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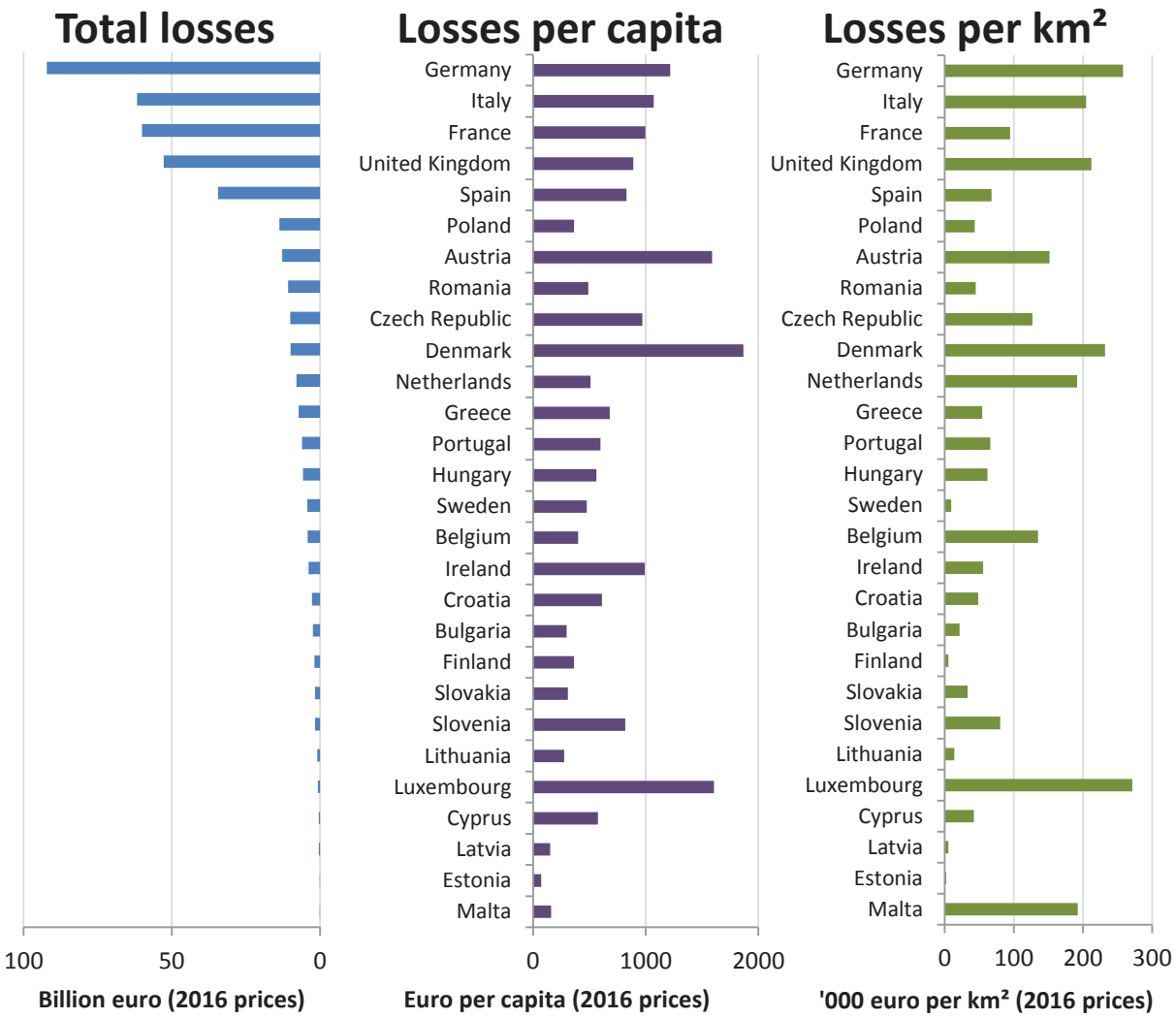
REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

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

{SEC(2018) 472 final} - {SWD(2018) 460 final} - {SWD(2018) 461 final}

1. INTRODUCTION

Three out of four European citizens consider climate change to be a very serious problem. The changes observed in climate are already having wide-ranging impacts on ecosystems, economic sectors, human health and well-being in Europe. The total reported economic losses caused by weather and other climate-related extremes in Europe in 1980–2016 amounted to over EUR 436 billion and were distributed between EU Member States the following way[1]:

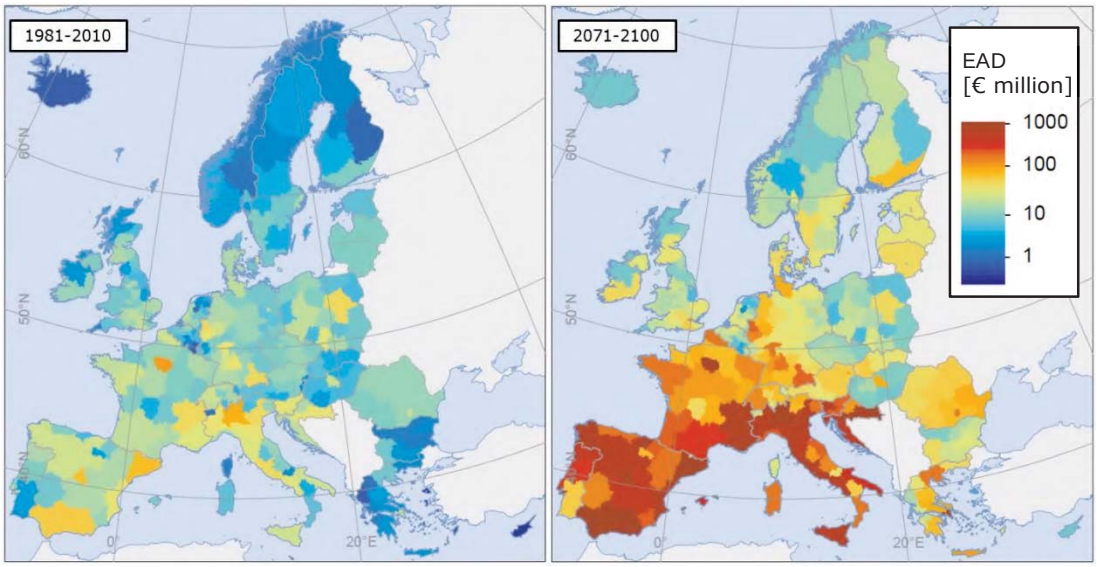


Due to climate change alone, annual damage to Europe's critical infrastructure could increase ten-fold by the end of the century under business-as-usual scenarios (from the

[1] 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'. Differences in damages between countries are partially a result of differing levels of reporting among the countries surveyed. It must be noted that over 70% of the damages are caused by only 3% of all reported events.

current EUR 3.4 billion to EUR 34 billion)[2]. Losses would be highest for the industry, transport and energy sectors.

