



Issue No. 2, May 2014
www.base-adaptation.eu

Climate adaptation strategies in the EU: Processes for design, implementation and review

Key messages

- *National adaptation strategies (NAS's) are widely accepted as appropriate tools for countries to assess climate change vulnerabilities, mainstream climate risks, and address the issue of climate adaptation.*
- *EU Member States differ widely in their progress in designing and implementing NAS's in their own territories, and valuable insights can be learned from their respective activities.*
- *The EU's 2013 Strategy on Adaptation to Climate Change has the potential to promote mainstreaming of adaptation into all relevant policy areas, particularly in early policy stages, and has had a generally positive influence since its adoption.*
- *The shortness of political timeframes, particularly related to elections, stands as a key obstacle to the effective design and implementation of NAS's, which require longer timeframes.*
- *Ensuring the mainstreaming of adaptation into all policy areas is a challenge in the design and implementation of NAS's, but can be supported by action plans prescribing specific actions to be taken within each sector.*

1. Introduction

It is commonly agreed that NAS's are a valuable tool for countries to use in planning and implementing adaptation.

There is broad consensus that climate change impacts may lead to serious ecological, economic and social impacts across Europe, with some regions and sectors more deeply affected than others.¹ Appropriate adaptation can reduce these impacts and, in some cases, yield benefits and business opportunities, but this often requires a multi-scale and multi-sector exercise in complex decision making across multiple levels of government. To this end, the United Nations Framework Convention on Climate Change (UNFCCC) has identified National Adaptation Strategies (NAS's) as a useful tool for countries to "assess their vulnerabilities, mainstream climate change risks, and address adaptation."²

¹ EEA, 2012

² United Nations Climate Change Secretariat, 2012.

In line with this, many EU Member States are currently in different stages of designing, implementing and reviewing their own NAS's, a practice actively encouraged by the European Union under its 2013 Adaptation Strategy.³ As these processes have occurred over different timeframes and in different national contexts, the different successes and challenges experienced by each Member State provide important insights on what is needed to enhance adaptation planning across all levels in Europe, and where barriers and challenges exist.

This policy brief is an output of the EU FP7 project 'Bottom-up Climate Adaptation Strategies Towards a Sustainable Europe' (BASE)⁴. It builds upon the first BASE policy brief, which overviews the key challenges facing decision makers in Europe in planning climate change adaptation.⁵ To provide the broader context, Section 2 provides an overview of the 2013 EU Adaptation Strategy, and its implications for adaptation planning in Member States. Sections 3 and 4 use case studies to examine the processes through which Member States design and implement their NAS's, and identifies challenges and trends both common and unique. Six NAS case studies are drawn from five Member States, as follows:

- Section 3: NAS's currently being designed and implemented: Italy (3.1), Czech Republic (3.2), and Denmark (3.3)
- Section 4: Implemented NAS's currently being reviewed and/or revised: Finland (4.1), Portugal (4.2) and Denmark (4.3).

Additionally, as the EU Adaptation Strategy encourages cities in Europe to adopt climate adaptation strategies at the local level, Section 5 also examines three case studies where such strategies have been implemented. Finally, in Section 6, findings from these case studies are considered and some conclusions and policy recommendations are drawn.

2. Overview of the EU Adaptation Strategy

The European Commission adopted an 'EU Strategy on Adaptation to Climate Change'⁶ in April 2013. The general aim of the EU Adaptation Strategy is to contribute to a climate resilient Europe by ensuring that adaptation considerations are integrated into all relevant EU policies. The EU Adaptation Strategy is designed as a "framework strategy" analogous to the framework directives that set general goals, outline the course of action and suggest processes for the implementation without regulating all specific details⁷. The Adaptation Strategy itself is a short document of 11 pages, but it builds on extensive Commission Staff Working Documents covering seven areas of interest, such as infrastructure, health, cohesion, rural development and coastal development. The Strategy is built strongly around the idea that other policy areas and sectors pick up the ball – as the real climate adaptation 'work' will have to be done in the sectors. BASE analysed the EU Adaptation Strategy and characterises it as a rational procedural process, which promotes soft policy instruments in efforts to integrate climate adaptation into different policy areas.

The BASE project has concluded that the strength of the EU Strategy lies in its effort to mainstream adaptation into all relevant policy areas. Earlier developments leading to the publication of the strategy have contributed to a general awareness, and the strategy is expected to support this process. Currently the focus is on early policy stages. The power of the EU Adaptation Strategy to steer policy processes may well be limited by its flexible framework character and its focus on the early (agenda setting) stages. Policies are being (re-)formulated and interpreted throughout the

The EU adopted the Strategy on Adaptation to Climate Change in April 2013.

The strength of the EU Adaptation Strategy lies in its effort to mainstream adaptation to all relevant policy areas.

³ COM(2013) 216 final

⁴ For more, see: www.base-adaptation.eu

⁵ See the first policy brief or an extended overview of these challenges: 'Challenges to planning climate adaptation strategies in Europe' (Bosello et al, 2013).

⁶ COM(2013) 216 final. Hereafter referred to as 'EU Adaptation Strategy'.

