Study to support the Evaluation of the EU Adaptation Strategy

Final report

Appendices

May 2018

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2018 EUR [number] EN

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Luxembourg: Publications Office of the European Union, 2016

ISBN XXXXXX
doi:XXXXXX

Appendices

All Appendices are in this document apart from Appendices 2A, 2B, 2C and 2E which are in separate documents.

Appendix 1 – Procedural information concerning the process to prepare the evaluation

It is understood that this Appendix is for a later document that will refer to the current study and will be prepared by DG CLIMA

Appendix 2 – Stakeholder consultation

This includes:

Appendix 2A – Stakeholder consultation – synopsis report

Appendix 2B – Results of targeted stakeholder survey

Appendix 2C – Stakeholder interviews – Scripts and respondents

Appendix 2D – Results of stakeholder workshops

Appendix 2E – Results of open public consultation

Appendix 2A – Stakeholder consultation – synopsis report

See file as below

Appendix	Title	Pages	Filename
2A	Consultation synopsis	14	Adaptation Strategy Evaluation Final App2A Stakeholder Survey Report V1.1

Appendix 2B – Results of targeted stakeholder survey

A questionnaire survey has been used to gather data that is not available from the published literature targeting some stakeholder groups that respond to a shorter, more-focused survey than an interview. Survey invitations were sent out to 370 stakeholders, who have been directly or indirectly involved in implementing the EU Adaptation Strategy, from national government bodies, sub-national governments, municipal/city governments, the private sector, universities, research organisations, EU institutions or bodies, other international organisations, non-governmental organisations (NGOs), and an 'other'[1] category. These invitees were identified by the study team and by DG CLIMA. In addition, the invitation to participate in the targeted survey was extended to everyone who registered for the 3rd European Climate Change Adaptation Conference, "Our climate ready future", held in Glasgow, 5-9 June 2017 (over 850 attendees)[2].

The questionnaire addressed all actions apart from Action 2, where evidence is being drawn from the LIFE Mid Term Evaluation (Ecorys, 2017). The survey also included questions relating to all evaluation criteria apart from efficiency, where it was considered that interviews would supply relevant evidence. The survey was designed so that respondents could address questions on all actions if they wished, or they could navigate to a single action and respond solely on that. It was available online in English, where the targeted stakeholders were invited to fill them in. It was intended to target primarily stakeholders at EU, national competent authority and regional/local levels. Stakeholders not targeted in this phase will have the opportunity to fill in the public survey later.

60 responses were received. These addressed on average about four of the eight action areas per respondent. Respondent types and responses by action area are illustrated below.

Results of the targeted stakeholder survey are in the following file

See files as below

Appendix	Title	Pages	Filename
2B	Results of targeted stakeholder survey	180	Adaptation Strategy Evaluation Final App2B Stakeholder Survey Report V1.1

[1] As examples, survey respondents that self-identified as "Other" are: an EU network of regional authorities, a local government association in a MS region, a regional development agency; and a research institute with a focus outside the EU
[2] ECCA 2017 – Our climate ready future (webpage accessed 05-10-2017) http://ecca2017.eu/conference/

Appendix 2C – Results of stakeholder interviews

Interviews were targeted at stakeholders who have been actively involved in different aspects of the implementation of the Strategy. Interviews have primarily been by telephone, with a few carried out in person. Interview scripts were developed for each of the 8 actions, using operationalised questions from the evaluation matrix. (Scripts are in Appendix 2C, and the evaluation matrix is in Appendix 4). Interviews were approached flexibly with stakeholders being able to focus initially on a single action, and then to consider questions in the area of one or more of the evaluation criteria. Interviewees could also answer questions on more than one action. Sometimes this was by making limited comments on a number of actions, and sometimes by addressing a broad range of questions from 2 or more actions. After the interview, draft outcomes were submitted to the interviewee for review/approval.

34 interviews have been held. These involved 40 individuals. Across the interviews, 42 responses on actions were received and there were a further 5 limited responses on actions. In addition, DG CLIMA submitted as evidence possible areas for a revision of the EU Adaptation Strategy – this has informed consideration of recommendations, but no other part of this study.

See separate file as below:

Appendix	Title	Pages	Filename
2C	Stakeholder interviews Scripts and respondents	63	Adaptation Strategy Evaluation Final App2C Interview Report Scripts V1.1

Appendix 2D – Results of stakeholder workshops

Two workshops were held to gather new evidence and to elicit further feedback on draft conclusions. The first workshop was held in April 2017. The list of invitees was compiled from existing mailing lists, supplied by DG CLIMA and complemented based on the consultants' experience. Notes are in Appendix 2Da.

The second workshop, in January 2018 was publicised on the CLIMA website and gave an opportunity to any interested party to participate and comment. Notes are in Appendix 2Db.

In addition, an interactive exercise, based on the Member State Adaptation preparedness scoreboard was held with Member State representatives in DG CLIMA Working Group 6 in January 2018. Notes are in Appendix 2Dc.

Appendix 2Da – Notes from stakeholder workshop: Evaluation of the EU's Strategy on Adaptation to Climate Change, 5 April 2017

Committee of the Regions, Rue Belliard 101, Brussels (Room 52, 5th floor)

Over 90 stakeholders participated (local and regional authorities, NGOs, academia and research institutes, banking and insurance institutions, national governments, industry associations, consultants and think tanks, Committee of the Regions (CoR), European Commission (EC), European Environment Agency (EEA), Covenant of Mayors, international organisations) – a full list is provided in an annex

Plenary session

Interventions from Yvon Slingenberg (Director, DG CLIMA), and Martin Nesbit (Senior Fellow, IEEP, and chair of the workshop), outlined respectively the current policy context for climate adaptation, including the Paris Agreement and the SDGs; and the evaluation project to which this workshop contributed, in particular the questions it seeks to address. Presentations then followed from André Jol (EEA) and Claus Kondrup (acting Head of Unit, DG CLIMA). André Jol set out the latest evidence from the EEA, noting the range of vulnerabilities affecting different regions; and Claus Kondrup set out the action that had taken place to implement the adaptation strategy launched in 2013, across the three priorities and eight actions.

Points raised in questions and answers included:

- the relevance of extra-EU climate impacts, and of EU action outside the EU;
- the importance of a sectoral approach to mainstreaming of climate adaptation;
- a range of specific questions on the background to, and assumptions built into, research on vulnerabilities.

Panel session

The workshop then heard presentations from a panel of speakers, covering:

- **Michael Mullan (OECD)** – experience in the development of national adaptation strategies in OECD countries, noting that while good progress in the adoption of strategies had been made, there was limited evidence of a link to adaptation outcomes.
- **Dr Eberhard Faust (MunichRe)** – on examples of the treatment of climate risk in a number of different insurance markets, noting the potential for government compensation mechanisms and guarantees to crowd out insurance solutions;
- **Sirpa Hertell (Member, Committee of the Regions)** – on the CoR's recent opinion on the adaptation strategy, noting in particular the need for greater awareness, with funding currently tending to follow disasters rather than mitigate them;
- **Dr Paul Bowyer (Climate Service Center Germany – GERICS)** – on mechanisms for providing adaptation-relevant information suitable for decision-makers, with an emphasis on multi-partner platforms such as Euro-Cordex and SECTEUR.

Points raised in questions and answers included:

- The potential for greater involvement of cities and regions in climate adaptation;
- The potential impact of winners and losers from climate change (with greater negative impacts in southern Member States) on adaptation decision-making at EU level;

- Possible positive models for government/public sector involvement in climate risk insurance.

Breakout sessions

Participants chose between three groups for the breakout sessions held in the afternoon, the groups being focused on the three priorities identified in the 2013 adaptation strategy. The reports back to the plenary made the following points:

Breakout A: Promoting Action by Member States

- **What has been the most effective driver of adaptation activity at Member State/ regional/ local level?**
  - A range of factors was mentioned, including: the impact of natural disasters, or of improved understanding of potential impacts; the availability of funding; the existence of national plans, or of clarity on policy frameworks; regional and local ownership of projects; cities as main drivers for action, particularly larger cities.
  - Risk and vulnerability assessments were identified as important tools.
  - ESIF and LIFE funding had proved valuable, although stakeholder engagement in projects was an important success criterion; however, the relatively limited overall budget for LIFE and its competitive nature were raised as concerns.
  - Showcasing of successful actions and projects, and effective networking, were also mentioned. The Covenant of Mayors had been valuable in creating more bottom-up pressure for action at the local level.
- **What has been the contribution of the EU Adaptation Strategy to Member State/ local/regional action?**
  - Views on the relevance of the strategy varied; in some Member States, it had been the key inspiration for development of strategies in plans, in others it had been less relevant – although the availability of EU funding linked to the strategy (particularly through the ESIF) was important. Even where it had triggered action at the national level, it had not necessarily been effective at subnational level –although the Covenant of Mayors was mentioned by several participants as a valuable tool.
  - The strategy had also helped to promote coherence in Member State action; and to emphasise the importance of cooperation, and of the exchange of best practices. Coherence had in part been facilitated by the mainstreaming of adaptation in EU policy in a range of sectors.
- **How should performance at Member State (and subnational) level be monitored and assessed?**
  - A broad range of indicators were mentioned; although it was recognised that improvements in resilience were difficult to monitor. The robustness and effectiveness of decision-making, and the process for prioritisation of adaptation investments (based on a sound business case and the maximisation of co-benefits) were important criteria to reflect.
  - An EU-level scoreboard was seen as helping to ensure a common and consistent set of indicators. The authors of national strategies should not also be responsible for their assessment, which should be independent; and the local and regional levels were important in monitoring and evaluation. It was also important to ensure that the EU and Member States were delivering on their commitments under the Paris Agreement; it was therefore necessary to be able to assess whether the collective actions of the EU and its Member States were sufficient to deliver the global goals.

Breakout B: Better-informed decision-making

Following a presentation from Nicolas Faivre (Commission, DG RTD) on Research and Innovation in Horizon 2020, and its contribution to the EU Adaptation Strategy (see PowerPoint file), participants focused on four questions, as set out below. Points raised included:

- **What is the relevant evidence base for adaptation action?**
  - Differences between the evidence used by economists, scientists, and engineers were noted.
  - Decision-makers have a strong preference for point estimates (e.g. expected increase of average or extreme temperatures), while climate scientists work with ranges, which are more difficult to communicate. Decision-takers are uncomfortable taking decisions based on ranges of parameters.
  - Cultural barriers to action, and issues of decision-making in uncertainty, needed to be addressed. It was therefore important to ensure a more effective and cross-disciplinary approach.
  - Local stakeholders, including local governments should develop local vulnerability assessments, which take the specifics of the region/city into consideration. These assessments should not be based on findings e.g. from IPCC reports, which were not designed for this scale.
  - Stakeholders need to be involved and over a long period. For example, when developing research proposals under Horizon 2020, municipalities should take part right from the start in developing the research questions that matter to them (rather than being involved at later stages).
- **What areas of knowledge gap have not been properly addressed?**
  - Information needed to be tailor-made to sector-specific groups; the example of the forestry sector was quoted, where the relevant timescales were much longer than for other sectors, and the information on climate impacts made available needed to reflect this in order to be effective.
  - Generally, there exists a lot of knowledge and data, but it needs to be made accessible to local actors, e.g. local government in a way that meets their needs.
  - In addition, engaging key stakeholders and society more broadly was key; evidence needed to be made available in ways that were accessible to users, while remaining accurate.
  - The governance structures need to be adapted, for example, adaptation is not only about technical parameters (e.g. heavy rain incidents) but equally about social aspects, especially related to vulnerable population groups (e.g. elderly people affected by heatwaves).
  - Greater understanding of mitigation co-benefits ("adaptation *for* climate change as well as *to* climate change") was needed.
- **What contribution do EU-wide vulnerability assessments make?**
  - Sectoral coherence benefited from an EU-wide approach; which could also help to promote cross-region learning. North-South exchanges could also be valuable, in order to promote understanding of the range of potential impacts affecting the EU economy.
  - EU-wide vulnerability assessments can be valuable for exchange of good practice across different regions in the EU and across Member States. They are also an important tool for awareness-raising and showing the European scale of the adaptation challenge and needs.

- However, EU-wide vulnerability assessments should not be expected to be useful at the local level, where contexts vary and further information is needed. An EU-wide assessment will not be sufficient to decide local adaptation actions.

- **What is the value of Climate-Adapt as a tool? How well used is it?**
  - The current evaluation exercise for Climate Adapt was welcomed as an opportunity for constructive engagement in its design.

    The information made available was useful in gaining understanding of what other areas were doing, and what was happening at European scale; but less useful in designing locally or regionally relevant action.
  - In this sense, the Climate-Adapt website works less as a tool but more like a database. It should be further developed with an EU-wide focus and not aim at including all possible kind of information on climate adaptation. There is a role of national, regional and local websites on climate change adaptation, and stakeholders will consult these anyway.
  - The results/key findings of European research projects (especially Horizon 2020) should be integrated into the Climate-Adapt website.
  - An emphasis on co-benefits (for example, jobs) would help in generating city-level interest in investment.

Breakout C: Climate-proofing EU action

The actions covered under this priority are broad-ranging, including sectors with an interest in EU funding; improving the resilience of infrastructure; and promoting insurance instruments. Participants were asked to identify what had been the areas of success in climate-proofing, and what were the areas where progress had not been sufficient.

- **Action 6: CAP, cohesion policy, and the CFP**
  - Introduction of thematic objective 5 (resilience and adaptation) in ESIF programming had been effective in sparking interest at national/regional level in some Member States – but it was not clear how well this translated into adaptation outcomes.
  - Adaptation may be more difficult to deliver in programmes under shared management than mitigation; the objective risks being side-lined when projects are implemented at local level, and there is a risk that projects with different underlying objectives are labelled as "adaptation" in order to secure funding.
  - There were some success stories on adaptation in the CAP (water management in some Southern Member States; animal health management), although on balance participants felt that more could be done.
  - Other areas of policy which might benefit from attention were mentioned – trade; nature, in particular the promotion of co-benefits of ecosystem-based adaptation; and development and neighbourhood instruments.
  - Policies and programmes were sometimes slow to react to changes in knowledge about adaptation needs.
- **Action 7: more resilient infrastructure**
  - The development of technical standards had helped to raise awareness, although further work was needed on how to use data and scenarios, and on data quality.
  - Standards were currently based on current or historic environmental data; further work was needed to ensure that they are consistent with project

climate scenarios. The Copernicus programme was expected to help in this regard by providing high quality data at a local level.

  - Social justice issues were mentioned – with poorer neighbourhoods being less resilient to climate change; social co-benefits could be an additional driver for adapted infrastructure development, strengthening the political case for investment.

- **Action 8: Insurance**
  - The group exchanged information on examples of national approaches.
  - A key issue to address was the balance between private risk insurance, and Government guarantees, including implicit guarantees; it was suggested there was a fine balance between the approaches, with room for different answers in different Member States.
  - Other products were also relevant – for example, the development of weather-linked derivatives.

Report back from breakout groups, and close of the workshop

Additional issues raised by the audience in the final plenary sessions were on public versus private insurance mechanisms, where the importance of clarity on the approach adopted in each Member State was emphasised; and on adaptation in engineering solutions adopted to mitigation, where some mal-adapted energy efficiency solutions pointed to the need for an integrated approach.

The chair noted some commonality between the discussions in the groups, particularly in relation to the need for research to be made available in forms decision-makers could use, and on the need for better understanding of social and cultural barriers to adaptation. Claus Kondrup from DG CLIMA closed the workshop by thanking participants warmly for their engagement, and looking ahead to the second workshop, to be held in the Autumn of 2017.

Appendix 2Db – Notes from stakeholder workshop: Evaluation of the EU's Strategy on Adaptation to Climate Change, January 2018

Place: Brussels, Albert Borschette Congress Centre, Rue Froissart 36

Date: Tuesday, 23 of January 2018

Welcome and introduction

A welcome address by Yvon Slingenberg (DG CLIMA), Director for International, Mainstreaming and Policy Coordination) underlined the importance of climate adaptation and resilience. The evaluation of the EU Adaptation Strategy started in 2016 and the report from the evaluation is expected to be presented to the European Parliament and the Council by Autumn 2018.

State of play on actions under the strategy

The presentation by the consultants (Martin Nesbit (IEEP), Richard Smithers and James Tweed (Ricardo), and Matthew Smith (Trinomics) outlined the progress identified under the Strategy's actions (with the exception of Action 5, "Further develop Climate-ADAPT as the 'one-stop shop' for adaptation information in Europe"), and is available at [insert link]. André Jol from the European Environment Agency (EEA) then presented results from the separate evaluation of the Climate ADAPT website – presentations are available at https://ec.europa.eu/clima/events/articles/0119_en.

Questions, comments, and discussion

Audience comments and questions were invited, and covered the following issues:

Action 4 (knowledge gaps): One response to a point in the presentation (which noted that although monitoring and evaluation is a knowledge gap, it was not viewed by stakeholders as a high priority to address), was that this is not because M&E is viewed as unimportant, rather it is because in most cases implementation of adaptation strategies is still at an early stage.

Green infrastructure: Green infrastructure is highly relevant to climate adaptation; ongoing actions including guidance at international level is very promising, as are the results of a stream of research on ecosystem-based adaptation.

Paris Agreement:. A question was asked about the evaluation report's references to the global adaptation goal established by the Paris Agreement. It was noted that this can be found at Article 7.1 of the Agreement.

Copernicus: The availability of trusted data was important, particularly data developed by Copernicus Climate Change services – have they been included in the evaluation? It was explained that published evidence from Copernicus has/will be considered in the evaluation; however, there is a challenge to ensure that results emerge from Copernicus investment at sufficient speed to feed in to current policymaking processes.

LIFE projects: LIFE project implementation in the Central Denmark region is contributing to resilience, through work on risk assessments, and prioritisation through cost benefit analysis (CBA). Financial tools are needed to support climate adaptation services based on the CBA results, and it was suggested that a recommendation for the development of such tools should be included in the evaluation. Other participants noted that funding for adaptation under LIFE is uneven; there is only one LIFE project in Portugal, while Greece and Spain seem to be significant recipients of LIFE funding. DG CLIMA noted that while LIFE has a relatively small budget, under the Cohesion Fund, Thematic Objective 5, there are still significant allocations available for use on adaptation in many Member States; similarly, funding is available under EAFRD.

EU Habitats Directive: It was suggested that there are impediments to adaptation action in current EU legislation; that, for example, the Habitats Directive restricts scope for making changes to the landscape, as do the requirements of Good Agricultural and Environmental Conditions (GAEC) under the CAP.

European Regional Development Fund (ERDF): Prioritisation of adaptation was considered difficult under the European Regional Development Fund. However, it was noted that it could be valuable to demonstrate economic development co-benefits of adaptation projects; and that the Energy Union governance framework would make decisions on the use of EU funding for adaptation and mitigation more explicit, and more visible.

Action 8 ("Promote insurance and other financial products for resilient investment and business decisions"): It was suggested that the focus of the evaluation on insurance may have been too narrow and that other financial mechanisms are also relevant, for example, the regulation in France obliging banks to disclose climate risks associated with their assets.

Presentation from Andre Jol on Climate-Adapt website

Audience comments noted that **Climate-Adapt** was a valuable tool; but there was also a suggestion that **data collection** could be more systematic and effective.

Findings of the evaluation

Presentation by James Tweed, Richard Smithers, Matthew Smith. The evaluation questions are structured around five criteria: effectiveness, efficiency, relevance, coherence, and EU added value. In the next stage of the evaluation the consultants would look also at the effectiveness of Strategy across the actions in a horizontal manner, as an addition to an action by action overview. The main focus of the evaluation questions is on effectiveness. More evidence is needed in a number of areas, most notably in relation to Action 8 (with regards to all criteria) and also in some respects to Action 3 ("Introduce adaptation in the Covenant of Mayors framework, 2013/14").

Questions, comments, and discussion

A wide range of responses to the presentations and outline conclusions were offered. These included:

Research funding can be difficult to attain at Member State level because of the need for multi-country coverage. However, research funding was not available under LIFE and is limited to Horizon 2020.

Cross-sectoral issues: More collaboration between Member States on infrastructure risks would be valuable, as would a better understanding of cross-sectoral risks (for example, rail transport's dependence on energy systems).

European Structural and Investment Funds (ESIF): The impact of the ex ante conditionalities applied to programmes in relation to Thematic Objective 5 (resilience, adaptation) was raised. It was noted that, in principle, all programmes had met the ex ante conditionalities, in order for funds to have been committed. However, in practice, confidence that the requirements were fully complied with varied. Nevertheless, the evaluation currently noted that the introduction of the ex ante conditionalities had been effective in encouraging a deeper and more active Member State response.

Structural barriers in the insurance market: One reason for a lack of evidence on insurance is that bank risk management products in the EU depend largely on national legal systems. Innovative practice in this field should be shared and encouraged (linking Action 7 on "Ensuring more resilient infrastructure" and Action 8), and Member States could be encouraged to cooperate more closely with insurance sector.

External impacts: The lack of adaptation in non-EU countries and the potential for knock-on impact on the EU is relevant. A question was raised and left unanswered as to whether the revised Strategy should tackle the problem, or whether it should be left to sectoral policies?

Disaster Risk Reduction: Good work is being done internationally on the integration of adaptation strategies with disaster risk reduction, recognising the importance of harmonised data. A workshop organised with UNFCCC had brought a group together with a common mandate. Common goals need to be formulated and used to address the challenge of a sectorally fragmented response.

Evaluation methodology: A description of the evaluation methodology was requested, in particular, the approach taken to the selection of interviewees. The consultants explained that they have sought to consult a range of different groups of stakeholders, with 40-50 interviews covering different objectives, levels of governance, Member States, and stakeholder groups. However, it is recognised that the number of interviews means that they are not representative, are limited in comparison to the breadth of the evaluation questions and are being triangulated with a range of other sources of evidence.

Action 6 ("Facilitate the climate proofing of the CAP, the Cohesion Policy and the Common Fisheries Policy"): It was suggested that there is a long way still to go in achieving successful mainstreaming at EU level. One element in achieving this could be development of better awareness among Member States' programme authorities, and sectoral ministries of the wider social and environmental benefits of adaptation spending in addition to improved resilience. Further comments suggested that action in response to extreme weather events was reactive, rather than an adaptation policy success and that there were potential benefits from a focus on innovation in delivering enhanced resilience.

Panel session

An invited panel of experts from a range of disciplines and sectors was invited to offer brief comments on (i) what had worked well following adoption of the Strategy; and (ii) what action they would like to see in future.

Simone Borg, Co-Chair, Forum of European Legal Experts on Climate Adaptation, Malta University: The Strategy has been useful in building momentum and raising ambition. Complexity and challenges remain in terms of, for instance, linkages between climate action and governance, finance and adaptation, and stakeholders' engagement. Cost-benefit analyses are needed to help with selection of adaptation options. The ex ante conditionalities associated with ESIF now need to be reviewed to help Member States to implement the Strategy.

Carole Escolan-Zeno, Head of Sustainable Development Unit, UIC (international union of railways): The Strategy has given us some inspiration. Rail is a system of systems with different levels of infrastructure having different lifespans. Performance data is used to assess the impact of weather on the railway network. Different tools are under development, like a database that will allow sharing of case studies on the evaluation of the impacts of climate change, and a guidance document to help members assess the risks.

Emma Bonnevier, Swedish Association of Local Authorities: Adaptation choices vary, in one municipality there may be a focus on concrete actions in the buildings sector, in other municipalities the emphasis may be on identifying risks and making strategies. Everyone can be involved in implementing the Strategy but it needs actions, targets, and funding, some of which could be better clarified at EU level. ClimateAdapt is useful but could be improved, for example, by becoming become more user-friendly.

Rachel Burbridge, Eurocontrol: From the perspective of the aviation sector, there are many levels of adaptation to climate change and much progress has been made since 2013. To some degree, there is a coordinated approach but more communication is needed to reach the people who can take action. Cross-border perspectives are vital in the transport sector.

Sara Goddard, Association of Mutual Insurers and Insurance Cooperatives in Europe, AMICE: There is an agreement that what happens at EU level, Member State level and local level varies to a great extent. Insurance companies want to contribute more to adaptation action and the development of resilience (two recent reports have been released), including through risk knowledge and risk management techniques.

Miroslav Petkov, Head of Environmental and Climate Risk, Standard and Poor's: Climate risks are dependent on future adaptation action but a majority of climate action is focused on mitigation. The Strategy is, therefore, helpful in highlighting the need to focus on adaptation as well. The private sector needs to understand the risks; the knowledge gap between high-level projections and more specific information should be bridged.

Jannes Maes, President, European Council of Young Farmers: Agriculture faces new consumption patterns and climate change. Climate change risks involve extreme weather conditions. Insurance is an option but only helps to compensate for damage once it has occurred. Adaptive innovation is also needed, e.g. through crop breeding, or wetland conservation.

Evangelos Koumentakos, COPA-COGECA: Farmers have a specific role in the implementation of climate policy. We have shown that production growth can be decoupled from emissions but the links with climate adaptation are less sure. The Paris Agreement recognises the fundamental priority of safeguarding food security and makes clear that it should not be compromised by climate mitigation or adaptation. Agriculture can adapt but the strength and the frequency of climatic events is overwhelming, so we should first look for support at EU level.

Zuzana Hudekova; Union of Slovak Cities and Towns: Implementation at national level is problematic: the hierarchy of strategies is unclear, and links between mitigation and adaptation should be clarified. Nature-based solutions seem to be the most promising, as grey infrastructure projects could endanger the environment. Better spatial planning is an important tool to drive sustainable development and adaptation.

Carlos Campillos, E3G: The Strategy was successful in putting adaptation on people's agenda, but much has changed since 2013: the knowledge base has increased, the Paris Agreement has been signed. Climate adaptation remains marginalised within the climate policy debate. So progress is needed not only on issues like integration, prevention, and disaster risk management but also in terms of political salience. The Future of Europe debate is encouraging – many of its priorities point to a need for a stronger adaptation strategy.

Questions, comments, and discussion

The Committee of the Regions opinion: The CoR had produced opinion statement on the Strategy following a broad consultation process, which should be taken into account in the evaluation. In particular, it calls for a stronger level of cooperation between the levels of governance, and emphasises that the Covenant of Mayors is a key initiative to support action at subnational level.

Foresight and projections: Improved projections could help strengthen links between disaster risk management and adaptation. It was noted that: projections are not always helpful in pointing to links between mitigation and adaptation in agriculture; risk management experts should work together to improve their understanding of long-range weather forecasting options; and the Strategy could focus on initiatives to help the tourism sector to understand risks and to adapt.

Small firms: While large companies have more capacity to take action, mobilising sectors dominated by smaller entities (e.g. tourism) is hard. Answers could include: improved dialogue with the insurance industry; better sharing of information (and experience with relevant technologies) among small businesses (including in agriculture); better signposting of expertise, e.g. within municipalities; and improved information for and communication with stakeholders who may not fully appreciate their own risks.

Data: A lack of data on issues like sectoral vulnerabilities was noted – rather than expect the EU to provide it, is it more important to discuss how the EU level could coordinate the information? Is there a role for Eurostat in addressing data gaps? It was suggested that it is important to bring high-level projections into sharper focus for users. Greater transparency of information on lakes and coastal pressures would be valuable, and the availability of data on vulnerabilities at city or local level is important to encourage local action.

Infrastructure investment: Who should pay for investment in improved infrastructure resilience – current users?

LIFE: It was noted that countries with low uptake of LIFE adaptation projects should be encouraged to focus more on the potential of the funding and that work on the rail network could be useful.

Emerging recommendations from the evaluation

Following lunch, the consultants presented summary information on the emerging recommendations.

Questions, comments, and discussion

Disaster risk reduction: Should there be a message on how public authorities should focus less on post-disaster operations, and more on prevention through developing resilience?

Vulnerability assessment: It was suggested that areas such as disaster risk and agriculture are currently singled out by the evaluation and that other sectors not mentioned. In response to a question about whether a systematic vulnerability assessment been carried out in order to develop the recommendations, it was explained that the recommendations were based on the evaluation of the Strategy and that while a vulnerability assessment could be valuable, it was not part of the evaluation.

Health implications: It was suggested that the health implications of climate change are insufficiently addressed by the Strategy's current actions, and by the emerging recommendations. It was suggested that a forthcoming WHO report will include recommendations that should be taken into account.

Agriculture: It was advocated that there could be more emphasis on synergies in rural development programmes between mitigation and adaptation, rather than on conflicts between the two.

Sectoral coverage: It was suggested that the recommendations should mention a wider range of sectors, for example, with links to recommendations on climate adaptation in respect of environmental impact assessment and strategic environmental assessment.

Public attitude data: It was noted that the evaluation could make more use of Eurobarometer data on attitudes to climate change and on surveys.

Collective exercise

The collective exercise provided an opportunity for participants to react to the draft recommendations, to comment on them, and to suggest additional or alternative recommendations. Overall 173 new ideas and comments on the draft recommendations formulated by the consultants were recorded, and are set out in detail in Annex 1.

Questions, comments, and discussion

An initial summary of the discussion, and of the ideas put forward by participants, was provided by the evaluation project consultants. The summary was considered a fair reflection of the feedback; participants commented that further **follow up** should be ensured. It was also suggested that **Mainstreaming** targets could be misleading, particularly if the available funding was not always taken up in Member States. Monitoring should focus on the money actually spent.

Conclusions and closing remarks

Elena Visnar Malinovska (DG CLIMA, Head of Unit for adaptation) thanked participants for a valuable and interesting discussion. The parallel consultation had so far yielded 152 responses, mainly individual contributions, with strong representation from Spain, Belgium, France, Italy, and Germany. Some responses came from non-EU countries, some of these providing more responses even than some individual EU Member States.

Awareness raising and advocacy on resilience would continue, with two events taking place in February (the Covenant of Mayors Investment Forum and 10 years anniversary ceremony on 20-21 February). A major climate change adaptation conference would be organised on 28-31 May 2019 in Lisbon.

Several of the comments during the day had concerned funding. The next Multi-annual Financial Framework (MFF) is under preparation, with a strong focus on EU added value. The current MFF provides golden opportunities for investment in adaptation, and it is important for Member State stakeholders to make use of the funding available.

Management of risk and uncertainty is vital. The presence of stakeholders from the financial sector, particularly from insurers, is therefore encouraging because their awareness is vital to proper private-sector funding of risk mitigation and reduction.

Discussion had identified the availability of a wealth of data but also the challenge of synthesizing it to provide tailored information for users. Work on vulnerability assessments with the EEA would continue.

Policy coherence at all levels is important, including at the macro-regional scale. Both adaptation and mitigation are needed. Spill-over benefits of investment should be taken into account and we should also address new sectors of interest, such as health.

The public consultation is still open, and stakeholders were encouraged to participate. The Commission will finalise the evaluation this year and, based on it, will issue a communication that could identify future avenues for further work. The enthusiasm from the meeting provided a strong encouragement to continue the work between the Commission, Member States, and regional and local actors

Annex 1: detailed results of the collective exercise

Recommendation 1: Continue promoting action by Member States and cities

Recommendation	Support "Green"	No support "Red"
Recommendation 1.1: EU action could focus on tools to encourage MS strategies and facilitate action	10	0
Recommendation 1.2: CoM should encourage equal emphasis on adaptation and mitigation	3	0
Recommendation 1.3: EC should identify where cross-border cooperation could help MS readiness	7	0
Total	20	0

Generally high levels of support for continued Commission efforts to promote Member State action on adaptation, with a particular focus on Recommendation 1.1 (Tools to encourage Member State strategies and facilitate action, general support for continued attention to the Covenant of Mayors, although with some scepticism about action in specific areas (see below under Recommendation 5 with regard to ecosystem-based adaptation).

Comments and new recommendations

Comments identified a gap between national strategies and action at the local level, including the initiatives of cities.

Suggestions focused on governance mechanisms to address that gap, including:

- The need for a structured dialogue between different levels of government
- The importance of greater coherence between Commission action to encourage Member State strategies, on the one hand, and deployment of EU funding on the other
- A better link between demands for action, and the distinct competences of different levels of administration.
- "A dedicated chapter in a strategy on support for local authorities and regions. "
- "Cities being "at the front line" of climate adaptation"
- "Appropriate financing to support local level implementation"
- "More focus on implementation as compared to the focus on plans and strategies"
- "Greater focus on cross-border cooperation encouraged through EU policies"
- "Greater EU commitment to climate adaptation"
- "Link plans and strategies to real competencies/responsibilities of the authority drafting it
- "Adaptation in form of EC directive would be the solution not to keep the implementation on voluntary basis"
- "Promotion of action by Member States should be done more coherently on the side of the Commission and its different funding sources"
-

One comment indicated that merging adaptation and mitigation action in the Covenant of Mayors had led to a lack of focus on adaptation.

New ideas included:

- A suggestion for an explicit spatial dimension in adaptation policy;
- The need to address rural/urban links, particularly where the need for upstream action in rural areas had benefits which were felt in downstream urban areas.
- A much greater need for vulnerability assessments to be used in European action was identified, either in relation to the EU strategy itself, or to European Territorial Cooperation programmes.
- "More private finance leveraging with the support of the EIB, LIFE, and through public-private partnerships"
- "More promotion of awareness raising and capacity building" 3x, "facilitation of learning, and a challenge forum where one can post an issue and receive advice" "Support further capacity-building activities for cities and regions, also through the Covenant of Mayors"
- "Collaboration with the Commission ambassadors of the Committee of the Regions to provide country-focused support to cities and regions"
- "Current EUAS is not a strategy with vulnerability assessment, pressures, drivers, actions etc. but a loose collection of documents and recommendations"
- "Linking adaptation funds with vulnerability priorities of the different areas i.e. INTERREG"
- "Take into account the results of the different partnerships of the Urban Agenda"
- "Climate data from Copernicus framework clarified, officialised, harmonised"
- "Need to further promote adaptation mainstreaming in EU policies"
- "Examples of cross border actions would help such as flood management or halting of species loss"
- "Include local level of production of national climate and energy plans"
- "Establish a structured regular dialogue among Commission, member states, and subnational governments"

Recommendation 2 Continuing need for EC to work with MS on knowledge gaps

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 2: Continuing need for EC to work with MS to close existing knowledge gaps, address emergent ones and promote knowledge exchange	8	0
Recommendation 2.1: EC should further encourage practical application of results from H2020 projects	2	0
Recommendation 2.2: EC should foster research on: adaptation to high-end climate change; risks to EU from climate impacts elsewhere	8	0
Recommendation 2.3: Establish a community of practice (beyond Climate-ADAPT) to share good practice, particularly for MS groupings that share similar impacts	9	1
Total	27	1

The level of support (from green and red dots) was strong for the overall recommendation and Recommendations 2.2 and 2.3, notwithstanding a single "red dot"

for 2.3. Support for Recommendation 2.1 was modest, though no indication that it was not supported.

Comments and new recommendations

- 2.1. This could include a systematic review of applications of H2020 projects.
- One aspect of encouraging practical application is to provide knowledge of forecast future climate to end users.
- "2.2 EC may be too distant from practitioners to comment on relevant knowledge gaps."
- Cost benefit analysis (relevant to climate change adaptation) was mentioned as a possible additional area where there is a knowledge gap.
- 2.3 There were several comments, covering the sorts of areas identified by EEA for development in their evaluation of Climate-ADAPT. One specific comment was that an initial focus could be on making existing platforms more liked/appreciated.
- More data (Copernicus), knowledge and challenge sharing **(many comments**)
- "We should prepare for the worst case scenario"
- Address "research gap in terms of costs and benefits"
- "Lobby management plan through ESIF, divest in fossil fuel business and transform to greed industry"
- Recommendation 2.3 should be clarified as to "who?, at which level?"
- "Look at existing data about public attitudes and behaviour"
- "Develop guidelines on integration of science/ policy/ practice interactions"
- Include health as an area for research, e.g. drinking water quality – groundwater impacted by flooding
- Consider social science research on public attitudes – this may inform approaches to a change in culture
- Support pro-active adaptation [this may be to do with how adaptation is framed rather than necessarily a different approach to adaptation]
- Commission [Commissioner?] to deliver an annual state of the climate union address

Recommendation 3 Next financial framework should identify added value of EU programmes for adaptation

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 3: Next financial framework should identify added value of EU programmes for adaptation	4	0
Recommendation 3.1: New emphasis on monitoring extent of knowledge transfer and capacity-building across EU	3	0
Recommendation 3.2: EC should investigate tracking separately to clarify EU contribution to climate resilience	0	2
Recommendation 3.3: Future EAFRD programming/monitoring could enhance effectiveness/relevance by distinguishing: mitigation/adaptation; resilience of businesses/society	2	0
Recommendation 3.4: EC should consider improving: future impact of EAGF on adaptation; use of GAEC	2	0
Recommendation 3.5: Assess use of guidance to guide its promotion and inform post-2020 materials	2	0

Recommendation 3.6: EC should identify proportionate approaches to improving adaptation impact of funds8	1	0
Total	14	2

The level of support (from green and red dots) was modest with 4 supporting the overall recommendation and no more than 3 supporting any individual recommendation. Even considering all votes across all the recommendations in this area, the support for Recommendation 3 was only about one half of that for Recommendation 4. Recommendation 3.2 attracted no support and two participants did not support it.

Comments and new recommendations

- 3.3 There were several comments to the effect that in the agriculture sector, actions can be effective for both adaptation and mitigation. These questioned the practicality and value of seeking to distinguish adaptation and mitigation.
- 3.5 What is the role of the ESF in tracking social issues linked to adaptation?
- "Role of ESF in tackling social issues linked to adaptation (integrated approach)"
-
- More adequate methodologies are needed to assess/count mainstreaming climate change to ESIF 2020+
- Emphasize that mitigation should be part of strategic planning
- "Does the EU discharges its obligations to pursue climate change adaptation by throwing the ball at local level?"
- "We need industrial symbiosis to be included into the climate adaptation platform"
- "All action (not at a project but programme level) funded by the EU should be climate proofed prior to funding"
- "More adequate methodology to assess/count mainstreaming climate action to ESIF beyound 2020 needed"
- "NOT READABLE that mitigation should be a part of strategic planning and one can't catch up on mitigation on the project level"
- "I heavily suspect that the vast majority of 20% commitment to climate change is spent on mitigation. That is certainly my experience of ERDF in the UK, England. CCA has no ring fence allocation"
- "New emphasis would overburden individual projects. Better: additional activity on knowledge transfer and on capacity building across EU. Example service contract specific projects"
- "There is an over reliance on LIFE to cover climate change. It's a fraction of other funding programmes. This should be explicitly recognised in any recommendation for its future contribution to EU adaptation strategy"
- "How can we say that we need a 'resource based approach from member States' when it is the EU who has to put 'more emphasis on knowledge transfer and capacity building across EU'"
- "Conflict: EU should track funding to adaptation separately from that for mitigation <> promote synergies"
- "Introduce compulsory monitoring indicators for Climate Change at EU level"
- "In agriculture adaptation and mitigation happen at the same time. Funds are there for mitigation. How come there is more need for funds for adaptation?"
- "EU funding should label as adaptation only action that is additional to existing DRR efforts and measures"
- "It is impossible/difficult to distinguish adaptation and mitigation separately. Agriculture contributes to both, division is difficult"

- "Transferability is often difficult and not always useful to achieve. Many projects would have more added value if they could fully focus on positive impacts on their own area"
- "Raise awareness and demonstration of LIFE projects in CEE region"

Recommendation 4 Coherence between DRR and adaptation should be enhanced

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 4: Coherence between DRR and adaptation should be enhanced across all levels of governance via closer vertical, horizontal, cross-border and transnational coordination and collaboration	10	3

Recommendation 4 attracted 3 red dots and was noted as being too broad, too vague, and requiring further development and clarification as to how it could be put into operation.

Comments and new recommendations

- Ideas on how to bring DRR and adaptation closer together included integrated horizontal planning, tailored methodologies along the policy cycle including standardised vulnerability assessments and other solutions for climate risk management and risk governance. An "integrated, inclusive, people centred and multi-hazard and landscape approach" has also been suggested.
- In general, an effective intersectoral cooperation, communication, participation should be encouraged. Insurers and SMEs should for instance collaborate closer to improve risk management.
- Two additional suggested elements mentioned as relevant to DRR and adaptation is better use of standardisation tools and reinforcement of political commitment.
- "Should be more than collaboaration/coordination e.g. stronger links between CCA and risk assessment in the framework of DRR"
- "DRR should be exemplified also including Risk mitigation in land use. E.g. Fuel management to prevent forest fire".
- 3x "It means nothing – too broad"
- "Adoption of an integrated, inclusive, people centered, multi-hazard and landscape approach to overcome barriers by sector"
- "Look also at EU placard projects dealing with DRR and CCA linkages and maybe other horizon 2020 projects"
- "Work on climate risk management to operationalise coherence between CCA and DRR"
-
- "It needs more specific recommendations so more informed decisions are crucial for strategy implementation"
- "Implementation of Ecosystem-based DRR/CCA can be fostered through standardisation of existing principles and political commitment"
- "Better use of standardised vulnerability assessment/ provide framework for combining hot spot identification with adaptation needs measures"
- "We need a deeper understanding of DRR plus climate adaptation overlap/common areas and then to allocate clearer responsibilities on who does what. This runs across finance data in the areas etc. It will require a stronger mandate to promote collaboration"
- "Specific focus on overseas territories because vulnerable to high end events"

- "Ecosystem-based DRR CCA require effective intersectoral collaboration that should include communities and promote participatory processes"
- "Promote in house risk management in businesses (risk identification assessment mitigation)"
- "Promote better collaboration between insurers and SMEs to improve their risk management"
- "Important but requires further development and clarification"
- "Integrated territorial planning is needed"

Two comments were difficult to read, and have not been included.

Recommendation 5 Mainstreaming ecosystem-based approaches across EC activity

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 5: Greater efforts to mainstream ecosystem-based approaches across EC activity	14	0
Recommendation 5.1: Covenant of Mayors action to promote green infrastructure should be enhanced	9	3
Recommendation 5.2: Mobilisation and market uptake of ecosystem-based approaches need further promotion	2	0
	25	3

There were high levels of support for an increased focus on ecosystem-based adaptation, although a minority (3 votes) were concerned that promotion of green infrastructure through the Covenant of Mayors was inappropriate – either because it was the wrong vehicle, or a wrong focus for its work.

Comments and new recommendations

- Importance of addressing ecosystem-based adaptation through a range of action, not just through the covenant of Mayors;
- the need to address blue infrastructure as well as green;
- the key role of overseas territories of the EU in protecting biodiversity through adaptation measures;
- a suggestion that the Habitats Directive needed to be more flexible to allow investment in ecosystem-based or other forms of adaptation action.
- "Spatial/urban planning should be addressed"
- "Rural non-rural links should be enhanced"
- "Dedicated chapter on the renewal strategy for cities and regions"
- "Exchanging of experiences on ecosystem based adaptation"
- "Water management and the circulation of water is the key issue in the adaptation"
- "EU Habitat Directive should reflect adaptation and ecosystem based adaptation"
- "CoM already promotes both mitigation and adaptation. Maybe it would be better to say that it should "continue to promote both mitigation and adaptation".
- "EU should focus on relation between climate agriculture nature water quality and their interactions"
- "Specific focus on overseas territories as a big part of common biodiversity heritage"

- "Don't just focus on EBA in cities and covenant of mayors. Broader needs"
- "Facilitate access to finance for EBA private households and communities"
- "Take stock of existing EBA projects. There is a lot of work done by Commission and Horizon 2020"
- "Covenant of mayors is not enough. It does not reach all actors at local level. Expand extent of this point"
- "Not only mainstream but put priority to nature based solution"
- "The EU should recognise the learning potential of EU MS actions, such as those in Germany. Focus is always the other way around"
- "Prefer ecosystem based 'approaches' to 'adaptation'. It is a larger concept"
- "You miss the social issue of adaptation policy and the role of citizens (Leipzig Charter)"

Recommendation 6 Reinforcement of synergies between adaptation and mitigation actions through EU action

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 6: EU action should encourage and facilitate better integration of, and reinforcement of synergies between, adaptation and mitigation actions	6	0
Recommendation 6.1: Renew efforts to identify actions that mutually reinforce adaptation and mitigation in an EU context, drawing on work at UNFCCC level, as a first step to greater coherence	11	0
Total	17	0

There was much enthusiasm for the recommendations but concern that adaptation may lose out to mitigation.

Comments and new recommendations

- Adaptation and mitigation attract very different communities of interest.
- Use of international standards (ISO) was suggested as means of encouragement.
- "Adaptation will lose influence" and "it can lead to less effort on adaptation"
- "Coherence – yes! But separate budgets to ensure that adaptation will still happen"
- "adaptation vs. mitigation "good practices should be defined to highlight the differences"
- "what about synergies with other policy objectives?"
- "link recommendation 6 to international standardisation at ISO"
- "work together to raise the importance of adaptation together with mitigation"
- "Bringing closer together the adaptation and mitigation communities, i.e. developing and developed countries"
- "Take an example of the integrated approach in urban sustainable development (Leipzig Charter principles) … coherence between policies (adaptation, mitigation, but also social influence)"

Recommendation 7: Ensuring more resilient economic sectors

Recommendation	**Support "Green"**	**No support**

		"Red"
Recommendation 7: EU should increase efforts to include climate resilience in economic sectors/infrastructure	16	0
Recommendation 7.1: Requirements for climate risk assessment should be extended to all EU-funded infrastructure projects	13	0
Recommendation 7.2: Review guidelines to ensure accessible language; improve awareness; support capacity building for their implementation	4	0
Recommendation 7.3: Climate resilient investment should be promoted by pursuing 2016 proposal (CRR/CRD IV) to amend capital requirements legislation	1	0
Recommendation 7.4: Explore introduction of political risk guarantees for sustainable (climate-resilient) infrastructure investments	4	0
Recommendation 7.5: EC continue to support development/sharing of disaster loss/damage data, and dialogue with MS and stakeholders on disaster-risk insurance	8	0
Total	46	0

Recommendation 7 attracted a lot of enthusiasm and no criticism.

Comments and new recommendations

- The need for a clear communication of the benefits of investing in DRR and adaptation to encourage ecosystem-based approaches
- Potential benefit of more public-private partnerships focusing on innovation and open to civil society.
- Guidelines on vulnerable investment should be condensed and "factsheet like".
- The need to take resilience into account at planning level, "without a need for new SEA/EIA guidelines but rather integrating resilience at every step of the decision making".
- "EIA, SEA climate integration to be clarified, further developed"
- The sectors also to be considered in planning are: construction (through building codes) and land use. "The concept of resilience is too narrow".
- Better use of spatial data provided e.g. by Copernicus and innovation (e.g. through start up companies) should be encouraged.
- "Role of standards to be further developed"
- Need for better guidance on how to mix different funds available for investment in climate adaptation.
- Amending Solvency II directive (2x) (e.g. in relation to the fiduciary duties of insurers) was proposed as well as distinguishing between disaster risk insurance for individuals and for business.

Suggestions relevant to 7.3-7.5 recommendations include:

- Boosting financing of the mitigation projects,
- Providing a menu of tailored, evidence based options of climate resilient investment such as restoring ecosystems (wetlands) including establishment of "certification scheme" for resilient investment,
- Paying more attention to behavioural aspects of climate adaptation,
- Encouraging public private partnerships and collaboration (including data sharing) between insurers, businesses, academia, and industry,

- Including resilience in EU's 2030 "agenda" targets
- Introducing climate change as a variable in data analysis
- "Structured dialogue between Commission, Member States, and local authorities".

Recommendation 8: Addressing EU vulnerability to impacts outside Europe with non-EU countries

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 8: EC should consider its external climate vulnerabilities and potential synergies between EU domestic adaptation and adaptation needs of others	3	0
Recommendation 8.1: In line with international policy developments, the Strategy should address links between EU and non-EU adaptation actions, including sharing of EU experience and climate modelling, and identification of risks to the EU from climate impacts elsewhere and commensurate actions to improve EU resilience	5	1
Recommendation 8.2: Better to include adaptation in NDC, as would send stronger signal about balance of EU efforts in relation to mitigation and adaptation	0	1
Total	8	2

There was much enthusiasm for Recommendations 8 and 8.1. Recommendation 8.2 only attracted one red dot and no green dots. Whether this indicated widespread disagreement or lack of interest/understanding was unclear. However, two stakeholders commented that it should be subject to agreement by Member States.

Comments and new recommendations

- Further care required with use of language, e.g. what does "external climate vulnerabilities" mean?
- Suggestion that focusing on the impact on the EU of climate change impacts beyond the EU was quite different from focusing on the impact on the EU of climate change adaptation actions taken by countries beyond the EU. The former was preferred, the latter was viewed as too complex and potentially imponderable.
- "Recommendations 8.1 and 8.2 are a topic discussed by team on UNFCCC negotiations. This is pre-empting their work."
- "Pay more attention to global diseases, pandemics, species loss"
- "EU should seek cooperation with the new global Centre of Excellence Climate Adaptation"
- "INDCs on adaptation subject to Member States"
- "Strong coordination between focal points for multilateral environmental agreements (Paris Agreement, RAMSAR, UNCCD, CBD)

Recommendation 9: The Strategy should be aligned with international obligations under the Paris Agreement

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 9: The Strategy should be aligned with international obligations under the Paris Agreement	3	1
Recommendation 9.1: The Strategy's cycle should be aligned with the Paris Agreement cycle of the Global Stocktake in 2023 and every five years thereafter	2	7
Total	5	8

Recommendations 9 and 9.1 attracted eight red dots (the most of any recommendation) plus five green dots.

Comments and new recommendations

- The EU has no mandate and this should be something for Member States.
- Suggestion that there is a lack of understanding about the Global Stocktake.
- Suggestion that Recommendation 9 was simply a sub-recommendation relating to Recommendation 8.
- "Global green business platform, industry can take a step forward towards recycling and industrial symbiosis"
- "By aligning agriculture only to mitigation, the EC misinterprets the scope of the Paris Agreement"
- "Without this, the strategy will always be out of synch and accused of being out of date – could consider mid-term review as well?"
- "Why 2023, why not 2030 or 2050?"
- ""EU has no mandate to speak as MS. MS report as a party".
- "Commission tried it with the Governance Regulation out of their mandate"
- "Only if easily done otherwise not necessary"
- "Need for structured dialogue among Commission, Member States and local authorities on COP negotiations"
- "Article 2.1b in a manner that does not threaten food production"
- "Alignment on other levels necessary for example ISO"
- "Not only Paris Agreement cycles, but content too, inclusion of climate Overseas Development Aid, disaster and humanitarian efforts"
- "Why is Recommendation 9 needed, Paris Agreement is also part of Recommendation 8"

Recommendation 10: Maintain internal coherence and further consider how to enhance it

Recommendation	**Support "Green"**	**No support "Red"**
Recommendation 10: Maintain internal coherence and further consider how to enhance it	0	0
Recommendation 10.1[i]: • Greater links between risk management under agriculture policy and EU policy on insurance mechanisms	0	0
Recommendation 10.1[ii]: • Improving understanding of and addressing knowledge gaps that impede progress in MS adaptation policy	2	0
Recommendation 10.1[iii]: • Greater links between city-level actions encouraged by CoM and activities to improve national-level actions	4	0
Total	6	0

There was enthusiasm for Recommendations 10 and 10.1.

Comments and new recommendations

Comments simply provided many additional examples for consideration, including:

- Harmonisation of the Habitats Directive, Floods Directive, Water Framework Directive, and SEA Directive
- "Links with Overseas Territories."
- "Recommendation 10.1, it is not clear what you mean by EU policy on insurance mechanisms – there is no such single policy
- "Deploy appropriate resources to implement action locally"
- "Recommendation 10.1: more emphasis on city-level action"
- "Emphasis on state led policy, e.g. building and land codes, planning policy to foster an environment where insurers can help households"

Annex 2: list of participants

SURNAME	Name	Country	Organisation
AGRILLO	Cristina	EU	Slow Food
AHO	Laura	Finland	Finnish Permanent Representation to the EU
ALVES MARINHO	Bruno	Luxembourg	Ministry of Environment
APPULO	Leorita		Wetlands International EU Association
ARAMAYO	Anna	EU	European Commission DG
BAFFERT	Claire	EU	EUROCITIES
BAKARDZHIEVA	Silvia	Bulgaria	Climate Attachés in Perm Rep
BAÑOS DE GUISASOLA	Eva	EU	CCRE-CEMR
BEDHOUCHE	Julien	EU	Federation for European Risk Management Associations (FERMA)
BLONDEL	Lucie	EU	Climate Alliance
BONNEVIER	Emma	Sweden	Swedish Association of Local Authorities and Regions
BORG	Simone	Malta	University of Malta
BORMIOLI	Francesca		Rina Consulting
BOUWHUIS	Egbert	NL	verbond van Nederlandse verzekeraars
BROZEK-EVERAERT	Stella	EESC	European Economic and Social Committee
BURBIDGE	Rachel		Eurocontrol
CAMPILLOS	Carlos	Belgium	E3G
CHIARETTI	Carla		Eur Eau
CHRELIA	Eirini	Greece	Permanent Representation of Greece to the EU
COLLIN	Claire	Belgium	SPF Environment
COOK	Rosalind	EU	UNISDR - UN office for Disaster Risk Reduction

SURNAME	Name	Country	Organisation
CREPY	Mathilde		ECOS
DA COSTA	Tomás		Swiss Re
DAVIES	Craig	EU	EBRD
DE HAAN	Erik	Netherlands	Provincie Zuid-Holland
DE BUCK	Abraham	Netherlands	
DE GUSMAO-SOERENSEN	Diogo	EU	European Commission DG
DECKER	Bernd	EU	EASME
DEVAUX	Charles		Student
DI PIETRANTONIO	Nicola	EU	Committee of the Regions
EBBEN	Thomas		German Permanent Representation to the EU
EHRLE-MANTHEY	Barbara		Vertretung des Landes Hessen bei der EU
ENGEL	Christian	Germany	Representation of North Rhine Westphalia to the EU
ESCOLAN ZENO	Carole		UIC
ESTOL	Judith	Spain	Catalan government
FELIU	Efrén		Tecnalia
FEYEN	Luc	EU	European Commission DG
FIASCONARO	Milo	Italy	Aqua Publica Europea
FREDERIKSEN	Birgitte	EU Chief Adviser	
GAUDART	Delphine	France	
GODDARD	Sarah		AMICE
GRÄS	Tobias	Denmark	Danish Agriculture and Food Council
HAMON	Kevin		DNV GL Group
HARTL	Christoph	Germany	German Insurance Association (GDV)
HAUNER	Oliver	Germany	German Insurance Association (GDV)
HEMPEN	Susanne	Germany	German Environment

SURNAME	Name	Country	Organisation
			Ministry
HERAS	Francisco	Spain	MAPAMA- Spanish Climate Change Office
HERTELL	Sirpa	EU	Committee of the Regions
HUDEKOVA	Zuzana		Union of Slovak Cities and Towns
HUTT	Lorraine	UK	
JAKOBI	Reeli	Estonia	Ministry of the Environment, Climate and Radiation Department
JOHNSEN	Rolf	Denmark	Central Denmark Region
JOL	André	EU	EEA
JONES	Gregg		CPMR
JURKEVICIUTE	Ausra		Jaspers-IQR/EIB
KAMPUS	Krista	EU	Council of the Baltic Sea States Secretariat (EU Strategy for the Baltic Sea Region)
KENDROVSKI	Vladimir	European WHO Region	WHO (Technical Officer for Climate Change and Health)
KLEINENKUHNEN	Lea	EU	
KLEMMAYER	Inga	Germany	Ministry for Environment - North Rhine-Westphalia
KONITZER	Kerstin	Sweden	Swedish Geotechnical Institute
KORMANN	Christophe	Germany	Permanent Representation of the Federal State of Hessen
KOUMENTAKOS	Evangelos	EU	COPA - COGECA
LAHTVEE	Valdur		CBSS - Permanent Secretariat of the Council of Baltic Sea States
LATINOS	Vasileios-Panagiotis		ICLEI
LAZARO	Gloria		CEPRI

SURNAME	Name	Country	Organisation
LEFEVRE	Filip		VITO
LEITNER	Markus	EU	PLACARD
LEJA	Linda	Latvia	Climate Attaché in Permanent Representation
LEMESIOS	Ioannis	Greece	National Observatory of Athens
LILJA-ROTHSTEN	Saara	Finland	Ministry of agriculture and forestry/natural Resources Dpt
LINDNER	Marcus	EU	European Forest Institute
LOW	Charles Michael	EU	Insurance Europe
LOZANOV	Radoslav		Permanent Representation of Bulgaria to the EU
MACARTHUR	Sara Macarthur	EU	Insurance Europe
MACGREGOR	Judith	UK	Confederation of Scottish Local Authorities
MAES	Jannes		CEJA
MARTINEZ BOTI	Miguel		European Commission
MATTERN	Kati		EEA
MEISTER	Wiebke	Germany	DIN - German Standardization Institute
MELCION	Carme		Barcelona Province
MUTZIG	Xavier		FERMA
NEUMANN	Thomas		Ramboll
NIKOLOV	Krasimir	Bulgaria	The Ministry of Interior
O'NEILL	John	Ireland	Department of Communications, Climate Action & Environment
O'BRIEN	Sarah	EU	Ecofys
O'NEILL	Eoin	Ireland	UCD Planning and Environmental Policy
OPDENACKER	Philippe		ENGIE

SURNAME	Name	Country	Organisation
PANNIER	Rodolphe		CEPRI
PAULINO	José	Portugal	Portuguese Environment Agency
PEKIN	Ethem	Belgium	CER - Community of European Railway and Infrastructure Companies
PICATOSTE RUGGERONI	José Ramón	Spain	Spanish Climate Change Office, Ministry of Agriculture, Food and Environment
PLA	Eduard	Spain	CREAF
POČUČA	Žana	Croatia	Ministry of Environment and Energy
POHJANKOSKI	Riikka	EU	ARCTIK
POŠKULKOVÁ	Lada	Czech Republic	Representation of the South Moravia Region to the EU
RABAZAUSKAITE	Jurga	Lithuania	Permanent Representation of Lithuania to the EU
RAKONCZAY	Zoltar		European Commission
RICCI	Simona	Malta	Office of the Permanent Secretary, Directorate For The Environment and Climate Change
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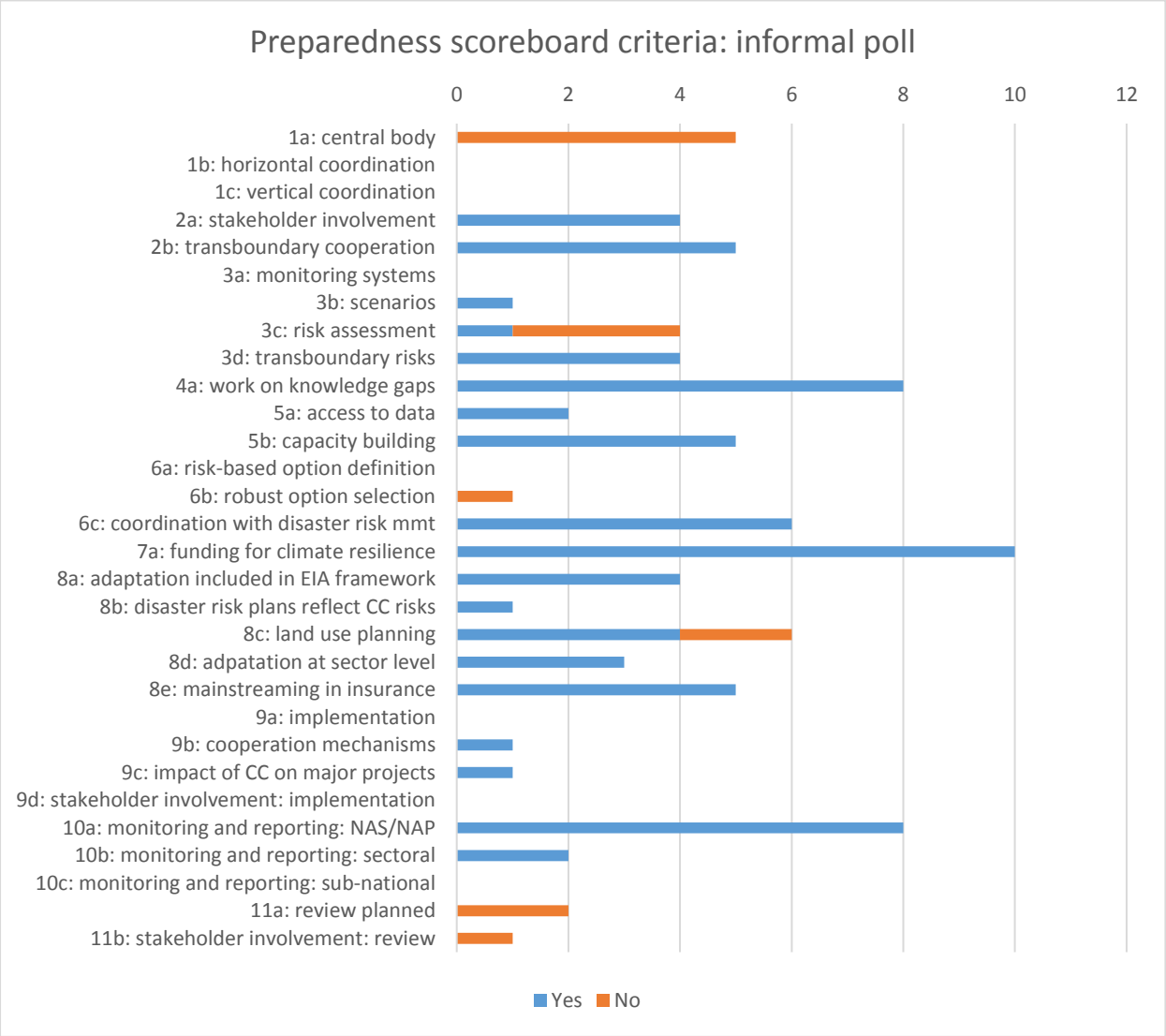
Appendix 2Dc – Notes from an interactive exercise with Working Group 6 members, 24 January 2018

Following the Public Consultation Meeting held on 23 January, consultants Richard Smithers (Ricardo) and Martin Nesbit (IEEP) briefly presented a brief summary of the issues raised during the interactive exercise, under which stakeholders reacted to elements of the draft recommendations from the evaluation study. A short exercise for the Working Group participants was then introduced: participants were (i) invited to consider the criteria used in the Commission's adaptation preparedness scoreboard, using a chart which showed the numbers of Member States assessed as having met, not met, or being in progress to meet each individual criterion; (ii) asked to fix up to 4 positive votes against criteria where action at EU level or other collective action could be helpful in improving performance against a criterion; and (iii) asked to fix up to 2 negative votes against criteria where EU or other collective action would be considered unhelpful. The results are set out in the chart below.



Member States were asked to offer any initial thoughts on the nature of the collective action that might be helpful in addressing the 3 most-identified criteria; one comment was offered, to the effect that more effective methods of communicating the economic and broader social benefits of adaptation action would be helpful.

One further point can be noted, which is that there is no clear correlation between the criteria on which further help was considered useful, and the criteria which were judged to have been Met by relatively low numbers of Member States.

Appendix 2E – Results of open public consultation

A 12-week internet-based public consultation was intended to reach a broad audience and ran from 7 December 2017 to 1 March 2018. The focus of the public consultation survey was to elicit feedback on the draft general, technical and specific conclusions from the Second Interim Report of this study. The consultation was a multiple-choice questionnaire available in all EU languages, with the opportunity for some limited open text response. The contributions made to the online consultation will be made public through the consultation webpage in the language they were submitted.

385 responses were received.

See separate file as below:

Appendix	Title	Pages	Filename
2E	Open public consultation	27	Adaptation Strategy Evaluation Final App2E Open Public Consultation V1.1

Appendix 3 – Methods

This Appendix presents the evaluation matrix and methods used in the evaluation covering:

- Evaluation matrix
- Literature review
- Targeted stakeholder survey
- Stakeholder interviews
- Open public consultation
- Stakeholder workshops
- Case studies

A3.1 Evaluation matrix

The evaluation matrix is presented in Appendix 4. It starts from the 10 primary evaluation questions given in the terms of reference for the evaluation. The primary evaluation questions were then adapted for each of the Actions of the EU Adaptation Strategy and also for each of the objectives to give 75 evaluation questions, bespoke to actions or objectives. If appropriate each of these questions was divided into sub-questions. Finally, operational questions were developed from the sub-questions.

The framework of evaluation questions was used to guide the literature review in part. The operational questions provided a starting point for developing questions for the targeted stakeholder survey and were used directly in the stakeholder interviews

A3.2 Literature review

Initial work sought to collate as much evidence as possible from desk based research before consulting with stakeholders, to make most effective use of engagement with stakeholders. The review included policy documents, studies on the effects and impacts of the EU Adaptation Strategy and wider literature relevant to the intervention logic. This included studies at both EU and individual Member State level, including regional data.

The document review contributed to the preparation of the:

- Information base on Strategy implementation (including case studies) (Appendix 7)
- List of EU legislation where climate adaptation is mainstreamed (Appendix 5)
- Fact sheets on adaptation components of (I)NDCs (Appendix 6)
- Updating country fiches for adaptation preparedness

The evidence gathered as part of the review was used to answer the evaluation questions, as set out in Appendix 4. In particular, this evidence was relevant to:

- Determining the baseline.
- Providing evidence on:
    - The rationale of the programme, and relevance of the programme's objective;
    - The current State of Play with the implementation of the Strategy;
    - The policy context, and coherence of the programme with EU and national policies;
    - The cost (efficiency) of the Strategy (e.g. cost of Climate-Adapt)
    - The EU added value of the Strategy;

- Issues associated with the implementation of the Strategy to date.

A3.2.1 Identification of data sources

Review started from familiarity with many of the key references from our previous work in this area e.g. recent work for GIZ on the adaptation components of (I)NDCs. We therefore already understoodd the format of the key documents and the challenges that needed to be addressed in the evaluation of this information.

We recognised from this previous work that there are a number of "critical" data sources which cover a number of the evidence requirements. These include specific reporting requirements (e.g. reporting by Member States under the Monitoring Mechanism Regulation) policy documents (e.g. impact assessment of the EU Adaptation Strategy) and wider literature (e.g. academic research on climate impacts and vulnerability).

For each of these data sources we began by categorising the data sources and mapping the evidence they can provide against each of the individual evaluation questions. For example, the EU Adaption Strategy impact assessment provided evidence on the rationale for the Strategy and expected impacts, so informed the baseline.

We then used the output from this mapping to identify gaps in the evidence, that could be addressed through identifying additional literature or through questions in the targeted stakeholder survey or in stakeholder interviews.

To fill the data gaps we then performed a wider review of relevant publications and research reports.

Additional data and literature was also identified through the other evaluation tools. For example, as part of the stakeholder survey and targeted stakeholder interviews, respondents were asked to identify other relevant sources of evidence or research.

More generally, the policy literature and data review followed an iterative process, with the list of references continuing to grow as new data and evidence were identified.

A3.2.2 Collection of evidence

For each of the identified data sources we reviewed the relevant evidence for the evaluation. This identified and extracted key evidence that could be used to inform the baseline, state of play or to answer the relevant evaluations questions. This was captured in a working document used as a resource to inform the evaluation report (See Appendix 7)

We also made use of recent and concurrent studies from DG CLIMA and other Commission institutions. These included: the mid-term evaluation of the Mayors Adapt initiative in 2014; the mid-term evaluation of the LIFE programme on environment and climate change; a service contract on insurance of weather and climate-related disaster risk; and an evaluation of the Climate-ADAPT programme undertaken by the European Environment Agency.

A3.2.3 List of EU legislation where climate adaptation is mainstreamed

Drawing upon the review of policy documents, the list was developed of EU legislation and guidance documents where climate change adaptation is currently mainstreamed, or has the potential to be mainstreamed. (See Appendix 5)

A3.2.4 Fact sheets on adaptation components of (I)NDCs

Following discussion with DG CLIMA, fiches for the nationally Determined Contributions (NDCs) of 10 non-EU countries were reviewed and updated. In addition, fiches for an additional 5 non-EU countries were prepared from scratch. Each fiche addresses: key facts and figures about the country; mitigation targets and measures; adaptation measures; means of implementation and comments. In addition, a list of background projects is included. (See Appendix 6)

A3.2.5 Country fiches and scoreboard of adaptation preparedness of EU Member States

In discussion with DG CLIMA, effort for the evidence gathering for this study was re-apportioned with significant effort allocated to an assessment of the adaptation preparedness of Member States.

Discussions with Member States on the proposed 'adaptation preparedness scoreboard' began in 2013, and led to the development of a detailed scoreboard, based to a large extent on the process and approaches recommended in the staff working document. This scoreboard was not published in a final form; a draft was published on the Climate-Adapt website[3]. In an effort to fine tune the scoreboard, a first Commission assessment of performance in each Member State against the scoreboard was carried out in 2015, as a pilot exercise, which was not published. A second assessment against a modified version of the scoreboard, with criteria for each indicator, was carried out with support from this study. A full version of the scoreboard with criteria was published with the open public consultation on the evaluation of the EU Adaptation Strategy[4]. The process for the second assessment was:

- Confirmation by DG CLIMA of the scoreboard, indicators and criteria following comments from Member States' representatives and from the contractor team.
- An update of country fiches for the Evaluation using the indicator list and criteria. This update included a literature review and also, in many cases, interaction with Member States' representatives.
- An initial coherence check across country fiches, followed by an update to the country fiches.
- A further coherence check by DG CLIMA and update of the country fiches.
- Comment by Member States' representatives on their country fiches
- A further update and coherence check by DG CLIMA following Member States' comments
- Publication[5] of current draft country fiches in conjunction with an open public consultation for the Evaluation.

A3.3 Targeted stakeholder survey

The results of the targeted stakeholder survey are presented in Appendix 2B.

Survey invitations were sent out to 370 stakeholders, who have been directly or indirectly involved in implementing the EU Adaptation Strategy, from national government bodies, sub-national governments, municipal/city governments, the private sector, universities, research organisations, EU institutions or bodies, other international organisations, non-governmental organisations (NGOs), and an 'other' category. These invitees were identified by the study team and by DG CLIMA. In addition, the invitation to participate in the targeted survey was extended to everyone who registered for the 3rd European Climate Change Adaptation Conference, "Our climate ready future", held in Glasgow, 5-9 June 2017 (over 850 attendees). Stakeholders not targeted in this phase of the study had the opportunity to respond to the open public consultation, which included questions suitable for members of the general public as well as for experts.

The questionnaire (Appendix 1 to Appendix 2B) was developed by the study team in consultation with DG CLIMA, which also sought comment from the European

[3] See: http://climate-adapt.eea.europa.eu/eu-adaptation-policy/strategy/index_html/resolveuid/bbc416202fd844b1a09f90a2990553ae
[4] See https://ec.europa.eu/clima/sites/clima/files/consultations/docs/0035/scoreboard_description_en.pdf
[5] See https://ec.europa.eu/clima/consultations/evaluation-eus-strategy-adaptation-climate-change_en

Commission's Secretariat-General. It was made available online in English via SurveyMonkey and comprised a series of multiple choice and free text questions, which were structured to give respondents the opportunity to focus their responses on those of the Strategy's action(s) that were of primary interest to them. Questions built upon the primary evaluation questions detailed in the study's terms of reference, its intervention logic and associated evaluation matrix. The questions were targeted at what were perceived to be the main potential gaps in evidence that might be filled through a targeted survey of this kind. The questionnaire did not include questions or statements in relation to Action 2, as the EU LIFE programme had already been the subject of a separate recent evaluation.

The survey allowed stakeholders to respond to questions selectively in relation to their specific areas of interest/experience. The introduction to the survey advised potential respondents that it was anticipated that they might wish to take up to one hour to complete it but that for those with wide interests/experience it might take longer. It was explained that people should plan to complete the survey in a single sitting, as they would not be able to save and return to their response at a later date. Furthermore, it was noted that if respondents closed the tab or the browser on which they were working, information would be lost. It was recommended that people download a copy of the survey template in order to prepare their responses before completing the survey online.

Respondents were strongly encouraged when answering questions to provide hyperlinks or full references to any important sources of evidence (e.g. reports, research, case studies, news or other media) that supported their views. They were also prompted to upload documents at the end of the questions on each action, if they had access to the relevant files and were permitted to supply them.

A privacy statement at the start of the survey noted that respondents' data would be processed in line with Regulation (EC) №45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Furthermore, it stated that the data would only be processed for the specific purpose for which they were collected. In brief, individual responses would not be attributed to respondents, all responses would be held in confidence and only summaries of responses were published in the report of responses to the targeted stakeholder survey.

The survey asked questions about each of the Strategy's actions in turn starting with Action 1. Many of the questions were presented as statements for respondents to indicate their level of agreement on a Likert scale (the full survey pro forma is available at Appendix 1). Where free text fields were provided, they were primarily used to allow respondents to provide specific examples in support of their level of agreement with statements. If respondents did not want to answer questions regarding one of the Strategy's actions, they were able to skip to the next relevant action by responding to a question at the foot of the page for each action. It was suggested to respondents that they might may find it easiest to answer each action relevant to them in numerical order. However, if they wished to return to the previous page of their survey response, they could simply use the "prev" button at the bottom of the page to go backwards.

A3.3 Stakeholder interviews

Interview scripts were prepared for each of the 8 actions under the EU Adaptation Strategy. These are shown in a separate appendix (Appendix 2C Stakeholder interviews – Scripts) and include the operational questions developed from the evaluation questions tailored for each Action.

A letter of invitation was sent to potential interviewees (also in the Appendix with the scripts).

In some cases, the interviewee had a very specific interest in one of the actions. In other cases, the interviewee had an interest in several actions. In addition, many interviewees wished to answer questions in relation to all evaluation criteria, while others wished to focus on a subset of the criteria. A flexible approach was taken in initial discussion with the interviewee as to which questions under an action were of most interest, and whether more than one action should be covered.