Expected annual damage to critical infrastructure in European regions, due to climate change, by the end of the century (million EUR)[3]



These maps on damage to critical infrastructure reflect a pattern: in general, climate impacts will be unequally distributed across Europe, both in terms of when and where they occur. For instance:[4]

- The Mediterranean area will suffer more from the effects of heat-related human mortality, water restrictions, habitat loss, energy demand for cooling and forest fires.
- Coastal regions, under a high-emissions scenario (between 3.2 ºC and 5.4 °C global temperature increase in 2 081–2 100)[5], may suffer economic losses of around EUR 39 billion per year by 2050 and up to EUR 960 billion per year towards the end of the century[6].
- Preliminary evidence points to a substantial contraction of Alpine tundra ecosystems in Europe, even if global warming stays within the 2ºC limit of the Paris Agreement. Apart from having a key role in water regulation and freshwater for human consumption, Alpine tundra sustains tourism and rural communities and it is also home to endemic species only found in Europe.

The fires in Sweden last summer show that, beyond modelling and projections, no European country is protected from the consequences of climate change.

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2 Forzieri et al. (2018), 'Escalating impacts of climate extremes on critical infrastructures in Europe' Global Environmental Change 48 97–107. Study from the European Commission's Joint Research Centre.

3 Forzieri et al. (2018), 'Escalating impacts of climate extremes on critical infrastructures in Europe' Global Environmental Change 48 97–107.

4 The following are results from the work of the European Commission's PESETA project, https://ec.europa.eu/jrc/en/peseta

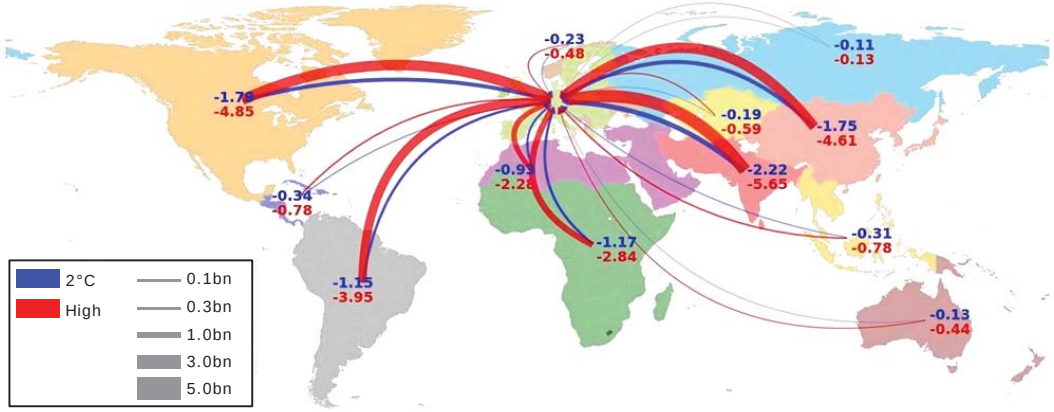
5 Combination of IPCC scenarios RCP8.5 – SSP5.

6 Vousdoukas et al. (2018), "Climatic and socioeconomic controls of future coastal flood risk in Europe", Nature Climate Change 8: 776–780.

Evidence is growing that Europe is also vulnerable to climate change impacts beyond its borders through, for example, trade, international financial flows, migration[7] and security. Climate risk operates across boundaries, because of the myriad of complex and global interconnections between people, ecosystems and economies. Approaching adaptation as a global public good to tackle cross-border risks may reveal opportunities to strengthen international cooperation on resilience[8]. By helping others adapt, donor countries are also helping themselves.

The Commission has gathered some initial evidence on how climate impacts in other parts of the world may affect Europe through international trade (imports and exports). The map below provides an assessment of losses of annual EU GDP (billion Euros) due to climate impacts in the rest of the world, through international trade. The figures inserted in the different regions reflect losses in a high-emissions scenario (in red) and a 2ºC world (in blue) by the end of the century. Only four sectors are included in the assessment: labour productivity, agriculture, energy and river floods.

Impacts on annual EU GDP (billion Euros) due to climate impacts in the rest of the world, via international trade (imports and exports)[9]



The magnitude of these cross-border trade effects depends on two factors:

1. the severity of climate impacts in the rest of the world's regions; and
2. the volume of trade between those regions and the EU[10].

The map shows that the EU would be most affected by impacts in the Americas and south Asia. Among the four assessed sectors, the one that channels most of the cross-border effects is agriculture, followed by labour productivity. For instance, if climate change reduces yields from an EU agricultural trading partner, that partner's GDP will decrease, which means (among other consequences) that it will import

7 "Climate change, impacts and vulnerability in Europe 2016, EEA Report No 1/2017", European Environment Agency, 2017.

8 See, for instance, Benzie et al (2018), "Meeting the global challenge of adaptation by addressing transboundary climate risk: A joint collaboration between SEI, IDDRI, and ODI. Discussion Brief". Stockholm Environment Institute, Stockholm.

