseminate relevant experiences, lessons and approaches, the stakeholders felt that the EU Adaptation Strategy could seek to strengthen collective and interconnected planning.

[418] Moreno Rodriquez, 2014, Los incendios forestales en España en un contexto de cambio climático: Información y herramientas para la adaptación. Available: http://www.adaptecca.es/sites/default/files/editor_documentos/infoadapt_memoria_final_proyecto.pdf

[419] http://lifemontserrat.eu/en/

Case Study 2 Spillover effects from climate change impacts occurring outside the EU

Context and the EU response

Some stakeholders interviewed for the evaluation of the EU Adaptation Strategy have suggested that the Strategy does not sufficiently recognise and address the EU's vulnerabilities to climate change impacts outside Europe, and of missing potential opportunities for cooperation with non-EU countries in that regard. Climate change worldwide may have consequences for trade, food security, immigration, and biodiversity. The purpose of this case study is to provide supporting evidence for the wider evaluation of the Strategy specifically with regard to the impact of climate change outside the EU on food production and supply within the EU.

The Strategy states that it takes account of global climate change impacts, including disruptions to supply chains and reduced access to food supplies, and spillover effects on the EU.[420] However, the Strategy focuses on EU level and Member State actions and does not explicitly address international climate change adaptation. Under Action 2 of the Strategy, the LIFE programme does give priority to adaptation flagship projects that address key cross-sectoral, trans-regional and/or cross-border issues. Guidance on the development of NASs also refers to transboundary issues. In addition, the Global Strategy for the European Union's Foreign and Security Policy identifies external climate risks and resilience challenges for the EU and addresses the potential impacts from a development policy perspective.[421]

In 2012, DG CLIMA commissioned a study to investigate spillover effects in the EU of climate change impacts occurring outside the EU. The research focused particularly on European neighbourhood countries.[422] It identified that at that time, policy responses generally at the EU, national and regional level did not address spillover effects of global climate change on the EU. The report went on to conclude that no matter how robust adaptation planning is within the EU, it will remain vulnerable to the impacts of climate change outside the EU, in particular, from neighbouring countries. Food production and supply has been recognised as a vulnerable priority sector to such spillover effects, especially in relation to crops grown elsewhere on which the EU is reliant.[423]

The EEA's latest report on climate impacts in Europe, in 2016,[424] highlighted how climate change impacts (e.g. heatwaves, prolonged drought and water scarcity) have already affected agricultural production outside the EU and had spillover effects on Europe through regional or global markets and supply chains. For example, the 2010 wheat crisis in Russia, caused by severe heatwaves, destroyed 30% of Russia's grain

[420] See footnote 1

[421] Shared Vision, Common Action: A Stronger Europe: A Global Strategy for the European Union's Foreign and Security Policy, European Commission, 2016.

[422] AMEC, Assessing the spillover effects in the EU of the adverse effects of climate change in the rest of the world, in particular the EU's Neighbourhood countries, Study for the European Commission, 2013

[423] Stockholm Environment Institute, Introducing the transnational climate impacts index: indicators of country-level exposure – methodology report, 2016

[424] 'Climate change, impacts and vulnerability in Europe 2016, *Report No 1/2017*', European Environment Agency, 2017: Chapter 6.4

harvest, resulting in an export ban on wheat that contributed to a 60% to 80% increase in global wheat prices.[425]

Based on an assessment of current evidence (as summarised above), the EEA[426] identified a number of priority vulnerabilities for Europe from climate change impacts outside the EU that are of relevance to food production and supply:

- Economic effects through climate-induced price volatilities.
- Disruption to transport networks and possible new shipping routes (e.g. melting of polar ice).

Feedback from Member States

Representatives of three Member State authorities were consulted with regard to this case study. It appears from these consultations that the issue of spillover effects, at least in relation to food production and supply, has not yet been addressed by some, and perhaps all, NASs or plans. One Member State confirmed that it was unaware of this issue at the time of preparing its first national adaptation plan and that, as it had not been raised as a concern, it was not factored in to its future adaptation planning priorities. Another Member State noted that while its current national adaptation plan did not address the issue of spillover effects, future iterations of the plan would consider such impacts. A third Member State reflected that there is a need for clarity as to what is meant by spillover effects, for example, in relation to their link with climate change as compared with other drivers and policies. It noted also that there is very little literature and guidance available on this issue and that a subsequent EU-level review of relevant existing studies at the sector level would be helpful, for example, in relation to impacts on food production and supply within the EU. In addition, it questioned if the EU Adaptation Strategy is the best place to address spillover effects or whether they should be addressed by other policies.