⁷ Legally speaking Directives are obviously stronger than strategies as they are binding as to the result to be achieved (§288 Treaty On the Functioning of the European Union, TFEU).

policy cycle, especially as they are implemented on the ground. It is thus vital that the Strategy gains traction at this stage in order to be successful. This can be achieved by strengthening coordination and/or by further encouraging the uptake of the mainstreaming and climate proofing in the sectors. Ultimately, the future of adaptation activities at the EU level will greatly depend on Commission staff interaction between DGs, as the Strategy itself does not include particularly strong commitments. This calls for formal or informal reporting practices that should be developed for adaptation to climate change across sectors at the EU-level (or within the Commission). In this way policy learning could be enhanced and policy coherence improved.

3. Designing and implementing national adaptation strategies

The initial process of designing and adopting an NAS is complex and time consuming, requiring coordination and collaboration between numerous actors, and across levels. In this section, three national case studies are used to examine the differing processes by which Member States are either currently developing (Italy, Czech Republic) or have previously developed (Denmark) their NAS. These three examples have occurred along different timelines, in different political contexts, and, as such, differ in terms of whether and how they reflect the EU Adaptation Strategy.

3.1. Preparation of the Italian National Adaptation Strategy

In Italy, the Ministry for the Environment, Land and Sea has primary responsibility for the preparation, establishment and implementation of an NAS. The Ministry focuses on the integration of adaptation into sectoral policies, while Regional Governments are in charge of the implementation of adaptation action plans at the local level.

The first important initiative on adaptation to climate change was organised by the Ministry with the support of ISPRA (formerly APAT) in 2007, with the objective of defining a framework on adaptation at the national level. This 'National Conference on Climate Change' represented an important opportunity and step forward for placing adaptation on the Italian political agenda. Despite this, however, the formal decision to develop the Italian NAS was not taken until July 2012.

Under this timeline, Italy is therefore currently in the process of finalising the elaboration of an NAS, which is foreseen to be adopted in 2014. Following the expected adoption, a Plan of Action is expected to be elaborated. The NAS process has been undertaken via active consultation with national, regional and local stakeholders relevant for the national sector. It has already resulted in the drafting of the following three documents⁸:

1. A national vulnerability assessment based on the collection of the available sound scientific data on impacts, vulnerability and adaptation relevant by sector at the national level;
2. An analysis of European and national policy framework for adaptation;
3. A strategy document based on the scientific analysis and on the national stakeholders and institutions consultation.

The general objective of the Italian NAS is to provide a framework for adaptation at the national level by identifying relevant sectors and proposing a set of short and long-term adaptation actions for these sectors, following the general principles presented in the EU Adaptation Strategy. The specific objectives are as follows:

- Identify specific sectors for sectoral and inter-sectoral analysis;
- Analyse the status of scientific knowledge on climate change impacts, availability of data and information at different scales and sectors⁹ in the

Initial work on Italy's NAS dates back to 2007, but the formal process began in 2012. It is expected to be adopted in 2014.

⁸ These documents have not been published as of the release of this policy brief. For more on the Italian NAS generally, see: <http://www.minambiente.it/pagina/adattamento-ai-cambiamenti-climatici-0>

⁹ Water resources, desertification, land degradation and drought, hydrogeological risk, biodiversity and ecosystems, health, forestry, agriculture and food production, marine fisheries, aquaculture, energy, coastal zone, tourism, urban settlements, cultural heritage,

country, including the estimation of costs (with a particular focus on damages from hydro-geological events), and identify the knowledge gaps;

- Identify sectoral vulnerabilities to the impacts of climate change and evaluate related risks;
- Identify and involve the main national, regional and local stakeholders, and promote dialogue between institutions.

For these purposes, ‘top-down’ and ‘bottom-up’ approaches have been combined. The top down process, aiming at preparing an NAS that is scientifically based and shared at the institutional level, was implemented through the establishment of a Technical Panel of Experts and an Institutional Committee, including Ministries, the Civil Protection Department, and representatives of regional and local authorities.

The bottom-up approach has been implemented through an on-line survey gathering perceptions of the risks of climate change and the overall ‘adaptation concept’ in the country¹⁰. The survey was launched in October 2012. Furthermore, both an on-line public review and ‘ad hoc’ public consultations were organised, in order to promote the involvement of citizens and stakeholders, such as NGOs, municipalities, private sector and trade unions¹¹. The results of these activities will be key to the future implementation of the NAS.

The Italian NAS is generally well aligned with the EU Adaptation Strategy, including approaching adaptation non-normatively.

The Italian NAS appears to be well aligned with the principles outlined in the ‘Guidelines on developing adaptation strategies’ (a communication from the European Commission accompanying the launch of the EU Adaptation Strategy)¹², though the impacts assessment and vulnerability analysis is still mainly built upon a qualitative approach.

In line with the EU Adaptation Strategy, the NAS considers integration of climate adaptation aspects in a non-normative way. Climate policy integration takes a rational view that considers planned adaptation action as being more economically advantageous than paying the costs resulting from not adapting. The NAS lacks a normative stance, which would include providing an *outcome-oriented* approach through an explicit setting of binding targets, nevertheless it provides a general description of potential actions to be implemented at the sectoral level.