The balance of interviewees was chosen in the light of responses to the targeted stakeholder survey. In particular there was a very low response to the survey from EU institutions and bodies and so a relatively high proportion of interviews was with staff from EU institutions and bodies to ensure that their input was available to the evaluation.

Within the evaluation, it was planned to undertake 50 interviews with 12 originally allocated to case studies and 38 to general interviews of a range of stakeholders for the evaluation. It was intended to undertake a minimum of 3 interviews for each of the actions, with additional interviews anticipated in particular for Action 1, which was anticipated to be a particular focus for Member State input, and Action 6, which covers 3 policy areas.

A3.4 Open public consultation

The public consultation was open for 12 weeks from December 7th 2017 up to March 1st 2018.

The public consultation consisted of a questionnaire containing four sections uploaded to the EU online platform (https://ec.europa.eu/clima/consultations/evaluation-eus-strategy-adaptation-climate-change_en). The full text of the questionnaire is in Appendix 2E.

Part 1 of the survey was to do with characteristics of the respondent, such as the capacity in which they are completing the questionnaire and where they are based. It also included a number of general questions related to adaptation to climate change. These included whether, in their place of living, respondents had experienced unusually frequent or severe events that could be attributed to climate change, and also whether respondents had heard of a number of adaptation initiatives. This part of the survey was open to all respondents including private individuals.

Parts 2 and 3 of the survey were not open to private individuals.

Part 2 sought the extent of agreement from respondents with some preliminary generic conclusions from the study supporting the evaluation. These preliminary generic conclusions were based on the preliminary conclusions in an open summary of the study to support evaluation of the EU Adaptation Strategy that was published alongside the consultation[6].

Part 3 sought the level of agreement with some preliminary specific and technical conclusions from the study supporting evaluation of the EU Adaptation Strategy. As with Part 2, they were based on specific and technical conclusions in the open summary report published along with the survey.[7]

Part 4 of the survey was open to all respondents and provided a free text field for further comments and also the opportunity to upload a document providing further information, comments or suggestions.

[6] Richard Smithers et al, Study to support the evaluation of the EU Adaptation Strategy, Summary, December 2017, https://ec.europa.eu/clima/sites/clima/files/consultations/docs/0035/summary_interim_findings_en.pdf
[7] Ibid

A3.5 Case studies

Four case studies have been 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.

These have been developed as a ½ page summary/box in the main report plus a more detailed 2-page document in this Appendix per case study. the 2 pages provide further details on the background/context to the issue, the nature of the EU response and the lesson learnt and future plans or thoughts.

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.

A3.6 Analytical models

No analytical models were used in this study.

Appendix 4 – Evaluation matrix

The evaluation considers the eight actions of the EU Adaptation Strategy as well as the overall performance of the strategy.

The evaluation matrix below considers the strategic and specific objectives of the strategy and each of the actions. For each action, evaluation questions are considered to address the five themes identified in the Better Regulation guidelines[8] to develop evidence to consider the extent to which the adaptation strategy has:

- Been **relevant** given the needs and its objectives
- Been **effective** and **efficient**
- Been **coherent** both internally and with other EU policy interventions and has
- Achieved **EU added-value.**

The matrix is organised principally by action and then by evaluation theme. Under each theme, the following are considered:

- Evaluation question – these are primary questions [numbered 1, 2 etc]
- Sub-questions – each primary question may be split into several sub questions [each has the same number as the evaluation question with a, b, … added]
- The rationale for posing the sub-question
- Evidence from existing data sources
- Indicators, where available. Many are from the Adaptation Scorecards that are being developed for EU Member States
- What evidence is planned to be gathered from consultation activities. This includes
    - Target stakeholders
    - The relevant question numbers from the targeted stakeholder survey – denoted "SQ" (for Survey Question). The responses to survey questions are reported in Appendix 2b, which in turn includes the complete survey script as an Appendix
    - The relevant question numbers that were used in interviews – denoted "IQ" (for Interview Question). These will either be the relevant sub-question or operationalised question
- Operationalised questions. In most cases the sub-questions are recast as operationalised questions for use with stakeholders. These are tailored for each action. These were used flexibly with stakeholders as starting points for seeking feedback.
- Any additional comments

This is an extract from a spreadsheet version of the evaluation matrix that was used during the project. The spreadsheet format allows easy filtering to examine specific aspects of the matrix.

[8] SWD (2017) 350 final. Available at https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines.pdf

Table 1: Evaluation matrix by action and evaluation theme

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments
Strategic objective: To contribute effectively to a more climate resilient Europe							
1. Does there continue to the need for the EU, and its Member States, to increase resilience to unavoidable climate change?		This question explores if the need for EU action to increase resilience remains (i.e. relevant NEEDS and IMPACT)	Literature on climate change impacts in Europe Literature on resilience to climate change in Europe	N/A	Primary evidence with come from scientific literature rather than stakeholder views.		
2. Is there a need for the objectives of the Strategy to be modified to reflect changes in external factors since the Strategy was published?		This question explores if changes in EXTERNAL FACTORS means that the objectives of the Strategy are less relevant	Paris agreement	N/A	Stakeholders will have opinions on the relative needs Target: • National policy makers • NGOs ***SQ 108, 109***	Op2 How well does the EU Adaptation Strategy respond to the needs to the Paris Agreement?	This will take into account external factors, such as Paris agreement
Objective 1: Promoting Action by Member States							
Relevance							
3. Does there continue to be the need for the promotion of adaptation action at sub-EU level, including the facilitation and exchange of information?		This question explores if the specific OBJECTIVE is still relevant to the need	**This will be answered through the analysis of the individual actions that contribute to this objective**				
Effectiveness							
4. To what extent has the Strategy encouraged actions at the sub-EU level and facilitated the			**This will be answered through the analysis of the individual actions that contribute to this objective**				

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments
exchange and coordination of information?							

Action 1: Encourage Member States to adopt comprehensive adaptation strategies

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
5. To what extent does there continue to be a need for the Commission to encourage MSs to adopt comprehensive adaptation strategies?	5a Is there still a need for MSs to develop comprehensive adaptation strategies? 5b Is there still a need to for the Commission to encourage Member States to adopt comprehensive adaptation strategies? 5c What is the nature of the support that is still needed?	This question explores if there continues to be a need for the specific OUTPUT This question explores if there continues to be a need for the specific ACTIVITIES associated with the action	Review of current adaptation strategies and adaptation scoreboard Committee of the Regions report on adaption progress	N/A	Stakeholders will have opinions on the relative needs Target: • MS policy makers • Local authorities • NGOs • Businesses ***SQ 5, 6*** ***IQ Op5a, Op5b, Op5c***	Op5a Is there still a need for MSs to maintain and develop comprehensive adaptation strategies? Op5b Does there continue to be a need for the Commission to support MSs with the development of adaptation strategies? Op5c What further support do MSs require to help than to adopt comprehensive adaptation strategies?	
Effectiveness							
6. To what extent has the Strategy encouraged Member States to adopt comprehensive adaptation strategies?	6a. What actions have been taken by MSs to adopt comprehensive adaptation strategies over the period 2013 to 2016?	This question explores the evidence on the implementation of adaptation strategies by MS (i.e. ACTIVITIES, OUTPUTS)	Adaptation scoreboard, and performance indicators Review of MS reports under Article 15 of the MMR	1a. A central or federal administration body officially in charge of adaptation policy making 1b. Horizontal (i.e. sectoral) coordination	Interviews/survey can be used to validate the information from the scoreboard, but the scoreboard will be the primary source of evidence Target: • MS policy	Op6a What specific actions have taken place at MS level to enhance climate adaptation?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
				mechanisms exist within the governance system, with division of responsibilities 1c. Vertical (i.e. across levels of administration) coordination mechanisms exist within the governance system, enabling lower levels of administration to influence policy making. 2a. A dedicated process is in place to facilitate stakeholders' involvement in the preparation of adaptation policies 2b. Transboundary cooperation is planned to address common challenges with relevant countries	makers • NGOs • Businesses ***SQ 4*** ***IQ Op6a***		
	6b What is the quality of the outputs (National Adaptation Strategies) produced by this action?	The above question will provide an indication of whether the NAS were produced or not. Yet it is important to	Desk review of National Adaptation Strategies, Use of country fiches	N/A	Survey/ Stakeholder interviews will provide insight into perceived quality of strategies. Target:	OP6b1 What is your opinion on the quality of the national adaptation strategies with which you are most familiar? OP6b2 How would	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
		reflect on their quality – as the adequacy of the guidelines would affect this.			• MS policy makers • NGOs ***SQ 7, 8*** ***IQ Op6b1, OP6b2, Op6b3***	you rate the quality of the NAS [in general / or of country x]? - scale: Very good, good, sufficient, insufficient, don't know. OP6b3 How do you reach that judgement – in terms of how it meets your expectations, or in terms of how it compares with other national strategies?	
	6c When did MSs adopt adaptation strategies?	The timing may indicate the influence of the Strategy – for example if the strategies were in place prior to the EU Strategy	Impact Assessment of the Adaptation Strategy and associated research Adaptation scoreboard, and performance indicators	Number of MS with national strategies prior to the implementation of the EU Strategy (As of January 2013, 15 EU Member States have adopted national adaptation strategies[9])	Interviews/survey will help to clarify or update progress on implementation. Target: • MS policy makers ***IQ Op6c***	Op6c When was the adaptation strategy (or elements of it) implemented?	

[9] https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/swd_2013_134_en.pdf

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	6d To what extent do MS' Adaptation Strategies follow the Commission's guidelines?	This explores the effectiveness of the Commission's INPUTS	Commission's Guidelines. Desk review – comparison of selected strategies with the Commission's guidelines		Stakeholder interviews or Survey can be used to explore the use of the Commission's guidelines Target: • MS policy makers ***SQ 9, 10*** ***IQ Op6d1, Op6d2***	Op6d1 Did you consciously choose to follow the Commission's guidelines in the preparation of the Strategy? Op6d2 How useful did you find the guidelines? – scale: very useful, useful, not useful, did not use	
	6e To what extent can the EU Adaptation Strategy reasonably expect to take some credit for these actions?	Building on the above, this is concerned with the extent to which any observed action can be attributed to the Adaptation Strategy		Proportion of stakeholder responses indicating that the EU Adaptation Strategy was an important influence on this outcome	Interviews/Survey may be able to provide some evidence on the role that the EU Strategy has played at national level – including any specific examples Target: • MS policy makers • NGOs • Businesses ***SQ 12*** ***IQ Op6e1, Op6e2***	Op6e1 To what extent can the EU Adaptation Strategy take some credit for actions have taken place at MS level to enhance climate adaptation? Op6e2 What actions would have taken place in the absence of EU action to encourage adaptation plans?	Overlap with EU added value

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
7. What other factors may have influenced action by Member States to adopt comprehensive adaptation strategies?	7a What other factors may have influenced the development of national adaptation strategies in Member States?	This is concerned with the EXTERNAL FACTORS influencing the translation of INPUTS to OUTPUTS	Possible evidence from literature on development of adaptation policy landscape in specific MSs		Interviews/survey may be able to provide some evidence of the external factors that were important, and also the relative importance of the individual factors Target: • MS policy makers • NGOs • Businesses ***SQ 15*** ***IQ Op7a, Op7b***	Op7a What other factors have influenced actions taken MS level to enhance climate adaptation? Op7b What is the relative importance/strength of these actions?	Alternative questions: What recent events have increased the interest of MS for undertaking adaptation action? What recent events have reduced the interest of MS for adaptation?
	7b What has been their relative strength?	This seeks to understand the relative importance of the different EXTERNAL FACTORS					
	7c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors					
8. What drivers/barrier stood in the way of Member States adopt comprehensive adaptation strategies?	8a What drivers have stimulated, or barriers have stood in the way of Member States developing national adaptation strategies?	This is concerned with the EXTERNAL FACTORS	Commission's Guidelines on developing adaptation strategies discussed the barriers.		Interviews/survey may be able to provide some evidence of the external factors that were important, and also the relative importance of the individual factors Target: • MSs • NGOs • Businesses	Op8a What specific barriers stood in the way of Member States developing national adaptation strategies? OP8b Did the EU Adaptation Strategy help to overcome any of these barriers?	
	8b How did these drivers/barrier affect implementation?	This seeks to understand the relative importance of the different external factors					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
					SQ Op8a, Op8b		
9. To what extent has the adoption of comprehensive adaptation strategies enhanced the preparedness and capacity of MS to respond to the impacts of climate change?	9a Has the adoption of comprehensive adaptation strategies been successful in enhancing the preparedness and capacity of MS to respond to the impacts of climate change?	This checks if the OUTPUTs have led to the desired IMPACTs		Overall results of the Scoreboard?	Interviews/survey may be able to provide some views on whether the national strategies have actually increased preparedness and capacity in practice Target: • MSs • NGOs • Businesses ***SQ 13, 14*** ***IQ Op9a1, Op9a2***	Op9a1 Has the adoption of comprehensive adaptation strategies been successful in enhancing the preparedness and capacity of MS to respond to the impacts of climate change? Op9a2 Why do you consider this is the case?	
Efficiency							
10. How adequate were the resources for Action 1: Encouraging MS to adopt comprehensive adaptation strategies?	10a Which resources were made available to produce the EC guidelines on preparing a national adaptation strategy?	Need to identify the resources (INPUTS) made available for the action to provide basis for assessment of adequacy and proportionality.	Desk review of EC documentation	N/A	May need to follow-up in interview with EC stakeholders if not available through desk research Target: • EC	Op10a1 Approximately how much time was spent preparing and disseminating the EC guidelines on preparing a national adaptation strategy?	If interviewed, ask EC to reflect on the adequacy of the resources.

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	10b What other EC resources were provided in support of this action?				***IQ Op10a1, Op10a2, Op10b1***	Op10a2 What other costs were involved in the preparation of the guidelines e.g. consultancy costs Op10b1 What other EC resources were provided in support of this action?	
11. How do the different stakeholders view the monitoring of the implementation of Action 1? Encouraging MS to adopt comprehensive Adaptation Strategy? Which aspects are perceived as an unnecessary burden, if any, and to what extent?	11a What is the effort involved in the preparation of the national Adaptation Strategy?	To get stakeholders' views on the benefits of monitoring implementation		N/A	Stakeholder interviews. Target: • MSs ***IQ Op11a1, Op11b1, Op11c1***	Op11a1 How much efforts was involved in the preparation of the Adaptation Strategy?	Very specific question that only MSs can answer
	11b How much time is spent monitoring implementation of the Strategy using the Commission's guidelines?	To understand what the burden of the monitoring activities is.				Op11b1 What did it cost in terms of staff time and other resources to prepare the Adaptation Strategy?	It may be necessary to prepare a separate admin burdens questionnaire
	11c How appropriate is the level of effort required?	To get views on the appropriateness of the burden.				Op11c1 If you followed the Commission's guidelines, what aspects are unnecessary, if any?	
Coherence							
12. To what extent is the development of comprehensive adaptation strategies, as	12a To what extent have the actions taken to develop comprehensive adaptation	This question explores the evidence on the coherence of Action 1 with actions required at	Literature may include studies on coherence. Comparisons can be made with	No relevant indicators	Interviews/survey can be used to understand stakeholder views on coherence in	Op12a1 Has the development of comprehensive adaptation strategies, as encouraged by the	What could also be added here is whether it was effective to link other EU policies (e.g. ESIF

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
encouraged by the EU Strategy, coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	strategies, in response to the Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	other levels	requirements for MSs e.g. Paris agreement		this area Target: • MSs • NGOs • Businesses ***SQ 16, 17*** ***IQ Op11a1, OP11b1, Op11c1***	EU Strategy, fitted well with, and reinforced, other adaptation policies and initiatives, or the reverse? Op12b1 What, if any, are areas where development of comprehensive adaptation strategies, as encouraged by the EU Strategy, has not fitted well with, and reinforced, other adaptation policies and initiatives? Op12c1 What could be done to improve the fit of comprehensive adaptation strategies, as encouraged by the EU Strategy with other adaptation policies and initiatives?	funding) to the existence of such strategies
	12b What are the areas where there is less coherence?						
	12c What could be done to improve coherence in these areas?						

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
EU Added value							
13. To what extent have the activities associated with the EU Adaption Strategy, to support the development of comprehensive adaptation strategies at national level, added value compared to what would have resulted from an action at regional or national level?	13a What would have happened in the absence of the Commission's activities to develop guidelines for preparing Adaptation Strategies, and preparing the Adaptation Scoreboard?	This question explores the added value of one of the main ACTIVITIES associate with this action	Review of National Adaptation Strategies prepared prior to the Commission's guidelines being published Evidence from the original impact assessment	No relevant indicators	Interviews/survey can be used to understand the added value of the Guidelines Target: • EU • MSs • NGOs • Businesses ***SQ 18*** ***IQ Op13a1, Op13a2***	Op13a1 In the absence of Commission action to encourage the development of a national adaptation strategy, would equivalent pressure have been applied by other institutions, e.g. at national level? Op13a2 How useful do you find the Adaptation Scoreboard? – scale: very useful, useful, not useful	Links to effectiveness question on the use of the Commission's guidelines

Action 2: Funding to support capacity building and step-up adaptation actions

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
14. To what extent does there continue to be a need for the Commission to fund capacity building projects for climate action at MS level?	14a Is there still a need for capacity building in Member States with respect to climate action?	This question explores if there continues to be a need for the specific OUTPUT	LIFE programme documents, and evaluation results Evidence of adaptation projects supported by MS activities		Mid-term evaluation of LIFE programme is on-going so original plan was that, rather than duplicate activities we propose to draw on the results of this evaluation. Whilst no questions were included in the survey, some interviews were held on LIFE. ***IQ 14a, 14b, 14c***	Sub-questions were used as starting point for interview questions	
	14b Is there still a need to for the Commission to fund capacity building projects for climate action at MS level?	This question explores if there continues to be a need for the specific ACTIVITIES associated with the action					
	14c What is the nature of the support that is still needed?						

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Effectiveness							
15. To what extent has the EU Adaptation Strategy steered LIFE funding for adaptation?	15a What funding has been provided for adaptation actions under the LIFE programme over the period 2014 to 2016?	This is the measure of the level of INPUT by the Commission	Adaptation scoreboard, and performance indicators	7a Funding is available to increase climate resilience in vulnerable sectors and for cross-cutting adaptation action	As above ***IQ 15a***	As above	
	15b What types of actions/projects have been implemented by MS in relation to adaptation?	This explore the projects that have been implemented (ACTIONS/OUTPUTS)	LIFE Multi-annual work plan for 2014-2017 Project selection statistics Example of LIFE adaptation projects: http://ec.europa.eu/environment/life/publications/lifepublications/lifefocus/documents/climatechangeadaptation.pdf Ongoing LIFE projects: http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_pr	LIFE has its own performance indicators which we could also draw upon.	As above ***IQ 15b***	As above	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
			oj_id=6139 (Life Integrated project in Denmark, flood management) https://www.urbanadapt.eu/ (Urban adaptation in the Netherlands) http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5679 (strengthening governance in Spain and Portugal)				
	15c To what extent have projects helped to promote adaptation in the vulnerable areas described in the Strategy e.g. cross-border management	This explore the RESULTS	Relevant outputs from the mid-term evaluation of the LIFE Programme on environment and climate (2017) LIFE evaluation opinions from EESC and COR	Adaptation scoreboard includes all sources of finance, so LIFE funding as a proportion of total funding can be expressed.	As above ***IQ 15c***	As above	The specific action refers to LIFE funding, but the indicator also captures other source, inc EU sources (EFSI). It would thus be important to put LIFE funding in the context of the total, where data allows.

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	15d To what extent have the supported projects helped to establish vulnerability assessments and adaptation strategies, including those with a cross-border nature.	This explore the RESULTS	Relevant outputs from the mid-term evaluation of the LIFE Programme on environment and climate (2017)	.	As above ***IQ 15d***	As above	
	15e To what extent have the supported projects promoted awareness-raising on adaptation, including indicators, risk communication and management.	This explore the RESULTS	Relevant outputs from the mid-term evaluation of the LIFE Programme on environment and climate (2017)	.	As above ***IQ 15e***	As above	
16. What drivers/barrier stood in the way of Member States implementing adaptation projects	16a What drivers/barriers stood in the way of Member States implementing adaptation projects?	This is concerned with the EXTERNAL FACTORS	Relevant outputs from the mid-term evaluation of the LIFE Programme on environment and climate (2017)		As above ***IQ 16a, 16b***	As above	
	16b How did these drivers/ barriers affect implementatio	This seeks to understand the relative importance of					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	n?	the different external factors					
Efficiency							
17. How adequate were the resources for Action 2: Funding to support capacity building and step-up adaptation actions?	17a Which resources were made available through LIFE+ to support capacity building and step-up adaptation plans?	Need to identify the resources (inputs) made available for the action to provide basis for assessment of adequacy and proportionality .	Desk review of existing LIFE programme documents	7a. Funding is available to increase climate resilience in vulnerable sectors and for cross-cutting adaptation action	As above ***IQ 17a, 17b***	As above	
	17b Were the projects supported under LIFE+ sufficient to achieve the desired level of capacity building?	It is important understand the sufficiency of the outputs to understand if resources were adequate.					
Coherence							
18. To what extent has the support to capacity building and stepping up adaptation action provided by the LIFE projects,	18a To what extent has the support to capacity building provided by the LIFE projects, been	This question explores the evidence on the coherence of Action 2 with actions required at other levels	Literature may include studies on coherence. LIFE Mid-term evaluation contains information on coherence.	N/A	As above ***IQ 18a, 18b, 18c***	As above	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives • Funding programmes	coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives		Comparison can be made with other project facilities at EU and MS level				
	18b What are the areas where there is less coherence?						
	18c What could be done to improve coherence in these areas?						
EU Added value							
19. To what extent have the projects supported by the LIFE programme, to support capacity building and step-up adaptation actions, added	19a What was the added value of the LIFE programme projects in the climate adaptation area?	This question explores the added value of the main activities associate with this action	Mid-term evaluation of the LIFE Programme should already have covered this.	No relevant indicators	As above ***IQ 19a***	As above	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
value compared to what would have resulted from an action at regional or national level?							

Action 3: Encourage adaptation at the sub-national and local level

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
20. To what extent does there continue to be a need for the Commission to encourage adaptation at the sub-national and local level?	20a Is there still a need for adaptation at the sub-national and local level in Member States? 20b Is there still a need to for the Commission to promote action at the sub-national and local level i.e. by promoting CoM? 20c What is the nature of the support that is still needed?	This question explores if there continues to be a need for the specific OUTPUT This question explores if there continues to be a need for the specific ACTIVITIES associated with the action	EEA reports on Urban Adaptation Committee of the Regions report on adaption progress CoM programme documents and evaluation results Relevant input from the Mayors Adapt final report (2017; to be finalised) Relevant input from the mid-term evaluation of the Mayors Adapt initiative (2014) Urban Agenda for the EU, partnership on climate adaptation		Stakeholders will have opinions on the relative needs Target: • National policy makers • Local authorities • NGOs • Businesses ***SQ 22*** ***IQ Op20a, Op20b, Op20c***	Op20a Is there still a need within Member States for adaptation at the sub-national and local level? Op20b Does there continue to be a need for the Commission to encourage action at the local and sub-national level i.e. by promoting the CoM? Op20c What specific capacity building support is required at sub-national and local level with respect to adaptation actions?	
Effectiveness							
21. To what extent have the cooperative mechanisms of the Covenant of Mayor	21a What cooperation mechanisms have been supported by the Commission to	The action taken by the commission/Strategy was notably to launch the CoM so this is about	Adaptation scoreboard, and performance indicators Committee of the Regions report on	1c. Vertical (i.e. across levels of administration) coordination mechanisms exist within the	Stakeholder interviews and survey with those involved in CoM would provide evidence on the	Op21a1 Does the CoM framework foster adaptation action at local and sub-national level? Op21a2 How has	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
framework helped to promote action at local and sub-national level?	foster adaptation at local and sub-national level, over the period 2013 to 2016?	exploring what mechanisms were carried out (INPUTS, ACTIVITIES), and links to the relevant indicator.	adaption progress Relevant input from the Mayors Adapt final report (2017; to be finalised) Relevant input from the mid-term evaluation of the Mayors Adapt initiative (2014)	governance system, enabling lower levels of ***administration*** to influence policy making. 9b. Cooperation mechanisms in place to foster and support adaptation at relevant scales (e.g. local, subnational) 10c Monitoring and reporting: Information on regional, sub-national or local action is collected and disseminated CoM has its own performance indicators which we could also draw upon.	effectiveness of CoM, but this is more about the role of the Strategy in supporting CoM ***SQ 22, 25*** ***IQ Op21a1, Op21a2,***	the Commission's activities to support the CoM framework helped with its success in relation to climate change adaptation?	
	21b How many EU cities are engaged in the CoM framework, including making voluntary commitments?	Highlights the level of commitment across the EU to take up adaptation action through sub-national mechanisms.	Reports from the consortium implementing the Mayors Adapt and new Covenant of Mayors for Climate and Energy initiatives		Verify information in reports through stakeholder interviews/ surveys with relevant experts Target: • Local Authorities ***SQ 24*** ***IQ Op21b***	Op21b What impact has the Covenant of Mayors had on your City's adaptation policy? (Direction; coverage; effectiveness)	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	21c What actions have been taken at sub-national and local level within MSs to adopt comprehensive adaptation strategies?	This question explores the evidence on the implementation of adaptation strategies by local authorities (i.e. ACTIVITIES, OUTPUTS)	Reports from Mayors Adapt, Cities Adapt		***IQ Op21c***	Op21c What actions have been taken at sub-national and local level within MSs to adopt comprehensive adaptation strategies?	
22. What other factors may have influenced adaptation action at sub-national and local level	22a What other factors may have influenced adaptation action at sub-national and local level	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS			Interviews/ survey may provide evidence Target: • MSs • Local and regional authorities networks • NGOs • Businesses ***SQ 26*** ***IQ Op22a, Op22b, Op22c***	Op22a What other factors may have influenced adaptation action at sub-national and local level Op22b What has been their relative strength? Op22c Where these factors expected or unexpected when the Strategy was launched?	?
	22b What has been their relative strength?	This seeks to understand the relative importance of the different external factors					
	22c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors					
23. What drivers/barrier stood in the way of adaptation action at sub-national and local level?	23a What drivers have stimulated, or barriers have stood in the way of adaptation action at sub-national/ local level	This is concerned with the EXTERNAL FACTORS	Committee of the Regions report on adaption progress	No relevant indicators	Interviews/survey may be able to provide some evidence of the external factors that were important, and	Op23a1 What specific barriers stood in the way of adaptation action at sub-national and local level?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	23b How did these drivers/barrier affect implementation?	This seeks to understand the relative importance of the different external factors			also the relative importance of the individual factors Target: • MSs • Local and regional authorities networks • NGOs • Businesses ***SQ (relates to) 26, 27*** ***IQ Op23a1, Op23a2, Op23b***	Op23a2 Did the EU Adaptation Strategy help to overcome any of these barriers? Op23b What other drivers stimulated adaptation action at sub-national and local level?	
24. To what extent has the cooperative mechanisms of the Covenant of Mayors framework helped to enhance the preparedness and capacity at the sub-national and local level to respond to the impacts of climate change?	24a Has the adoption of the cooperative mechanisms of the Covenant of Mayors framework been successful in enhancing the preparedness and capacity at the sub-national and local level to respond to the impacts of climate change?	This checks if the OUTPUTs have led to the desired IMPACTs	Committee of the Regions report on adaption progress				This is more about the effectiveness of CoM, so best to refer back to CoM evaluation data
Efficiency							
25. How adequate were the	25aWhich resources were	Need to identify the resources (inputs)	Desk review of existing sources	No relevant indicators	May need to follow-up on with	Op25a Which resources were	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
resources for Action 3: Encouraging adaptation at the sub-national and local level?	made available to fund CoM?	made available for the action to provide basis for assessment of adequacy and proportionality.			EC & CoM stakeholders if not available through desk research **IQ Op25a**	made available to the CoM?	
	25b Has the level of support of CoM been sufficient to support sub-national and local level adaptation action?	It is important understand the sufficiency of the outputs to understand if resources were adequate.			May need to follow-up with Stakeholder interviews or survey (MS, EC) ***IQ Op25b1, Op25b2***	OP25a1 Have the activities supported under CoM been sufficient to encourage adaptation at the sub-national and local levels, e.g. development and implementation of local adaptation strategies/plans? Op25a2 What more could have been achieved with additional resources? What would have been the cost in terms of effectiveness had available resources been lower?	In interview follow-up on how the situation could be improved.
26. How do the different stakeholders view the monitoring and reporting within the CoM?	26a What are the monitoring and reporting arrangements? And how do CoM participants perceive them?	To get stakeholders' view on this monitoring and reporting of implementation		No relevant indicators	Stakeholder interviews (CoM participants) ***IQ Op26a1, Op26a2, Op26b, Op26c***	OP26a1 Are you aware of the monitoring and reporting arrangements for the CoM? Op26a2 If so, what do you think of the monitoring and reporting arrangements for	Possible (and preferable) that sufficient answers to these questions can be found in desk review
	26b Which resources are spent on these?	To understand what the burden of the monitoring activities is.					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	26c How appropriate is the level of effort required?	To get views on the appropriateness of the burden.				CoM? Op26b What does it cost in terms of staff time and other resources to prepare the monitoring and reporting updates for CoM? Op26c How appropriate do you find this level of effort and resources? How could this be improved?	
Coherence							
27. To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or	27a To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	This question explores the evidence on the coherence of Action 3 with actions required at other levels	Literature may include studies on coherence.	No relevant indicators	Interviews/survey can be used to understand stakeholder views on coherence in this area Target: • MSs • NGOs • Businesses **SQ 28, 29** **IQ Op27a1, Op27a2, Op28b, Op28c**	Op27a1 Has CoM activity fitted well with, and reinforced, other adaptation activity in your MS, or the reverse? OP27a2 Has CoM activity fitted well with other activity to encourage effective local decision-making in your MS? Op27b In what areas, if any, does the CoM activity not fit well with other adaptation activities? Op27c Are there any specific aspects	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
sub-nations initiatives •	What are the areas where there is less coherence? What could be done to improve coherence in these areas?					which could be added to the Strategy or changes, to make it more coherent with respect to National Adaptation Strategies.	
EU Added value							
28. To what extent have the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, added value compared to what would have resulted from an action at regional or national level?	What was the added value of the Commission's activities to promote the CoM initiative in relation to adaptation action?	This question explores the added value of the main activities associate with this action	CoM programme documents may cover some of this National action on urban adaptation in EEA Member states (Breil and Swart, 2015)	No relevant indicators	Interviews/survey can be used to understand stakeholder views on added value of these activities. Target: • MS Government • Local Authorities • NGOs ***SQ 30*** ***IQ Op28a***	OP28a In the absence of Commission action to encourage the CoM, would an equivalent level of progress have been made?	

Objective 2: To further the understanding of adaptation, improve and widen the knowledge base and enhance dissemination of adaptation-related information

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
29. Does there continue to be the need to enhance understanding by stakeholders of the vulnerability of the EU to climate change impacts, and the actions being taken to improve resilience?	Does there continue to be the need to enhance understanding by stakeholders of the vulnerability of the EU to climate change impacts, and the actions being taken to improve resilience?	This question explores if the need for EU action to further understanding of adaptation remains (i.e. relevant IMPACT)	**This will be answered through the analysis of the individual actions that contribute to this objective**				
Effectiveness							
30. To what extent has the Strategy helped address knowledge and information gaps in order to promote better informed decision making with respect to climate impacts and adaptation?	To what extent has the Strategy helped address knowledge and information gaps in order to promote better informed decision making with respect to climate impacts and adaptation?		**This will be answered through the analysis of the individual actions that contribute to this objective**				

Action 4: Bridging the knowledge gap

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
31. To what extent does there continue to be a need for the Commission to bridge the knowledge gap with respect to adaptation-related information?	31a Are there still important knowledge gap with respect to adaptation-related information in the EU?	This question explores if there continues to be a need for the specific OUTPUT	Original impact assessment identified the knowledge gaps Commission study on knowledge gaps		Stakeholders will have opinions on the relative needs Target: • National policy makers • Local authorities • NGOs • Businesses **SQ 34** **IQ Op31a, OP31b, Op31c**	Op31a Are there still important knowledge gaps with respect to adaptation-related information in the EU? Op31b If so, does there continue to be the need for the Commission to bridge any such knowledge gap? Op31c What specific knowledge gaps can be best addressed through EU action?	
	31b If so, does there continue to be the need for the Commission to bridge any such knowledge gap?	This question explores if there continues to be a need for the specific ACTIVITIES associated with the action					
	31c What is the nature of the support that is still needed?						
Effectiveness							
32. To what extent have the actions taken in response to the Strategy helped to bridge the knowledge gap and led to better informed decision making?	32a What actions have been taken to identify and address any knowledge gaps, over the period 2013 to 2016?	Understanding the current landscape through identifying knowledge gaps that need to be addressed that may result in more effective decision making.	Adaptation scoreboard, and performance indicators Impact Assessment for the Strategy Within institutions involved in the delivery of the Strategy –	4a/b. Work is being carried out to identify and address the knowledge gaps 5c. Capacity building activities take place; education and training materials on climate change adaptation	Stakeholder workshop will focus on better information decision making. In addition stakeholder views were sought by survey and interview. Target:		
	32b To what extent can these actions be said to	Identifying whether knowledge gaps					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	have led to better informed decision making?	are the reason for poor decision making choices	trainings delivered Commission funded report on knowledge gaps Any evaluation of JRC outputs?	concepts and practices are available and disseminated	• MS • Researchers ***SQ 35, 36, 37, 44*** ***IQ 32a, 32b, 32c***		
	32c What funding has been made available to address these knowledge gaps?	Are resources available to address gaps identified					
33. What other factors may have helped to bridge the knowledge gap and led to better informed decision making	33a What other activities may have helped to bridge the knowledge gap and led to better informed decision making?	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS			Interviews/survey Target: • Researchers • MSs ***SQ 38*** ***IQ Op33a, Op33b, Op33c***	Op33a What other research activities supported at national or local level have helped to address key knowledge gaps? OP33b What has been their relative strength? OP33c Were these factors expected or unexpected when the Strategy was launched?	
	33b What has been their relative strength?	This seeks to understand the relative importance of the different external factors					
	33c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors					
34. What drivers/barrier stood in the way of efforts to bridge the knowledge gap and better informed decision making?	Op34a What drivers have stimulated, or barriers have stood in the way of efforts to bridge the knowledge gap and better informed decision making?	This is concerned with the EXTERNAL FACTORS			Interviews/survey may be able to provide some evidence of the external factors that were important, and also the relative importance of the	OP34a1 What specific barriers stood in the way of EU activities to increase knowledge of climate change impacts and adaptation?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	Op34b How did these drivers/barrier affect implementation?	This seeks to understand the relative importance of the different external factors			individual factors Target: • MSs • Researchers ***SQ 39, 40, 41*** ***IQ OP34a1, Op34a2, Op34b***	Op34a2 What specific barriers stood in the way of the use of this information in decision making? Op34b Did the EU Adaptation Strategy help to overcome any of these barriers?	
35. To what extent has bridging the knowledge gap led to and increased understanding of climate change risks better informed decision making	35a Has the Commission's efforts to bridge the knowledge gap been successful in leading to better informed decision making?	This checks if the OUTPUTs have led to the desired IMPACTs			Target: • MSs • Researchers ***SQ 40, 41,42, 43*** ***IQ Op35a***	Op35a How has the JRC analysis been used to inform decision making?	
Efficiency							
36. How adequate were the resources for Action 4: Bridging the knowledge gap?	36a Which resources were made available to fund relevant H2020, JRC and other activities?	Need to identify the resources (inputs) made available for the action to provide basis for assessment of adequacy and proportionality.	Desk review of statistics and programme documents		May need to follow-up on with EC if not available through desk research ***IQ Op36a***	Op36a Which resources were made available to H2020, JRC and other activities with the purpose of bridging knowledge gaps?	
	36b Has the level of support been sufficient to support bridging knowledge gaps?	It is important understand the sufficiency of the OUTPUTS to understand if resources were			May need to follow-up with Stakeholder interviews or survey (MS, EC) ***IQ Op36b***	Op36b Have the activities supported under H2020, JRC, etc; been sufficient to bridge knowledge	In interview follow-up on how the situation could be improved.

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
		adequate.				gaps?	
Coherence							
37. To what extent have the actions taken to bridge the knowledge gap, in response to the Strategy, led to better informed decision making, coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	37a To what extent have the actions taken to bridge the knowledge gap, in response to the Strategy, led to better informed decision making? • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives 37b What are the areas where there is less coherence? 37c What could be done to improve coherence in these areas?	This question explores the evidence on the coherence of Action 5 with actions required at other levels	Literature may include studies on coherence.	No relevant indicators	Interviews/survey can be used to understand stakeholder views on coherence in this area Target: Researchers ***SQ 45, 46, 47*** ***IQ Op37a, Op37b, Op37c***	Op37a Has the research supported under H2020, and the research carried out by JRC, fitted well with, and reinforced, other adaptation research in your MS, or the reverse? Op37b What, if any, are areas where research supported under H2020, and the research carried out by JRC, has not fitted well with, and reinforced, other adaptation research in your MS? Op37c What could be done to improve the fit of adaptation research supported under H2020 or carried out by JRC with	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
						other adaptation research in your MS?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
EU added value							
38. To what extent have the Commission's activities to bridge the knowledge gap with respect to adaptation, as part of the EU Strategy, added value compared to what would have resulted from an action at regional or national level?	38a What was the added value of the Horizon 2020 funded projects on Adaptation?	This question explores the added value of the main activities associate with this action	Existing evaluations of H2020 projects	No relevant indicators	Interviews/survey can be used to understand stakeholder views on coherence in this area Target: Researchers ***SQ 38*** ***IQ OP38a, OP38b (denoted Op38a1 and Op38a2 in the script)***	Op38a In the absence of Commission action to address the knowledge gaps through supporting research in H2020, would an equivalent level of progress have been made? Op38b In the absence of Commission action to address the knowledge gaps through the activities of JRC, would an equivalent level of progress have been made?	
	38b What was the added value of the of the work of the JRC on EU climate impacts and vulnerability?	This question explores the added value of the main activities associate with this action	Existing evaluations of JRC projects				

Action 5: Further development of Climate-ADAPT

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
39. To what extent does there continue to be a need for the Commission to further develop a one-stop shop, for adaptation information in Europe?	39a Is there still a need for a one-stop shop, for adaptation related information in the EU?	This question explores if there continues to be a need for the specific OUTPUT	Climate ADAPT user statistics will inform the evidence on the need EEA evaluation of Climate ADAPT	N/A	EEA Evaluation of Climate ADAPT is on-going so original plan was to draw on the results of this evaluation. Because of timing and coverage it was then decided to include stakeholder questions. Target • MSs • Researchers ***SQ 52*** ***IQ 39a, 39b, 39c***	Used sub-questions	
	39b Is there still a need to for the Commission to provide and/or facilitate a one-stop shop, for adaptation related information in the EU ?	This question explores if there continues to be a need for the specific ACTIVITIES associated with the action					
	39c What is the nature of the support that is still needed?						
Effectiveness							
40. To what extent has the further development of Climate-ADAPT led to better informed decision making	40a What further updates to Climate-ADAPT have happened through the implementation	To explore what further developments of Climate-ADAPT resulted in more informed	Adaptation scoreboard, and performance indicators Review of Climate-ADAPT website and	5a Adaptation relevant data and information is available to all stakeholders, including policymakers (e.g. through a dedicated website or other	Stakeholder workshop will focus on better information decision making.	Used sub-questions	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	of the EU Adaptation Strategy, over the period 2013 to 2016? 40b How is this monitored? 40c To what extent have these developments contributed to more informed decision making under the Strategy?	decision making by Member States	related plans EEA evaluation of Climate ADAPT	comparable means). 10a. Monitoring and reporting: Information on NAS/NAP implementation is collected and disseminated, Climate ADAPT has its own performance indicators which we could also draw upon.	Further stakeholder views are sought. Target • MSs • Researchers ***SQ 53, 54, 55, 56*** ***IQ 40a, 40b, 40c***		
41. What other factors may have led to better informed decision making on climate related issues	41a What other factors may have influenced the availability of information on climate change for use in decision making	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS	As above	No relevant indicators	Target • MSs • Researchers ***IQ 41a, 41b, 41c***	Used sub-questions	
	41b What has been their relative strength?	This seeks to understand the relative importance of the different external factors					
	41c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
42. What drivers/barrier stood in the way of efforts to bridge the knowledge gap and better informed decision making?	42a What drivers have stimulated, or barriers have stood in the way of efforts to further develop Climate ADAPT?	This is concerned with the EXTERNAL FACTORS	As above	As above	Target • MSs • Researchers ***IQ 42a, 42b***	Used sub-questions	
	42b How did these drivers/barrier affect implementation?	This seeks to understand the relative importance of the different external factors					
43. To what extent has the further development of climate ADAPT led to an increased understanding of climate change risks and better informed decision making	43a Has the further development of Climate ADAPT led to better informed decision making?	This checks if the OUTPUTs have led to the desired IMPACTs	As above	As above	Target • MSs • Researchers ***IQ 43a***	Used sub-questions	
Efficiency							
44. How adequate were the resources for Action 5: Further develop a one-stop shop for adaptation information in Europe?	44a What resources were made available to fund and improve Climate-ADAPT?	Need to identify the resources (INPUT) made available for the action to provide basis for assessment of adequacy and proportionality.	As above	As above	Target • MSs • Researchers ***IQ 44a***	Used sub-question	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	44b Has the level of support been sufficient to turn CLIMATE ADAPT into a one-stop shop for adaptation information in Europe?	It is important understand the sufficiency of the outputs to understand if resources were adequate.	As above	As above	Target • MSs • Researchers ***IQ 44b***	Used sub-question	
Coherence							
45. To what extent is the development of comprehensive adaptation strategies, as encouraged by the EU Strategy, coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	45a To what extent is the development of comprehensive adaptation strategies, as encouraged by the EU Strategy, coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	This question explores the evidence on the coherence of Action 5 with actions required at other levels	As above	As above	Target • MSs • Researchers ***IQ 45a, 45b, 45c***	Used sub-questions	
	45b What are the areas where there is less coherence?						

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	45c What could be done to improve coherence in these areas?						
EU added value							
46. To what extent has the Commission's activities to further develop Climate ADAPT, as part of the EU Strategy, added value compared to what would have resulted from an action at regional or national level?	46a To what extent has the Commission's activities to further develop Climate ADAPT, as part of the EU Strategy, added value to existing horizontal and vertical actions at MS level?	This question explores the evidence on the added value of Action 5 with actions required at other levels	As above	No relevant indicators	Target • MSs • Researchers ***IQ 46a***	Used sub-questions	

Objective 3: To develop initiatives for a consistent and comprehensive integration of climate change adaptation considerations into sectors closely integrated at EU level via common policies

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
47. Does there continue to the need to more consistently and comprehensively integrate climate change adaptation considerations into decision making with key European sectors?	47a Does there continue to the need to more consistently and comprehensively integrate climate change adaptation considerations into decision making?	This question explores if the need for EU action to further support integration of climate change adaptation consideration into relevant sectors (i.e. relevant IMPACT)	**This will be answered through the analysis of the individual actions that contribute to this objective**				
Effectiveness							
48. To what extent has the Strategy encouraged the climate proofing of EU actions?	48a To what extent has the Strategy encouraged the climate proofing of EU actions?		**This will be answered through the analysis of the individual actions that contribute to this objective**				

Action 6: Climate-proofing of CAP, Cohesion policy and CFP promoted adaptation in key vulnerable sectors

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
49. To what extent does there continue to be a need for the Commission to support the climate-proofing of EU actions?	49a Is there still a need to integrate climate change considerations into EU programmes? 49b Is there still a need to for the Commission to develop regulations and guidelines to support the climate proofing of EU actions? 49c What is the nature of the support that is still needed?	This question explores if there continues to be a need for the specific OUTPUT This question explores if there continues to be a need for the specific ACTIVITIES associated with the action	Research reports on mainstreaming of EU programmes European Court of Auditors report MFF climate tracking study (on going) Possibly: ENEA-MA Working Group report on mainstreaming	N/A	Stakeholders will have opinions on the relative needs Target: • European Commission • National policy makers • Local authorities • NGOs • Businesses **SQ 60, 61, 62, 63** **IQ OP49a1, Op49a2, Op49b, Op49c**	Op49a1 How well are climate adaptation considerations taken into account in EU actions i.e. climate-proofing of operational programmes? Op49a2 Is there a need to better integrate climate change adaptation considerations into EU programmes? Op49b Is there a need for the Commission to develop further regulations and guidelines to support the climate proofing with respect to adaptation? Op49c In what areas is further strengthening required?	Which directorates were expected to have an important task regarding the climate-proofing of their legislation and policies? Which sectors / EU directorates have taken up climate change in their legislation and policies? Do they need further support? Which directorates are still missing in the network and why? Which parts of EU legislation urgently needs to be revised because of climate change? Are you aware of any updating processes of EU policies and legislation to ensure more resilience against climate change?

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Effectiveness							
50. Action 6: Climate-proofing of CAP, Cohesion policy and CFP promoted adaptation in key vulnerable sectors?	50a How has climate change adaptation been considered in key vulnerable sectors within environmental impact assessments within: i. The CAP ii. Cohesion policy iii. CFP over the period 2013 to 2016	To understand the extent to which climate change adaptation has been embedded horizontally.	Adaptation scoreboard, and performance indicators Relevant guidelines and regulations for EU programmes	8a Consideration of climate change adaptation has been included in the national frameworks for environmental impact assessments 8d. National policy instruments promote adaptation at sectoral level, in line with national priorities and in areas where adaptation is mainstreamed in EU policies	First Stakeholder workshop focused on climate proofing. Interviews/survey may be able to provide additional evidence Target: • MSs • NGOs • Businesses ***SQ 60, 61, 76*** ***IQ 50a,***	Used sub-questions	Workshop themes: (i) Areas of success in adaptation climate-proofing of EU policies and action (ii) Areas where climate-proofing needs more emphasis (iii) What lessons should we draw for future climate-proofing?
	50b To what extent has adaptation been promoted at the sector level?						
51. What other factors may have promoted adaptation in key vulnerable sectors?	51a What other factors may have promoted adaptation in key vulnerable sectors?	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS	Review of other non-EU actions in vulnerable sectors?		Interviews/survey may be able to provide some evidence of the external factors that were important, and also the relative importance of the individual factors Target: • MSs • NGOs • Businesses ***SQ 65***	Op51a1 What other activities may have promoted adaptation in key vulnerable sectors? Op51a2 Did the EU Adaptation Strategy help to overcome any of these barriers? Op51b What has been their relative strength? Op51c Were these factors expected or un expected when the Strategy was launched?	
	51b What has been their relative strength?	This seeks to understand the relative importance of the different external factors					
	51c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
					IQ Op51a1, Op51a2, Op51b, Op51c		
52. What drivers/barriers stood in the way of efforts to promote adaptation in key vulnerable sectors?	52a What drivers have stimulated, or barriers have stood in the way of efforts to promote adaptation in key vulnerable sectors?	This is concerned with the EXTERNAL FACTORS			Interviews/survey may be able to provide some evidence of the external factors that were important, and also the relative importance of the individual factors Target: • MSs • NGOs • Businesses ***SQ 66, 67*** ***IQ OP52a, Op52b***	Op52a What specific drivers/ barriers contributed to or stood in the way of EU activities to promote adaptation in key vulnerable sectors? Op52b Did the EU Adaptation Strategy help to overcome any of these barriers?	
	52b How did these drivers/barriers affect implementation?	This seeks to understand the relative importance of the different external factors					
53. To what extent has the promotion of adaptation in key vulnerable sectors led to an increased understanding of climate change risks and better informed decision making	53a Has the promotion of adaptation in key vulnerable sectors led to better informed decision making?	This checks if the OUTPUTs have led to the desired IMPACTs			Interviews/ survey may be able to provide some evidence of whether outputs led to desired impacts Target: • MSs • NGOs • Businesses ***SQ 68*** ***IQ OP53a***	Op53a Has the promotion of adaptation in key vulnerable sectors led to better informed decision making?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Efficiency							
54. How adequate were the resources for Action 6: Facilitating the climate proofing of EU policies and programmes?	54a Which resources were made available to fund the production of guidelines on climate proofing EU policies and programmes?	Need to identify the resources (inputs) made available for the action to provide basis for assessment of adequacy and proportionality.	Desk review of existing sources		Stakeholder interviews or survey Target: • European Commission ***IQ OP54a, Op54b***	OP54a Which resources were made available to fund the production of guidelines on climate proofing EU policies and programmes? Op54b Which resources were made available within cohesion, CAP and other funding for climate proofing?	Note that a significant proportion of expenditure in the early years of programmes for the 2014-2020 period will have been financed from resources made available in the 2007-2013 MFF
	54b Which resources were made available within cohesion, CAP and other funding for climate proofing?	Need to identify the resources (inputs) made available for the action to provide basis for assessment of adequacy and proportionality.	Desk review of existing sources				
	54c Are the guidelines useful?	To understand if the resources dedicated to this action produced something useful for the target group is important to understand if resources were both adequate and well spent.	Analysis of guidelines by team		Stakeholder interviews or survey - with MSs can be used to explore the use of the Commission's guidelines ***IQ OP54c***	Op54c How useful did you find the guidelines in climate proofing your policies/programmes? – scale: very useful, useful, not useful, did not use	In interview follow-up on how the guidelines could be improved.
	54d Has the level of support within cohesion, CAP and other funding been sufficient to climate proof these investments?	It is important understand the sufficiency of the outputs to understand if resources were adequate.	Desk review of existing sources		May need to follow-up with Stakeholder interviews or survey (MS, EC) ***IQ OP54d***	Op54d Have the activities supported within cohesion, CAP and other funding been sufficient to climate proof these investments?	In interview follow-up on how the situation could be improved.
55. How do the different stakeholders view the monitoring of the implementation of Action 6? Facilitating the climate proofing of	55a What are the monitoring arrangements?	To get stakeholders view on this monitoring of implementation	Desk review of existing evaluation		Should be sufficiently covered by existing evaluation To gain additional evidence, these	Used sub-questions	Target group for these Q's likely to be very narrow at EC. Unless website visitor survey monitoring is
	55b Which resources are spent on these?	To understand what the burden of the					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
EU policies and programmes?		monitoring activities is.			questions were used in stakeholder interviews ***IQ 55a, 55b, 55c***		included – probably too specific.
	55c How appropriate is the level of effort required?	To get views on the appropriateness of the burden.					
Coherence							
56. To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	56a To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	This question explores the evidence on the coherence of Action 7 with actions required at other levels	Literature may include studies on coherence.	No relevant indicators	Interviews/survey can be used to understand stakeholder views on coherence in this area Target: • MSs • NGOs • Businesses ***SQ 69, 70, 71, 72, 73, 74*** ***IQ OP56a, Op56b, OP56c***	Op56a Has the the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy fitted well with, and reinforced, other relevant policies and initiatives, or the reverse? Op56b What, if any, are areas where climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, has not fitted well with, and reinforced, other adaptation policies and initiatives? Op56c Are there any specific aspects which could be added to the Strategy or changes, to make it more coherent with: • EU legislation and policies • International	
	56b What are the areas where there is less coherence?						
	56c What could be done to improve coherence in these areas?						

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
						initiatives • National initiatives • Regional or sub-nations initiatives?	
EU added value							
57. To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, added value compared to what would have resulted from an action at regional or national level	57a To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, added value to existing activities	This question explores the evidence on the coherence of Action 6 with actions required at other levels	Literature on climate mainstreaming activities	No relevant indicators	Interviews/survey can be used to understand stakeholder views on EU Added Value in this area Target: • MSs • NGOs • Businesses ***SQ 75, 76*** ***IQ Op57a1, Op57a2***	Op57a1 What would have happened in the absence of the Commission's activities to climate proof relevant policies? Op57a2 How could the involvement of the Commission have added more value?	

Action 7: Ensuring more resilient infrastructure

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
58. To what extent does there continue to be a need for the Commission to help project developers working on infrastructure and physical assets to climate-proof vulnerable investments?	58a Is there still a need to increase the resilience of infrastructure in the EU to climate impacts?	This question explores if there continues to be a need for the specific OUTPUT	Review of technical standards and guidelines and there usage Research reports on mainstreaming of investments, and climate risks to infrastructure	N/A	Stakeholders will have opinions on the relative needs Target: • National policy makers • Local authorities • NGOs • Businesses (project developers) • Financial institutions ***SQ 80, 85*** ***IQ Op58a1, Op58a2, Op58b, Op58c***	Op58a1 How well are climate considerations taken into account in infrastructure investments i.e. climate-proofing of projects? Op58a2 Is there a need to better integrate climate change considerations into infrastructure investment decisions? Op58a3 Is there a need for the Commission to provide further support to project developers working on infrastructure and physical assets to climate-proof vulnerable investments? Op58a4 In what area is further strengthening required?	
	58b Is there still a need to for the Commission to help project developers working on infrastructure and physical assets to climate-proof vulnerable investments e.g. through development of technical standards and guidelines?	This question explores if there continues to be a need for the specific ACTIVITIES associated with the action					
	58c What is the nature of the support that is still needed?						

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Effectiveness							
59. To what extent has the Strategy helped to ensure more resilient infrastructure	59a To what extent has climate change adaptation been considered in impact assessments for land use planning, over the period 2013 to 2016?	To understand the extent to which climate change adaptation has been mainstreamed in to urban/land use planning and disaster management.	Adaptation scoreboard, and performance indicators	8c. Key land use and spatial/ urban planning policies take into account the impacts of climate change	Desk review will be the primary source of evidence Interviews could be used to reinforce the evidence from the desk review Target: • EC Programme managers • Project developers ***SQ 81, 82, 83, 84*** ***IQ Op59a, Op59b, Op59c***	Op59a Are you aware of the technical standards and guidelines prepared by the European Commission for assessing the climate impacts in infrastructure? Op59b Have you used of applied the standards/guidelines? Op59c If so, how valuable were they?	
	59b What guidelines or procedures have been developed/ are available for assessing climate impacts in infrastructure projects/programmes?	To understand the relevant OUTPUTs that have been delivered		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			
	59c To what extent are these used in developing new infrastructure programmes?						
60. What other factors may have promoted more resilient infrastructure	60a What other factors may have promoted more resilient infrastructure?	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS	Guidelines used in EU programmes and by EIB		Desk review will be the primary source of evidence Interviews could be used to reinforce the evidence from the desk review Target: • EC Programme managers	Op60a What other factors have promoted the assessment of climate impacts as part of infrastructure projects and programmes? Op60b How influential were these factors?	
	60b What has been their relative strength?	This seeks to understand the relative importance of the different external factors					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	60c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors			• Project developers ***IQ Op60a, Op60b, Op60c***	Op60c Were these factors expected or un expected when the Strategy was launched?	
61. What drivers/barriers stood in the way of efforts to promote more resilient infrastructure?	61a What drivers have stimulated, or barriers have stood in the way of efforts to promote more resilient infrastructure?	This is concerned with the EXTERNAL FACTORS			Interviews/survey may be able to provide some evidence of the external factors that were important, and also the relative importance of the individual factors Target: • EC Programme managers • Project developers ***SQ86, 87*** ***IQ Op61a, Op61b***	Op61a What specific drivers/barriers contributed to or stood in the way of the assessment of climate impacts as part of infrastructure projects and programmes? Op61b Did the EU Adaptation Strategy help to overcome any of these barriers?	
	61b How did these drivers/barriers affect implementation?	This seeks to understand the relative importance of the different external factors					
62. To what extent has the promotion of more resilient infrastructure led to the consistent and comprehensive integration of climate change adaptation considerations into decision making, and thus more resilient infrastructure?	62a Has the promotion of more resilient infrastructure led to the consistent and comprehensive integration of climate change adaptation considerations into decision making, and thus more resilient infrastructure?	This checks if the OUTPUTs have led to the desired IMPACTs			Interviews/survey may be able to provide some evidence of whether outputs led to the desired impacts Target: • EC Programme managers • Project developers ***SQ88, 89*** ***IQ Op62a***	Op62a Has the promotion of more resilient infrastructure led to the consistent and comprehensive integration of climate change adaptation considerations into decision making, and thus more resilient infrastructure?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Efficiency							
63. How adequate were the resources for Action 7: Ensuring more resilient infrastructure?	63a Which resources were made available to fund the production of guidelines to ensure more resilient infrastructure?	Need to identify the resources (INPUTS) made available for the action to provide basis for assessment of adequacy and proportionality.	Desk review of existing sources	€ of investment	May need to follow-up on with EC & other stakeholders if not available through desk research ***IQ Op63a***	Op63a Which resources were made available to fund the production of guidelines to ensure more resilient infrastructure?	
	63b Are the guidelines useful?	To understand if the resources dedicated to this action produced something useful for the target group is important to understand if resources were both adequate and well spent.	Analysis of guidelines by team		Stakeholder interviews or survey - with MSs can be used to explore the use of the Commission's guidelines ***IQ Op63a***	Op63b How useful did you find the guidelines in ensuring infrastructure is climate resilient? – scale: very useful, useful, not useful, did not use	In interview follow-up on how the guidelines could be improved.
64. How do the different stakeholders view the monitoring of the implementation of Action 7? Ensuring more resilient infrastructure	64a What are the monitoring arrangements?	To get stakeholders' views on this monitoring of implementation	N/A	N/A	Interviews Target: • EC Programme managers • Project developers ***IQ 64a, 64b, 64c***	Used sub questions	There is one indicator in the country fiche relating to effectiveness of this action, but it will not be possible to isolate the cost of monitoring this indicator alone
	64b Which resources are spent on these?	To understand what the burden of the monitoring activities is.					
	64c How appropriate is the level of effort required?	To get views on the appropriateness of the burden.					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Coherence							
65. To what extent has the development of guidelines or procedures to assess the climate impacts of infrastructure, as encouraged by the EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	65a To what extent has the development of guidelines or procedures to assess the climate impacts of infrastructure, as encouraged by the EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	This question explores the evidence on the coherence of Action 7 with actions required at other levels	Literature may include studies on coherence. Comparisons can be made with requirements for MSs e.g. Paris agreement	No relevant indicators	Interviews/survey can be used to understand stakeholder views on coherence in this area Target: • MSs • NGOs • Businesses ***IQ OP65a, Op65b***	Op65a Has the development of guidelines or procedures to assess the climate impacts of infrastructure, as promoted under the Adaptation Strategy fitted well with, and reinforced, other relevant policies and initiatives, or the reverse? Op65b What, if any, are areas where the development of guidelines or procedures to assess the climate impacts of infrastructure, as promoted under the Adaptation Strategy, has not fitted well with, and reinforced, other adaptation policies and initiatives?	
	65b What are the areas where there is less coherence?						
	65c What could be done to improve coherence in these areas?				As above ***IQ OP65c***	Op65c Are there any specific aspects which could be added to the Strategy or changes, to make it more coherent with respect to other actions relating to infrastructure planning.	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
EU added value							
66. To what extent has the development of guidelines or procedures to assess the climate impacts of infrastructure, as encouraged by the EU Strategy, added value compared to what would have resulted from an action at regional or national level	66a What was the added value of the technical standards and guidelines?	This question explores the added value of the main activities associate with this action		No relevant indicators	Interviews/survey can be used to understand added value Target: • Programme managers • Project developers ***SQ 90, 91*** ***IQ Op66a1, Op66a2***	Op66a1 What would have happened in the absence of the Commission's strategy action on resilient infrastructure? Op66a2 How could the involvement of the Commission have added more value?	To what extent has the development of guidelines or procedures to assess the climate impacts of infrastructure, as encouraged by the EU Strategy, added value to existing activities

Action 8: Promotion of insurance and other financial products for resilient investments and business decisions

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Relevance							
67. To what extent does there continue to be a need for the Commission to promote insurance and other financial products for resilient investments and decisions?	67a Is there still a need for greater use of financial products to internalise climate costs? 67b Is there still a need to for the Commission to promote insurance and other financial products for resilient investments and decisions? 67c What is the nature of the support that is still needed?	This question explores if there continues to be a need for the specific OUTPUTs and IMPACTs This question explores if there continues to be a need for the specific ACTIVITIES associated with the action	Review of market for insurance and other financial products Commission report on Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU	Market size (and growth) indicators	Stakeholders will have opinions on the relative needs. Target: • National policy makers • NGOs • Businesses (project developers) • Financial institutions ***SQ 95, 97*** ***IQ OP67a1, Op67a2, Op67b, Op67c***	Op67a1 How well developed is the market for insurance and other financial products for resilient investments? Op67a2 Is there a need for greater use of financial products such as insurance to increase the climate resilience of investments? Op67b Is there a need for the Commission to promote the use of insurance and other financial products for resilient investments and decisions? Op67c In what areas is further support or promotion of activities required?	
Effectiveness							

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
68. To what extent has the Commission's efforts to engage with the insurance and financial sector led to the further development of the market for risk management and insurance policy instruments?	68a What actions have been taken by the Commission to engage with the insurance and financial sector on adaptation issues, over the period 2013 to 2016?	To understand exactly what ACTIVITIES have occurred in relation to the Strategy	Adaptation scoreboard, and performance indicators Commission study on Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU SOLVENCY II regulation	8e. Adaptation is mainstreamed in insurance or alternative policy instruments, where relevant, to provide incentives for investments in risk prevention	Original plan was that as Commission study on Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU was on-going this evaluation would draw on the results of this study. In the event this does not address the evaluation questions so stakeholders were engaged through survey and interview. ***SQ 96, 97, 98*** ***IQ 68a, 68b***	Used sub-questions	Interviews with European Commission and Financial/insurance institutions
	68b To what extent has this led to adaptation being embedded within risk management and insurance policy instruments?	Explores where adaptation has been mainstreamed in to insurance or other policy instruments and whether these incentivise investments in risk prevention					
69. What other factors may have led to the further development of the market for risk management and insurance policy instruments?	69a What other factors may have led to the further development of the market for risk management and insurance policy instruments??	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS	As above	No relevant indicators	As above ***IQ 69a, 69b, 69c***	Used sub questions	Interviews with European Commission and Financial/insurance institutions:

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
	69b What has been their relative strength?	This seeks to understand the relative importance of the different external factors					
	69c Were these factors expected or un expected when the Strategy was launched?	This explores potentially unexpected factors					
70. What drivers/barrier stood in the way of the Commission's efforts to further develop the market for risk management and insurance policy instruments?	70a What drivers have stimulated, or barriers have stood in the way of efforts to further develop the market for risk management and insurance policy instruments?	This is concerned with the EXTERNAL FACTORS	As above	No relevant indicators	As above ***IQ 70a, 70b***	Used sub questions	Interviews with European Commission and Financial/insurance institutions:
	70b How did these drivers/ barriers affect implementation?	This seeks to understand the relative importance of the different external factors					
71. To what extent has the further development of the market for disaster risk insurance led to the greater use of financial products, such as insurance, and the	71a Has the promotion of the market for disaster risk insurance led to the greater use of financial products, and internalisation of	This checks if the OUTPUTs have led to the desired IMPACTs	As above	No relevant indicators	As above ***IQ 71a***	As above	Interviews with European Commission and Financial/insurance institutions:

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
internalisation of climate costs?	climate costs?						
Efficiency							
72. How adequate were the resources for Action 8: Promotion of insurance and other financial products for resilient investment and business decisions?	72a Which resources were made available to fund EU engagement with the insurance and financial sectors to promote more resilient investments and business decisions?	Need to identify the resources (INPUTS) made available for the action to provide basis for assessment of adequacy and proportionality.	Budget information on expenditure relating to this action	€ of investment	Interview with relevant people in DG CLIMA and other relevant DGs to understand how the resources to support this activity were used ***IQ Op72a1, Op72a2, Op72b1, Op72b2***	Op72a1 What level of resources was invested in promoting insurance and other financial products with the financial community? Op72a2 How were these resources used? On what types of activity? Op72b1 Was the level of effort sufficient to deliver the desired outcome? Op72b2 If not, why not?	
	72b Has the level of support been sufficient to support the necessary promotion of insurance and other financial products?	It is important understand the sufficiency of the outputs to understand if resources were adequate.					
73. How do the different stakeholders view the monitoring of the implementation of Action 8?	73a What are the monitoring arrangements?	To get stakeholders view on this monitoring of implementation	N/A	N/A	***IQ 73a, 73b, 73c***	Used sub questions	There is one indicator in the country fiche relating to this action, but it will not be possible to isolate the cost of monitoring this indicator alone
	73b What level of resources are spent on these?	To understand what the burden of the monitoring activities is.					
	73c How appropriate is the level of effort required?	To get views on the appropriateness of the burden.					

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
Coherence							
74. To what extent has the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as encouraged by the EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	74a To what extent has the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments as encouraged by the EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives 74b What are the areas where there is less coherence? 74c What could be done to improve coherence in these areas?	This question explores the evidence on the coherence of Action 7 with actions required at other levels	Wider literature may include studies on coherence of different activities	No relevant indicators	The technical nature of the questions would suggest a survey may be less suitable. Interviews/survey can be used to understand stakeholder views on coherence in this area Target: • European Commission • MSs • NGOs • Businesses (project developers) • Financial sector ***SQ 100, 101, 102*** ***IQ Op74a, Op74b, Op74c***	Op74a Have the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as promoted under the Adaptation Strategy fitted well with, and reinforced, other relevant policies and initiatives, or the reverse? Op74b What, if any, are areas where the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as promoted under the Adaptation Strategy, have not fitted well with, and reinforced, other adaptation policies and initiatives?	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
						Op74c Are there any specific aspects which could be added to the Strategy or changes, to make it more coherent with respect to other activities relating to engagement with the financial sectors.	

Evaluation Question	Sub-question	Rationale	Evidence from existing data sources	Indicators	Evidence from consultation activities	Operationalised question	Comments and possible further questions
EU added value							
75. To what extent have the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as encouraged by the EU Strategy, added value compared to what would have resulted from an action at regional or national level	75a What was the added value of the Commission's engagement with the financial sector?	This question explores the added value of the main activities associate with this action		No relevant indicators	The technical nature of the questions would suggest a survey may be less suitable though one general question has been included. Interview would target the insurance and financial sector. Target: • Businesses (project developers) • Financial sector ***SQ 104*** ***IQ Op75a1, Op75a2***	Op75a1 What would have happened in the absence of the Commission's engagement with the insurance and financial sector? Op75a2 How could the involvement of the Commission have added more value?	

Appendix 5 – Mainstreaming adaptation into EU policies

The EU adaptation strategy in 2013 emphasised, in its 3rd objective, the priority and responsibility of mainstreaming adaptation measures into EU policies and programmes. This appendix provides an overview of adaptation mainstreaming into EU policies, looking first at areas where climate adaptation is currently mainstreamed, and then at areas where there could be further potential for adaptation mainstreaming.

A5.1 Areas of existing climate adaptation mainstreaming activity

The tables below assess those policy initiatives which are listed in Objective 3 ("Climate-proofing EU action: promoting adaptation in key vulnerable sectors) of the EU Adaptation Strategy. For each policy area the relevant initiative/legislation is indicated (with a Eurlex link), a brief status update is provided and the level to which adaptation was mainstreamed into the policy initiative is assessed.

The policy initiatives were categorised into four groups, in line with the Adaptation Strategy (as it was adopted in 2013):

1. Policy initiatives and legislation into which adaptation has been already mainstreamed, as of 2013 (Table A5.2);
2. Policy initiatives where a legislative proposal to mainstream adaptation was already tabled by the Commission, as of 2013 (Table A5.3);
3. Expected forthcoming initiatives, as of 2013 (Table A5.4); and
4. Further initiatives considered necessary, as of 2013 (Table A5.5).

Table A5.2: List of initiatives and legislation into which adaptation has been already mainstreamed, as indicated by the Adaptation Strategy (2013)

Policy area	Relevant initiative/legislation (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
Marine waters	Council Directive 2008/56/EC on establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)	Directive is still in force, as amended by Commission Directive 2017/845, which adapted the indicative list of elements to be taken into account for the preparation of marine strategies.	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.
	EU Regulation No 1255/2011 on establishing a Programme to support the further development of an Integrated Maritime Policy	The regulation is no longer in force, having been repealed by Regulation (EU) 508/2014 on the European Maritime and Fisheries Fund, which includes Integrated Maritime Policy as one of the objectives it can finance. However, the specific reference to climate adaptation in article 3.3 (c) of the 2011 regulation is not repeated in the EMFF regulation, and Title VI of the regulation (which sets out the objectives of integrated maritime policy investment under direct management) does not explicitly mention climate change.	There is now no direct reference to adaptation to climate change in the legal base for expenditure on integrated maritime policy; and in practice, EMFF projects funded under direct management do not appear to have a significant climate adaptation focus.
Forestry	Regulation (EC) 2152/2003 concerning monitoring of forests and environmental interactions in the Community (Forest Focus)	The 2003 regulation provided explicitly time-limited funding over a period of 4 years (to the end of 2006), and was repealed by the LIFE regulation for the 2007-2013 financial perspective (Regulation (EC) 614/2007), which also made available funding for forest monitoring. That option of funding for forest monitoring is repeated in the	The current LIFE regulation does not address forest monitoring issues under the heading of climate adaptation; forests are only mentioned in the preamble in respect of climate mitigation. The potential for funding forest monitoring is only mentioned in Annex 3, which identifies thematic priorities for the Environment sub-

Policy area	Relevant initiative/legislation (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
		2014-2020 LIFE regulation (Regulation (EU) 1293/2013). Support for the European Forest Fire Information System is also provided under the Copernicus programme.	programme, in respect of resource efficiency. In practice, however, a number of climate adaptation projects are funded under several themes. Moreover, as set out in Table 3 below, broader EU policy on forests, including the 2013 Forest Strategy, addresses climate risks and adaptation; and funding for EFFIS is provided under the Copernicus programme.
Transport	Decision 661/2010/EC on Union guidelines for the development of the trans-European transport network	The 2010 decision was repealed and replaced by the 2013 Regulation (Regulation (EU) 1315/2013) setting out the Union guidelines for the trans-European transport network.	Climate adaptation is addressed clearly in the guidelines, with (inter alia) recognition of a need for "adequate consideration of the vulnerability of transport infrastructure with regard to a changing climate" (article 5), and a requirement on Member States to "give due consideration to improving resilience to climate change and to environmental disasters" during infrastructure planning (article 33).
Inland water	COM(2012)673 on A Blueprint to Safeguard Europe's Water Resources	The Blueprint remains relevant; however, the timescale for all of the specific actions under the Blueprint has elapsed (other than for those stated as "ongoing").	A number of measures listed in the Blueprint are relevant for adaptation, particularly those in the section on "vulnerability of EU waters", and all appear to have been implemented (including those concerning other policy areas, such as the references to the use of Ecological Focus Areas under Pillar 1 of the CAP, and the commitment to water use reduction becoming a pre-condition for Pillar 2 CAP support for irrigation). Work is under way on proposals for "Minimum quality requirements for reused water in the EU" (see the inception impact

Policy area	Relevant initiative/legislation (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
			assessment on the Commission website).
Biodiversity	COM(2011)244 on Our life insurance, our natural capital: an EU biodiversity strategy to 2020	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).	The 2017 Action Plan emphasises the importance of resilience to climate change, and 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 Staff Working Document 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,
Migration and mobility	COM(2011)743 on The Global Approach to Migration and Mobility	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).	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).

Table A5.3: List of policy initiatives where a legislative proposal to mainstream adaptation was already tabled by the Commission, as indicated by the Adaptation Strategy (2013)

Policy area	Relevant legislative proposal (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
Agriculture and forestry	COM(2011) 627: 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)	Regulation was adopted and is currently in force: Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005	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 on the following areas." 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) The **farm advisory system** helps stakeholders 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)
	COM(2011) 625: Proposal for a Regulation of the European Parliament and of the Council on establishing rules for direct payments to farmers under support schemes within the framework of the	Regulation was adopted and is currently in force: Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct	The **greening** of CAP pillar 1 has introduced the following three requirements for farms: **crop diversification**; maintaining existing **permanent grassland**; and having

Policy area	Relevant legislative proposal (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
	common agricultural policy	payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009	**ecological focus area** on the agricultural area. (Article 43). This is in addition to cross-compliance requirements, which include minimum good agricultural and environmental conditions (GAEC) on soil, biodiversity and water.
Maritime spatial planning and integrated coastal management	COM(2013) 133: Proposal for a Directive of the European Parliament and of the Council establishing a framework for maritime spatial planning and integrated coastal management	Directive was adopted and is currently in force: Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning	"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 improvement of the environment, including **resilience to climate change impacts**." (Article 5)
Energy	COM(2011) 665: Proposal for a Regulation of the European Parliament and of the Council 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 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010	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,

Policy area	Relevant legislative proposal (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
			including the amount of support used with a view to attaining climate-change objectives") and Article 27 on evaluation undertaken by the EC.
Disaster risk prevention and management	COM(2011) 934: Proposal for a Decision of the European Parliament and of the Council on 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	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 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)
Transport	COM(2011) 650: Proposal for a Regulation of the European Parliament and of the Council on Union guidelines for the development of the Trans-European Transport Network	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 on Union guidelines for the development of the trans-European transport network and repealing	Article 5 indicates that the TEN-T network should be resource-efficiency 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

Policy area	Relevant legislative proposal (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
		Decision No 661/2010/EU	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.
Plant Health	COM(2013) 267: Proposal for a Regulation of the European Parliament and of the Council on protective measures against pests of plans	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**".
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	Directive was adopted and is currently in force: 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	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

Policy area	Relevant legislative proposal (with Eurlex link)	Current status/update since 2013	Level to which adaptation is mainstreamed in the legislation
			greenhouse gas emissions) and **the vulnerability of the project to climate change**" should be included.