Considerations for the future

Reflecting on the EU response to date and feedback from Member States, there appears to be a need for the EU to review existing evidence and invest, where necessary, in further research in order to identify Europe's vulnerabilities to climate change impacts elsewhere, particularly in neighbouring countries. This would then enable the EU to consider the extent of likely impacts from spillover effects on Member States and commensurate actions required within and beyond Europe to increase the EU's resilience to climate change. Guidance could subsequently be provided to Member States on the potential urgency of preparing for these impacts, for example, through/during review and further development of NASs.

References

Benzie, M., T. Carter, F. Groundstroem H. Carlsen, G. Savvidou, N. Pirttioja, R. Taylor & A. Dzebo (2017). *Implications for the EU of cross-border climate change impacts*, EU FP7 IMPRESSIONS Project Deliverable D3A.2.

[425] Foresight, 2011, The future of food and farming. Final project report, the Government office for Science; and Coghlan et al., 2014, A sign of things to come? Examining four major climate-related disasters, 2010-2013.

[426] 'Climate change, impacts and vulnerability in Europe 2016, *Report No 1/2017*', European Environment Agency, 2017: Chapter 6.4

Ercin A.E, Chico D., and Chapagain A. K. (2016) *Dependencies of Europe's economy on other parts of the world in terms of water resources*, Horizon2020 - IMPREX project, Technical Report D12.1, Water Footprint Network.

AMEC Environment & infrastructure UK Limited, Bio Intelligence Service, Cambridge Econometrics and Millieu (2012) Assessing the spillover effects in the EU of the adverse effects of climate change in the rest of the world, in particular the EU's Neighbourhood countries', European Commission – DG CLIMA

European Commission (2013) *An EU Strategy on Adaptation to Climate Change*, COM 216

European Commission (2016) *Shared vision, common action: a stronger Europe. A Global Strategy for the European Union's Foreign and Security Policy.*

European Environment Agency (2017) *Climate change, impacts and vulnerability in Europe 2016: An indicator-based report*, EEA Report, No 1/2017

Case Study 3 The Danube macro-regional strategy and its contribution to action at Member State level

Context and the EU response

The Danube macro-regional strategy was presented by the Commission in 2010[427], following a request from the European Council in June 2009[428]; and was then endorsed by Council and European Council[429]. It was developed in consultation with Member States in the region and other stakeholders. The strategy proposed a focus on three issues: improved connections within the Danube region; better protection of the environment; and shared action to increase prosperity. The climate adaptation aspects of the macro-regional strategy are addressed under the environmental heading (Priority Action 5), with a reference to the need for: "Preventive and disaster management measures implemented jointly, for example as required by the Floods, Seveso, Mining Waste or Environmental Liability Directives. Work undertaken in isolation simply displaces the problem and puts neighbouring regions in difficulty. Increasing frequency of droughts is also an issue, as is adaptation to climate change." The macro-regional strategy goes on to note that: "Regional cooperation must facilitate Green Infrastructure, application of long-term, ecosystem-based solutions, and learning from previous events."

While the macro-regional strategy was neither directly focused on climate adaptation nor directly addressed the importance of Member States adopting adaptation strategies, it, nevertheless, had the potential to encourage and facilitate both the development of national strategies and, as importantly, a better focus on transboundary issues. The EU Adaptation Strategy itself notes the relevance of macro-regional strategies including the EU Strategy for the Danube Region (EUSDR), as a framework for transboundary projects under cohesion policy.

Feedback from stakeholders

The main focus of the case study has been on the experience of national focal points, who are important elements in the governance arrangements for the macro-regional strategy[430]. Different countries coordinate the individual priority actions of the macro-regional strategy; Hungary, for example, coordinates the priority actions on environmental protection (Priority Action 5) and water quality (Priority Action 4). For each priority action, coordination points are established in each of the 14 participating countries[431]. Participants felt that this was a highly important element in progress made under the macro-regional strategy; if an issue needed to be addressed, it was possible to identify relatively quickly, using the contact points, relevant interlocutors, either in a national administration, or in academia in a neighbouring country.

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[427] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: European Union Strategy for Danube Region, COM (2010) 0715 final

[428] Presidency conclusions of the 18/19 June 2009. Council of the European Union, 2009.

[429] Council conclusions on the European Union Strategy for the Danube Region 13 April 2011. Council of the European Union, 2011; and Conclusions of the European Council 23/24 June 2011, European Council, 2011.