9 Source: European Commission, 2018 – JRC PESETA project.

10 Public adaptation is not modelled and may reduce the negative impact of climate change in third countries.

fewer products from (among others) the EU. This in turn will also lower the EU's GDP.[11] It is clear however that impacts could also come from supply chain disruptions in EU imports, from damages to other sectors, and from further structural changes not assessed in this research.

On climate and migration, recent scenarios confirm a relationship between climate change[12] and fluctuations in asylum applications in the EU. Even under a moderate emissions scenario[13], asylum applications are projected to increase by 28 % due to climate impacts by the end of the century (an average of 98 000 additional asylum applications per year).

Adaptation is about solutions and preparedness for these domestic and international challenges. It means anticipating the above-mentioned adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise.

In 2005, the Commission began to consider the need to adapt to changes in Europe's climate. As a result, a White Paper[14] was adopted in 2009, and an EU adaptation strategy ('the strategy') in 2013[15].

At the time the strategy was developed, the economic, environmental and social costs of inaction for the EU, for a number of sectors of the economy, were estimated at EUR 100 billion a year in 2020 and at EUR 250 billion a year in 2050[16]. Current estimates seem to indicate that the cost of inaction could increase exponentially by the 2080s[17]. The current economic models of the aggregate global impacts of climate change may be inadequate in their treatment of sectors, integration of impacts on the physical environment, ecosystems, biodiversity and their services, uncertainty and tipping-points. Models may well underestimate future risks[18].

The strategy includes eight actions working towards three specific objectives:

1. To increase the resilience of EU countries, regions and cities.

2. To better inform decision-making on adaptation.

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11 The methodology of the JRC PESETA III study (multi-sector, multi-region general equilibrium) accounts also for other economic and trade-related effects, such as higher EU agriculture exports and production (which would raise EU GDP) due to increasing agriculture prices in the rest of the world, and substitution of more expensive imports from one trading partner to another (trade diversion). The estimated net effect is a reduction in EU GDP.

12 Missirian et al. (2017), 'Asylum applications respond to temperature fluctuations', Science 358, 1610–1614,.

13 IPCC scenario RCP 4.5.

14 Adapting to climate change: Towards a European framework for action. COM (2009) 147 final: https://ec.europa.eu/health/ph_threats/climate/docs/com_2009_147_en.pdf

15 An EU strategy on adaptation to climate change. COM (2013) 0216 final: https://ec.europa.eu/clima/policies/adaptation/what_en#tab-0-1

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

17 COACCH (CO-designing the Assessment of Climate CHange costs): http://www.coacch.eu/

18 Stoerk T, Wagner G, Ward R E T (2018); Recommendations for Improving the Treatment of Risk and Uncertainty in Economic Estimates of Climate Impacts in the Sixth Intergovernmental Panel on Climate Change Assessment Report, *Review of Environmental Economics and Policy* 12: 371-376, https://doi.org/10.1093/reep/rey005

3. To increase the resilience of key vulnerable sectors and EU policies.

From 2013, the Commission has pursued those three goals across a broad range of its activities. They continue to guide the Commission's work today.

The report examines the process and the results of the evaluation of the strategy, including the lessons-learned from its implementation so far.

2. PROCESS

The strategy stated that, in 2017, the Commission should report to the European Parliament and the Council on the state of implementation and propose a review, if needed. This is the context of this report, along with its accompanying staff working document (SWD) detailing the results of the evaluation.

In line with the Commission's better regulation guidelines, the evaluation was carried out according to five criteria: (i) effectiveness, (ii) efficiency, (iii) relevance, (iv) coherence and (v) EU added value. A thorough assessment according to these criteria can be found in the accompanying staff working document.

Evidence was gathered mainly through contractors, who performed a literature review, a targeted survey, a public survey, interviews, workshops and case studies.

In addition, the Commission based its analysis on several sources, either consulted directly or integrated by means of the contractor's report, e.g. other evaluations linked to actions under the strategy[19], national strategies from Member States, information provided by Member States under the Monitoring Mechanism Regulation[20], reports for programmes funded by the European Structural and Investment Funds (ESIF)[21] since 2014 and results of research and innovation projects financed by the EU framework programmes.

3. RESULTS OF THE EVALUATION

Overall, the strategy has delivered on its objectives, with progress recorded against each of its eight individual actions, which are:

1. Encourage all Member States to adopt comprehensive adaptation strategies.
2. Provide LIFE[22] programme funding to support capacity building and step up adaptation action in Europe.
3. Introduce adaptation in the Covenant of Mayors[23].

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19 E.g. evaluations of LIFE (SWD (2017) 355, https://ec.europa.eu/info/publications/mid-term-evaluation-life-programme_en) and Climate-ADAPT (EEA Report No 3/2018, https://www.eea.europa.eu/publications/sharing-adaptation-information-across-europe/).

20 Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC

21 For the 2014-2020 period, this includes the three cohesion policy funds, i.e. the European Regional Development Fund (ERDF), the Cohesion Fund (CF) and the European Social Fund (ESF), as well as the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF).

22 http://ec.europa.eu/environment/life/

4. Bridge the knowledge gap.
5. Further develop Climate-ADAPT[24] as the one-stop shop for adaptation information in Europe.
6. Enable the climate proofing of the common agricultural policy, the cohesion policy and the common fisheries policy.
7. Ensure more resilient infrastructure.
8. Promote insurance and other financial products for resilient investment and business decisions.

Between 2013 and 2018, the number of Member States with a national adaptation strategy went from 15 to 25. The EU has been promoting and monitoring action through LIFE projects and the Covenant of Mayors for Climate and Energy ('the Covenant of Mayors'). The strategy has contributed to improve adaptation knowledge and to share it to inform decision-making. Through the strategy, adaptation has permeated and guided a wide range of the EU's own key policies and funding programmes, and reinforced links with disaster risk reduction, infrastructure resilience and the financial sector.

3.1. Relevance

Since the adoption of the strategy, evidence has continued to increase that weather and other climate-related extremes are becoming more frequent and intense in Europe. Current emission reduction commitments under the Paris Agreement[25] would result in global warming beyond 3 °C over pre-industrial times. Therefore, building up the EU's resilience against climate shocks is imperative, in order to limit short, medium and long-term economic, social and environmental costs.