Furthermore, with respect to the choice of weak versus strong climate policy integration, the NAS seems to aim at a rather weak form, leaving the responsibility for coordination of different policy objectives at the level of the different sectors.

3.2. Designing a National Adaptation Strategy in the Czech Republic

Work on the Czech NAS began in 2009, and is expected to be adopted by 2016.

The aim of the National Strategy to Adapt to Climate Change in the Conditions of the Czech Republic (Czech NAS) is to mitigate and adapt to projected climate change impacts as well as maintain and improve human well-being. The Czech NAS assesses climate change impacts and proposes suitable adaptation measures in particular sectors, such as forestry, agriculture, water management, urban areas, biodiversity and ecosystem services, health, tourism, transport, industry and energy, risk prevention and community protection. The preparatory process for the Czech NAS, which began in 2009, can be described as top-down. According to the Policy Statement of the newly named Czech government, approval of the Strategy is expected in mid-2016¹³.

In terms of process, the preparation of the National Adaptation Strategy was started in 2009 by Government Resolution No. 1452, which assigned all Ministers under the lead and coordination of Ministry of the Environment with the task of drafting an NAS.

transportation and infrastructure and two special cases: mountain areas (Alps and Apennines) and Po river basin.

¹⁰ For more, see: <http://www.minambiente.it/pagina/questionario-sensibilizzazione-del-pubblico>.

¹¹ For more, see: <http://www.minambiente.it/notizie/strategia-di-adattamento-ai-cambiamenti-climatici>.

¹² SWD(2013) 134 final

¹³ Government of the Czech Republic, 2014.

Within the Ministries, various interdepartmental working groups worked on the topics by thematic focus. A working draft of the Adaptation Strategy was reviewed by a number of academic institutions, including Charles University in Prague, Environment Center and BASE partner CzechGlobe – Global Change Research Centre of the Academy of Sciences of the Czech Republic. In 2013, the strategic working document was updated during the comment procedure within the Ministry of the Environment of the Czech Republic. In early 2014, the Ministry of the Environment approved the NAS proposal. Currently, the interdepartmental comment procedure is under preparation in order to finalise the Czech NAS for governmental approval. In February 2014, however, a new government was named, which issued a commitment to prepare mid-2016 the Czech NAS by mid-2016, together with specific adaptation measures oriented mainly on water management (e.g. water retention in the landscape, restoration of watercourses, protection of groundwater).

Due to the fact that the Czech NAS has been in development since 2009, it is not a direct result of the EU Adaptation Strategy, but rather a process stemming from the EU White paper - Adapting to climate change: towards a European framework for action¹⁴. As a whole, the Czech NAS does aim to fulfil the objectives of EU Adaptation Strategy, however, by promoting action by the Czech Republic, including better-informed decision-making and increasing the resilience of key vulnerable sectors.

Mainstreaming adaptation into sectoral policies is a key challenge, that could be supported by an 'action plan'.

Within the current Czech NAS process, one of the main challenges relates to mainstreaming adaptation into sectoral national, regional and local policies, so as to support specific adaptation actions. Mainstreaming could be supported by the adaptation 'action plan', which is expected to follow adoption of the Czech NAS. The action plan would identify needs for adaptation actions within particular policy sectors. Another challenge of the Czech NAS is that in the current working version of the strategy, cost benefit analysis (CBA) and multi criteria analysis (MCA) of particular adaptation actions are only partially included.

Another key issue will be ensuring broader public participation. This is expected to be enabled during the strategic environmental impact assessment (SEA) that will need to be undertaken by the Czech NAS. The SEA should focus on an evaluation of the expected impacts of the proposed strategy on the environment, as well as public health and providing opportunity for public involvement.

Moving forward, the National adaptation strategy will serve as basis for the creation of an Adaptation action plan, which will be segmented into impacts or specific sectors at the national level. Preparation of the Adaptation action plan is expected in 2015. The Action Plan will be preceded by comprehensive study on impacts, vulnerability and risk, in order to assess the likely impacts in particular sectors, including analysis of costs of policy inaction.

3.3. Strategy for adaptation to climate change in Denmark

The Danish NAS was published in 2008, and focused on providing a knowledge base on sectoral climate change impacts, and place adaptation planning on the agenda.

The Danish NAS¹⁵, published in 2008, was a relatively brief document intended to provide a knowledge base regarding the impact of climate change in various sectors and to place adaptation on the planning and decision making agendas of key sectors in order to ensure early, timely and ongoing adaptation. The strategy contains four main elements. The first element consists of vulnerability assessments for each of the sectors expected to be most affected by climate change. These are: coastal management, construction, water supply, energy supply, agriculture and forestry, fisheries, nature and nature management, planning, health, emergency services, and insurance.

The three other elements of the Danish NAS are cross cutting and involve:

¹⁴ (COM (2009) 147)

¹⁵ Danish Government, 2008.