Table A5.4: List of expected forthcoming initiatives, as indicated by the Adaptation Strategy (2013)

Policy area	Current status/update since 2013	New initiative/legislation (with Eurlex link)	Level to which adaptation is mainstreamed in the initiative
Invasive alien species	In 2014, a regulation in this policy area was adopted.	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	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 human intervention, **in response to changing ecological conditions and climate change**".
Green Infrastructure	In May 2013, just after the adoption of the EU Adaptation Strategy, a Commission Communication was published.	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	The GI Strategy is intended to support the integration of GI in a number of policy areas, including climate change and disaster risk reduction. The link between green infrastructure (GI) and climate change and disaster risk management are presented in a separate chapter within the communication. This chapter emphasises **the role of GI in climate change adaptation** and it calls for the greater use of ecosystem-based

Policy area	Current status/update since 2013	New initiative/legislation (with Eurlex link)	Level to which adaptation is mainstreamed in the initiative
			approaches. It 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. "
Land as a resource	This initiative was announced as part of the 7th EAP and an EC Communication was initially planned to be published in 2015. Nevertheless, the initiative has not been taken forward. More information is available on the DG ENV site.	No new initiative identified.	Climate adaptation issues were featured prominently in research published by the Commission in support of its work, in particular the potential benefits of using land more effectively for climate regulation and flood prevention.
Forests	In September 2013, a Commission Communication was published	COM(2013) 659: 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; followed by a Multi-Annual Implementation Plan (SWD (2015) 164) in 2015.	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 (e.g. appropriate species, plant varieties, etc.)." 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. The 2015 implementation plan recommends action by Member States to "demonstrate how they

Policy area	Current status/update since 2013	New initiative/legislation (with Eurlex link)	Level to which adaptation is mainstreamed in the initiative
			enhance their forests' adaptive capacities and resilience."
Natura 2000	In 2013, a guidance document was published by the Commission.	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	The whole guidance focuses on climate change and it provides a detailed assessment on **the ways in which Natura 2000 sites can help in climate adaptation**. Furthermore, it provides detailed guidance on the **types of adaptation measures** that are needed for the Natura2000 sites.

Table A5.5: List of further initiatives considered necessary, as indicated by the Adaptation Strategy (2013)

Policy area	Current status/update since 2013	New initiative/legislation (with Eurlex link)	Level to which adaptation is mainstreamed in the initiative
Eurocodes and standardisation	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).	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	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.
Disaster insurance	A green paper on the insurance of natural and man-made disasters (COM (2013) 213 final) was published alongside the 2013 adaptation strategy. Detailed information on progress on mainstreaming of adaptation in disaster risk insurance is included in the main report (see section 3.3.3.3).	A DG CLIMA study on "Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU" has recently been finalised.	The main report notes that this area of policy is still at an early stage of development. The DG CLIMA study referenced emphasises the importance of risk transfer as an integral part of adaptation approaches, and the potential for insurance industry pricing of risk to help identify where risk reduction action is required.

A5.2 Areas with potential for further mainstreaming

By its nature, climate adaptation requires action across a broad range of policy areas. In principle, all policy areas are to a greater or lesser degree affected by the potential impact of a changing climate, particularly those with a link to the avoidance of weather-related risks, those with a long-term time horizon, or those involving significant infrastructure investment. However, the Commission, and DG CLIMA within it, has limited resources at its disposal, and needs to focus its activity in terms of integrating climate adaptation in its policymaking on the areas where the greatest potential improvement in outcomes, or in resilience, can be achieved.

The tables in section 1 above review the Commission's existing understanding of areas where there is, or has been, activity to ensure the integration of climate adaptation concerns. In general, the emphasis seems to be sound, with a focus on areas of Commission activity where there is a need to follow through on commitments made in the adaptation strategy. A number of areas can, however, be suggested where the Commission may want to reflect on whether further effort to ensure mainstreaming of climate adaptation would help to deliver greater effectiveness of the Commission's policy agenda. It should be noted that the desk study we have carried out in response to this task could not, by its very nature, be exhaustive in identifying policy action in the areas we have suggested below; in some cases the action recommended may already be in hand, and simply not in evidence on the relevant DGs' web pages.

A5.2.1 Trade

While trade policy pays significant attention to climate mitigation, as evidenced by, for example, successive Sustainability Impact Assessments of ongoing trade negotiations, and by a number of references to "the fight against climate change" in the Commission's 2015 communication "Trade for All"[10], climate adaptation is a largely underdeveloped theme. However, as a joint WTO/UNEP paper on trade and climate change[11] notes:

> "Climate change can affect the pattern and volume of international trade flows. It may alter the comparative advantage of countries and lead to shifts in the pattern of international trade. This effect will be stronger in those countries whose comparative advantage stems from climatic or geophysical sources. Moreover, climate change can also increase the vulnerability of the supply, transport and distribution chains upon which international trade depends. Any disruptions to these chains will raise the costs of engaging in international trade."

Trade policy, and trade action, can act as a means of adaptation to climate change; and it needs to be responsive to, and to mitigate, the vulnerabilities caused by exposure to climate risk, including vulnerabilities in trading partners, particularly developing countries. Increased trade may lead to situations where growing specialisation by an economy in specific sectors leads to increased vulnerability if that sector is affected by localised climate impacts including extreme weather events, or abrupt shifts in long-term climate patterns. At the same time, increased openness to trade can help importing countries improve their resilience to damage to local supply or traditional supplies of key products. Impacts on the agriculture sector in particular may affect comparative advantages. Abrupt changes linked to climate have the potential to significantly disrupt production chains. While much of the response to these impacts will need to be led by the private sector, trade policy has a potential role to play through, for example,

[10] Communication from the Commission to the European Parliament, the Council , the Economic and Social Committee and the Committee of the Regions on "Trade for all - Towards a more responsible trade and investment policy", COM(2015) 497 final
[11] Trade and Climate Change: A report by the United Nations Environment Programme and the World Trade Organization; WTO, 2009

integrating vulnerability to climate change impacts in sustainability impact assessments as a matter of course. Further analysis across the EU's trade partners may help in identifying particular risks, such as the risks to food security and affordability in the EU (or in developing countries) in the event of significant climate event disruption to trading patterns. The EU and its partners in the WTO may also need to address policy issues caused by an increase in abrupt changes in patterns of production and demand as a result of climate change, for example in relation to policy on anti-dumping measures.

A5.2.2 Animal and plant health disease risks

The Commission's list of policy areas where mainstreaming of climate adaptation is taking place already includes references to animal health and to plant health, with the proposals for revision of animal health law and plant health law included in the list of legislative proposals which integrate climate adaptation. The Animal Health Law[12], as adopted in 2016, explains in the preamble 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" (recital 3), and Article 1 (2) of the Directive states that the rules it lays down take into account climate risks. Similarly, the new Plant Health Law[13] notes in its preamble 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" (recital 4). However, while the general recognition of the vulnerability caused by climate change is clearly welcome, there is less visible evidence (on the basis of our desk study) of a structured programme of assessment of the risks, and potential responses to it (at EU and Member State level). Potential action (which may already be in hand, but not in evidence through the Commission's web site) could include analysis of specific disease threats, and in particular the impact that differing levels of climate response to warming could have on the extent of those risks. There may be particular value in combining some of this analysis with the further mainstreaming work on climate adaptation in trade policy, mentioned above.

A5.2.3 European Defence Action Plan

Europe's role in defence policy consists largely in fostering cooperation among Member States, and in particular avoiding inefficiencies, while ensuring complementarity with action by NATO. The European Defence Action Plan set out in a Commission communication of 2016[14] identifies in particular the potential for EU added value in "further stimulating defence cooperation through positive incentives, and targeting projects that Member States are not able to undertake", and "reducing unnecessary duplications". Both are potentially areas where climate impacts need to be taken into account. Member State strategic analysis of climate risks may benefit from coordination to avoid duplication, and to ensure good links to scientific expertise on climate impacts. The emphasis the Commission communication places on research funding to improve the joint development of defence capability may be relevant here.

A5.2.4 Global Strategy on Foreign and Security Policy

The Communication ""Shared Vision, Common Action: A Stronger Europe"; a global strategy for the

[12] 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')
[13] Regulation 2016/2031 of the European Parliament and of the Council of 26 October 2016 on protective measures against pests of plants,
[14] COM(2016) 950 final

European Union's foreign and security policy"[15] sets out a range of priorities for EU action, including "State and societal resilience to our east and south". The text of the strategy here 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."

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. Further effort to integrate climate adaptation into implementation of the EU's foreign and security policy could include over-arching analysis of the impact of different scenarios for climate impacts on foreign and security challenges (and in particular, migration flows); and enhanced cooperation with developing countries on implementation of SDG 13, and in particular the development of national adaptation plans, with a particular focus on identifying areas where shared EU/ partner country action and research would be of particular value.

A5.2.5 Cyber resilience

Cyber security is one of the three emerging challenges identified by the Commission in its Mid-Term Review of implementation of the digital single market strategy[16]. The Commission's cyber security strategy itself dates from 2013[17]. While it does not address the question of climate resilience, a potential area for cooperation among Commission services is in the potential cumulation of resilience threats; for example, the heightened impact of simultaneous attacks against information systems, and the operation of flood defence systems, or water management systems at times of water shortage. This could, as appropriate, expand to a wider shared approach to resilience challenges among Commission services.

A5.2.6 Climate change mitigation

The Commission's list of policy areas, or instruments, where climate adaptation mainstreaming activity is taking place lists areas of inter-DG activity; it does not note areas of coordination within DG CLIMA, in particular areas where there is a significant adaptation interest in mitigation policy, or where DG CLIMA's primary engagement with another DG (for example, in energy policy) addresses climate mitigation. Emerging areas include the impact of LULUCF action on fire risk management; the impact of energy efficiency policies on climate resilience in cities (both in terms of heating and of cooling); and the potential adaptation benefits of investments in renewable energy. If DG CLIMA has not already done so, it could be a valuable best practice exercise in climate adaptation mainstreaming to list and priorities the adaptation impacts, including both synergies and conflicts, across the full range of its policy responsibilities. At Member State level, the inclusion of a requirement to include information on progress in adaptation planning and strategies in biennial reports under the proposed directive on Governance of the Energy Union[18] should help to ensure a degree of complementarity and coherence between mitigation and adaptation policy.

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[15] European External Action Service, A Global Strategy for the European Union's Foreign and Security Policy, 28 June 2016.
[16] COM(2017) 228 final
[17] "Cybersecurity Strategy of the European Union: An Open, Safe and Secure Cyberspace", JOIN(2013) 1 final
[18] COM(2016) 759 final: Proposal for a Regulation of the European Parliament and of the Council on the Governance of the Energy Union, articles 15 and 17

A5.2.7 Ecosystem-based approaches to climate change

Climate change and biodiversity loss are interlinked. While there is a need to ensure that species and habitats can adequately adapt to the impacts of climate change in return resilient ecosystems can also help society to better cope with these changes. The EU's Biodiversity Strategy[19] reiterates this connection and states that "while biodiversity makes a key contribution to climate change mitigation and adaptation, achieving the '2 degrees' target coupled with adequate adaptation measures to reduce the impacts of unavoidable effects of climate change are also essential to avert biodiversity loss." An emphasis is put on ecosystem-based approached to mitigation and adaptation; the latter is defined by the Convention on Biological Diversity (CBD) as a "strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems"[20].

The Adaptation Strategy makes a reference to two relevant policy initiatives in this area: (i) the Green Infrastructure Strategy[21] and (ii) the Guidelines on Climate Change and Natura 2000[22]. Furthermore, it indicates that "the Commission will in 2013 explore the need for additional guidance for authorities and decision makers, civil society, private business and conservation practitioners to ensure the full mobilisation of ecosystem-based approaches to adaptation." As of today, no guidance has been produced by the European Commission on ecosystem-based approaches (EbA) to climate change adaptation (and mitigation). Given that EbA measures can provide cost-effective alternatives to hard infrastructure solutions, while delivering multiple benefits beyond biodiversity conservation, and can target a wide range of sectors it is suggested that the Commission further considers the need to develop guidance on this, which could be widely used by the relevant stakeholders. This could build on the discussion paper, 'Towards a Strategy on Climate Change, Ecosystem Services and Biodiversity'[23], prepared by the EU Ad Hoc Expert Working Group on Biodiversity and Climate Change in 2009, and a subsequent 2011 study of the potential for EbA approaches to climate change adaptation and mitigation in Europe[24].

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[19] Communication from the Commission to the European Parliament, the Council , the Economic and Social Committee and the Committee of the Regions on Our life insurance, our natural capital: an EU biodiversity strategy to 2020, COM(2011/0244), http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011DC0244

[20] CBD (2009) Connecting Biodiversity and Climate Change Mitigation and Adaptation, https://www.cbd.int/doc/publications/cbd-ts-41-en.pdf

[21] Communication from the Commission to the European Parliament, the Council , the Economic and Social Committee and the Committee of the Regions on **Green Infrastructure (GI) — Enhancing Europe's Natural Capital, COM (2013/0249),** http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0249

[22] EC (2013) 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, http://ec.europa.eu/environment/nature/climatechange/pdf/Guidance%20document.pdf

[23] EU Ad Hoc Expert Working Group on Biodiversity and Climate Change (2009) Towards a Strategy on Climate Change, Ecosystem Services and Biodiversity' http://ec.europa.eu/environment/nature/pdf/discussion_paper_climate_change.pdf

[24] Naumann, Sandra, Gerardo Anzaldua, Pam Berry, Sarah Burch, McKenna Davis, Ana Frelih-Larsen, Holger Gerdes and Michele Sanders (2011): Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe. Final report to the European Commission, DG Environment, Contract no. 070307/2010/580412/SER/B2, Ecologic institute and Environmental Change Institute, Oxford University Centre for the Environment, http://ec.europa.eu/environment/nature/climatechange/pdf/EbA_EBM_CC_FinalReport.pdf

A5.2.8 Social resilience

While employment and social policy is dominated by Member State instruments, EU funding, in particular the European Social Fund (ESF), in this area supports and complements the Member State efforts. Climate change impacts are multiplied on vulnerable groups and thus adaptation strategies are vital for vulnerable communities not only in developing countries but in the EU as well.

The ESF already provides some support for the "shift to a low-carbon, resource efficient Europe"[25]. Nevertheless, there is also potential to put a greater emphasis on adaptation actions with a social context – such as increasing social inclusion and providing support for vulnerable communities - in the post-2020 Multiannual Financial Framework (MFF), deploying funds from a broader range of the Structural and Investment Funds. As this is particularly relevant for the EU's Structural Funds one option could be to require Member States to assess and identify vulnerable communities within their Partnership Agreements for the next programming period, and offer options to address these groups in their Operational Programmes with the support of the ESF.

[25] While the ESF does not target the climate change related thematic objectives which are established for the European Structural and Investment Funds (ESIF) in order to capture the potential for the ESF to support the shift towards improved low-carbon skills a secondary objectives was established in the current 2014-2020 MFF.

Appendix 6 – NDC fiches

Newly completed NDC fiches

- Chad
- Myanmar
- Niger
- Nigeria
- Sudan

Updated NDC fiches

- Afghanistan
- Bangladesh
- Bhutan
- Ethiopia
- Ghana
- Maldives
- Mali
- Morocco
- Rwanda
- Senegal

Annex 1 Newly completed NDC fiches

Chad

Last update: 10th April 2018
Contacts:

Overview

Key facts and figures	
Socio-economic data:	11,679,974 inhabitants (2nd National Census, 2009 including refugees) GDP $ 9,600.76 million (2016) or $664.3/ capita (2016) 43% of the population is 14 years or under Population growth rate is 1.86% (2017 est.) and the rate of urbanisation is 3.7%
GHG emission data:	
Member of groupings:	African Group, G77, LDC
Main policy documents:	• NDC • National Adaptation Programme of Action (2010) • NAP-GSP: Progress & Lessons synthesis report (2016) • Ecosystem-based Adaptation Assessment (2015) • National Investment Plan for the Rural Sector (PNISR), 2014 – 2020
Lead department:	•
Lead political figure:	•
Lead negotiator:	•
UNFCCC focal point:	• Mr. Nadji Tellro Wai, Point Focal du Tchad auprès du CCNUCC (nadji_tellro@yahoo.fr) • Mr. Hamid Abakar Souleymane, Director of Meteorology and National Focal Point of IPCC and 2nd National Focal Point of UNFCCC (hamidzakaria1983@gmail.com)
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• Second National Communication (2013)
Mitigation targets and measures	
Pre-2020 pledge:	
INDC overall target:	
Key policies/deliverables and implementation progress:	•
	•

Carbon pricing:	
Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	Forward- and backward-looking NDC with 2014 – 2020 timeline
Priority sectors:	• Sectors: ○ Water ○ Agriculture ○ Livestock ○ Fish • Cross-cutting priorities: ○ Reinforce the capacities of stakeholders (farmers, fishermen and livestock-rearers) and their revenue-generating activities; ○ Improve production techniques by developing water infrastructure, access to improved and adapted inputs (food crop and fodder seeds, animal gene banks, manure management, compost management, etc.), develop storage and conservation units to limit high post-harvest losses; ○ Inform, educate and communicate information relating to climate risk, (improve the observatory used to forecast meteorological events and develop the population's ability to react in the event of a catastrophe); ○ Create an observatory for policies for adapting to climate change; ○ Improve the seasonal forecast of precipitation and surface runoff; ○ Manage climate risks
Key deliverables and implementation progress:	• Initiatives to support adaptation have just started within the NAPA (adopted in 2009) – in 2015: ○ Development of intensive and diversified crops that are adapted to extreme climate risks ○ Soil restoration and defence against degradation caused by climate change ○ Improvement of intercommunity grassland areas, in order to reduce migratory movements due to climate change ○ National Agency for the Great Green Wall • Adaptation will also be supported by: ○ The 11th European Development Fund for the period 2014-2020. ("rural development, nutrition and food safety", and "sustainable management of natural resources".) ○ The Project to Improve the Resilience of Agricultural Systems in Chad (PARSAT) • At a regional level, there are: ○ The Lake Chad basin sustainable development programme (PRODEBALT with funding from ADB) ○ The nutrition and food insecurity resilience reinforcement programme in the Sahel (P2RS, based on African Development Funds amounting to 15 million USD)

	○ The Project in Support of the Lake Chad Basin initiative to reduce vulnerability and the risks associated with STIs/HIV/AIDS (PAIBLT, ADB) ○ The regional "Adaptation to climate change in the Lake Chad Basin" project (German Ministry for Economic Development and Cooperation/Federal Enterprise for International Cooperation cooperation) covering the period 2013-2018 ○ The Lake Chad preservation project: contribution to the Lake development strategy (GEF-ADF)
Monitoring and reporting plans	Not specified
Required resources	14.170 billion USD in total for the period of which 11.380 will be used to achieve the conditional objective. See table below
Means of implementation	
Own climate finance resources:	• Project to Improve the Resilience of Agricultural Systems in Chad – own resources not specified
Support from EU/MS donors:	• EU (~5.26 billion CFA francs or 8 million Euros through the AMCC –Global Climate Change Alliance project) for NAPA • 11th European Development Fund (2014-2020). 297 million euros for "rural development, nutrition and food safety", and an amount of 53 million euros for "sustainable management of natural resources".
Support from other donors:	• Project to Improve the Resilience of Agricultural Systems in Chad (36.2 million USD, co-funded by IFAD, GEF, ASAP and the Chadian)
Participation in international capacity building programmes:	•
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	•
Monitoring capacities and data gaps	•
Other comments	(…)

Background Projects
Opportunities and necessary financial means to implement the INDC[26]

Project	Unconditional	Conditional

[26] Main sources: PNISR, PNSA, Agriculture transformation plan, NAPA.

	(USD)	(USD)
Develop access to water whilst ensuring it is used to its full potential	1,176,350,000	950,959,000
Promote water-efficient and intensive agriculture	1,247,400,000	8,316,000,000
Secure animal and fishery production and promote associations	118,792,000	1,000,000,000
Support development of fishing resources	14,616,000	24,795,400
Develop of renewable energies for the agriculture and pastoral sectors	2,890,146	19,267,642
Reinforce cloud-seeding operations to compensate for the rainfall deficit in agriculture	18,000	24,000,000
Strengthen meteorological and climate networks and improve weather and climate forecasting tools	10,000,000	24,000,000
Communication relating to climate risks and adaptation scenarios	1,000,000	22.584,300
Maintain initiatives in favour of the environment (FSE)	39,421,800	400,000,000
Improve access to agriculture production and livestock zones	179,419,372	598,064,572
Sub-total	2,789,907,318	11,379,670,914

Myanmar

Last update: 3rd August 2017
Contacts:

Overview

Key facts and figures	
Socio-economic data:	52.89 million inhabitants (2016); $63.22 bn (2016) or $1,195.5/ capita (2016) 27% of the population is 14 years or under Population growth rate is 0.91% (2017 est.) and the rate of urbanisation is 2.29%
GHG emission data:	
Member of groupings:	Asia-Pacific Group, G77, LDC
Main policy documents:	• National Comprehensive Development Plan (2011-30) • Environmental Conservation Law (2012) • Initial National Communication (2012) • National Adaptation Programme of Action (2012) • National Climate Change Strategy and Action Plans: 2016-2030 (2017) • National Adaptation Plan (forthcoming) • National Climate Change Policy (forthcoming) • INDC (2015)
Lead department:	• Ministry of Environmental Conservation and Forestry
Lead political figure:	•
Lead negotiator:	•
UNFCCC focal point:	• Mr. Hla Maung Thein, Director General Ministry of Natural Resources and Environmental Conservation (dg.ecd@moecaf.gov.mm / hlamaungthein.env@gmail.com)
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• First National Communication (2012)
Mitigation targets and measures	
Pre-2020 pledge:	
INDC overall target:	
Key policies/deliverables and implementation progress:	
Carbon pricing:	

Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	Backward and forward looking, timeline 2016 – 2030
Priority sectors:	The NAPA (2012) establishes four priority levels for the identified sectors: 1. resilience in the agriculture sector, developing early warning systems and forest preservation measures 2. public health protection and water resource management 3. coastal zone protection 4. energy and industry sectors, and biodiversity preservation
Key deliverables and implementation progress:	• NAPA adopted in 2012; a NAP Stocktaking Analysis developed a set of key messages and recommendations for taking forward the NAP development actions. • Government of Myanmar is implementing a series of actions both at the policy, legal and programme level in line with NAPA priorities • Sector actions: Ministries are streamlining adaptation to climate change in their planning. For example, agriculture sector is implementing climate smart agriculture actions • Policy and legal instruments: The Myanmar Climate Change Strategy and Action Plan (approved in 2016), with its associated Capacity Development Assessment, will be used to enable adaptation to be featured into ministerial programming and planning. • Capacity-building, education, awareness and communication: establishing a Disaster Management Technical Centre to provide technical support on disaster management to ministries, sub-departments and other institutions at regional, state and lower administrative levels. • Co-benefits highlighted: forest management e.g. reducing soil erosion to minimise frequency of flooding/other land related disasters
Monitoring and reporting plans	Myanmar will develop an appropriate mechanism for monitoring of climate vulnerability, funds allocated for adaptation and the results of adaptation actions.
Required resources	Myanmar requires the support of the international community in improving its planning and monitoring for adaptation efforts and to implement priorities which may be re-prioritised.
Means of implementation	
Own climate finance resources:	• Myanmar is budgeting for adaptive actions in all sectors with the national budget.
Support from EU/MS donors:	•
Support from other	•

donors:	
Participation in international capacity building programmes:	• Private and Public International Cooperation will be oriented for capacity building and technology development and transfer
Provision of support to other countries:	Capacity-building is required in all sectors, to increase the ability to devise and implement adaptive solutions in all key sectors such as forestry, agriculture and early warning systems.
Comments	
Mitigation ambition and delivery:	•
Monitoring capacities and data gaps	•
Other comments	(…)

Niger

Last update: 3rd August 2017
Contacts:

Overview

Key facts and figures	
Socio-economic data:	17.7 million inhabitants (2015); GDP $6,303.5 million (2015) (National Institute of Statistics) or $ 413/ capita 49.01% of the population is 14 years or under Population growth rate is 3.91% (2017 est.) and the rate of urbanisation is 5.49%
GHG emission data:	
Member of groupings:	African Group, G77, LDC
Main policy documents:	• NAPA (2006) also know as: National Strategy and Plan of Action for Climate Change and Variability (SNPA-CVC) • Strategic Framework for Sustainable Land Management (SF-SLM) in sub-Saharan Africa • National Policy on Climate Change (PNCC) (2012) • National Economic and Social Development Plan 2012-2015 • National Economic and Social Development Plan 2016 – 2020 • Sustainable Development and Inclusive Growth Strategy - Niger 2035
Lead department:	•
Lead political figure:	•
Lead negotiator:	•
UNFCCC focal point:	• Mr. Kamaye Maazou, Secretaire Executif du CNEDD (bionedd@intnet.ne)
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• Third National Communication (2017)
Mitigation targets and measures	
Pre-2020 pledge:	
INDC overall target:	
Key policies/deliverables and implementation progress:	•
	•
Carbon pricing:	

Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	Backward/forward looking in line with exisiting national processes (NAP & NAMA), the INDC aims at specific measures in AFOLU priority sectors. Implementation of the proposed INDC relates to the application of a set of techniques coming from the SF-SLM over the period 2015-2030.
Priority sectors:	Priority relates to AFOLU sectors: agriculture, animal husbandry and forestry sub-sectors. Other priorities concern water resources, fishing, fauna, health and capacity building of actors at all levels
Key deliverables and implementation progress:	• NAP recently adopted in 2016 • Wide range of adaptation related/focused projects are ongoing: ○ The PANA Resilience/FEM/ACDI project (US $7.0 million), which has been going on since 2010 at the commune level in seven regions and allows the good practices to be put to use in the use of improve varieties, market gardening, use of meteorological data, seeding of degraded grazing areas and income-producing activities. ○ The African Climate Change Adaptation Programme (P2AA) (US $610,000), which is setting up an index-based insurance prototype to prevent episodes of drought. ○ The PNUD/FED Community Based Adaptation project (CBA) costing US $4.26 million over four years beginning in 2015, which is operating in the departments of Dakoro and Bermo. ○ The Climate-Smart Agriculture Support Project of HC-13N, financed by the World Bank in the amount of US $111 million beginning in 2016 and lasting five years in 20 departments. ○ The PRASE-FEM project, the objective of which is to facilitate access to power services, for a cost of US $5.47 million. ○ The Strategic Programme for Climate Resilience (SPRC), consisting of three projects (PAC-RC, PROMOVARE and PDIPC) and financed at the level of US $100 million. ○ The Food Security Support Project in the Maradi region (PASADEM) for a cost of $ US 31.7 million, which is dealing with aspects of resilience in the rural environment.
Monitoring and reporting plans	M&E of the implementation process will examine aspects of inter-sector coordination, of the decision-making process, etc., follow-up and evaluation of the effects and impacts of the INDC based on relevant criteria and indicators and the definition of corrective measures for climate, environmental, economic and social protection, monitoring of risk and of the evolution of vulnerability to climate change at the national level, and capitalisation of experiences and the lessons learned. No adaptation level plan detailed in the INDC

Required resources	The cost of upscaling the SF-SLM is estimated at US $1.27 billion (conditional), knowing that US $0.337 billion (unconditional) has already been mobilised, for an overall adaptation cost of US $1.607 billion.
Means of implementation	
Own climate finance resources:	• Attaining the objectives of Niger's INDC requires a total investment estimated at US $8.667 billion. The unconditional financing coming from the government's own resources and public development aid is estimated at US $1.167 billion, or 13% of the total cost.
Support from EU/MS donors:	• Existing support being received from AFD: extension of the NIGELEC electrical network (US $46.33 million); the socioeconomic development of Kandadji (US $15.8 million); support for the food security of households (US $1.36 million); development and management of the Badaguichiri watershed (US $12.4 million); and management of the natural forests for the sustainable supply of wood energy to Sahelian cities (Bamako, Ouagadougou and Niamey) (US $1.7 million). •
Support from other donors:	• Attract financing from the private sector to implement the SF-SLM. • US $7.5 billion of which (87% of the total) is dependent on access to new sources of financing (the Green Climate Fund and other climate financing mechanisms).
Participation in international capacity building programmes:	• INDC proposes at least 10% of total Investment support for capacity building/technology transfer
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	•
Monitoring capacities and data gaps	• A number of capacity constraints/ areas for improvement exist: design of bankable projects and the understanding of the donors' rules and procedures; the evaluation of adaptation projects in terms of economic and financial analysis; the establishment of the measurement, notification and verification system (MNV); knowledge and understanding of the INDC implementation process; improved coordination between institutions, synergy between policies and strategies, and appropriate allocation of expertise in the case of cross-sector projects.
Other comments	Co-benefits in the AFOLU sector consist of the results of implementing and upscaling the Climate-Smart Agriculture activities: *strengthening of the good practices of assisted natural regeneration and recovery of degraded land; improvement of the balance sheet of cereals and fodder, along with food and nutritional security; development of local agro-climate information; job creation and reduction of the rural exodus; and strengthening of social cohesion*.

	Agriculture sector contributes 80% to the income of the populations and is very dependent on climatic risks.

Nigeria

Last update: 3rd August 2017
Contacts:

Overview

Key facts and figures	
Socio-economic data:	185.99 million inhabitants (2016); GDP $404.65 bn or $2,175.7/ capita (2016) 42.54% of the population is 14 years or under Population growth rate is 2.43% (2017 est.) and the rate of urbanisation is 49.4%
GHG emission data:	492.44 $MtCO_2$ (Source: Country Greenhouse Gas Emissions Data), <1% of global emissions (Source: INDC, 2015)
Member of groupings:	African Group, G77
Main policy documents:	• FNC (2003); SNC (2014) • Nigeria Vision 20:2020, Economic Transformation Blueprint (2009) • Transformation Agenda 2011 – 2015 • Nigeria Climate Change Policy Response and Strategy (2012) • Post Disaster Need Assessment (PDNA) Report (2012) • National Adaptation Strategy and Plan of Action for Climate Change Nigeria (NASPA-CCN) (2011) • National Agricultural Resilience Framework (NARF 2014) • National Policy on Environment • Other key policies: Nigeria's Agricultural Policy, Nigeria's Drought Preparedness Plan, National Policy on Erosion and Flood Control, National Water Policy, National Forest Policy, and National Health Policy
Lead department:	• Federal Ministry of Environment
Lead political figure:	• Amina J. Mohammed, Minister, Federal Ministry of Environment
Lead negotiator:	•
UNFCCC focal point:	• Mr. Yerima Peter Tarfa, UNFCCC Focal Point, Federal Ministry of Environment
Lead interlocutor on NDC implementation	• Department of Climate Change
Status of reporting obligations:	• Second National Communication (2014)
Mitigation targets and measures	
Pre-2020 pledge:	Economic and social development: grow economy 5% per year, improve standard of living, electricity access for all
INDC overall target:	20% unconditional, 45% conditional Reduction from Business as Usual (BAU)
Key	Targets set in the INDC

policies/deliverables and implementation progress:	• Work towards ending gas flaring by 2030 • Work towards Off-grid solar PV of 13 GW (13,000 MW) • Efficient gas generators • 2% per year energy efficiency (30% by 2030) • Transport shift car to bus • Improve electricity grid • Climate smart agriculture and reforestation
	Policy and strategy objectives as per INDC • Implement mitigation measures that will promote low carbon as well as sustainable and high economic growth; • Enhance national capacity to adapt to climate change; • Raise climate change related science, technology and R&D to a new level that will enable the country to better participate in international scientific and technological cooperation on climate change; • Significantly increase public awareness and involve private sector participation in addressing the challenges of climate change; • Strengthen national institutions and mechanisms (policy, legislative and economic) to establish a suitable and functional framework for climate change governance.
Carbon pricing:	
Long Term Strategy:	The INDC presents a set thirteen sector-specific strategies, policies, programmes and measures • Improve awareness and preparedness for climate change impacts • Mobilise communities for climate change adaptation actions • Reduce the impacts of climate change on key sectors and vulnerable communities • Integrate climate change adaptation into national, sectoral, State and Local Government planning and into the plans of universities, research and educational organisations, civil society organizations, the private sector and the media. The initiatives noted in the Department of Climate Change website include: • Development of strategic and sustainable climate change and environmental advocacy programme. • Development of national frame work for ecosystem base adaptation. • Development of toolkit for the establishment and capacity development of climate change desks/units in state ministries of environment and relevant MDAs • Development of a Climate Public Expenditure and Institution Review for Nigeria (CPEIR) • Continuation with the implementation of Nigeria Nationally Determined Contribution (NDC) • Coordination of Nigeria's issuance of Sovereign Green Bonds.
Adaptation measures	
Goal/vision:	Forward- and backward-looking goals with existing policy documents (e.g.: NASPA-CCN); qualitative targets for period

	2015 - 2030
Priority sectors:	• Agriculture (crops & livestock) • Forests • Energy • Transport & Communication • Industry & Commerce • Vulnerable groups
Key deliverables and implementation progress:	Adaptation measures planned in the INDC in the highest emitting sectors to have mitigation co-benefits Agriculture (Crop and Livestock) Adopt improved agricultural systems for both crops and livestock Implement strategies for improved resource management Focus on agricultural impacts in the savanna zones, particularly the Sahel Forests • Strengthen the implementation of the national Community-Based Forest Resources Management Programme. • Support review and implementation of the National Forest Policy. • Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status; and initiate a research programme on a range of climate change-related topics, including long term impacts of climatic shifts on closed forests. • Provide extension services to CSOs, communities and the private sector to help establish and restore community and private natural forests, plantations and nurseries. • Improve management of forest reserves and enforce low impact logging practice. Energy • Include increased protective margins in construction and placement of energy infrastructure (i.e. higher standards and specifications). • Undertake risk assessment & risk reduction measures to increase resilience of the energy sector. • Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions. • Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply. • Expand sustainable energy sources and decentralize transmission in order to reduce vulnerability of energy infrastructure to climate impacts. Transportation and Communication • Include increased protective margins in construction and placement of transportation and communications infrastructure • Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors.

	• Strengthen existing transportation and communications infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions. • Develop and diversify secure communication backup systems to ensure both civil society and security forces have access to emergency communication methods. Industry and Commerce • Increase knowledge and awareness of climate change risks and opportunities • Undertake and implement risk assessments and risk reduction measures • Incorporate climate change into ongoing business planning • Review and enforce land use plans in industrial areas in light of climate change • Encourage relocation of high risk industries, facilities and markets • Promote and market emerging opportunities from climate change • Encourage informal savings and insurance schemes, and arrange for the availability of medium term credit (especially for industries in crisis).
Monitoring and reporting plans	Plans for monitoring and reporting us unclear
Required resources	The INDC identifies that international finance and investment, technology and capacity-building will be needed to achieve the ambitious intended contribution. The implementation of the full contribution is conditional on the availability of adequate financing for investment in the mitigation actions contained therein.
Means of implementation	
Own climate finance resources:	• Total National Cost = $142b; National Benefits = $304b (World Bank report "Low Carbon Development Opportunities for Nigeria" (2013)) The Department of climate change website states: • The Clean Technology Fund is supporting the development of transformative public transport schemes in Lagos, Kano and Abuja • The Department of Climate Change has established a pioneering Climate Finance Unit that will enhance knowledge and information on climate finance opportunities and help develop robust project proposals • The Bank of Industry is in the final stages of seeking accreditation as a National Implementing Entity to the Adaptation Fund. If successful, this will allow a national organisation to be responsible for implementing projects funded from this source, substantially enhancing country ownership. • In anticipation of a successful accreditation, efforts to develop a cross-cutting project concept to support the climate resilience of some of Nigeria's poorest and most vulnerable citizens has begun. • In 2016 major effort was planned to better coordinate

	Nigeria's climate change response and climate finance prioritisation, and a strategy for accessing resources from the Green Climate Fund will also be developed The progress of the above activities could not be confirmed.
Support from EU/MS donors:	Europe Aid funded projects in Nigeria • Action against desertification (2014- 2019) • Rural Water Supply and Sanitation Project - Niger Delta Support Programme (NDSP) (2012- 2017) • Farmer managed renewable energy production: Improving the fuel wood balance in Katsina State (2014- 2018) • Support to the Implementation of the Great Green Wall Initiative for the Sahara and the Sahel (2011- 2014)
Support from other donors:	Several initiatives by African Development Bank (AfDB) • Nigeria Trust Fund • Bauchi Solar Power Project (Lending)- AFDB • Mainstream Hydro Project- AFDB Other initiatives • The Global Environment Facility–Small Grants Programme (GEF-SGP) • Niger Delta Biodiversity Project (2013- 2016) together with GEF and UNDP •
Participation in international capacity building programmes:	
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	•
Monitoring capacities and data gaps	Gap analysis of existing data sharing and reporting structures and processes and make initial recommendations on the appropriate form and structure of a national MRV system, including completing and maintaining the national GHG inventory and assuring data quality. Promoting public awareness and education on climate-compatible development. Training and capacity building, including simplified user-friendly tools for analysis and further development of the LEAP model.
Other comments	Implementation of INDC includes a review of Nigeria's current climate finance landscape, support needs and the international funding landscape, along with an assessment of climate finance readiness and gaps. This will include possible use of funding through carbon market mechanisms subject to the

	detailed provisions of the Paris agreement.

Sudan

Last update: 3rd August 2017
Contacts:

Overview

Key facts and figures	
Socio-economic data:	39.6 million population (2016); $95.6 bn (2016) or $2,415/ capita (2016) 38% of the population is 14 years or under Population growth rate is 1.64% (2017 est.) and the rate of urbanisation is 3.02%
GHG emission data:	
Member of groupings:	African Group, G77, LDC
Main policy documents:	• NAPA (2007) • NAP (2016) • SNC (2013) • TNA (2013)
Lead department:	•
Lead political figure:	•
Lead negotiator:	•
UNFCCC focal point:	•
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• Second National Communication (2013)
Mitigation targets and measures	
Pre-2020 pledge:	
INDC overall target:	
Key policies/deliverables and implementation progress:	•
	•
Carbon pricing:	
Long Term Strategy:	(…)
Adaptation measures	

Goal/vision:	Forward- and backward-looking goals to 2025, based on NAP (2016) but also building on various adaptation-related mechanisms and processes under the Convention (NAPA, 20017; INC (2003) and SNC (2013); TNA (2013) Qualitative targets/contributions
Priority sectors:	Sector level priorities: water, agriculture (both livestock and crop production systems), coastal zone and human health State level priorities:
Key deliverables and implementation progress:	• Currently implementing key urgent and immediate adaptation initiatives as identified in the NAPA in six states out 18 vulnerable states,
Monitoring and reporting plans	None presented in NDC
Required resources	$1.2 billion USD for adaptation over 5 - 10 years Further development and elaboration of contributions and assessment of costs will be necessary to refine the required investment for implementing such programmes and actions.
Means of implementation	
Own climate finance resources:	• Substantial local contributions from the participating states and the national government support NAPA implementation.
Support from EU/MS donors:	•
Support from other donors:	• Receive resources from the LDCF to support NAPA implementation • Additional request for $1.2 billion USD for adaptation from international climate finance (including GCF, GEF, bilateral)
Participation in international capacity building programmes:	• LDCF
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	•
Monitoring capacities and data gaps	•
Other comments	(…)

Annex 2 Updated NDC fiches

Afghanistan

Last update: 30 June 2016
Contacts: Maddalena DALI' (CLIMA A3)

Overview

Key facts and figures	
Socio-economic data:	30 million inhabitants (42nd); GDP $20.5 bn (103rd) or $687/capita 40.9% of the population is 14 years or under Population growth rate is 2.36% (2017 est.) and the rate of urbanisation is 3.77%
GHG emission data:	18 million tCO2eq/yr (102nd), 0.03% of global emissions, 0.6 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	G77, LDC
Main policy documents:	• INDC of September 2015 • NAPA (2009); Afghanistan National Renewable Energy Policy (ANREP); National Water and Natural Resource Management Priority Programme; Strategic National Action Plan for Disaster Risk Reduction (SNAP); National Comprehensive Agriculture Production and Market Development Programme; Energy for Rural Development (ERDA) • Afghanistan is finalizing its National Climate Change Strategy and Action Plan as well as its NAP
Lead department:	National Environmental Protection Agency
Lead political figure:	
Lead negotiator:	(…)
UNFCCC focal point:	Mr. Fazal Rahman Aimaq, Desk Officer of Environment, Min. of Foreign Affairs
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	First national communication, 2013; no biennial update report yet; latest GHG inventory 2005
Mitigation targets and measures	
Pre-2020 pledge:	n/a
INDC overall target:	13.6% below BAU by 2030 conditional on external support
Key policies/deliverables and implementation progress:	**Energy supply** • (…) - (…)
	Land sector • (…)

	- (…)
	Industry • (…) - (…)
	Transport • (…) - (…)
	Buildings • (…) - (…)
Carbon pricing:	(…)
Long Term Strategy:	
Adaptation measures	
Goal/vision:	Both backward-forward looking INDC that sets qualitative and quantitative goals/actions. Period 2020-2030 for the whole INDC, unclear if same period apply to adaptation. Contingent on international support.
Priority sectors:	Main impacts: change in rainfall patterns; extreme weather events; heat waves; floods; droughts; glacial lake outflows; Main vulnerable sectors: agriculture; water resources; food security; health. Priority sectors: agriculture; water; DRR; land management; food security; energy; biodiversity; education; forestry; infrastructure Synergies between adaptation and mitigation: energy; forestry; agriculture
Key deliverables and implementation progress:	**Mainstreaming** climate change considerations into national development policies • Water - Strengthen and expand meteorological and hydrological monitoring networks and services - Rehabilitation and reconstruction of infrastructure; planning for proper watershed management • Agriculture and natural resources - Increase irrigated agricultural land to 3.14 M-ha - at least 10% of land area and the habitat of selected species under a system of conservation - regeneration of at least 40% of existing degraded forests and rangeland areas • Energy - provision and development of alternative and renewable energy sources for 25% of the rural population
Monitoring and	Development of a system to monitor and assess vulnerability and adaptation to climate change is considered (financial need

reporting plans	of 0.2 bn USD)
Required resources	Cost of adaptation component estimated to 10.785 bn USD. Conditional/ unconditional
Means of implementation	
Own climate finance resources:	(…)
Support from EU/MS donors:	(…)
Support from other donors:	(…)
Participation in capacity building programmes:	• UNFCCC/UNEP's Climate technology centre and network (CTCN) • GEF/UNDP/UNEP's National Communications Support Programme (NCSP) • World Bank's Energy Sector Management Assistance Program (ESMAP), Energy Subsidy Reform and Delivery Technical Assistance Facility (ESMAP ESR) • GCF's readiness funding
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	
Monitoring capacities and data gaps	(…)
Other comments	(…)

Background

Bangladesh

Last update: 15 August 2017
Contacts: Maddalena Dali (A3)

Overview

Key facts and figures	
Socio-economic data:	155 million inhabitants (8th); GDP $116.36 bn (58th) or $752/capita 27.76% of the population is 14 years or under Population growth rate is 1.04% (2017 est.) and the rate of urbanisation is 3.19%
GHG emission data:	183 million tCO2eq/yr (37th), 0.3% of global emissions, 1.2 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	Cartagena Dialogue, G77, LDC
Main policy documents:	INDC NAPA (2005); Bangladesh Climate Change Strategy and Action Plan; National Sustainable Development Strategy; The 7th Five Year Plan (adaptation mainstreamed); National Disaster Management Plan; Disaster Management Act
Lead department:	Ministry of Environment and Forests (MOEF)
Lead political figure:	Anwar Hossain Manju, Minister, Ministry of Environment and Forests (MOEF)
Lead negotiator:	(…)
UNFCCC focal point:	Mr. Istiaque Ahmad, Secretary, Secretary; Ministry of Environment and Forests (MOEF)
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	Second National Communication in Dec2012. No biennial update report yet. Latest GHG inventory year 2005
Mitigation targets and measures	
Pre-2020 pledge:	No pledge.
INDC overall target:	5% below BAU by 2030 (power, transport and industry sectors, based on existing resources); conditional target of 15% below BAU.
Key policies/deliverables and implementation progress:	**Energy supply** • A target to deliver 5% of energy from renewable sources by 2015, and 10% by 2020 (2008 Renewable Energy Policy) • A target to reduce energy intensity (per GDP) by 20% by 2030 compared to 2013 levels (Energy Efficiency and Conservation Master Plan) • Reducing commercial sector energy consumption by 25%

	below BAU by 2030 • 400 MW of wind generating capacity by 2030 • 1000 MW of utility-scale solar power plant by 2030 • More than 1.5 million Improved Cook Stoves (ICS) and 4.0 million Solar Home Systems have already been distributed across the country. Target for increasing the number of households with improved cook stoves to 70% by 2030
	Land sector • Continuation of coastal mangrove plantation • Reforestation and afforestation in the reserved forests • Plantation in the island areas of Bangladesh • Continuation of Social and Homestead forestry
	Industry • Improving kiln efficiency in the brick making industry, composting of organic waste and waste biomass-based thermal energy generation • An Energy Management Programme, including establishment of Energy Management Systems and energy audits for industry by accredited energy auditors • 10% energy consumption reduction in the industry sector compared to the business as usual by 2030
	Transport • To achieve a shift in passenger traffic from road to rail of up to around 20% by 2030 compared to the business as usual. • 15% improvement in the efficiency of vehicles due to more efficient running by 2030.
	Buildings • Energy Efficiency measures for buildings, such as heat insulation and cooling measures, and a revised code on energy efficiency of new buildings
Carbon pricing:	(…)
Long Term Strategy:	
Adaptation measures	
Goal/vision:	Backward and forward looking INDC with 2015-2030 timeframe; Qualitative goals
Priority sectors:	Vulnerability Index (CCVI-2011); damage to settlements, crop loss, loss of life, economic loss from floods, storms, droughts, river bank erosions Priority sectors: water; agriculture; forestry; DRR; health; infrastructure; coastal zone management Synergies between adaptation and mitigation especially in the forestry sector
Key deliverables and implementation progress:	• NAPA; NAP under development (roadmap completed 2015) • To implement INDC, plan to set out roadmap and timetable for actions (no ddl) • Key priorities for adaptation interventions (no targets/ddl): - Food security and livelihood and health protection (incl.

	water security): stress tolerant crop varieties and cultivation - Comprehensive disaster management: disaster preparedness and construction of shelters; improved early warning systems; tropical cyclones, storm surge, and inland monsoon protections; building shelters - Salinity intrusion and coastal protection - River flood and erosion protection: river training and dredging - Building climate resilient infrastructure, housing and communication - Urban resilience through improved drainage systems - Ecosystem based adaptation (incl. forestry co-management) - Community based conservation of wetlands and coastal areas
Monitoring and reporting plans	Mainstream adaptation initiatives in a National Monitoring, Reporting and Verification (MRV) system that has been planned
Required resources	Cost of adaptation was estimated at $40bn dollars for the period 2015-2030. Creation of two innovative funds: the Bangladesh Climate Change Trust Fund (BCCTF) from the Government's own budget and the Bangladesh Climate Change Resilient Fund (BCCRF) with the support of development partners
Means of implementation	
Own climate finance resources:	(…)
Support from EU/MS donors:	UKAid GIZ, EC
Support from other donors:	UNDP
Participation in capacity building programmes:	UNDP NAP-GSP
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	(…)
Monitoring capacities and data gaps	(…)
Other comments	(…)

Background

Bhutan

Last update: 14 August 2017
Contacts: Maddalena Dali

Overview

Key facts and figures	
Socio-economic data:	742 000 inhabitants (162nd); GDP $1.78 bn (163rd) or $2399/capita 25.8% of the population is 14 years or under Population growth rate is 1.07% (2017 est.) and the rate of urbanisation is 2.89%
GHG emission data:	3 million tCO2eq/yr (134th), 0.01% of global emissions, 4.4 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	G77, LDC
Main policy documents:	National Environment Protection Act; National Strategy and Action Plan for Low Carbon Development (2012); Economic Development Policy (2010 and draft 2015); National Adaptation Program of Action 2006 revised in 2012; INDC
Lead department:	National Environment Commission (NEC)
Lead political figure:	Mr Lyonpo Yeshey Dorji, Minister of Ministry of Agriculture and Forests
Lead negotiator:	(…)
UNFCCC focal point:	Mr Chencho Norbu, Secretary and National Focal Point, National Environment Commission (NEC) Mr Thinley Namgyel, Chief Environment Officer, National Environment Commission (NEC)
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	Second National Communication in 2011; no biennial update report yet; Latest GHG inventory 2000
Mitigation targets and measures	
Pre-2020 pledge:	Efforts to remain GHG neutral
INDC overall target:	Bhutan intends to remain carbon neutral where emission of greenhouse gases will not exceed carbon sequestration by forests, which is estimated at 6.3 million tons of CO2.
Key policies/deliverables and implementation progress:	**Energy supply** • Pursue sustainable and clean hydropower development with support from CDM or other climate market mechanisms to reduce emissions within Bhutan and the region by exporting surplus electricity
	Land sector • Sustainable management of forest management units

	(FMUs), protected areas, community forests, forest areas outside FMUs, and private forests • Enhancing forest information and monitoring infrastructure through national forest inventories and carbon stock assessments • Forest fire management and rehabilitation of degraded and barren forest lands • Organic farming and conservation agriculture • Development and promotion of sustainable agricultural practices • Integration of sustainable soil and land management technologies and approaches
	Industry • Improvement of manufacturing processes in existing industries through investments and adoption of cleaner technology, energy efficiency and environmental management
	Transport • Improving mass transit and demand side management of personal modes of transport • Exploring alternative modes of transport to road transport such as rail, water and gravity ropeways • Improving efficiency in freight transport • Improving efficiency and emissions from existing vehicles through standards and capacity building
	Buildings • Energy demand side management by promoting energy efficiency in appliances, buildings and industrial processes and technologies. • Integration of low emission strategies in urban and rural settlements through green buildings, sustainable construction methods and climate smart cities.
Carbon pricing:	(…)
Long Term Strategy:	
Adaptation measures	
Goal/vision:	Timeframe is partially pre-2020 and mainly post 2020 (2018 - 2028). Sets qualitative forward-looking goals that rely on international support
Priority sectors:	Vulnerabilities: fragile mountain environment with threat due to the high dependency on agriculture and hydropower Priority sectors: water; agriculture; ecosystem services (forestry & biodiversity); DRR; health; transport infrastructure; farming; information services; clean energy; urban settlements.
Key deliverables and implementation progress:	• NAPA; development of NAP relies on external support • Integration of mitigation and adaptation actions in the 12th Five Year Development Plan (2018-2023) and subsequent five-year plans • No concrete actions, list of priority adaptation needs with specific requirements:

	- increase resilience on water security - resilient agriculture to achieve food security, resilient climate farming - sustainable forest management and conservation of biodiversity - resilience to CC induced hazards, climate proof infrastructure - minimize health risks - enhancement of information service - integrate climate resilient and low emission strategies on urban and rural settlements
Monitoring and reporting plans	National Environment Commission ensures the coordination for mitigation and adaptation priorities. Update of the National Forestry Inventory by the end of 2016. On this inventory relies a forest monitoring inventory system which was created in conjunction with a national forest monitoring system for REDD+
Required resources	International support is essential. No concrete figures
Means of implementation	
Own climate finance resources:	(…)
Support from EU/MS donors:	(…)
Support from other donors:	(…)
Participation in capacity building programmes:	(…)
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	(…)
Monitoring capacities and data gaps	(…)
Other comments	(…)

Background

Ethiopia

Last update: 26 April 2017
Contacts: Alessandra Sgobbi (CLIMA A3), Daniele Morbin, Mersha Argaw (EUDEL Addis Ababa)

Overview

Key facts and figures	
Socio-economic data:	102.4 million inhabitants (14th); GDP $69 bn (69st) or $1,900/capita 43.47% of the population is 14 years or under Population growth rate is 2.85% (2017 est.) and the rate of urbanisation is 4.64%
GHG emission data:	185 million tCO2eq/yr (36th), 0.4% of global emissions, 2 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	African Group, Cartagena Dialogue, G77, LDC (current Chair), Climate Vulnerability Forum (current Chair)
Main policy documents:	• Climate Resilient Green Economy Strategy (CRGE) of Nov 2011, integrated into the Second Growth and Transformation Plan (GTP II) of May 2016 • The National Adaptation Programme of Action (NAPA 2007) • The Ethiopian Programme of Adaptation to Climate Change (EPACC 2011) • National, regional and city-level adaptation plans • NDC of June 2015, ratified March 2017
Lead department:	Ministry of Environment, Forestry and Climate Change
Lead political figure:	• Mr H.E. Gemedo Dale, Minister of Environment, Forestry and Climate Change
Lead negotiator:	(…)
UNFCCC focal point:	• Mr H.E. Gemedo Dale, Minister of Environment, Forestry and Climate Change
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• Second national communication, 2015 • No biennial update report yet • Latest GHG inventory 1995
Mitigation targets and measures	
Pre-2020 pledge:	Single project activities (CDM) / NAMAs; Ethiopia has not set its 2020 pledge
INDC overall target:	• 64% below BAU by 2030 (145 MtCO2e or lower), while achieving middle income economy status. Covers CO2, CH4 and N2O. • Conditional upon ambitious climate deal and access to support
Key policies/deliverables and implementation progress:	**Energy supply** • **Expanding Energy Infrastructure and Ensuring its Quality (GTP II 2015-2020):** – Increase power generating capacity from 4.2 GW in

	2014/15 to 17.2 GW by 2019/20, including 13.8 from hydro, 1.2 from wind, 0.3 from solar, 0.6 from geothermal, 0.5 from reserve fuel (gas turbine), 0.8 from biomass/waste – Increase electricity coverage from 60% to 90% – Increase power transmission lines from 16,000 to 21,700km – Increase energy consumption per capita from 86 kWH to 1,269 kWh – Reduce power loss from 23% to 11% – Enhance institutional capacity of power companies – Distribute biogas stoves – Produce 3,600,000 solar lanterns and 400,000 household solar PVs – Distribute 300 wind powered water pumps – Develop 135 mini hydropower stations – 500 000ha of biofuel plantations to produce 1.4 billion litres of bioethanol and 450 million litres of biodiesel. 5 ethanol and 6 biodiesel production plants to be established
	Land sector • increase national forest coverage from 15.5% in 2015/14 to 20% in 2019/2020 • increase community watersheds with a development plan from 20,000 to 94,000 • increase land rehabilitation through area closure from 11 to 22.5 million ha • increase watershed areas supported with conservation structures from 8 to 27 million ha • create 1.5 million jobs through development works in watershed management • Increase irrigated land from 2.3 to 4.1 million ha and provide access to alternative water points for 80% of smallholder farmers • Improve livestock value chain efficiency, expand low carbon methods, improve grazing lands and livestock health coverage
	Industry • Leapfrogging to modern and energy efficient technologies in transport, industry and building sectors • Construction of industrial parks with access to adequate electricity, water, ICT, road, sewerage system and fire emergency services
	Transport • Intra-Urban Electric Rail NAMA (2012) • - Replace 50% of the cargo transport with electric rail transport construct 2,741km national railway network in five corridors before 2020. • - Expected emissions reduction of 8.9 Mt CO2e/yr by 2030 • Bio-fuel development (see energy section above) • No GHG target for air transport
	Buildings (including waste and green cities) • Generic target Leapfrogging to modern and energy efficient technologies in transport, industry and building sectors

Carbon pricing:	The World Bank and the Ethiopian Development Research Institute are conducting an exploratory study on carbon pricing in Ethiopia to be completed by June 2017
Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	• INDC sets qualitative medium- and long-term goals to increase resilience and reduce vulnerability of livelihoods and landscapes in 3 pillars (droughts, floods and other cross cutting interventions) • GTP II covers basic strategies of building climate resilient green economy
Priority sectors:	• Vulnerabilities: droughts, floods • Priority sectors: water, agriculture, farming, forestry, DRR, food security, biodiversity, ecosystems, infrastructure, health, clean energy • Maximise synergies between adaptation and mitigation, especially involving agriculture and forests
Key deliverables and implementation progress:	• Improve the status of vulnerable groups • Develop the ongoing Land Management Programme and Productive Safety Net Programme • Main medium and long-term actions: - Enhance food security breeding and making available improved crop varieties - Improve economic opportunities from agroforestry - Enhance integrated water management - Create biodiversity movement corridors; - Enhance ecosystem health through ecological farming - Expand electric power generation; build additional dams and power stations - Develop and implement sustainability codes for infrastructure - Develop insurance systems especially for farmers - Develop DRR policies for weather and health (integrated pest management)
Monitoring and reporting plans	The Ministry of Environment, Forestry and Climate Change will regularly organise consultative dialogues to review the implementation of the national and sectorial adaptation plans
Required resources	Future research will quantify the required international support
Means of implementation	
Own climate finance resources:	The government expenditure for the GTP II's period will be financed by 86% through domestic revenues. The 14% deficit will be financed for 38.8% through foreign loans and 61.2% through domestic borrowing. Total government expenditure is projected to reach 92 billion EUR (52bn for capital expenditure and 40bn for recurrent expenditure). Irrigation and energy infrastructures will account for 21.6% and railway

	infrastructures for 1.5% of the capital expenditure.
Support from EU/MS donors:	• EU contributes to climate related programmes up to around 450m EUR. This includes programmes and projects that have an impact on climate mitigation and adaptation. Details in table below. • DE supports a supra-regional project on nutrition security and resilience building and a project on participatory forest management. More projects implemented by German Development Entities GIZ and KfW in table below
Support from other donors:	WB, AfDB, Norway and DFID are the main donors involved in the CRGE facility through GGGI. Many other donors are involved indirectly in projects with climate components.
Participation in international capacity building programmes:	• Italian NDC support programme • German NDC support programme • Climate Development Knowledge Network (CDKN) • EU's technical assistance facility for the UN sustainable energy for all programme (SE4ALL) • World Bank's Forest Carbon Partnership Facility (FCPF) • UNEP/UNDP/FAO's UN-REDD programme • IKI / Sustainable ecosystems • Internationale Klimaschutzinitiative (IKI) • EU's Global Climate Change Alliance + (GCCA+) • World Bank's Global Facility for Disaster Reduction and Recovery/ACP-EU Natural Disaster Risk Reduction Program (GFDRR) • UNFCCC/UNEP's Climate technology centre and network (CTCN) • GEF/UNDP/UNEP's National Communications Support Programme (NCSP) • EU's capacity building project for monitoring capacities in Africa (lead consultant NIRAS) • International Partnership on Mitigation and MRV led by Germany/South Africa/South Korea • World Bank's Energy Sector Management Assistance Program (ESMAP), Energy Subsidy Reform and Delivery Technical Assistance Facility (ESMAP ESR) • Climate mainstreaming • GCF's readiness funding • UNECA/AUC/AfDB's Climate for Development in Africa programme (ClimDev-Africa) • COMESA project under the GCCA Intra-ACP programme
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	• The NDC is linked to the Climate Resilient Green Economy Strategy (CRGE) and finance, technology transfer and capacity building under the strategy. Its preparation has catalysed an increase in ambition. Ethiopia will need significant support for its implementation. • Ethiopia would need to implement additional policies to achieve its NDC target by 2030 - including LULUCF - by 164 MtCO2e.Ethiopia's GHG emissions are projected to be 310 MtCO2e by 2030 (including LULUCF) under the Growth and

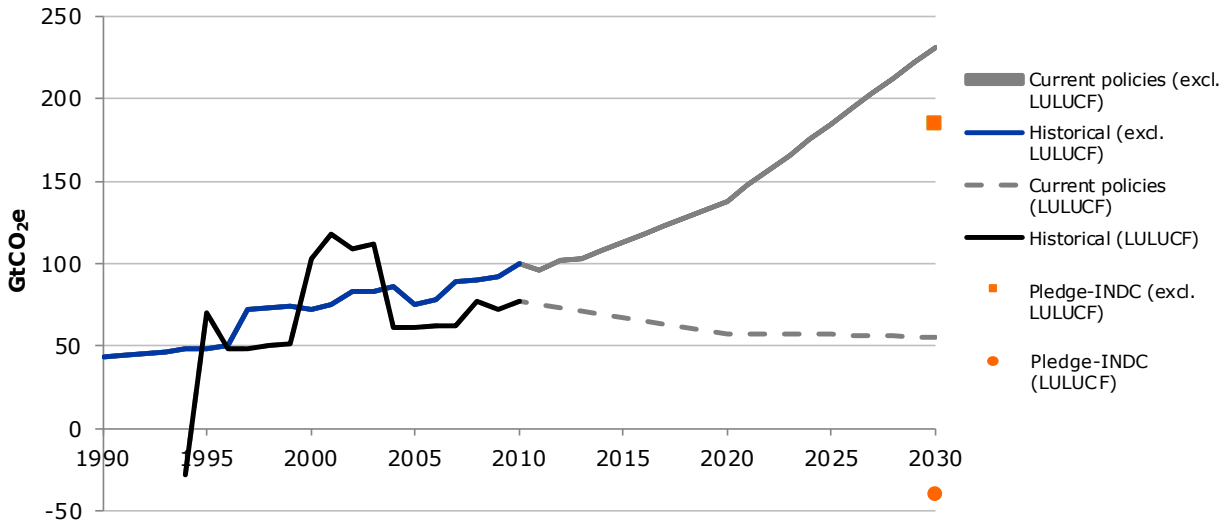
	Transformation Plan (GTP) phase I (2010-2015) and some initiatives under the Climate Resilience and Green Economy Strategy.
Monitoring capacities and data gaps	An MRV project funded by the European Commission is ongoing and after a number of trainings is expected to set up an MRV system for one sector (not yet identified). The Ethiopian Development Research Institute is in charge for developing an MRV system within the CRGE facility. Capacities are still very low, and technical as well as financial support is needed.
Other comments	(…)

Background

Table: Impact of climate policies on GHG emissions (including LULUCF) in Ethiopia. Absolute emission levels and emission levels relative to 2010 levels are presented.

2010 GHG emissions, incl. LULUCF	2020 target and INDC		Current policies	
	Official data	NewClimate estimates	Official data	NewClimate estimates
Absolute: 175 $MtCO_2e$	145 $MtCO_2e$; -18% by 2030	145 $MtCO_2e$; -18% by 2030	N/A	210 $MtCO_2e$; 12% by 2020 285 $MtCO_2e$; 62% by 2030
Per capita: 2.0 tCO_2e/capita	N/A	1.2 tCO_2e/capita by 2030	N/A	2.1 tCO_2e/capita by 2020 2.6 tCO_2e/capita by 2030

Graph: Impact of climate policies on greenhouse gas emissions (CO_2, CH_4 and N_2O) in Ethiopia



Source: NewClimate Institute calculations. Historical greenhouse gas emissions are based on the 2nd National Communication.

EUDEL climate change projects as at October 2016

Contract Title	Partner		Description Project
CLIMATE CHANGE's ACTIONS	**TOT**		
GCCA Ethiopia: Pilot Testing Climate Change Activities within the SLM Programme	**GIZ**		The overall objective of the GCCA project is to contribute towards achieving Ethiopia's Climate Resilient Green Economy (CRGE) through capacity building and sustainable land management. The specific objective is to increase the awareness and capacity of targeted Government institutions both at federal and regional levels and of the rural population at large to deal with climate change
ENVIRONMENT AND FOREST's ACTIONS	**TOT**		
A new approach to the conservation of **wild Coffea** arabica in south-west Ethiopia: exploring the potential of participatory forest	**University of Huddersfield**		The project aims to contribute to the conservation of coffee biodiversity through the application of simplified PFM procedures.
Conservation of Biodiversity and Ecosystems Functions and improved well-being of Highland and Lowland Communities within Bale Eco region	**FARM Africa** Partners: SOS Sahel ; Frankfurt Zoological Society , IWMI, PHE EC		The project aims to enhance drought resilience, food and nutrition security of vulnerable populations in Southern and Eastern Ethiopia through conservation of biodiversity /ecosystems functions/ services in BER and increase resilience and well-being of highland/ lowland communities.
Forest landscape sustainability and improved livelihoods through non-timber product development and payment for environmental services	**University of Huddersfield**		To maintain a forested landscape to support improved livelihoods of local forest-dependent communities and thereby ensure the delivery of environmental services in a wider context'
Bamboo as sustainable biomass energy: A suitable alternative for firewood and charcoal production in Africa	**INTERNATIONAL NETWORK FOR BAMBOO AND RATTAN**		The overall objective is to increase the use of bamboo as a source of energy for the poor of Ethiopia and Ghana thereby providing a more sustainable, environmentally friendly and economic option to firewood and wood charcoal.
Strengthening Sustainable Livelihoods and Forest Management in Ethiopia	**FARM Africa**		Will secure sustainable management of Ethiopia's forests and reduce environmental degradation through PFM and promotion of NTFP. 200,000 indigenous people dependent on the 270,000 ha of targeted forests & total of 3 mn people will benefit.
Implementing effective and sustainable biodiversity conservation in Ethiopia's Afro-montane ecosystems	**Frankfurt Zoological Society**		Ethiopia's unique biodiversity conserved and contributing to the social and economic well-being of present and future generations
PE 1 - Programme Estimate Scaling up Participatory Forest Management (PFM)	**MoA**		Improve forest conditions and forest-based livelihoods through building MoARD and community capacity to scale-up and mainstream Paprticipatory Forest Management and Non Timber Forest Products Development
PE 2 - Programme Estimate Scaling up Participatory Forest Management (PFM)	**MoA**		Activities aim at improving forest conditions and forest-based livelihoods through building MoA and community capacity to scale-up and mainstream Paprticipatory Forest Management and Non Timber Forest Products Development
Technical assistance support to Scaling-up Participatory Forest Management Project	**GOPA**		To assist build MoA and community capacity to scale-up and mainstream Participatory Forest Management and Non-Timber Forest Products development
Mapping the EU+ Engagement in the Green Sector, Joint Programming Needs Assessment in Bale, the South-West, the Simein, and Identification of EU Activities in the 11th EDF	**PARTICIP GMBH**		The Contract is encompasses three distinct assignments: Mapping report on the country wide engagement by EU+ partners in the green sector including detailed mapping for the South West, Bale and Simien eco-regions; needs assessment and gaps identification at country wide scale and detailed work for Bale, Simien and the South-West eco regions and lastly preparation of an AD for EU engagement in the green sector over the period of the 11th EDF
AGRICULTURE AND SMART CLIMATE AGRICULTURE's ACTIONS	**TOT**		

Support to Responsible Agricultural Investment in Ethiopia	**GIZ**		The overall objective of the EU support is to enhance secure tenure of land, fisheries and forest and other natural resources for smallholders, vulnerable people and communities in Sub-Saharan Africa, to achieve food security and contribute to the eradication of poverty in Sub-Saharan Africa. The specific project objective is to: Establish a conducive and transparent environment for responsible agricultural investments while securing the rights of the resident population.
Support to the Productive Safety Nets Programme of Ethiopia	**World Bank**		This allocation is intended to provide support to the Productive Safety Net Programme of Ethiopia.
Support to the RFM of the PSNP (component 1 of SHARE Ethiopia - Accelerating Resilience Capacity in southern and eastern Ethiopia-ARCE)	**World Bank**		Support to the Risk Financing Mechanism (€ 11 mio) of the Productive Safety Net Programme (PSNP) implemented by the GoE that provides transitory cash and food needs in case of shocks (drought or flood) in exchange for participation on Public Works, mainly soil & water conservation activities that significantly contribute to sustainable resource management and to the climate adaptation efforts. Non able participants receive support directly without participating in Public Works. This component 1 of SHARE ARCE is coordinated by the World Bank.
Building Resilience Capacity and Recovery for the Vulnerable Population in Ethiopia	**Different International NGOs**		The project aims to contribute to the enhancement of communities and local government capacities to avert the underlying causes of food and nutrition insecurity and build their resilience.
Pursuing Pastoral Resilience (PPR) through improved animal health service delivery in pastoral areas of Ethiopia	**FAO**		Improved understanding of animal disease status in pastoral areas combined with improved capacity for animal disease control and sustainable animal health delivery.
Enhancing agricultural productive capacities of resource poor farmers and improve food security .	**Different International NGOs**		The overall objective of the project is to improve the food security situation for households in targeted areas. Enemorena Ener and West Badiwacho woredas of SNNPR, Oromia Regiona State, Arba Minch Chencha and Zuria Weredas.
Smallholder Markets and Agriculture Resilience Transformation Project (SMART Project) in SNNPR and South Oromia	**IDE UK** + SHA UK, SOS Sahel, OXFAM, RVCWDA, BG MFI, OMO MFI		The project aims to enhance the resilience of 36,500 poor smallholder farmers in thirteen target woredas of Oromia and SNNP Regional states through improved agricultural production and income. The project to be implemented in partnership with 4 NGOs (SHA.UK, OXFAM.UK, SOS Sahel, RVCWDA.
Enhancing Food Security, Stability and Resilience (EFSSR): Assisting the Rural Poor to Improve Farming, Asset Base and Income Sources	**CARE Austria** + Farm Africa UK		The action aims to enhance the social and economic stability of 174,000 people from 34,800 vulnerable households in 12 drought-affected Woredas through supporting the recovery of livelihoods of the affected population and building their resiliency.
Sustainable Agriculture and Food Security Enhancement through Integrated Recovery Support Mechanisms (SAFE)	**VITA,** Partner NGOs IDE UK, AMREF UK & CiBe		The project aims to enhance the resilience capacity of 12,000 pastoralists, agro-pastoralists and smallholder farmers in five target woredas of Wolayita and South Omo zones of SNNPR through integrated recovery support mechanisms and sustainable livelihood improvement measures
RENEWABLE ENERGY's ACTIONS	**TOT**		
Integrated Approach to Meet Rural Household Energy Needs of Ethiopia	(**HoA-REC/N**), Addis Ababa University		The project aims to contribute to economic prosperity, social well-being, environmental sustainability and climate change issues (and hence to contribute to MDGs) through creating increased access to sustainable energy in the rural and peri-urban areas of Ethiopia
Support to Efficient Utilization of Alternative Energy Sources to Improve the Livelihood of Pastoral and Agro pastoral Communities in Southern Ethiopia	**COOPI**		To contribute to increase the access to affordable and sustainable energy through increased production, supply and efficient use of renewable energies in order to improve basic social services and livelihood in un-served rural areas of S. Ethiopia
11th EDF's ACTIONS	**TOT**		
PSNP IV	**World Bank**		This allocation is intended to provide support to the Productive Safety Net Programme of Ethiopia.
RESET2	**Several NGOs**		Resilience programme.
AGP II	**World Bank**		Agriculture Growth Programme II.
Nutrition and AGP II	**World Bank**		Main streaming nutrition in the agricultural growth programme.