[430] For a fuller account of governance arrangements for the strategies, see; Council conclusions of the governance of macro-regional strategies 21 October 2014, General Affairs Council, 2014

[431] EU Member States: Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Romania, Slovakia, Slovenia. Non Member States: Ukraine, Moldova, Serbia, Bosnia-Herzegovina, Montenegro

Adoption of the macro-regional strategy built on the views of stakeholders, as well as experience working in the more formal structures of the International Convention on the Protection of the Danube River; although the subjects covered by the EUSDR were broader, going beyond those connected to the river itself. Interviewees noted that the EUSDR structures were less formal and, therefore, more flexible, but also less capable of securing commitments backed by the full authority of a participating country.

The EUSDR does not have its own funding sources (the so-called "three no's" – no new funding; no new legislation; and no new institutions – were important principles in the development of EU policy on macro-regional strategies)[432]. However, participating countries can commit funding jointly or individually; and the EUSDR has a close relationship with the managing authority for the Danube Transnational Programme under European Territorial Cooperation (ETC). This managing authority has funding of EUR 274 million available over the current 2014-2020 programming period and can issue letters of recommendation for projects, which are closely aligned to EUSDR priorities. The letters of recommendation are regarded as an effective means of influencing funding decisions.

Under the EUSDR, action plans are established for three-year periods. The focus on adaptation has strengthened following the adoption by the International Commission for the Protection of the Danube River (ICPDR) of the "ICPDR Strategy on Adaptation to Climate Change". The current plan under Priority Action 5 covers the 2017-2019 period. It focuses particularly on improved knowledge and understanding of climate-related risks, including stakeholder and practitioner seminars and guidance documents on issues such as flood protection education and flood risk assessment in the Danube. Other areas include drought management, sectoral impacts (including forestry and agriculture) on water management, and improving forecasting models. Examples of action under the macro-regional strategy include the development – in partnership with the EU-funded SEERISK research project – of a "Guideline on Climate Change Adaptation and Risk Assessment in the Danube Macro-region"[433], published in 2014, which provides guidance on a common approach to identification and management of risk. The transboundary nature of the issue means that "collaboration between neighbouring countries and harmonization of the existing practices and methods are essential". More recent work has included the WaterAtRisk project, which is providing improved monitoring and shared risk management systems for watercourses vulnerable to flooding events on the Hungary/Serbia border[434]; and workshops on improving flood protection education.

The climate adaptation priorities, or water management priorities, of the countries involved in the EUSDR differ, based particularly on geography. For example, upstream countries tend to be less concerned about ice flow management in winter, while this is an issue for downstream countries such as Hungary, Serbia and Bulgaria. Similarly, in terms of modelling, upstream countries place a higher priority on the accuracy of short-term meteorological forecasting, given their exposure to rapidly-developing flood risks; while downstream countries have a much greater interest in hydrological forecasting, including long-term projections for the types of flood risk that they may face (and may need to

[432] See, for instance, the emphasis on these principles in the Council conclusions on governance mentioned in footnote 430.

[433] SEERISK 2014. Guideline on climate change adaptation and risk assessment in the Danube macro-region

[434] See information on the EUSDR website at https://www.danubeenvironmentalrisks.eu/wateratrisk-1

prepare for)[435]. The benefit of the EUSDR is in providing a framework for discussion, which ensure that the needs of downstream countries are take into account by upstream countries (e.g. through enhanced provision of data for modelling purposes). It was stressed by interviewees that full alignment of priorities was not necessary for improved cooperation.

Interviewees were clear that the EUSDR had helped participating countries identify and respond to transboundary adaptation challenges, particularly through improved dialogue and exchange of information. The EUSDR is referred to directly in NASs adopted since it was put in place (e.g. in the Hungarian revised NAS, adopted in 2017). It is also notable that three of the four countries identified in the Commission's assessment of Member State adaptation activity are participants in the EUSDR (criterion 3d, "Climate risks/ vulnerability assessments take transboundary risks into account, when relevant", assessed as met by Czech Republic, Germany, and Romania). The EUSDR has also proved to be a valuable structure for enabling cooperation on river basin management plans and flood risk management plans required under EU legislation, and for developing projects which can then apply for funding from other sources, particularly cross-border and pre-accession programmes under the European Regional Development Fund. As such, the macro-regional strategy maximises the coherence in practice of EU instruments, including through effective cross-border implementation of legislation and investment programmes.

In line with the principle that new institutions should not be established by the macro-regional strategies, the EUSDR has been able to make use of structures and cooperation already in place under the auspices of the ICPDR. A joint paper on cooperation and synergy[436] sets out steps to further strengthen that cooperation and to improve information flows. Participants explain that while the ICPDR provides a formal mechanism through which the participating countries can make commitments which have the full backing of their governments, EUSDR mechanisms provide a more informal but flexible approach to cooperation.