- The provision of information on climate adaptation through a web portal for climate adaptation¹⁶. The portal includes up-to-date information on climate change, assessment tools, and adaptation measures.
- A research strategy for climate adaptation to supplement climate mitigation research.¹⁷ The strategy specifically identified two initiatives to promote adaptation research strategy: development of modelling tools for socio-economic assessments of adaptation activities to support prioritisation of such efforts, and establishment of a coordination unit for adaptation research set up under the Danish Center for the Environment and Energy, Aarhus University (DCE-AU), and included several universities and research institutions. The unit existed between 2009 and 2012 and was replaced in 2013 by a network of research institutions at DCE-AU.
- Setting up an organisational structure for climate adaptation to ensure coordination across sectoral efforts. It includes all relevant national authorities as well as representatives from municipalities, the regional governments and research.

From the EU perspective, the 2008 Danish NAS preceded the EU Adaptation Strategy and does not make reference to EU adaptation policies. The strategy is motivated entirely by the issue of climate change impacts and the need to plan ahead.

The Danish NAS was process oriented, and did not include specific tools like CBA or MCA.

The 2008 strategy was entirely process oriented, aiming to provide background information and impetus for national, local and private sector actors to include climate adaptation needs in planning and decision-making processes. As such the plan also did not include specific decision-making tools, such as CBA or MCA, nor did it specifically design participatory decision processes. But it set in motion a coordination effort that could design and implement such processes. With the new government elected in September 2011, however, the Danish NAS was updated with a new plan, which shifted policy priorities to focusing on flood risk (see Section 4.3).

4. Reviewing and revising existing national adaptation strategies

A number of EU Member States have already implemented the first iterations of their NAS's, and have begun the process of reviewing and revising the effectiveness of their implementation. Revisions to NAS approaches can also reflect new political realities in the Member States. This section presents the review and revisions processes undertaken by Finland, Portugal and Denmark. Their work provides important insights for countries currently designing and implementing their NAS's.

4.1. Review and update of the Finnish National Adaptation Strategy

The Finnish NAS was published in 2005, and first reviewed in 2009.

Finland published its first National Adaptation Strategy in 2005.¹⁸ It arose partly as a response to the Parliament's comments on the 2001 National Climate Strategy¹⁹. In its comments the Parliament identified the need to draft a programme for adaptation to climate change. The Parliament's awareness was based on, among other things, several Finnish scientific studies²⁰ on the potential impacts of climate change.

The work on the strategy was coordinated by the Ministry of Agriculture and Forestry. Representatives from the Ministry of Transport and Communications, Ministry of Trade and Industry, Ministry of Social Affairs and Health, Ministry of the Environment, Ministry for Foreign Affairs, Finnish Meteorological Institute and Finnish Environment Institute took part in the preparation, which took two years. Each Ministry was responsible for assessing the impacts and identifying adaptation measures in its own sector. The result was an extensive document of 272 pages, with the ambition to

¹⁶ For more, see: <http://en.klimatilpasning.dk/>

¹⁷ For the research strategy, see Danish Government, 2008, pp. 41-45.

¹⁸ Finnish Ministry of Agriculture and Forestry, 2005.

¹⁹ Finnish Government, 2001.

²⁰ E.g. Kuusisto, E. et al., 1996; Kuoppamäki, P., 1996; Käyhkö, J. and Talve, L. (eds.), 2002; Soimakallio, S. and Savolainen, I. (eds.), 2002.

cover all relevant sectors. More than half of the Finnish NAS examined possible impacts.

The NAS included tables of possible adaptation actions separately for the public and the private sectors, with these actions classified into proactive and reactive actions. Public actions were further divided according to the type of policy action, from information based to economic, regulatory and planning based. For most actions, an implementation timeline was indicated in terms of measures to be taken immediately, in the short term (2010-2030) and the long term (2030-2080).

In 2009 progress in the strategy's implementation was evaluated.²¹ One of the main conclusions was that Finland should increase resources allocated to adaptation research and awareness of climate issues in decision-making at all levels. The evaluation also called for more cooperation between sectors, especially at the regional level. In 2009 it was foreseen that the strategy would be updated and revised in 2011–2013 to reflect the anticipated EU Adaptation Strategy and other developments.

Update of the NAS began in 2012 with an evaluation of implementation.

The actual work on updating the strategy started in 2012 by appointing a new coordination group. It was even broader than the 2005 group and included all Ministries as well as representatives of major research organisations and local governments. The group started by carrying out a systematic evaluation of the development after 2009²², and concluded that important progress had been made in actions for adaptation, but that there were substantial variations with respect to the need for and practical progress in mainstreaming. Because of different conditions, sectors were not considered fully comparable.

The preparatory work for the new strategy included an overview of relevant policy instruments, stakeholder events, a survey of views on the update and a separate hearing on the update. The coordination group then proceeded to formulate a new strategy. The group decided to opt for a high-level policy document, which would be much shorter than the NAS of 2005, and one clearly focused on the public sector. This decision was made because the coordination group was specifically appointed to deal with actions by the public sector. It was not designed as a broad societal consensus group that would include the private sector or civil society. However, a significant part of the activities of the public sector are aimed at guiding or regulating activities of the private sector. Hence public consultations and public hearings have been included in the preparatory work.

The revised strategy focuses on mainstreaming, development of methods and tools for risk assessment and management, RDI, and dissemination.