Sustainable Land Management II - Techical cooperation	**GIZ + KfW**		Support the Government Sustainable Land Management Programme II.
Support to the Coffee strategy of the GoE	**?**		Under approval
GCCA+ CSI	**?**		Expected for 2017
Eco-regional Climate Smart Growth Program	**MEFCC + NGOs**		The Overall Objective of the action is to "Improve the livelihoods, food security and economic well-being of natural resource dependent communities in the Bale, South West and Simien eco-regions and beyond"
Up-Scaling EnDev Ethiopia - Access to Energy through off-grid Renewable Energy solutions	**GIZ**		Overall Objective: Sustainable modern energy access in Ethiopia increases through market development for modern energy technologies and services. Lower-income households, social facilities and small- and medium-sized enterprises obtain access to reliable and renewable energy solutions.
Biogas Dissemination Scale-Up Project – NBPE+	**SNV**		By supporting the installation of 35,000 biogas digesters throughout Ethiopia, the project aims at developing mechanisms and partnerships ensuring that a self-sustainable biogas market is created.
IcSP - Recovery Action	**Care International & Save the Children**		

Ghana

Last update: 23 August 2016
Contacts: Martin Kaspar

Overview

Key facts and figures	
Socio-economic data:	25.4 million inhabitants (47th); GDP $41 bn (84th) or $1605/capita 38% of the population is 14 years or under Population growth rate is 2.17% (2017 est.) and the rate of urbanisation is 3.07%
GHG emission data:	108 million tCO2eq/yr (50th), 0.2% of global emissions, 4.3 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	African Group, Cartagena Dialogue, G77
Main policy documents:	NDC Ghana Shared Growth Development Agenda II (includes 11 adaptation programs of actions); National Climate Change Policy (NCCP)
Lead department:	Ministry of Environment, Science, Technology, & Innovation
Lead political figure:	Mr Mahama Ayariga, Minister of Environment, Science, Technology, & Innovation
Lead negotiator:	(…)
UNFCCC focal point:	Mr Kyekyeku Yaw Oppong-Boadi, Director and National Focal Point, Environmental Protection Agency
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	Third National Communication in July 2015; 1st Biennial update report in July 2015. Latest GHG inventory year 2012.
Mitigation targets and measures	
Pre-2020 pledge:	Single project activities (CDM)+Sustainable forest management (REDD)
INDC overall target:	15% below BAU by 2030; conditional goal of 45% below BAU
Key policies/deliverables and implementation progress:	**Energy supply** • 10% renewable energy penetration by 2030; • Promote clean rural household lighting; • Expand market-based cleaner cooking solutions; • 20% energy efficiency improvement in power plants.
	Land sector • Promote sustainable utilization of forest resources using REDD+
	Industry • Adopt alternative urban solid waste management

	Transport • Scale up sustainable mass transportation
	Buildings • (…)
Carbon pricing:	(…)
Long Term Strategy:	
Adaptation measures	
Goal/vision:	Forward looking NDC that sets qualitative goals for the 2020-2030 timeframe. Conditional(Co)/Unconditional(Un) targets
Priority sectors:	No vulnerabilities identified Priority sectors: agriculture and food security, forest resources, infrastructures, health, water resources, gender and vulnerable Positive synergies with mitigation policy actions
Key deliverables and implementation progress:	• NAP under development • Integrate INDC in the 40-year long-term development plan (2018-2057) • 11 adaptation programme of actions in 7 priority sectors (2020-2030) **Food and Agriculture, livelihood** - Modify community-based conservation agriculture (Un) - Increase livestock and fisheries productivity by 10% (Un) - Promote innovation (Co) - implement livelihood for vulnerable groups (Un) (NCCP) **Bioenergy** - sustainable use of forestry (Un) - manage fragile areas (Un) **Infrastructure** - improve strategic infrastructures (Co) **Climate data** - Ghana Meteorological Agency Act 682: modernize synoptic stations (Con) Health - adopt information systems (Un) - strengthen disease surveillance (Co) **Water** - equity in water access for 20% popul. (Un)
Monitoring and reporting plans	The MRV will build on the existing Annual Progress Report system by enhancing the technical functionalities and with

	proper institutional coordination.
Required resources	Ghana needs $12.79 billion for adaptation: $4.21 billion mobilized at national level, $8.29 billion international contribution
Means of implementation	
Own climate finance resources:	(…)
Support from EU/MS donors:	(…)
Support from other donors:	Indicative amounts proposed for mitigation and adaptation: GCF = $5bn Other multilateral funds = $1.1 bn Bilateral agreements = $2.8bn Private capital investment $3.8bn International carbon market $3.6bn
Participation in capacity building programmes:	(…)
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	(…)
Monitoring capacities and data gaps	(…)
Other comments	(…)

Background

Annex 2: Adaptation Policy Actions

INDC Policy Actions	Programme of Actions	Supporting national policy & measures	Investment Needs (mil $)	Status
Agriculture resilience building in climate vulnerable landscapes	Modified community-based conservation agriculture adopted in 43 administrative districts	Food and Agriculture Sector Development Policy Ghana's Medium-term Agriculture sector investment plan Ghana Agriculture Investment Programme	799	Unconditional
	Scale up penetration of climate smart technologies to increase livestock and fisheries productivity by 10%.		1,119	Unconditional
	Promote innovations in post-harvest storage and food processing and forest products in 43 administrative districts.		1,270	Conditional
Value addition-based utilization of forest resources	Governance reform for utilization of forest resources for sustainable energy use and biodiversity business.	National bio-energy strategy. Sustainable energy for all action plan National Forest and Wildlife Policy	767	Unconditional
	Manage 413,000ha fragile, ecologically sensitive and culturally significant sites in 22 administrative district in the forest and savannah areas.		512	Unconditional
City-wide resilient infrastructure planning	Building standards for strategic infrastructure in housing, transport, coastal, waste management, telecommunication and energy) adopted in 10 urban administrative regions.	Local Government Act 462. National Building Regulation	3,558	Conditional
Early warning and disaster prevention	Expand and modernize the current 22 synoptic stations based on needs assessment, and increase the number to 50 stations for efficient weather information management	Ghana Meteorological Agency Act 682.	403	Conditional
Managing climate-induced health risks	Strengthen climate related disease surveillance in vulnerable communities in 3 Districts.	National Health Policy	919	Conditional
	Adopt climate change informed health information systems including traditional knowledge on health risk management.		492	Unconditional
Integrated water resources management	Strengthen equitable distribution and access to water for 20% of the population living in climate change risk communities.	National Water Policy	1,919	Unconditional
Resilience for gender and the vulnerable	Implementation of community led adaptation and livelihood diversification for vulnerable groups	National climate change policy	1,023	Unconditional

Maldives

Last update: 23 August 2016
Contacts: Maddalena Dali' (CLIMA A3)

Overview

Key facts and figures	
Socio-economic data:	338 000 inhabitants (171sth); GDP $2.2 bn (160th) or $6567/capita 21.4% of the population is 14 years or under. Population growth rate is -0.06% (2017 est.) and the rate of urbanisation is 3.52%
GHG emission data:	1 million tCO2eq/yr (143rd), <0.01% of global emissions, 2.2 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	AOSIS (current Chair), Cartagena Dialogue, G77
Main policy documents:	NDC National Adaptation Program of Action (2006); Strategic National Action Plan for Disaster Risk Reduction and the Climate Change Adaptation 2010-2020
Lead department:	Ministry of Environment & Energy
Lead political figure:	Mr Thoriq Ibrahim, Minister of Environment & Energy
Lead negotiator:	(…)
UNFCCC focal point:	Mr Abdullahi Majeed, Minister of State for Environment and Energy, Ministry for Environment and Energy Mr Amjad Abdulla, Director-General / Chief Negotiator for AOSIS, Ministry for Environment and Energy
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	First National Communication in 2001; no biennial update report yet; Latest GHG inventory 1994
Mitigation targets and measures	
Pre-2020 pledge:	Long-term transformational effort to achieve carbon neutrality as a country by 2020
INDC overall target:	10% below BAU by 2030; 24% conditional reduction
Key policies/deliverables and implementation progress:	**Energy supply** • Plans to create a more sustainable and stable economy independent of external shocks to base economic factors such as fluctuating energy prices • Plans to ensure that transport and electricity systems meet society's economic, social and environmental needs whilst minimizing their undesirable impacts on the economy, society and the environment • Plans to strengthen the legal and regulatory framework for

	promoting energy efficiency, renewable energy and conservation.
	Land sector • (…)
	Industry • Plans to prepare a sectoral low emission development (power generation, transport, agriculture and waste) plan to reduce the GHG emission.
	Transport • (…)
	Buildings • (…)
Carbon pricing:	(…)
Long Term Strategy:	
Adaptation measures	
Goal/vision:	No specific timeframe set for adaptation. Detailed qualitative goals are set. Need for MoI. Forward-looking
Priority sectors:	Vulnerabilities: extremely vulnerable to climate change impacts and associated extreme weather events and disasters Priority sectors: water; agriculture; coastal protection; fisheries; tourism; DRR; health; infrastructure
Key deliverables and implementation progress:	• NAPA with 12 priority actions/CC detailed programs. • Following submission of INDC, developed a clear roadmap for implementation, including costing of activities. **Enhancing food security** • Strengthening DRR for farmers; establishing strategic food storage facilities; promotion and introduction of new technologies **Infrastructure resilience** • Expanding the Ibrahim Nasir International Airport; relocation of the Male Commercial Port; establishing a National Building Code; establishing the National Development Act to facilitate integration of climate change into development planning **Public health** • creation and implementation of a vector surveillance programs **Water** • explore cost effective desalination techniques; develop integrated water resource management schemes **Coastal protection** • facilitating investments; Including land elevation, shore protection and reclamation in adaptation measures **Safeguarding coral reef and its biodiversity** • ecosystem approach conservation; Reduction of sources of pollution through appropriate policies **Tourism**

	• establish a special insurance mechanism; establish a Green Tax to finance environmental projects **Fisheries** • facilitate fisheries industry to adapt to tuna catch from deep water; strengthening the fisherman insurance mechanism **Early warning and systematic observation** • expand and strengthen the meteorological network; improve climate forecasting
Monitoring and reporting plans	Not mentioned
Required resources	International support is necessary, but not quantified. Two initiatives for financing: creation of sustainable financing mechanisms and establishment of the Maldives Climate Resilient Fund
Means of implementation	
Own climate finance resources:	Public finance is being allocated to meet urgent and immediate adaptation actions. Establishing a 'Maldives Climate Resilient Fund' to finance climate change adaptation and mitigation programs.
Support from EU/MS donors:	EU support to the national trust fund. Also projects funded by France, Germany, Norway, Sweden
Support from other donors:	Australia, Global Environment Fund, the Least Developed Countries Fund (LDCF), the United States Agency for International Development (USAID), and the World Bank Submitted a proposal to the GCF
Participation in capacity building programmes:	(…)
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	(…)
Monitoring capacities and data gaps	(…)
Other comments	(…)

Background

Mali

Last update: 27 April 2017
Contacts: Maddalena Dali' (CLIMA A3), Sylvie Fontaine (EUDEL Bamako)

Overview

Key facts and figures	
Socio-economic data:	17 million inhabitants (70th) (source: IDH 2015); GDP $1039 bn (129th) or $700/capita 48% of the population is 14 years or under Population growth rate is 3.02% (2017 est.) and the rate of urbanisation is 4.97%
GHG emission data:	77 million tCO2eq/yr (62nd), 0.1% of global emissions, 5.2 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	African Group (current Chair), G77, LDC, LMDC
Main policy documents:	• NDC, version revised Sept 2016 • Adaptation: National Environment Protection Policy; National CC Policy (2011) • National Adaptation Plan of Action (2007) • The *Haut conseil des collectivités territoriales* is prepararing a *Charte de l'environnement,* currently which is in the technical validation phase.
Lead department:	Ministère de l'Environnement, de l'Assainissement et du Développement Durable (MEADD)
Lead political figure:	• Ms Aida M'bo KEITA, Ministre de l'Environnement, de l'Assainissement et du Développement Durable
Lead negotiator:	• Seyni Nafo, Ambassador, Special Advisor to the President of Mali, Chair of the African Group of Negotiators
UNFCCC focal point:	• M. Modibo SACKO, Point Focal National UNFCCC
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• Second National Communication in 2012, third one under preparation, should be published **in** time for COP23 • No biennial update report yet • Latest GHG inventory 2006
Mitigation targets and measures	
Pre-2020 pledge:	Regional pledge agriculture
NDC overall target:	Reduction from BAU by 2030: 29% for agriculture; 31% for energy; 21% LULUCF
Key policies/deliverables and implementation progress:	**Energy supply** • Large scale development of Mali's renewable energy sector (World Bank grant and government commitment to buil a 50MW solar central in Keita with the French group Akuo Energy) • Rural Electrification Hybrid System Project aiming to expand access to modern energy services in rural Mali and to

	increase renewable energy generation in target areas (World Bank) • Target of 10% of renewables in the energy mix by 2020, increase the use of PV, wind, hydro power and biomass • Program for the Development of Renewable Energy and Energy Efficiency – instalment of over 100 MW of renewable energy.
	Land sector • Intensive Reforestation Program for the reconstruction of forest ecosystems in Mali aiming to reforest 325,000 hectares (but moderate success in terms of tree survival rate) • The production and the massive adoption of alternative fertilizers to nitrogen fertilizer such as organic manure, the PNT and other biological fertilizers. • Classified forest areas
	Industry • (…)
	Transport • (…)
	Buildings • (…)
Carbon pricing:	(…)
Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	Forward-looking with a mix of qualitative and quantitative targets for 2015-2020
Priority sectors:	• Key impacts: droughts; floods; strong winds (although this is contested); heat stress, reduced of availability of water and decrease agricultural production. • Priority sectors: agriculture; forestry; energy; land use; water • Human rights and gender considerations • Synergies between adaptation and mitigation: energy sector and agricultural and forestry sector with significant carbon sequestration potential
Key deliverables and implementation progress:	**Policies:** • Develop a NAP by 2030 • Climate finance strategy for sustainable environment and climate change is under elaboration. **Forestry** • Reforestation of 325.000 ha **Agriculture** • Resilient agriculture (invest 15% of national budget) by using hydro-agriculture on 92.000 ha • -Increase pastoral areas: create 3.300 km transhumance axes, create 21 dedicated surfaces covering 400.000 ha **Water and sanitation**

	• create 20 potable water supply systems, 200 surface water catchment facilities (for the use of 75.000 rural households) **Energy** • Energy efficiency by using renewable energy • 10% of renewables in the energy mix by 2020, increase the use of PV, wind, hydro power and biomass
Monitoring and reporting plans	Not mentioned
Required resources	Request for financial support of 1,062 bn USD.
Means of implementation	
Own climate finance resources:	• The NDC quantifies the support needed to implement the targets it contains • Preparation of an investment plan for the NDC is underway
Support from EU/MS donors:	• DE supports projects on adaptation and irrigation
Support from other donors:	
Participation in capacity building programmes:	• EU's Global Climate Change Alliance + (GCCA+) • World Bank's Global Facility for Disaster Reduction and Recovery/ACP-EU Natural Disaster Risk Reduction Program (GFDRR) • IKI / Risk management and insurance • UNFCCC/UNEP's Climate technology centre and network (CTCN) • GEF/UNDP/UNEP's National Communications Support Programme (NCSP) • International Partnership on Mitigation and MRV led by Germany/South Africa/South Korea • World Bank's Energy Sector Management Assistance Program (ESMAP), Energy Subsidy Reform and Delivery Technical Assistance Facility (ESMAP ESR) • GCF's readiness funding • UNECA/AUC/AfDB's Climate for Development in Africa programme (ClimDev-Africa) • ECOWAS/Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS) project under the GCCA Intra-ACP programme
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	• Mali's NDC is driven by the Ministry of Environment and none of the broad climate policy plans are yet under preparation (LEDS, NAMA). According to the World Bank, at this stage the government does not have a very high level of ambition to implementing the mitigation target. • With Mali's updated contribution in Nov 2016, several mistakes were corrected and the unconditional commitment was further clarified.
Monitoring capacities and data gaps	(…)

Other comments (…)

Background

GHG Business as usual and NDC scenarios – conditional and unconditional - according to Mali's INDC document, 2015:

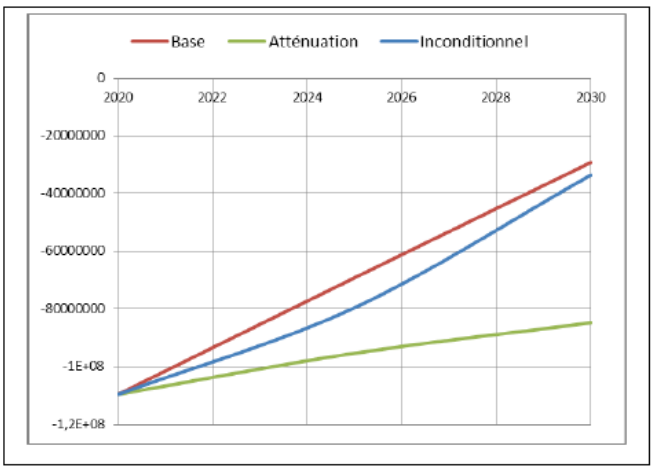


Figure 12 : Evolution des émissions du scénario de base, du scénario d'atténuation conditionnel et du scénario d'atténuation inconditionnel pour l'ensemble des secteurs de 2015 à 2030.

Extrait du profil environnemental du mali sur les forêts

« Les pressions anthropiques sur les ressources forestières, accélérées par les effets des changements climatiques, entraînent une déforestation et une perte de forêts estimée selon les différentes sources entre 100.000/ha/an (PNCC, 2011) et 500.000 ha/an (CSCRP3, 2011), données très différentes et d'importances cruciales étant donné leur impact socioéconomique. (page 15 profil environnemental)

« Les superficies de reboisement réalisées (en moyenne 10.000 ha/an) demeurent en deçà des attentes (Plan quinquennal de reboisement 2010 – 2014, envisageant 100.000 ha/an), avec un faible taux de réussite (IED, 2012) lié principalement à un manque de suivi et donc de regarnissage des surfaces boisées. » (page 23 Profil Environnementale Mali, UE 2004)

*« Toutefois, **le secteur –**l'exploitation forestière**- est le moteur de la déforestation et de la destruction des formations forestières naturelles**, formations qui ont subi de profondes modifications. Actuellement, la consommation de bois de la population est de 1m³/hab./an pour une productivité moyenne de 0,86m³/an. La diminution des surfaces boisées est de **500.000ha/an, dont 400.000ha à cause de la coupe de bois**, souvent illégale dans les forêts classées, et **100.000ha/an pour les défrichements agricoles**. En plus, seuls 70% de la production annuelle sont accessibles à la consommation et le bilan de la situation de l'offre et de la demande de bois énergie est de plus en plus négatif. (AEDD, 2009)." (pag 23 Profil Environnementale Mali, UE 2004)*

Morocco

Last update: 26 April 2017
Contacts: Matthieu Ballu (CLIMA A1), Leila Truelsen (EUDEL Rabat)

Overview

Key facts and figures	
Socio-economic data:	33.7 million inhabitants (40th); GDP $105 bn (59th) or $8400/capita 25.77% of the population is 14 years or under Population growth rate is 0.97% (2017 est.) and the rate of urbanisation is 1.92%
GHG emission data:	80 million tCO2eq/yr (60th), 0.2 % of global emissions, 2.5 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	African Group, G77
Main policy documents:	• NDC, Sept 2016 update • National Strategy for Sustainable Development • National Strategy to Combat Global Warming • National Policy to Combat Global Warming • National Plan to Combat Global Warming
Lead department:	Ministry of Energy, Mining , Water and the Environment
Lead political figure:	• Mr Naser Bourita, Minister of Foreign affairs • Ms Nezha El Oufi, Secretary of State to the ministry of energy, mines and sustainable development, in charge of sustainable development • Mr Salaheddine Mezouar, COP22 President (TBC) • Ms Hakima El Haite, Champion of pre2020 action (TBC)
Lead negotiator:	• Mr Aziz Mekouar, Special Envoy of the COP22 President • Mr Mohamed Benyahia, Lead negotiator
Lead interlocutor on NDC implementation	• Mr Mohamed Nbou, Director, Climate Change Capacity Centre (4C)
UNFCCC focal point:	• Mr Mohamed Nbou, Director, Climate Change Capacity Centre (4C)
Status of reporting obligations:	• Third National Communication in 2016 • Biennial update report 2016 • Latest GHG inventory 2000
Mitigation targets and measures	
Pre-2020 pledge:	Single project activities (CDM)
NDC overall target:	42 % below BAU by 2030 of which 17 % unconditional and 25 % conditional (includes 4 % from Agriculture, Forestry and Other Land Use)
Key policies/deliverables and implementation progress:	**Energy supply** • National Energy Strategy (2009, updated 2012): • - Aim for an installed renewable electricity capacity of 52 % by 2030 (20 % wind, 20 % solar and 12 % hydro) (42 % by 2020)

	• - Energy savings of 15 % in 2030 compared to current trends - Reduce energy consumption in buildings, industry and transport by 12 % by 2020 and 15 % by 2030, of which industry covers 48 %, transport 23 %, residential 19 % and services 10 %. • Morocco Integrated Wind Energy Program (2010) • - Extension of national wind farms to total 2,000 MW by 2020 • Morocco Solar Plan (2009) • - Extension of solar power capacity to 2,000 MW (both concentrated solar power plants & photovoltaic systems) • Morocco Hydro-Electric Plan (continuation of plan started in 1970s) - Extension of hydro power capacity with 775 MW by 2020
	Land sector • Preservation and Sustainable Forest Management Strategy • - Afforestation and regeneration of approximately 50,000 hectares of forest per year • Morocco Green Plan (PMV) (2008) • - Promotion of natural resources and their sustainable management • - Modernisation of the agricultural sector
	Industry • Energy efficiency program in the industry sector (2011) for industry, buildings and transport sector (excluding large energy consuming industries)
	Transport • Implement large-scale public transit in major urban centres powered by renewable energy • Extension of Rabat tramway by 20 km by 2019 • Extension of Casablanca tramway by 45 km by 2025
	Buildings • Energy efficiency program in the building sector (2009) • - Minimum requirements for new residential and commercial buildings • Energy efficiency program for public lighting (2009) • - Instalment of new public lightening technologies
Carbon pricing:	Market mechanism intended
Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	Forward-looking NDC that focuses on qualitative long-term goals and quantitative medium-term policy targets for 2020 and 2030
Priority sectors:	Vulnerabilities: water scarcity; declining agricultural production; desertification; floods; rising sea levels Priority sectors: water; agriculture; forestry; fisheries;

	biodiversity; tourism; infrastructure; protection of national heritage; energy
Key deliverables and implementation progress:	• Develop National Adaptation Plan up to 2030; list of national sectorial actions and related costs • Targets for 2020 with necessary actions: - Agriculture: improve and localise irrigation systems; build hydro-agriculture infrastructure around dams. - Water: substitution of water withdrawal (85 million m3/year); - Forestry: reconstitution of 200.000 ha • Targets for 2030 with necessary actions: - Agriculture: extension (260,000 ha) and modernisation (290,000 ha) of irrigation systems for $5 bn - Water: desalinisation of seawater (500 mn m3/year, $15 bn); recycling of wastewater (325 bn/year, $3 bn); construction of 3 dams/year ($2.7 bn); transferring 800 mn m3 of water/per year from North to South; improving efficiency of drinking water network - Forests: protecting 1.5 mn ha against erosion ($260 mn); afforesting 600,000 ha ($46 mn)
Monitoring and reporting plans	M&E system to assess vulnerability and CCA has been piloted in two regions. Morocco plans to expand this system to other regions and to complement it with a national governance mechanism. A national vision on land planning is supposed to contribute to the M&E activities of CCA.
Required resources	Morocco expects to dedicate at least 15 % of its overall investment budgets to adaptation. Morocco forecasts that, between 2020 and 2030, the implementation these programs will cost at a minimum $35 bn for the most vulnerable sectors. The upcoming NAP will present and quantify adaptation measures.
Means of implementation	
Own climate finance resources:	(…)
Support from EU/MS donors:	• Sustainable energy for city of Chefchaouen (1.1 m EUR, 80% financed by EU) • 237m EUR EU support to development of RES, reform of energy sector and training • NOOR solar plant supported by EU NIF (106+43m EUR), EIB (250m EUR), AFD and KfW • IFMEREE (training institutes for RE/EE professions) supported by EU (10 m EUR), AFD and GIZ • Forest protection and management programme supported by EU (37 m EUR) • Support to small farmers: 60M€ (not clear how much from EU) • Improved irrigation: 42.5 m EUR from EIB • Modernisation of water supply and waste water treatment: 75 m EUR from EIB • Integrated water management: twinning with FR, ES and RO

	(1.1 m EUR) • Regional EU-funded programmes: ClimaSouth (technical assistance for climate policies and projects), Switchmed (support to innovation) and CES-MED (support to local authorities) • DE Climate and Technology Initiative (DKTI) project on the Moroccan solar plan • DE supports projects on renewable energy and energy efficiency, adaptation and environmental and climate governance as well as integrated water management, irrigation, wastewater management and drinking water supply
Support from other donors:	(…)
Participation in international capacity building programmes:	• UNDP's Low emission capacity building programme (LECB) • Italian NDC support programme • German NDC support programme • UNEP's Global Fuel Economy Initiative (GFEI) • Internationale Klimaschutzinitiative (IKI) • UNEP/UNDP/FAO's UN-REDD programme • UNFCCC/UNEP's Climate technology centre and network (CTCN) • GEF/UNDP/UNEP's National Communications Support Programme (NCSP) • EU's capacity building project for monitoring capacities in Africa (lead consultant NIRAS) • International Partnership on Mitigation and MRV led by Germany/South Africa/South Korea • UNEP DTU/VCS/WRI's Initiative for Climate Action Transparency (ICAT) • World Bank's Partnership for Market Readiness (PMR) • GCF's readiness funding • UNEP's African Low emission development strategies programme (African LEDS) • EU's Clima South project • UNECA/AUC/AfDB's Climate for Development in Africa programme (ClimDev-Africa)
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	• The ambitions in Morocco's NDC plan are scaled up from its INDC. It contains different "packages" aimed at achieving different CO2 reductions based on the international climate financing available. Priority is given to adaptation. • GHG emissions are projected to be 151 to 157 MtCO2e by 2030 (including LULUCF) under including projections for the National Energy Strategy, including the Morocco Solar Plan, as well as the Morocco Integrated Wind Energy Program.. Morocco would, therefore, almost achieve its unconditional NDC target of 141 MtCO2e by 2030 including LULUCF (NewClimate Institute, November 2017).
Monitoring capacities and data	(…)

gaps
Other comments

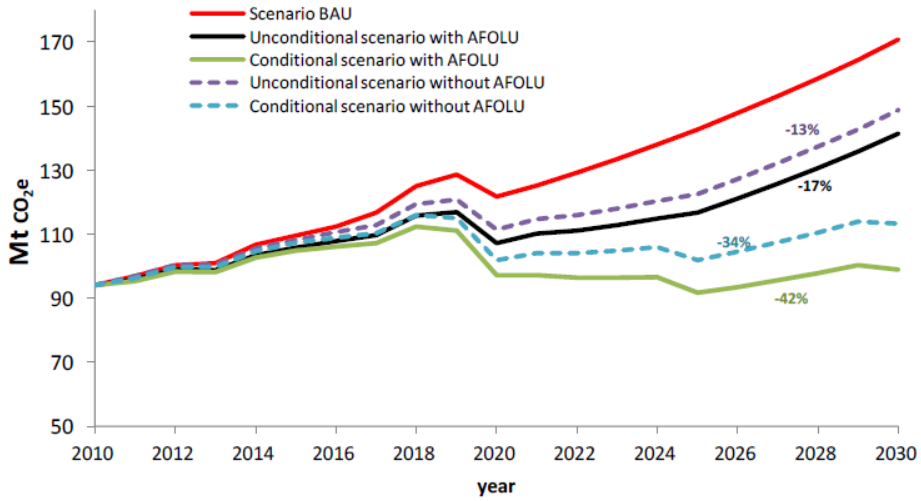
Background

Table: Impact of climate policies on greenhouse gas emissions (including LULUCF) in Morocco. Absolute emission levels and emission levels relative to 2010 levels are presented.

2010 GHG emissions, incl. LULUCF	2020 target and NDC		Current policies	
	Official data	NewClimate estimates	Official data	NewClimate estimates
Absolute: 94 $MtCO_2e$	99 to 147 $MtCO_2e$ by 2030	100 to 140 $MtCO_2e$; 5 % to 50 % by 2030	N/A	110 $MtCO_2e$; 15 % to 19 % by 2020 150 to 155 $MtCO_2e$; 61 % to 67 % by 2030
Per capita: 2.9 tCO_2e/capita	N/A	2.6 to 3.7 tCO_2e/capita by 2030	N/A	3.1 to 3.2 tCO_2e/capita by 2020 4.0 to 4.1 tCO_2e/capita by 2030

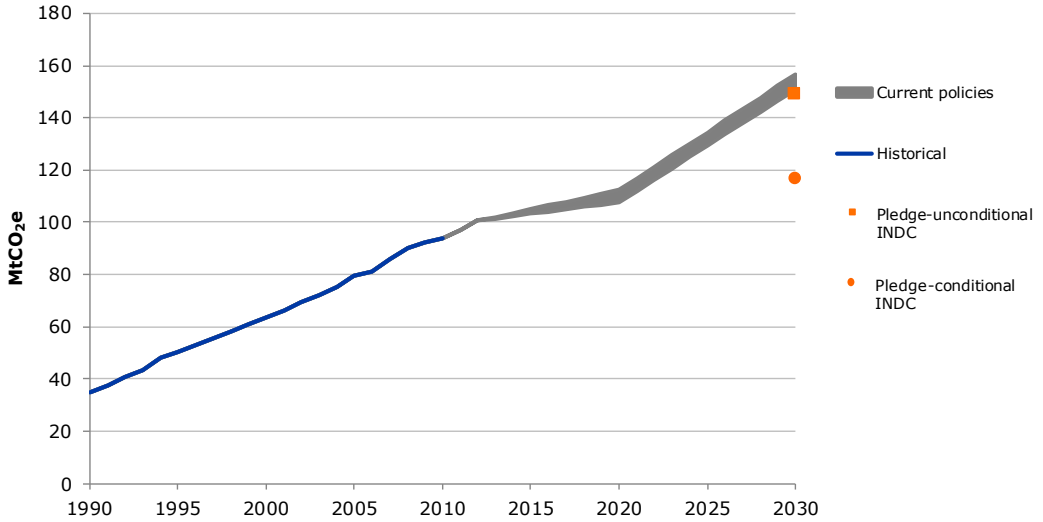
Source: Report 'Greenhouse gas mitigation scenarios for major emitting countries' by New Climate Institute, PBL, IASA, November 2016, p. 48.

Graph 1: Emissions pathways of mitigation scenarios (with and without AFOLU)



Source: Morocco NDC, p.7

Graph 2: Impact of climate policies in greenhouse gas emissions in Morocco (CO_2, CH_4 and N_2O; including LULUCF)



Source: PBL FAIR/TIMER model and NewClimate Institute calculations; IIASA GLOBIOM/G4M model. Historical greenhouse gas emissions are taken from Morocco's first Biennial Update Report (Kingdom of Morocco, 2016a).

Rwanda

Last update: 28 July 2016
Contacts: Alessandra Sgobbi (A3)

Overview

Key facts and figures	
Socio-economic data:	11.5 million inhabitants (75th); GDP $7 bn (142nd) or $620/capita 41.38% of the population is 14 years or under Population growth rate is 2.45% (2017 est.) and the rate of urbanisation is 5.59%
GHG emission data:	7 million tCO2eq/yr (122nd), 0.01% of global emissions, 0.6 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	African Group, Cartagena Dialogue, G77, LDC
Main policy documents:	NDC (submitted Oct 2016) National Adaptation Programmes of Action (2006); Rwanda's Green Growth and Climate Resilient Strategy (2011). NAP under development (expected May 2018)[27].
Lead department:	Ministry of Natural Resources
Lead political figure:	M. Vincent BIRUTA, Minister of Natural Resources
Lead negotiator:	(…)
UNFCCC focal point:	Ms. Coletha Uwineza Ruhamya, Deputy Director General, Rwanda Environment Management Authority (REMA)
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	Second National Communication in 2012; no biennial update report yet; Latest GHG inventory 2005
Mitigation targets and measures	
Pre-2020 pledge:	Regional Pledge Agriculture
INDC overall target:	Estimated impact of policies/actions is underway and will be informed by the Third National Communication Report which will be completed by 2017.
Key policies/deliverables and implementation progress:	**Energy supply** • (…) - (…)
	Land sector • (…) - (…)

[27] http://www.rema.gov.rw/climateportal/spip.php?article206#sthash.ObWWcH71.dpbs

	Industry • (…) - (…)
	Transport • (…) - (…)
	Buildings • (…) - (…)
Carbon pricing:	(…)
Long Term Strategy:	
Adaptation measures	
Goal/vision:	Forward looking INDC that up to 2050. Provides qualitative and quantitative goals.
Priority sectors:	Vulnerabilities: heavy reliance on rain-fed agriculture, floods, storms, landslides, soil erosion, crop losses, health, damage to infrastructure, food security. Priority sectors: agriculture; forestry; tourism; water; land use; DRR, energy Synergies between adaptation and mitigation in many sectors
Key deliverables and implementation progress:	**Agriculture** • 100% of households implementing agro forestry sustainable production (2030) • 100% organic waste use through composting and shift to fertiliser enriched compost (2030) • 100% of vulnerable areas with land protection structures (2030) • Intensive agroforestry programme covering 100% arable land; • 11% operation irrigation infrastructure (2030) • participation of group based organisations in agriculture production and agro processing facilities by up to 90% (2030) • Capacity of agro processing installations is to reach 1,200,000 MT (2030) **Forestry**: • 30% sustained forest cover of the total land surface (2030) **Water:** • detailed catchment management plans developed and implemented for all the nine identified main catchments areas (2030) • 53 gauging stations upgraded to automated real time data stations (2030) • Integrate rainwater harvesting in the building codes (2030) **Land use** • reduce the plot size for single family houses to 300m2

	(2016) and to 225 m2 (2030) • fully implement the National Spatial Data Infrastructure program (2030) **DRR** • countrywide risk assessment and relocate 30 000 households (2030)
Monitoring and reporting plans	The Min of Natural Resources is responsible for M&E of INDC implementation through regular statutory stakeholders' consultative engagement including the Environment and Natural Resources Joint Sector Review (JSR) meetings
Required resources	Initial cost of implementing the green growth and climate resilience strategy is 24.15 Billion USD in the sector of Water resource management, Agriculture and Energy up to 2030
Means of implementation	
Own climate finance resources:	National Fund for Environment and Climate change (FONERWA) is a national green fund to mobilize additional internal and external climate funds
Support from EU/MS donors:	(…)
Support from other donors:	Support from NAP-GSP programme (Global Support Programme, UNDP-UNEP initiative) to develop NAP. Intends to access funds from through international climate funds: MINIRENA has been accredited as implementing entity for Adaptation Fund and Green Climate Fund (GCF). REMA has been nominated as national designated authority for GCF.
Participation in capacity building programmes:	(…)
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	(…)
Monitoring capacities and data gaps	(…)
Other comments	(…)

Background

Table 2: Adaptation actions

Key: Unconditional (UC) Capacity Requirements (CR), Technology Requirements (TR) and Finance Requirements (FR)

Sectors	Intended policy based action	Provision of implementation means			
		UC	CR	TR	FR
Agriculture	Increase irrigation at smallholder level	✓			
	Increase land under irrigation through Greenbelt initiative from 20000 to 40000 ha	✓			
	Expanded programmes of Greenbelt intiative from 40000 ha to 10000 ha by 2030		✓	✓	✓
	Build adaptation capacity in climate resilient agronomic practices for smallholder farmers	✓			
	Promote on-farm water conservation technologies	✓			
	Support an expanded programme of constructing multipurpose dams for irrigation and aquaculture		✓	✓	✓
	Develop financial mechanisms to support crop insurance targeting smallholder farmers		✓	✓	✓
	Promote the growing of drought torelant crop varities	✓			
	Implement conservation agriculture and agroforestry practices		✓	✓	✓
	Promote improved land use practices	✓			
Water	Implement integrated catchment conservation and management programme		✓	✓	✓
	Promote water harvesting technologies at all levels	✓			
	Support an expanded programme of constructing multipurpose dams to enhance water storage		✓	✓	✓
	Support the revision of water related policies and strategies (inc. water-SWAP)		✓	✓	✓
	Develop and enhance climate information and early warning systems		✓	✓	✓
Human Health	Build capacity to diagnoze, prevent and control climate-sensitive diseases such as malaria, darrhoeal diseases and malnutrition	✓			
	Enhance public awareness about water, sanitation and hygience practices; and enhance health surveillance	✓			
	Support expanded programme for preventing and controlling climate-sensitive diseases		✓	✓	✓
	Construct more health centres in order to improve access to health facilities within a walking distance of 8 km		✓	✓	✓
	Support the establishment of centre of excellence for research and disease control targetting climate-sensitive diseases		✓	✓	✓
Energy	Promote use of biomass briquettes as substitute for firewood and charcoal	✓			
	Promote an energy mix that moves people away from use of biomass	✓			
	Support an expanded programme of briquette production and use		✓	✓	✓
	Construct storage dams for hydrpower generation		✓	✓	✓
	Promote solar PV and use of energy efficient bulbs	✓			
	Promote use of bio-fuels for lighting and cooking replacing fossil based fuel	✓			
Forestry	Support research in drought tolerant and fast growing tree species	✓			
	Expand afforestation and forest regeneration programmes		✓	✓	✓
	Promote growing of drought tolerant and fast frowing tree species	✓			
Wildlife	Provide watering points at strategic locations of national park/ game reserve		✓	✓	✓
	Implement diseases control programmes		✓	✓	✓
	Support capacity building in wildlife institution to lead in adaptation initiatives e.g. translocation and culling.		✓	✓	✓
Fisheries	Capacity building in aquaculture and cage culture fish farming practices	✓			
	Adopt eco-system services approach in the management of fisheries resources	✓			
	Promote aquaculture and cage culture fish farming practices		✓	✓	✓
	Protect of fish spawning/breeding sites	✓			
	Maintain fingerings for stocking lakes and rivers after severe droughts episodes	✓			
Gender (and vulnerable groups)	Promote gender mainstreaming in policies, programmes and projects	✓			
	Support capacity building programmes for vulnerable groups		✓	✓	✓
Infrastructure	Construct infrastructure for flood control, transport, etc		✓	✓	✓
	Develop and implement climate related building codes/standards		✓	✓	✓
	Revise existing building standards in line with climate change	✓			
Industry	Promote research in industrial technologies		✓	✓	✓

Senegal

Last update: 26 April 2017
Contacts: Maddalena Dali (CLIMA A3), Stephane Meert (EUDEL Dakar)

Overview

Key facts and figures	
Socio-economic data:	14.3 million inhabitants (72nd); GDP $14.87 bn (116th) or $2600/capita 41.51% of the population is 14 years or under Population growth rate is 2.39% (2017 est.) and the rate of urbanisation is 3.53%
GHG emission data:	54 million tCO2eq/yr (74th), 0.1% of global emissions, 4 tCO2eq/hab/yr (source: JRC/PBL EDGAR database, all gases, 2012)
Member of groupings:	African Group, G77, LDC
Main policy documents:	• Legislative framework announced in new environmental code • Developing NAMAs + MRV • NDC of Sept 2015 • It is planned to develop a National Climate Change Strategy and Action plans for adaptation and mitigation across all sectors
Lead department:	• Ministry of Environment and Sustainable Development • National climate change committee established to guide climate related policies
Lead political figure:	• Mr Abdoulaye Baldé, Minister of the Environment and Sustainable Development
Lead negotiator:	• Ms Madeleine-Rose Diouf Sarr, Head of Climate Change Programme, Ministry of the Environment • Mr El Hadji Mbaye Diagne, Chair of the National Climate Change Board
UNFCCC focal point:	• Ms Mariline Diara, Director, Ministry of the Environment
Lead interlocutor on NDC implementation	(…)
Status of reporting obligations:	• Third National Communication in Jan 2016 • No Biennial Update Report yet • Latest GHG inventory year 2000
Mitigation targets and measures	
Pre-2020 pledge:	Regional pledge Agriculture
INDC overall target:	Unconditional (Un): 5% reduction vs BAU by 2030 at cost of $1.8bn Conditional (Co): 21% reduction vs BAU by 2030 at cost of $5bn + technical assistance in energy & agriculture. Covers CO2, CH4, N2O
Key policies/deliverables and implementation	**Energy supply** • Strengthening the distribution of electricity and household fuel

progress:	- Solar PV (Un 160MWp; Co 200 MWp), Wind (Un 150MW; Co 200MW), Hydraulic (Un 144MW/522 GWh; Co 200 GWh by 2025), Biomass (Co 50MW), Solar CSP (Co 50 MW) - Rural electrification (Un 392 cities; Co 5000 cities) • Improving energy efficiency - Local production of energy efficient materials (Un); Recycling of Agro-Industrial waste(Un); Substitution of natural gas for coal (40%) for generating electricity (Co); Insulating of (public) buildings • Energy and Transport aim together to 4%-10% GHG reduction by 2020 (Un and Co respectively), and 6%-31% by 2030 (Un and Co respectively)
	Agriculture, forestry and land sector • Accelerated program for agriculture in Senegal (PRACAS) (Un), System of Rice Intensification (SRI) (Co), agroforestry practices, assisted natural regeneration • Enhanced forest management areas and reafforestation (including Great Green Wall) (Un); diversification of domestic fuel sources, reduction of deforestation by 25% from 2023 and reafforestation, including of mangroves (Co) • Reduction of forest fires from 2020 – by 5%-30% for Un and Co respectively • Forest Sink Strategies to strengthen the CO2 absorption
	Industry • Improving the industrial processes by clinker substitution in the cement production • Reducing HCFC-22 use in industry by 35% by 2020 • Aims at 10% reduction by 2030
	Transport • Strengthening the public transport by including Bus Rapid Transit (BRT) systems
	Waste – recycling • Construction of 3 waste management facilities, strengthen purification capacity of STEP and installation of new STEPS (Un) • Rehabilitation of waste management sites and new infrastructure, methane recovery (Co)
Carbon pricing:	Will be a recipient of market mechanisms, including CDM
Long Term Strategy:	(…)
Adaptation measures	
Goal/vision:	Mostly forward-looking INDC, including qualitative adaptation targets for the period 2016-2035. Mainstreaming mentioned as one of the essential goals.
Priority sectors:	Biodiversity, coastal areas, water management, agriculture, breeding, fishery and health
Key deliverables and implementation progress:	• NAP is under development • List of qualitative targets for the period 2016-2035 according to prioritized sectors and also list of expected socio-economic benefits (including quantitative) if adaptation measures will

	be undertaken • Main deliverables include (p. 16 of INDC): implement the national biodiversity strategy and strategy on humid areas, develop a legal framework for protected areas and biodiversity, promote integrated water management, establish a costal observatory and protect vulnerable coastal areas and populations, promote insurance in agriculture, fishery and breeding; promote surveillance systems for epidemics
Monitoring and reporting plans	The Comité National sur les Changements Climatiques (COMNACC) in charge of follow up of implementation and monitoring of INDC. The development of targets and of a monitoring system, including for NAP is under development.
Required resources	Adaptation costs until 2035 estimated to 14558 mn USD, with 12725,66 mn USD of international support requested
Means of implementation	
Own climate finance resources:	• Fonds Vert Climat under construction. Formerly not adopted. • Centre de suivi écologique accredited as a national entity at the Green Climate Fund.
Support from EU/MS donors:	• EU aid focal sectors are food security/sustainable agriculture and water. • Institutional support to Ministry in charge of Environment (including climate change) under preparation on a 10th EDF programme (1.1m EUR) • GCCA project on integrated coastal zone management and adaptation ended in 2015 (4m EUR) • Ongoing support from DG CLIMA (first phase of the project to identify an MRV in Senegal. • Ongoing discussions between Expertise France and French MAE, to target Senegal for support • DE's main focal sector is energy (promotion of renewable energy, energy efficiency and the access to energy services), in total 20m EUR per year through KfW and GIZ
Support from other donors:	• World Bank is currently preparing a budget support including Energy • AfDB supporting Energy sector
Participation in international capacity building programmes:	• Italian NDC support programme • EU's technical assistance facility for the UN sustainable energy for all programme (SE4ALL) • EU's Global Climate Change Alliance + (GCCA+) • World Bank's Global Facility for Disaster Reduction and Recovery/ACP-EU Natural Disaster Risk Reduction Program (GFDRR) • UNFCCC/UNEP's Climate technology centre and network (CTCN) • GEF/UNDP/UNEP's National Communications Support Programme (NCSP) • International Partnership on Mitigation and MRV led by Germany/South Africa/South Korea • UNEP DTU/VCS/WRI's Initiative for Climate Action Transparency (ICAT) • World Bank's Energy Sector Management Assistance Program (ESMAP), Energy Subsidy Reform and Delivery Technical Assistance Facility (ESMAP ESR)

	• GCF's readiness funding • UNECA/AUC/AfDB's Climate for Development in Africa programme (ClimDev-Africa) • ECOWAS/Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS) project under the GCCA Intra-ACP programme
Provision of support to other countries:	(…)
Comments	
Mitigation ambition and delivery:	• Ambition is concentrated on adaptation rather than mitigation. • Efforts for mitigation concentrated in energy, industry, waste, transport. • The implementation of the INDC poses enormous challenges in terms of financial resources and administration capabilities in the sector in charge of climate change in particular
Monitoring capacities and data gaps	• Forest cover data highly uncertain (governance weaknesses in the institutional sector) • Transport data to be developed
Other comments	(…)

Appendix 7 – Literature review

A range of literature has been assembled based on the background knowledge of the consultants and recommendations from the Commission and other stakeholders.

Literature was reviewed to input to the state of play for the Strategy, focussing on the action areas, and to provide some evidence for assessment of the evaluation questions.

In association with the literature review, the following reviews were also undertaken:

- Review of adaptation scoreboards for EU Member States. These were updated and sent to CLIMA in June 2017 before further review by CLIMA. They were then issued to Member States for their comment[28]
- Review of Nationally Determined Contributions (NDCs) relating to adaptation for countries that are not members of the EU. For 10 of these a draft had been prepared by the EU. All have been updated (See Appendix 6).
- List of EU legislation and guidance documents/guidelines where climate adaptation is currently mainstreamed, or has potential to be mainstreamed (See Appendix 5).

This appendix is arranged in line with the evaluation questions and sub-questions presented in Appendix 4. There is sometimes little or no evidence from the literature that addresses an evaluation question and this is noted.

[28] These are not included as an Appendix to this report. Draft fiches were sent to DG CLIMA in June 2017. These were reviewed and updated by DG CLIMA and issued to Members States for review due in early October. After review, the draft fiches were published along with the open public consultation in December 2017

A7.1 Action 1: Encourage all Member States to adopt comprehensive adaptation strategies

A7.1.1 Action taken at European level to encourage Member States to adopt adaptation strategies

Alongside the commitment in the strategy to encourage Member States to encourage Member States to adopt adaptation strategies, the Commission published a staff working document (SWD(2013) 134 final) which provided detailed advice and guidance on best practice in the development of strategies, including practical examples, checklists, and detailed information on the range of support available at European level.

The strategy was endorsed by the Council (and thus by implication all Member States by consensus) in its conclusions of 18 June 2013[29], which acknowledged:

> "that one of the greatest challenges for cost - effective adaptation measures is to achieve coordination and coherence at the various levels of planning and management and that national adaptation strategies, including risk and vulnerability assessments, are key instruments designed to inform and prioritise action and investment";

The conclusions also called upon all Member States to:

> "continue to develop, implement and review their adaptation policies in the light of guidelines prepared by the European Commission addressing issues such as cross-border aspects and coherence with national disaster risk management plans".

The European Parliament does not appear to have adopted a specific resolution on the adaptation strategy, although it has implicitly endorsed them in subsequent resolutions on related subjects. The Economic and Social Committee endorsed the strategy[30], and called "on those Member States which have yet to do so to act swiftly to draw up and rigorously apply national adaptation strategies". The ESC also encourages the Commission to "make use of its powers under the TFEU"; implicitly recommending a binding legislative approach.

Discussions with Member States on the proposed "adaptation preparedness scorecard" began in 2013, and led to the development of a detailed scorecard, based to a large extent on the process and approaches recommended in the staff working document referred to above. However, the scorecard was not published. An internal Commission process assessing performance in each Member State against the scorecard was carried out in 2015, but not published. A further assessment of progress against a modified version of the scorecard has been carried out under the current evaluation project. The intention is for it to be published, following an opportunity for Member States to offer their comments on it, fulfilling the commitment in the strategy to "assess whether action being taken in the Member States is sufficient". The strategy includes a suggestion that, if progress is deemed to be insufficient, the Commission would consider without delay proposing a legal instrument; however, as noted in section A7.1.2 below, action has been

[29] Council document 11151/13
[30] Opinion of the European Economic and Social Committee on the 'Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an EU strategy on adaptation to climate change' COM(2013) 216 final: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52013AE4122

noted in all Member States, with varying levels of depth and quality, but with a significant overall level of progress.

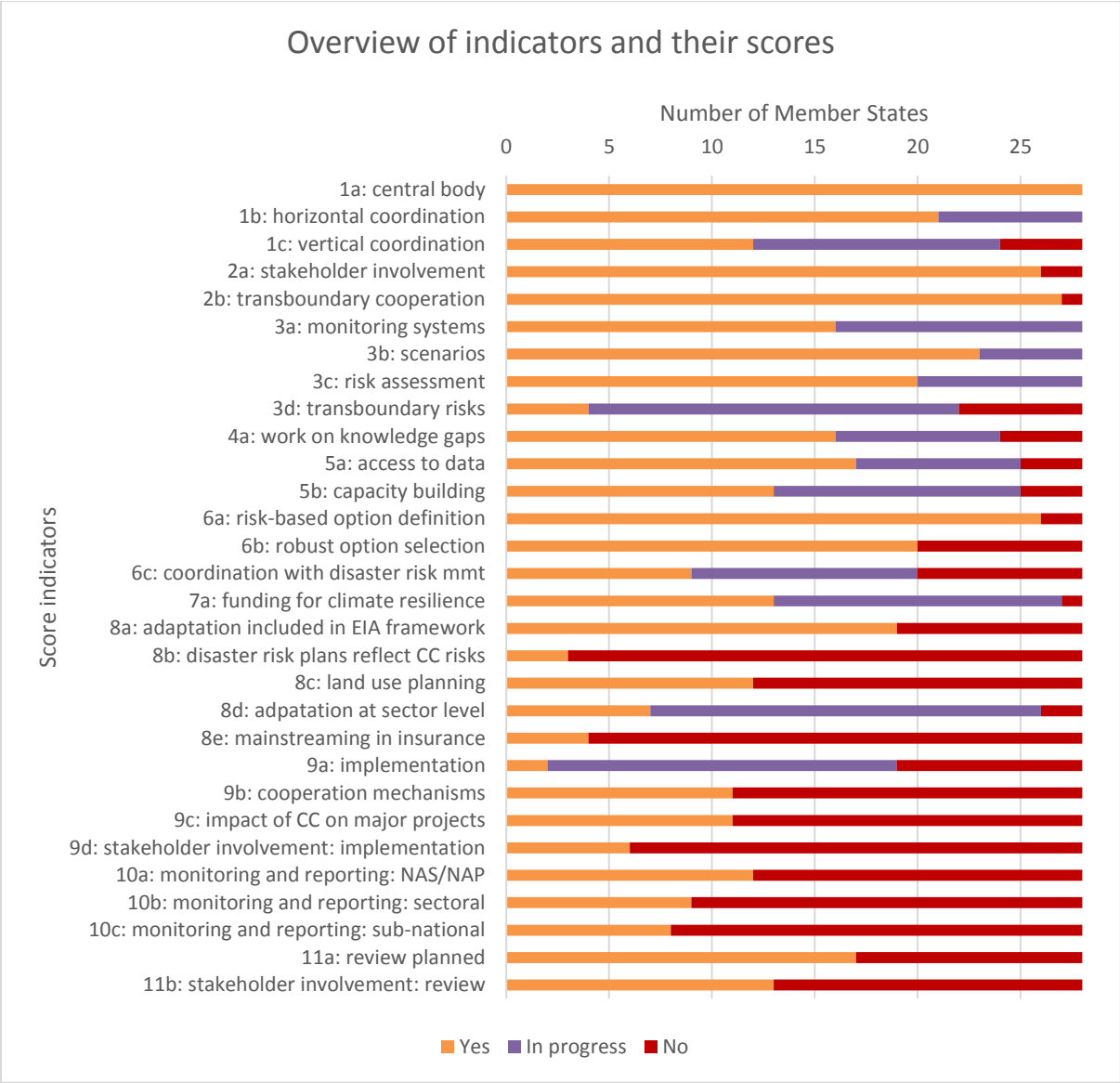
Literature on the preparation of national strategies is relatively limited. The EEA published a report in 2014 on "National adaptation policy processes in European countries"; which noted that "21 [of 33] European countries have adopted a national adaptation strategy (NAS) and 12 have developed a national adaptation plan (NAP)." A report carried out by ONERC in 2016 as part of a process of review of the French national adaptation strategy took the innovative step of assessing adaptation strategies in other countries as a source of inspiration, and noted examples of strategies from Finland, Spain, the Netherlands, the UK, and Germany – however, much of the strategy development described had taken place in advance of the publication of the European strategy, so cannot be regarded as evidence of its impact.

A7.1.2 State of play on Member State adaptation strategies

Discussions with Member States on the proposed 'adaptation preparedness scoreboard' began in 2013, and led to the development of a detailed scoreboard, based to a large extent on the process and approaches recommended in the staff working document. This scoreboard was not published in a final form; a draft was published on the Climate-Adapt website[31]. In an effort to fine-tune the scoreboard, a first Commission assessment of performance in each Member State against the scoreboard was carried out in 2015 as a pilot exercise, but was not published. A second assessment against a modified version of the scoreboard was carried out under the current evaluation project, and draft versions of the Member State fiches were published as background documents for the public consultation. The Commission's intention is to publish final versions of the Member State fiches in the second half of 2018. The scoreboard indicates progress in the delivery of Action 1, and fulfils the commitment in the Strategy to "assess whether action being taken in the Member States is sufficient". Figure A7-1 below shows the aggregate assessment from the published draft fiches against each of the criteria in the scoreboard. Member States have been assessed as either already meeting the criterion or (when appropriate) currently implementing measures which should enable them to meet the criterion, or not meeting the criterion.

[31] See: http://climate-adapt.eea.europa.eu/eu-adaptation-policy/strategy/index_html/resolveuid/bbc416202fd844b1a09f90a2990553ae

Figure A7-1 Overview of adaptation scoreboard indicator assessments



Source: analysis of draft scoreboards published in conjunction with the open public consultation on evaluation of the EU Adaptation Strategy, December 2017[32]. Acronyms are included in the list on page iii and detailed descriptions of the indicators are available at the link provided in footnote 31.

The operational objective proposed in the Impact Assessment for the Strategy (European Commission, 2013b) was that "by 2017, all Member States have adopted (an) Adaptation Strateg(y)ies, complemented by regional or local adaptation strategies when appropriate". A total of 25 of the 28 Member States had adopted national adaptation strategies by the end of 2017. Strategies are being developed in the remaining three Member States (Latvia, Bulgaria and Croatia) but have not yet been adopted. Information on regional and local strategies is less readily available. Assessment of the objective requires a judgement of where it is "appropriate" for national strategies to be complemented at regional level. Some Member States, notably Sweden, have taken a highly decentralised approach to implementing adaptation strategies. The scoreboard analysis in relation to Action 3 (Covenant of Mayors) summarises the extent to which

[32] Available at: https://ec.europa.eu/clima/consultations/evaluation-eus-strategy-adaptation-climate-change_en (Accessed 5 March 2018)

national strategies integrate action at a local level (Criterion 1c) and suggests patchy progress, as only six Member States have met this criterion.

A7.1.3 Specific evaluation questions

A7.1.3.1 EQ 10. How adequate were the resources for Action 1: Encouraging MS to adopt comprehensive adaptation strategies?

Which resources were made available to produce the EC guidelines on preparing a national adaptation strategy?

The literature review does not provide information on this point, and will need to be followed-up by interview questions for EC stakeholders.

What other EC resources were provided in support of this action?

The literature review does not provide information on this point, and will need to be followed-up by interview questions for EC stakeholders.

It should be noted that resources for implementation at national and local level are also an important consideration. The Committee of the Regions[33] notes that ensuring continued availability of resources for adaptation activity has been challenging, and in particular that "Southern and Eastern European cities seem to have struggled more to keep political commitment high, and have generally encountered more challenges in gathering resources for adaptation and obtaining tailored information."

A7.1.3.2 EQ 12. To what extent is the development of comprehensive adaptation strategies, as encouraged by the EU Strategy, coherent with relevant: EU legislation and policies, international initiatives, national initiatives and regional or sub-national initiatives?

Has the development of comprehensive adaptation strategies, as encouraged by the EU Strategy, fitted well with, and reinforced, other adaptation policies and initiatives, or the reverse?

The draft EEA report on adaptation and disaster risk reduction[34] notes that: "The decades old Environmental Impact Assessment (EIA) Directive amended few times was revised in 2014 and now addresses climate change and disaster risks throughout the whole EIA process more explicitly than before". It also notes a number of areas where adaptation and disaster risk management, in particular the Sendai Framework for Disaster Risk Reduction, have been aligned.

The ONERC evaluation of 2016 includes a useful summary of action at EU level and a selection of national case studies of adaptation strategies. It notes in particular that the commitment to spend 20% of the EU budget on climate objectives provides support to implementation of the adaptation strategy[35]. Recent analysis has also suggested that the process of developing Partnership Agreements under the European Structural and Investment Funds has reinforced the prominence of climate objectives, including climate

[33] COR 2016
[34] EEA 2017 (draft of unpublished report)
[35] ONERC 2016 "Cette stratégie est soutenue par l'allocation d'au moins 20 % du budget de l'Union à l'action pour le climat sur la période 2014-2020, soit un triplement par rapport à la période précédente."

adaptation, in Member States[36] (see also Action 6). This coherence at the level of European funding creates opportunities for ensuring greater coherence in national and regional funding by alignment with it, as noted by ONERC (2016)[37].

What are the areas where there is less coherence?

There is little identification in the literature of areas where there is a lack of coherence in policies at European level. There are a number of references to lack of resources at national and regional level (including as noted above); however, theses seem to be primarily concerned with the level of priority accorded to adaptation by national and regional authorities, and the consistency with which that priority is applied, rather than a lack of coherence per se with other policies.

One further area for policy coherence is between mitigation action and adaptation. This is particularly relevant in areas such as energy efficiency, including the energy costs of cooling buildings during summer heat peaks; but is also relevant for the forestry and land use sector, given the need to ensure both improved carbon sequestration and reduced fire forest fire risks.

What could be done to improve coherence in these areas?

The Commission's guidelines for member states place little emphasis on coherence with other areas of policy. Step 4b (Assess cross-cutting issues, trade-offs and synergies of adaptation options) suggests that ""Individual policy areas/sectors might follow different objectives leading to proposals for adaptive actions that could potentially create negative side effects for another policy area/sector if not coordinated. Likewise, adaptation responses in distinct policy areas can potentially deliver synergies when mutually designed. There is, therefore, a clear need for coordination across a wide range of political, legal and institutional settings, as well as different information-management approaches and financial arrangements." While these principles are sound, and while the precise requirements for policy coordination to avoid conflicts and maximise synergies will vary from member state to member state, there may also be value in identifying and promulgating successful examples of coordination through CLIMATE-Adapt, and in any future guidelines. The question will, however, need to be addressed through interviews and the wider process of stakeholder engagement (survey and workshop).

A7.1.3.3 EQ 13. To what extent have the activities associated with the EU Adaption Strategy, to support the development of comprehensive adaptation strategies at national level, added value compared to what would have resulted from an action at regional or national level?

What would have happened in the absence of the Commission's activities to develop guidelines for preparing Adaptation Strategies, and preparing the Adaptation Scoreboard?

There is limited analysis in the literature we have reviewed of the impact of the EU Adaptation Strategy in prompting action at member state level. The EEA's 2014 study does not analyse the impact in detail; and the 2016 ONERC evaluation focuses mainly on

[36] See for example Nesbit, Paquel & Illes (2017) Research for REGI Committee – Cohesion policy and Paris Agreement Targets, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels, https://ieep.eu/uploads/articles/attachments/c6717f0c-98bc-4ede-a662-edd0ce418a8b/Cohesion%20Policy%20and%20Paris%20Agreement%20targets%20report.pdf?v=63667241874

[37] ONERC, 2016: national authorities and state agencies should "s'assurer de la cohérence de leurs politiques d'aides avec celles des fonds européens, voire des fonds propres des régions."

adaptation strategies in member states which had begun addressing the challenge of climate adaptation some time before the EU strategy was published.

The EEA report also noted that 19 European countries surveyed identified "EU policies" as a driver for adaptation action, second only to extreme weather events (28 countries). It is less clear whether this can be attributed to Action 1, to other actions in the strategy (particularly integration of climate objectives into the European Structural and Investment Funds) or to other policy drivers; but 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 of political salience of the subject. It is also noteworthy that, from a level of implementation of national strategies and plans that gave rise to concern from the Economic and Social Committee (see above), effectively full coverage of national strategies has now been achieved.

One further area of added value stems from the positive reinforcement of national strategies, particularly those which identify the need for cross-border cooperation, by simultaneous implementation of adaptation policies in neighbouring countries. The EEA notes that "for policies to become effective, collaborative effort is needed for implementation." The voluntary nature of national adaptation strategies makes it possible for member states to develop a mechanism which suits its national administrative systems and national preferences. While in some cases this may lead to a sub-optimal level of implementation at national level, it also allows (for example) for choices like that of Sweden, which has decided to implement adaptation action through regional and local strategies, rather than a process led by a central government coordinator (Sweden is thus the one member state for which a "No" is recorded against scorecard criterion 1a ("A central or federal administration body officially in charge of adaptation policy making").

Relevant literature from the data sources table:

Data source	Description	Evidence relevant to current evaluation	Relevant other actions
Action 1			
Guidelines on developing adaptation strategies. SWD(2013) 134 final	It provides a first answer to identified barriers to the uptake of adaptation strategies at national level. It builds on and aims to make more operational the so-called Adaptation Support tool, one of the key features of Climate-ADAPT.	One of the main inputs associated with this action	
Member State reports under Article 15 of the Mechanism for Monitoring and Reporting (MMR)	Information on Member States' national adaptation planning and strategies, outlining their implemented or planned actions to facilitate adaptation to climate change. That information shall include the main objectives and the climate-change impact category addressed, such as flooding, sea level rise, extreme temperatures, droughts, and other extreme weather events.	Provides evidence on the implementation of adaptation strategies in Member States	
April 2017 - May 2017: An update to be sent by Member States to the Commission on transposition of the 2014 Environmental Impact Assessment (EIA) Directive with regards to country scoreboard indicator 8a (consideration of climate change in the national frameworks for environmental impact assessments and strategic environmental assessments).		Useful for the country fiche exercise.	
Reports from the EEA, for example: National adaptation policy processes in European Countries (2014)	Provide knowledge on adaptation related topics: policy processes and progress in key sectors	Gathered understanding to bridge knowledge gaps	Action 3, 4, 8

Data source	Description	Evidence relevant to current evaluation	Relevant other actions
EU MS national risk assessments, and report currently produced by JRC and ECHO summarizing conclusions.	Gives an idea of where climate is considered in national assessments of risk.		Action 4
Committee of the Regions: Regional and Local Adaptation in the EU since the Adoption of the EU Adaptation Strategy in 2013, published in 2016 http://cor.europa.eu/en/documentation/studies/Documents/Local%20and%20regional%20adaptation.pdf	The report analysed the impact of the EU Adaptation Strategy in 2013 on the development of national, regional and local adaptation strategies in the Member States. For the report, the authors analysed national, regional and local adaptation policies. The analyses included interviews with two regional governments and a survey to signatories of the initiative MayorsAdapt.	Progress update with implementation since the adaptation strategy	Action 3
Update on the Adaptation Preparedness Scoreboard	A framework for evaluating Member States' adaptation readiness to climate change impacts	Lists steps of adaptation policy making, including main performance areas and key domains of relevance for the actions taken under their scope.	All Actions
Observatoire nationale sur les effets du réchauffement climatique (France): Adaptation au changement climatique : "Évaluation de la démarche nationale et recommandations" (2016)	Report reviewing the state of implementation of the French national strategy, but which includes valuable analysis of other national approaches (in line with the recommendation in the Commission guidelines to consider "good practice examples from other countries", and an assessment of the international and European policy context.	Assessment of national approaches.	

A7.2 Literature review Action 2: Provide LIFE funding to support capacity building and step up adaptation action in Europe (2014-2020)

LIFE[38] is the EU's financial instrument supporting environmental, nature conservation and climate action projects, linked to EU priorities[39] and contributing to sustainable development. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value.

As part of the development of the EU Adaptation Strategy, a Climate Action sub-programme was created under the 2014-2020 LIFE funding programme for the environment. This substantially increased the LIFE funds available to combat climate change and it was intended that priority vulnerable areas should be identified to steer discussions with Member States on the 2014-2020 LIFE work programme. The funding for this work programme is approximately €3.4 billion, of which €864 million is marked for Climate Action. The Climate Action strand covers climate change mitigation, climate change adaptation, and climate governance and information. The programme also provides for activities outside the EU, for the participation of third countries, and for cooperation with international organisations.

The 2014-20 LIFE programme is intended to be used as a catalyst; to promote implementation and integration of environment and climate objectives in other policies and Member State practice, including mainstreaming; and to emphasise better governance. The specific objectives of the Climate Action sub-programme are:

1. Implement and develop **Union policy** and legislation and **mainstream** activities across policy areas
2. Improve and apply **knowledge base** in practice
3. Develop and implement **integrated strategies** and action plans
4. Develop and demonstrate **innovative technologies**, systems, methods and instruments for replication, transfer or mainstreaming

For climate change adaptation specifically, LIFE projects focus on innovative practices and measures that promote resilient communities, safeguard natural resources, encourage protection of ecosystems and foster adaptive technologies for economic sectors that are vulnerable to climate change. By tackling possible threats and hazardous events such as water scarcity, severe droughts, forest fires or floods, the LIFE projects strategically underpin the implementation of the EU strategy on adaptation to climate change.

The LIFE programme is also providing capacity building support (such as recruitment of personnel, training, knowledge exchange, and dissemination) to LIFE national or regional

[38] The LIFE 2014-2020 Regulation (EC) No 1293/2013 was published in the Official Journal L 347/185 of 20 December 2013. The Regulation establishes the Environment and Climate Action sub-programmes of the LIFE Programme for the next funding period, 2014–2020. The budget for the period is set at €3.4 billion.

[39] Specifically to the achievement of the objectives and targets of the Europe 2020 Strategy, the 7th Union Environmental Action Programme and other relevant EU environment and climate strategies and plans.

contact points[40] in order to facilitate resourcing of LIFE programme activities and projects.

A mid-term evaluation[41] of the LIFE Programme on environment and climate was recently completed earlier in 2017. The results of this report provides the basis of the assessment of Action 2 for this evaluation, together with other supporting literature.

Since 2000, the LIFE programme has co-funded nearly 150 projects that focus – in whole or part - on climate change adaptation. These have mobilised some €307 million for climate change adaptation (with an EU contribution of €152 million)[42]. This figure also excludes the many millions spent, for instance, on agri-environmental measures relevant to adaptation but not branded as such, or on green infrastructure to increase ecosystem resilience. The total number of projects financed under the Climate Action sub-programme for 2014 was 31 out of a total of 135 and 35 out of total of 151 in 2015. The Mid-Term Evaluation (MTE) found that the Programme has financed 432 projects (185 in 2014, 216 in 2015 and 31 in 2016). The sub-total for climate change adaptation for the LIFE 2014 – 2017 is €190.1 million[43]. The first two years of the Climate Action sub-programme (2014 & 2015) has seen €38.6m spent on climate change adaptation focused projects, with the average amount of funding requested per project for climate change adaptation being €1.48 million[44].

The programme has been most active in mainstreaming climate adaptation in water policy (43 projects since 2000), including a strong focus on water scarcity and floods; in agriculture (25 projects since 2000); and in creating resilient urban and peri-urban areas (22 projects since 2000). The programme has also directly supported other Actions under the Strategy, for example, since 2007, nine LIFE projects have supported the development of climate adaptation strategies or plans (total budget: €16 million), including one project to develop a national adaptation strategy (for Cyprus), that was recently completed in April 2017. The majority of projects have worked at sub-national level, helping to turn strategies into action plans at regional or local level.

A7.2.1 Specific evaluation questions

A7.2.1.1 Relevance

LIFE MTE findings and conclusions from Executive Summary:

"The areas identified in the Multi-Annual Work Programme for the sub-programme for Climate action are relevant both for adaptation and mitigation measures."

EQ14. To what extent does there continue to be a need for the Commission to fund capacity building projects for climate action at MS level?

Is there still a need for capacity building in Member States with respect to climate action?

[40] Eligibility of MS for funding of capacity building projects is based on criteria linked to GDP.
[41] In line with the requirements of Article 27 § 2 of the LIFE Regulation, the Commission has decided to carry out an external and independent mid-term evaluation mainly assessing the LIFE programme, its types of interventions, its implementation and its results so far in order to facilitate evidence-based decision-making.
[42] LIFE and climate change adaptation http://ec.europa.eu/clima/publications/docs/life_climate_change_adaptation_en.pdf
[43] LIFE programme mid-term review 2017 (forthcoming)
[44] EASME presentation, DG CLIMA workshop April 2017

Is there still a need to for the Commission to fund capacity building projects for climate action at MS level?

What is the nature of the support that is still needed?

LIFE MTE findings and conclusions from Executive Summary

"It was recognised by all stakeholders that, due to the limited budget and the large number of objectives, the dissemination and replication of LIFE projects is key to achieving impacts…."

"All set milestones for 2017 are on track to being reached. Replication of project results of LIFE projects will likely be higher compared to LIFE+, sustainability of LIFE Nature projects however varies greatly across Member States due to their dependency on funding."

LIFE MTE Annex

The Multi-Annual Work Programme 2014-2017 provides the basis for two financial instruments: the Natural Capital Financing Facility (NCFF) and the Private Finance for Energy Efficiency (PF4EE). Both are implemented by the European Investment Bank (EIB) on the basis of delegation agreements between the Commission and the EIB. Regarding the NCFF no contracts have been signed yet although two are undergoing final negotiations. This implies that for this interim evaluation it is too early to present any findings on the achieved results and impacts at the project level for financial intermediaries and clients or final recipients."

LIFE MTE findings and conclusions from Executive Summary

"The Natural Capital Financing Facility (NCFF) is a financial instrument that supports projects which can benefit biodiversity and climate adaptation. The instrument is a financial innovation and therefore new for many players in the area of biodiversity, thus time is needed to build up a project pipeline. Since the start in 2014 until November 2016, eight applications are in the portfolio of NCFF, out of which six applications were eligible and two projects in the contracting phase. Therefore, it is too early to completely assess the relevance and effectiveness of NCFF. The analysis identified potential relevance issues regarding the (financial) needs and barriers to reach mature projects for the four project categories. Complexity regarding the number of stakeholders, project development and financial structuring might imply that the set-up of the NCFF equity and debt financing instruments will not reach its 2017 milestone. More substantial support to potential beneficiaries for project development and new forms of credit enhancement or grant instruments might be needed: in order to prevent the risk of not achieving the targets in the delegation agreement, we regard it as advisable to step up assistance to support potential beneficiaries for project development and financial structuring".

LIFE MTE Annex

"The NCFF has been established to function as a policy instrument for innovative pilot projects and offers the potential to improve the cost-effectiveness of the LIFE Programme through leverage and complementarity. The Delegation Agreement lays down the objective of the instrument, namely to address market gaps and barriers for revenue -generating or cost–saving projects that are aimed at preserving natural capital, including climate change adaptation projects."

"At the time of writing (November 2016), there are two projects in the final negotiation before being signed (including Rewilding Europe) and six projects in the pipeline that are eligible in meeting the LIFE objectives. Rewilding Europe aims to support small businesses in rural areas that will have a positive impact on restoring landscapes, ecosystems and biodiversity. Various EU countries can participate in the project within the pro-biodiversity businesses and climate change adaptation category. The financial mechanisms of Rewilding Europe are based on intermediated loans to a specialist

nonbank financial institution that will on-lend to rural micro, small and medium sized pro-biodiversity businesses, which will apply natural processes in land use and land management that supports biodiversity conservation and climate change adaptation. The amount of EIB funding for Rewilding Europe is EUR 5 million with total costs of the project mounting EUR 7 million."

"Under the area innovative pro -biodiversity and adaptation investments fall projects that 'involve the supply of goods and services, mostly by SMEs, which aim to protect biodiversity or increase the resilience of communities and other business sectors.' Examples of such innovative businesses are sustainable agriculture (organic food), recreational or family farming, ecotourism, sustainable forestry, hunting, etc. According to case studies by KPMG (2014), the participants in such projects included the private sector (71%), public sector (6%), land owners (15%) and civil organisations (9%). According to the ex-ante assessment, the key barriers are affordable SME finance and low or risky profitability of projects especially for new business lines. Pooled revolving funds, de-risking and affordable direct equity and loans are advised as key instruments for the NCFF.

"Climate adaptation investments and potential business models and financing instruments are analysed in 2014 by Ecorys[45]. The report shows a number of case studies in the area of adaptation projects, especially related to flood management and water security. The report shows that in this segment business models heavily depend on the possibility of scope extension towards integrated land development projects and revenue generation through other sectors (such as energy, land and urban development, tourism, etc.). An example is a flood safety project (barrier) combined with nature development which provided possibilities for land and urban development (with income streams out of land and real estate sales). Often these integrated projects (multi-sectoral components and services) have complex structures and need PPP models or viability gap grant funding in order to arrive at viable implementation models. This could be an area where support through the NCFF instrument with combinations of LIFE grants for Integrated projects or ERDF grants could be further investigated. Additional to the ex-ante evaluation, limited experience in financial institutions or funds with some innovative business lines could be added as a barrier. Therefore, the lack of Technical Assistance (or Project Pipeline facilities) regarding developing, structuring and developing viable business models of projects in these more complex and innovative areas could be seen as another barrier."

LIFE MTE Annex

"The evaluation team analysed information provided by LIFE projects to date (call 2014) on total project expenditure at the beginning; at the end; and envisaged after-LIFE ending of the project. We found that total project funding for the 2014 LIFE call sums up to roughly 540 million euro and that by far the largest share stems from Integrated Projects (57%). Furthermore, and perhaps more interesting when assessing the extent to which relevant stakeholder will be able to support projects after the end of the EU funding (as this gives an indication), is the budget estimated to become available after ending of the LIFE funding. The total envisaged expenditure on after-LIFE is just over 370 million. Based on this data we find that the share of envisaged 'after-LIFE+' budget is with 81% highest for Environment projects and with 39% lowest for Climate adaptation projects. Furthermore, we find that the expected expenditure available for IP projects is with 71% relatively high in percentage and by far highest in total numbers. The table below gives a breakdown per type of funding."

[45] See Ecorys(2014), "Innovative financing and positioning of the water sector" for Partners for Water (Ministries of Infrastructure and Environment, Economic Affairs (RVO) and Foreign Affairs in the Netherlands).

Table A.1.11 Reported and envisaged expenditure for LIFE 2014 projects

Total project related expenditure	at the beginning	at the end	beyond	share
CCA	€ 182.498	€ 29.597.407	€ 11.475.097	39%

"The expected sustainable funding of climate change adaptation (39%) is lower compared to climate change mitigation projects (66%), this could be related to the higher number of CCA projects that are producing strategies etc. as output. We however note, that it is a bit early to say what the sustainable funding for projects under the sub-programme of climate will be (also since there is no comparison possible with LIFE+)"

LIFE MTE Annex

"**A.2.3.2 Assessment of the relevance of the areas identified in the Multi-Annual Work Programme 2014-2017 (Section 4) for the sub-programme for Climate Action, and of the uptake of those areas**

Thematic priorities and project topics are not foreseen as part of action grants implemented under the sub-programme for Climate Action. However, in line with the general objective of the LIFE Regulation, i.e. to improve the development, implementation and enforcement of Union climate policy and legislation and to provide for the required EU added value, the implementation of action grants is linked with the three priority areas - climate change mitigation, climate change adaptation and climate governance and information - as well as with the specific objectives as specified by Article 14, 15 and 16 of the LIFE Regulation. In the public consultation respondents gave information regarding the LIFE priority area they are active in. 12% of all respondents are also active in climate action (combination of adaptation and mitigation), and in comparison with the average from the overall public consultation, they were slightly more convinced of the relevance of financial instruments and slightly less supportive of operating grants. The analysis of the interviews shows that there is a good correspondence between the objectives of the projects' and the LIFE programme. A majority (10 out of 14) of the respondents state that the projects are relevant for the local level. The respondents inter alia comment that the projects will make state-of-the-art knowledge and new technology available on the local level. Furthermore the projects will also lead to concrete adaptation to climate change (e.g. stop forest degradation). In the public questionnaire respondents active in the field of climate action responded on the question whether there is a need for a specific European programme for the environment and climate action financed at EU level (Q2.1) in 96% of the responses with 'yes'. This response is slightly above average. In addition, regarding the reasons to have a programme for the environment and climate action financed at EU level this group of stakeholders strongly agreed that the reason for the LIFE Programme is to guide environmental and climate actions at all levels. Our analysis of the projects approved under the priority areas covered by the sub-programme for Climate Action indicates that with respect to climate change adaptation, so far 61% of the projects are expected to contribute to development of innovative technologies, systems and instruments, while 73% of the projects are expected to propose best practice solutions which will increase climate resilience. This performance is slightly below the milestone for 2017, which is set at 80% for LIFE projects. About 68% of the projects funded so far contributing to climate adaptation measures envisage some type of continuation, replication of transfer of the achievements. Our quantitative analysis of the climate change mitigation priority area shows that more than 80% of all the projects set up lasting innovative technologies, systems and instruments and/ or best practice solutions for the reduction of greenhouse gas emission. This exceeds the milestone for 2017, which is set at 80% for LIFE projects. 74% of all LIFE projects envisage some actions with regard to the entry into

new entities or follow-up on projects, the entry into new sectors or the entry into new geographical areas. Regarding climate governance and information, the number of projects currently amounts to nine, and there is no evidence of uptake at this stage (three projects that fall directly under this thematic priority did not report on indicator 14). However, a total of 15 projects report that they plan to implement enforcement measures, aimed at fostering the sharing of experience and best practice between public bodies charged with investigation. Most of the projects envisage the development of a new, tool, database, practice or methodology that will improve governance."