Considerations for the future

A number of suggestions were identified by interviewees for future work, either under the Danube Strategy or as lessons which could be considered by other macro-regional cooperative approaches to tackling climate adaptation.

Future work under the Danube Strategy could particularly focus on improving shared models for climate and hydrology, as well as on improving the understanding and use of the outputs of those models. A clear strength of the EUSDR approach was that it enabled an exchange of views and experience at the level of technical practitioners.

Another potentially fruitful area would be cooperation at the local level, including through Covenant of Mayors participants. Cooperation to date has been mainly at the level of national authorities, although the benefits of sharing experience and best practice are clearly relevant at city level.

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[435] An issue also of particular relevance to the insurance sector: see for example the "Short response to the EU Adaptation Strategy Consultation – March 2018", a consultation response submitted by the Oasis consortium

[436] See ICPDR and EUSDR: "ICPDR – EUSDR PA4 & PA5 Coordination: Joint Paper on Cooperation and Synergy for the EUSDR Implementation."

In terms of lessons for other macro-regions, it is important to identify areas of broad general interest for activity. Where issues appear of less relevance to a Member State, it is less likely that its experts will attend meetings; which could weaken the relevance and completeness of the understanding emerging from discussions.

The approach of providing letters of recommendation in support of projects, which are aligned with, or necessary for implementing, the goals of the macro-regional strategy has been a valuable mechanism to enable relevant projects to demonstrate their importance to potential funders.

Where regional cooperation also depends on non-EU Member States participation, particular attention needs to be paid to the means of maximising cooperation. It is notable that in the EUSDR cooperation with some non-EU partners is effectively confined to the border zone itself, rather than to broader integrated water management within the relevant country. One simple approach, which has been useful, is to provide travel funding for expert participation from those countries.

The existence of the ICPDR and its established structures for formal cooperation has facilitated work under relevant EUSDR priority areas. The relatively less formal structures of the EUSDR are seen by participants as providing a more flexible means for taking forward cooperation (as the Commission's 2016 report on implementation of the macro-regional strategies notes, "the EUSDR has very clearly contributed to an improved culture of cooperation"). In contrast, the formal endorsement of policies and agreements under the ICPDR provides greater certainty that governments are fully committed. Both approaches have been part of an improved culture of cooperation, however, careful attention to ensuring that relationships between the bodies maximise the synergies and effectiveness of cooperation is recommended.

Summary and conclusions

Experience in the EUSDR suggests that transboundary cooperation mechanisms can significantly facilitate and enhance cooperation on climate adaptation issues, including those where the degree of political priority for action was greater in some countries than in others. The process is, however, a gradual one; networks of contacts develop over time, as does a shared willingness to address challenges. The Danube's geography provides a clear geographical rationale for cooperation, and helps to ensure that all relevant countries participate. Similar geographical structures and shared biophysical climate risks (based on shared river basins, or seas) are, therefore, likely to be the most effective basis for similar strategies in future. However, more ad hoc structures could also be of value, including the enhanced sharing of experience and best practice through mechanisms such as the Covenant of Mayors.

Case Study 4 Adaptation of infrastructure in the energy sector

Context

Energy infrastructures are critical. Due to the long economic life-spans of energy infrastructure, it is important to understand the hazards to which they are exposed at an early stage in order to carry out actions to protect them. The vulnerability of energy transmission system operators and distribution system operators have been well documented,[437] with a projected increase in frequency and intensity of storms, snowfall and flooding events causing damages and disruptions throughout Europe. Specific examples are falling trees from strong winds breaking transmission cables, flooding leading to the short-circuiting of networks and heavy snow or ice loads causing failures of overhead cables.[438]

Climate variable	Physical components	Key impacts	Level of impact
Wind speed and storms	Wind and storm damage	Overhead lines and pylons	Moderate to high
	Increased heat convection	Overhead lines	Up to 20% capacity
Increasing temperatures	Decreased conductivity	Overhead and underground cables	Cable resistance increases ~0.4% per 1°C rise
	Sag	Overhead cable	4.5cm per 1°C rise
	Thawing permafrost	Substations and pylons	Potential loss of supply
Extreme heat	Buckling of structures	Pylons	Potential loss of supply
Increasing drought	Alteration of soil moisture	Underground cables	Reduces cable capacity
	Shifting soil	Underground cables	Repair costs
Flooding	Flood	Substations	Potential loss of supply
	Cable breakage	Underground cables	Potential loss of supply

[437] Bartos et al., 2016, Impacts of rising air temperatures on electric transmission ampacity and peak electricity load in the United States. *Environmental Research Letters*, *11*(11); and Asian Development Bank, 2012, Climate risk and adaptation in the electric power sector; and WBCSD, 2014, Building a resilient power sector, World Business Council for Sustainable Development.