The consequences of climate change will significantly affect a wide range of the EU's population. Both public authorities and private stakeholders (households, companies, investors) will need to consider preventive actions. Therefore, the initial objectives of the strategy to better inform decision-making and increase resilience across Europe remain relevant and should continue to be pursued.

Since 2013, international policy developments such as the Paris Agreement, the Sustainable Development Goals and the Sendai Framework on Disaster Risk Reduction[26] have substantially reinforced the political momentum for supporting climate change adaptation across the globe. Climate commitments and Sustainable Development Goals must be advanced jointly to effectively tackle the urgent challenges posed by ecosystem degradation, climate impacts, inequality rise and political instability[27]. As the strategy's scope was to focus on the climate change impacts on the EU's territory, it did not address the potential interrelations with climate change adaptation outside the EU. Due to lack of evidence, it also only partially took into account the possible impacts of climate change outside Europe and their consequences for the EU.

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23 https://www.covenantofmayors.eu/

24 https://climate-adapt.eea.europa.eu/

25 Nationally Determined Contributions (NDCs). See also UNEP's Emissions Gap Reports at: https://www.unenvironment.org/resources/emissions-gap-report

26 https://www.unisdr.org/we/coordinate/sendai-framework

27 See: World Resources Institute: 'Connecting the Dots: Elements for a Joined-Up Implementation of the 2030 Agenda and Paris Agreement', 2018.

Nevertheless, today growing evidence points at the need for the EU to consider climate-security links and cross-boundary effects of adaptation, or lack of adaptation, in non-EU countries.

3.2. Effectiveness

The wide-ranging objectives of the strategy have not been completely fulfilled in five years, but progress has been made. In general, political attention has shifted towards adaptation issues and the need to prepare for inevitable impacts.

At national level, 25 Member States now have an adaptation strategy in place, compared to 15 in 2013. LIFE, since 2014, has funded 60 adaptation-related projects with EUR 184 million, which after their completion are estimated to impact through replication and transfer an area of 1.8 million km2, equivalent to one fourth of the EU territory. Through dedicated projects, LIFE is also helping to implement national and regional adaptation strategies in Greece and Cyprus. In addition, the uptake of adaptation strategies was accelerated by the European Structural and Investment Funds (ESIF), which introduced risk assessments, taking climate change adaptation into account, as a precondition to ensure effective and efficient spending.[28]

For the regional and local level, the Commission has introduced adaptation in the Covenant of Mayors and has been raising awareness, mobilising and supporting cities in adopting local adaptation strategies. By April 2018, 1 076 Covenant signatories from 25 EU Member States, covering around 60 million inhabitants, had committed to conduct vulnerability and risk assessments, and to develop, implement and report on adaptation plans. Across the EU, around 40 % of cities with more than 150 000 inhabitants are estimated to have adopted adaptation plans to protect Europeans from climate impacts[29].

The evaluation also confirms a substantial increase of adaptation knowledge as a result of the Commission's efforts, notably through EU's research and innovation Framework Programmes and also through the European Climate Adaptation Platform (Climate-ADAPT). However, none of the priority knowledge gaps have been closed and new gaps have emerged. Firstly, knowledge gaps were formulated in an open-ended way in 2013 (rather than sector-specific questions), which makes it difficult to measure progress. Secondly, as is often the case for gaps in other scientific fields, knowledge may never be complete and certain. Uncertainty, however, can be integrated in modelling, transparent and open decision-making: it is no excuse for inaction.

Progress is also clear on mainstreaming in current EU policies and programmes. There might still be margin for improvements in the integration of adaptation in some EU common policies, such as trade and fisheries. For trade, there is a knowledge gap on spill-over effects from third countries, the understanding of which would allow for an effective mainstreaming of adaptation into the EU's trade

28 SWD(2017) 127 The Value Added of Ex ante Conditionalities in the European Structural and Investment Funds

29 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 of the study extracted this figure from the study's database, which included a representative sample of the 497 EU cities with more than 150 000 inhabitants.

policy. For fisheries, the reasons are largely due to insufficient attention to climate adaptation in the related EU fund.

On EU funds, there were variable degrees of mainstreaming under the European Structural and Investment Funds: a system for tracking climate-related expenditure was introduced, but assessing to what extent investments produced adaptation benefits on the ground was challenging at times. A complete separation of mitigation and adaptation spending is not always possible, due to synergies between policies, especially in the agriculture sector. However, under the European Regional Development Fund (ERDF) and Cohesion Fund (CF), a substantial amount of funding can be directly tracked to adaptation-related investments. In addition, the current common agriculture policy, adopted a few months after the adaptation strategy, includes a number of measures relevant for adaptation as well as for mitigation (including certain cross-compliance and greening requirements) spread across several priorities. Allocations to adaptation in the different funding programmes are shown in the table below.

EU Structural and Investment Funds 2014-2020 - climate related allocations (in € billion and % of total)

	EU support	**Climate-related**	**Of which**		
			Direct mitigation	Direct adaptation	Supportive measures for both
ERDF and ETC[30]	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[31] and Youth Employment Initiative	88.9	**1.2**	1.2	-	-
		[1.3%]	[1.3%]	-	-
EMFF[32]	5.7	**1.0**	1.0	-	-
		[18.2%]	[18.2%]		
EAFRD[33]	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%]

30 European Territorial Cooperation: http://ec.europa.eu/regional_policy/en/policy/cooperation/european-territorial/

31 European Social Fund: http://ec.europa.eu/esf/home.jsp

32 European Maritime and Fisheries Fund: https://ec.europa.eu/fisheries/cfp/emff_en The values relate to the portion of the EMFF under shared management.

33 European Agricultural Fund for Rural Development: https://ec.europa.eu/agriculture/rural-development-2014-2020_en

Furthermore, all major projects[34] funded by European Regional Development Fund and Cohesion Fund are subject to climate proofing in the period 2014-2020, which addresses climate resilience through vulnerability and risk assessments followed by the identification, assessment and carrying out relevant adaptation actions.