European Committee of the Regions response to MTE

"Strongly recommends maintaining and strengthening the sub-programme on climate in the 2nd LIFE Multiannual Work Programme (MAWP) and after 2020, as the frontrunner in paving the way for local and regional action in the EU and international climate political agenda. This could be done by a substantial increase in the budget allocated for climate change mitigation and adaptation actions, and taking into account the upcoming review of the EU climate change adaptation strategy. In addition, the thematic priorities and project topics under the Climate Action sub-programme should be defined and linked with the action grants."

A7.2.1.2 Effectiveness

EQ15. To what extent has the EU Adaptation Strategy steered LIFE funding for adaptation?

What funding has been provided for adaptation actions under the LIFE programme over the period 2014 to 2016?

Section 2.2 LIFE MTE

"To reflect on the importance of climate-related action, the LIFE Programme 2014-2020 includes a dedicated sub-programme for climate action which will provide €864 million (25% of total budget) of co-financing between 2014 and 2020 to develop and implement innovative ways to respond to climate challenges. This amounts to a tripling of the climate action budget compared to the LIFE+ Programme in 2007-2013. The sub-programme for Climate Action has the goal of supporting efforts for better implementation and integration of climate-related objectives in the following areas:

- 'Climate Change Mitigation' will focus on reducing greenhouse gas emissions;
- 'Climate Change Adaptation' will focus on increasing resilience to climate change;
- 'Climate Governance and Information' will focus on increasing awareness, communication, cooperation and dissemination of climate mitigation and adaptation actions."

Section 2.3 LIFE MTE

Types of funding (in million EUR) for the LIFE 2014-2017 MAWP	Environment and resource efficiency	Nature and biodiversity	Environmental governance and information	Climate change mitigation	Climate change adaptation	Climate governance and information
Action grants:						
- traditional projects	305	379	65	72,5	91	21,5
- Integrated Projects	128	169	0	30	30	0
- TA projects	1,2	1,7	0	0,1	0,1	0
- Preparatory projects	2,4	8,1	1	0	0	0,4*
- Capacity-building projects	0	0	11,3	0	0	3,8
Financial instruments**:						
- NCFF	0	30	0	0	30	0
- PF4EE	0	0	0	80*	0	0
Operating (NGO) grants			28			8
Procurement	58,8	26,5	93,3	23,3	26,4	13,8
Sub-total	*495,8*	*614*	*198,6*	*193,4*	*190,1*	*47,5*
Technical Assistance						56,8
Total						**1796,3**

* This funding pursues climate change mitigation objectives.
**The FI's amount does not include the additional EIB financing of €50 to €75 million to the NCFF and €400 million for the PF4EE. The EIB further supports the FI's with €10 million for the technical support facility.

LIFE MTE Section 5.1.3

"The contribution of LIFE-14 consists of 11 climate adaptation… projects… 3 adaptation projects have been interviewed to obtain additional qualitative information".

Previously "LIFE+ did not have dedicated climate action projects… in total 84 LIFE+ projects reported on LIFE climate adaptation indicators. These projects reported that they increased adaptive capacity of the area (67%), improved condition of climate vulnerable areas (43%) and/ or targeted infrastructure to improve resilient status (44%)."

"The analysis shows that climate change adaptation projects fall slightly short of their 2017 milestone of 80%, as about 61% of the projects funded so far under LIFE 2014-2020 set up innovative technologies, systems and instruments to deal with this area. Meeting the 2017 milestone will depend on projects selected and their results in 2015 and 2016, but expectations are moderate. 50% of the selected projects report a contribution to improving the status of vulnerable areas and 61% envisage development of infrastructure that will improve resilience."

LIFE MTE Section 10

"Climate action is the second smallest priority area in terms of the number of projects. The milestones in the sub-area of climate change adaptation are for 2014 not on track to reach the 2017 milestones, whereas the LIFE 2014 outcomes in the sub-area of climate change mitigation surpass both the LIFE+ results (based on climate action projects and projects that reported on climate indicators) and the 2017 milestones."

LIFE MTE Annex

"Under the LIFE sub-programme for Climate Action in the area of climate change adaptation, there are 11 ongoing projects reporting contribution to all three climate adaptation indicators: adaptation area, particularly vulnerable areas and infrastructures

targeted for climate resilience. Additionally, there are 17 projects reporting on the climate adaptation indicators under other LIFE sub-programmes."

"The projects funded in the area of climate change adaptation report contribution to all three climate change adaptation indicators. The overall area targeted by the projects in implementation is above 35 million ha. 50% of the projects funded so far address particularly vulnerable areas, while 61% envisage development of infrastructure targeted for climate resilience. The projects have wide geographical coverage: Spain, Italy, Greece, Belgium, France, Germany, Netherlands, Poland, Portugal, Slovakia and Estonia."

"With respect to climate change adaptation, so far 61 % of the projects are expected to contribute to development of innovative technologies, systems and instruments, while 73% of the projects are expected to propose best practice solutions which will increase climate resilience. This is below the milestone for 2017, which is set at 80% for LIFE projects. About 68% of the projects funded so far under LIFE 2014-2020 that contribute to climate adaptation measures envisage some type of continuation, replication of transfer of the achievements."

"There are 84 LIFE+ projects reporting achievements under the climate change adaptation indicators, of which 67% report an increase of the adaptation area, 43% report a positive impact on particularly vulnerable areas, and 44% on the infrastructures targeted for climate resilience."

"There are 28 projects within the priority area Climate Action contributing to 44% of the climate action indicators. The milestones in the sub-area of climate change adaptation will probably not be met, whereas the outcomes in the sub-area of climate change mitigation surpass both the LIFE+ and the milestones."

"The new type of funding under the current LIFE Multi-Annual Work Programme, Integrated Projects (IPs) are aiming at the implementation of plans, programmes or strategies required by EU environmental or climate legislation or pursuant to other acts developed by MS authorities. They are conceived to act at a larger scale, e.g. regional, multiregional, and national levels, and primarily in the areas of nature, water, waste, air, climate mitigation and adaptation. IPs are inclusive: stakeholders must be involved as associated beneficiaries. The European Commission deems the sustainability of the IPs as important as well as complementarity with and mobilisation of other funds (EU or other, e.g. ERDF)." Integrated projects (as well as preparatory projects and technical assistance projects) have a 60% co-financing rate."

What types of actions/projects have been implemented by MS in relation to adaptation?

LIFE MTE findings and conclusions from Executive Summary:

Of relevance to CCA – "…LIFE supports countries in achieving the goals formulated in the EU Biodiversity strategy, particularly the green infrastructure and Support for an external and independent LIFE Mid Term Evaluation Report invasive alien species…. "

"The milestones in the priority area of climate change adaptation (CCA) are not on track to reach the 2017 targets (based on 2014 project indicators). After-LIFE funding for most CCA is limited, because projects often produce plans or strategies as their final product. However, CCA project results are often taken up indirectly, and this might compensate for the gap in reaching the milestones."

LIFE MTE Annex

"Under the LIFE sub-programme for Climate Action in the area of climate change adaptation, there are 11 ongoing projects reporting contribution to all three climate adaptation indicators: adaptation area, particularly vulnerable areas and infrastructures targeted for climate resilience. Additionally, there are 17 projects reporting on the climate adaptation indicators under other LIFE sub-programmes."

"The projects funded in the area of climate change adaptation report contribution to all three climate change adaptation indicators. The overall area targeted by the projects in implementation is above 35 million ha. 50% of the projects funded so far address particularly vulnerable areas, while 61% envisage development of infrastructure targeted for climate resilience. The projects have wide geographical coverage: Spain, Italy, Greece, Belgium, France, Germany, Netherlands, Poland, Portugal, Slovakia and Estonia."

"With respect to climate change adaptation, so far 61 % of the projects are expected to contribute to development of innovative technologies, systems and instruments, while 73% of the projects are expected to propose best practice solutions which will increase climate resilience. This is below the milestone for 2017, which is set at 80% for LIFE projects. About 68% of the projects funded so far under LIFE 2014-2020 that contribute to climate adaptation measures envisage some type of continuation, replication of transfer of the achievements."

"There are 84 LIFE+ projects reporting achievements under the climate change adaptation indicators, of which 67% report an increase of the adaptation area, 43% report a positive impact on particularly vulnerable areas, and 44% on the infrastructures targeted for climate resilience."

"LIFE supports projects in the area of water mainly related to improvement of the water quality and the status of the water bodies but also related to water management. There are few projects funded so far under LIFE that could potentially contribute to efficient use of water, including some projects under Climate adaptation sub-programme."

"Our analysis of the projects approved under the priority areas covered by the sub-programme for Climate Action indicates that with respect to climate change adaptation, so far 61% of the projects are expected to contribute to development of innovative technologies, systems and instruments, while 73% of the projects are expected to propose best practice solutions which will increase climate resilience. This performance is slightly below the milestone for 2017, which is set at 80% for LIFE projects. About 68% of the projects funded so far contributing to climate adaptation measures envisage some type of continuation, replication of transfer of the achievements. Our quantitative analysis of the climate change mitigation priority area shows that more than 80% of all the projects set up lasting innovative technologies, systems and instruments and/ or best practice solutions for the reduction of greenhouse gas emission. This exceeds the milestone for 2017, which is set at 80% for LIFE projects. 74% of all LIFE projects envisage some actions with regard to the entry into new entities or follow-up on projects, the entry into new sectors or the entry into new geographical areas. Regarding climate governance and information, the number of projects currently amounts to nine, and there is no evidence of uptake at this stage (three projects that fall directly under this thematic priority did not report on indicator 14). However, a total of 15 projects report that they plan to implement enforcement measures, aimed at fostering the sharing of experience and best practice between public bodies charged with investigation. Most of the projects envisage the development of a new, tool, database, practice or methodology that will improve governance."

"The last project category consists of a mixture of business types of projects and climate adaptation types of projects, however this does not make much sense from the viewpoint of project characteristics and types of project promoters…. Learning from its developments, the NCFF now focuses on cities with this idea of integrated planned projects that often involve green infrastructure, pro-biodiversity businesses and nature-based climate adaptation solutions."

LIFE LOCAL ADAPT – Integration of climate change adaptation into the work of local authorities – Newsletter 1 (March 2017)

"On July 1st 2016 the LIFE LOCAL ADAPT – Integration of climate change adaptation into the work of local authorities' project started. Within this five-year project, six partners

from four countries will identify and test different approaches to support small and medium sized municipalities to cope with the expected impacts of future climate change."

To what extent have projects helped to promote adaptation in the vulnerable areas described in the strategy e.g. cross border management

To what extent have the supported projects helped to establish vulnerability assessments and adaptation strategies, including those with a cross-border nature?

LIFE MTE Annex

"It is… noteworthy to stress the potential of the newly introduced Integrated Projects (IP), which are a novelty of the LIFE programme. IPs were introduced in order to be able to implement environmental legislation and goals on a wider scale and to increase the impact of the LIFE programme. They provide funding for plans, programmes and strategies developed on the regional, multi-regional or national level. Building on LIFE's existing strengths, water, waste and air are three of the thematic priorities targeted, along with nature and mitigation and adaptation to climate change."

"The evaluation team analysed information provided by LIFE projects to date (call 2014) on total project expenditure at the beginning; at the end; and envisaged after-LIFE ending of the project. We found that total project funding for the 2014 LIFE call sums up to roughly 540 million euro and that by far the largest share stems from Integrated Projects (57%). Furthermore, and perhaps more interesting when assessing the extent to which relevant stakeholder will be able to support projects after the end of the EU funding (as this gives an indication), is the budget estimated to become available after ending of the LIFE funding. The total envisaged expenditure on after-LIFE is just over 370 million. Based on this data we find that the share of envisaged 'after-LIFE+' budget is with 81% highest for Environment projects and with 39% lowest for Climate adaptation projects. Furthermore, we find that the expected expenditure available for IP projects is with 71% relatively high in percentage and by far highest in total numbers. The table below gives a breakdown per type of funding."

Table A.1.11 Reported and envisaged expenditure for LIFE 2014 projects

Total project related expenditure	at the beginning	at the end	beyond	share
CCA	€ 182.498	€ 29.597.407	€ 11.475.097	39%

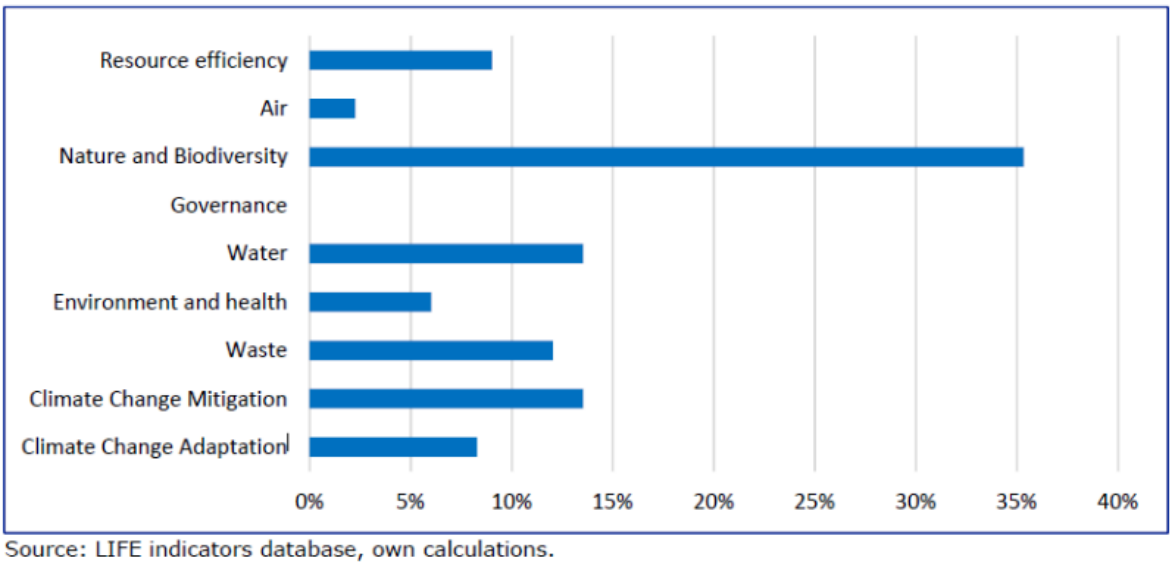
To what extent have the supported projects promoted awareness-raising on adaptation, including indicators, risk communication and management?

LIFE MTE Section 6.3

"…all LIFE projects, irrespective of their priority area, include measures for dissemination of information and awareness raising, making the contribution of the projects specifically designed for this purpose relatively insignificant (about 7-8%) if measured against the cumulative number of information events, individuals and stakeholders reached."

LIFE MTE Annex

Figure A.1.1 Share of projects from other sectors (not I&A) that contribute to information and awareness indicators (LIFE 2014-2020)



Source: LIFE indicators database, own calculations.

LIFE MTE Annex

"The survey responses and interviews show that stakeholders overall agree that LIFE is acting as a catalyst, providing and disseminating solutions and best practices to achieve environmental and climate goals. For instance, the large majority of LIFE project monitoring experts and National and Regional Contact Points, respectively 80% and 70%, confirmed that LIFE is indeed accelerating and stimulating change in the environmental and climate areas, although this is relatively more evident for the Nature projects."

"The LIFE communication strategy does not make any explicit provisions to undertake its revision. In our opinion, successful communication is an on-going process, not a onetime event. The communication strategy should therefore be considered as a living component of the LIFE programme, subject to regular adaptation to the evolutions of the programme and/ or of its stakeholders, as well as to any relevant changes intervened in the European environmental and climate context. Following from this consideration, the Commission should plan a regular verification and update of the Communication strategy at least once a year."

What drivers/barrier stood in the way of Member States implementing adaptation projects?

"The Natural Capital Financing Facility (NCFF) is a financial instrument that supports projects which can benefit biodiversity and climate adaptation." (See 'Relevance' for further information.

"Under the area innovative pro -biodiversity and adaptation investments fall projects that 'involve the supply of goods and services, mostly by SMEs, which aim to protect biodiversity or increase the resilience of communities and other business sectors.' Examples of such innovative businesses are sustainable agriculture (organic food), recreational or family farming, ecotourism, sustainable forestry, hunting, etc. According to case studies by KPMG (2014), the participants in such projects included the private sector (71%), public sector (6%), land owners (15%) and civil organisations (9%). According to the ex-ante assessment, the key barriers are affordable SME finance and low or risky profitability of projects especially for new business lines. Pooled revolving funds, de-risking and affordable direct equity and loans are advised as key instruments for the NCFF.

"Climate adaptation investments and potential business models and financing instruments are analysed in 2014 by Ecorys[46]. The report shows a number of case studies in the area of adaptation projects, especially related to flood management and water security. The reports shows that in this segment business models heavily depend on the possibility of scope extension towards integrated land development projects and revenue generation through other sectors (such as energy, land and urban development, tourism, etc.). An example is a flood safety project (barrier) combined with nature development which provided possibilities for land and urban development (with income streams out of land and real estate sales). Often these integrated projects (multi-sectoral components and services) have complex structures and need PPP models or viability gap grant funding in order to arrive at viable implementation models. This could be an area where support through the NCFF instrument with combinations of LIFE grants for Integrated projects or ERDF grants could be further investigated. Additional to the ex-ante evaluation, limited experience in financial institutions or funds with some innovative business lines could be added as a barrier. Therefore, the lack of Technical Assistance (or Project Pipeline facilities) regarding developing, structuring and developing viable business models of projects in these more complex and innovative areas could be seen as another barrier."

"The last project category consists of a mixture of business types of projects and climate adaptation types of projects, however this does not make much sense from the viewpoint of project characteristics and types of project promoters…. Learning from its developments, the NCFF now focuses on cities with this idea of integrated planned projects that often involve green infrastructure, pro-biodiversity businesses and nature-based climate adaptation solutions."

How did these drivers/barrier affect implementation?

A7.2.1.3 Efficiency (see also 'Effectiveness' above for further relevant information)

EQ17. How adequate were the resources for Action 2: Funding to support capacity building and step-up adaptation actions?

LIFE MTE Annex

"The evaluation team analysed information provided by LIFE projects to date (call 2014) on total project expenditure at the beginning; at the end; and envisaged after-LIFE ending of the project. We found that total project funding for the 2014 LIFE call sums up to roughly 540 million euro and that by far the largest share stems from Integrated Projects (57%). Furthermore, and perhaps more interesting when assessing the extent to which relevant stakeholder will be able to support projects after the end of the EU funding (as this gives an indication), is the budget estimated to become available after ending of the LIFE funding. The total envisaged expenditure on after-LIFE is just over 370 million. Based on this data we find that the share of envisaged 'after-LIFE+' budget is with 81% highest for Environment projects and with 39% lowest for Climate adaptation projects. Furthermore, we find that the expected expenditure available for IP projects is with 71% relatively high in percentage and by far highest in total numbers. The table below gives a breakdown per type of funding."

[46] See Ecorys(2014), "Innovative financing and positioning of the water sector" for Partners for Water (Ministries of Infrastructure and Environment, Economic Affairs (RVO) and Foreign Affairs in the Netherlands).

Table A.1.11 Reported and envisaged expenditure for LIFE 2014 projects

Total project related expenditure	at the beginning	at the end	beyond	share
CCA	€ 182.498	€ 29.597.407	€ 11.475.097	39%

Which resources were made available through LIFE+ to support capacity building and step-up adaptation plans?

Were the projects supported under LIFE+ sufficient to achieve the desired level of capacity building?

LIFE MTE findings and conclusions from Executive Summary

"LIFE is witnessing strong synergies between the different thematic objectives, in line with what has been accomplished in LIFE+. The different thematic objectives are mutually reinforcing. Especially strong synergies have been observed between projects in the area of Nature & Biodiversity and Water & Marine environment, Nature & Biodiversity and Climate adaptation, as well as between Waste and Environment & Health".

LIFE MTE Annex

"A policy officer at the Commission acknowledged that there is a dialogue with potential applicants, where in the case of technological or innovative projects the focus is put on the possibility of developing business models based on the project's outcomes. However, they found that in the area of nature and adaptation private sector participation or development of a business model is difficult, as a return on investment is more difficult."

"We have found that several European territorial cooperation projects have sometimes objectives that the LIFE programme is coherent with, in particular with regards to climate adaptation and mitigation, but also nature. A potential overlap with Horizon 2020 has also been confirmed, e.g. in the field of adaptation to climate change, a redundancy with a Horizon 2020 call on Natural-based solutions has been identified. Some overlap has also been recorded also between LIFE and Priority 5 of Horizon 2020 that covers, among other topics, Climate Action and Environment, and offers a higher co-funding rate to beneficiaries. However, given that the different scope of the other Union programmes, and the fact that we found no evidence of double funding, the overlaps does not seem to be very significant. Besides, with specific regard to the goals of climate change adaptation and mitigation, they are often not "hard-coded" in legislation; instead there are many different approaches. This certainly contributes to explain why some stakeholders find it difficult to identify the 'right' Union instrument when they seek funding for their climate projects."

A7.2.1.4 Coherence

EQ18. To what extent has the support to capacity building and stepping up adaptation action, provided by the LIFE projects, been coherent with relevant: EU legislation and policies; international initiatives; national initiatives; regional or sub-nations initiatives; funding programmes

LIFE MTE Section 5.5

"Together with the EC, the following EU-programmes were determined to be of interest: European Regional Development Fund (ERDF), including INTERREG, European Social Fund (ESF), Cohesion Fund (CF), European Agricultural Fund for Rural Development (EAFRD), European Maritime and Fisheries Fund (EMFF), Horizon 2020 including its SME instrument, the Competitiveness of SMEs Programme (COSME), the Common

Agricultural Policy (CAP) and the Agri-Environmental Schemes, EEA grants, as well as Eco-innovation. Some of the above European territorial cooperation funds have objectives that are potentially overlapping with LIFE, in particular with regards to climate adaptation and mitigation, but also nature. However, given the different scope of the other Union programmes, and the fact that no evidence of double funding was found, the overlapping actions indicate that funding mechanisms are well matched. Project have the opportunity to be funded by different programmes, depending on their focus. In our view this illustrates the complementarity and synergy between programmes, rather than an overlap."

LIFE MTE Annex

"[NCFF's] Complementarity of the instrument with the market offer and other funding instruments

Various instruments and funding schemes target natural capital, biodiversity and climate adaptation projects. The LIFE programme in itself offers various mechanisms including financial instruments (see chapter 2). In addition to the LIFE programme, the Rural Development Fund under the Common Agricultural Policy (CAP) finances projects of green infrastructure. The Operational Programmes of Structural Funds provide further funding opportunities in various Member States to address natural capital issues. Examples are some Operational Programs (OPs) for the Environment or regional development where the ERDF or Cohesion Fund can be used for investments in nature, tourism or recreation. Lastly, environmental impact assessment (EIA) legislation of national governments indicates that compensation is required to offset intervention in the nature. There are a number of national and regional budgets and EU -funded grant – based systems (such as the EAFRD, ERDF (including INTERREG), LIFE) in place that could enable projects addressing natural protection and climate change. The question is why a project applicant should submit a project under NCFF (with a more complex financial structure) while there are many grant-based options available. This argument is especially valid for the Green Infrastructure project category under NCFF."

To what extent has the support to capacity building provided by the LIFE projects, been coherent with relevant:

- *EU legislation and policies?*

LIFE MTE Annex

"The EU Biodiversity Strategy aims to 'halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020'.142 By enabling broader private sector involvement in climate finance and investment in natural capital projects, the NCFF (*see 'Relevance' section above*) aligns with the EU biodiversity and adaptation policies. However, at a higher policy level the instrument works rather in a vacuum. Important enabling policy instruments such as national legislation and regulations, and supporting policies and capacity building aimed at the potential beneficiaries in Member States are lacking. At EU level the European Commission currently lacks wider promotion and capacity building on natural capital financial instruments (including the NCFF) and financial structuring of natural capital projects towards Member States, NGOs and National Contact Points. Also regulatory, coordination and capacity building support to relevant agencies in Member States on the implementation of EU regulations is lacking. Sometimes coordination between different government levels (municipal, regional, national) or institutions is lacking. This can be especially problematic in landscaping projects (cutting national borders or jurisdictions within a country) or for offsets. Four DGs (DG CLIMA, DG ENV, DG COMP, DG ECFIN) are involved in the implementation of NCFF. Moreover, ERDF of DG Regio and Horizons 2020 of DG RTD are also relevant for NCFF. This implies that coordination between the stakeholders and different EU instruments is an important challenge for NCFF."

- *International initiatives?*

LIFE MTE Annex

"…the evaluation also analysed whether synergies between objectives have been reached, i.e. if projects that impact one area also have an impact in another area. To this end, the study team has used the quantitative indicator data in order to demonstrate the extent of synergies between projects' thematic objectives… From the figures we find that the pattern of synergies is similar between LIFE+ and LIFE projects. The tables furthermore demonstrate that there are synergies between the thematic objectives, and that these synergies are coherent with the objectives. We find that:

- Nature & Biodiversity projects contribute very strongly to Water & marine environment, climate adaptation and Information and Governance indicators;
- Climate mitigation projects contribute a lot to Nature and biodiversity, and Air quality but also to Resource efficiency, but also to and climate adaptation indicators. In turn, climate adaptation projects also contribute to Nature and Biodiversity;
- Water & marine environment projects contribute a lot to Climate adaptation, and also to Nature & Biodiversity, Resource efficiency and to Environment & Health;"

Figure A.1.8 – Extent of synergies in LIFE projects

	Nature & Biodiversity	Air quality	Environment & health	Resource efficiency	Waste	Water & marine environment	Climate action –mitigation	Climate action – adaptation	Information-Governance-Enforcement
Nature & Biodiversity		0	0	6	12	24	29	24	6
Air quality	9		17	4	13	9	30	4	13
Environment & health	11	5	16	11	16	21	16	0	5
Resource efficiency	7	5	5		24	22	24	5	7
Waste	23	0	10	23		17	7	3	17
Water & marine environment	48	0	8	2.5	10		13	15	5
Climate action –mitigation	21	4	4	19	21	17		8	6
Climate action – adaptation	41	0	0	6	6	29	0		18
Information-Governance-Enforcement	32	2	5	8	11	13	12	8	8

Colour scheme

>35	
29 to 35	
21 to 28	
12 to 20	
6 to 11	
0 to 5	

Figure A.1.9 – Extent of synergies in LIFE+ projects

	Nature & Biodiversity	Air quality	Environment & health	Resource efficiency	Waste	Water & marine environment	Climate action –mitigation	Climate action – adaptation	Information-Governance-Enforcement
Nature & Biodiversity		0	5	14	8	17	5	8	43
Air quality	8		14	9	14	6	23	6	20
Environment & health	5	8		13	35	21	5	0	13
Resource efficiency	4	2	4		35	12	28	2	13
Waste	16	0	15	16		16	17	1	19
Water & marine environment	62	1	6	6	9		4	3	9
Climate action –mitigation	17	2	3	9	21	4		31	13
Climate action – adaptation	41	0	1	5	5	10	23		15
Information-Governance-Enforcement	44	3	7	5	12	10	10	2	7

Colour scheme

>35	
29 to 35	
21 to 28	
12 to 20	
6 to 11	
0 to 5	

Figure A.1.10 Difference in synergies between objectives (LIFE-LIFE+) in total %

	Nature & Biodiversity	Air quality	Environment & health	Resource efficiency	Waste	Water & marine environment	Climate action –mitigation	Climate action – adaptation	Information-Governance-Enforcement
Nature & Biodiversity		-	-5	-8	4	7	24	16	-37
Air quality	1		3	-5	-1	3	7	-2	-7
Environment & health	6	-3	16	-2	-19	0	11	-	-8
Resource efficiency	3	3	1		-11	10	-4	3	-6
Waste	7	-	-5	7		1	-10	2	-2
Water & marine environment	-14	-1	1	-3	1		8	12	-4
Climate action –mitigation	4	2	1	10	-0	13		-23	-7
Climate action – adaptation	0	-	-1	1	1	19	-23		3
Information-Governance-Enforcement	-12	-1	-2	3	-1	4	2	7	1

"We have found that several European territorial cooperation projects have sometimes objectives that the LIFE programme is coherent with, in particular with regards to climate adaptation and mitigation, but also nature. A potential overlap with Horizon 2020 has also been confirmed, e.g. in the field of adaptation to climate change, a redundancy with a Horizon 2020 call on Natural-based solutions has been identified. Some overlap has also been recorded also between LIFE and Priority 5 of Horizon 2020 that covers, among other topics, Climate Action and Environment, and offers a higher co-funding rate to beneficiaries. However, given that the different scope of the other Union programmes, and the fact that we found no evidence of double funding, the overlaps does not seem to be very significant. Besides, with specific regard to the goals of climate change adaptation and mitigation, they are often not "hard-coded" in legislation; instead there are many different approaches. This certainly contributes to explain why some stakeholders find it difficult to identify the 'right' Union instrument when they seek funding for their climate projects."

"Overall the LIFE programme is coherent, but its role as a catalyst should be further emphasized indicating 'LIFE should bridge the gap to other, bigger funds, but this bridge is not yet there.'"

A7.2.1.5 EU Added Value

EQ19. To what extent have the projects supported by the LIFE programme, to support capacity building and step-up adaptation actions, added value compared to what would have resulted from an action at regional or national level?

What was the added value of the LIFE programme projects in the climate adaptation area?

LIFE MTE Section 5.5

"Together with the EC, the following EU-programmes were determined to be of interest: European Regional Development Fund (ERDF), including INTERREG, European Social Fund (ESF), Cohesion Fund (CF), European Agricultural Fund for Rural Development (EAFRD), European Maritime and Fisheries Fund (EMFF), Horizon 2020 including its SME instrument, the Competitiveness of SMEs Programme (COSME), the Common Agricultural Policy (CAP) and the Agri-Environmental Schemes, EEA grants, as well as Eco-innovation. Some of the above European territorial cooperation funds have objectives that are potentially overlapping with LIFE, in particular with regards to climate adaptation and mitigation, but also nature. However, given the different scope of the other Union programmes, and the fact that no evidence of double funding was found, the overlapping actions indicate that funding mechanisms are well matched. Project have the opportunity to be funded by different programmes, depending on their focus. In our view this illustrates the complementarity and synergy between programmes, rather than an overlap."

LIFE MTE Section 5.6

"LIFE projects report that they expect, on average, to create 2.5 jobs at the start and 13.5 jobs at the end of the project. Sustainable jobs are created for most types of grants (on average 17.8), most notably for environment (30.5), IP and climate adaptation projects."

LIFE MTE Section 10

"…a preliminary estimation on the impact of the current Programme shows that up to 32500 sustainable direct jobs are likely to be created… The estimated total expenditure from other sources is estimated to be around €4.7 billion, of which €3 billion is ex-post… Climate change adaptation projects are also expected to lead to a high increase in sustainable jobs (34 FTE per project). Climate change mitigation and climate information and governance projects have a below average expected impact on sustainable job creation. However, climate change mitigation projects have a 66% sustainable funding potential, which is almost double that of climate change adaptation and only just below the total average. We however note, that it is a bit early to say what the sustainable funding for projects under the sub-programme of climate will be as the information is mainly based on the 2014 call."

LIFE MTE Annex

"In terms of average employment created an average of 2.5 jobs in FTE equivalent p.a. was reported in the beginning of the project and on average this increased to 13.5 FTE at the end of the project and to 17.8 after ending of the LIFE funding. By thematic priorities, at the end of the project implementation, the largest average employment per projects is reported in Integrated Projects and Climate Change Adaptation projects (around 25 FTE and slightly above)."

"For climate action we find that 50% of the projects have created or safeguarded employment and 57% of projects generate, or will generate, economic growth locally, according to the interviews. A differentiation between adaptation and mitigation was statistically not possible."

"The expected sustainable funding of climate change adaptation (39%) is lower compared to climate change mitigation projects (66%), this could be related to the higher number of CCA projects that are producing strategies etc. as output. We however note, that it is a bit early to say what the sustainable funding for projects under the sub-programme of climate will be (also since there is no comparison possible with LIFE+)"

LIFE MTE summary section on EU Added Value

"The stakeholders largely acknowledged (95%) the catalytic role that LIFE is playing for better solidarity and responsibility-sharing in preserving the common good of the Union's environment and climate, leading to a less costly implementation of environmental and

climate change policies, in particular for the implementation of Natura 2000 and of the EU Biodiversity Strategy. Notably, the added value of the Programme lies in the EU cofounding that enables project beneficiaries to deliver results that in most cases would either not be realised at national, regional and/or at local level, or would be pursued at slower pace and on a lesser scale, especially in MS that have fewer financial mechanisms in place or when these mechanisms are difficult to access.

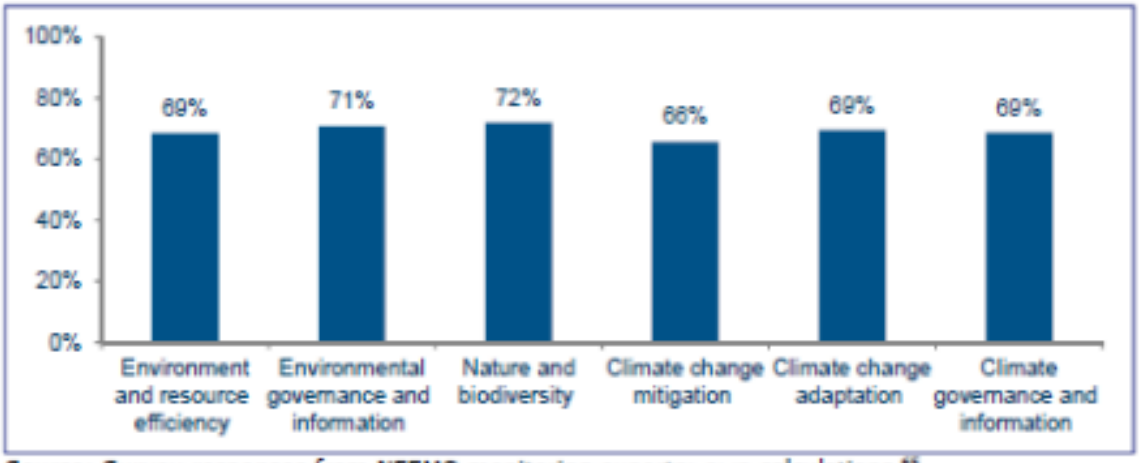
Member States have different sensitiveness about the challenges tackled by the LIFE programme, different level of awareness, and different availability of financial resources, translating into different priorities regarding environmental protection and climate action. The LIFE programme responds to the long-term agenda of the Union, carrying out a forward looking policy that otherwise would not be fully implemented by all Member states. However, some stakeholders have also pointed out that the LIFE potential added value could be further sharpened through a more focused targeting of its resources and a more efficient implementation.

Many stakeholders noted during interviews that the enforcement of Union policy and legislation is one of the core tasks of the LIFE Programme, which is fulfilled effectively. Governance, that supports enforcement and implementation of EU legislation, is an integral part of many projects, especially in the Nature and Biodiversity (30%), Water (14%) and Climate Action (13%). The consultation also highlighted that the main consequences of stopping or withdrawing the existing LIFE interventions would be mostly negative, reducing MS' capacity – and in some cases commitment – to pursue the Union's objectives in the area of environmental protection and climate change, but also negatively affecting employment and economic growth."

LIFE MTE Annex

"According to the NEEMO monitor experts who took part in the consultation, about 30% of the project activities could probably have been developed anyway – meaning that at least 70% of project activities would not have been carried out without the support from the Programme." See Figure A.1.23 below.

Figure A.1.23 Percentage of project activities that would have not been implemented without LIFE support (per priority area).



Source: Survey responses from NEEMO monitoring experts; own calculations.[65]

"There is great potential of EU added value through this instrument [the NCFF]. Supporting natural capital in the EU is essential to biodiversity and climate change adaptation strategies. As indicated in the ex-ante assessment of the NCFF, healthy and well-functioning ecosystems enhance resilience to the adverse impacts of climate change and reduce the vulnerability of people in both urban and rural areas. In particular, EU added value is foreseen to derive from:

- the establishment of a pipeline of replicable, bankable natural capital projects that will serve as a "proof of concept";
- the demonstration to private investors of the attractiveness of natural capital projects for the longer term, in order to develop a sustainable flow of private capital towards those projects and achieve scale;
- the leverage of funding from private investors for this pipeline of projects through the use of EU funds."

MTE Recommendations

"15. It is essential to further enhance the results-orientation and leveraging capacity of the Programme through a systematic follow-up of After-LIFE Plans and a smoother cooperation and coordination of capitalisation efforts at all levels. This includes the establishment of greater synergies with other EU and national / regional programmes, a better-targeted communication about LIFE project concepts and results, and a clearer identification and involvement of private and public stakeholders. Practically speaking, this means that the communication about transferable business models and results from projects, both at the central and project levels, should be improved.

14. It is recommended to encourage a greater involvement of key stakeholders for the results to be delivered – in particular from the private sector, to ensure that the demand and supply of solutions addressing environmental and climate challenges are in equilibrium, and to enhance the overall added value of LIFE interventions.

15. In order to achieve/ improve follow-up actions after project closure the Commission could consider setting up specific financial means to cover the costs of capitalisation.

16. Within the LIFE Programme, the EU value added is most prominent in Nature projects and in Integrated Projects covering the two sub-programmes. It is recommended to take this aspect into account if changes are to be made to the financial allocations within the Programme.

17. In order to increase the added value of the projects funded, it is recommended that the Commission either refocuses the objectives, nature, target audiences, and scale of the LIFE Environmental Governance & Information and of the LIFE Climate Governance & Information projects, or reorients those funds to other priorities where comparable information and governance activities are currently yielding more significant results."

EESC response to MTE

"The climate action strand should be further developed, primarily with regard to possible adaptation measures that could be taken by the individuals, farmers, cities/municipalities and regions particularly affected."

European Committee of the Regions response to MTE

"Establishing new instruments such as a sub-programme on climate action is recognised as of fundamental importance in light of the emerging European climatic challenges, also as a frontrunner in paving the way for the local and regional agenda of the EU strategy on adaptation to climate change"

References

Data Sources	Description	Evidence relevant to evaluation
Relevant outputs from the mid-term evaluation of the LIFE Programme on environment and climate (2016) (draft report available as pdf) **USED AS PRIMARY SOURCE.**	Provides information on the extent to which the LIFE Programme has delivered its objectives, including those relating to Climate Action	Number of projects and volume of funding supporting projects related to Climate Action
NAT/689 - Mid-term evaluation of the LIFE programme - European Economic and Social Committee Rapporteur: Lutz RIBBE **PROVIDED ONLY THE ONE QUOTE UNDER EU ADDED VALUE** ENVE-VI/016 - 121st plenary session, 8-9 February 2017 - Mid-term evaluation of the LIFE programme THE EUROPEAN COMMITTEE OF THE REGIONS Rapporteur: Witold Stępień (PL/EPP), Marshal of Łódzkie region	The opinions by the **Committee of the Regions** and the **European Economic and Social Committee on LIFE (EESC)**	Outside perspectives on the rationale for LIFE funding for adaptation under the sub-programme Climate-action
LIFE – Climate Change Adaptation (2015) http://ec.europa.eu/environment/life/publications/lifepublications/lifefocus/documents/climatechangeadaptation.pdf **MAYBE FURTHER SCOPE TO REFER TO THIS DOCUMENT TO SUPPORT OR ADD FURTHER DETAIL TO EXTRACTS FROM MTE**	Report on progress under sub-programme on Climate Action: Climate Change Adaptation	
LIFE LOCAL ADAPT – Integration of climate change adaptation into the work of local authorities – Newsletter 1 (March 2017) https://life-local-adapt.eu/en/downloads/newsletter **REFERRED TO BRIEFLY UNDER 'RELEVANCE'**	Newsletter on LIFE LOCAL ADAPT.	Recent updates on adaptation-related LIFE project integrating adaptation into local level authorities https://life-local-adapt.eu/en

A7.3 Action 3: Introduce adaptation in the Covenant of Mayors framework (2013/2014)

- The Commission will support adaptation in cities. It will do this in particular by launching an initiative, based on the model of the Covenant of Mayors, through which local authorities can make a voluntary commitment to adopt local adaptation strategies and awareness-raising activities.

A7.3.1 Data Sources

Data source	Description	Evidence relevant to current evaluation
Action 3		
EEA Report on urban adaptation (2016): http://www.eea.europa.eu/publications/urban-adaptation-2016 EEA Report on urban adaptation (2012): http://www.eea.europa.eu/publications/urban-adaptation-to-climate-change National action on urban adaptation in EEA Member states (Breil and Swart, 2015): http://cca.eionet.europa.eu/reports/Urban%20Adaptation%202016	Provide knowledge on adaptation related topics: policy processes and progress in key sectors	Gathered understanding to bridge knowledge gaps
EEA and EC case studies on urban adaptation: http://climate-adapt.eea.europa.eu/data-and-downloads#searchtype=ACTION&b_start=0&sectors=URBAN (or map in http://climate-adapt.eea.europa.eu/knowledge/tools/sat, filtering by urban sector)		
Committee of the Regions: Regional and Local Adaptation in the EU since the Adoption of the EU Adaptation Strategy in 2013, published in 2016 http://cor.europa.eu/en/documentation/studies/Documents/Local%20and%20regional%20adaptation.pdf	The report analysed the impact of the EU Adaptation Strategy in 2013 on the development of national, regional and local adaptation strategies in the Member States. For the report, the authors analysed national, regional and local adaptation policies. The analyses included interviews with two regional governments and a survey to	Progress update with implementation since the adaptation strategy

Data source	Description	Evidence relevant to current evaluation
	signatories of the initiative MayorsAdapt.	
Committee of the Regions report Empowerment of local and regional authorities, with a focus on their involvement in monitoring and policy design[47] Final report of the Adaptation Strategies for European Cities (EU Cities Adapt) project4.	Literature	
Relevant input from the mid-term evaluation of the Mayors Adapt initiative (2014)	Provides information on the extent to which the Mayors Adapt initiative has delivered its objectives, including those relating to Climate Action	Number of local authorities that have elaborated adaptation plans
Reports from the consortium implementing the Mayors Adapt and new Covenant of Mayors for Climate and Energy initiatives (the final report for the launch of Mayors Adapt in the year 2014 was finalised in that same year; the final report for the development of Mayors Adapt and its integration in the new Covenant in 2015-2016 will be finalised in late February 2017)	Provides information about how adaptation is implemented at the local and regional level	Number of local authorities that have elaborated adaptation plans
"Climate change response in Europe: what's the reality? Analysis of adaptation and mitigation plans from 200 urban areas in 11 countries", 2014: http://link.springer.com/article/10.1007/s10584-013-0989-8		
"Making headway in climate policy mainstreaming and ecosystem-based adaptation [in relation to municipal policy]: two pioneering countries [DE and SE], different pathways, one goal": http://link.springer.com/article/10.1007/s10584-016-1660-y		

[47] Local Governments for Sustainability, European Secretariat (ICLEI) and CEPS (Centre for European Policy Studies), Climate change adaptation: Empowerment of local and regional authorities, with a focus on their involvement in monitoring and policy design, European Union, November 2013, http://cor.europa.eu/en/documentation/studies/Documents/climate-change-adaptation.pdf.

A7.3.2 From proposal:

A7.3.2.1 Action area 3: Introduce adaptation in the Covenant of Mayors framework

The nature of the action

Action 3 of the Strategy states that the Commission foresees the development of an adaptation initiative based on the model of the Covenant of Mayors that will establish voluntary commitments for cities to develop and implement adaptation strategies.

The emphasis in this Action area stems from the important role that cities and urban areas must play in low-carbon and climate-resilient development across Europe, and it is reflected in priorities for the implementation of the Paris Climate Agreement.

The Mayors Adapt initiative[48] was launched by the European 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 ground-breaking 2012-2013 'EU Cities Adapt' project (funded by DG CLIMA and led by Ricardo Energy & Environment).

In October 2015, Mayors Adapt and the Covenant of Mayors initiatives were merged, and the integrated Covenant of Mayors for Climate and Energy was launched. The CoM offers towns and cities the opportunity to make an unconditional and voluntary commitment to build more sustainable and resilient cities. It brings together thousands of local and regional authorities voluntarily committed to implementing EU climate and energy objectives on their territory. New signatories now pledge to reduce CO_2 emissions by at least 40% by 2030 and to adopt an integrated approach to tackling mitigation and adaptation to climate Change.

Continuing with the emphasis established under Mayors Adapt, the new CoM helps to strengthen local authorities' capacity to adapt to the unavoidable impacts of climate change. Outputs produced by the initiative and shared by signatories are disseminated more widely via the Climate-ADAPT platform.

Responsibilities for the implementation of the action

The European Commission has implemented the first steps of the action to Introduce adaptation in the Covenant of Mayors framework, by securing the launch of the Integrated CoM for Climate and Energy in 2015. The Covenant of Mayors Office is responsible for the overall coordination of the initiative. It is managed by a consortium of networks of local and regional authorities, led by Energy Cities. Since it is a voluntary commitment, ultimately the successful implementation of the CoM to deliver adaptation action at local level, rests with the city authorities which support and sign up to it.

The current *State of Play* with the action

Currently the CoM commitments are strongly dominated by pre-existing support and plans related to sustainable energy. These are slowly being integrated with the climate theme and there is also guidance, such as in the FAQs, on risk and vulnerability assessment. The Mayors Adapt website is maintained in parallel to the CoM although content-wise this points back to CoM.

Signatory cities vary in size from small villages to major metropolitan areas such as London or Paris, and currently there are 6,968 signatories across Europe. However, it is not straightforward to identify the extent to which these signatories are active on adaptation as well as energy. A major challenge still exists around how to integrate the

[48] http://mayors-adapt.eu/

EU Adaptation Strategy with specific or local adaptation pathways, and to continue fruitful exchange of analysis, evidence and good practice across Member States and between cities.

Finally, the CoM is not the only network and engagement platform serving European cities, regions and local authorities in the field of climate and energy. There are a large number of other EU-funded networks and platforms which may be linked with CoM to greater or lesser extents.

A mid-term evaluation of the urban adaptation initiative within the CoM was published in 2014. This will be an important source of evidence for the evaluation, albeit a source that is more relevant for the baseline given its age.

Key issues for the evaluation: Action 3

Whilst the merging of Mayors Adapt into one integrated CoM for Climate and Energy has occurred in name, structure and website, the evaluation will consider the extent to which adaptation is being facilitated in practice under the new CoM and the extent to which signatories are embracing both energy and resilience aspects of the covenant commitments. It is still very early days for the new Covenant, with less than one year of its existence, and so the evaluation may have little evidence to work from in relation to demonstrating change in resilience at the local level stemming from this action.

There is some patchiness in the take-up of the Covenant, and so the evaluation will explore to what extent are National and local authorities facilitating and making use of CoM as a forums for sharing and exchanging adaptation experience with stakeholders across policy sectors and governance levels, and what are the patterns across Europe in this.

NOTES

Background

Final Report: Mayors' Adapt 2015 - 2017

"Mayors Adapt initiative goals were to

1) Raise awareness of climate change adaptation among cities;
2) Mobilise cities to take action;
3) Support cities in developing and implementing adaptation plans;
4) Facilitate information sharing and an active city network; and
5) Enable signatory cities to demonstrate good practice as leaders in adaptation.

From 2014 to early 2017 (the three years and two phases of the project), Mayors Adapt has grown into a community of over 660[49] cities in Europe."

A7.3.3 From DG CLIMA

The Covenant of Mayors' integrated approach, which broadly follows the IPCC guidelines[50] is in line with a number of EU priorities not only concerning mitigation and adaptation but also

[49] Total of MA and Covenant of Mayors signatories of urban adaptation-committed Local Authorities in the European territory as of 15.02.2017.

in terms of embracing a robust transparency framework for the implementation of the Paris Agreement. It is the first initiative of its kind addressed to local authorities, requiring signatories to define a CO_2 reduction target, to develop an action plan to 2030 addressing mitigation and adaptation, and to monitor the results on a regular basis in order to track progress towards their targets

By 1st July 2017, 7,521 signatories (from 57 countries, covering 233 million inhabitants) have committed to the Covenant of Mayors for Climate and Energy. OF those, 747 cities from 33 countries, covering 56.5 million inhabitants, have also committed to conduct vulnerability and risk assessment, and develop and implement adaptation plans, covering 25 % of the CoM signatories' population.

The collective pledge of emission reduction of covenant cities is 27 % by 2020 in comparison to emissions in base years, almost 7 percentage points higher than the minimum target[51] . As of September 2016, 315 cities, representing 25.5 million inhabitants, have already achieved a reduction of 23 %.

A7.3.4 Baseline:

Action 3 of the Strategy states that the Commission foresees the development of an adaptation initiative based on the model of the Covenant of Mayors that will establish voluntary commitments for cities to develop and implement adaptation strategies.

The emphasis in this Action area stems from the important role that cities and urban areas must play in low-carbon and climate-resilient development across Europe, and it is reflected in priorities for the implementation of the Paris Climate Agreement.

A7.3.5 State of play

As a result of the Strategy, the Mayors Adapt initiative[52] was launched by the European 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 ground-breaking 2012-2013 'EU Cities Adapt' project.

The Mayors Adapt initiative goals were to

1) Raise awareness of climate change adaptation among cities;
2) Mobilise cities to take action;
3) Support cities in developing and implementing adaptation plans;
4) Facilitate information sharing and an active city network; and
5) Enable signatory cities to demonstrate good practice as leaders in adaptation.

From 2014 to early 2017 (the three years and two phases of the project), Mayors Adapt grew into a community of over 660[53] cities and local authorities from across Europe.

In October 2015, Mayors Adapt and the Covenant of Mayors initiatives were merged, and the integrated Covenant of Mayors for Climate and Energy was launched. The Covenant of

[50] P. Bertoldi, D. Bornas Cayuela, S. Monni, and R. Piers De Raveschoot, How to develop a Sustainable Energy Action Plan (SEAP) - Guidebook., EUR 24360. Luxembourg: Publication Office of the European Union, 2010.
[51] A. Kona, G. Melica, A. Iancu, B. Koffi, P. Zancanella, S. R. Calvete, P. Bertoldi, G. Janssens-Maenhout, and F. Monforti-Ferrario, "Covenant of Mayors : Greenhouse Gas Emissions Achievements and Projections." EUR 28155 EN. Publications Office of the European Union, 2016, Luxembourg:, 2016.
[52] http://mayors-adapt.eu/
[53] Total of MA and Covenant of Mayors signatories of urban adaptation-committed Local Authorities in the European territory as of 15.02.2017.

Mayors integrated approach, which broadly follows the IPCC guidelines[54], is in line with a number of EU priorities concerning mitigation and adaptation, as well as embracing a robust transparency framework for the implementation of the Paris Agreement. The CoM offers towns and cities the opportunity to make an unconditional and voluntary commitment to build more sustainable and resilient cities. It brings together thousands of local and regional authorities voluntarily committed to implementing EU climate and energy objectives on their territory. New signatories now pledge to reduce CO2 emissions by at least 40% by 2030, to adopt an integrated approach to tackling mitigation and adaptation to climate change, and to monitor the results on a regular basis in order to track progress towards their targets. Continuing with the emphasis established under Mayors Adapt, the new CoM helps to strengthen local authorities' capacity to adapt to the unavoidable impacts of climate change. Outputs produced by the initiative and shared by signatories are disseminated more widely via the Climate-ADAPT platform.

By 10th July 2017, 7,521 signatories (from 57 countries, covering 233 million inhabitants) have committed to the Covenant of Mayors for Climate and Energy. Of those, 874 signatories from 33 countries, covering 56.5 million inhabitants, have also committed to conduct vulnerability and risk assessment, and develop and implement adaptation plans, covering 25 % of the CoM signatories' population.

The collective pledge of emission reduction of covenant cities is 27 % by 2020 in comparison to emissions in base years, almost 7 percentage points higher than the minimum target[55] . As of September 2016, 315 cities, representing 25.5 million inhabitants, have already achieved a reduction of 23 %.

Mayors Adapt Final Report

Challenges/solutions/recommendations

- **Lack of publication of urban adaptation strategies and plans**
- *Further efforts shall be made by the EU (EC – DG Climate Action, European Environment Agency), Committee of the Regions, and National institutions, to encourage Local Authorities to share their documents when existing, regardless if they are in original language only.*
- **Major structural changes during the course of the project**
    - The merge of Mayors Adapt (MA) and the Covenant of Mayors (CoM) to become the Covenant for Climate and Energy in October 2015.
    - The currently ongoing transition phase to the Global Covenant of Mayors for Climate and Energy (combining the Compact of Mayors with the EU's Covenant of Mayors.

  Resolved through partnership ensuring: close coordination between the consortia, DG CLIMA and DG ENER; and the creation of Task forces for the Helpdesk, Communications, Methodology and Knowledge Support ensure coherence and avoid duplication, which met on a regular basis until the end of the Mayors Adapt phase.

  More work has to be done to clarify the requirements and expectations from the integrated Covenant of Mayors and keep their momentum up in terms of adhesion to the new Covenant from 2017 onwards.

- **Developing a Monitoring and Reporting Framework** that meets cities' needs. The MA project integrated requests from practitioners and the European

[54] P. Bertoldi, D. Bornas Cayuela, S. Monni, and R. Piers De Raveschoot, How to develop a Sustainable Energy Action Plan (SEAP) - Guidebook., EUR 24360. Luxembourg: Publication Office of the European Union, 2010.
[55] A. Kona, G. Melica, A. Iancu, B. Koffi, P. Zancanella, S. R. Calvete, P. Bertoldi, G. Janssens-Maenhout, and F. Monforti-Ferrario, "Covenant of Mayors : Greenhouse Gas Emissions Achievements and Projections." EUR 28155 EN. Publications Office of the European Union, 2016, Luxembourg:, 2016.

Commission to improve the overall content, structure and user-friendliness of the template: updating climate hazards and vulnerable sectors, developing visual graphs, integrating the Mayors Adapt template into the Covenant of Mayors, solving format issues (between Excel and Open Office), translating both the template and the guidelines etc.

Allow time for thorough consultation with cities in close collaboration with Commission, CoM an other key stakeholders

- **Cities working on adaptation are not always members of adaptation initiatives** - perceived extra burden on their reporting, not fully understanding/attracted to membership benefits – Mayors Adapt found this may be the case in certain countries – e.g. Denmark, Netherlands, Austria, United Kingdom, Norway and Finland.

  Suggest to enhance role of Covenant Naitonal Co-ordinators – crucial in building a bridge between adaptation policy making at the European level and that at the national level, to facilitate cities use of national policy instruments, additional funding schemes, and technical assistance tools in national languages.

- **Technical limitations for technical guidance – Urban Adaptation Support Tool.** Remains on Climate-ADAPT, saving development of IT needs, but restricts ability to update information or redesign the tool layout, hindering implementation of user recommendations.

  Thoroughly explore pros/cons of UAST/related knowledge database to ensure right balance for between investment needed and responding to user preferences.

- **City profile factsheets – interest/take up by cities less than expected, despite successful outreach/research by MA team.**
- *Future data related to adaptation/MA will be integrated in to existing CoM structure (profiles and the new reporting template) to minimise reporting burden on countries, which will partially reflect MA country factsheets. The MA fact sheet content was made available to DG CLIMA in excel format to integrate into COM signatory profiels and monitoring outputs.*

- **Language barriers existed where cities wanted materials/tools available in local languages – limited resources available and certain guidance could only be made available in English.**
- *DG CLIMA / CoM team to ensure wide library of materials available in local languages to ensure greater accessibility.*

Task 1:

Implementation of the initiative

- The role of Coordinators and Supporters could be strengthened, along with the role of National Coordinators, enlarging their responsibilities for raising awareness and providing technical assistance to Local Authorities in the climate adaptation domain. For instance, National Coordinators can help set up an enabling framework based on the Covenant principles of voluntary, bottom-up involvement. Committed local actors can facilitate and multiply the peer-to-peer exchanges foreseen in the frame of the initiative, as well as further showcase the action taken at the local level.
- Best Practice Publication translated in the most important EU languages.

- MA and SECAP Reporting Templates and Guidelines shall be translated in each EU language (as of February 2017, it has been translated into all the 24 EU official languages, except Irish); one pagers/introductions realised as a result of these materials could be distributed at local events to give cities practical examples of how the reporting structure is used.
- At least 3 of the most significant - out of the 19 - guidance resources in the UAST should be translated in the most important EU languages. Those resources might be:
  - LIFE ACT Project, 2011: "Planning for Adaptation to Climate Change: Guidelines for Municipalities" (http://www.actlife.eu/medias/306-guidelinesversionefinale20.pdf);
  - NordREgio Publications, 2009: "Climate Change Emergencies and European Municipalities: Guidelines for Adaptation and Response" (http://www.nordregio.se/en/Publications/Publications-2009/Climate-Change-Emergencies-and-European-Municipalities/);
  - ADEME : "Monitoring and Evaluating Climate Change Adaptation at Local and Regional Levels" (http://www.ademe.fr/sites/default/files/assets/documents/monitoring-and-evaluating-climate-change-adaptation-7412.pdf).
- It would be very useful if the Urban Vulnerability Map Book could also be translated.
- The management rights for the Mayors Adapt LinkedIn group was transferred to the Covenant of Mayors office in February 2017. The use of the LinkedIn group shall be discussed during the elaboration of the Covenant of Mayors for Climate and Energy communication strategy, foreseen in Spring 2017.

A7.3.6 Evaluation questions

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
Relevance	1. To what extent do the objectives and actions of the Strategy (still) respond to needs within the EU and at international level?	20. To what extent does there continue to be a need for the Commission to encourage adaptation at the sub-national and local level?	20	Is there still a need for adaptation at the sub-national and local level in Member States?	20a	This question explores if there continues to be a need for the specific OUTPUT	It is vital that cities adopt an integrated approach to climate resilience: reducing greenhouse gas emissions to mitigate climate change, while also strengthening their resilience to the inevitable adverse impacts of climate change. The impacts of climate change will affect all cities across Europe but with regional and local differences. European cities are particularly vulnerable to extreme weather events: severe floods, heat waves or exceptional storms. Many of cities/towns have already experienced other consequences of climate change: effects on health, damage to homes, power and water supply failures, disruption of transport, and increased energy use for heating or cooling, which exacerbates climate change and increases energy bills. EEA report "Urban adaptation to climate change in Europe 2016", 2002 flooding in Dresden damaged community services that amounted to EUR 80 million. Damages to buildings amounted to EUR 100 million as a consequence of the 2014 flash floods in Genoa. As major centres of population and infrastructure, cities therefore play a central role in enhancing the EU's resilience through adaptation.
Relevance	1. To what extent do the objectives and actions of the Strategy (still) respond to needs within the EU and at international level?	20. To what extent does there continue to be a need for the Commission to encourage adaptation at the sub-national and local level?	20	Is there still a need to for the Commission to promote action at the sub-national and local level i.e. by promoting CoM?	20b	This question explores if there continues to be a need for the specific ACTIVITIES associated with the action	The Covenant of Mayors, initiated by the Commission has enabled cities, towns local and regional authorities from across Europe (and beyond) to engage on taking action to adapt to the effects of climate change. Through peer to peer networks, members have been able to share best practices, challenges and undertake study tours to learn from one another, which would not have been possible with the Commission intervention. Under Mayors Adapt: the Commission increase support for local activities, provided a platform for greater engagement and networking by cities, and raised public awareness about adaptation and the measures needed.

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
Relevance	1. To what extent do the objectives and actions of the Strategy (still) respond to needs within the EU and at international level?	20. To what extent does there continue to be a need for the Commission to encourage adaptation at the sub-national and local level?	20	What is the nature of the support that is still needed?	20c	This question explores if there continues to be a need for the specific ACTIVITIES associated with the action	The recently published Final Report for Mayors Adapt (which ran until 2017 to support the integration in the Covenant of Mayors) highlights the following as areas for additional support:
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	21. To what extent have the cooperative mechanisms to the Covenant of Mayor framework helped to promote action at local and sub-national level?	21	What cooperation mechanisms have been supported by the Commission to foster adaptation at local and sub-national level, over the period 2013 to 2016?	21a	The action taken by the commission/Strategy was notably to launch the CoM so this is about exploring what mechanisms were carried out (INPUTS, ACTIVITIES), and links to the relevant indicator.	Initially through the Mayors Adapt programme the following project activities, which are now in the process of being integrated within the Covenant of Mayors for Climate and Energy: - Outreach/awareness raising to encourage local and regional authorities to sign up to the initiative to commit to local-level adaptation action - Peer to peer networks, help desk for

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	21. To what extent have the cooperative mechanisms to the Covenant of Mayor framework helped to promote action at local and sub-national level?	21	How many EU cities are engaged in the CoM framework, including making voluntary commitments?	21b	Highlights the level of commitment across the EU to take up adaptation action through sub-national mechanisms.	By 10th July 2017, 7,521 signatories (from 57 countries, covering 233 million inhabitants) have committed to the Covenant of Mayors for Climate and Energy. Of those, 874 signatories from 33 countries, covering 56.5 million inhabitants, have also committed to conduct vulnerability and risk assessment, and develop and implement adaptation plans, covering 25 % of the CoM signatories' population. This is described in state of play in greater detail.
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	21. To what extent have the cooperative mechanisms to the Covenant of Mayor framework helped to promote action at local and sub-national level?	21	What actions have been taken at sub-national and local level within MSs to adopt comprehensive adaptation strategies?	21c	This question explore the evidence on the implementation of adaptation strategies by local authorities (i.e. ACTIVITIES, OUTPUTS)	Within the integrated CoM for Climate and Energy, signatories (towns and cities, local and regional authorities) have voluntarily committed to develop 'Sustainable Energy Climate Action Plan' which includes climate vulnerability and risk assessment and an action plan for targeted adaptaiton options within the proposed timeline (from 2017 this is up to 2030). The CoM website provides detailed information for each signatory on a profile page with an overview, including the current status of progress (step 1: signature; step 2: action plan submitted; step 3: results monitored; or 'on hold (deadline over)'), and further details regarding action plans and status.

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	22. What other factors may have influenced adaptation action at sub-national and local level	22	What other factors may have influenced adaptation action at sub-national and local level	22a	This is concerned with the EXTERNAL FACTORS influencing the translation of OUTPUTS to IMPACTS	Would need to verify other external factors with MS/ local level stakeholders.
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	22. What other factors may have influenced adaptation action at sub-national and local level	22	What has been their relative strength?	22b	This seeks to understand the relative importance of the different external factors	Would need to verify other external factors with MS/ local level stakeholders.

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	22. What other factors may have influenced adaptation action at sub-national and local level	22	Were these factors expected or un expected when the Strategy was launched?	22c	This explores potentially unexpected factors	Review Final Report for MA. Would need to verify other external factors with MS/ local level stakeholders.
Effectiveness	5. 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?	23. What drivers/barrier stood in the way of adaptation action at sub-national and local level?	23	What drivers have stimulated, or barriers have stood in the way of adaptation action at sub-national/ local level	23a	This is concerned with the EXTERNAL FACTORS	DRIVERS: BARRIERS:
Effectiveness	5. What drivers and barriers (expected or unexpected) contributed to or stood in the way of	23. What drivers/barrier stood in the way of adaptation action at sub-national and local level?	23	How did these drivers/barriers affect implementation?	23b	This seeks to understand the relative importance of the different external factors	DRIVERS: BARRIERS:

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
	implementation of the EU Adaptation Strategy and how did they affect it?						
Effectiveness	4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).	24. To what extent has the cooperative mechanisms to the Covenant of Mayor framework helped to enhance the preparedness and capacity at the sub-national and local level to respond to the impacts of climate change?	24	Has the adoption of cooperative mechanisms to the Covenant of Mayor framework been successful in enhancing the preparedness and capacity at the sub-national and local level to respond to the impacts of climate change?	24a	This checks if the OUTPUTs have led to the desired IMPACTs	Yes. The Mayors Adapt initiative and subsequently the Covenent of Mayors for energy & climate has initiated voluntary commitment at the subnational level to prepare action plans for climate action. While many have completed step 1 (signature of the CoM), a large share of signatories are moving into implementation (Step 2: submitting a Sustainable Energy and Climate Action Plan) and monitoring (Step 3: Regular submission of implementation reports)[56]. The SECAP contains a template to realize a risk and vulnerabilities assessment, and a template to draw an integrated action plan, addressing the impacts of climate change on all sectors.
Efficiency	7. How adequate were the resources for the overall implementation of the EU Adaptation Strategy and	25. How adequate were the resources for Action 3: Encouraging adaptation at the sub-national and local level?	25	Which resources were made available to fund CoM?	25a	Need to identify the resources (inputs) made available for the action to provide basis for assessment of adequacy and proportionality.	The European Commission allocated resources through DG CLIMA to fund the Mayors Adapt initiative, with a consortia of organisations coordinating the delivery for the full three years/ two phases. Since the integration of MA into the CoM for Energy & Climate, the Commission has continued to fund the adaptation element as part of its commitment to the CoM initiative. Seek views from stakeholder interviews.

[56] www.covenantofmayors.eu/about/covenant-step-by-step_en.html

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
	how proportionate were those resources across its eight actions?						
Efficiency	7. How adequate were the resources for the overall implementation of the EU Adaptation Strategy and how proportionate were those resources across its eight actions?	25. How adequate were the resources for Action 3: Encouraging adaptation at the sub-national and local level?	25	Has the level of support of CoM been sufficient to support sub-national and local level adaptation action?	25b	It is important understand the sufficiency of the outputs to understand if resources were adequate.	As a pioneering initiative, the MA and the CoM for Energy & Climate have received sustained support and international attention. Subsequently the success of the CoM has led to the transition towards to the Global CoM, incorporating the Compact of Mayors to form a worldwide initiative. Seek views from stakeholder interviews.
Efficiency	7. How adequate were the resources for the overall implementation of the EU Adaptation Strategy and how proportionate were those resources across its eight actions?	25. How adequate were the resources for Action 3: Encouraging adaptation at the sub-national and local level?	25	Has the level of support of CoM been sufficient to support sub-national and local level adaptation action?	25b	It is important understand the sufficiency of the outputs to understand if resources were adequate.	Seek views from stakeholder interviews.
Efficiency	8. How do the different stakeholders view the monitoring of the implementation of the EU	26. How do the different stakeholders view the monitoring and reporting within the CoM?	26	What are the monitoring and reporting arrangements? And how do CoM participants perceive them?	26a	To get stakeholders view on this monitoring and reporting of implementation	The CoM for Climate and Energy 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 where cities can conduct a self-assessment of their adaptation

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
	Adaptation Strategy? Which aspects are perceived as an unecessary burden, if any, and to what extent?						status. Will need to seek views from local level stakeholders on how CoM particpants perceive these arrangements. Given the transition to CoM has happened relatively recently, signatories may not yet have an in depth experience of these arrangements under CoM compared to Mayors Adapt.
Efficiency	8. How do the different stakeholders view the monitoring of the implementation of the EU Adaptation Strategy? Which aspects are perceived as an unecessary burden, if any, and to what extent?	26. How do the different stakeholders view the monitoring and reporting within the CoM?	26	Which resources are spent on these?	26b	To understand what the burden of the monitoring activities is.	It is voluntary commitment. No resources have been spent on monitoring at the subnational level, it is up to signatories themselves to monitor/report progress. Seek views from stakeholder interviews.
Efficiency	8. How do the different stakeholders view the monitoring of the implementation of the EU Adaptation Strategy? Which aspects are perceived as an unecessary burden, if any, and to what extent?	26. How do the different stakeholders view the monitoring and reporting within the CoM?	26	How appropriate is the level of effort required?	26c	To get views on the appropriateness of the burden.	Seek views from stakeholder interviews.

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
Coherence	9. 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?	27. To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	27	To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	27a	This question explores the evidence on the coherence of Action 3 with actions required at other levels	• EU legislation and policies: The support to CoM by the Commission recognise existing focus on urban resilience – to climate change and other related issues. The origins of the Covenant of Mayors initially lies with the European Commission adopting the 2020 EU Climate and Energy Package in 2008, to endorse and support efforts deployed by local authorities in the implementation of sustainable energy policies. In 2014, the Mayors Adapt initiative built on the successful response of the CoM to deliver commitments made under the EU Adaptation Strategy in 2013 for Action 3. • International initiatives: The CoM for Energy & Climate is currnelty undergoing a transition to become the Global CoM, which will combine with the Compact of Mayors to offer a worldwide network and support service. The Global Covenant of Mayors will capitalise on the experience gained over the past eight years in Europe and beyond, and build upon the key success factors of the initiative: its bottom-up governance, its multi-level cooperation model and its context-driven framework for action. The CoM for Climate and Energy offers synergies to a number of international and regional level initiatives, which are summarised on the CoM webpages[57]. • National initiatives • Regional or sub-national initiatives The CoM outlines that "integrating adaptation into mitigation and planning policies provides new

[57] http://www.covenantofmayors.eu/about/related-initiatives_en.html#initiatives

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
							opportunities for EU mayors and political leaders to make cities more liveable". Breaking new ground in urban development and revolutionising approaches "stimulates investment and innovative concepts, for example in housing or public green spaces". The CoM also outlines that "strengthening stakeholder participation lays the foundation for fruitful cooperation among citizens and public administration, which may benefit further policy areas as well". By investing in climate preparedness, cities become more attractive, healthier and safer.[58]
Coherence	9. 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	27. To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	27	What are the areas where there is less coherence?	27b	This question explores the evidence on the coherence of Action 3 with actions required at other levels	

[58] http://www.covenantofmayors.eu/Adaptation.html

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
	added to increase coherence of actions?						
Coherence	9. 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?	27. To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant: • EU legislation and policies • International initiatives • National initiatives • Regional or sub-nations initiatives	27	What could be done to improve coherence in these areas?	27c	This question explores the evidence on the coherence of Action 3 with actions required at other levels	

A3 Covenant of Mayors							
Evaluation theme	**TOR Evaluation question**	**Evaluation question**	**Eval qn No.**	**Sub question**	**Sub qn No.**	**Rationale**	**Response**
EU added value	10. What is the added value of addressing climate adaptation at EU level, in addition to the vertical and horizontal cooperation at national level?	28. To what extent have the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, added value compared to what would have resulted from an action at regional or national level?	28	What was the added value of the Commission's activities to promote the CoM initiative in relation to adaptation action?	28a	This question explores the added value of the main activities associate with this action	

Relevance

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

20. To what extent does there continue to be a need for the Commission to encourage adaptation at the sub-national and local level?

Sub-Q 20 a: Is there still a need for adaptation at the sub-national and local level in Member States?

It is vital that cities adopt an integrated approach to climate resilience: reducing greenhouse gas emissions to mitigate climate change, while also strengthening their resilience to the inevitable adverse impacts of climate change.
The impacts of climate change will affect all cities across Europe but with regional and local differences.
European cities are particularly vulnerable to extreme weather events: severe floods, heat waves or exceptional storms. Many of cities/towns have already experienced other consequences of climate change: effects on health, damage to homes, power and water supply failures, disruption of transport, and increased energy use for heating or cooling, which exacerbates climate change and increases energy bills. EEA report "Urban adaptation to climate change in Europe 2016"[59], 2002 flooding in Dresden damaged community services that amounted to EUR 80 million. Damages to buildings amounted to EUR 100 million as a consequence of the 2014 flash floods in Genoa. As major centres of population and infrastructure, cities therefore play a central role in enhancing the EU's resilience through adaptation.

Sub-Q 20b: Is there still a need to for the Commission to promote action at the sub-national and local level i.e. by promoting CoM?

The Covenant of Mayors, initiated by the Commission has enabled cities, towns local and regional authorities from across Europe (and beyond) to engage on taking action to adapt to the effects of climate change. Through peer to peer networks, members have been able to share best practices, challenges and undertake study tours to learn from one another, which would not have been possible with the Commission intervention.
Under Mayors Adapt: the Commission increase support for local activities, provided a platform for greater engagement and networking by cities, and raised public awareness about adaptation and the measures needed.

Sub-Q 20c: What is the nature of the support that is still needed?

The recently published Final Report for Mayors Adapt (which ran until 2017 to support the integration in the Covenant of Mayors) highlights the following as areas for additional support:

Effectiveness

4. To what extent has each of the eight actions of the Strategy contributed to these achievements? For each action explain the extent to which the effects achieved were expected or unexpected (i.e. not considered at the moment when the strategy was adopted).

[59] EEA Report

21. To what extent have the cooperative mechanisms to the Covenant of Mayor framework helped to promote action at local and sub-national level?

Sub-Q 21a: What cooperation mechanisms have been supported by the Commission to foster adaptation at local and sub-national level, over the period 2013 to 2016?