The overall vision of the new strategy is to ensure the adaptive capacity of the Finnish society can cope with foreseeable climate change. In addition the strategy is to support adaptation internationally. The vision is to be realised through actions in three main pillars. The first is mainstreaming, the second the development of tools and methods for climate risk assessment and management, and the third research, development, innovation (RDI) and dissemination.

The idea of sector responsibility and mainstreaming was clearly included already in the 2005 strategy. However, the need to develop awareness of climate change impacts occurring outside of Finnish borders is more strongly emphasised than previously. The development of tools and methods for risk assessment is a routine activity in some sectors, but are particularly relevant for those sectors that are still in an early stage of adaptation action. The need to find new and better ways to deal with economic aspects of climate change and adaptation concerns all sectors. In RDI the emphasis is on seeing adaptation as a potential part of a green economy. Active fostering of innovations is new relative to the 2005 strategy.

The high-level policy nature of the new strategy means that it is considerably shorter than the 2005 strategy. It relies on background documents and summaries of relevant research, but the document itself will only be around 40 pages, as opposed to the nearly 300 pages of the 2005 strategy.

²¹ Finnish Ministry of Agriculture and Forestry, 2009.

²² Finnish Ministry of Agriculture and Forestry, 2013.

The revised strategy will be short, political in nature, and implementation in all sectors will be key.

Because the new strategy will be a brief political document, the critical issue will be its implementation in the sectors and in the public administration as a whole. Its relation to and capacity for generating interest also in the private sector and civil society will be crucial for its success. A coordination group will be appointed to monitor the activities. Regular evaluations will also be part of the implementation and will provide a base for policy learning. If the strategy succeeds in providing lessons on how to engage stakeholders and how to make adaptation contribute to the transformation of the Finnish society into a green and sustainable one, it stands a fair chance to achieve its vision. The strategy was sent for public hearing in spring 2014 before formal adoption by the Government later in the year. The reactions in the hearing round will give an indication of its prospects for success. A preliminary analysis of the responses suggests an overall positive attitude to the new NAS, but there are also many proposals put forward on how to improve it. The final document is therefore likely to change from the one sent out for review.

4.2. Review of Portuguese National Adaptation Strategy

The Portuguese NAS was adopted in 2010, and a review of the initial phase (2010-2013) has recently been concluded.

Portugal was one of the first countries to develop an NAS, having been adopted by the Portuguese Government on 1 April 2010²³. The Portuguese NAS establishes the need for adaptation through a synthesis of the main observed changes in the climate over the 20th century, alongside a summary of climate scenarios and projections for Portugal. This strategy is structured around four objectives reflecting its approach to the problem:

1. *Information and knowledge*: This is the basis for the development of the Portuguese NAS, focusing on the need to collect, consolidate, and develop a strong technical and scientific basis;
2. *Reducing vulnerability and increasing the response capacity*: This is the core of the Portuguese NAS, and frames the work of identification of vulnerabilities, definition of priorities and implementation of the main adaptation measures;
3. *Participation, awareness raising and dissemination*: This highlights the importance of educating and involving all relevant agents in the efforts to identify and implement the most appropriate adaptation measures;
4. *International cooperation*: This addresses cooperation efforts within the European Union, the UNFCCC and other international forums to promote coordination and information sharing, and to support adaptation efforts in developing countries.

The Portuguese NAS also identifies nine priority sectors: i) territory and urban development; ii) water resources; iii) safety of people and goods; iv) human health; v) energy and industry; vi) tourism; vii) agriculture, forests and fisheries; viii) coastal areas; and ix) biodiversity.

Since 2010, the Climate Change Commission, an interministerial coordination group that aims to address all crosscutting issues, has met in a forum that discusses issues that are, by nature, cross-sectoral. This approach brings together the actors with interest and knowledge in each particular sector and which tried to identify the most appropriate adaptation measures.²⁴ The Climate Change Commission is chaired by the Portuguese Environmental Agency (APA) – Climate Change Department, and includes representatives of the different sectors (coordinated by the agency responsible for the policy area), the Ministry of Foreign Affairs, the Autonomous Regions of Azores and Madeira and of the National Association of Portuguese Municipalities.

Phase 1 (2010-2013) of the Portuguese NAS was recently evaluated, and a 225 page report assessment was produced, consisting of sectoral vulnerabilities and a first

A report for Phase 1 (2010-2013) has been produced, and discussions for Phase 2 (2014-2020) are underway.

²³ ENAAC, 2010.

²⁴ Carvalho et al, 2013.

Phase 2 is supported by multiple grants and research projects aimed at increasing capacity for assessing vulnerability, as well as awareness.

identification of adaptation needs and process failures.²⁵ Phase 2 (2014-2020) is currently being elaborated, and aims at creating the conditions to facilitate the initiation of concrete adaptation action across sectors and regional scales. This phase will be supported by the EEA Grants programme²⁶ which finances important projects for the development of adaptation in the country. The total Support of EEA Grants to Portugal in this period is 57.95M€. Programme AdaPT²⁷ is one of the 8 programmes supported by the EEA Grants in Portugal for the period 2009-2014 (though projects will run until 2016). Programme AdaPT was designed to support the start-up of supported projects on 'Adaptation to Climate Change' in Portugal. The design of the programme is informed by the needs and contributions of the coordinating group developing the Portuguese NAS. The aim of this program is to increase capacity for assessing vulnerability to climate change, as well as to enhance awareness and education. The programme will be implemented via:

- A pre-defined project, which aims to provide easy access to systematised information on climate scenarios of a regional nature, including the data processing of the 5th IPCC Assessment (design responsibility of the Portuguese Institute of Ocean and Atmosphere - IPMA);
- Three project areas that will be submitted for tender: 1. Project "Local Adaptation Strategies", which aims to build capacity for local actors (municipalities and municipal companies) to develop Local Strategies for Adapting to Climate Change; 2. Project "Climate Change Education and Award", which aims to integrate and complement the environmental education in the field of climate change, areas of mitigation and adaptation, in pilot schools, one of the components being a prize (funding) for the best project implementation on measures related with climate change in the school environment; 3. Several sectoral projects to support development studies or implementation measures (pilot or demonstration) identified as relevant in the context of sectoral groups of the NSA.

Additionally, in support of the NAS, the Portuguese Environmental Agency has been collaborating with Portuguese academic groups and local municipalities. Recently, on 29 April 2013, it organised an open event to celebrate the launch (and presentation) of the EU Adaptation Strategy. This event intended to clarify and better understand the implication for the Portuguese Adaptation process as well as clarify to all present and media all the actions made in Portugal regarding this topic.

4.3. Action plan for a climate-proof Denmark

The Action Plan is a follow-up to the 2008 Danish NAS, sketching actions and approaches for climate proofing Denmark.

This Action Plan²⁸, released in 2012, is a follow-up on the 2008 Danish NAS (Section 3.3). It sketches a range of actions and approaches directed at climate proofing Denmark. The actions outlined have been implemented or are planned, and are presented at a national level. The main focus of the Action Plan is to manage increased precipitation, i.e. cloudbursts, increased frequency and intensity of rains, and also the interaction between increased rains and rising sea levels. Moreover, the Action Plan specifically targets urban regions. The Action Plan targets five areas and outlines specific measures within each: (i) Improving the legal framework for adapting to climate change; (ii) improved knowledge, increased advisory service of local actors and improved data availability; (iii) Enhanced collaboration on and coordination of climate adaptation actions; (iv) Green growth and employment; and (v) Alignment between national and international adaptation actions.

The Action Plan lists a range of measures that have been launched, some of which will take effect over the coming years:

²⁵ Portuguese Environmental Agency, 2013.

²⁶ For more information on the programme, see: <http://eeagrants.org/>

²⁷ For more information on Programme AdaPT, see: <http://www.eeagrants.gov.pt/index.php/en/en-news/273-implementation-of-adapt-adapting-portugal-to-climate-change-pt-04>

²⁸ Danish Government, 2012.

The Action Plan lists measures with a focus on managing increased precipitation and flooding.

- The Ministry of Climate establishes a Task Force to supervise and assist municipalities in managing the impacts of climate change;
- Improving the legal framework for adaptation, including changing the Planning Act to enable local plan regulations aimed at adaptation;
- All Municipalities will have maximum 2 years to finalise Municipal Adaptation Plans (the deadline was subsequently shortened to Dec 2013), based on a detailed risk mapping of potential flooding areas;
- Investments in wastewater management, including technology and innovation;
- Mapping the key state road infrastructure and climate proofing them for flooding situations;
- Taking advantage of urban rain water as a resource for developing city areas, including active spaces;
- Stimulating green business and clean tech innovation within adaptation technologies, including financial support for innovation and start-ups;
- Monitoring the health effects of climate changes, including livestock;
- Monitoring the effects of a warmer climate and increased precipitation on the distribution and use of pesticides, with a specific focus on mapping the risks of pesticides in ground water;
- Monitoring developments in wind scenarios for Denmark, and preparing to certify buildings with respect to climate proofing;
- Monitoring and alerting high risks situations during periods of extreme weather; and
- Monitoring impacts for natural areas, particularly Natura 2000 areas;

Issued 4 years after the Danish NAS, the Action Plan distributes the implementation of the NAS across key sectors and supports the development of sectoral action plans in policy areas such as transport, coastal management, water management, agriculture. Additionally, it initiates monitoring in transport, health and coastal sectors. To promote and speed up local adaptation measures and planning, climate adaptation has been integrated as a target area in the annual financial agreement between the State and Local Government Denmark (KL), the association of the 98 Danish municipalities. As flooding due to heavy rains and/or cloudbursts, often in combination with rising sea levels and/or storm surges are the dominant impacts of climate change which anticipated – and experienced – in Denmark, the Action Plan almost exclusively targets management of rain and waste water. Problems are amplified in urban areas and the plan has specific focus on urban measures. Finding solutions that have benefits beyond adaptation are emphasised, in particular using green wedges of cities that also provide green spaces and urban nature, or green solutions that also provide spaces for activities and recreation.

Importance is placed on accessibility of information and risk data, through research funding and the establishment of a new web portal.