The European Social Fund and European Maritime and Fisheries Fund did not specifically address TO5 ("Promoting climate change adaptation, risk prevention and management") in spite of impacts on vulnerable population, employment and fish stocks. The European Agricultural Guarantee Fund (EAGF), which funds the CAP's direct payments, is not part of ESIF, but around 20% of direct payments can be considered climate relevant.

3.3. Efficiency

Administrative costs directly resulting from the strategy were low and mostly limited to the Commission, with the exception of funding programmes where other (e.g. national) organisations complement EU funding[35]. Costs for other stakeholders were voluntary in most cases and mainly linked to accessing EU funds.

The benefits linked to the strategy were achieved at low cost thanks to the multiplier effects of its actions on guidance, coordination, dissemination, demonstration and mainstreaming into other policies and funding programmes.

Overall, the EU strategy provides value for money, as the eight actions of the strategy can be considered as highly cost-efficient. For example, LIFE projects, including adaptation ones, are estimated to have produced benefits in society of around EUR 1.7 billion in 2014, four times the overall LIFE budget for that year[36].

3.4. Coherence

Climate impacts will be widespread in Europe's future. Adaptation is required to make action at all governance levels transformative enough to cope with systemic changes in our climate, environment and society.

The strategy is broadly coherent with other EU, national, regional and local policies and adaptation action. The Commission's guidance produced under the strategy helped coordinate national sectors and policies, and helped tackle some cross-border climate issues between Member States. The EU's macro-regional strategies[37] and

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34 This refers to major projects in the meaning of Article 100 of the Common Provision Regulation (Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013), which undergo a specific appraisal procedure. Examples of good climate proofing: *Collection of waste water and waste water treatment on the island of Krk, Croatia*, CCI: 2017HR16CFMP005 and *Construction of the S2 expressway, section: junction Puławska – junction Lubelska*, Poland, CCI: 2017PL16CFMP014

35 For example, through the Member States' programming, implementation, monitoring and evaluation of adaptation action and climate proofing in the context of EU funded programmes such as the European Regional Development Fund (ERDF).

36 Mid-term evaluation of LIFE (SWD(2017) 355, available at https://ec.europa.eu/info/publications/mid-term-evaluation-life-programme_en)

37 http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/

the Covenant of Mayors also reinforced similar approaches across EU Member States sharing similar climate risks.

The picture is more nuanced for coherence with international policies and initiatives. At the time the strategy was developed, the Commission decided to focus on addressing climate change impacts on the EU territory, with some analysis of the links between migration and climate change[38] and potential repercussions for the EU.

In spite of that, carrying out the Strategy has contributed to strengthening the EU's external action on climate resilience by improving the knowledge base, and offering a test-base for adaptation options and responses that could be relevant outside the EU[39].

Looking ahead, there is margin for reframing the strategy to better align to international policy developments since 2013, as well as to better assess the implications for the EU of cross-border effects of climate impacts in non-EU countries via e.g. migratory flows, trade and financial flows.

The EU, as a party to the UNFCCC[40], must report on progress and actions on adaptation and possibly redefine its adaptation ambition by reviewing its strategies and policies. The strategy should support this process by joining up European and global efforts to adapt.

There are opportunities for links between the EU future adaptation policy and reaching the Sustainable Development Goals, the Convention on Biological Diversity[41] and the Sendai Framework on Disaster Risk Reduction. For example, many of the indicators developed to monitor the progress on these global frameworks are highly relevant to adaptation. In addition, modelling tools that integrate sustainability and climate scenarios and challenges (for adaptation and mitigation) are being developed[42].

On internal coherence (i.e. its contents), the strategy was found to be highly coherent and several actions complemented each other. For example, there was a rich flow of adaptation knowledge between those generating or compiling it at EU level[43], Climate-ADAPT[44] and local authorities drawing the necessary information to engage with the Covenant of Mayors. However, a more comprehensive

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38 One of the component staff working documents of the 2013 strategy (SWD(2013) 138 final) dealt with environmental degradation and migration.

39 For instance, the 2017 EU Submission to the UNFCCC on adaptation presents how the strategy has promoted the use of ecosystem based adaptation in Europe, which can provide relevant information and examples to non-EU countries with similar challenges or ecosystems, in particular the most vulnerable.

40 United Nations Framework Convention on Climate Change.

41 The Convention on Biological Diversity's Aichi Target 15 states: 'By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification'.

42 See: World Resources Institute: 'Connecting the Dots: Elements for a Joined-Up Implementation of the 2030 Agenda and Paris Agreement', 2018.

43 E.g. through research framework programmes, the Commission and the European Environment Agency.

44 EU portal on adaptation: https://climate-adapt.eea.europa.eu/

exploration and use of links between actions could have improved internal coherence even further[45].

3.5. EU added value

The strategy generates added value for Europe, particularly because it enables the integration of adaptation in key sectors, governance levels and EU policies.

Stakeholders appreciated the benefits of adaptation research at EU level and the spreading of knowledge through initiatives like Climate-ADAPT.

Decision-makers at national, regional and local level may have been compelled to consider adaptation without the EU Strategy. However, stakeholders confirmed that, in the absence of an EU adaptation steer, there would have been less progress and less encouragement to strengthen adaptive capacity, particularly across borders in EU macro-regions sharing common climate risks[46], e.g. river basins and Alpine areas. Also, without the Covenant of Mayors, EU cities would be more vulnerable and local and regional actors would have less available science to support long-term planning.

In addition, stakeholders rated highly the catalytic role of the LIFE programme. LIFE has enhanced bottom-up climate adaptation action and learning, optimising putting into place EU environmental and climate change policies in general.

The strategy's action on insurance and the financial sector may not have been sufficient to overcome hurdles for public-private cooperation so far. Although it has helped better understand how insurance markets function as a crucial adaptation tool in Member States, specifically on the role of insurance in climate risk management, EU action has yet to bring clear results. Here, EU added value lies in enabling cooperation between governments and insurers, raising awareness about the coverage gap and about the need for governments to integrate insurance in the management of all climate risks.