Initially through the Mayors Adapt programme the following project activities, which are now in the process of being integrated within the Covenant of Mayors for Climate and Energy:

- Outreach/awareness raising to encourage local and regional authorities to sign up to the initiative to commit to local-level adaptation action
- Peer to peer networks, help desk for

Sub-Q 21b: How many EU cities are engaged in the CoM framework, including making voluntary commitments?

By 10th July 2017, 7,521 signatories (from 57 countries, covering 233 million inhabitants) have committed to the Covenant of Mayors for Climate and Energy. Of those, 874 signatories from 33 countries, covering 56.5 million inhabitants, have also committed to conduct vulnerability and risk assessment, and develop and implement adaptation plans, covering 25 % of the CoM signatories' population.

This is described in section 6.3 of the Final Report (state of play for Action 3) in greater detail.

Sub-Q 21c: What actions have been taken at sub-national and local level within MSs to adopt comprehensive adaptation strategies?

Within the integrated CoM for Climate and Energy, signatories (towns and cities, local and regional authorities) have voluntarily committed to develop 'Sustainable Energy Climate Action Plan' which includes climate vulnerability and risk assessment and an action plan for targeted adaptaiton options within the proposed timeline (from 2017 this is up to 2030).
The CoM website provides detailed information for each signatory on a profile page, including the current status of progress (submission, adopted,

22. What other factors may have influenced adaptation action at sub-national and local level

Sub-Q 22a: What other factors may have influenced adaptation action at sub-national and local level

Would need to verify other external factors with MS/ local level stakeholders.

Sub-Q 22b: What has been their relative strength?

Would need to verify other external factors with MS/ local level stakeholders.

Sub-Q 22c: Were these factors expected or un expected when the Strategy was launched?

Review Final Report for MA. Would need to verify other external factors with MS/ local level stakeholders.

24. To what extent has the cooperative mechanisms to the Covenant of Mayor framework helped to enhance the preparedness and capacity at the sub-national and local level to respond to the impacts of climate change?

Sub-Q 24a: Has the adoption of cooperative mechanisms to the Covenant of Mayor framework been successful in enhancing the preparedness and capacity at the sub-national and local level to respond to the impacts of climate change?

Yes. The Mayors Adapt initiative and subsequently the Covenant of Mayors for energy & climate has initiated voluntary commitment at the subnational level to prepare action plans for climate action. While many have completed step 1 (signature of the CoM), a large share of signatories are moving into implementation (Step 2: submitting a Sustainable Energy and Climate Action Plan) and monitoring (Step 3: Regular submission of implementation reports)[60].
The SECAP contains a template to realize a risk and vulnerabilities assessment, and a template to draw an integrated action plan, addressing the impacts of climate change on all sectors.

5. 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?

5. 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?

23. What drivers/barrier stood in the way of adaptation action at sub-national and local level?

Sub-Q 23a: What drivers have stimulated, or barriers have stood in the way of adaptation action at sub-national/ local level?

DRIVERS:

BARRIERS:

Sub-Q 23b: How did these drivers/barriers affect implementation?

DRIVERS:

BARRIERS:

Efficiency

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

25. How adequate were the resources for Action 3: Encouraging adaptation at the sub-national and local level?

Sub-Q 25a: Which resources were made available to fund CoM?

The European Commission allocated resources through DG CLIMA to fund the Mayors Adapt initiative, with a consortia of organisations coordinating the delivery for the full three years/ two phases. Since the integration of MA into the CoM for Energy & Climate,

[60] www.covenantofmayors.eu/about/covenant-step-by-step_en.html

the Commission has continued to fund the adaptation element as part of its commitment to the CoM initiative.
Seek views from stakeholder interviews.

Sub-Q 25b: Has the level of support of CoM been sufficient to support sub-national and local level adaptation action?

Seek views from stakeholder interviews.

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

26. How do the different stakeholders view the monitoring and reporting within the CoM?

Sub-Q 26a: What are the monitoring and reporting arrangements? And how do CoM participants perceive them?

The CoM for Climate and Energy 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 where cities can conduct a self-assessment of their adaptation status. Will need to seek views from local level stakeholders on how CoM participants perceive these arrangements. Given the transition to CoM has happened relatively recently, signatories may not yet have an in depth experience of these arrangements under CoM compared to Mayors Adapt.
Sub-Q 26.b: Which resources are spent on these?

It is voluntary commitment. No resources have been spent on monitoring at the subnational level, it is up to signatories themselves to monitor/report progress.
Seek views from stakeholder interviews.

Sub-Q 26c: How appropriate is the level of effort required?

Seek views from stakeholder interviews.

Coherence

9. 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?

27. To what extent has the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, been coherent with relevant:

- EU legislation and policies
- International initiatives
- National initiatives
- Regional or sub-nations initiatives

Sub-Q 27a. (as above)

• EU legislation and policies:

The support to CoM by the Commission recognise existing focus on urban resilience – to climate change and other related issues. The origins of the Covenant of Mayors initially lies with the European Commission adopting the 2020 EU Climate and Energy Package in 2008, to endorse and support efforts deployed by local authorities in the implementation of sustainable energy policies. In 2014, the Mayors Adapt initiative built on the successful response of the CoM to deliver commitments made under the EU Adaptation Strategy in 2013 for Action 3.

• International initiatives:

The CoM for Energy & Climate is currnelty undergoing a transition to become the Global CoM, which will combine with the Compact of Mayors to offer a worldwide network and support service. The Global Covenant of Mayors will capitalise on the experience gained over the past eight years in Europe and beyond, and build upon the key success factors of the initiative: its bottom-up governance, its multi-level cooperation model and its context-driven framework for action.

The CoM for Climate and Energy offers synergies to a number of international and regional level initiatives, which are summarised on the CoM webpages .

• National initiatives

• Regional or sub-national initiatives

The CoM outlines that "integrating adaptation into mitigation and planning policies provides new opportunities for EU mayors and political leaders to make cities more liveable". Breaking new ground in urban development and revolutionising approaches "stimulates investment and innovative concepts, for example in housing or public green spaces". The CoM also outlines that "strengthening stakeholder participation lays the foundation for fruitful cooperation among citizens and public administration, which may benefit further policy areas as well". By investing in climate preparedness, cities become more attractive, healthier and safer.

Sub-Q 27b: What are the areas where there is less coherence?

Sub-Q 27c: What could be done to improve coherence in these areas?

EU Added Value

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

28. To what extent have the Commission's actions to support the Covenant of Mayors initiative, as part of EU Strategy, added value compared to what would have resulted from an action at regional or national level?

Sub-Q 28a.

What was the added value of the Commission's activities to promote the CoM initiative in relation to adaptation action?

A7.4 Action 4: Bridging the knowledge gap

A7.4.1 Introduction

As a point of reference for Action 4 Bridging the knowledge gap we use the following five knowledge gaps that were identified in support of the EU Adaptation Strategy (EU 2013 impact assessment p14):

- Information on projected damage and adaptation costs and benefits;
- 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;
- Socio-economic trends that are interrelated with climatic changes;

For all knowledge activities we assess whether they addressed one of these gaps, or if they addressed other (new) gaps, and if the results considered the gap to be closed or not, as indicated by a proposal for additional research.

Bases on the data sources table, the JRC website, the Cordis website for EU projects, and the EEA website, 124research reports, projects and programs were identified. These projects were included when they started or were published in 2013 or later, and when they focused on adaptation to climate change. Research focusing on mitigation or on the climate system itself (or research merely mentioning adaptation) was not included. All items were scanned for content, and categorized under one of the knowledge gaps and under a number of domains such as water, cities, infrastructure, etc.

A7.4.2 Channels for adaptation research

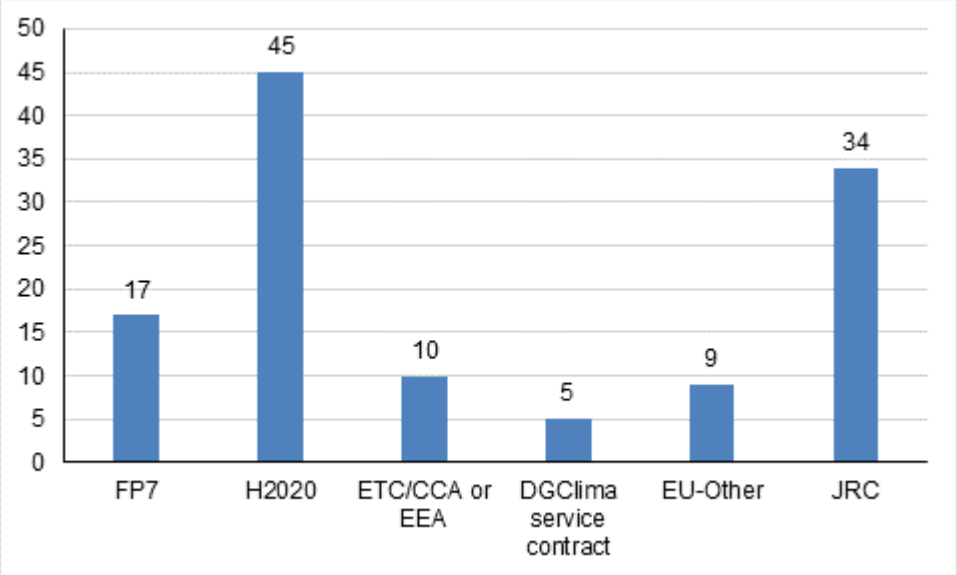
Of the 101 items, 39 were H2020 research projects, and 33 were JRC reports. These two institutions produce the bulk of the adaptation research.

H2020 spends in total 70,2 billion euro[61] between 2011 and 2020 on a wide range of topics. Over 275 million euro was allocated on adaptation research projects starting between 2013 and 2017 (and generally ending 3-5 years later). FP7 also funded projects on adaptation worth 106 million Euro which were partly still running in the investigated period.

The mission of the Joint Research Centre (JRC) is to support EU policies with independent evidence throughout the policy cycle. JRC is located in five countries and cooperates with over a thousand other organizations. JRC publishes several hundreds of scientific publications every year (https://ec.europa.eu/jrc/en/publications) of which 33 were on adaptation since 2013. What the JRC budget was for this output is unknown.

Other channels for adaptation research are EEA and a diversity of other EU related research funds (see figure).

[61] In constant prices, https://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_horizon2020_budget.pdf

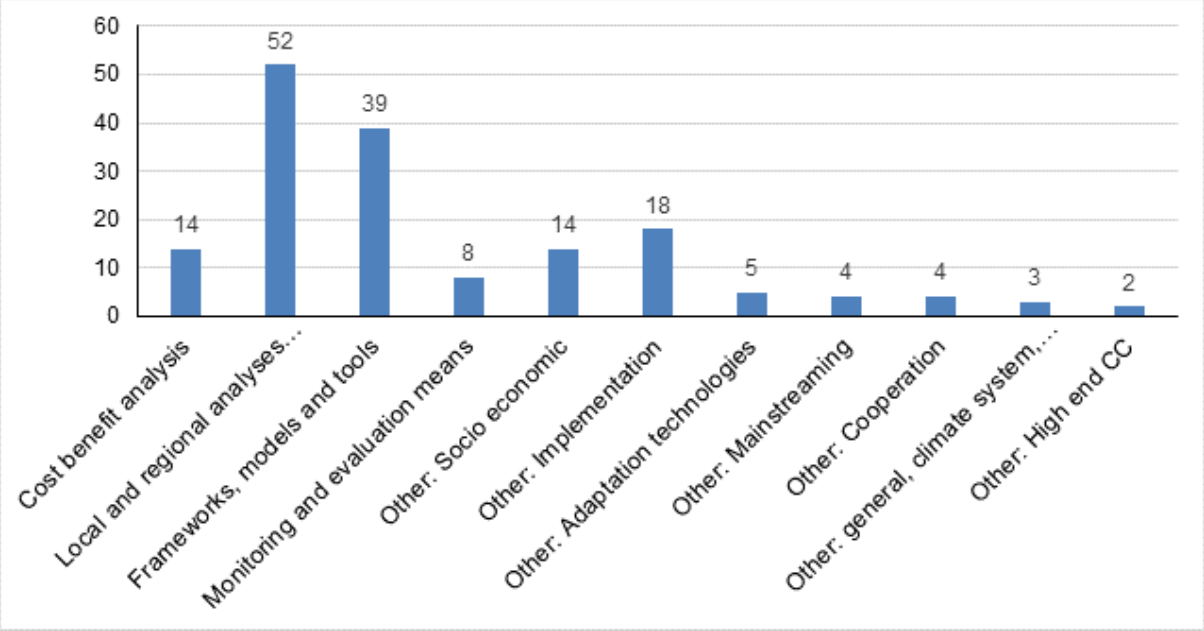


A7.4.3 Addressing the four knowledge gaps

In the Adaptation strategy four knowledge gaps were identified. Of these four knowledge gaps, risk assessments and tools were addressed extensively; by 52 and 39 of the research items, respectively (see figure). The risk assessments address a wide array of sectors and issues, and this research represents a necessary phase in climate adaptation, that is now passing. The number of tools that has been produced and still is underway is impressive, and now there even are a couple of projects providing assistance to decide which tools to use (FP7 project EconAdapt, H2020 project RESIN).

Costs, monitoring and socio-economic aspects are addressed but in fewer projects and reports. Possibly these issues will receive increased interest when adaptation progresses to a more advanced stage of implementation.

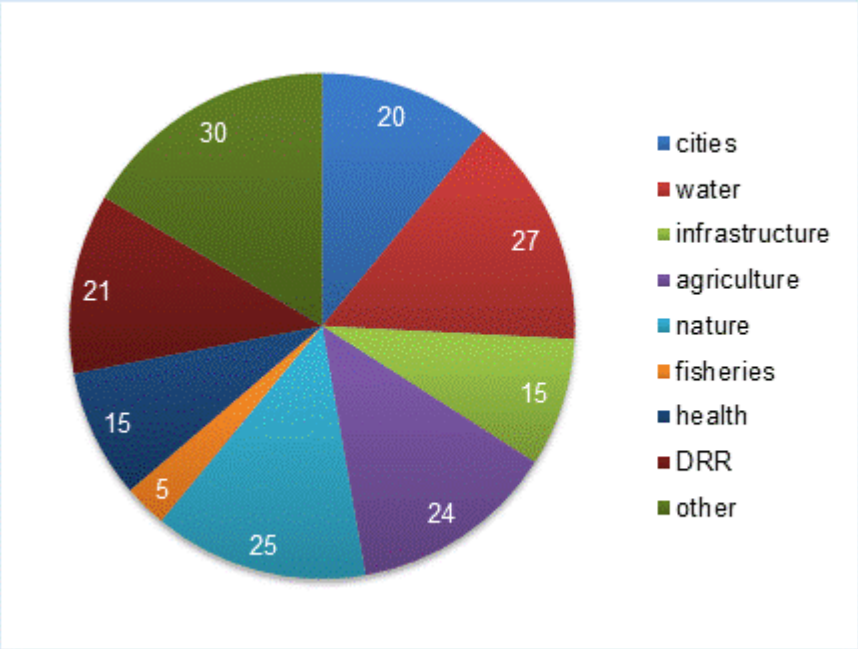
Interestingly, 50 items address other aspects of which implementation and socio economic issues stand out clearly as an emerged knowledge needs. Implementation is, for example, investigating barriers for implementation, or finding ways for upscaling of pilots. Mainstreaming in policy and regulations, finding adaptation options and developing networks and cooperation are other knowledge needs that have emerged.



A7.4.4 Domains and sectors addressed

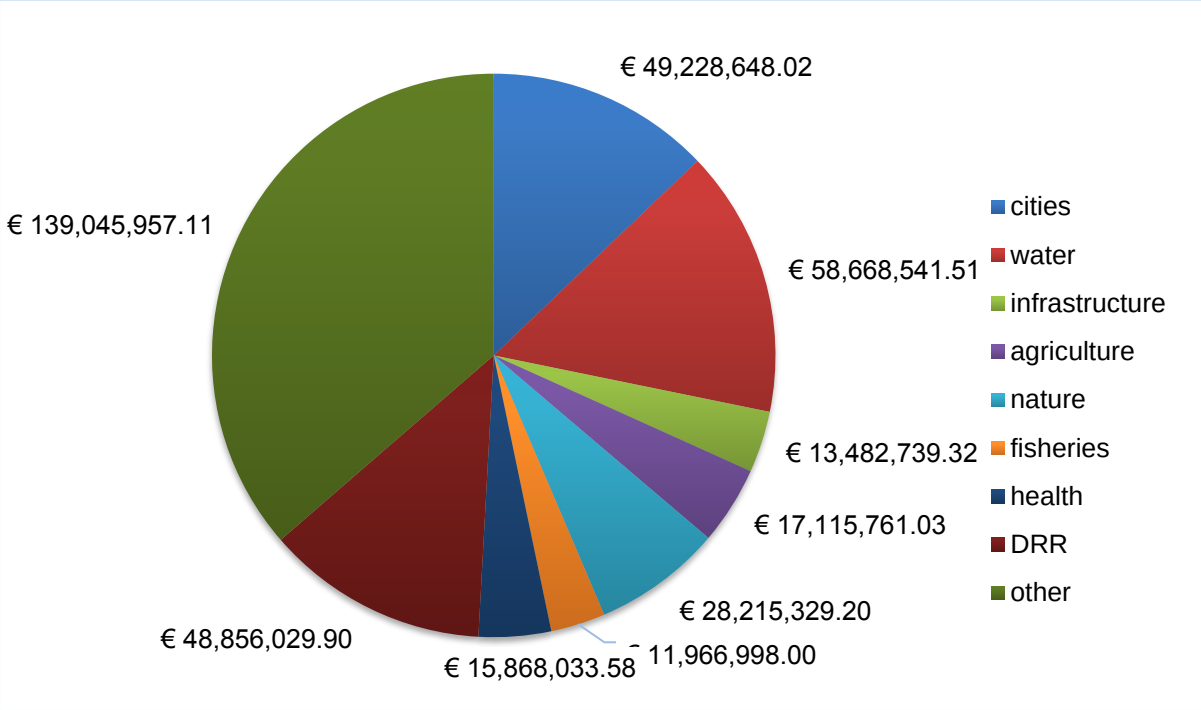
The research items were categorized over a number of domains. Some projects or reports addressed more than one domain; then they were scored under each relevant domain.

The figure shows that the research is divided rather evenly over different domains. The top three consist of Nature, Water, and Agriculture, respectively. This is based on the number of references only and not on the funding or any other measure of relative effort.



When we take the H2020 proposals as a proxy of spending per domain, we see that the 'other' category takes the bulk of the money. These are often broad projects or programs, encompassing all domains. This number is actually distorted by the ERA4CS

program that comprises 75 million euro including 25 million from the EU. In the other domains we see that the top 3 now is Water, Cities, Nature.



A7.4.5 Specific evaluation questions on Action 4

EQ 31. To what extent does there continue to be a need for the Commission to bridge the knowledge gap with respect to adaptation-related information?

31a Are there still important knowledge gaps with respect to adaptation-related information in the EU?

Of the five knowledge gaps, the risk assessments and the tools could be considered as closed. There may be small pockets of issues left for which risk assessments or tools are still lacking but there is enough literature to learn the methods from even in those cases.

Regarding three of the identified gaps, the costs of adaptation, the monitoring, and the socio-economic aspects, less work has been done. Likely there is still a research need as the adaptation policy field proceeds towards maturation.

The inventory also reveals a number of new knowledge needs, notably the issue of implementation (options for implementation, barriers to implementation, etc). Mainstreaming in other policy and in regulation, finding adaptation options and developing networks and cooperation are other new knowledge needs.

Cities, water and nature are the domains where most of the research budget has been spent. Issues like agriculture, infrastructure, disaster risk, and health might still need more work.

31b If so, does there continue to be the need for the Commission to bridge any such knowledge gap?

Since two out of four knowledge gaps identified in the original strategy so far received less attention a continued effort would likely be required. Estimating the costs and benefits of adaptation has been a difficult topic, and may only become clearer once implementation of adaptation really takes off. If monitoring of adaptation is further developed, the costs and benefits could be a substantial part.

The socio-economic aspects have to be described in a more precise way in order to be addressed in a targeted way in the future: is this about awareness of the public, support during or after implementation, involvement of the private sector?

Emerging new knowledge gaps are identified around implementation, mainstreaming and adaptation options.

31c What is the nature of the support that is still needed?

Likely candidates for further EU support for research are implementation (as an important shared problem across the EU) and monitoring (how to do it).

EQ 32. To what extent have the actions taken in response to the Strategy helped to bridge the knowledge gap and led to better informed decision making?

32a What actions have been taken to identify and address any knowledge gaps, over the period 2013 to 2016?

A large amount of research funding has been spent on a wide array of topics and domains, leading to at least 39 dedicated H2020 projects, 33 JRC reports and more, as reported above.

32b To what extent can these actions be said to have led to better informed decision making?

The risk assessments have likely led to a clear focus how to adapt in important domains like water management, urban development and nature.

Regarding the development of tools there may be an overkill of available tools, and the uptake by society of all these tools is questionable. If anything, this uptake and evaluation of their effectiveness could be a new focus.

32c What funding has been made available to address these knowledge gaps?

The funding for the 39 identified H2020 projects was 225,5 million euro. The funding required for JRC, EEA, TTC/CCA and other channels of adaptation research is unknown.

EQ 36. How adequate were the resources for Action 4: Bridging the knowledge gap?

36a Which resources were made available to fund relevant H2020, JRC and other activities?

The funding for the 39 identified H2020 projects was 225,5 million euro. The funding required for JRC, EEA, TTC/CCA and other channels of adaptation research is unknown.

36b Has the level of support been sufficient to support bridging knowledge gaps?

The level of support in itself seems adequate, but the research focus could have been better guided over the five gaps. The choice which domains are assisted should also be considered and discussed with the sectors in society. Likely the research need is also shifting to implementation questions.

EQ 37. To what extent have the actions taken to bridge the knowledge gap, in response to the Strategy, led to better informed decision making,

coherent with relevant EU legislation and policies, international initiatives, national initiatives, and regional or sub-nations initiatives?

37a To what extent have the actions taken to bridge the knowledge gap, in response to the Strategy, led to better informed decision making? For EU legislation and policies, International initiatives, National initiatives and Regional or sub-nations initiatives?

The uptake of the research output in society is difficult to assess from the written material. Most projects make an effort to reach out to local and regional governments and other stakeholders. Likely the involved case studies have learned from it, but the level of dissemination of the acquired knowledge to other places is unknown.

37b What are the areas where there is less coherence?

Possibly agriculture and fisheries have not been addressed sufficiently to lead to coherent EU policy. Regarding nature, a lot of work has been done but the barriers identified likely have not been mainstreamed in the EU nature legislation.

37c What could be done to improve coherence in these areas?

For fisheries and agriculture a dialogue with the sectors could reveal what remaining issues are (eg crops that have not been addressed). Regarding nature an investigation would be needed how the dynamics of climate change and the dynamics of nature itself could be integrated in new/adapted directives.

EQ 38. To what extent have the Commission's activities to bridge the knowledge gap with respect to adaptation, as part of the EU Strategy, added value to what would have resulted from an action at regional or national level?

38a What was the added value of the of the Horizon 2020 funded projects on Adaptation?

A vast amount of valuable risk assessments have been produced (or are still underway) that all national and regional stakeholders can rely on. Furthermore, an array of tools have become publicly available.

38b What was the added value of the of the work of the JRC on EU climate impacts and vulnerability?

JRC has added more research to the risk assessments and the tools, but in a more focused and probably more need- driven way. JRC likely has contributed in closing holes in the fabric of adaptation knowledge that were more difficult to address with the H2020 instrument, for example, in less affluent regions.

Action 4, summary of document review

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
BASE project Bottom-Up Climate Adaptation Strategies towards a Sustainable Europe (2012-2016) http://base-adaptation.eu	The objectives of BASE include compiling and analysing data and information on adaptation measures and their effectiveness towards a publicly available comprehensive, integrated knowledge base. D2.2 - Knowledge use, knowledge needs and policy integration in Member States: A lot of research on impacts of climate change on water management, health and agriculture. The uptake of this knowledge is good for water management but lacking in the other two sectors.	Other: FP7	Costs, Tools, Other: knowledge gaps in general	Costs and benefits of adaptation is identified as an important knowledge gap
RAMSES (2012-2017): Reconciling Adaptation, Mitigation and Sustainable Development for cities http://www.ramses-cities.eu/ Mendizabal, M., Peña, N.,García-Blanco, G., Feliu, E., Terenzi, A., Latinos, V., Peleikis, J., Anza Porras, B., Forino, G., Firus, K. Kropp, J., Rybski, D., Wyckmans, A., Lobaccaro, G., Dawson, R., Ford, A., Heidrich, O., De Ridder, K., Hooyberghs, H., Floater, G., Costa, H., Sanchez, G., Da-Cunha, C., Salakhova, D., Hezel, B., Broschkowski, E. (2017) Toolbox and training for policy making / Transition handbook and training package. European Community's Seventh Framework Programme under Grant Agreement No. 308497 (Project RAMSES).	The aim is to produce quantified evidence of the impacts of climate change and the costs and benefits of adaptation measures for cities. The results provide information on hazard, exposure, vulnerability and risks to enable the prioritisation of national and EU-wide adaptation investments. The Transition Handbook and the Training Package are key tools to support cities in their adaptation work. The Transition Handbook uses the Urban Adaptation Support Tool developed by the European Environment Agency, and presents resources that cities can use to strengthen climate adaptation planning. The Training Package offers worksheets and exercises that cities can use to progress on their adaptation endeavours.	Other: FP7	Tools, Costs	
ENHANCE (2012-2016) Aerts J., and Mysiak, J. (eds) (2016) Novel Multi-Sector Partnerships in Disaster Risk Management. Results of the ENHANCE project. EU FP7 project	The project delivers new risk based scenarios of hazards and socio-economic trends in collaboration with stakeholders in 10 case studies; and concepts for new multi-sector partnerships that reduce or redistribute risks. The case studies	FP7	Other: partnerships and regulatory frameworks	Ecosystems can provide means to mitigate natural hazard risks, by mediation of flows and

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
ENHANCE. pp. 346, Brussels www.enhanceproject.eu grant agreement No 308438	are related to heat waves, forest fires, floods, droughts, storm surges, and volcanic eruptions. Insurance schemes can be used to compensate losses after a damaging event, and they can also be used to provide incentives to households to reduce risk. The book describes indicators for successful and unsuccessful partnerships. The regulatory policy framework can steer the development of partnerships and set the financial and administrative boundary conditions for partnerships for developing DRR measures.			nuisances; or through maintenance of physical, chemical, biological conditions in the face of pressures. How can insurance and other financial instruments help to protect or restore risk-mitigating ecosystem services? Collective insurance reward? Full economic impacts of disaster risks, including distributional and spill-over effects of natural hazards.
EconAdapt (2013-2016) http://econadapt.eu/	This projects purpose is to support adaptation planning through building the knowledge base on the economics of adaptation to climate change. The website offers a large number of decision support tools such as Cost-benefit assessment, Cost-effectiveness assessment, Adaptive Management (Iterative Risk Management), Multi-Criteria Analysis (MCA), Portfolio Analysis (PA), Real Option Analysis (ROA), and Robust Decision Making (RDM)	FP7	Tools	
Eclipse (2011-2015) http://eclipse.nilu.no/	ECLIPSE is a EU FP7 Collaborative Project, aiming to develop and assess effective emission abatement strategies for short-lived climate forcers in order to provide sound scientific advice on measures that mitigate climate change and improve air quality at the same time.	FP7	N.A.	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
ECOADAPT Ecosystem-Based strategies and innovations in water governance networks for adaptation to climate change in Latin American landscapes	EcoAdapt is an action-research initiative working with three Latin American provinces to influence water management processes that contribute to local development and reduce vulnerability of human populations to climate change through capacity building, knowledge sharing, conflict prevention and mitigation, and promoting joint work with local and national stakeholders.	FP7	Socio-economic, Other: implementation	
GREEN SURGE Green Infrastructure and Urban Biodiversity for Sustainable Urban Development and the Green Economy	This project identifies, develops and tests ways of linking green spaces, biodiversity, people and the green economy. The main aim is to meet the major urban challenges related to land use conflicts, climate change adaptation, demographic changes, and human health and wellbeing.	FP7	Socio-economic, Other: implementation	
HELIX High-End cLimate Impacts and eXtremes	"HELIX project is assisting decision-makers and the research community by making adapting to our changing climate both more understandable and manageable. To accomplish this, project researchers are developing a set of credible, coherent global and regional scenarios of what one can expect in a world where the temperature continues to rise. A key aim is to explain to policymakers that a range of outcomes are possible, allowing them assess risks accordingly. They are also looking at how rising temperatures could impact humans, from our health and the well-being of our economies to such issues as migration and security	FP7	Risk assessment, Other: high end	
IMPACT 2C	IMPACT2C represented a major advance in understanding the complex processes and interactions between environmental, economic, social and technological systems. It provided easily available climate-related information, which was suitable for awareness raising and readily communicable to a wide audience, including	FP7	Risk assessment, Other: high end, Forestry	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	policymakers, the media and other interested parties. user-friendly interactive IMPACT2C web-atlas. It shows the impacts of a 2°C global warming on various European sectors and some key vulnerable regions outside Europe. Some key results of the analyses undertaken in IMPACT2C for a future +2°C world include: •In most regions of Europe, projected surface warming will exceed the global mean 2ºC global warming; •Heatwaves are projected to double while extreme precipitation events tend to become more intense; •The spatial and sectoral distribution of impacts is complex within Europe with some areas and sectors potentially benefiting, while others may suffer negative impacts; •In the energy sector, changes in wind energy potential, and solar photovoltaic potential show little to no change in a +2°C world across most parts of Europe. Larger changes are projected for changes in gross hydropower potential, with areas in northern Europe increasing by up to 20%, while areas in Southern Europe may experience reductions of up to 20%; •In the health sector, changes in ozone and particulate matter in a two degree world are shown to be small, with air pollution policy exerting a more important effect on changes in these pollutants; •Heat mortality in Europe is expected to increase by an average of around 23,000 additional heat related deaths. Countries particularly exposed to these impacts are Greece, Spain, Cyprus, Bulgaria, Hungary, and Romania; •In the agriculture sector, there is a projected overall loss in rain-fed crop calorie yield of around 1.6%, with robust negative impacts being			

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	concentrated in Western and Southern Europe; •In the forestry sector, changes in productivity are projected to increase across Europe by between 10% and 20%; •In the water sector, extreme flood magnitudes are projected to increase substantially in parts of Central and Southern Europe, whereas in Northern Europe changes in extreme flood magnitude are projected to decrease. Streamflow droughts on the other hand are projected to become more intense in Southern Europe, whereas in parts of Scandinavia and Eastern Europe streamflow drought may become less intense; •In coastal areas, flooding associated with sea level rise are projected to be upwards of 50 million Euro per annum, in the UK, Netherlands, Belgium and France;			
IMPRESSIONS Impacts and risks from higher-end scenarios: Strategies for innovative solutions http://www.impressions-project.eu/	The main approach is to develop new scenarios and models of the impacts of high levels of climate change, and apply these to five case studies at different geographical scales: Europe; regional or local (Scotland, Iberia and Hungary); and an EU External case study that looks at interactions between Europe, Central Asia, Russia and China. Different adaptation and mitigation options are being assessed for each case study, in order to help decision-makers identify strategies that are robust for a range of possible futures.	FP7	Risk assessment, Other: high end	
LUC4C Land use change: assessing the net climate forcing, and options for climate change mitigation and adaptation http://luc4c.eu/	LUC4C will advance our fundamental knowledge of the climate change - land use change interactions, and develop a framework for the synthesis of complex earth system science into guidelines that are of practical use for policy and	FP7	Socio-economic	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	societal stakeholders. In particular, LUC4C aims to: 1. enhance our ability to understand the societal and environmental drivers of land use and land cover change (LULCC) relevant to climate change; 2. assess regional and global effects of different mitigation policies and adaptation measures within alternative socio-economic contexts; 3. quantify how the LULCC-climate change interplay affects regional vs. global, and biophysical vs. biogeochemical ecosystem-atmosphere exchange, and how the relative magnitude of these interactions varies through time; 4. advance our ability to represent LULCC in climate models; 5. assess LULCC-climate effects on multiple land ecosystem services and analyse these in relation to other societal needs that provide either a synergy or trade-off to climate mitigation and adaptation.			
RISES-AM Responses to coastal climate change: Innovative Strategies for high End Scenarios - Adaptation and Mitigation	Coastal areas concentrate vulnerability to climate change due to high levels of population, economic activity and ecological values. Because of that RISES-AM- addresses the economy-wide impacts of coastal systems to various types of high-end climatic scenarios (including marine and riverine variables). It encompasses analyses from global to local scales across the full range of RCPs and SSPs. It considers the still significant uncertainties in "drivers" (physical and socio-economic) and coastal system responses (e.g. land loss or uses, biological functions, economic productivity) within a hazard-vulnerability-risk approach. The emphasis is on the advantages of flexible management with novel types of coastal	FP7	Risk assessment, Socio-economic, Other: high end	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	interventions (e.g. "green" options) within an adaptive pathway whose tipping points will be identified/quantified in the project.			
RISC-KIT Resilience-Increasing Strategies for Coasts - toolKIT	"RISC-KIT provided coastal managers and policy makers with tools and methods to increase the resilience of EU coastal zones to minimise loss of life, economic damage, habitat destruction and loss of cultural heritage due to low-frequency and high-impact hydro-meteorological events. Specific impacts are 1) Faster attainment of the disaster risk reduction goals of UNISDR 2) Design of cost-effective risk-reduction plans, based on the proposed tools and solutions. 3) Improve risk governance and preparedness through the provision of timely information and warnings to decision-makers."	FP7	Risk assessment, costs, tools	
ToPDAD -Tool-supported Policy Development for Regional Adaptation	ToPDAd developed the 'next generation tool set' for assessing the full costs (direct and indirect) of climate change impacts under different RCP (Representative Concentration Pathways)- and SSP (Shared Socioeconomic Pathways)-scenarios, and under different adaptation strategies and measures. In order to address local adaptation challenges a set of case-themes related to the above sectors were specified. Partners' own software tools were exploited in the cost assessments which focused on sector-level cost impacts Three key sectors have been chosen as point of departure: energy, transport and tourism. • ToPDAd has brought together economic, energy, climate and social models to provide a glimpse	FP7	Costs, tools, socio-economic, Other: tourism	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	into how the energy system might evolve over the coming decades and into the points of greatest vulnerability. Several case studies look at the impacts of both gradual climate change and extreme weather events. The results show that whereas the EU energy system can largely accommodate gradual climate change, it is particularly vulnerable extreme weather events. • ToPDAd assessed how beach and ski tourists may react to changing weather patterns and how this will affect the competitiveness of various European tourism destinations. This can help decision makers and investors choosing the most cost efficient strategies for adapting to climate change			
TREES4FUTURE Designing Trees for the Future	Among the project outcomes are: a common search interface for genetic data; new standards and methodologies for the assessment of field traits and wood properties; and the creation of three thematic networks on phenotypic plasticity, phenology and societal perception of forestry; modelling tools that provides insights into how the sites will change under climate change. The project developed a suite of statistical tools for genetic evaluation; a molecular marker platform for fingerprinting and traceability of biological material; a site matching tool to match the current or projected climate at a site to any other similar place in Europe; a clearinghouse with 'Geographic information system' (GIS) functionality for research data; improved compatibility of existing modelling tools; and medium to high-throughput phenotyping methods	FP7	Tools, Other: forestry	
CLI-EMA Climate Change Impacts – Economic Modelling and Assessment. https://cordis.europa.eu/project/rcn/98977_en.html Van Passel, S., Massetti, E. & Mendelsohn, R.	The economic impact of climate change on European agriculture. new study has estimated how changes to climate might affect the value of European farmland. Based on data for over 41	FP7	Costs, Risk assessment	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
(2016). A Ricardian Analysis of the Impact of Climate Change on European Agriculture. Environmental and Resource Economics. DOI 10.1007/s10640-016-0001-y	000 farms, the results suggest that their economic value could drop by up to 32%, depending on the climate scenario considered. Farms in southern Europe are particularly sensitive to climate change and could suffer value losses of up to 9% per 1 °C rise. The researchers say policy, on water and land use, for example, will be crucial to help farmers adapt to climate change and mitigate economic losses. Agriculture is extremely vulnerable to climate change, as farming depends directly on weather conditions, such as rainfall and temperature. The economic implications for farmers could be huge. This study estimated these effects in Europe. Importantly, it used farm-level data rather than crop models (which describe how climate affects specific crops, but omit impacts to livestock and underestimate the ability of farmers to adapt). The data, obtained from the Farm Accountancy Data Network (FADN)1, contain information from 2007 on over 41 000 farms across Europe2 (this data set only covers the EU-15).			
BeWater project Making society an active participant in water adaptation to global change FP7 grant agreement No. 612385 Broekman, Annelies, Anabel Sánchez (2016) Tordera River Basin Adaptation Plan, CREAF	BeWater project promoted an iterative dialogue and mutual learning collaboration process engaging with stakeholders in discussions on current water uses and their related problems, raising public awareness of the importance of sustainable and adaptive water management, with particular focus on the expected global change impacts at River Basin scale. To address these challenges, stakeholders were invited to contribute to the formulation of potential water management options. A set of 33 options were identified. This intensive collaboration resulted in the basic input for the redaction of the plan presented. The implementation of environmental flow regime (WMO29) is considered by all	FP7	Other: Participation	

Reference FP7	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	participants by far the most important action needed in the Tordera basin. Creating a Permanent Participation Centre (PPC) (WMO12) is considered crucial to improve integrated water management of the Tordera Basin. Conclude adaptive forest management agreements (WMO33), reached the highest score of the whole Tordera set of water management options evaluation process, and answers to the challenge to improve current forest management in the basin.			

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
European Commission (2015) Horizon 2020 Work Programme 2014 – 2015. 12. Climate action, environment, resource efficiency and raw materials – Revised, European Commission Decision C (2015)7154 of 23 October 2015	Six topics related to adaptation to climate change: WATER-2-2014/2015: Integrated approaches to water and climate change (EUR 6 - 8 million) SC5-1-2014: Advanced Earth-system models (EUR 10 - 15 million) SC5-2-2015: ERA for Climate Services (via ERA-NET Cofund) SC5-3-2014: The economics of climate change and linkages with sustainable development a) developing a comprehensive economic assessment of climate change b) examining the link between climate change actions and	H2020	Tools, Socio-economic trends	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	sustainable development (a) EUR 6 - 8 million + b) EUR 3 - 5 million) SC5-5-2014/2015: Coordinating and supporting research and innovation for climate action SC5-19-2014/2015: Coordinating and supporting research and innovation in the area of climate action, environment, resource efficiency and raw materials			
European Commission (2016) Horizon 2020 Work Programme 2016 – 2017 12. Climate action, environment, resource efficiency and raw materials. European Commission Decision C(2016)4614 of 25 July 2016	Six topics related to adaptation to climate change: SC5-01-2016-2017: Exploiting the added value of climate services a) Demonstration of climate services (EUR 5 million) b) From climate service concepts to piloting and proof-of-concept (EUR 5 million) SC5-02-2017: Integrated European regional modelling and climate prediction system (EUR 13 million) SC5-03-2016: Climate services market research (EUR 1.5 million) SC5-05-2016: A 1.5 million year look into the past for improving climate predictions (EUR 2 million) SC5-30-2017: ERA-NET on Climate Services Roadmap: Cross-sector impact assessments (evaluation, comparison and integration) (EUR 13 million) SC5-31-2017: Widening international cooperation activities on climate adaptation and mitigation (EUR 2 million)	H2020	Tools, Other: Climate system; International cooperation	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
HYDRALAB+ Adapting to climate change (2015 – 2019) http://cordis.europa.eu/project/rcn/198466_en.html	HYDRALAB is a network of environmental hydraulic institutes in Europe, which provides access to a suite of environmental hydraulic facilities from the European scientific community. A continuation project will prepare environmental hydraulic modelling for the upcoming urgent technical challenges associated with adaptations for climate change. Total cost: EUR 9 979 376,17	H2020	Tools	
IMPREX IMproving PRedictions and management of hydrological EXtremes (2015-2019) http://cordis.europa.eu/project/rcn/196811_en.html	Prediction and foresighting capabilities on future high impact hydrological extremes need to be improved. The use of this knowledge is addressed in the strategic sectors of safety of citizens, agricultural production, transportation, energy production and urban water supply, and overall economic productivity. IMPREX will improve forecast skill of meteorological and hydrological extremes in Europe and their impacts, by applying dynamic model ensembles, process studies, new data assimilation techniques and high resolution modeling. Novel climate change impact assessment concepts will focus at increasing the realism of relevant events by specific high resolution regional downscaling, explore compounding trans-sectoral and trans-regional risks, and design new risk management paradigms. Total cost: EUR 7 996 848	H2020	Tools	
RESCCUE - RESilience to cope with Climate Change in Urban arEas - a multisectorial approach focusing on water (2016-2020) http://cordis.europa.eu/project/rcn/202678_en.htm	RESCCUE aims to deliver a framework enabling city resilience assessment, planning and management. It integrates into software tools new knowledge related to the detailed water-centred modelling of strategic urban services performance into a comprehensive resilience	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
l	platform. These tools will assess urban resilience from a multisectorial approach, for current and future climate change scenarios and including multiple hazards. Total cost: EUR 8 097 190,72			
ERA4CS European Research Area for Climate Services (2016-2020) http://cordis.europa.eu/project/rcn/200835_en.html	ERA4CS will focus on the development of a "climate information translation" layer bridging "user communities" and "climate system sciences". It implies the development of tools, methods, standards and quality control for reliable, qualified and tailored information required by the various field actors for smart decisions. ERA4CS will launch a joint transnational co-funded call, with over 16 countries and up to 75M€. ERA4CS additional activities will initiate a strong partnership between JPI Climate and other key European and international initiatives (as Copernicus, KIC-Climate, JPIs, WMO/GFCS, Future Earth, Belmont Forum…) Total cost: EUR 78 284 239,28 EU contribution: EUR 25 000 000	H2020	Tools	
CLARITY Integrated Climate Adaptation Service Tools for Improving Resilience Measure Efficiency (2017-2020) http://cordis.europa.eu/project/rcn/210518_en.html	Based on the results of FP7 climate change, future internet and crisis preparedness projects (SUDPLAN, ENVIROFI, CRISMA) following an agile and user-centred design process, end-users, purveyors and providers of climate intelligence will co-create an integrated Climate Services Information System (CSIS) to integrate resilience into urban infrastructure. CLARITY will provide the practical means to include the effects of CC hazards and possible adaptation and risk management strategies into planning and implementation of urban infrastructure development projects, focusing on increasing CC	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	resilience. Total cost: EUR 5 882 535			
PUCS Pan-European Urban Climate Services 2017-2019 http://cordis.europa.eu/project/rcn/210509_en.html	The objective of the Pan-European Urban Climate Service (PUCS) project is to establish a service that translates the best available scientific urban climate data into relevant information for public and private end-users operating in cities. This will be achieved by demonstrating the benefits of urban climate information to end-users, considering the sectors of energy, cultural heritage, mobility, energy, health, and urban planning. PUCS aims at a genuine market uptake of (urban) climate services, based on a distributed network of local business intermediaries throughout Europe. Total cost: EUR 3 514 416,25	H2020	Tools	
EU-CIRCLE A panEuropean framework for strengthening Critical Infrastructure resilience to climate change 2015-2018 http://cordis.europa.eu/project/rcn/196896_en.html	Climate related hazards have the potential to substantially affect European Critical Infrastructures (CI), particularly the energy, transportation sectors, buildings, marine and water management infrastructure. EU-CIRCLE's scope is to derive an innovative framework for supporting the interconnected European Infrastructure's resilience to climate pressures, supported by an end-to-end modelling environment where new analyses can be added anywhere along the analysis workflow. It will be open to all interested parties in the infrastructure resilience business. It will allow potential users to introduce fully tailored solutions and infrastructure data, by defining and implementing customised impact assessment models, and use climate / weather data on demand. Total cost: EUR 7 283 525	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
H2020_Insurance Oasis Innovation Hub for Catastrophe and Climate Extremes Risk Assessment 2017-2020 http://cordis.europa.eu/project/rcn/210519_en.html	This project intends to operationalize a system, called the Oasis Loss Modelling Framework, that combines climate services with damage and loss information and provides a standardised risk assessment process that can assess potential losses, areas at most risk and quantify financial losses of modelled scenarios. The project will undertake a range of demonstrators linked and co-designed to 'real' situations and end-user communities in the insurance, municipalities and business sectors. Total cost: EUR 5 438 922,01	H2020	Tools	
INNOVCITIES Institutional Innovation for Adapting to Climate Change in Water Governance within Cities 2015-2017 http://cordis.europa.eu/project/rcn/195712_en.html	For innovation in urban water governance systems in the context of climate change institutional innovation is needed (e.g. policy change, new organisational setups, new inter-organisational arrangements). This will involve: (1) global assessment of institutional innovation in water governance in 30 cities across 6 continents to identify broad patterns and best practices across the world; (2) comparative case study analysis of 3 'innovative' cities across 3 continents in contrasting global contexts to attain deeper understanding of dynamics underpinning innovation; and (3) dissemination of results and policy recommendations to enable innovation in cities in Europe and globally. Total cost: EUR 165 598,80	H2020	Socio-economic trends	
URBAN GreenUP New Strategy for Re-Naturing Cities through Nature-Based Solutions 2017-2022 http://cordis.europa.eu/project/rcn/210521_en.html	Urban GreenUP aims at obtaining a tailored methodology (1) to support the co-development of Renaturing Urban Plans focused on climate change mitigation and adaptation and efficient water management, and (2) to assist in the implementation of NBS in an effective way. (3) to	H2020	Tools, Other: implementation	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	identify the market opportunities for European companies out of Europe and fostering the European leadership in NBS implementation at global level. Total cost: EUR 14 811 824,43			
CLARA Climate forecast enabled knowledge services 2017-2020 http://cordis.europa.eu/project/rcn/210522_en.html	As a part of European efforts to catalyse the potential of climate services for more efficient natural resource management and improved disaster risk management and resilience, the CLARA project will boost innovation and uptake of climate services based on front line seasonal and decadal forecasts and climate projections. A portfolio of user co-designed and co-developed climate services will help to improve policy and decision makings in the five priority areas GFCS: disaster risk reduction, water resource management, agriculture and food (security), renewable energy sources, and public health. Total cost: EUR 3 821 700	H2020	Tools	
GROW GREEN Green Cities for Climate and Water Resilience, Sustainable Economic Growth, Healthy Citizens and Environments 2017-2022 http://cordis.europa.eu/project/rcn/210514_en.html	GROW GREEN will provide the platform for a step change in the way that NBS are embedded in the long-term planning, development, operation and management of cities around the world. The project outputs will be promoted directly to 4-5 follower+ cities in Latin America, Africa and India to encourage them to develop and implement NBS strategies and to 146 Chinese 'Sponge Cities'. These channels have been designed to create global demand for NBS and to promote European NBS products and services to meet this demand. Total cost: EUR 11 589 852	H2020	Other: implementation	
VISCA Vineyards´ Integrated Smart Climate	Wine-grapes are specially threatened by climate	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
Application 2017-2020 http://cordis.europa.eu/project/rcn/210173_en.html	change, since subtle differences in microclimate impacts directly through over-ripening, rising acidity levels, greater vulnerability to pests and diseases, etc., resulting in changes in wine quality and properties. The main objective of VISCA is making South-European wine industries resilient to climate changes, while minimizing costs and risks through an improvement of the production management (quality and quantity of final product). This objective will be achieved with the integration of climatic data, phenological , irrigation models, and end-users' requirements into a Decision Support System (DSS) co-designed with wine producers from Spain, Italy and Portugal. Total cost: EUR 3 197 958,58			
ADAPTATION Predicting adaptive responses of protected species to environmental changes to optimise conservation management frameworks in Europe 2016-2018 http://cordis.europa.eu/project/rcn/207816_en.html	There is a substantial knowledge gap between traditional monitoring methods that record abundances and conservation management frameworks that require the integration of species' ecology with their adaptive responses to rapidly changing environments. The primary aim of this Fellowship is to thus deliver a novel conservation management framework for a model protected species, integrating ecological and genetic data, to provide a new predictive basis for European conservation management programmes. Total cost: EUR 183 454,80	H2020	Tools	
CRESCENDO Coordinated Research in Earth Systems and Climate: Experiments, kNowledge, Dissemination and Outreach 2015-2020 http://cordis.europa.eu/project/rcn/196812_en.html	CRESCENDO brings together seven Earth System Modelling (ESM) groups to address the following goals; (i) improve the process-realism and simulation-quality of European ESMs in order to increase the reliability of future Earth system projections; (ii) develop and apply a community	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	ESM evaluation tool allowing routine ESM performance benchmarking, process-based ESM evaluation and the analysis of Earth system projections. The resulting tool will be installed and made openly-available on the Earth System Grid Federation (ESGF); and more Total cost: EUR 15 003 511,25			
FRAGCLIM The Combined Effects of Climatic Warming and Habitat Fragmentation on Biodiversity, Community Dynamics and Ecosystem Functioning 2017-2022 http://cordis.europa.eu/project/rcn/210034_en.html	The goal of FRAGCLIM is to determine the individual and combined effects of climatic warming and habitat fragmentation on biodiversity, community dynamics, and ecosystem functioning in complex multitrophic communities. FRAGCLIM will determine the effects of (i) warming, (ii) fragmentation, and (iii) warming and fragmentation combined, on numerous facets of biodiversity, community structure, food web dynamics, spatial and temporal stability, and key ecosystem functions. Then, it will (iv) investigate the extent of evolutionary thermal adaptation to warming and isolation due to fragmentation, and its consequences for biodiversity dynamics. Finally, (v) it will provide creative solutions to mitigate the combined effects of warming and fragmentation. Total cost: EUR 1 998 802	H2020	Risk assessment	
SYSTEM-RISK A Large-Scale Systems Approach to Flood Risk Assessment and Management 2016-2019 http://cordis.europa.eu/project/rcn/198112_en.html	SYSTEM-RISK will deliver a suite of methods and tools for assessing and managing flood risk across large regions. Flood risk systems are characterised by physical and socio-economic processes acting at different space-time scales, by non-stationary and non-linear behaviour, and by a significant degree of interdependence between processes. This may lead to surprising developments and unanticipated side effects of	H2020	Tools, Risk assessments	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	risk reduction measures. Total cost: EUR 3 884 131,08			
RESIN Climate Resilient Cities and Infrastructures 2015-2018 http://cordis.europa.eu/project/rcn/196890_en.html	One of the major challenges cities face are more frequent extreme weather events due to climate change. The current diversity of approaches and methods available for cities developing an adaptation strategy limits the comparability between cities. The objective of RESIN is to provide standardised methodologies for vulnerability assessments, performance evaluations of adaptation measures, and for decision support tools supporting the development of robust adaptation strategies tailored to the city. To this end, RESIN aims to create a common unifying framework that allows comparing strategies, results and identification of best practices. Total cost: EUR 7 466 004,50	H2020	Tools, Risk assessments	
PLACARD PLAtform for Climate Adaptation and Risk reDuction 2015-2020 http://cordis.europa.eu/project/rcn/198647_en.html	PLACARD seeks to support the coordination of the two communities of Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). PLACARD will tackle current challenges by 1) providing a common 'space' where CCA and DRR communities can come together, share experiences and create opportunities for collaboration; 2) facilitating communication and knowledge exchange between both communities; and 3) supporting the coordination and coherence of CCA and DRR research, policy and practice. Total cost: EUR 3 031 647,50	H2020	Other: network building	
PLACARD (2016) PLACARD Foresight Workshop summary: How can foresight help to reduce vulnerability to climate-related hazards?	PLACARD is a platform to support dialogue and consultation between the Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) domains. In this workshop foresight	H2020	Tools, Other: mainstreaming	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
http://www.placard-network.eu/wp-content/PDFs/PLACARD-foresight-workshop-summary-2016.pdf	methods are discussed to explore future vulnerabilities, risks, and opportunities. Some of the mega-trends identified are increasing urbanization, dependency on technology, inequalities, population growth, changing disease burden, extreme climate events, and migration.			
COPE-50 Global Climate change impact on phenOtype and ePigenomE stability: Accessing plant adaptability through a 2050 simulation model 2017-2019 http://cordis.europa.eu/project/rcn/209569_en.html	Computer modelling using historical data predicts a climate shift towards combination of increasing temperature, rising carbon dioxide (CO2) levels and high Ultraviolet (UV) radiation. Such climatic change could negatively affect productivity of the agricultural systems Our first objective will be to examine the impact of the predicted 2050 climate on the morphological and physiological performance of the model and the crop plants. In the second objective we will study plant chromatin changes in response to predicted climatic change and their effects on plant phenotypes. Total cost: EUR 171 460,80	H2020	Risk assessment	
NATURVATION Nature Based Urban Innovation 2016-2020 http://cordis.europa.eu/project/rcn/206400_en.html	NATURVATION will take a transdisciplinary, internationally comparative approach to Nature-Based Solutions (NBS): advance assessment approaches (Objective 1) to capture the multiple impacts & values of NBS to deliver a robust evidence base for decision-making; enable innovation (Objective 2) to identify the most promising governance, business/finance and participation models and how to overcome the systemic conditions that currently limit their use to support systemic integration; and generate momentum to realise the potential of NBS through co-design, co-development & co-implementation (Objective 3).	H2020	Other: implementation	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	Total cost: EUR 7 798 296,25			
PRIMAVERA PRocess-based climate sIMulation: AdVances in high resolution modelling and European climate Risk Assessment 2015-2019 http://cordis.europa.eu/project/rcn/196807_en.html	The goal of PRIMAVERA is to deliver novel, advanced and well-evaluated high-resolution global climate models (GCMs), capable of simulating and predicting regional climate with unprecedented fidelity, out to 2050. This capability will deliver innovative climate science and a new generation of advanced Earth System Models. Sector-specific end-users in policy and business will be identified and engaged individually, with iterative feedback, to ensure that new climate information is tailored, actionable and strengthening societal risk management decisions. Total cost: EUR 14 967 969,50	H2020	Tools	
GREEN-WIN Green growth and win-win strategies for sustainable climate action 2015-2018 http://cordis.europa.eu/project/rcn/196818_en.html	First, we develop transformative narratives highlighting opportunities in climate and sustainability action in order to contribute to overcoming cognitive barriers and empowering people. Second, we examine climate and sustainability finance policies and governance arrangements in order to contribute to overcoming financial barriers to mitigation and adaptation. Third, we substantiate the economics of green growth in order to contribute to overcoming economic and collective action barriers to de-carbonisation. Total cost: EUR 3 925 012,50	H2020	Other: implementation	
EU-MACS European Market for Climate Services 2016-2018 http://cordis.europa.eu/project/rcn/206092_en.html	The project analyses the market structures and drivers, obstacles and opportunities from scientific, technical, legal, ethical, governance and socioeconomic vantage points. The analysis is grounded in economic and political science theories on how service markets with public and	H2020	Other: implementation	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	private features can develop, and how innovations may succeed. Total cost: EUR 1 499 621,25			
ClimeFish Co-creating a decision support framework to ensure sustainable fish production in Europe under climate change 2016-2020 http://cordis.europa.eu/project/rcn/200477_en.html	The overall goal of ClimeFish is to help ensure that the increase in seafood production comes in areas and for species where there is a potential for sustainable growth, given the expected developments in climate, thus contributing to robust employment and sustainable development of rural and coastal communities. ClimeFish will address 3 production sectors through 16 case studies involving 25 species, and study the predicted effects of 3 pre-defined climate scenarios. As a container for the models, scenarios and MPs ClimeFish will develop the ClimeFish Decision Support Framework (DSF) which also contains the ClimeFish Decision Support System (DSS) Total cost: EUR 5 195 216,25	H2020	Tools	
CERES Climate change and European aquatic RESources 2016-2020 http://cordis.europa.eu/project/rcn/200289_en.html	CERES advances a cause-and-effect understanding of how future climate change will influence Europe's most important fish and shellfish populations, their habitats, and the economic activities dependent on these species. CERES will involve and closely cooperate with industry and policy stakeholders to define policy, environment, social, technological, law and environmental climate change scenarios to be tested. Total cost: EUR 5 586 851,25	H2020	Risk assessment	
PODARCIS Potential Oxygen Limitation of Distributions And Responses to Changing Climates In Ectotherms	Climate change is driving many species to migrate along the altitudinal gradient of mountainous landscapes. The effects of altitude-related hypoxia	H2020	Risk assessment	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
2017-2019 http://cordis.europa.eu/project/rcn/208718_en.html	on the ability of organisms to colonize and adapt to higher altitudes during warming have, to our knowledge, not received scientific interest. PODARCIS will generate such knowledge, via a detailed study of physiological responses to hypoxia across an altitudinal gradient in a species that undergoes upward range expansion, the wall lizard Podarcis muralis. Total cost: EUR 185 076			
ClimatCon Climate-resilient pathways for the development of concrete infrastructure: adaptation, mitigation and sustainability 2015-2017 http://cordis.europa.eu/project/rcn/195610_en.html	The action aims to develop a comprehensive method for the evaluation of the whole life performance of reinforced concrete (RC) structures subjected to carbonation in conditions of climate change. It will be applied to several case studies (i.e., typical RC members located in different climatic conditions) to examine the sustainability performance of different concrete types (traditional and 'green' with blended cements) and repair techniques. The method and other results obtained in the action will provide strong support for decision making regarding the sustainable development of concrete infrastructure. Total cost: EUR 195 454,80	H2020	Tools	
CRISIS Coastal flood risk in Europe and the socio-economic impacts in a changing climate 2016-2018 http://cordis.europa.eu/project/rcn/195535_en.html	The Dynamic Interactive Vulnerability Assessment (DIVA) model, has been used extensively to assess the socio-economic impacts associated with coastal flooding under climate change and to explore the benefits of mitigation, adaptation, and migration. Shortcomings will be addressed. The results will be used along with existing data bases and model infrastructure to develop a regional version of DIVA. The latter will be applied to perform the most comprehensive and realistic (in terms of temporal variations) mesoscale flood risk	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	analysis of the European coastline to date, Total cost: EUR 195 454,80			
KeyDynamics Addressing key challenges for forecasting climate change effects on biodiversity: an assessment of dispersal limitation, priority effects and intra-species trait variation in range dynamics 2017-2019 http://cordis.europa.eu/project/rcn/200212_en.html	The project will address the following questions i) to which extent current species' distributions are in equilibrium with their climatic niches, ii) how necessary range shifts are modulated by complex biotic interactions, which may depend on arrival order in a community i.e. "priority effects", and iii) if 'species' is the adequate unit for impact assessments and predictive modelling given large within-species variability in adaptive capacity. Total cost: EUR 212 194,80	H2020	Risk assessment	
WATER DROP Droughts and Water Scarcity in the EU: Economic Impact, Adaptation, Policy Implications and Integrated Assessment Modelling 2016-2018 http://cordis.europa.eu/project/rcn/205751_en.html	Mediterranean countries are more prone to prolonged drought spells than others. Understanding and properly measuring the overall and sector-wide economic impact of those episodes is of crucial importance for the design of disaster risk management instruments and other policy-related issues. With econometric techniques, the project will use European-wide data to obtain estimates of the economic consequences of droughts and unveil potential adapting behaviour. Total cost: EUR 168 277,20	H2020	Risk assessment; Other: implementation	
ROBUST POLICY Developing a robust decision making framework for climate change policy under uncertainty 2016-2018 http://cordis.europa.eu/project/rcn/205740_en.html	The policy implications of climate change uncertainty depend on the proper treatment of uncertainty in integrated assessment models (IAM) of climate change. The objective of this research is to develop a framework for robust climate policy making under uncertainty. The project will develop a unifying framework for analyzing decision making under uncertainty in the context of climate change.	H2020	Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	Total cost: EUR 168 277,20			
CLOCK Climate Adaptation to Shifting Stocks 2016-2021 http://cordis.europa.eu/project/rcn/202567_en.html	The main objectives are: 1) Identify and understand the new challenges raised by climate change for current sustainable fisheries management; 2) Develop a novel approach to fisheries adaptation within a socio-ecological framework; 3) Provide empirical evidence on potential solutions for the adaptation of fisheries management systems; and 4) Help introduce fisheries adaptation at the top of the regional and international adaptation policy agendas. Total cost: EUR 1 184 931	H2020	Tools	
AdaptClim Genomic and epigenomic signatures of climate-mediated selection in cattle 2015-2017 http://cordis.europa.eu/project/rcn/195044_en.html	The aim of this project is to compare the genomes and methylomes of two tropical Creole bovine breeds, their main Spanish ancestors, and one taurine breed from Africa, to understand rapid adaptation to extreme climatic conditions and identifying biomarkers of resilience. The anticipated outcomes from this project will help in designing management systems to improve productivity, thermal and stress tolerance, and disease resistance in cattle. Total cost: EUR 183 454,80	H2020	Other: develop adaptation options	
INDRO Remote sensing INdicators for DROught monitoring 2017-2019 http://cordis.europa.eu/project/rcn/201072_en.html	The objective is to improve the existing methods of monitoring droughts and their impact on terrestrial ecosystems. Early warning systems need to be developed. Remote sensing (RS) technologies are well-placed to provide such monitoring. The proposed project "INDRO" will focus on the definition of new RS-based indicators able to monitor vegetation status and how it is responding to drought. Total cost: EUR 170 121,60	H2020	Tools, Monitoring	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
PERS-RELICT-CLIM The persistence of relict populations under climate change 2016-2018 http://cordis.europa.eu/project/rcn/195244_en.html	The rapid change in the Earth's climate is predicted to disrupt the conditions which determine the distribution of tree species, with the most dramatic impacts at species range edges. The project is designed to gain a complete understanding of trailing-range edge structure and functioning and potential of populations for persistence under global climate change. Total cost: EUR 195 454,80	H2020	Risk assessment	
AMBER Adaptive Management of Barriers in European Rivers	The AMBER project seeks to apply adaptive management to the operation of dams and barriers in European rivers to achieve a more efficient restoration of stream connectivity, and address impacts caused by river fragmentation. The first step of this project is to create an inventory of all barriers in Europe . The second step of the AMBER project is the development of four decision support tools. These will help dam managers and planners to adjust the operation, improve existing barriers or carefully plan new ones.	H2020	Tools	
BRIGAID Bridges the Gap for Innovations in Disaster Resilience	BRIGAID's mission is to provide integral support for innovations for climate adaptation, focusing on climate-driven disasters like floods, droughts and extreme weather. BRIGAID aims to become the quality label for the development of innovations for climate adaptation and risk reduction from climate-related disaster impacts in Europe and beyond.	H2020	Other: innovation	
NAIAD NAture Insurance value: Assessment and Demonstration (http://cordis.europa.eu/project/rcn/206403_en.html)	NAIAD will contribute to providing a robust framework for assessing insurance value for ecosystem services by (i) enabling full operationalisation through improved understanding of ecosystem functionality and its	H2020	Costs, Tools	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	insurance value at a broad range of scales in both urban and rural context; (ii) making explicit the links between ecosystem values and social risk perception; and (iii) the application of developed methods and tools in water management by relevant stakeholders, especially businesses, public authorities and utilities. The EC CORDIS web page states: "NAIAD aims to operationalise the insurance value of ecosystems to reduce the human and economic cost of risks associated with water (floods and drought) by developing and testing - with key insurers and municipalities - the concepts, tools, applications and instruments (business models) necessary for its mainstreaming."			
RESCCUE Resilience to cope with Climate Change in Urban Areas – a multisectorial approach focusing on water	One of the key goals of the project is to elaborate a Resilience Action Plan (RAP) for each of the case study cities, considering the inputs of all local partners and stakeholders of each site and led by the three involved local resilience offices. The civil protection and emergency sectorial plans will be analysed to improve coordination during crises, as these plans can benefit from RAPs inputs and vice versa.	H2020	Other: implementation	
SMR Smart Mature Resilience	Smart Mature Resilience is a multi-disciplinary research project working for more resilient cities in Europe. Researchers and cities come together to enhance cities' capacity to resist, absorb and recover from the hazardous effects of climate change. The project aims to provide an innovative "holistic" methodology for assessing resilience of smart critical infrastructures (SCIs) in Cities	H2020	Tools	
UNALAB Urban Nature Labs	UNaLab will develop, via co-creation with stakeholders and implementation of 'living lab' demonstration areas, a robust evidence base and	H2020	Socio-economic, Other: Implementation,	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	European framework of innovative, replicable, and locally-attuned nature-based solutions to enhance the climate and water resilience of cities. UNaLab focuses on urban ecological water management, accompanied with greening measures and innovative and inclusive urban design. The UNaLab partners aim to develop smarter, more inclusive, more resilient and more sustainable local societies through nature based innovation jointly created with and for stakeholders and citizens. UNaLab's 3 front runner cities: Tampere, Eindhoven and Genova, have a track record in smart and citizen driven solutions for sustainable development. They support 7 follower cities: Stavanger, Prague, Castellon, Cannes, Basaksehir, Hong Kong and Buenos Aires plus share experiences with observers as City of Guangzhou and the Brazilian network of Smart Cities. Therefore UNaLab results will impact on different urban socio-economic realities, with diversity in size, challenges and climate conditions. In order to create an EU reference demonstration and go-to-market environment for NBS, UNaLab will use and further develop the ENoLL Urban Living Lab model, and the European Awareness Scenario Workshop method for the co-creation of solutions, and the roadmap approach, in this way achieving an innovative NBS toolbox. Roadmaps will be used in all 10 cities, but in particular serve the follower cities. VTT, with a track record in the field of urban sustainability and Smart Cities, leads UNaLab. The UNaLab consortium is comprised of 29 partners across 12 different European countries and three non-EU countries. The consortium is well-balanced, representing key stakeholders within the value chain of urban challenges and smart, sustainable cities (public bodies, research institutions, large		Innovation	

Reference H2020	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	industries, small and medium enterprises.			

Reference ETC/CCA en EEA	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
EEA Draft 2017: Climate change adaptation and disaster risk reduction in Europe. Enhancing coherence of the knowledge base and policies (not citable)	Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) provide a range of complementary approaches for managing climate risks. CCA addresses mainly weather and climate related hazards of the future, while DRR focuses on the present by addressing all hazards. Enhancing coherence between CCA and DRR policies and practices requires creating awareness, mobilizing resources and actions taken by public and private actors, preferably in partnership.	ETC/CCA	Risk assessments, Monitoring	Uncertainties about the development of the location, frequency and intensity of winter and autumn wind storms, hail storms and storm surges. Impacts of past disasters (economic, human, and ecological) Monitoring, reporting and evaluation activities (MRE) in both policy areas
EEA, 2017. Climate change, impacts and vulnerability in Europe 2016. An indicator-based report. doi:10.2800/534806. EEA, Copenhagen https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016	This report is an assessment of past and projected climate change and its impacts on ecosystems and society. This is the fourth 'Climate change, impacts and vulnerability in Europe' report, and aims to support the review process of the 2013 EU Adaptation Strategy. Some key findings: The changing climate has already increased the magnitude of many extreme weather events and this impacts	JRC, ETC-CCA	Risk assessments, Monitoring	Improved monitoring and reporting of climate-related extremes and the associated damage, enhanced national and sectoral assessments and their reporting, and further

Reference ETC/CCA en EEA	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	ecosystems, economic sectors and human health in Europe. Hotspots for adverse effects are south and south-eastern Europe (droughts), coastal areas and floodplains (flooding), and the Arctic (melting of land and sea ice). Europe's economy is also vulnerable for worldwide climatic effects.			monitoring, reporting and evaluation of adaptation actions at the national level. The costs and benefits of adaptation options and on interdependencies, synergies and trade-offs between adaptation policies and other policies and actions.
ETC/CCA Work Programme 2017	Tasks descriptions: European climate change indicator report; European climate change indicators; Monitoring and evaluation of adaptation; Urban adaptation (social vulnerability, justice and adaptation); Disaster risk reduction (finalize report); Climate change impacts and adaptation in agriculture (scoping report on adaptation and sustainability of European agriculture in relation to CAP); Adaptation in transnational regions (vulnerability of rivers, forests, mountain regions)	ETC/CCA	Monitoring, Risk Assessments, Other: Urban adaptation; Adaptation in agriculture	
Financing Europe's low carbon, climate resilient future, EEA Briefing No 6/2017 https://www.eea.europa.eu/themes/climate/financing-europe2019s-low-carbon-climate/financing-europes-low-carbon-climate	In an assessment of the state-of-play of climate finance tracking in Europe, a recent European Environment Agency (EEA) study indicates that few European countries have translated their national climate and energy objectives into corresponding investment needs and plans.	EEA	Costs	There is a lack of available information at country level regarding the financing of climate and energy targets
The Arctic Environment, EEA Report No 7/2017 https://www.eea.europa.eu/publications/the-arctic-environment	The Arctic is currently warming at a rate of almost twice the global average. The climatic stressors are coupled with pressures from economic development. Collectively, these changes challenge ecosystem resilience, and Arctic species and inhabitants, particularly indigenous peoples,	EEA	Risk assessment	Better knowledge and understanding of the Arctic is essential. We have yet to fully recognise and understand Arctic

Reference ETC/CCA en EEA	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	all of whom and which will have to adapt to pressures and rapid transformation in both the environment and living conditions. These impacts will affect Europe and in some cases already are doing so.			resilience, long-term effects and tipping points.
Financing urban adaptation to climate change, EEA Report No 2/2017 https://www.eea.europa.eu/publications/financing-urban-adaptation-to-climate-change	Municipalities across Europe increasingly acknowledge the need to adapt to climate change and have begun to adopt various measures. Meeting the costs of adaptation measures for climate change is, however, a major challenge. Municipalities have found innovative ways to overcome that challenge and have started implementing measures.	EEA	Costs	
Urban adaptation to climate change in Europe 2016 — Transforming cities in a changing climate, EEA Report No 12/2016 https://www.eea.europa.eu/publications/urban-adaptation-2016	Transforming cities enables Europe to become a more attractive and climate-resilient place. Regional, national and international bodies can provide and legal and institutional frameworks that enable the transformation of cities and. They can also facilitate better city networking across Europe and harvest and transfer urban adaptation knowledge, thus enabling cities to learn from each other and follow the example of frontrunners.	EEA	Other: implementation	Effective co-creation of knowledge with practitioners, the communities affected and businesses ensures that the knowledge will be relevant and applicable. To create the knowledge base for transformative adaptation, research must pursue much more systemic approaches and integrate the socio-economic and demographic dimensions of urban development.
National monitoring, reporting and evaluation of climate change adaptation in Europe, EEA Technical	This report provides new insights into adaptation monitoring, reporting and evaluation systems at	EEA	Monitoring	There is a need to strengthen the

Reference ETC/CCA en EEA	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
report No 20/2015 https://www.eea.europa.eu/publications/national-monitoring-reporting-and-evaluation	the national level in Europe and constitutes the first attempt to consolidate emerging information across European countries.			knowledge base about MRE in European countries and to foster learning from the evaluation of adaptation policies. Improve the understanding of the information challenges for evaluating adaptation policies, for example in terms of: –– collecting, assessing and aggregating data and analysing lessons across sectors and levels; –– learning from implemented policies and measures within a particular sector, across sectors and across governance levels. Learn from the commonalities and differences between European countries.
Adaptation of transport to climate change in Europe, EEA Report No 8/2014 https://www.eea.europa.eu/publications/adaptation-of-transport-to-climate	This report explores current climate change adaptation practices concerning transport across European countries. Adapting the transport system could require substantial infrastructure investments; mainstreaming of adaptation in	EEA	Risk assessment	Improved monitoring and reporting on impacts of extreme weather and climate-related events

Reference ETC/CCA en EEA	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	infrastructure planning is needed now. The EU and national governments can create the enabling framework and invest in the knowledge base.			Strategic Environmental Assessment, Environmental Impact Assessment and cost-benefit analysis, or how best to approach the challenge of acting under uncertainty Scenario-building and collaborative planning considering transport within the larger framework of changes in the economy, society and demography.
National adaptation policy processes in European countries — 2014, EEA Report No 4/2014	Results of a self-assessment survey conducted on national adaptation policy processes in Europe. European countries are aware of the need for adaptation to climate change: to date, 21 European countries have adopted a national adaptation strategy (NAS) and 12 have developed a national adaptation plan (NAP). More than half of European countries have made progress in identifying and assessing adaptation options, and 13 report that they are in the implementation or the monitoring and evaluation stages of the adaptation policy process.	EEA	Other: Implementation	More information is needed on costs and benefits of adaptation, as well as on risks and uncertainties, vulnerability at local level, and availability of data for monitoring and evaluation purposes.