The Action Plan stresses the accessibility of information and risk data based on IPCC scenario A1B for local areas, and establishes a web portal to share information, experience and present concrete measures. Furthermore, the Action Plan supports development of new knowledge through funding research in climate adaptation. The Action Plan stresses the importance of collaborative actions across different sectors and different types of public and private actors, including public administration, research, business, water management companies and citizens. A second main approach in the Action Plan is to make adaptation a joint responsibility that involves local governance as well business and citizen actions, where for example private business are engaged in developing and implementing adaptation measures through support for green innovation.

Adaptation is presented as an opportunity for growth and innovation.

In terms of progress, the web portal, the risk mapping and the task force are implemented. Climate adaptation has been integrated in the annual financial agreements between the State and Local Governance Denmark. The majority of the municipalities' local climate adaptation plans are finalised. The sectoral actions plans are being developed and sectorial monitoring and risk mapping are being or have been implemented.

The Action Plan is based on the assumption that water management and prevention of flooding are the main challenges, followed by wind and heat. Adaptation is repeatedly presented as an opportunity for green innovation, growth and employment which due to Denmark's front-runner position within many forms of clean tech can stimulate increased exports.

5. Adaptation at the municipal level

Though the design and implementation of NAS's is a key tool for EU Member States to reduce climate vulnerabilities and promote adaptation activities at a national level, the context specific nature of climate adaptation means that local level strategies are also very important. In this section, we examine three case studies at the local level.

5.1. Local adaptation strategy for Ancona Municipality, Italy

Ancona, a harbour city with an international flavour, is characterised by dynamic forces and by a location that has historically determined a relationship of negative synergistic effects with its urban plant/structure. In addition, it is located in an area with complex terrain. In the last few decades, major weather events affecting the city – due to natural or anthropogenic causes – have produced the following phenomena: the 'Great Ancona Landslide' of 1982, flooding as a result of localised concentrations of impromptu phenomena of short but high intensity, coastal erosion, rising summer temperature and intensification of heat waves. It is expected that the increase in temperature, the uneven distribution of rainfall and sea level rise will have consequences on soil and subsoil. There will be increased coastal erosion and landslides on the road and railway infrastructure, which run behind the coastline. Furthermore, it is expected that this changes will impact negatively on the conservation of cultural and artistic achievements.

In the context of these factors, the Local Adaptation Plan (LAP) was adopted by the Municipality in July 2013²⁹. The four sectors identified as priority action areas are: (i) soil and subsoil landslides; (ii) coastal erosion; (iii) infrastructure connectivity and mobility; and (iv) cultural heritage. Within the LAP, there is a key symbolic action for each priority area of intervention:

- *Landslides*: enhancement and optimisation of the early warning system of Ancona's landslide, coupled with the extension of monitoring landslides that are ranked as very dangerous ones (P4) in the whole municipal territory of Ancona.
- *Coastal erosion*: defence of Portonovo's coast obtained by moving back from the coastline bathing establishments and restaurants.
- *Infrastructure connectivity and mobility*: restoration of full functionality and safety of the railway and the Via Flaminia.
- *Cultural heritage*: training for the creation of specific professionals for assessment, monitoring and analysis of the historical and cultural heritage.

In order to provide a complete portfolio of objectives within the LAP, the following types of intervention measures were also identified:

- Political decisions, such as the definition of the governance process and the award of a financial budget for adaptation on the budget of the Municipality of Ancona;
- Management actions to improve knowledge on erosion, training of new professionals, enhanced public awareness and improvement of warning mechanisms;
- Technological infrastructure actions, for the improvement and extension of technologies for monitoring landslides and for the protection of the coasts;

Ancona's experience with weather events, and its expectation of negative future impacts has led to adopt a Local Adaptation Plan.

The Local Adaptation Plan focuses on landslides, coastal erosion, infrastructure, and cultural heritage.

Under the Local Adaptation Plan, a range of measures have been identified and, in some cases, implemented.

²⁹ Municipality of Ancona, 2013.

- Behavioural measures, with appropriate information campaigns for the population.

Among these actions, there are also some measures that have already been implemented, including: an early monitoring system for landslides (24 hours); a cultural exchange between Italian and Swedish engineers on the themes of landslide monitoring and early warning systems; restoring the railway's full functionality and safety; and partnering in the 'My City is Getting Ready' campaign, under the UN Office for Disaster Risk Reduction³⁰.

Under the LAP, Ancona has a Local Adaptation Board, which consists of members representing: FSI (Italian State-owned Railway), ANAS Regional Civil Protection, Superintendent for the Architectural and Landscape Heritage of the Marche Region, Marche Region, Polytechnic University of Marche, and Ancona Province.

Ultimately, the LAP represents an operational tool substantiating the intents of the LAP's three slogans:

- Act now, because the consequences of climate change are becoming pressing.
- Act together, because only with the cooperation of all stakeholders you fully achieve the objectives of adjustment/adaptation
- Re-Act to challenges, because adaptation requires customised approaches for different challenges.

5.2. Local level adaptation in Portugal – Cascais Municipality

Historical flooding, wild fires, heat waves and recent extreme weather has motivated Cascais to adapt.

Cascais adopted its adaptation strategy, PECAC, in 2010.

PECAC has a sectoral focus on water, health, and tourism.