Although the strategy included the promotion of financial products for resilient investment in its Action 8, the impact of the 2018 Commission action plan on financing sustainable growth[47] does not form part of the evaluation due to its timing. However, it is likely that it will prove useful for ensuring the stability of the EU financial system by including climate risks in the risk management processes of companies and financial institutions. The action plan also intends to foster the

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45 For example, 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 Commission has proposed that LIFE should continue to have a sub-programme for climate change mitigation and adaptation under the next multiannual financial framework. The new LIFE should focus on strategic integrated projects, which will support Member States in implementing key climate action plans and strategies, including adaptation ones.

46 There are four macro-regional strategies, all of which integrate adaptation: Adriatic and Ionian Region, Alpine Region, Baltic Sea Region and Danube Region. A 'Macro-regional strategy' is an integrated framework endorsed by the European Council, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area involving Member States and non-EU countries. More information: http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/

47 COM(2018) 097. See also: https://ec.europa.eu/info/publications/180308-action-plan-sustainable-growth_en.

transparency and sustainability of investment decisions on both adaptation needs and emission reduction opportunities.

4. LESSONS-LEARNED

The outcomes and examples mentioned above illustrate that an EU level adaptation strategy is still highly relevant and adds value to national, regional and local adaptation efforts while remaining cost-effective. The strategy, a policy instrument with little administrative implications for most stakeholders, has succeeded in focusing decision-makers on the need to prepare for climate hazards. The strategy has acted as a reference point, i.e. focusing and catalysing action at other levels of governance. In addition, it has successfully channelled efforts to continue to ensure that EU level policies and budgets integrate climate change considerations.

Over the evaluation process, the Commission has gained valuable insights on the first five years of putting the strategy into practice:

- **Knowledge gaps** on adaptation may never be entirely closed, but the added value of EU research and innovation actions since 2013 has been strongly appreciated by stakeholders. It may be time now to switch focus from generating knowledge to applying it for decision-making under uncertainty, particularly in economic sectors or regions that are potentially more vulnerable, such as agriculture in the Mediterranean regions or the European outermost regions. For these purposes, the Commission could envisage exchanges of information on successful adaptation measures between stakeholders and with the scientific community. To an extent, bottom-up, co-designed adaptation can spur action and learning in spite of incomplete evidence, in line with the precautionary principle[48]. Structured science-policy dialogues could be held regularly, for example, in the context of the biennial European Climate Change Adaptation (ECCA) conference[49]. In addition, an adaptation analysis and modelling forum could be established, to improve the use of climate change impact and adaptation models for policy-making. The forum could harness the collective capabilities of a variety of models, work on the strength and limitations of competing approaches to adaptation research and provide ongoing guidance for further efforts.

- In the case of long-term **infrastructure** investments, climate resilience is essential: it requires, among others specific adaptation standards[50], earth observation data, other space data and space-based services, citizen science and guidelines that are accessible to both experts and decision-makers. There is room to further expand the integration of adaptation in infrastructure, e.g. by

48 Although the principle is enshrined in Article 191(2) of the Treaty on the Functioning of the European Union, it is not defined there. The Commission issued a Communication on the precautionary principle in 2000: COM(2000)0001

49 The next ECCA will take place in Lisbon. See: https://www.ecca2019.eu/

50 The Commission has requested the European Standardisation Organisations to update standards for climate-resilient infrastructure in the transport, energy and building sectors. See Commission Decision (C(2014)3451).

prescribing climate proofing for any infrastructure funded by the EU[51], and particularly when the infrastructure is vital for emission reduction efforts.

- The strategy's actions could be **better integrated** with each other. Links between actions did occur spontaneously, but could be better identified and exploited. For example, Climate-ADAPT could provide a better overview of current research projects funded by the EU or operational activities such as the various Copernicus services. In addition, there should be a more frequent exchange of methodologies and findings targeting practitioners and relevant national and EU platforms, e.g. through more interactive tools or webinars.

- Equally, the strategy should better integrate the **international dimension of adaptation** to synchronise with global collective policy and actions on sustainable development, biodiversity and disaster risk reduction, to name just a few. So, the Commission aims to join up its mainstreaming efforts and processes to achieve SDGs and climate commitments, both inside the EU and through its support to and cooperation with developing countries.

- The strategy promoted adaptation plans at all levels, but was less effective **on the carrying out and monitoring** of those plans in Member States. A more streamlined process to follow progress in national adaptation actions, and to facilitate peer learning, could help to further accelerate adaptation action. Adaptation is included in the Regulation on the Governance of the Energy Union[52], which will enable a more systematic regular reporting from Member States on a range of adaptation goals and progress. This will also help to carry out the Paris Agreement. This should lead to an enhanced EU-wide monitoring framework of national and/or regional and/or local strategies, which in turn could more effectively flag areas for enhanced action and cooperation, common challenges or shared uncertainties.

- On the number of **local adaptation strategies**, progress has been slower than envisaged in 2013, and differs between Member States. This is probably linked to national contexts, i.e. whether or not there is binding national legislation requiring local adaptation plans from local authorities[53]. In order to promote the development and carrying out local adaptation strategies, the Commission should:

(1) Encourage Member States to consider frameworks to enhance local action actively and constantly; and

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51 Current Commission proposals for the 2021-2027 EU budget foresee that a wider range of EU-funded infrastructure investments be climate-proof. See: COM(2018) 375 for the proposal on a Common Provisions Regulation and COM/2018/372 final for ERDF and CF in particular. All legal texts and factsheets are available at: https://ec.europa.eu/commission/publications/regional-development-and-cohesion_en. See also, for COM(2018) 439 for the InvestEU programme, and COM(2018) 438 for the Connecting Europe Facility (CEF).

52 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

53 Denmark, France and the United Kingdom have binding national legislation in place requiring local adaptation plans from local authorities.