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
Hendel-Blackford, S., Brand, K., Downing, C., Street, R., McVittie, A. (2017) EU strategy on adaptation to climate change: knowledge assessments. Final Project Report – **Confidential** (13 February 2017) Project number: DESNL16057, Ecofys 2016 by order of: The European Commission	Knowledge gaps to be addressed: 1. Ecosystem-based adaptation (EbA): evaluation of the available knowledge on the potential of ecosystems based measures as adaptation options. 2. Infrastructure resilience and adaptation: evaluation of the available knowledge on impacts of, and vulnerability and adaptation to climate change in the infrastructures resilience. 3. Vulnerability assessments in support of adaptation decision making: evaluate the available knowledge on vulnerability assessments in Europe.	Other: DGClima service contract	Risk assessments, Tools, Other: Resilience of Infrastructure	
McVittie, A., Cole, L., Wreford, A. (2017) EU strategy on adaptation to climate change: knowledge assessments. Thematic Report: Ecosystem-based Adaptation. February 2017, Project number: DESNL16057. Ecofys 2016 by order of: the European Commission	Aim is to assess the effectiveness of Ecosystem-based adaptation (EbA). EbA refers to measures that utilise natural or ecosystem-like processes to adapt to a variety of climate hazards. Categories of EbA: Agriculture, Forestry, Coastal, Urban, and Water. 125 case studies have been found for this assessment. Main findings: Biophysical effectiveness and benefits are difficult to assess because they are described in many context-specific ways. Costs are easier to assess because they are defined as project costs. Key success factors are cooperation, finance and demonstration of benefits. Task 1 of Hendel-Blackford et al 2017	Other: DGClima Service Contract	Other: Ecosystem-based adaptation	Common units to demonstrate benefits
Hendel-Blackford, S., Brand, K., Nierop, S., Winkel, R. (2017) EU Strategy on adaptation to climate change: knowledge assessments to support informed decision making. Infrastructure Resilience in the Transport, Energy and Construction Sectors February 2017, Project number: DESNL16057	Aim is to assess vulnerability and adaptation in three infrastructure sectors: Energy, Construction, Transport. Data and risk/vulnerability assessments are available. For energy and transport extreme events are most relevant; for construction next to the resilience to extreme events heating and cooling issues in urban areas	Other: DGClima Service Contract	Risk Assessments	Cross-sector cooperation, interdependencies Analysis of past extreme weather events

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	are important. Adaptation options in Energy and Transport are mostly related to flooding. For all three sectors legislation is seen as an important mechanism to enhance adaptation. Task 2 of Hendel-Blackford et al 2017			Projections of climate variables which are more uncertain to predict: storm intensity, wind direction, lightning. Interaction of biophysical data with socio-economic data and social sciences expertise; impact on vulnerabilities Comparable indicators for vulnerability and risk
Downing, C. (2017). EU strategy on adaptation to climate change: knowledge assessments. Thematic Report: Vulnerability Assessment in Europe. Draft version: February 2017. Project number: DESNL16057, CLIMA.C.3/SER/2015/0007. Ecofys 2016 by order of: the European Commission	Aim is to synthesise the frameworks, processes and methods being used to assess vulnerability in Europe. It describes the concepts and definitions covering impacts, vulnerability, risk, resilience, adaptive capacity. There is extensive interest is these assessments in Europe. 21 of 28 Member States have completed assessments and EU funded projects ESPON and PESETA help to close remaining gaps. A checklist of 13 elements is recommended for future assessments. Task 3 of Hendel-Blackford et al 2017	Other: DGClima Service Contract	Risk Assessments	Dynamic aspects of natural and socio-economic systems Future socio-economic scenarios Current social vulnerabilities (factors such as economic diversity, poverty and wealth, education, social cohesion/capital, equity, governance, policy priorities)
PLACARD (2016) PLACARD Foresight Workshop summary: How can foresight help to reduce vulnerability to climate-related hazards? http://www.placard-network.eu/wp-content/PDFs/PLACARD-foresight-workshop-	PLACARD is a platform to support dialogue and consultation between the Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) domains. In this workshop foresight methods are discussed to explore future vulnerabilities, risks, and opportunities. Some of	Other: European Commission	Risk assessment	

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
summary-2016.pdf	the mega-trends identified are increasing urbanization, dependency on technology, inequalities, population growth, changing disease burden, extreme climate events, and migration.			
Research warns of rise in coastal flooding in Europe http://www.endseurope.com/article/48710/research-warns-of-rise-in-coastal-flooding-in-europe	Once-in-a-century coastal floods could become an annual disaster in Europe if CO2 emissions continue to rise, a new study has warned. The full text of this article is only available to subscribers and free trialists. To login, please enter your email address and subscriber access code below	Other: European Commission	Risk assessment	
ECRA (2017) ECRA General Assembly 7-8 March 2017 "Climate Change and Vulnerable Regions" organised by the European Climate Research Alliance in Brussels. http://ecra-climate.eu/workshops-conferences/ecra-general-assemblies/ecra2017	The European Climate Research Alliance (ECRA) aims to accelerate the development of climate change research. Future research topics identified in March 2017: Most vulnerable regions: cities, Arctic, Mediterranean, mountain regions, coasts. Integration of natural and social sciences A sustained science-policy dialogue and stakeholder involvement are increasingly important Improving the observational network Model simulations at all scales is still required The Paris Agreement's mitigation and adaptation frameworks have implications for climate research and scenario building	Other: European Commission	Risk assessment	Most vulnerable regions: cities, Arctic, Mediterranean, mountain regions, coasts. Integration of natural and social sciences A sustained science-policy dialogue and stakeholder involvement are increasingly important Improving the observational network Model simulations at all scales is still required The Paris Agreement's mitigation and adaptation frameworks have implications for climate research and

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
				scenario building
EU (2014) The economic impact of climate change and adaptation in the Outermost Regions. Final report http://ec.europa.eu/regional_policy/nl/information/publications/studies/2014/the-economic-impact-of-climate-change-and-adaptation-in-the-outermost-regions	The Outermost Regions (OR) of the EU are particularly vulnerable to the impacts of climate change. They are characterised by their remoteness, insularity, climate, terrain and richness of biodiversity as well as an economic dependence on a small number of products. Major impacts include extinction of endemic species, coral bleaching and shoreline erosion. Observations have already shown changes to water and air temperature, cyclone activity, ocean acidification and sea level rise.	Other: European Commission Directorate-General for Regional and Urban policy	Risk assessment	Data on Outermost Regions' economy. Research to support the achievement of a bio-based economy, clean energy, sustainable transport systems, climate change and resource efficiency. Adaptation to climate change and responses to extreme weather events
Sand Jespersen, M., Munk Sørensen, M., Raphaelsen, B., Wessel, R., Wähler, L.C., Olesen, A., Laursen Bager, S., Julija Skolina, J. (2016) Mainstreaming of climate action into ESI Funds. Final Report EU DG Climate / COWI A/S, Kongens Lyngby, Denmark https://ec.europa.eu/clima/sites/clima/files/budget/docs/report_mainstreaming_of_climate_action_en.pdf	Mainstreaming of climate action ensures that climate action is embedded widely in the programming of the European Structural and Investment Funds. An analysis of the 28 Partnership Agreements and the 530 programmes that have been prepared by Member States, focused on the European Regional Development Fund including its European Territorial Cooperation Goal, the European Social Fund, the European Agricultural Fund for Rural Development, and the European Maritime and Fisheries Fund.	Other: European Commission	Costs, Other: mainstreaming	
Sand Jespersen, M., Munk Sørensen, M., Raphaelsen, B., Wessel, R., Wähler, L.C., Olesen, A., Laursen Bager, S., Julija Skolina, J. (2016) Mainstreaming of adaptation to climate change into the ESI Funds 2014-2020 Annex A - Case Studies EU DG Climate / COWI A/S, Kongens Lyngby, Denmark	Annex A presents a number of case studies to provide a deeper understanding of how climate change adaptation has been addressed in the programming of ESIF. The case studies are: › Water scarcity and drought – Spain	Other: European Commission	Other: mainstreaming	

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
https://ec.europa.eu/clima/sites/clima/files/budget/docs/report_maindtreaming_adaptation_annex_a_en.pdf	› Flooding – Romania › Rural development and climate change adaptation – Poland › Sea level rise, coastal erosion and coastal flooding – France › European territorial co-operation and climate change adaptation (Danube, Adriatic-Ionan, Ireland-Wales and Spain-Portugal) › Climate change adaptation in outermost regions (OR)			
ESPON (2013) Territorial insight: Where to focus what types of investments. Second ESPON 2013 Synthesis Report. ESPON Results by early 2013 https://www.espon.eu/	The ESPON EGTC is a European Grouping on Territorial Cooperation. ESPON started in 2002. ESPON's findings show Europe's territorial diversity, and make comparisons between regions and cities. The comparable information on territorial dynamics provided by ESPON can be used for the development of integrated approaches in the framework of the European Structural and Investments Funds (ESIF) 2014 to 2020. Adaptation issues: in the south access to water resources will be a particular issue. There are also threats to bio-diversity and cultural heritage, and there will be new challenges for the agricultural and forestry sectors as well as for tourism.	Other: European Regional development Fund	Risk assessment	
Le Den, Xavier, Matilda Persson, Audrey Benoist, Paul Hudson, Marleen de Ruiter, Lars de Ruig, Onno Kuik (2017). Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU. Final report August 2017 European Commission, Directorate-General for Climate Action	The aim is to conduct a study on the insurance of weather and climate-related disaster risk, and to create an inventory and analysis of mechanisms to support damage prevention in the European Union (EU). The study provides an overview of the use of insurance against natural disasters. It suggests general recommendations as well as specific recommendations on the role of the	DGClima	Costs	

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	European Commission in addressing the issues uncovered, and encourages stakeholder's efforts and best practices observed across the EU. It is not yet very clear whether there is an increase in monetary impacts from extreme weather events. The trade-off between premium affordability and risk-reduction incentives is an important, yet difficult, challenge for insurance companies to balance. On the whole (across extreme weather events), insurance at affordable rates, notwithstanding individual deviations from this, is available in the countries studied. Generally, the countries studied do not perform very well in terms of providing incentives for risk reduction or signalling the risk.			
Council of the EU, 2017: Climate finance: EU and member states' contributions up to €20.2 billion in 2016 PRESS RELEASE 592/17, 17/10/2017	Contributions from the EU and its member states to support developing countries in reducing their greenhouse gas emissions and coping with the impacts of climate change showed a significant increase in 2016. The total was confirmed on 16 October 2017 at a meeting of the EU Economic Policy Committee, ahead of COP23 UN climate change conference in Bonn. Total contributions from the EU and its member states amounted to €20.2billion[1]in 2016, a significant increase compared to 2015. The contributions were successfully channelled into climate change mitigation and adaptation initiatives in developing countries. This figure includes climate finance sources from public budgets and other development financial institutions, as reported by member states in the context of the article 16 of regulation 525/2013 of 21 May 2013. It also includes €2.7 billion climate finance from the EU budget and the European Development Fund, and €1.9 billion from the European Investment Bank.			

Reference European commission contract	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
THE EUROPEAN COMMITTEE OF THE REGIONS (2017) Towards a new EU climate change adaptation strategy – taking an integrated approach OPINION ENVE-VI/015 121st plenary session, 8-9 February 2017	THE EUROPEAN COMMITTEE OF THE REGIONS stresses that a well-functioning multi-level governance framework is of crucial importance, and therefore calls on the European Commission to encourage stronger collaboration between the different levels of government - especially in the preparation and implementation of the national, regional and local adaptation strategies and plans; invites the Commission to explore further the idea of a fast-track access to financial support for local and regional authorities committed to adaptation action;	EU (other)		

Reference Other	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
Crimmins, A., J. Balbus, J. L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M. Hawkins, S.C. Herring, L. Jantarasami, D. M. Mills, S. Saha, M. C. Sarofim, J. Trtanj, and L. Ziska, 2016: Executive Summary. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 24 pp. http://dx.doi.org/doi:10.7930/J00P0WXS health2016.globalchange.gov	The U.S. Global Change Research Program (USGCRP) Climate and Health Assessment provides a comprehensive estimation of observed and projected climate change related health impacts in the United States. Impacts are exposure to elevated temperatures; more frequent, severe, or longer-lasting extreme events; degraded air quality; diseases transmitted through food, water, and disease vectors (such as ticks and mosquitoes); and stresses to mental health and well-being. Some populations are disproportionately vulnerable, including those with low income, some communities of color, immigrant groups, Indigenous peoples, children	US federal government	Risk assessment	

Reference Other	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	and pregnant women, older adults, vulnerable occupational groups, persons with disabilities, and persons with pre-existing or chronic medical conditions.			
ECCA Adaptation Futures conference 2016 Adaptation Futures (2016), Adaptation Futures - Practices and solutions. Meeting report of the 4th International Climate Change Adaptation Conference, Rotterdam, The Netherlands 10 – 13 May 2016 http://www.adaptationfutures2016.org/	Adaptation should be increasingly solution-oriented. Successful adaptation requires a close connection between national level strategy and policy, and interventions at the regional and local level. Mainstreaming will only happen when incremental change turns into systemic practice.	Other: PROVIA, the European Commission and the Government of the Netherlands	Other: practice, dissemination and implementation	Adaptation needs strategies and policies that are underpinned by a strong science and evidence base. Examples of good practice need more constant monitoring and updates to show trends and the complete situation, ideally through longitudinal studies. Research can support the development of solid business cases and adequate narratives for policy-makers based on businesses that have been analysed.
ECCA 2017 – Our Climate Ready Future. Glasgow, 5th-9th June 2017 http://ecca2017.eu/conference/	The aim was to inspire and enable people to work together to discover and deliver positive climate adaptation solutions that can strengthen society, revitalise local economies and enhance the environment.	Other: Copernicus, EU	Other: practice	
Romanovska, Linda, Thomas Dworak (Fresh Thoughts), Sarah Hendel-Blackford, Sonja Forster (Ecofys), September – 2016. Mayors Adapt Knowledge Base Strategy: 'Urban adaptation	Mayors Adapt, the EU initiative on adaptation in European cities, undertook empirical research into urban adaptation knowledge gaps faced by European cities. This work identifies cities' needs	Covenant of Mayors, Mayors Adapt	Other: implementation	

Reference Other	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
knowledge gaps in Europe' Executive Summary	on knowledge generation and the barriers to knowledge transfer and access that cities experience when working on adaptation and climate risks; these needs and barriers are preventing them from building adaptive capacity and implementing adaptation at city level. This executive summary outlines the gaps identified by cities regarding the current knowledge available, as well as proposes recommendations to address both the knowledge gaps and barriers to knowledge transfer.			
Selby, Jan, Omar S. Dahi, Christiane Fröhlich, Mike Hulme (2017). Climate Change and the Syrian Civil War Revisited. Political Geography, Vol. 61 (2017)	For proponents of the view that anthropogenic climate change will become a 'threat multiplier' for instability in the decades ahead, the Syrian civil war has become a recurring reference point, providing apparently compelling evidence that such conflict effects are already with us. According to this view, human-induced climatic change was a contributory factor in the extreme drought experienced within Syria prior to its civil war; this drought in turn led to large-scale migration; and this migration in turn exacerbated the socio-economic stresses that underpinned Syria's descent into war. This article provides a systematic interrogation of these claims, and finds little merit to them. Amongst other things it shows that there is no clear and reliable evidence that anthropogenic climate change was a factor in Syria's pre-civil war drought; that this drought did not cause anywhere near the scale of migration that is often alleged; and that there exists no solid evidence that drought migration pressures in Syria contributed to civil war onset. The Syria case, the article finds, does not support 'threat multiplier' views of the impacts of climate change; to the contrary, we conclude, policymakers, commentators and scholars alike should exercise	University of Hamburg	Risk analysis, Socio-economic, Other: migration	

Reference Other	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	far greater caution when drawing such linkages or when securitising climate change.			

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
https://ec.europa.eu/jrc/en/peseta Ciscar J-C (ed.), 2014.Climate Impacts in Europe, The JRC PESETA II Project — JRC Scientific and Policy Reports, European Commission Joint Research Centre Ciscar JC, Feyen L, Soria A, Lavalle C, Raes F, Perry M, Nemry F, Demirel H, Rozsai M, Dosio A, Donatelli M, Srivastava A, Fumagalli D, Niemeyer S, Shrestha S, Ciaian P, Himics M, Van Doorslaer B, Barrios S, Ibáñez N, Forzieri G, Rojas R, Bianchi A, Dowling P, Camia A, Libertà G, San Miguel J, de Rigo D, Caudullo G, Barredo JI, Paci D, Pycroft J, Saveyn B, Van Regemorter D, Revesz T, Vandyck T, Vrontisi Z, Baranzelli C, Vandecasteele I, Batista e Silva F, Ibarreta D (2014). Climate Impacts in Europe. The JRC PESETA II Project. JRC Scientific and Policy Reports, EUR 26586EN.	PESETA II (2010-2014): "Projection of Economic Impacts of climate change in Sectors of the European Union based on Bottom-up Analysis". PESETA II covers nine areas: agriculture, coastal systems, river floods, tourism, human health, energy, transport infrastructure, forest fires, and habitat suitability. The project integrates biophysical direct climate impacts into a macroeconomic economic model, which enables the comparison of the different impacts based on common metrics (household welfare and economic activity). If the 2080s climate would happen today and without public adaptation, the EU household welfare losses would amount to around €190 billion, almost 2% of EU GDP. The geographical distribution of the climate damages is very asymmetric with a clear bias towards the southern European regions.	JRC	Costs, Socio-economic aspects	Further research is needed in complex and relevant areas such as human migration, effects on ecosystems services, and the possible consequences of abrupt climate change. How adaptation measures can reduce climate impacts should be better understood and assessed
Lloyd, S., Kovats, S., Chalabi, Z., Khare, S., Gasparrini, A., Sheehy, E., (2016) Assessment of global climate change impacts on human health.	An assessment of the impacts of climate change on heat- and cold-related mortality, temperature-related diarrhoeal disease mortality in children,	JRC	Socio-economic trends	Large uncertainty regarding the relationship between

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
JRC/SVQ/2014/J.1/0025/NC. Deliverable D3b. Final Health Impact Report, Revised. London School of Hygiene & Tropical Medicine. September 2016	and labour productivity losses. Climate change is projected to have substantial adverse impacts on future heat-related mortality. Impacts in southern Europe are projected to be an order of magnitude larger than on northern and central Europe. In Europe, future climate change-attributable diarrhoeal disease mortality is estimated to be very close to zero, even under high climate change. In Europe, the estimated impacts on labour productivity losses appear negligible.			actual daily mortality and temperature variations
Borrelli, P., Modugno, S., Panagos, P., Marchetti, M., Schütt, B., Montanalerra, L. (2014) Detection of harvested forest areas in Italy using Landsat imagery, JRC Publication N°: JRC84788, Type: Articles in Journals: Applied Geography Volume 48, March 2014, Pages 102-111, https://doi.org/10.1016/j.apgeog.2014.01.005	The paper deals with coppice harvest mapping in Italian forestlands. The study provides a publicly accessible database for future studies of forestland dynamics	JRC	Monitoring	
Forzieri, G., Bianchi, A., Marin Herrera, M.A., Batista e Silva, F., Feyen, L., Lavalle, C. (2015) Resilience of large investments and critical infrastructures in Europe to climate change, JRC Publication N°: JRC98159, Final report for DG CLIMA, AA 071303/2012/630715//CLIMA.C.3 – JRC 32971-2012 NFP	The project provides a comprehensive multi-hazard multi-sector risk assessment for Europe. Research activities were undertaken by the JRC in the CCMFF project financed by DG CLIMA. The project integrated high-resolution climate hazard projections, a detailed harmonized representation of sectorial physical assets, productive systems and investments, and estimates of their sensitivity. Economic losses are highest for the industry, transport and energy sectors. Floods currently account for approximately half of climate hazard damages, but in the future droughts and heatwaves may become the most damaging hazards. Southern and south-eastern European countries will be most impacted.	JRC	Risk assessment	A better understanding of the regional and sector distribution of impacts could aid in orienting further EU investments such that Cohesion policy
DONATELLI Marcello, SRIVASTAVA Amit Kumar, DUVEILLER BOGDAN Grégory Henry E, NIEMEYER Stefan, FUMAGALLI Davide (2015) Climate change	This study presents estimate of the effects of climate variables and CO2 on three major crops namely wheat, rapeseed, and sunflower in EU27	JRC	Risk assessments	Using ensemble simulation would allow identifying the areas

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
impact and potential adaptation strategies under alternate realizations of climate scenarios for three major crops in Europe, JRC Publication N°: JRC96397	Member States. The results show primarily that different realization of the emission scenario lead to noticeably different crop performance projections in the same time slice. Simple adaptation techniques such as changing sowing dates and the use of different varieties, the latter in terms of duration of the crop cycle, may be effective in alleviating the adverse effects of climate change in most areas.			where adaptation, like those simulated, may be run autonomously by farmers, hence not requiring specific intervention in terms of support policies
HERNANDEZ GONZALEZ Yeray, MARTINHO GUIMARAES PIRES PEREIRA Angela, CUEVAS-AGULLÓ Emilio, RODRÍGEZ-GONZÁLEZ Sergio, MARINHO FERREIRA BARBOSA Paulo (2016) Perspectives on Contentions about Climate Change Adaptation in the Canary Islands: A case study for Tenerife, JRC Publication N°: JRC104349	This case study is aimed at exploring climate change adaptation scenarios as well as concrete actions to increase climatic resilience in a small European island: Tenerife, Canary Islands (Spain), the largest and most populated of the seven islands of the Canaries. The effects of climatic and non-climatic hazards on local population health and ecosystems are reviewed, such as heatwaves, air pollution and the atmospheric dust which comes from the Saharan dessert. Participants indicate an institution responsible for climate issues is needed. Scenarions for future resilience will be built in a next step.	JRC	Risk assessment	https://ec.europa.eu/jrc/en/publication/
BREYIANNIS George, PETROLIAGKIS Thomas, ANNUNZIATO Alessandro (2016) Exploring DELFT3D as an operational tool, JRC Publication N°: JRC104897	Delft3D is a prototype of an operational system that can tackle the task of an early information and awareness platform for Coastal Risk. The Mediterranean Sea was selected as a test case for validating and benchmarking the various components. The outcome of this research suggest that a prototype system is feasible but there are still issues to be addressed.	JRC	Tools	Further validation and user-friendliness needs to be investigated
MACIAS MOY Diego, STIPS Adolf, GARCIA GORRIZ Elisa (2016) Multi-year simulations of future socio-economic and climate scenarios in the	The Modelling Framework for European regional seas is applied to explore plausible consequences for the Mediterranean Sea marine ecosystems of a set of climate and socio-economic scenarios for	JRC	Tools	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
Mediterranean Sea, JRC Publication N°: JRC103933	the 2030 horizon. The applicability of the Modelling Framework to this type of scenario investigations could be successfully demonstrated.			
ALFIERI Lorenzo, FEYEN Luc, DI BALDASSARRE Giuliano (2016) Increasing flood risk under climate change: a pan-European assessment of the benefits of four adaptation strategies, JRC Publication N°: JRC97809	This research builds upon a recently developed flood risk assessment framework at European scale to explore the benefits of adaptation against extreme floods. Results suggest that the future increase in expected damage and population affected by river floods can be compensated by a combination of different adaptation measures. The adaptation efforts should favour measures targeted at reducing the impacts of floods, rather than trying to avoid them.	JRC	Other: develop adaptation options	
Alfieri, L., Bisselink, B., Dottori, F., Naumann, G., De Roo, A., Salamon, P., Wyser, K., Feyen, L. (2017) Global projections of river flood risk in a warmer world. Earth's Future Volume 5, Issue 2 February 2017 pp 171–182 DOI: 10.1002/2016EF000485	A global assessment of the economic costs and the population affected by river floods under different global warming scenarios. In the case of a 2°C temperature increase, both the affected population and the related flood damages would rise by 170% compared to present levels. Even under the most optimistic scenario of a 1.5°C temperature increase, the authors estimate that the flood-affected population would still double, and flood damages would increase by 120%.	JRC	Risk assessment	
SAIOTE CARRAO Hugo Miguel, NAUMANN Gustavo, BARBOSA Paulo (2016) Mapping global patterns of drought risk: an empirical framework based on sub-national estimates of hazard, exposure and vulnerability, JRC Publication N°: JRC101431	Drought risk is assessed for the period 2000-2014. Our findings support the idea that drought risk is driven by an exponential growth of regional exposure. Since most agricultural regions show high infrastructural vulnerability to drought, regional adaption to climate change may begin through implementing and fostering the widespread use of irrigation and rainwater harvesting systems.	JRC	Risk assessment	
DE ROO Arie; BISSELINK BERNARD; BECK HYLKE;	Simulations for 30-year periods with various	JRC	Risk assessment	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
BERNHARD JEROEN; BUREK PETER ANDREAS; REYNAUD ARNAUD; PASTORI MARCO; LAVALLE Carlo; JACOBS CHRISTIAAN; BARANZELLI CLAUDIA; ZAJAC ZUZANNA; DOSIO Alessandro (2016) Modelling water demand and availability scenarios for current and future land use and climate in the Sava River Basin JRC N°: JRC99886	combinations of land use change and climate change have been evaluated for their impact on the water-food-energy-environment nexus in the Sava river basin (from Serbia to Slovenia). More intense irrigated agriculture has the potential to increase crop yields considerably, but there sufficient water resources are lacking to realise this. If irrigation would be increased drastically, other sectors would be negatively influenced, such as the energy sector, navigation, and the environment.			
JRC99685 2015 The role of social inequalities for the vulnerability to climate related extreme weather events NEHER FRANK; MIOLA Apollonia	This report analyses the differential impact of extreme weather events in the presence of social inequalities. The results establish that countries with more equality in gender issues and the distribution of incomes on average face lower fatalities when climate related extreme weather events strike.	JRC	Socio-economic aspects	What is the underlying mechanism, i.e. why should inequality increase vulnerability or decrease system resilience? Input for future research would be relating inequality to trust and cooperation as important building blocks for societies' resilience.
JRC105751 2017 Robust modelling of the impacts of climate change on the habitat suitability of forest tree species DE RIGO DANIELE; CAUDULLO GIOVANNI; SAN-MIGUEL-AYANZ Jesus; BARREDO CANO JOSE IGNACIO	Within the PESETA II project, a robust methodology is introduced for modelling the habitat suitability of forest tree species (2071-2100 time horizon).	JRC	Tools	
JRC105684 2017 Modeling the impacts of climate change on forest fire danger in Europe: Sectorial results of the PESETA II Project CAMIA Andrea; LIBERTA' Giorgio; SAN-MIGUEL-AYANZ Jesus	Modeling the impacts of climate change on forest fire danger in Europe: Sectorial results of the PESETA II Project.	JRC	Risk assessment	
JRC93682 2014 Assessing the impact of climate	Under future climate change, not only average	JRC	Risk assessment	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
variability on crop yields in Europe CEGLAR ANDREJ; TORETI ANDREA; NIEMEYER Stefan	climate conditions will change but also the variability is expected to further increase. This study identifies the key climate factors influencing the inter-annual variability of maize and winter wheat yields in Europe. Grain maize and winter wheat yield are significantly influenced by weather conditions during the period of flowering. The weather conditions at the beginning of the growing season have substantial impact on grain maize yield especially over regions with continental climate.			
JRC101133 2016 Frequency analysis of critical meteorological conditions in a changing climate - Assessing future implications for railway transportation in Austria KELLERMANN Patric; BUBECK Philip; KUNDELA Guenter; DOSIO Alessandro; THIEKEN Annegret H	Aim is to attain insights on future frequencies of meteorological extremes with relevance for the railway operation in Austria. Results give robust indications for an all-season air temperature rise, but show no clear tendency in average precipitation.	JRC	Risk assessment	To carefully define, validate and – if needed – to adapt the thresholds that are used in the weather monitoring and warning system of the railway operator. For this, continuous and standardized documentation of damaging events and near-misses is a pre-requisite.
JRC91704 2014 Climate change and the emergence of vector-borne diseases in Europe: case study of dengue fever BOUZID Maha; COLÓN-GONZÁLEZ Filipe; LUNG TOBIAS; LAKE Iain R; HUNTER Paul R	Climate change could spread diseases to areas currently unaffected. The occurrence of autochthonous infections in Croatia and France in 2010 has raised concerns about a potential re-emergence of dengue fever in Europe.	JRC	Risk assessment	
JRC101376 2016 Multi-hazard assessment in Europe under climate change FORZIERI GIOVANNI; FEYEN Luc; RUSSO SIMONE; VOUSDOUKAS MICHAIL; ALFIERI LORENZO; OUTTEN Stephen; MIGLIAVACCA Mirco; BIANCHI ALESSANDRA;	A multi-hazard framework to map exposure to multiple climate extremes in Europe along the twenty-first century is hereby presented. Results show that Europe will likely face a progressive increase in overall climate hazard with a	JRC	Risk assessment	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
ROJAS Rodrigo; CID Alba	prominent spatial gradient towards south-western regions mainly driven by the rise of heat waves, droughts and wildfires.			
JRC89601 2014 Europe's freshwater biodiversity under climate change: distribution shifts and conservation need MARKOVIC Danijela; CARRIZO Savrina F.; FREYHOF J.; CID PUEY NURIA; LENGYEL Szabolcs; SCHOLZ Mathias; KASPERIDUS Hans; DARWALL William	Aim is to assess the future climatic suitability of European catchments for freshwater species and the future utility of the current network of protected areas. Results show that six percent of widespread and 77% of restricted range species are predicted to lose more than 90% of their current range.	JRC	Risk assessment	
JRC93420 2014 Climate Vulnerability of the Supply-Chain: Literature and Methodological review ANDREONI Valeria; MIOLA Apollonia	A number of analyses have been oriented to quantify the cascading economic effects of climate change generated all over the world. The objective of the report is to provide an overview of the main studies, methodologies and databases used to investigate the climate vulnerability of the global supply chain.	JRC	Risk assessment	
JRC91564 2014 Biodiversity Funds and Conservation Needs in the EU Under Climate Change LUNG Tobias; MELLER Laura; VAN TEEFFELEN Astrid; THUILLER Wilfried; CABEZA Mar	Recent EU biodiversity funding is analysed from a climate change perspective. We find that funding is reasonably well aligned with current conservation efforts but poorly fit with future needs under climate change, indicating obstacles for implementing adaptation measures.	JRC	Other: implementation	
JRC92492 2015 Climate change and supply-chain vulnerability: Methodologies for resilience and impacts quantification ANDREONI Valeria; MIOLA Apollonia	The objective of this paper is to provide an overview of the main studies, methodologies and databases used to investigate the climate vulnerability of the global supply chain.	JRC	Risk assessment	This information can be useful to i) support further studies, ii) to build consistent quantification methodologies, and iii) to fill the possible data gap
JRC86970 2014 Human Health Impacts of Climate Change in Europe. Report for the PESETA II project	Climate projections also indicate an increase in incidence of heat waves and extreme events. At	JRC	Risk assessment	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
PACI DANIELE	European level, on average, the climate change-attributable deaths will increase significantly over the next 90 years around 40,000 additional annual deaths in the period between 2010 and 2040 to more than 140,000 in the latest 30 years of the century.			
JRC102767 2016 Mediterranean habitat loss under future climate conditions: Assessing impacts on the Natura 2000 protected area network BARREDO CANO JOSE IGNACIO; CAUDULLO GIOVANNI; DOSIO Alessandro	We assess Mediterranean habitat loss and conversion into arid habitat under scenarios of climate change and evaluate protected areas, including Natura 2000 sites. Our results indicate that by the end of the century the Euro-Mediterranean domain is projected to shift into other climatic domains by an area equivalent to 53-121% of its current size. The loss is entirely due to shifts of the arid domain. A proactive approach taking into consideration landscape connectivity and the concomitant threats triggered by climate change is a priority.	JRC	Risk assessment	
JRC106165 2017 Mediterranean habitat loss under RCP4.5 and RCP8.5 climate change projections - Assessing impacts on the Natura 2000 protected area network BARREDO CANO JOSE IGNACIO; CAUDULLO GIOVANNI; MAURI ACHILLE	This report describes the main findings of Task 10, Mediterranean habitat loss, of the PESETA III project. Biodiversity is threatened by climate-driven habitat loss, which is one of the most serious concerns for this region	JRC	Risk assessment	
JRC100313 2016 Resilience of large investments and critical infrastructures in Europe to climate change FORZIERI GIOVANNI; BIANCHI ALESSANDRA; MARÍN HERRERA MARIO ALBERTO; BATISTA E SILVA FILIPE; FEYEN Luc; LAVALLE Carlo	Climate hazard damages to critical infrastructures in Europe will inflate as a result of global warming. This calls for (i) an EU commitment on continuing to support adaptation action in Member States and coordinating the exchange of information and best practices; and (ii) further mainstreaming of climate adaptation in a wide range of EU policies	JRC	Other: implementation	
JRC94634 2015 An integrated approach for assessing flood impacts due to future climate and socio-economic conditions and the scope of	The Coastal Fluvial Flood (CFFlood) model for assessing coastal and fluvial flood impacts under current and future climate and socio-economic	JRC	Tools, Risk assessment	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
adaptation in Europe MOKRECH Mustafa; KEBEDE Abiy; NICHOLLS Robert J.; WIMMER Florian; FEYEN Luc	conditions is presented and applied at the European scale.			
JRC97099 2015 Supporting sectorial adaptation to climate change through weather forecasts and natural hazard applications Pappenberger F.; EMERTON Rebecca; DI GIUSEPPE Francesca; SAN-MIGUEL-AYANZ Jesus; CLOKE Hannah L.; THIEMIG VERA; HIRPA FEYERA AGA; WETTERHALL F.; DUTRA E.; SMITH Paul; ZSOTER Ervin; ARNAL Louise; BAUGH Calum; STEPHENS Elisabeth; SALAMON Peter; VOGT Juergen; BARBOSA PAULO; LAVAYSSE CHRISTOPHE; REVILLA ROMERO BEATRIZ; PETROLIAGKIS THOMAS; LIBERTA' Giorgio; THIELEN DEL POZO Jutta	Examples of flood, drought, malaria and fire forecasts are used to illustrate how the ECMWF NWP forecasts can be used as a soft adaptation tool to reduce loss of life and economic damage during extreme events.	JRC	Tools	
JRC95886 2015 Strategies for adapting maize to climate change and extreme temperatures in Andalusia, Spain GABALDÓN-LEAL Clara; LORITE I.j.; MÍNGUEZ M.i.; LIZASO J.i.; DOSIO Alessandro; SANCHEZ Enrique; RUIZ-RAMOS Margarita	Climate projections indicate that rising temperatures will affect summer crops in the southern Iberian Peninsula. The aim of this study was to obtain projections of the impacts of rising temperatures, and of higher frequency of extreme events on irrigated maize, and to evaluate adaptation strategies.	JRC	Risk assessment	
JRC92028 2015 Time is of the essence: adaptation of tourism demand to climate change in Europe BARRIOS Salvador; IBANEZ RIVAS JUAN	In certain regions, most notably the Southern EU Mediterranean regions, climate conditions in 2100 could, lower tourism revenues for up to −0.45 % of GDP per year. Other areas of the EU, most notably Northern European regions would gain from altered climatic conditions, although these gains would be relatively more modest.	JRC	Risk assessment	
JRC82305 2015 Mainstreaming climate change in regional development policy in Europe: four insights from the 2007-2013 programming period HANGER Susanne; HAUG Constanze; LUNG TOBIAS; BOUWER Laurens M.	This paper reports on the current level of climate mainstreaming in EU regional development policy. We find that mitigation appears well mainstreamed in EU cohesion policies in normative terms, which is supported by	JRC	Monitoring	

Reference JRC	Brief content	Source of funding: JRC, H2020, ETC-CCA, Other	Knowledge gap: Costs; Risk assessments; Tools; Monitoring; Socio-economic trends; Other	Gap closed or further research needed?
	increasing financial investments. Adaptation however is hardly considered.			
JRC90743 2014 Integrated Assessment of Climate Impacts and Adaptation in the Energy Sector CISCAR MARTINEZ Juan Carlos; DOWLING Paul	This article reviews how integrated assessment models have estimated the impacts of climate in the energy sector, including the modelling of adaptation. While most of the literature has considered changes in space heating and cooling demand, few models have studied the impacts on the supply side of the energy sector.	JRC	Risk assessment	Modelling possible adaptation measures and assessing the effects of climate extremes on the energy infrastructure are topics that require further attention.
Poljanšek, K., Marín Ferrer, M., De Groeve, T., Clark, I., Faivre, N., Peter, D., Quevauviller, P., K., Boersma, K.E., Krausmann, E., Murray, V., Papadopoulos, G.A., Salamon, P., Simmons, D.C., Wilkinson, E., Casajus Valles, A., Doherty, B., Galliano, D., 2017. Science for disaster risk management 2017: knowing better and losing less. Executive Summary. EUR 28034 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-79-69673-2, doi:10.2760/451402, JRC102482	The scope of the report is divided conceptually into three distinct parts: understanding disaster risk, communicating disaster risk and managing disaster risk, forming the "bridge concept" of the report. Chapter 1 "Current status of disaster risk management and policy framework" aims to explain why recent global and European initiatives are beginning to seek help to strengthen society's resilience by using science and technology. The final Chapter 6 "Future challenges of disaster risk management" aims to inform decision makers and practitioners of existing science that should find its way into legislative form and practice as well as tackling a much more challenging purpose: to recognise knowledge gaps that could serve as valuable reference based input for a Horizon2020 call.	JRC, Directorate for Space, Security and Migration	Other: implementation	

EU 2013 Impact assessment: Impact Assessment – Part 1 – An EU strategy on adaptation to climate change, SWD(2013) 132 final (http://ec.europa.eu/clima/policies/adaptation/what/docs/swd_2013_132_en.pdf)

A7.5 Action 5: Further development of Climate-ADAPT

A7.5.1 Introduction - Climate-ADAPT

Action 5 in the European Adaptation Strategy includes the further development of the Climate-ADAPT portal as a 'one-stop shop' for adaptation information in Europe. This Action 5 includes (European Commission, 2013):

- Improved access to information and develop interaction between Climate-ADAPT and other relevant platforms, including national and local adaptation portals (2013/2014).
- Special attention for cost-benefit assessments of different policy experiences and to innovative funding, through a more close interaction with regional and local authorities and financial institutions.
- Work on the inclusion of the future Copernicus climate services (previously known as GMES – Global Monitoring for Environment and Security), expected to start in 2014.

The aim of Climate-ADAPT is to provide a knowledge base on climate adaptation in Europe. The main objective of the web-based adaptation platform is to provide a common knowledge base on climate change, climate change impacts, vulnerability and adaptation to support decision making on adaptation in Europe. (EEA, 2018[62]) Climate-ADAPT was launched online by March 2012.

Nowadays, in 2017, Climate-ADAPT provides knowledge and information by various functionalities. At the core, is the knowledge database. Reports, guidance, research projects, organisations, tools, indicators and many more can be found in the database. The users are guided through this European adaptation knowledge base by search criteria like adaptation sectors, climate impacts, adaptation elements, countries and years.

Other functionality is the European policy section, where up to date information on European adaptation policy is available, as well as state of affairs of mainstreaming climate adaptation in different European sector policies.

Users can also access an overview of information on climate adaptation funding.

Specific knowledge on adaptation at country-level, transregional level and city level is gathered and provided in separate sections. These sections wrap-up the state of affairs of adaptation at different policy levels.

Furthermore, there is a section that describes the networks and organisations at global, EU, transnational, national, regional and local level that are active in climate adaptation.

To support users in the adaptation process, Climate-ADAPT provides data by different indicators and tools that can be used for adaptation like the Adaptation Support Tool, the Case Study Search Tool, the Uncertainty Guidance, Map Viewer, the Urban Adaptation Support Tool, the Urban Vulnerability Map Book, the Guidelines for Project Managers and many more.

[62] EEA, 2018. Sharing adaptation information across Europe. Evaluation of the European Climate Adaptation Platform – Climate-ADAPT. Draft for Eionet consultation, 8 January 2018

Users can find inspiration on climate adaptation options in the adaptation options database and will find examples in the Case Study Search Tool.

Last but not least, Climate-ADAPT is the forum where actual information on news and events in the field of climate adaptation can be found. This news is also disseminated by newsletters.

Climate-ADAPT has welcomed about 267,000 visitors since the start of the monitoring period (March 1st, 2013 until April 2017).

A7.5.2 Specific evaluation questions

EQ39. To what extent does there continue to be a need for the Commission to further develop a one-stop shop, for adaptation information in Europe?

Is there still a need for a one-stop shop, for adaptation related information in the EU?

Yes, a need for a one-stop shop is still identified. First of all, the user statistics of the Climate-ADAPT website demonstrate a continuously increasing trend of the number of users since the start of the monitoring in March 2013. In March 2013, about 2868 users have accessed the Climate-ADAPT website, while in April 2017 about 11,680 users were monitored. In particular in the last months, 2,5 times more users have accessed Climate-ADAPT. To conclude, there is still a need for the Climate-ADAPT portal by current and future users (EEA, 2017).

Second, the user statistics indicate the most popular pages that have been consulted by the users. Most popular pages of the Climate-ADAPT portal are (EEA, 2017):

- The homepage
- The database search page
- The adaptation options
- The country pages

Needs that can be fulfilled by the current Climate-ADAPT portal are:

- Information about research and knowledge projects, policy documents
- Information on EU climate adaptation policy and climate adaptation in EU policies
- Information on national adaptation policy in the 28 European member states, cities and transnational collaborations
- Information on tools that can help policymakers to set-up an adaptation process: strategy, plan and actions
- Information on adaptation options and good practices (case studies)
- Information about organisations working on adaptation
- Information about available EU funding for adaptation
- Information on events and news
-

The EEA survey has identified that remaining user needs are (EEA, 2018[63]):

- Diversified knowledge for different types of users, e.g. less and more experienced users, and users at different levels of government

[63] EEA, 2018. Sharing adaptation information across Europe. Evaluation of the European Climate Adaptation Platform – Climate-ADAPT. Draft for Eionet consultation, 8 January 2018

- Knowledge that is useful in later stages of the adaptation process, such as 'how does adaptation work on the ground', and 'What role do the private sector and other non-state actors play in adaptation implementation and governance?'

The EEA evaluation of Climate-ADAPT provides the following input on the baseline for evaluation of the EU Adaptation Strategy. According to the White paper on adaptation in Europe (EC, 2009), there was information on adaptation in Europe available, but in a very scattered way. In 2012, at the launch of the platform, there were only five national adaptation platforms available. Research outcomes on adaptation were presented mainly on project websites.

Based on expert judgement and the outcomes of the internal assessment and the analysis of external feedback to the platform, some conclusions are drawn on the evaluation criteria. These messages can inform the on-going evaluation of the EU Adaptation Strategy, mainly related to Action 5) (Climate-ADAPT).

Is there still a need for the Commission to provide and/or facilitate a one-stop shop, for adaptation related information in the EU?

Yes, a need for the European Commission to further provide and/or facilitate a one-stop shop has been identified. These activities are (ETC/CCA Workplans -2013-2016):

- Thematic experts that submit new items in the Climate-ADAPT database: Thematic experts submit 300 items on an annual basis. At this moment, the database consists out of 1812 items. This support is needed in order to ensure that up to date sector information is provided by the platform (EEA, 2018).
- Thematic experts and stakeholders that describe case studies and adaptation options, to inspire others to take climate action. Next to the homepage, awareness campaigns and country pages are popular pages with about 800 and 600 users every month. (EEA, 2018).
- Activities to facilitate capacity building as for instance by Climate-ADAPT sessions in the annual Eionet meetings (e.g. 2nd workshop on climate change impacts, vulnerability and adaptation – October 2013 (EEA, 2013a)); expert meetings on adaptation platforms (e.g. June 19th 2013 – national adaptation platforms expert meeting), webinars, training activities: the number of participants for these activities is increasing or remaining stable over the past years.
- Climate-ADAPT newsletter to inform about new information: the newsletter is sent to 5000 persons and is consulted on the Climate-ADAPT website on average 600 times each month (EEA, 2018).

What is the nature of the support that is still needed?

- Diversified knowledge for different types of users, e.g. less and more experienced users, and users at different levels of government
- Knowledge that is useful in later stages of the adaptation process, such as 'how does adaptation work on the ground', and 'What role do the private sector and other non-state actors play in adaptation implementation and governance?'

EQ 40. To what extent has the further development of Climate-ADAPT led to better informed decision making

The outcomes of all three objectives of Climate-ADAPT have shown, that there is a continuous need for Climate- ADAPT to build the knowledge base, to share it across Europe, to assist the uptake of this information and to support cooperation. The number of Climate-ADAPT users is continuously growing (web statistics), users have specific information requests (user/provider survey), and the 17 Climate-ADAPT use cases have

shown that all providers of these cases have indicated further needs to be supported by Climate-ADAPT. (EEA evaluation, 2018)

What further updates to Climate-ADAPT have happened through the implementation of the EU Adaptation Strategy, over the period 2013 to 2016?

	2013	*2014*	*2015*	*2016*
Functionality update	Advice on further IT developments Homepage News and events (linked with a future newsletter, see below) Case studies (submission form and presentation on map) Submission forms for all information types (database items) User rating Database search (e.g. including year of publication) Document system Map viewer	Maintenance of IT IT functionality improvements – revised website	Upgrade of underlying software for content management Urban functionalities added User interactivity enhanced	IT system transferred to PLONE – new content management system Improved search function Improved overview and access to country and regions' information; Improved navigation structure of the platform; Case studies linked with adaptation options and vice versa
Content update	Database items added: Submitting and quality check of new items in the Climate-ADAPT database Reviewing existing items Tool improvement: Specific tools from different EU research projects like MEDIATION and CLIMSAVE included Guidance on NAS linked with the Climate-ADAPT adaptation support tool AST revised Dedicated tools for various stakeholders of Climate-ADAPT	Database items added: Submitting and quality check of new items in the Climate-ADAPT database Reviewing existing items Country profile pages updated Tools: Key results and tools from European projects included Adaptation costs: Information on adaptation costs included Case studies: Case studies on relevant sectors reviewed and added	Database items added: Submitting and quality check of new items in the Climate-ADAPT database Reviewing existing items Case studies: Case studies on relevant sectors reviewed and added Adaptation options: Adaptation options enhanced News/event pages updated Country profile pages updated Update EU policy pages, tool pages, regions pages,	Database items added: Submitting and quality check of new items in the Climate-ADAPT database Reviewing existing items Case studies and adaptation options: Case studies/adaptation options on relevant sectors reviewed and added - – focus on specific topics like green infrastructure, ecosystem based adaptation, natural water retention measures and DRMKC Leaflet illustrating 8-10 case studies Adaptation options for mountain areas

	explored Case studies: Case studies on relevant sectors reviewed and added Urban vulnerability mapbook: Urban vulnerability indicators and tools to map urban vulnerability implemented	Adaptation options: Adaptation options enhanced CIRCLE-2 infobase linked Newsletter launched	cities pages, research project pages	Mayors adapt city profiles included Newsletter and events updates Update countries pages and tool pages Existing content was updated and further improved (e.g. the information on EU sector policies, adaptation profiles of the EEA member states, overview on adaptation at transnational level, the MRE guidance in the Adaptation Support Tool as well as the interactive urban vulnerability maps). Link to C3S and presenting results of pre-operational Copernicus projects EU research projects and Interreg projects systematically included

Source: ETC/CCA workplans 2013, 2014, 2015 and 2016; EEA 2013c.

How is this monitored?

It is not monitored if Climate-ADAPT knowledge provision results in improved decision-making. It is monitored if access to Climate-ADAPT knowledge has increased by user statistics and by feedback from users. These user involvement activities took place in (ETC/CCA workplans 2013-2016):

- 2014 – workshop on adaptation platforms in Europe
- 2014 – Climate-ADAPT science/policy forums
- 2014 - working paper on analysis of Climate-ADAPT user and possible improvements
- 2015 – internal meeting on Climate-ADAPT user statistics to develop improvements
- 2015 – Climate-ADAPT session during ECCA 2015
- 2015/2016 – session on EnviroInfo and ITC4S 2015 and 2016 conference
- 2016 – Climate-ADAPT session during Adaptation Futures
- 2015 and 2016 – virtual meetings and EIONET workshop related to Platform development
- 2016 – expert meeting connected to annual Eionet workshop

To what extent have these developments contributed to more informed decision making under the Strategy?

(1) During workshops organized by the EEA, users of the Climate-ADAPT tool were invited to share their experiences on how they use the Climate-ADAPT tool in their decision making.

(2) In 2017, the EEA was gathering testimonials of Climate-ADAPT users to demonstrate how the uses of the information can lead to better informed decision making (EEA. 2017).

(3) Feedback of users is requested during specific workshops and consultations

(4) The thematic experts that provide information in Climate-ADAPT meet on an annual basis to provide suggestions to improve the user-friendliness of Climate-ADAPT.

According to this information, it is clear that Climate-ADAPT assisted to more informed decision making.

EQ 41. What other factors may have led to better informed decision making on climate related issues?

The user/provider survey as well as in particular the 17 Climate-ADAPT use cases have shown that Climate- ADAPT is used in various policy processes, and the Climate-ADAPT use cases provided in-depth insight in how the platform has led to better informed decision making under various specific adaptation challenges in Europe. (EEA evaluation, 2018)

trusted source of information. A barrier is the need to submit and use only information in English.

What other factors may have influenced the availability of information on climate change for use in decision making?

External factors that have influenced the availability of information for decision making are:

1. EU and national funded projects: within FP7, H2020, JPI Climate, Interreg, projects on climate change are funded, bringing together many stakeholders that develop, share and apply knowledge that is relevant for climate change decision making. For example,the BEWATER project has resulted in adaptation strategies and options that thanks to close collaboration with policymakers and practitioners is currently resulting in integration in policy plans. In addition, consultancy projects financed by national ministries result in improved decision making as well.
2. National adaptation platforms: the emergence of more and more national adaptation platforms that collect data and studies on adaptation that is relevant for this specific country also result in improved decision making (EEA, 2016).
3. Boundary organisations: these organisations play a role in improving decision making by 'translating' scientific knowledge on adaptation to policy in various ways .

What has been their relative strength?

Were these factors expected or unexpected when the Strategy was launched?

EQ 42. What drivers/barrier stood in the way of efforts to bridge the knowledge gap and better informed decision making?

Success factors are the transparent and systematic development of Climate-ADAPT that has led to a brand as a trusted source of information. A barrier is the need to submit and use only information in English. (EEA evaluation, 2018)

What drivers have stimulated, or barriers have stood in the way of efforts to further develop Climate ADAPT? How did these drivers/barrier affect implementation?

Availability of information on Climate-ADAPT is hampered by (EEA, 2013d):

1. Language: documents in the Climate-ADAPT portal are supposed to be in English, or having an English summary. This results in the elimination of items that are reported in other languages than English.

2. The procedure to submit items: when a stakeholder aims to submit items, an Eionet account has to be set-up. Furthermore, the stakeholder has to be guided in how to submit an item. It was mentioned that this takes a lot of time, resulting in discouraged stakeholders to further submit items
3. Online availability of information: not all relevant climate change information for improved decision making is publicly accessible online. These documents are not included in Climate-ADAPT.
•

Availability of information on Climate-ADAPTis encouraged by:

1. National representation: the country profiles are updated and reviewed by the national respresentatives of the EIONET group. This results in accurate information on the current state of affairs of the national adaptation strategy, plans and processes.
2. Geographical diversity of the Thematic Experts: the Thematic Experts of the European Topic Centre are coming from a wide range of European countries. Each of them are also working in local and national adaptation projects, which ease the development of case studies from different member states as well as access to items to be submitted in the database.
3. Aligning with other initiatives: Mayors Adapt: the strong collaboration between the former Mayors Adapt initiative and Climate-ADAPT has resulted in a well elaborated urban section on the Climate-ADAPT portal.
4. Urban vulnerability mapbook: the mapbook enabled the harmonized and uniformed access to available data that is relevant for urban policymakers

EQ 43. To what extent has the further development of climate ADAPT led to an increased understanding of climate change risks and better informed decision making

The internal assessment of the Climate-ADAPT database has shown, that Climate-ADAPT captured the growth of knowledge in the evaluation period, that is related to CCIVA, published in Europe in English, and publicly available, in terms of quantity, timeliness and in all its diversity. More specifically, it gathered also the knowledge that was generated through the EU funding streams LIFE, FP7 and Horizon 2020, as well as Interreg. The knowledge is shown in the policy context in which it is relevant. Research outcomes can be searched via metadata through the database. The user/provider survey showed the added value they gained from making information visible on Climate-ADAPT beyond project or initiative websites. Nearly half of the respondents stated that they made their specific information more relevant, and that users gained a better understanding of their work, a few got even feedback from their users.

The survey has shown that Climate-ADAPT knowledge is used in a variety of policy processes supporting decision making, such as for developing adaptation plans and strategies but primarily to inform the policy processes by developing evidence documents and methodologies (such as on indicators and case studies) feeding into the policy processes. Furthermore, participatory processes. A specific survey, carried out for the case studies, indicated that these inspiring examples of implemented adaptation measures across Europe were used in the same variety of policy processes. The selected Climate-ADAPT use cases confirmed the same pattern, showing that the Climate-ADAPT knowledge was used in decision making at all governance levels in Europe, at all stages of the adaptation policy cycle, and across Europe.

Climate-ADAPT supported mostly governmental decision makers at all levels, working on adaptation, but sectoral experts to a smaller extent (user/provider survey, ad-hoc feedback). (EEA evaluation, 2018)

Has the further development of Climate ADAPT led to better informed decision making?

xxx

EQ44. How adequate were the resources for Action 5: Further develop a one-stop shop for adaptation information in Europe?

Between 2013 and 2016, annual resources for the Climate-ADAPT management at the EEA included one full time project manager, other staff within EEA's Impacts, Vulnerabilities and Adaptation Group for some of their time, one IT expert (less than full time) and the annual activities by ETC CCA funded by EEA on content development.

In addition DG CLIMA has provided various contracts to support dissemination and use of Climate-ADAPT, as well as for development of functionalities through IT contracts (EEA, 2017).

The management of the platform by an ETC helps to have an efficient link to the EEA Member countries. EEA is the manager of the platform, and the role of ETC is to support EEA in managing the platform. EIONET guarantees the link with EEA member countries. A lot of coordination effort is needed to manage the platform with a range of ETC/CCA experts, mainly working remotely on all aspects of the platform development. Many IT related problems were overcome by the migration to the same content management system as used by EEA for its main website. Climate-ADAPT can benefit from all regular EEA IT services. Prioritising the IT support of the Mayors Adapt Initiative in 2014 has led to a delay in improving the user friendliness of the overall platform. (EEA evaluation, 2018)

Has the level of support been sufficient to turn CLIMATE ADAPT into a one-stop shop for adaptation information in Europe?

The resources for Climate-ADAPT development are the following. This includes both EEA budget as well as cofinance from ETC partners:

2013	2014	2015	2016	Total
Climate-ADAPT 247.740,38	Climate-ADAPT 234.165,25	Climate-ADAPT 183.934,06	Climate-ADAPT 207.628,41	Climate-ADAPT 873.468,1
Urban vulnerability mapbook: 47.754,98	Urban vulnerability:			

Coherence

EQ 45. To what extent is the development of comprehensive adaptation strategies, as encouraged by the EU Strategy, coherent with relevant:

- EU legislation and policies
- International initiatives
- National initiatives
- Regional or sub-nations initiatives

This question is transformed into:

To what extent does Climate-ADAPT support coherence of adaptation strategies with relevant:
• EU legislation and policies
• International initiatives
• National initiatives
• Regional or sub-nations initiatives

The Climate-ADAPT use cases and the survey have shown that the platform was developed in close consultation with all key stakeholders. However, there is a need to extend the outreach of the platform towards sectoral users and providers to improve the mainstreaming of adaptation into EU policy sectors (user/provider survey).

The platform has shown to be complementary to other platforms in terms of the provision of CCIVA knowledge, such as to Climate services, in terms of sectors (such as to other EU level sector platforms, and in terms of governance levels, i.e. to adaptation platforms at transnational and national levels. Information is not doubled by Climate-ADAPT, but users are guided to the complementary information sources via Web links on Climate- ADAPT. However, in particular the links to sector knowledge platforms need to be further improved. (EEA evaluation, 2018)

Climate-ADAPT is set-up in a way that coherence is encouraged (Climate-ADAPT portal, 2017):

- With EU legislation and policies: the EU sector policies section is updated every two years. This section describes how climate adaptation is mainstreamed in each of these policy domains. This section inspires national policy makers to mainstream climate adaptation in national legislation. Evaluation: Climate-ADAPT supports coherence
- International initiatives: The section on global platforms for climate adaptation is limited. There is no reference to global initiatives like GACSA – Global Alliance for Climate-Smart Agriculture or UNEP Finance Initiative. More can be done to support member states to connect with international initiatives and networks. Evaluation: Climate-ADAPT support is not fully coherent
- Country pages – adaptation policy: The country pages describe in a structured way current state of affairs in national adaptation policy. These country profiles are updated regularly. Evaluation: Climate-ADAPT supports coherence
- National initiatives – adaptation platforms: some member states are developing national adaptation platforms. EEA organized workshops in 2014 and 2016 to provide an update on recent developments of EU, transnational and national examples as well as to investigate progress and possible next steps (EEA, 2016). Evaluation: Climate-ADAPT supports coherence
- Regional and sub-nations initiatives: The cities section demonstrates cities that have signed Mayors Adapt Convenant. City profiles describe the situation and ambitions of each of the cities as well as a good practice. These city profiles are very useful to inspire other cities to follow their example. There is not that much knowledge support for cities or towns that have limited financial capacities to start an adaptation process. There is also not much support on how to organize regional collaboration in the adaptation processes. Evaluation: Climate-ADAPT support is not fully coherent.

In addition to this, Climate-ADAPT intensely supports transnational climate adaptation, collaboration for transboundary adaptation plans and measures. This section refers to transnational regions and describes the many projects and initiatives that take place in transboundary adaptation.

To conclude, Climate-ADAPT is clearly coherent with:

- The EU adaptation strategy because the objectives are clearly communicated on the website, including referring to existing EU initiatives.
- The intentions to mainstream climate adaptation in EU sector policies, because the mainstreaming actions are described on Climate-ADAPT and supported by relevant documents, reports, indicators, resources and multimedia.
- Mayors ADAPT initiative, since the knowledge collected in Mayors ADAPT is fully integrated in Climate-ADAPT

What are the areas where there is less coherence?

1. International initiatives
2. Regional and sub-nations initiatives

What is missing so far on the Climate-ADAPT portal is knowledge on (governance) mechanisms to foster coherence between adaptation plans of different governmental levels as well as knowledge on how to set up and carry out regional collaboration on climate adaptation. There is also knowledge missing on how national and urban adaptation plans can be more coherent with private sector plans and initiatives and vice versa. There is a need to disseminate this knowledge in future developments of Climate-ADAPT

What could be done to improve coherence in these areas?

No input from literature review.

EU added value

EQ 46. To what extent have the Commission's activities to further develop Climate ADAPT, as part of the EU Strategy, added value compared to what would have resulted from an action at regional or national level?

To what extent have the Commission's activities to further develop Climate ADAPT, as part of the EU Strategy, added value to existing horizontal and vertical actions at MS level?

The q24 of the survey as well as the use cases have shown that Climate-ADAPT adds value by providing the EU reference frame for the "state-of-the-art" of adaptation in Europe, supporting peer-to-peer learning and increasing the coherence of the EU countries in terms of better informed decision-making. (EEA evaluation, 2018)

The added value of Climate-ADAPT is (EEA, 2013b):

- providing the European perspective – Climate-ADAPT enables to keep track on what other member states are doing related to adaptation policies, as well as what is going on at the European level
- providing visibility and allow learning from each other (peer to peer) by case study description
- providing the "whole picture" of adaptation: the majority of information providers and users are working often in a very specialized way on adaptation; Climate-ADAPT aims to show the complexity of climate change adaptation to enable users to check their status in a systematic way and thus to support a better informed decision making.

The added value of Climate-ADAPT is that national resources are often not able to meet the scope and quality of information like in Climate-ADAPT (ETC/CCA working paper, 2014; EEA, 2013b). Furthermore, Climate-ADAPT provides information in a harmonized way, which is of added value because it increases the accessibility to the knowledge as

well as comparison. And Climate-ADAPT provides information on the European context of climate adaptation (EEA, 2013b).

With regard to existing horizontal actions:

Many member states are developing their own national adaptation platforms. At this moment, in 2017, about 15 member states have their own adaptation platform. The benefit of these national adaptation platform is that knowledge is provided in the national language.Climate-ADAPT plays a role in sharing experiences among national adaptation platforms about how to set-up and maintain a national adaptation platform by the EEA expert workshop in 2016 (EEA 2016) and the EEA report on adaptation platforms in 2015 (EEA 2015).This sharing of experiences was considered to be very valuable (EEA, 2016). Whereas the national adaptation platforms mainly provide national data on climate impacts and vulnerability in the format of maps, Climate-ADAPT has the added value to disseminate knowledge on adaptation strategies and European adaptation practices. This knowledge, that Climate-ADAPT collects, can be used in the national adaptation platforms as well. Harmonisation between Climate-ADAPT and the national adaptation platforms should be further encouraged (ETC/CCA Working Paper, 2014)

Climate-ADAPT has certainly added value for these member states that do not have a national adaptation platform (EEA, 2016; EEA, 2015).

With regard to vertical actions:

The added value of Climate-ADAPT for vertical actions is that is possible to find information for each governance level: transnational regions, countries, cities; as well as to other policy sectors (Climate-ADAPT evaluation report) Information is described in a systematic way, which enables comparison across member counties. This results in an interesting database for inspiration for adaptation and to learn lessons about practices from other member states and cities.

Literature

EEA, 2013a. 2nd workshop on climate change impacts, vulnerability and adaptation: in Western Balkan countries. EIONET meeting. October 2013. Belgrade.

EEA, 2013b, National adaptation platforms' experts meeting. June 19th, 2013. Copenhagen, Denmark

EEA, 2013c, Climate-ADAPT progress by June 2013. EEA, Copenhagen, Denmark.

EEA 2013d, Climate-ADAPT Maintenance Training Manual. Copenhagen, Denmark.

EEA 2015, Overview of climate change adaptation platforms in Europe. EEA Technical Report. No 5/2015.

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EEA, 2017 – evaluation of Climate ADAPT

A7.6 Literature review: Action 6. Facilitate the climate-proofing of the Common Agricultural Policy (CAP), the Cohesion Policy and the Common Fisheries Policy (CFP)

A7.6.1 State of play on Action 6

Action 6 of the EU's Adaptation Strategy calls to "facilitate the climate-proofing of the Common Agricultural Policy (CAP), the Cohesion Policy and the Common Fisheries Policy (CFP)". The funds supporting these policy areas - the European Agriculture Fund for Rural Development (EAFRD) and the European Agriculture Guarantee Fund (EAGF) for the CAP, the European Regional Development Fund (ERDF), the Cohesion Fund (CF) and the European Social Fund (ESF) for Cohesion Policy, and the European Maritime and Fisheries Fund (EMFF) for the CFP[64] – together make up a large share (around 70 per cent) of the EU's total budget in the 2014-2020 programming period. As such, mainstreaming climate change adaptation (and mitigation) considerations into the investments supported by these funds has important implications on the EU's effort to tackle and prepare for climate change.

A7.6.1.1 Tools supporting Action 6

Guidance provided by the Commission

As required by Action 6, alongside the Adaptation Strategy **three key technical guidance documents were published by the European Commission** to help managing authorities and other national stakeholders within the EU Member States to effectively consider climate change adaptation within the programming cycle of the CAP (EC 2013b), the Cohesion Policy (EC 2013c) and the CFP (EC 2013a). Two of the guidance documents largely build on a study by Hjerp et al. (2012) which assessed the potential contributions of the CAP and Cohesion Policy to climate change adaptation in details.

The three technical documents provide a step-by-step guidance for managing authorities to integrate climate change adaptation at the various stages of the programming cycle, i.e. programming stage, project preparation stage, project evaluation and selection stage, project implementation stage and monitoring and evaluation stage. Furthermore, a set of good examples of projects and approaches from the previous 2007-2013 programming period are presented. The documents were published in April 2013, and as such had the potential to influence the development of the MS Operational Programmes (OPs) / Rural Development Programmes (RDPs)[65]. Furthermore, they can provide support at the later programming stages. Nevertheless, **it is challenging to assess the impact of the documents on the ground and the extent to which managing authorities made/make use of them**. A potential constraint is that the documents were made available only in English.

[64] Five out of six of these funds – excluding the EAGF - are also referred as the European Structural and Investment Funds (ESIF).
[65] Due to the delays of the regulatory framework of the 2014-2020 Multi-annual Financial Framework (MFF), which had an impact on the timely agreement on the Partnership Agreements (see below), most of the OPs/RDPs were agreed with the Commission after 2014 (i.e. the start of the new programming period).

In addition to the adaptation-specific technical documents **an extensive set of guidance was produced by the Commission on climate mainstreaming in the ESI Funds** – including both mitigation and adaptation (see EC 2015b). There are two sets of factsheets for each ESI Fund: (i) the first set is called 'Potential for Climate Action – Examples of how to mainstream climate action and the potential for doing so' (e.g. EC2015c), and (ii) the second titled 'Assessment of climate action – How to assess the mainstreaming of climate action potential in Operational Programmes' (e.g. EC 2015a). These factsheets complement the specific adaptation guidance documents as they also provide information on potential adaptation actions, including for instance a set of project examples.

These guidance documents appear to be well-developed and thus in principal have the potential to provide effective support for the managing authorities. Nevertheless, it remains again a question whether they are actually used on the ground. In order to maximise the effectiveness of such guidance documents one option would be for the Commission to assess the practical impacts of the documents on programmes and projects.

Finally, while it cannot be considered as guidance documents in a similar sense as the above the Commission's Position Papers of the MS Partnership Agreements which suggested country specific recommendations also served as an enabling factor to integrate climate change adaptation into the current programming period (COWI 2017).

The 20% climate mainstreaming target

In February, 2013 the European Council reached an agreement on the outline of the 2014-2020 EU Multi-annual Financial Framework (MFF) and has decided that (EUCO 2013):

> "Climate action objectives will represent at least 20% of EU spending in the period 2014-2020 and therefore be reflected in the appropriate instruments to ensure that they contribute to strengthen energy security, building a low-carbon, resource efficient and climate resilient economy that will enhance Europe's competitiveness and create more and greener jobs."

The introduction of this 20% headline target translated into two commitments: (i) the need to mainstream climate change considerations into all EU funding programmes, and (ii) a requirement that at least 20% of EU resources should be spent on climate objectives. As such, **the target served as a stimulus to enhance and foster climate considerations by the managing authorities[66] and Commission services[67] in all EU programmes**. Even though climate change mitigation and adaptation actions were not articulated separately in the tow-fold commitment (see more below) **the establishment of the target complemented Action 6 of the EU Adaptation Strategy**.

At the same time, the European Court of Auditors has recently published an assessment of the 20% target and warned that "there is a serious risk that the 20% target will not be met without more effort" (ECA 2016). In order to further understand the experience of climate mainstreaming and tracking (see below) in the current programming period and to prepare for the new post-2020 MFF the Commission launched a service request[68] last year and the results of the study are expected to be published later in 2017.

[66] In the case of funds which are under shared management between the Commission and the Member States, i.e. all ESI Funds.
[67] Primarily in the case of funds which are directly managed by the European Commission.
[68] Climate mainstreaming in the EU budget: preparing for the next MFF

Tracking of climate-related expenditure

The 20% headline target requires the tracking of climate-related expenditure in the 2014-2020 EU budget for which a specific methodology was developed by the Commission[69]. The methodology builds on the OECD Rio markers (see OECD 2011) and **groups EU expenditure into three categories by assigning the following climate markers**:

- "A 100% climate marker applies to expenditure supporting climate action as the primary objective. This means climate action is fundamental to the design and impact of the activity and is an explicit objective of the activity; e.g. wind farms, energy efficiency, adaptation to climate change measures, cycle tracks.
- A 40% climate marker applies to expenditure where climate action is a significant, but not predominant objective. Climate action, although important, is not the principal reason for undertaking the activity; e.g. air quality measures, enhancement of biodiversity, sustainable transport modes, such as railways, inland water ways, clean urban transport systems.
- A 0% climate marker applies to expenditure that does not target climate action, e.g. motorways and roads, airports, waste management" (EC 2016c).

The methodology is currently applied at only ex ante level (i.e. at the level of commitments) and does not differentiate between climate mitigation and adaptation objectives. The former means that no comprehensive information is available on the achieved results as plans might not always translate into actual spending. Furthermore, the latter makes it very challenging to draw overall conclusions on how much of the EU budget is committed to mitigation and adaptation actions separately.

The approaches taken by the different Directorate-Generals to track climate-relevant expenditure under the various EU funds greatly differs primarily as a result of the different management modes (shared or central management) and the level of details available for the tracking exercise (e.g. whether tracking can be applied at project-by-project level, at the level of types of investment etc.). As such, the accuracy of the results of the ex-ante tracking can be questionable in some programming areas (e.g. the EAFRD (ECA 2016) – see more below).

Overall, the mid-term review of the MFF concluded that 18.9% of the total EU budget is planned to be allocated to climate objectives, which is less than the 2013 target (EC 2016b). An overall figure for expenditure specifically on adaptation actions is not available.

The Common Provisions Regulation (CPR)

The Common Provisions Regulation (CPR)[70] applies to all ESI Funds and includes a set of newly established requirements, which serve as important tools to support climate mainstreaming. These requirements are also translated into the fund-specific regulations on the ERDF[71], CF[72], ESF[73], EAFRD[74] and EMFF[75].

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[69] For the background study supporting the Commission in this process see Withana et al. (2014).
[70] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, 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 European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006.
[71] Regulation (EU) No 1301/2013 on the ERDF
[72] Regulation (EU) No 1300/2013 on the CF
[73] Regulation (EU) No 1304/2013 on the ESF
[74] Regulation (EU) No 1305/2013 on support for rural development by the EAFRD

Article 8: Sustainable Development

Climate action is explicitly considered in Article 8 of the CPR on sustainable development. The Article sets out that "**Member States and the Commission shall ensure** that environmental protection requirements, resource efficiency, **climate change mitigation and adaptation**, biodiversity, disaster resilience, and risk prevention and management **are promoted in the preparation and implementation of Partnership Agreements and programmes**". The Article also refers to the tracking methodology.

While it is challenging to assess the implementation of Article 8 on the ground it seems to serve as a driving force for climate change adaptation considerations.

Partnership Agreements (PA)

On the basis of the Common Strategic Framework (CSF), which provides a strategic orientation of the programming at the MS and regional levels, Member States are required to develop Partnership Agreements (PAs), which has to be agreed with the Commission. Article 15 of the CPR sets out the requirements for PAs and requires that **Member States should include (i) an indication of expected results per thematic objective (see below) and (ii) an indicative allocation of support per fund per thematic objective, as well as a total indicative amount of support for climate objectives**. It also requires MS to explain how Article 8 on sustainable development will be implemented.

A comparison of the first and final versions of the PAs by COWI (2016) showed an increase in focus on climate change considerations as a whole (without differentiating between mitigation and adaptation). Nevertheless, the delay in establishing the regulatory framework of the MFF has limited this potential. **While the 20% target seemed to play an important role in fostering climate objectives the role of the EU Adaptation Strategy, and in particular Action 6, in this process is not entirely clear**.[76]

Thematic Objectives (TO)

The CPR defines elven Thematic Objectives (TO), which set the scope of the PAs and the OPs/RDPs. **Thematic objective 5 is specifically focusing on adaptation ("Promoting climate change adaptation, risk prevention and management)** but there is also potential in other TOs to contribute to adaptation objectives (e.g. TO6: Preserving and protecting the environment and promoting resource efficiency).

The total cumulative allocations for TO5 under the ESI Funds are estimated to be €41.2 billion (around 6.5% of total ESIF), with the largest sources coming from the EAFRD (75.7%), followed by ERDF (13.8%), and CF (10.6%) (EC 2017). Out of all TOs the total allocations for TO5 are the 9th largest. According to the funds-specific regulations the other two ESI Funds, the ESF and the EMFF, do not contribute to TO5 (see more below). However, it should be noted that there is not a perfect overlap between climate adaptation expenditure, and expenditure under TO5; some expenditure under TO5 will not have a specific adaptation impact (for example, risk prevention unrelated to climate change); and interventions under other thematic objectives can have a significant adaptation benefit.

Ex- ante conditionalities (ExAC)

The establishment of ex-ante coniditionalities (ExAC) is also a novelty in the 2014-2020 programming period. The main aim of the ExAC is to ensure that the policy, regulatory

[75] Regulation (EU) No 508/2014 on the EMFF
[76] It should be mentioned that the COWI (2016) study which assessed climate mainstreaming in the ESI Funds have not mentioned the EU Adaptation Strategy at all. The more recent COWI study (2017) focusing entirely on climate adaptation mainstreaming into ESI Funds mentions the Adaptation Strategy as an enabling factor.

and institutional frameworks are fit for purpose and can support the effective and long-term implementation of investments. For TO5 the ExAC requires MS to put in place national or regional risk assessments, which should:

- include a description of the process, methodology, methods, and non-sensitive data used for risk assessment as well as of the risk-based criteria for the prioritisation of investment;
- include a description of single- risk and multi-risk scenarios;
- take into account, where appropriate, national climate change adaptation strategies

Although the ExAC related to climate change adaptation could serve as an important driving tool the COWI (2017) study indicates that progress has been slow in MS in complying with the ExAC and thus it might not have reached its potential in mainstreaming adaptation.

Common output indicators

In order to address the weaknesses in the previous programming period's monitoring framework **for the 2014-2020 ESI Funds a set of common output indicators were introduced**. Some of these are directly relevant for climate change adaptation (e.g. population benefitting from flood protection measures or population benefitting from forest fire protection measures in under ERDF) which also help to focus the managing authorities' attention on adaptation actions and outcomes.

Nevertheless, in general the establishment of climate change adaptation indicators is more challenging than for climate change mitigation, which is also reflected in the lack of high level targets for adaptation in EU climate policy.

A7.6.1.2 Results of climate-proofing

While the EC climate-tracking methodology does not offer insights into the extent to which climate change adaptation considerations have been mainstreamed into EU funds, in this case to ESI Funds, as it only delivers aggregate figures on climate mainstreaming, a COWI (2016) study attempted to provide estimates on this aspect building on the assessment of 28 PAs and more than 500 programmes prepared by the MS. **The study suggests that 1.6% of the ERDF, 4.7% of the CF and 7.6% of the EAFRD were allocated directly to climate change adaptation actions**. Furthermore, it notes that a large share (44%) of EAFRD actions have the potential to indirectly contribute to adaptation objectives and as such the overall share is likely to be significantly higher. A more recent study by COWI (2017) provides an overall estimate of **all ESIF allocations to climate adaptation at €62. 1 billion**. It estimates that allocations to TO5 are €6.3 billion and €1.1 billion from the ERDF/CF and the EAFRD, respectively; while allocations to adaptation actions through other Thematic Objectives amount to €4.9 billion in the case of ERDF/CF and €49.8 billion from EAFRD.