[438] Panteli and Mancarella, 2015, Influence of extreme weather and climate change on the resilience of power systems: Impacts and possible mitigation strategies, Electric Power Systems Research, 127, 259-270.

Security of energy supply is crucial for business continuity and the well-being of citizens. The impacts of energy transmission disruptions can vary spatially and temporally, based upon the relative magnitude of the climate event and the resilience of the energy infrastructure. Prolonged or frequent disruptions can cause reputational damage to service operators, with customers seeking more reliable alternate providers as a result. This is in addition to the short-term repair costs and the longer-term costs from potentially higher insurance premiums and costs associated with necessary reconfigurations to networks. Finally, financial implications can arise via reduction of subsidies or financial penalties by governments for failure to supply electricity. By contrast, preventing climate disturbances transmission can benefit the security of supply.

In order to alleviate the impacts of climate change on transmission and distribution services, actors are taking innovative steps to protect their infrastructure. One such method, which is being employed throughout Europe, is the deployment of underground cabling. Such adaptation measure is versatile due to its ability to combat multiple climate-related risks, including flooding. Due to its resilience against such events, the undergrounding of cables has been included as a potential adaptation measure in the Scottish and Southern Climate Change Adaptation Report and has been implemented throughout the entire transmission grid by Radius in Denmark. A few more detailed specific examples are presented below:

Finland: In areas of Europe which suffer from heavy snow such as Finland, energy DSO Elenia are currently installing underground cabling networks due to their perceived climate-proofing benefits. Jorma Myllymäki, Chief Operating Officer of Elenia, stated that "due to the aging infrastructure, the increased frequency of storms and heavy snow loads, Elenia began to think about the most cost-effective ways to adapt back in 2004-2006. We then decided that after 2009 we would place no new overhead cables." This has resulted in plans for 2017-2018 to include a further EUR 120 million investment to replace 3 000 km of overhead lines with underground equivalents, with an overarching goal to have 70% of over ground cabling underground by 2028. The costs of the action were not aided by EU funding, but will be carried by customers in the long term, in addition to leveraging costs from other financial mechanisms, such as bond programmes[439].

Such adaptation measures are stimulated by Finnish legislation stipulating that energy networks must be designed so that storms or snow load does not cause more than 6h breakdowns in town areas or more than 36h breakdowns in other areas[440]. In addition, the legislation requires distribution networks to comply with such rules by 2028, which coincides with Elenia's planned goal of 70% of cabling placed underground. Jorma added that 'to achieve the targets of having less than 6 hours of blackouts would be difficult to achieve with the previous overhead infrastructure' whilst other companies are continuing to use conventional strategies such as tree clearing to prevent outages[441]. This represents the potential to gain an upper hand in the market for such firms, by avoiding reputational damage in addition to potential regulatory fines for not fulfilling their legal requirements.

Germany: The German government has opted to install 600 miles of underground cables to transmit energy throughout the country. Germany's position with regard to uptake of

[439] Communication with Jorma Myllymäki, February 12th 2018
[440] The Electricity Market Act was revised broadly in September of 2013
[441] Communication with Jorma Myllymäki, February 12th 2018

wind power and step away from nuclear has resulted in the requirement for new power-link constructions to transport renewable energy from the windy north to consumers in the south. Underground construction of such transmissions has been partly implemented due to projected increased frequency of extreme weather events causing disruption to transmission and distribution networks. Another major determinant of these infrastructural measures was lack of community acceptance of traditional above-ground power lines. The additional construction costs of installing underground cables is estimated to cost between EUR 3-8 billion, which will likely to be added to consumers' electricity bills[442].

Considerations for the future

The examples show that energy companies are starting to take action to adapt to climate risks, prompted by governments and the financial implications of climate change. Yet these examples tend to be the exception rather than the rule. It is apparent that the focus will be on the private stakeholders in the energy system to invest in adaptation themselves. However, there can also be a role for the EU and national governments in creating the right market framework, funding research and sharing knowledge and good practice, such as we have seen in the case of Finland. Within the EU Adaptation Strategy the guidelines for project developers (Action 7 – ensuring more resilient infrastructure), standards for infrastructure development (Action 7), promotion of climate resilient investments (Action 8 - insurance) and infrastructure and knowledge development can all play a role in this, as would improving the requirements for these as a condition for structural funding (Action 6 - climate proofing EU policies). Doing so can result in benefits to Member States, such as contributing to the stability and security of energy supply.

[442] Reuters staff, 2015.