(2) increase awareness-raising and technical and financial assistance to local authorities, e.g. through the Covenant of Mayors or other initiatives, notably in Member States where the proportion of local adaptation strategies is lower (i.e. Southern and eastern Europe)[54].

- The five years since the strategy was adopted are too short a period to **analyse the distributional effects of adaptation** (or lack of adaptation). Projected impacts vary qualitatively and quantitatively between EU regions. The EU's solidarity instruments and its economic and social cohesion may be tested: there might be winners and losers both regionally, socially and among economic actors. Appropriate performance indicators aggregated at EU level would be needed to measure specific impacts on countries, regions, population groups or sectors. After the projects funded under the 2014-2020 multiannual financial framework end, it may be possible to aggregate relevant and innovative societal indicators to map more precisely the socioeconomic impacts of climate change and adaptation policies. This could possibly lead to improved approaches to the Commission's cohesion policy for the post-2027 programming period.

- The strategy **may be able to deliver more in the future** in certain areas, such as:

    - **Disaster risk reduction**, notably on integration of adaptation perspectives in methodologies and indicators, knowledge for risk assessment and a more systematic dialogue between practitioners of adaptation and practitioners of disaster risk reduction. Enhancing citizens' awareness could also be considered.

    - Better integration of adaptation in the **EU maritime and fisheries policy**, and coastal areas in general. Even if emissions and temperatures stabilise, sea levels will continue to rise. One in three EU citizens lives within 50 km of the seashore and without adaptation measures, millions will be affected by coastal flooding. EU policies that affect land-sea interactions in coastal areas, such as Maritime Spatial Planning and Integrated Coastal Zone Management[55], Horizon Europe and the European Maritime and Fisheries Fund[56], and also the actions in the International Ocean Governance agenda[57] should be better prepared to deal with this in the future.

    - Development and use of instruments and tools for **investors and insurers** who may not be integrating climate change into their risk management practices sufficiently[58]. There is untapped potential to improve forecasts

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54 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.

55 Directive 2014/89/EU. See also: http://ec.europa.eu/environment/iczm/practice.htm

56 COM(2018) 390 final

57 JOIN(2016) 49 final, https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/join-2016-49_en.pdf
The agenda could be also used to tackle the ongoing changes in distribution and abundance of marine species that poses challenges to those responsible for setting quotas.

58 https://www.sciencedaily.com/releases/2018/05/180515081720.html

and risk analyses through climate services and better data sharing[59], where emerging market opportunities can boost adaptation, particularly by using Copernicus climate information[60]. The Space Strategy for Europe[61] identified climate issues as one of the most important emerging user needs.

- **Using private investment in adaptation**. Public resources will not be sufficient to secure a climate-resilient economy. In order to attract private finance as well, the action plan for financing sustainable growth[62] envisages to provide clarity on whether or not investments contribute to climate adaptation through a taxonomy of environmentally sustainable investments[63]. This action, together with the investment support provided under the InvestEU Programme, opens up avenues to direct the private sector towards climate-resilient businesses and to build a pipeline of targeted adaptation projects. Ideally, this would be accompanied by the development of tools such as technical standards on climate resilience and cost-benefit analyses that highlight the economic advantages of adaptation.

- **Ecosystem-based adaptation** (e.g. conservational agricultural practices, green infrastructure, nature protection), provides multiple benefits including for biodiversity, ecosystems, climate change adaptation, climate change mitigation, air and soil quality and societal well-being. This multi-functionality should be better embedded in the assessment of adaptation options. This would allow nature-based adaptation solutions to compete in the short-term with other, more conventional or 'grey' infrastructure options. Ecosystem-based adaptation could also be mainstreamed in capital raising and investments. Lessons from LIFE (including its Natural Capital Financing Facility), Horizon 2020 and other EU-funded projects should be taken into account in order to implement the action plan on financing sustainable growth, triggering investments in green infrastructure and nature-based solutions.

- Promoting the adoption and monitoring of **local adaptation strategies and action.** It is important to better integrate adaptation into national/regional legal frameworks (e.g. urban, spatial and coastal planning). Political commitment from all the relevant governance levels should be encouraged, leading to better technical assistance for regional and local authorities and more adaptation funding. On the basis of the permanent national multi-level climate and energy dialogues envisaged in the Regulation on the Governance of the Energy Union, the Covenant of Mayors could help identify and share good national practices to engage cities.

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59 Climate services garnered increasing attention by the EU research and innovation community around 2015: https://ec.europa.eu/programmes/horizon2020/en/news/european-research-and-innovation-roadmap-climate-services

60 See: https://climate.copernicus.eu/

61 COM(2016)705

62 COM(2018) 097. See also: https://ec.europa.eu/info/publications/180308-action-plan-sustainable-growth_en

63 COM(2018) 353, Proposal for a Regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment

- Better preparation of **geographical areas** with specific environmental challenges, natural constraints or vulnerabilities with high exposure to climate change, such as the Outermost Regions.

- Promoting the **assessment and mapping of social vulnerability to climate-related events**, as well as identifying and involving vulnerable groups for the design of fair adaptation policies at all relevant governance levels. For example, the Commission could increase the need to assess, plan, and carry out socially just adaptation in cities through EU funding programmes, e.g. helping to build capacity in municipalities so that they can design adaptation policies that are socially fair. Some examples in Finland, Slovakia and France could be a point of departure[64].

- Reinforcing the links between **public health and adaptation,** notably to improve cross-sectoral cooperation on risk assessment and surveillance and to increase the awareness and capacity of the health sector, including at local level, to address current and emerging climate-related health risks. For example, the Commission could further support the development and sharing of best practice and new knowledge on climate-related health risks through Horizon 2020 and its successor programme, as well as through LIFE and, potentially, the health strand under the proposed European Social Fund Plus[65] for 2021-2027.