While a sound framework with multiple components (see sectionA7.6.1.1) seems to be in place enabling the climate-proofing of ESI Funds it should be highlighted that the uptake of adaptation actions also largely depend on Member State actions and the extent to which adaptation is embedded in their programs. The funds specific observations and the status of the climate-proofing exercise are presented in the sections below.

Climate-proofing the CAP

According to the COWI (2016) report **the EAFRD is the only ESI Fund 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 Adaptation Strategy there are two important caveats. Firstly, **while adaptation seems to be well integrated into Rural Development Programmes, in most cases it is not explicitly mentioned as an objective of the specific measures** (COWI 2016). While many measures (e.g. targeting biodiversity, soil, and water use) have the potential to

support climate adaptation, whether this actually takes place on the ground is a question which would need to be answered by an ex post evaluation of programmes. Secondly, **the tracking methodology developed for EAFRD raises concerns about over-estimations**; the ECA (2016) have suggested an alternative and more conservative use of the EC climate markers and concluded that this could reduce the overall climate allocations under the EAFRD by 42%.

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**, such as payments for agri-environment-climate commitments, or support for organic farming.[77] Nevertheless, this minimum requirement represents a rather low level and includes measures which do not appear to have a significant impact on the achievement of climate objectives[78].

The EAGF, which funds the CAP's direct payments, is not part of the ESI Funds. **Climate considerations are included via the greening component (30% share of total direct payments) and cross-compliance (applied to the remaining 70%).** According to the Commission's calculations around 20% of direct payments can be considered climate relevant; nevertheless the ECA (2016) suggests that the assumptions used for this estimate lack sound justification, in particular for measuring the climate relevance of the non-greening component. With the application of more conservative estimates the total contribution can be reduced by € 9 billion from €47.1 billion to € 38 billion.[79] The principal climate relevant impact of the greening measures is the carbon sequestration represented by the permanent grassland measure; adaptation impacts are less relevant indirectly covered byto greening measures, but are and to some extent present in elements of the cross-compliance requirements.

Climate-proofing the Cohesion Policy

While the ESF is not targeting TO5[80] both the ERDF and the CF provide contributions to the climate adaptation objectives. The climate tracking system applied under Cohesion Policy is the most sophisticated; the climate markers are applied to a thematic list of 123 intervention codes[81] 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**

[77] Article 59.6 of Regulation (EU) No 1305/2013 on support for rural development by the EAFRD
[78] Climate mainstreaming in the EU budget. Preparing for the next MFF : final report – Study. Available at https://publications.europa.eu/en/publication-detail/-/publication/1df19257-aef9-11e7-837e-01aa75ed71a1/language-en
[79] For more details of the calculations see page 30 of ECA (2016).
[80] As the ESF supports social and employment objectives climate change is not considered to be a primary objective. 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 rather than to adaptation.
[81] 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 European Social Fund, the Cohesion Fund, 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 European Social Fund, the Cohesion Fund 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 the European Structural and Investment Funds

infrastructures") was introduced, to which the 100% climate marker is 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 this intervention only accounts as 40%.

According to the COWI (2016) estimates, which build on the amount of allocations for the relevant intervention codes, **€6 billion (€3 billion each) has been allocated to adaptation objectives**, which accounts for 11.2% of the total ERDF and CF allocations. Furthermore, another €4 billion was estimated to provide indirect climate (mitigation and adaptation) benefits. The review of the OPs showed that nearly half of them addressed climate change adaptation in a strategic way. Most adaptation relevant allocations for targeted to flood protection measures.

As **the ESF supports social and employment objectives climate change is not considered to be a primary objective and 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 rather than to adaptation
In relative terms, while adaptation seems to be play a less prominent role in the ERDF than in the CF support from the CF can be only applied in a limited number of Member States.[82] **Those MS who cannot receive funds from the CF seem to have made a greater use of the EAFRD for their adaptation actions** (COWI 2016) although the actual adaptation impacts of these actions are not always clear (see above).

Another interesting aspect is the **urban dimension of Cohesion Policy**, which is primarily supported by the ERDF, but also through CF and ESF. In order to strengthen the role of the ERDF in sustainable urban development a target of 5% was set as a minimum share of ERDF which need to be spent on integrated urban strategies. Furthermore, the emphasis on cities in ERDF investments have been increased as about €15 billion from the ERDF is planned to be provided for cities (Nesbit, Paquel & Illes 2017). At the same time, the EEA (2016) 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". While green infrastructure has the potential to deliver adaptation benefits COWI (2016) pointed out that in the ERDF and CF OPs most of the green infrastructure actions were described only in general terms and the actual implementation of these actions are thus uncertain. Given the above factors, currently there seems to be further potential for Cohesion Policy support to ambitious adaptation action in cities.

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") should be at least 20% in more developed regions, 15% in transition regions, and 12% in less developed regions.[83] A similar ear-marking is not in place for the adaptation objective and according to COWI (2017) this thematic concentration might have resulted in a bias towards mitigation activates at the expense of adaptation objectives.

Adaptation objectives are also an important component of the European Territorial Cooperation (ETC) goal, and is supported by ERDF. ETC has been further strengthened in the 2014-2020 programming period and MS are encouraged to cooperate at the macro-regional and sea-basin level. In addition to the cross-border and

[82] Support from the Cohesion Fund can be only used by Member States whose Gross National Income (GNI) per inhabitant is less than 90 % of the EU average.
[83] Article 4 of the ERDF Regulation (No 1301/2013)

trans-national OPs, this is also being translated by the EU macro-regional strategies (e.g. the EU Strategy for the Danube Region or the EU Strategy for the Alpine Region), which in many cases have a targeted focus on adaptation actions (Nesbit, Paquel & Illes 2017).

Finally, **climate considerations that are being integrated into decisions on major projects supported by the ERDF and CF also have an impact on the effectiveness of climate-proofing the Cohesion Policy**. Investments in major projects, which has a total eligible cost exceeding €50 million, are managed differently compared to other Cohesion Policy investments; project developers of major projects are required to provide detailed project information to the Commission, including on climate change adaptation (e.g. a description on how climate change related risks, adaptation considerations and disaster resilience have been taken into consideration).[84] In order to support the mainstreaming of climate objectives into these major projects the Commission has produced a guidance for managing authorities and project developers (EC 2016a). This guidance document provides detailed information on specific climate requirements, including on the need to conduct a vulnerability and risk assessment for all major projects. Project developers are required to conduct a sensitivity and exposure analysis for the vulnerability assessment and a likelihood and impact analysis for the risk assessment, and building on the results they should identify and appraise various adaptation options.

Climate-proofing the Common Fisheries Policy

As mentioned above, **the EMFF does not cover TO5, which indicates a lower focus on climate adaptation actions.** Nevertheless, the COWI (2016) study found that some of the measures 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 State were not required to report on climate expenditure until 2016 and as such, the accuracy of EC estimates cannot be verified. It also notes 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". The recent COWI study (2017) also notes that the indirect contribution of EMFF to climate adaptation objectives cannot be tracked.

As for potential steps, **the promotion of a greater use of the adaptation technical guidance could be of importance in order to stimulate awareness within the managing authorities**. The guidance produced by the Commission is largely generic, but includes a valuable list of potential opportunities for climate mainstreaming under individual measures, separately identifying climate adaptation opportunities.

A7.6.2 Specific evaluation questions

Relevance – TO EQ1.

EQ 49.To what extent does there continue to be a need for the Commission to support the climate-proofing of EU actions?

Is there still a need to integrate climate change considerations into EU programmes?

[84] See Commission Implementing Regulation (EU) 2015/207 for more details.

The extent to which climate adaptation considerations are integrated into the Common Agricultural Policy (CAP), Cohesion Policy and the Common Fisheries (CFP), and its related funds, differs greatly both at the theoretical and practical level (see section A7.6.1.2 above). As such, there is still a need for the Commission to support MS and their managing authorities to facilitate the climate-proofing of these policy areas.

Further insights are expected to be provided by the stakeholder survey and stakeholder interviews, in particular which reflect the views of managing authorities.

Is there still a need to for the Commission to develop regulations and guidelines to support the climate proofing of EU actions?

There seems to be a wide set of well-developed EC guidance documents available on climate-proofing as well as climate mainstreaming more broadly (see section 0). Nevertheless, the question remains whether these documents are being used by the managing authorities on the ground to integrate climate considerations into their Operational Programmes and Rural Development Programmes. In order to maximise the effectiveness of such guidance documents and to avoid spending further resources on developing new documents the Commission should consider to assess the practical impacts of the documents on programmes and projects first. The COWI (2017) report also states that the practical uptake of adaptation actions under the ESI Funds largely depends on the Member States and thus a continued support from the EC on knowledge and best practice examples is needed. It concludes that "it is recommended that the Commission further facilitates and supports the implementation processes in Member States, e.g. by possibly establishing strong platforms for sharing best adaptation practices in implementing the programmes and in catalysing climate change adaptation actions."

With regards to the climate-proofing of regulations (related to CAP, Cohesion Policy and CFP), a more prominent role could be put on adaptation in the EMFF as this is currently not regarded as a fund that contributes to Thematic Objective 5 but can have the potential to contribute to climate change adaptation. Furthermore, the secondary theme established under the ESF (code 01: "low-carbon, resource efficient economy") could be extended to adaptation actions too.

For the question on guidelines further insights are expected to be provided by the stakeholder survey and stakeholder interviews, in particular which reflect the views of managing authorities.

What is the nature of the support that is still needed?

As noted above, rather than developing an additional set of guidelines first the practical impact of the existing guidelines should be measured.

As we have entered the second half of the 2014-2020 programming period more emphasis could be placed on project implementation and project monitoring and evaluation in case it is decided to provide further guidance.

The recent COWI (2017) study indicates that "Available guidance on the application of the horizontal principles and how to secure climate change adaptation is limited. Guidance and best-practice examples on how the horizontal principles can be put into use could thus benefit a number of Member States in better exploring the potential for adaptation mainstreaming, and also facilitate adaptation being integrated into selection criteria."

Further insights are expected to be provided by the stakeholder survey and stakeholder interviews, in particular which reflect the views of managing authorities.

Effectiveness – TO EQ4.

EQ 50. Climate-proofing of CAP, Cohesion policy and CFP promoted adaptation in key vulnerable sectors?

How has climate change adaptation been considered in key vulnerable sectors within: the CAP, Cohesion Policy and the CFP over the period 2013-2016?

As indicated above, the recently published COWI (2016) study analysed all OPs and RDPs and aimed to identify the extent to which funds have been allocated to climate change adaptation objectives. The results show a varied picture across the different funds, and as such the various sectors (see more in section A7.6.1.2).

Overall, adaptation seems to play the largest role in the CAP (i.e. agriculture and forestry) nevertheless there are important caveats which raise concerns about the accuracy of such assumptions (see more in section 0). In second and third place are the ERDF and CF, which can target many sectors but in general have an important role in funding infrastructure investments. This is further strengthened by the requirements to conduct vulnerability and risk assessments for the ERDF and CF major projects (see more in section 0). Finally, the level of focus on adaptation seems to be minor in the EMFF, raising the question about the extent to which the fisheries sector is climate-proofed, and the ESF, which targets social and employment actions and as such have a less potential to be climate-proofed. The lack of climate integration in the EMFF and ESF was also emphasised by the ECA (2016).

To what extent has adaptation been promoted at the sector level?

The literature review linked to the extent to which adaptation is mainstreamed into CAP, Cohesion Policy and the CFP does not provide specific details of the extent to which adaptation has been promoted on the ground in the various sectors. This will depend on the extent to which the adaptation priorities indicated in the OPs and RDPs are translated into the projects on the ground and are actually implemented.

The COWI (2017) study states that "a number of Member States have established clear links in their programmes to their national adaptation strategies and action plans at the strategy level. However, when it comes to specific objectives and actions under selected specific Investment Priorities, there is often scope to further strengthen the strategic links between the programmes on the one hand, and the strategies and action plans on the other. Improved coordination between relevant sector ministries at the national and regional levels as well as a strengthened coherence between climate adaptation and disaster risk reduction at the programme level may further strengthen the strategic links." The study also indicates that adaptation has been less successfully integrated into a number of sectors, including environment, transport, fisheries and agriculture.

The MS scorecards can provide further insight into the level of horizontal/sectoral mainstreaming at national level.

EQ 51. What other factors may have promoted adaptation in key vulnerable sectors?

What other factors may have promoted adaptation in key vulnerable sectors?

At the EU level, the establishment of the 20% climate mainstreaming target and the development of a climate expenditure tracking methodology has served as an important driving force in climate-proofing of the CAP, Cohesion Policy and CFP and the relevant sectors (see more in sections 0 and 0). While this can be seen as a complementary action to Action 6 of the EU Adaptation Strategy given the high profile of the political

commitment to the 20% target the role of the EU Adaptation Strategy in climate-proofing these policy areas might have been less prominent. This is also confirmed by the fact that the COWI (2016) study which assessed the extent to which climate mitigation and adaptation is mainstreamed into the ESI Funds does not refer to the Adaptation Strategy at all. Furthermore, concerns were raised at the stakeholder workshop organised under the currently ongoing service contract on "Climate mainstreaming in the EU Budget: preparing for the next MFF" that mainstreaming promoted by the Adaptation Strategy was not necessarily picked up by managing authorities at programme and investment levels[85].

At the national level, the National Adaptation Strategies served as key a driving force for integrating adaptation considerations into key sectors. For this the MS scorecards can provide further insights.

What has been their relative strength?

The high-level political nature of the 20% target has served as an important factor in providing momentum for managing authorities to consider climate change mitigation and adaptation in their PAs, OPs and RDPs. At the same time, the nature of the target has raised concerns with regards to its practical implication, in particular as a result of the lack of a process to ensure that the 20% target is met in practice[86].

Where these factors expected or unexpected when the Strategy was launched?

The 20% commitment is mentioned in the Adaptation Strategy as an important factor in financing adaptation actions in the EU.

With regards to the importance of 20% serving as a factor promoting adaptation more details might be expected from the results of the stakeholder engagement.

EQ53. To what extent has the promotion of adaptation in key vulnerable sectors led to an increased understanding of climate change risks and better informed decision making?

Has the promotion of adaptation in key vulnerable sectors led to better informed decision making?

A good practice example to be mentioned is the requirement to conduct vulnerability and risk assessments for all major projects supported by the ERDF and CF. This has a great potential to ensure a greater understanding of climate change risks by project developers and thus can help to make better decisions about large infrastructure projects.

Given the nature of how the ESI Funds are managed – i.e. their management is shared by the Commission and the MS – there is less scope to influence the project level decisions taken on the ground in the other sectors/funds.

Further insights are expected to be provided by the stakeholder survey and stakeholder interviews.

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[85] Climate mainstreaming in the EU budget. Preparing for the next MFF : final report – Study. Available at https://publications.europa.eu/en/publication-detail/-/publication/1df19257-aef9-11e7-837e-01aa75ed71a1/language-en

[86] Climate mainstreaming in the EU budget. Preparing for the next MFF : final report – Study. Available at https://publications.europa.eu/en/publication-detail/-/publication/1df19257-aef9-11e7-837e-01aa75ed71a1/language-en

Effectiveness – TO EQ5.

EQ 52. What drivers/barriers stood in the way of efforts to promote adaptation in key vulnerable sectors?

What drivers have stimulated, or barriers have stood in the way of efforts to promote adaptation in key vulnerable sectors?

See comment above in EQ51 about the 20% mainstreaming headline target as a driving force.

With regards to barriers, the challenging nature to define and measure adaptation actions, and as such establishing adequate output indicators, compared to mitigation should be considered. Given that adaptation needs to be applied at the local and regional level it is challenging to establish any high-level political targets similar to the GHG emission targets. The lack of focus on adaptation and the establishment of relevant targets within the Europe 2020 Strategy has made it difficult to drive adaptation actions at the same level as for mitigation. Furthermore, the lack of dedicated EU legislation on climate change adaptation can be also regarded as a barrier (COWI 2017).

Further insights are expected to be provided by the stakeholder survey and stakeholder interviews.

How did these drivers/barrier affect implementation?

Given the challenges of defining adaptation actions it is harder to mainstream adaptation objectives compared to climate mitigation. Furthermore, in some policy areas it is challenging to clearly define whether an action really delivers adaptation benefits or it only has adaptation potential (e.g. many environmental measures targeting biodiversity, soil, water etc.) but it will not deliver any benefits on the ground. This is further complicated by the problems with adaptation indicators (see above).

Further insights are expected to be provided by the stakeholder survey and stakeholder interviews.

Efficiency – TO EQ7.

EQ 54. How adequate were the resources for Action 6: Facilitating the climate proofing of EU policies and programmes?

Which resources were made available to fund the production of guidelines on climate proofing EU policies and programmes?

Action 6 itself required the Commission to facilitate the climate-proofing of the CAP, Cohesion Policy and the CFP by producing technical guidance, which were published in 2013 (see more in section 0). This was later complemented by broader climate mainstreaming guidelines. The amount of resources spent on the preparation of these documents is unclear from the literature review but more information can be requested from the Commission.

Which resources were made available within cohesion, CAP and other funding for climate proofing?

According to the COWI (2016) estimates, that 1.6% of the ERDF, 4.7% of the CF and 7.6% of the EAFRD were allocated to climate change adaptation actions. There are no estimates available on the breakdown between mitigation and adaptation allocations under the EAGF. See more in section A7.6.1.2

Are the guidelines useful?

See comments in EQ49.

Has the level of support within cohesion, CAP and other funding been sufficient to climate proof these investments?

In order to respond to this question an analysis is needed to understand the actual impact of the guidance documents produced by the EC. For this, interviews are suggested to be conducted with managing authorities.

Efficiency – TO EQ8.

EQ 55. How do the different stakeholders view the monitoring of the implementation of Action 6? Facilitating the climate proofing of EU policies and programmes?

What are the monitoring arrangements?

Managing Authorities are required to provide financial information to the Commission on the amount of allocations to climate objectives. The methodology for this differs between the ERDF/CF, EAFRD and EMFF (see more on tracking methodology in section 0). This does not apply to the EAGF. Building on this information the respective DGs aggregate the figures which are then reported to DG BUDGE and are being published in the annual EU budgetary documentations, in particular the working document on programme statements of operational expenditure accompanying the draft general budget, and the statement of estimates for the financial year ahead.

Nevertheless, the methodology currently does not differentiate between allocations for climate mitigation and adaptation and as such the aggregated figures cannot reflect on the extent to which climate adaptation has been integrated into the investment decisions made under the CAP, Cohesion Policy and the CFP. Furthermore, the accuracy of the aggregated figures varies between the different funds.

Another aspect which can serve with information on the extent to which adaptation is integrated into the funds is reporting on relevant output indicators.

Further insights can be expected from the stakeholder survey and interviews.

Coherence – TO EQ9.

EQ 56. To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, been coherent with relevant: EU legislation and policies, international initiatives, national initiatives, regional or sub-national initiatives?

Has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy fitted well with, and reinforced, other relevant policies and initiatives, or the reverse?

Action 6 complements 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.

With regards to other EU policy areas, the results of Task 2 are expected to provide more insights..

With regards to national and regional initiatives, according to COWI (2017) "explicit links to relevant national adaptation strategies and plans are often neither identified nor appropriately integrated into programmes, and the lack of coherence between National Adaptation Strategies, Partnership Agreements and measures chosen by Member States under different European Structural and Investment Funds may potentially hamper synergies and complementarities" The study also highlights that more action on coherence between adaptation actions and disaster risk prevention and management policy will be needed in the future.

For the national and regional initiatives the MS scorecards can serve with more information (see indicator 8).

With respect to the international level, the Paris Agreement's emphasis on adaptation actions in order to enhance capacity for climate resilience and reducing climate vulnerability does not have substantial implications on the CAP, Cohesion Policy and the CFP but rather on the EU's external policies (Nesbit, Paquel and Illes 2017). Nevertheless, as Nesbit, Paquel and Illes (2017) suggest the climate-proofing of the three internal EU policy areas in question can reinforce international actions for instance by providing lessons learnt from flagship climate resilience projects funded by them.

What are the areas where there is less coherence?

With regards to other EU policy areas, the results of Task 2 are expected to provide more insights At the MS level, see comments above. .

What could be done to improve coherence in these areas?

In order to support Member States to better integrate their NAS objectives into their EISF programmes more guidance could be provided by the Commission (see EQ 49).

EU added value – TO EQ10.

EQ 57. To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy, added value compared to what would have resulted from an action at regional or national level?

To what extent has the climate-proofing of CAP, Cohesion policy and CFP, as promoted under the Adaptation Strategy added value to existing activities?

As indicated in EQ51 while Action 6, and in particular the technical guidance documents, have the potential to raise the awareness of managing authorities for integrating adaptation objectives into their investments under the three policy areas the overarching

climate mainstreaming target might have served as a more important tool for Member States to think about climate change as a whole. As such, the MS even without the Adaptation Strategy were already considering climate adaptation (and mitigation) objectives in their PAs, OPs and RDPs as they were required to respond to the 20% mainstreaming decision.

This needs to be further explored in stakeholder interviews and by checking the relevant sections of the MS scorecards.

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A7.7 Action 7: Ensuring more resilient infrastructure

A7.7.1 Technical standards

In May 2014, the European Commission gave the European standardisation organisations (ESOs) a **mandate[87] to initiate standardisation activities** in order to support the implementation of the EU Adaptation Strategy. The ESOs were requested to:

- develop tools, i.e. guidance or other type of documents, that will ensure that adaptation to climate change can be taken into account in a systematic way in European standardisation, where relevant;
- identify the existing European standards and European standardisation deliverables, including those under development, that are most relevant for adaptation to climate change in the three priority sectors identified in the EU Strategy on Adaptation to Climate Change; and
- revise the identified European standards or European standardisation deliverables, and to draft new ones if deemed necessary, with a view to enhancing the resilience to climate change of the infrastructures they apply to.

In addition to the three priority sectors identified in the Strategy – energy, transport and buildings - the ESOs were requested to develop a set of prioritisation criteria to be used when selecting priority standards to be revised or adapted first.

A long list of standards was developed by CEN-CENELEC based on the results of a questionnaire sent to Technical Committees, sectorial workshops and a series of interviews with experts and stakeholders. The Technical Committees were asked to check the relevance of the list and apply the established prioritisation criteria, in order to derive a priority list of standards that would contain a maximum of 20 standards for each priority sector (CEN-CENELEC, undated). According to the CEN-CENELEC website, this was to be concluded by the end of 2016.

The ESOs were also requested to develop a guidance document for assisting standardisation processes in order to ensure that adaptation to climate change can be taken into account in a systematic way in all European standardisation. The ***'Guide for addressing climate change adaptation in standards'*** was adopted by CEN-CENELEC in April 2016. It complements the already existing **CEN Guide 4 - *'Guide for addressing environmental issues in product standards'*** (European Committee for Standardization, 2008). The new guide applies to product (including design), service, infrastructure and testing 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). It includes a checklist to help establish whether climate change adaptation is relevant to a particular standardisation activity and a decision tree to help identify which actions should be taken.

A7.7.2 Guidelines for project developers

Based on the results of a service contract[88], the European Commission issued ***'Guidelines for project managers: making vulnerable investment climate***

[87] 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.

resilient' (European Commission, 2013a). The document consists of a methodology and step-by-step guide on how to systematically assess the climate resilience of infrastructure projects as a complement to existing project appraisal and development procedures. The guidelines are intended to help project developers understand the steps they can take to make investment projects resilient to climate variability and change. They are not intended to replace, but to complement existing project development processes. The aim is to integrate climate resilience into the routine analyses performed by project developers.

The guidelines (or 'climate resilience toolkit') consist of seven modules designed to:
• consider how a project is vulnerable to climate variability and change;
• assess current and future climate risks to the success of the project;
• identify and appraise relevant and cost-effective adaptation options to build climate resilience; and
• integrate adaptation measures (resilience measures) into the project lifecycle.

The **Environmental Impact Assessment (EIA) Directive** has been updated to include the impact of projects on climate and the vulnerability of the project to climate change among the aspects to be considered in impact assessments.[89] The associated **Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EIA)** was published by the European Commission in 2013. The EIA guidance sets out a number of questions that should be asked in order to identify major climate change adaptation concerns. EIA practitioners are instructed to consider not only the historical data on climate, but climate change scenarios, and to outline extreme climate situations to be considered as part of the environmental baseline analysis. They are also encouraged to review any existing adaptation strategies, risk management plans and other national or sub-regional studies on the effects of climate variability and climate change, as well as proposed responses and available information on expected climate-related effects relevant to the project. The document also gives guidance on analysing the evolving baseline trends, gives examples of EIA alternatives and mitigation measures available to use in planning the adaptation of projects to climate change, and recommendations on how to assess significant effects (including references to existing support tools and information sources). The Commission also adopted in 2013 **Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment (SEA)**, which follows a similar structure to the EIA guidance and similarly includes adaptation considerations.

In the 2014-2020 programming period, approval of major projects[90] funded by the European Structural and Investment Funds (ESIF) will be subject to "an analysis of the environmental impact, taking into account climate change adaptation and mitigation needs, and disaster resilience" (Article 101 of Regulation (EU) No 1303/2013). In 2016, the European Commission published a brochure on the **integration of climate change adaptation and mitigation considerations in the preparation and approval of major projects funded by the European Regional Development Fund (ERDF) and the Cohesion Fund** (European Commission, 2016). The document is primarily intended for those involved in the various development stages of major projects, but the methodology presented can be usefully applied for a wider range of projects.

Seven organisations (including the European Commission) working together under the umbrella of the European Financing Institutions Working Group on Adaptation to Climate

[88] Service contract no. 071303/2011/610951/SER/CLIMA.C3, Guidelines for project managers: 'climate proofing'
of vulnerable investments, delivered by Acclimatise and COWI.
[89] Directive 2014/52/EU
[90] A major project has a total eligible cost exceeding € 50 million (and € 75 million for transport projects).

Change (EUFIWACC)[91] have developed a guide designed to help practitioners assess climate change risks and vulnerabilities and better integrate structural or non-structural adaptation measures into project planning, design and implementation (EUFIWACC, 2016). The overall aim of the guide is to help make projects and investments more resilient to the effects of climate change and to implement adaptation measures that reinforce the climate resilience of goods, people, economies and territories of the beneficiaries.

As regards sector-specific EU activities, for the energy sector, considerations of climate change impacts have been fed into the 2013 Regulation establishing **guidelines for the Trans-European Network Energy (TEN-E)**.[92] In particular, in relation to the criteria for projects of common interest concerning electricity, "security of supply, interoperability and secure system operation shall be measured … taking into account expected changes in climate-related extreme weather events and their impact on infrastructure resilience." The "system resilience, including disaster and climate resilience, and system security, notably for European critical infrastructure as defined in Directive 2008/114/EC" is among the aspects to be considered for cost-benefit analyses of projects of common interest for electricity transmission and storage.

Similarly, the 2013 **Union guidelines for the development of the trans-European transport network (TEN-T)**[93] specify that "during infrastructure planning, Member States shall give due consideration to improving resilience to climate change and to environmental disasters" (Article 35). Several other provisions of the TEN-T regulation reflect climate change considerations. For example:
- Article 5 states that: "The trans-European transport network shall be planned, developed and operated in a resource-efficient way, through: (…) (g) adequate consideration of the vulnerability of transport infrastructure with regard to a changing climate as well as natural or man-made disasters, with a view to addressing those challenges."
- Measures that are necessary for "improving or maintaining the quality of infrastructure in terms of safety, security, efficiency, climate and, where appropriate, disaster resilience…" are mentioned among the areas that should be given general priority in the development of the network (Article 10).
- The Work Plans elaborated by European Coordinators for each core network corridor shall include an analysis of, among others, "the possible impacts of climate change on the infrastructure and, where appropriate, proposed measures to enhance resilience to climate change" (Article 47).

A7.7.3 Green infrastructure

The European Commission adopted in May 2013 a ***Green Infrastructure Strategy*** to promote the deployment of GI in the EU (European Commission, 2013d). The strategy aims to create an enabling framework to promote and facilitate GI projects within existing legal, policy and financial instruments. It defines GI as "a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services" and foresees a number of actions to be carried out under the lead of the European Commission, such as integrating GI in other policy areas; improving information, strengthening the knowledge base and promoting innovation in relation to GI; improving access to finance for GI projects; and

[91] EUFIWACC consists of the Agence Française de Développement (AFD), the Council of Europe Development Bank (CEB), the European Bank for Reconstruction & Development (EBRD), the European Commission's Directorate-General for Climate Action (DG CLIMA), the European Investment Bank (EIB), KfW Development Bank (KFW), and the Nordic Investment Bank (NIB).
[92] Regulation(EU) No 347/2013
[93] Regulation (EU) No 1315/2013

exploring opportunities for the development of a Trans-European Network in Green Infrastructure (TEN-G).

To support the implementation of the GI Strategy, a service contract was commissioned by DG Environment in 2014.[94] It included, among other tasks, the development and dissemination of GI information material, to raise awareness among Member States and relevant stakeholders. This involved, among others, the elaboration of a fact sheet on GI and climate change adaptation, which discusses costs and benefits of GI in relation to adaptation and presents good practice examples of how GI has been used in adaptation.[95]

The report accompanying the mid-term review of the EU Biodiversity Strategy (published in October 2015) noted that considerable progress had been made in implementing the GI Strategy, but that national strategic frameworks for implementing GI were not yet widely developed, and awareness raising, capacity building and GI integration need to be stepped up (European Commission, 2015, pp.12-13). The report further noted that GI deployment was often too small-scale, dominated by action at the local or regional levels and that the multiple co-benefits of GI (economic, social, environmental) were often not sufficiently considered (European Commission, 2015, p.14). Progress at Member State level in implementing the EU GI Strategy is currently being assessed as part of an ongoing technical support contract for DG Environment[96] (to feed into the review of the EU GI Strategy expected by the end of 2017). The results should become available in July 2017.

Work relevant to GI and adaptation has also been carried out by the EEA. For example, the EEA has mapped the potential of GI to mitigate the impacts of weather- and climate change-related natural hazards by analysing: 1) which areas are prone to such hazards; 2) the capacity of ecosystems in these areas to mitigate the risks; and 3) the human demand for protection against these risks. Put together, these factors allow the identification of GI areas which should be prioritised for conservation or restoration (EEA, 2015).

A7.7.4 Specific evaluation questions

EQ 58. To what extent does there continue to be a need for the Commission to help project developers working on infrastructure and physical assets to climate-proof vulnerable investments?

Is there still a need to increase the resilience of infrastructure in the EU to climate impacts?

A 2015 study by the JRC assessed the risks to critical infrastructure[97] in the EU (as well as Switzerland, Norway and Iceland) associated with seven climate hazards: heat and cold waves, wildfires, droughts, river and coastal floods and windstorms (JRC, 2015).

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[94] Service Contract ENV.B.2/SER/2014/0012, "Supporting the Implementation of Green Infrastructure"

[95] http://ec.europa.eu/environment/nature/ecosystems/pdf/Green%20Infrastructure/GI_climate_adaptation.pdf

[96] Provision of technical support related to Target 2 of the EU Biodiversity Strategy to 2020 – Maintaining and restoring ecosystems and their services. ENV.B.2/SER/2016/0018

[97] 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.

Expected impacts to industry, energy, transport, social, environment and tourism, and ICT infrastructures and EU regional investments were analysed under current and future climate conditions. Climate-induced Expected Annual Damages were calculated based on the combination of climate hazard, exposed infrastructures and investments, and the vulnerability of exposed assets and expressed in 2010 € assuming no socio-economic change in future scenarios.

The study shows that Europe will face a significant increase in multi-hazard, multi-sector damages in the next decades. Current damages of 3.4 billion €/year in the EU+ (EU28 + Switzerland, Norway and Iceland) are projected to triple by the 2020s, multiply six-fold by mid-century, and rise up to 38 billion €/year by the 2080s (undiscounted and no socio-economic changes assumed). These numbers reflect only the (combined) damages from the seven climate hazards to the sectors considered, hence not the total damages to society. Based on the shares of damages that relate to the infrastructures considered in the study to the total (reported) climate damage, and assuming that changes in the remaining damages follow the same trend, total damages from the seven climate hazards to society could rise from currently 12 billion €/year to nearly 80 billion €/year by the end of this century. The strongest increase is projected for the energy and transport sectors. For EU+ as a whole, the share of GDP at risk rises progressively from 0.03% now to 0.28% by the end of century. Southern and south-eastern countries will be most impacted.

The study also evaluated the additional costs required to climate proof infrastructures and investments, based on possible avoided damage scenarios and cost-benefit analysis. Indicative estimates show that for EU+ the total accumulated benefits (or avoided damages) amount to 100 billion € when adapting critical infrastructures against short term climate changes (up to 2040). Costs incurred now could amount to 12 billion €, plus a yearly operational and maintenance (O&M) cost of nearly 1 billion €. Expected annual benefits of these investments would amount to 3.3 billion €. The adaptation investments required in the medium term (including the 2050s) would amount to an upfront capital cost of 54 billion €, and an annual O&M cost of 2.1 billion €, with expected annual benefits growing to 11.9 billion € by the 2050s. To make infrastructures climate resilient up to the end of the century, the total cost rises to 461 billion €, of which 138 billion € capital cost to be incurred now and O&M costs of nearly 3.6 billion €/year. This would yield total accumulated benefits or avoided damages of 1,152 billion € until the end of this century, with expected annual benefits reaching 23 billion € by the 2080s.

The latest EEA assessment of climate change impacts and vulnerability in Europe (EEA, 2017) highlights the vulnerability of energy and transport infrastructure to extreme events induced by climate change. The report recalls the climate change risks on energy transmission and distribution infrastructure identified in the 2013 Staff Working Document 'Adapting infrastructure to climate change' (European Commission, 2013e), such as decreased electrical network capacity (EU-wide) due to extremely high temperatures and damage to infrastructures in mountainous regions caused by geological instability due to increased precipitation. Coastal energy infrastructures in Europe (oil, gas or liquefied natural gas tanker terminals and nuclear power stations) are vulnerable to sea level rise. Regarding transport, the report notes that impacts will vary by region and transport mode. Most vulnerable will be transport systems in mountainous regions, coastal areas and regions prone to more intense rain and snow. Rail transport will also face particularly high risks from extreme weather events (floods, storms) and high temperatures. Climate change is also expected to affect air transport. For example, sea level rise and flooding could affect airports located in coastal areas, while increased wind and storms would have operational impacts such as loss of capacity and increased delays (Eurocontrol, 2013, cited in EEA, 2017). As regards water-borne transport, the EEA (2017) study concludes, based on the results of several research project, that this sub-sector will not be significantly affected by future climate change.

Is there still a need for the Commission to help project developers working on infrastructure and physical assets to climate-proof vulnerable investments e.g. through development of technical standards and guidelines?

As outlined above, several EU-level guidance documents have been developed. A process is underway for ESOs to identify, revise, and develop standards related to climate change adaptation.

The question of whether additional help is needed should be answered mainly through the stakeholder consultation rather than literature review.

CEN-CENELEC or DG CLIMA should be asked what is the state of play of the standardisation work.

DG ENV, Biodiversity Unit should be asked what is the state of play regarding the guidance on GI and adaptation – will it still be issued or was it concluded that it is not needed?

What is the nature of the support that is still needed?

This question should be answered through the stakeholder consultation rather than literature review.

EQ 59. To what extent has the Strategy helped to ensure more resilient infrastructure?

To what extent has climate change adaptation been considered in impact assessments for land use planning, over the period 2013 to 2016?

The Environmental Impact Assessment (EIA) Directive was updated in 2014 to include the impact of projects on climate and the vulnerability of the project to climate change among the aspects to be considered in impact assessments. The transposition deadline was 16 May 2017. According to the country information in the 'Adaptation preparedness scoreboard' (June 2017 version) and EUR-lex (national transposition measures communicated by the Member States)[98], by June 2017 the requirements of the revised EIA Directive had been transposed in 15 Member States.[99] In most cases, the legislation transposing the revised directive dates from 2016 or 2017; it is unclear to what extent adaptation was considered in impact assessments prior to 2016.

Further information should be gathered through the stakeholder consultation.

What guidelines or procedures have been developed/ are available for assessing climate impacts in infrastructure projects/programmes?

As outlined in more detail above, the key guidance documents developed at EU level are:

- European Commission Non-paper Guidelines for project managers: making vulnerable investment climate resilient (European Commission, 2013a)
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EIA) (European Commission, 2013b)

[98] http://eur-lex.europa.eu/legal-content/EN/NIM/?uri=CELEX:32014L0052
[99] Austria, Belgium (only Flanders), Bulgaria, Denmark, Germany, Finland, Hungary, Latvia, Lithuania, Netherlands, Poland, Slovakia, Slovenia, Spain and the UK.

- Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment (SEA) (European Commission, 2013c)
- Climate Change and Major Projects. Outline of the climate change related requirements and guidance for major projects in the 2014-2020 programming period. Ensuring resilience to the adverse impacts of climate change and reducing the emission of greenhouse gases (European Commission, 2016)
- Integrating Climate Change Information and Adaptation in Project Development: Emerging Experience from Practitioners (EUFIWACC, 2016)

To what extent are these used in developing new infrastructure programmes?

This question can only be answered by the stakeholders using the guidelines.

EQ 60. What other factors may have promoted more resilient infrastructure?

What other factors may have promoted more resilient infrastructure?

Financing and standards of the European Investment Bank (EIB):
All projects financed by the EIB must fulfil the requirements set out in the Bank's Environmental and Social Handbook (EIB, 2013). The Handbook provides that proposed projects undergo a vulnerability assessment, based on an evaluation of: the climate risk in the region, country, sector activities or project sites (where data is available); the capacity of the country/region to factor in these risks given its level of development or specific actions that it may have already undertaken; the capacity of the project promoter to manage climate risks; and the extent to which the project may have adverse consequences on the vulnerability of natural ecosystems and human structures. If it is determined that the project may be vulnerable to climate change, the promoter is required to introduce climate change parameters into the preparation and design of the projects, and to identify and apply adaptation measures so as to ensure the sustainability of the project. In cases where projects are at high risk due to climate change or when they affect the vulnerability of a country or geographical area, the promoter may be required to implement design changes.

Other factors may emerge from the interviews/survey – difficult to answer this (and the two sub-questions below) through literature review.

What has been their relative strength?

Where these factors expected or unexpected when the Strategy was launched?

EQ 63. How adequate were the resources for Action 7: Ensuring more resilient infrastructure?

Which resources were made available to fund the production of guidelines to ensure more resilient infrastructure?

For the programming period 2014-2020, over EUR 41.2 billion from the EAFRD, ERDF and CF has been allocated to the theme of "Climate Change Adaptation & Risk Prevention"[100] (but this does not relate only to Action 7).

Are the guidelines useful?

This question can only be answered by the stakeholders using the guidelines.

EQ 66. To what extent has the development of guidelines or procedures to assess the climate impacts of infrastructure, as encouraged by the EU Strategy, added value compared to what would have resulted from an action at regional or national level?

What was the added value of the technical standards and guidelines?

The Impact Assessment accompanying the EU Adaptation Strategy noted that there was at the time "no common methodology or guidance in place to systematically assess the climate resilience of infrastructure projects and improve their sustainability and liability in changing climate conditions." It further noted that the work on design standards had "remained uneven, in particular due to the coordination resources required to address the issue of climate change adaptation considerations in the thousands of design-standards potentially affected," and that "the lack of harmonised approach on standards at EU level would create potential technical barriers to trade." The Impact Assessment concluded that without further EU action, considerations about current and future impacts of climate change for new infrastructure investments would remain vague.

A7.7.5 References

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[100] https://cohesiondata.ec.europa.eu/themes/5#

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Joint Research Centre (JRC) (2015). *Resilience of large investments and critical infrastructures in Europe to climate change*. Final report for DG CLIMA, AA 071303/2012/630715//CLIMA.C.3 – JRC 32971-2012 NFP "Resilience of large investments in Europe to climate change (CCMFF)".

A7.8 Action 8: Promoting insurance and other financial products for resilient investment and business decisions

A7.8.1 The underlying need for Action 8: Increasing costs of climate-induced natural disasters

The costs of climate- and weather related natural disasters in recent years have increased. More specifically, weather and climate related damages in Europe between 1980 and 2013 is almost EUR 400 billion (EUR 393 billion, adjusted for inflation, in 2013 Euro values), on average EUR 11.6 billion per year, EUR 69,000 per square kilometre, or EUR 710 per capita (based on average population over the entire period 1980-2013) [101]. Only around 33% of the total losses were insured. The recent large-scale disasters such as the 2003 heat wave that struck Paris and other European cities, the 2010 windstorm in Northern Europe and the more recent 2013 flooding in Germany show the urgency of better understanding these events in order to adapt and prepare for such hazards. This includes understanding both their immediate and long-term impacts on the economy, society and the environment, as well as the role insurance can play.

Economic losses from extreme climate events have increased, but with large spatial and inter-annual variability. Reported disaster losses often reflect only structural damages to tangible physical assets, neglecting the damage on health, integrity of ecosystems, and intangible cultural heritage. Hence the reported losses should be understood as lower-bound estimates. The changes in recorded damage are to a large extent influenced by increased economic wealth and, presumably, by improved reporting particularly on the number of small loss events.

When considering economic losses of disaster events, flooding, along with wind-related storms, is the most important natural hazard facing Europe.[102] A recent study by Jongman et al (2014)[103] suggests that annual average economic losses caused by extreme floods could reach almost five times higher than 2013 values: the average annual economic losses due to flooding were expected to be in the region of EUR 23.5 billion by 2050, in comparison to the amount for the period 2000 to 2012 (EUR 4.6 billion annually). The study further indicates that around two thirds of increases in economic damages can be attributed to socio-economic growth, with the remaining one third due to climate change.

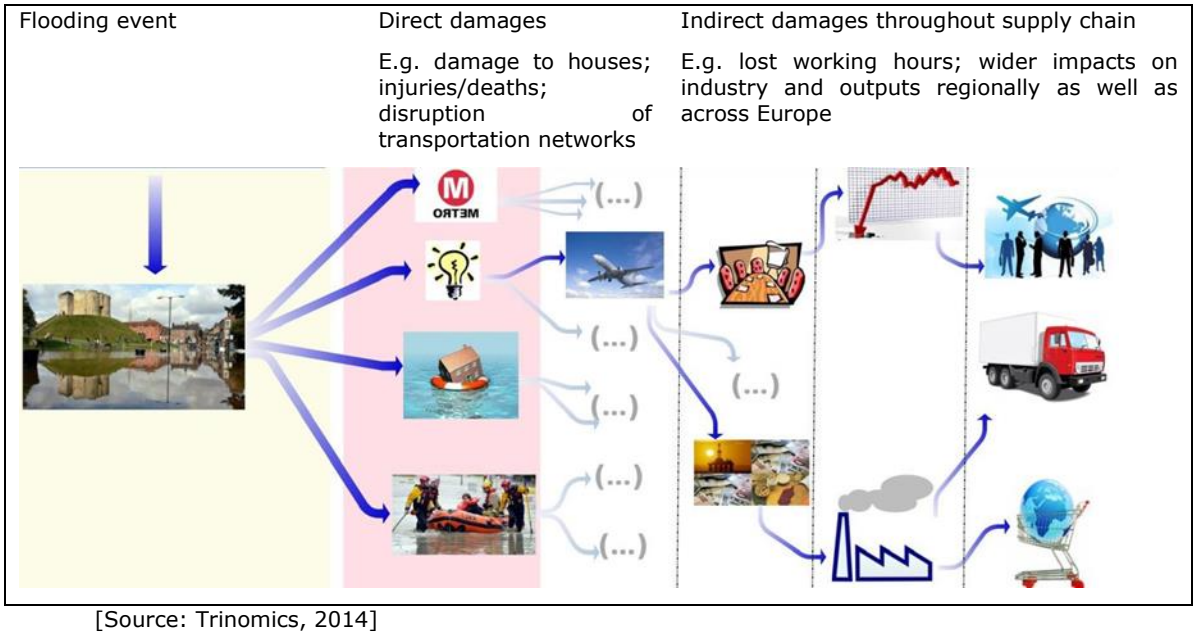
Physical properties such as magnitude and duration of extreme climatic events have significant influence on the extent of damage inflicted on exposed individuals, households and economies.[104] The duration of recovery is also very important in

[101] Munich RE, 2014, 'NatCatService Database' (www.munichre.com/natcatservice). As a proprietary database, it is not publicly accessible. The period 1980-2013 is the entire Munich Re (MR) dataset provided to the European Environment Agency under institutional agreement (June 2014).
NatCatSERVICE [www.munichre.com/natcatservice] is one of the most comprehensive natural catastrophe loss databases, managed by Munich Reinsurance Company, based in Munich, Germany. As a proprietary database, it is not publicly accessible. The period 1980-2013 is the entire Munich Re (MR) dataset provided to the European Environment Agency under institutional agreement (June 2014).
[102] ESPON (2013). "Natural hazards and climate change in European regions", Territorial Observation no. 7, European Union ESPON, May 2013
[103] Jongman, B., Hochrainer-Stigler, S., Feyen, L, 2014, 'Increasing stress on disaster-risk finance due to large floods'. *Nature Climate Change* 4, 264–268.
[104] Chambers, R., 1989, 'Editorial Introduction: Vulnerability, Coping and Policy' *IDS Bulletin* 20 (2).

estimating economic costs of a climate change and/or weather related disaster.[105] Studies have been published in recent years in post-disaster economic modelling aiming to better understand the consequences of natural disasters for a regional economy and to develop prevention and recovery strategies.[106]

Assessments of the climate change extreme impacts have traditionally focused on the initial impact on people and assets. These initial estimates (so-called 'direct damage') are useful both in understanding the immediate implications of damage, and in marshalling the pools of capital and supplies required for re-building after an event. Since different economies as well as societies and ecosystems are coupled, any small-scale damage may be multiplied and cascaded throughout wider economic systems and social networks, thus generating further economic, social and environmental impacts over the longer term (recovery period, etc.). This interaction of direct and indirect effects is illustrated for flood events in the figure below.

Figure 2: Illustration of the total disaster footprint with direct and indirect damages



[Source: Trinomics, 2014]

A7.8.2 Policy context: the nature of Action 8

To address these trends described above, a comprehensive approach to address weather and climate disaster risks is needed to not only consider hazards and vulnerabilities, but also increases the capacity to respond and recover from disasters. Risk financing mechanisms are crucial to complement the risk reduction measures of prevention,

[105] Hallegatte S., Hourcade J.C. and Dumas, P., 2007, 'Why economic dynamics matter in assessing climate change damages: illustration on extreme events.' *Ecological Economics*, 62, 330.
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[106] Bočkarjova, M., Steenge, A. E. and Van der Veen, A., 2004, 'On direct estimation of initial damage in the case of a major catastrophe: derivation of the basic equation', *Disaster Prevention and Management: An International Journal*. 13, 330-337
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mitigation and preparedness, which respectively address the existing hazards, vulnerabilities and response capacities.[107]

The **EU Strategy on Adaptation to Climate Change** (2013) strives for a climate-resilient Europe. While significant effort is placed at the national and European level on preventing damage caused by weather and climate related disasters, not all risks can be averted. This residual risk affects from urban development planning to agriculture and can be faced in different ways, through self-insurance (when we expect individuals to capitalise themselves against the contingency) public aid, or law and insurance.[108]

In **insurance markets**, individuals transfer the risk they bear to a commercial insurer in exchange for a payment – the premium.[109] In some cases the insurance is compulsory (e.g. for motor injury liability). The government may also play a part, as reinsurer of the commercial insurer, or even as primary risk-carrier. Intermediaries play an important role, in advising parties at risk on how best to manage or transfer their risk to the field of competing commercial insurers.

Insurance has been studied extensively as an instrument to address climate risk. Insurance and reinsurance mechanisms are linked to disaster risk reduction and climate change adaptation by providing means of financial relief, recovery of livelihoods, and reconstructions, which reduces vulnerability, and provides knowledge and incentives for reducing risk.

However, there are several risk transfer issues when insuring for climate-related disasters[110]:

- A low demand (due to low risk awareness and counterproductive incentives – state aid);
- A low level of communication about the risks (due to the high costs of risk assessment tools and the difficulty in sharing risk information); and
- Difficulty in the risk assessment itself (due to lack of data and technical knowledge).

Insurance aimed towards natural and manmade disasters was addressed by the Commission in a Green Paper[111]. This focuses on a number of questions related to the adequacy and availability of appropriate disaster insurance. Its main objective is to raise awareness and to assess whether action at EU level could be appropriate or warranted to improve the market for disaster insurance in the EU. As such, it will expand the knowledge base, help to promote insurance as a tool of disaster management and thus contribute to a shift towards a general culture of disaster risk prevention and mitigation, increasing availability of data and information.

Other European policies that potentially contribute to reducing the sector's financial vulnerability are related to the creation of a **single European insurance market** (for this purpose the EU launched an action plan for a single financial market, the Financial Services Action Plan), and the Solvency II and Solvency III Directives for insurance

[107] Wamsler C. et al (2011). The role of formal and informal insurance mechanisms for reducing urban disaster risk: A south-norht comparison. Housing studies 2011, Vol.26:2, pp.197-223
[108] Tort law works in case some agent can be held accountable for the damage, and entitles individuals to receive a 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: Insurance schemes in the agriculture sector to address climate change impacts. ICCG Reflection No. 46/March 2016
[109] Insurance schemes in the agriculture sector to address climate change impacts. ICCG Reflection No. 46/March 2016
[110] CEA (2011), PPT on "Insurance of Natural Catastrophes in Europe: Basic Principles of Insurability"
[111] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0213

companies. The latter directive requires firms to hold sufficient capital to reduce the risk of insolvency, including the risks from natural events. The goals of this directive are to reduce the risk that an insurer is unable to meet the claims of policyholders as well as to reduce the potential losses of policyholders when an insurer is unable to reimburse all claims in full.

A7.8.3 Insurance as a means for improved disaster risk reduction and incentivised adaptation

Previous research in this area[112] has revealed that climate change is increasing the risk to lives and economic assets, but insurance is currently not being used effectively to manage climate risk. Furthermore, climate change might negatively affect the risk transfer conditions and availability of insurance.

Three key barriers remain to the provision of catastrophe insurance in the EU:

1. Risk transfer conditions are not well matched to the underlying risk;
2. Insurance is unavailable or insufficient; and
3. Demand is lacking.

Climate change is likely to affect all three of these areas. These are not one-dimensional problems, and they interact with each other.

Insurance helps to finance losses caused by events induced by climate variability. As climate change is projected to increase the intensity and frequency of extremes, insurance, if properly adjusted for those changes, is a useful tool. Insurance is useful for adaptation in two ways (a) incentivising and enabling risk reduction; and (b) enabling recovery and economic development.

The IPCC's[113] report on managing the risk of extreme events supports the overall idea that 'risk sharing (formal insurance, micro-insurance, crop insurance) can be a tool for risk reduction' in the case of extreme weather events, yet also states that disincentives exist, particularly if the scheme is not correctly structured.

The existing literature on the topic shows that there are many risk management measures in multiple sectors that the different private and public insurance arrangements may incentivise, such as those adaptation measures highlighted in the table below. In order to give incentives for risk prevention, insurance prices have to be risk based and adjusted according to the risk prevention efforts taken by customers.

If insurance risks are not priced accurately this may lead to two issues: (a) insurers are exposed to adverse selection, and will not make an adequate return; (b) moral hazard will pick up, because a higher risk will not have a price penalty. In the USA, for example, the existence of the National Flood Insurance Program (NFIP) has been evaluated by experts[114] as leading to risky behaviour, since flood cover is readily available for high risk properties.

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[112] EU (2011) Application of economic instruments for adaptation to climate change. .EU contract CLIMA.C.3./ETU/2010/0011.September 2011.
[113] IPCC, 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.
[114] NYSFSMA (2011) *Rethinking the National Flood Insurance Program (NFIP).* The New York State Floodplain and Stormwater Managers Association. 27 January, 2011..Albany, USA.
AAA (2011) *The National Flood Insurance Program: Past, Present...and Future?* Flood Insurance Sub-committee, American Academy of Actuaries. July 2011. Washington, D.C.
Abbott, E. B. (2008) Floods, Flood Insurance, Litigation, Politics – and Catastrophe: The National Flood Insurance Program. Sea Grant Law and Policy Journal, Vol. 1, No. 1 (June, 2008) 129-155.

At the same time, a key issue is to identify the most efficient level of intervention, as well as they type of the measure, i.e. how to determine the cost-effectiveness of insurance mechanisms for promoting disaster risk reduction, including preventive capacity. It may be more cost-effective, for example, to introduce community-level risk reduction measures, than to focus on property-level defences. Another advantage of a holistic approach is to identify the appropriate entry point for insurance, to deal with the residual risk. For example, a study of the coastal city Hull in the UK[115], which was badly flooded in 2007, calculated an adaptation cost curve for the city, which indicates that investment in public awareness, sea and river defence system upgrades, property-level defences, training of emergency services staff, and upgrading the drainage systems are more cost-effective adaptation measures than insurance, which in turn was more cost-effective than trying to retrofit all existing buildings.

The following table provides an overview of sectoral uptake of adaptation measures triggered and incentivised via insurance mechanisms.

Table 6: Overview of sectoral uptake of adaptation measures incentivised by insurance mechanisms

Sector	Sectoral uptake	Type of insurance	Incentivised private adaptation measures
Agriculture	High	Agricultural insurance for drought and heatwave risks. Very relevant for crop insurance.	Risk (drought and heatwave)- based pricing and deductibles can incentivise the following efforts: • Switching to more heat and drought resistance cultivars • Developing crop variants with longer growing cycles • Implementation of (additional) irrigation measures
Buildings (private property)	High	Property insurance: private properties are insured against flood and windstorm risks	• Risk (flood and windstorm)- based pricing and deductibles can incentivize the following efforts • Flood proofing of buildings and property (raising plinth, adapting cellars etc.) • Retrofitting of houses (e.g. against windstorm)
Production Systems and services	High	Property business insurance: Insurance and other RFI are well used by industry to cope with the financial consequences of disasters, e.g. against flood and windstorm risks. Larger businesses often self-insure by pooling risks across their different operations in different locations or countries	• Risk (flood and windstorm)- based pricing and deductibles can incentivize the following efforts • Flood proofing of buildings and property • Retrofitting of facilities (e.g. against windstorm) • Resilience of supply chains, factories and their inventory etc. • Local flood protection measures with private good characteristic
Physical infrastructure	Medium	Sovereign insurance and regional pools for flood and	Sovereign insurance contracts via risk based pricing and deductibles can

[115] ECA (2009) *Shaping Climate-resilient Development*. The Economics of Climate Adaptation working Group. Swiss Re, Zurich.

Sector	Sectoral uptake	Type of insurance	Incentivised private adaptation measures
(private and public) incl. energy and transport		windstorm risk Insurance can be used for infrastructure, but in many developed countries the public sector self-finances via its taxing function	incentivize: • Flood- proofing infrastructure • Retrofitting buildings • Building larger scale flood protection schemes

[Source: adapted from Bräuninger, M., Butzengeiger-Geyer, S., Dlugolecki, A., Hochrainer, S., Köhler, M., Linnerooth-Bayer, J., Mechler, R., Michaelowa, A., Schulze, S. (2011). Application of economic instruments for adaptation to climate change. Report to the European Commission, Directorate General CLIMA, Brussels]

A7.8.4 Conclusions for Action 8: where do we go from here

While a good overview exists of the policy context and the needs to be fulfilled via improved insurance mechanisms, little evidence has been collected on progress. This is partly due to the difficulties surrounding data availability. (Re)insurance companies typically keep their data confidential. At the European level, not much useful data is currently being collected. However, we expect the ongoing DG CLIMA study on "Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU" to deliver crucial analysis and data to appropriately judge progress as regards to this Action.

Overall, the topic of insurance for promoting improved climate resilience is still at a rather early stage of development. Actual experience from implementation across the EU MS is low. This needs to be a target for improved implementation if Action 8 is to succeed.

A7.8.5 Specific evaluation questions

Within each thematic area, the analysis of each individual evaluation question should follow the structure below, addressing the points as shown.

1) Individual evaluation question

- a. **Data sources and limitations**
  - i) Explain the data that has been used to address the evaluation question.
  - ii) Evidence from literature review. Clearly set out what sources were used and which ones were considered but not used. Give an indication of the reliability the data sources (for example, how old is the report, does it represent the views of a single-interest organisation that may have a vested interest or from a group of organisations). Be clear on where we are simply reporting what is said in reports, and where we are inferring things from what is said in the reports.
  - iii) Evidence from stakeholder consultation. Indicate which stakeholders were interviewed (type, rather than specific organisations). Indicate how representative the responses were. Where possible, be clear on which views came from which type of stakeholders and also on where we are relaying a message from a stakeholder and where we are inferring things from that feedback.
  - iv) Evaluation-specific data limitations. What are the limitations in the data sources? For example, did we only get stakeholder feedback from certain types of stakeholder? Perhaps the number of stakeholders we received feedback from were quite low? Were there not many reports with information relevant to the evaluation question? What specific data gaps were there, for example a lack of studies at the national level, or a lack of recent studies etc.

b) Summary of evidence

- i) Summarise the main evidence that has been gathered in relation to the evaluation questions for each of the evaluation methods individually:
  - Policy literature and data review.
  - Stakeholder consultation (survey and interviews).
  - Case studies.
- ii) Refer to appendix for more detailed information.

c) Overall conclusions [This may actually be reported in section 8 – Conclusions]

- i) Set out clear conclusions for the specific section which draw together the evidence presented for the different evaluation methods.
- ii) Ensure that the conclusions refer back to the intervention logic and compares to what was originally expected.
- iii) Be clear on where conclusions are stemming from the stakeholder consultation and where they are stemming from the literature review. For example, are most of the conclusions from the stakeholder consultation?
- iv) Ensure that the conclusions reflect the evidence presented, so that specific conclusions are clearly linked back to the summary of evidence.

EQ 67. To what extent does there continue to be a need for the Commission to promote insurance and other financial products for resilient investments and decisions?

Is there still a need for greater use of financial products to internalise climate costs?

Insurance in general helps increase the resilience to natural disasters as the compensation for damages will led to a speedier recovery. However, insurers will have to adapt the insurance policies as climate change is leading to more extreme events occurring. With this regard, there seems to be a continued need for the European Commission to remain involved in the topic.

A more detailed answer might be easier to obtain from stakeholder consultation rather than from the literature review.

Is there still a need to for the Commission to promote insurance and other financial products for resilient investments and decisions?

One main issue facing the increase in damages in insurance risk models is the lack of data and the confidentiality of existing data. Insurance companies have up until now been reluctant to share information, and could therefore benefit from a third party overseeing the transition to include damages from climate hazards into insurance policies by playing "the messenger".

The answer to this question might benefit from conclusions from the stakeholder consultation rather than from the literature review.

What is the nature of the support that is still needed?

See previous answer.

Again, not much in the literature, stakeholder consultations might give a more thorough answer.

EQ 68. To what extent has the Commission's efforts to engage with the insurance and financial sector led to the further development of the market for risk management and insurance policy instruments?

What actions have been taken by the Commission to engage with the insurance and financial sector on adaptation issues, over the period 2013 to 2016?

The EU and its member states have established and committed to a policy framework on the external action for EU, found in Article 21 of the Treat and Global Strategy for the European Union's Foreign and Security Policy also known as the "EU global strategy". This framework among other things seeks to "build, maintain or restore livelihoods in the face of major pressures" and will place greater emphasis on "other structural pressures including environmental degradation, climate change...". The framework also builds on the 2013-2020 Resilience Action Plan and will align with EU commitments to the 2030 Agenda. In the framework, economic resilience is discussed as being an important area to consider for the overall resilience of the EU and mentions financial contingency measures, sustainable and inclusive investment and promotes circular economy in order to reduce single-dependency as to protect vital services and facilities in case of instability. Furthermore, it suggests that the EU should "work with the European Investment Bank, other International Financial Institutions (IFIs), business sector organisations and social partners to enhance investment frameworks for economic and

social resilience". In accordance, the EU should "promote risk transfer through risk financing mechanisms such as insurance and contingency credit". [116]

To what extent has this led to adaptation being embedded within risk management and insurance policy instruments?

In 2013 the EU strategy on Adaptation to Climate Change was adopted to contribute to a more climate resilient Europe, where insurance is mentioned as an effective tool in relation to the risks of climate hazards. Concurrently the Green Paper on insurance of natural and man-made disasters was launched, where both initiatives set out to pave the way for insurers to more efficiently manage risks stemming from climate change. The political arena has already realised the importance of guarding Europe against the economic consequences of extreme climate and weather events, thus have for some years now pushed for Disaster Risk Management (DRM) policies. So far, natural disasters have been covered by annual insurance contracts, but insurers should seek to explore long-term insurance contract solutions[117]. Furthermore, responses from the EU Climate Adaptation Strategy package cautions against making the regulation uniform across the EU [118]. Since 2013 the "Cohesion Policy" which refers to the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF) is dedicated to "climate change adaptation, in the context of overall risk planning and disaster management. National and/or regional risk assessments for disaster management are a precondition for funding". [119]

EQ 69. What other factors may have led to the further development of the market for risk management and insurance policy instruments?

What other factors may have led to the further development of the market for risk management and insurance policy instruments?

What has been their relative strength?

Where these factors expected or unexpected when the Strategy was launched?

EQ 70. What drivers/barrier stood in the way of the Commission's efforts to further develop the market for risk management and insurance policy instruments?

What drivers have stimulated, or barriers have stood in the way of efforts to further develop the market for risk management and insurance policy instruments?

How did these drivers/barrier affect implementation?

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[116] EC (2017) Joint Communication to the European Parliament and the Council. A strategic approach to resilience in the EU's external action.
[117] EC (2013) Green Paper: On the insurance of natural and man-made disasters.
[118] EC (2013) Green Paper: On the insurance of natural and man-made disasters.
[119] EC (2013) Technical guidance on integrating climate change adaptation in programmes and investments of Cohesion Policy. An EU strategy on adaptation to climate change.

EQ 71. To what extent has the further development of the market for disaster risk insurance led to the greater use of financial products, such as insurance, and the internalisation of climate costs?

Has the promotion of the market for disaster risk insurance led to the greater use of financial products, and internalisation of climate costs?

EQ 74. To what extent has the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as encouraged by the EU Strategy, been coherent with relevant: EU legislation and policies, Internal initiatives, national initiatives and regional or sub-nations initiatives?

To what extent has the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as encouraged by the EU Strategy, been coherent with relevant: EU legislation and policies, Internal initiatives, national initiatives and regional or sub-nations initiatives

The Commission has so far included climate change adaptation in all EU finance programmes that relate to this topic for 2014-2020. The European Structural and Investment funds, Horizon 2020 and the LIFE programme are some of the measures that will support Member States, regions and cities. Further, on the national level, specific funds will support the adaptation such as Climate-ADAPT. [120]

What are the areas where there is less coherence?

Focus is still on monitoring the impacts of climate change rather than the effectiveness of adaptation actions. There is therefore a need for indicators to help assess the transition. [121]

However, stakeholders might be better informed of areas that are less coherent.

What could be done to improve coherence in these areas?

EQ 75. To what extent have the Commission's efforts to engage with the insurance and financial sectors to promote more resilient investments, as encouraged by the EU Strategy, added value compared to what would have resulted from an action at regional or national level

What was the added value of the Commission's engagement with the financial sector?

[120] EC (2013) Technical guidance on integrating climate change adaptation in programmes and investments of Cohesion Policy. An EU strategy on adaptation to climate change.
[121] EC (2013) Principles and recommendations for integrating climate change adaptation considerations under the 2014-2020 rural development programmes.

Appendix 8: Case studies

Four case studies have been 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.

These have been developed as a ½ page summary/box in the main report plus a more detailed 2-page document in this Appendix per case study. the 2 pages provide further details on the background/context to the issue, the nature of the EU response and the lesson learnt and future plans or thoughts.

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.

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.

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 within and between 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 (Forest Europe, 2010). 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" [122].

Portugal, Spain, Italy, Greece and the Mediterranean region of France account for around 85% of the total burnt area in Europe each year (de Rigo et al. 2017). 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 (EEA, 2017). 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[123]. Up-to-date and comparable data across Europe is maintained by the European Forest fire Information System (EFFIS)[124].

The PESETA II study[125] estimated that the burnt area of southern Europe would more than double with climate change (Ciscar et al., 2014). Other researchers have concluded the same using current models (SREX A2), as noted in EEA's report (EEA, 2017). They

[122] 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
[123] http://www.euronews.com/2017/10/16/how-europe-s-wildfires-have-more-than-trebled-in-2017
[124] http://effis.jrc.ec.europa.eu/
[125] 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

also cited recent findings that suggest a warmer climate across Europe will lead to a greater area of Europe becoming fire-prone with longer fire seasons. Specifically, the impact of fire events may be strongest in southern Europe (Forest Europe, 2010; EEA, 2017). A follow-up 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 (de Rigo et al. 2017). 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[126]. 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[127].

Countries need to address forest fire preparedness by planning and implementing actions to reduce climate sensitivities 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 (Khabarov et al., 2014, cited in EEA, 2017; Camia et al, 2017).

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 Monserrat project (described below), as an example of best practice.

Spain has been proactive in seeking to integrate disaster risk reduction and climate change adaptation planning at the national level[128], 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, in 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 (i.e. if a fire occurs) 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 Monserrat project[129] 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 Monserrat Mountain region is attributable to changes in land use and

[126] https://www2.le.ac.uk/offices/press/press-releases/2016/march/wildfire-map-reveals-countries-in-europe-most-at-risk-of-catastrophic-fire-damage
[127] http://effis.jrc.ec.europa.eu/
[128] See: http://www.adaptecca.es/sites/default/files/editor_documentos/infoadapt_memoria_final_proyecto.pdf
[129] http://lifemontserrat.eu/en/

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, Horizon 2020) to capture and disseminate relevant experiences, lessons and approaches, the stakeholders felt that the EU Adaptation Strategy could seek to strengthen joined-up thinking in this regard.

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European Commission (2013) *An EU Strategy on Adaptation to Climate Change*, COM 216.

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Forest Europe (2010), Assessment of Forest Fire Risks and Innovative Strategies for Fire Prevention, 4–6 May 2010 Rhodes, Greece, Workshop Report.

Case Study 2: Spill-over 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 spill-over effects on the EU (EC, 2013). 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 national adaptation strategies 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 (EC, 2016).

In 2012, DG CLIMA commissioned a study to investigate spill-over effects in the EU of climate change impacts occurring outside the EU. The research focused particularly on European neighbourhood countries (AMEC et al, 2013). It identified that at that time, policy responses generally at the EU, national and regional level did not address spill-over 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 spill-over effects, especially in relation to crops grown elsewhere on which the EU is reliant (Benzie et al., 2017).

The EEA's latest report on climate impacts in Europe in 2016 (EEA, 2017: Chapter 6.4) highlighted how climate change impacts (e.g. heatwaves, prolonged drought and water scarcity) have already affected agricultural production outside the EU and had spill-over 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 harvest, resulting in an export ban on wheat that contributed to a 60% to 80% increase in global wheat prices (Foresight, 2011; Coghlan et al., 2014, cited in EEA, 2017). Other EU-funded research has since found that soya bean, which is used in Europe as an animal feed for meat and dairy production, is currently sourced from a region that is highly vulnerable to climate change (Ercin et al. 2016). More generally, it has been noted that Southern Europe is likely to be particularly vulnerable to the impact of climate change outside the EU on food production and supply within the EU (EEA, 2017).

Based on an assessment of current evidence (as summarised above), the EEA (EEA, 2017: Chapter 6.4) 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)

- Vulnerability hotspots in the Mediterranean to agricultural commodity trade shocks.

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 spill-over effects, at least in relation to food production and supply, has not yet been addressed by some, and perhaps all, national adaptation strategies 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 spill-over 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 spill-over 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 spill-over 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 spill-over 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 national adaptation strategies.

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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[130], following a request from the European Council in June 2009[131]; and was then endorsed by Council and European Council[132]. 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 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[133]. 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[134]. 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.

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.

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[130] Communication from the Commission concerning the European Union Strategy for the Danube Region, 8 December 2010: COM (2010) 715.
[131] Conclusions of the European Council, 19 June 2009,
[132] Conclusions of the General Affairs Council, 13 April 2011 and Conclusions of the European Council, 23-24 June 2011.
[133] For a fuller account of governance arrangements for the strategies, see the "Council conclusions on the governance of macro-regional strategies" adopted by the General Affairs Council, 21 October 2014
[134] EU Member States: Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Romania, Slovakia, Slovenia
Non Member States: Ukraine, Moldova, Serbia, Bosnia-Herzegovina, Montenegro

The EUSDR does not have its own funding sources (the so-called "three nos" – no new funding; no new legislation; and no new institutions – were important principles in the development of EU policy on macro-regional strategies)[135]. 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. This managing authority has funding of €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"[136], 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[137]; 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 prepare for)[138]. 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 national adaptation strategies adopted since it was put in place (e.g. in the Hungarian revised national adaptation strategy, 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

[135] See, for instance, the emphasis on these principles in the Council conclusions on governance mentioned in footnote 133.
[136] SEERISK 2014. Guideline on climate change adaptation and risk assessment in the Danube macro-region
[137] See information on the EUSDR website at https://www.danubeenvironmentalrisks.eu/wateratrisk-1
[138] 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

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 can be seen as a means of maximising 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, and has over time aimed to strengthen the cooperation with the ICPDR. A joint paper on cooperation and synergy[139] 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 either for future work 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.

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

[139] See ICPDR and EUSDR: "ICPDR – EUSDR PA4 & PA5 Coordination: Joint Paper on Cooperation and Synergy for the EUSDR Implementation."

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 are participants. Similar geographical structures (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.

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Case Study 4: Adaptation of infrastructure in the energy sector

Context

Energy infrastructures can be considered as a critical infrastructure due to our reliance on their functioning for daily activities, meaning they play an important role in the functioning of our society. Due to the long economic life-spans of energy infrastructure, it is important to understand the vulnerabilities to which they are exposed at an early stage in order to carry out actions to protect them. Such vulnerabilities to energy transmission system operators (TSOs) and distribution system operators (DSOs) have been well documented (Bartos et al., 2016, ADB, 2015, WBCSD, 2014), with a projected increase in frequency and intensity of storms, snowfall and flooding events imposing 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 and insulators causing flashover faults (Panteli and Mancarella, 2015).

Climate variable	Physical components	Key impacts	Level of impact
Wind speed and storms	Wind and storm damage	Overhead lines and pylons	Moderate to high
Increasing temperatures	Increased heat convection	Overhead lines	Up to 20% capacity
	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

Security of energy supply is crucial for business continuity and well-being of citizens. Disturbances to transmission services can manifest into multiple issues for TSOs. 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.

Preventing disturbances to energy transmission can benefit the security of supply in multiple ways.

In order to alleviate the impacts of climate change upon transmission and distribution services, actors are taking innovative steps to protect their infrastructure. One such method that is being employed throughout Europe is the deployment of underground cabling. Such adaptation measures are versatile due to their ability to combat multiple climate-related risks, including flooding. Due to their 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 €120 million investment to replace 3,000km 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[140].

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[141]. 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[142]. 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 federal cabinet have opted to install 600 miles of underground cables to transmit energy throughout Germany. Germany's positioning with regards to uptake of 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 due lack of community acceptance of traditional above-ground power lines. The additional construction costs of installing underground cables is estimated to cost between €3-8 billion, which will likely to be added to consumers' electricity bills (Reuters Staff, 2015).

Considerations for the future The examples show that energy companies are, prompted by government and the financial implications of climate change, starting to take action to adapt to climate risks. Yet these examples tend to be the exception rather than the rule.

[140] Jorma Myllymäki, personal communication, February 12th 2018
[141] The Electricity Market Act was revised broadly in September of 2013
[142] Jorma Myllymäki, personal communication, February 12th 2018

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 where regulation is incentivising adaptation by energy system stakeholders, and protecting consumers from loss of power for extended periods of time. 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) 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 stabilising their security of energy supply.

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Appendix 9 – Summary of costs and benefits table

Table A9-1: Overview of costs and benefits of the EU Adaptation Strategy

I. Overview of costs – benefits identified in the evaluation									
		Citizens/Consumers		Businesses		Administrations		[Other…]	
		Qualitative	Quantitative / monetary	Qualitative	Quantitative / monetary	Qualitative	Quantitative / monetary	Qualitative	Quantitative / monetary
Benefit	**Description:** Economic benefit in reduced/avoided damages from implementation of adaptation actions **Type of benefit: Market efficiency – cost savings** **Expected**	Medium – reduced vulnerability to climate change and damages		Medium - reduced vulnerability to climate change and damages		Medium – reduced disaster relief costs			
Benefit	**Description:** Multiple benefits of improved knowledge on adaptation (from A4 & A5). **Type of benefit: Market efficiency – improved information** **Expected**			Medium – improved knowledge to adapt products, services and investments.		Medium – improved knowledge to tailor Strategies, public funding and investments.			
Benefit	**Description:** Economic **Type of benefit: Wider macroeconomic benefit -** More resilient infrastructure and economy	Medium – reduced loss of services, utilities and mobility in the event of extreme weather events		High – reduced loss of utilities, services and ability to deliver in the event of extreme weather events.		Medium – reduced need for public intervention in the event of extreme weather events.			

I. Overview of costs – benefits identified in the evaluation									
		Citizens/Consumers		Businesses		Administrations		[Other…]	
		Qualitative	Quantitative / monetary	Qualitative	Quantitative / monetary	Qualitative	Quantitative / monetary	Qualitative	Quantitative / monetary
	Expected								
Cost	**Description:** Economic costs to fund the actions under the strategy **Type of cost: Enforcement costs (**funding) **Expected**	Negligible		Negligible – generally only incurred when applying for EC funding as match funding.	Per action, 2011-2017 cost – refer to table 5-1 in main report.	Low for EC; Low/Negligible for National authorities – primarily linked to voluntary adoption or update of a National Adaptation Strategy; Low/negligible for municipalities – only incurred when voluntarily become member of the adaptation part of the Covenant of Mayors for Energy and Climate Change	Per action, 2011-2017 cost – refer to table 5-1 in main report.		

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