- Promoting **links with mitigation policies** at all governance levels. At EU level, the Commission will include adaptation in its forthcoming long-term low-emission development strategy. Adaptation provides economic and social stability, not adapting (or 'maladaptation') will deepen inequalities, weaken territorial cohesion and increase security risks and displacements. At national level, adaptation goals will be part of the National Energy and Climate Plans (NECPs) under the Regulation on the Governance of the Energy Union. The Commission expects that these plans will reflect the need to climate-proof sectors that are crucial to emission reduction (e.g. land use, agriculture, energy or transport).

In general, despite the voluntary and indirect nature of the eight actions in the strategy (guidance, coordination, research, dissemination, integration of adaptation into policies and sectors), they have provided momentum and support to national, regional, local and cross-border adaptation.

The strategy has become a cooperative framework of reference, capable of updating knowledge and signalling the need to transform our societies as climate impacts materialise. Equivalent progress would not have been possible in the absence of it, particularly for the production and sharing of knowledge and the integration of

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64 Some local authorities (such as the Helsinki Metropolitan Area in Finland, Košice and Trnava in Slovakia, Vejle in Denmark and Paris in France) have already identified groups that are socially vulnerable to climate change and are beginning to plan and implement socially just adaptation actions. Source: Breil M, Downing D, Kazmierczak A, Mäkinen K, Romanovska L (2018), 'Social vulnerability to climate change in European cities – state of play in policy and practice'. European Topic Centre on Climate Change impacts, Vulnerability and Adaptation (ETC/CCA) Technical paper 2018/1. https://doi.org/10.25424/CMCC/SOCVUL_EUROPCITIES.

65 COM(2018)382

adaptation in EU policies. The Commission's climate ambition for the 2021-2027 budget builds on the ideas enshrined already in the 2013 Strategy.

For instance, the Commission intends to use 25 % of the next multiannual financial framework (2021-2027)[66] on climate mitigation and adaptation objectives[67]. The proposal envisaged to spend 35 % of the EU research framework programme on climate-related topics[68]. The European Regional Development Fund would aim at 30 % climate spending and the Cohesion Fund at 37 %. For these two funding programmes, this represents a significant relative increase compared to the current period. Besides that, the Commission proposals[69] envisages that:

(1) a wider range of EU-funded infrastructure investments is climate-resilient; and
(2) support through cohesion policy funds is, where applicable, conditional to disaster risk management plans consistent with national adaptation strategies, and to National Energy and Climate Plans.

This will be supported by legislative and non-legislative measures under the Commission's Sustainable Finance initiative, to channel private capital into climate change mitigation and adaptation activities and enable more avenues for blended finance vehicles.

In addition, the Commission has further consolidated adaptation in its legislative proposal for a future common agricultural policy[70], where climate adaptation is now clearly identified in one of the nine specific objectives, along with specific impact and result indicators to track progress. It is expected that 40 % of the future CAP budget will contribute to climate action and, furthermore, that Member State CAP strategic plans develop an intervention strategy based on an assessment of needs that looks into relevant climate change policies and planning[71].

At this stage, the Commission considers the current strategy is fit for purpose, while recognising that adaptation needs have intensified and diversified since 2013. Before deciding on a possible revision of the strategy, a number of events and their outcomes will have to be factored in up to 2020, e.g.:

- UNFCCC's COP24[72] and the facilitative (Talanoa) dialogue during 2018. Adaptation is an important aspect of the Paris Agreement work programme

66 COM(2018) 322. All legal texts and factsheets available at: https://ec.europa.eu/commission/publications/factsheets-long-term-budget-proposals_en

67 Note that at the level of the EU budget, the reporting is done on "climate mainstreaming" without any differentiation between adaptation and mitigation.

68 COM(2018) 435 and https://ec.europa.eu/commission/publications/research-and-innovation-including-horizon-europe-iter-and-euratom-legal-texts-and-factsheets_en

69 COM(2018) 375 for the proposal on a Common Provisions Regulation and COM/2018/372 final for ERDF and CF in particular. All legal texts and factsheets are available at: https://ec.europa.eu/commission/publications/regional-development-and-cohesion_en. See also, for COM(2018) 439 for the InvestEU programme, and COM(2018) 438 for the Connecting Europe Facility (CEF).

70 COM(2018)392

71 As referred to in Article 96, 97 and 103, and Annex XI of the Commission's proposal (COM(2018) 392).

72 The 24th Conference of the Parties of the UNFCCC: http://cop24.gov.pl/

that is currently being negotiated. COP24 and the Talanoa Dialogue will promote a global and European reflection on collective and individual progress to meet the long-term objectives of the Paris Agreement. This may have implications on adaptation discussions, particularly in light of the special report of the Intergovernmental Panel on Climate Change (IPCC) on the impacts of global warming of 1.5 °C and the special report of the IPCC on climate change and oceans and the cryosphere.

- The initial implementation of the Regulation on the Governance of the Energy Union. National Energy and Climate Plans (NECPs) will also include adaptation goals where appropriate. The Regulation requires the Commission to assess the draft plans and empowers it to provide recommendations on them. Member States will have to take due account of any recommendation, or make public the reasoning for not doing so. Long-term national strategies will also cover adaptation and will have to be consistent with the NECPs. Progress on adaptation will be reported in a more systematic and regular form by Member States, and this process will be facilitated via implementing acts on the structure and format of this reporting.

- The EU's long-term greenhouse gas emission reduction strategy. Adaptation will feature in the long-term strategy, highlighting the need for EU companies and governments to plan for slow-onset impacts such as sea level rise or water scarcity. It will also spur the combination of mitigation and adaptation into coherent climate actions and responses.

In the meantime, EU environment and maritime policies (e.g. the Soil Thematic Strategy, the Biodiversity Strategy), the Bioeconomy Strategy, the ongoing evaluations of the common agriculture policy, regional and cohesion policies and the next 2021-2027 budget will continue to concentrate mainstreaming efforts. The LIFE, cohesion policy funds and Horizon 2020 support for adaptation will be maintained up until 2020, the revamped Civil Protection Mechanism, if adopted, is expected to boost the links between adaptation and disaster risk reduction and, in cities, the Covenant of Mayors will forge ahead to protect European citizens against the impacts of climate change.