The Municipality of Cascais is located on the Portuguese coast, approximately 30 km west of Lisbon, near Sintra-Cascais Natural Park. Historically, the municipality has faced several severe floods, as well as regular wild fires and strong heat waves in the past century. More recently, Cascais has been regularly confronted with unprecedented extreme weather events and storm surges hitting the Portuguese coastline.

Since signing the Aalborg Charter³¹ in 1996, Cascais has actively worked on improving its governance and sustainability. Since then, it has created an Agenda XXI process for Cascais in 1997³², signed the Covenant of Mayors³³ in 2008, entered the Climate Alliance of European Cities with Indigenous Rainforest Peoples³⁴ in 2008, and in 2010 elaborated, together with a team from CCIAM, the Strategic Plan of Cascais for Climate Change, also known as PECAC³⁵. PECAC is an extensive document, which used the information available in the Intergovernmental Panel on Climate Change's Fourth Assessment Report³⁶, namely the well-known SRES scenarios, in order to draw conclusions regarding the expected impacts and vulnerabilities of Cascais for different sectors and suggest adaptation measures. These suggested measures were analysed, in a multi-criteria methodology by a group of experts, who selected the 2010 PECAC TOP 15 Adaptation Measures for Cascais.

The most vulnerable sectors identified were water, health and tourism. The most important climate impacts identified were heat waves, drought, and an increase in vector-borne diseases.

Agenda Cascais 21 is the body responsible for developing and implementing PECAC, namely the specific mitigation and adaptation measures identified. Agenda Cascais 21 belongs to the Strategic Planning Department of Cascais Municipality, being a

³⁰ For more, see: <http://www.unisdr.org/we/inform/publications/14043>

³¹ Charter, Aalborg, 2014.

³² For more, see: <http://www.cm-cascais.pt/sub-area/agenda-cascais-21>

³³ For more, see: http://www.covenantofmayors.eu/index_en.html

³⁴ For more, see: <http://www.climatealliance.org/home.html>

³⁵ Avelar & Lourenço, 2010.

³⁶ IPCC, 2007.

crosscutting body that spans sectoral departments and allows for cross-sectoral, cross-department strategies and actions. Being a benchmark for municipal climate adaptation strategies in Portugal, the Municipality of Cascais is currently working together with the BASE project in revisiting and analysing PECAC, specifically in terms of its priorities and adaptation measures, through participatory action-research methodologies.

PECAC is an advanced and comprehensive strategy, but awareness and uptake is still limited.

PECAC is the most comprehensive study done at the local level in Portugal and strategically it is well advanced. However, a recent survey of 99 individuals spanning middle and upper management of the municipal technical body produced important feedback regarding the concrete implementation and integration of PECAC in the Municipality decision-making processes. Key amongst this feedback was:

- 60% of the technical body is not aware of the Portuguese NAS, and although that percentage reduces to 45% when it comes to knowing about the existence of PECAC, 93% of the city technical body was not included in the design of the PECAC.
- The document used most to for guiding and reference on climate adaptation measures was PECAC for 66% of respondents, with the Portuguese NAS accounting for 12%, and the EU Adaptation Strategy for 16%.
- Although the vast majority (84%) considered PECAC an important-to-fundamental tool in the planning and activity design of their department, the vast majority did not integrate it in their day-to-day planning and decision making process.

Identified barriers to integrating PECAC into decision making included lack of political will, lack of funding, and lack of knowledge.

Numerous reasons why the PECAC had not been fully integrated into Cascais design planning and decision-making processes, were clearly shown, including: lack of political will and interest; lack of funding for concrete adaptation measures; and lack of knowledge regarding the PECAC as well as lack of involvement from the Municipality in its elaboration and implementation.

That being said, the main opportunities of this strategy and process mentioned included: reduction of risk and vulnerability; participation and citizen engagement; an increased resilience.

As mentioned before, the Municipality of Cascais is currently working together with BASE in revisiting and analysing the PECAC. This new PECAC is evolving through a participatory iterative process which has at its core the need to analyse what has been done in the past 3 years since the PECAC was drafted. The goal is the check if priorities ranked by the scientific experts still hold with the new climate scenarios, new socio-politic agenda of Cascais and after including the technical body views and opinions from all sectors of the Municipality. Since July 2013, seven participatory workshops have been held in Cascais, bringing together more than 150 key stakeholders for climate adaptation planning and action in Cascais. These workshops have ranged from cross-cutting to sectorally specific in nature, with one focusing solely on citizen involvement.

As part of the BASE project, a participatory process is underway to analyse PECAC, test its relevance, and bring it further into the design and concrete implementation of measures.

This process revealed that more than half (57%) of the PECAC TOP 15 Adaptation Measures were already implemented, or well underway, though they were implemented as separate initiatives, not as a part of an integrated strategic plan. Some had been implemented through the Municipality Sustainability plan, while others had been implemented in a completely ad-hoc manner. Also, and when given the opportunity, all the participants in the seven workshops (100%), either individually or later on in groups, significantly reprioritised the rankings that produced the original PECAC TOP 15 Adaptation Measures in 2010. They strongly considered bringing new adaptation measures to the set, in order to make a completely brand new TOP 20 2013/14.

During this process of engagement, an informal Adaptation Board/Group has been created within the formal Municipality structure, and is slowly bringing PECAC into the design and implementation of concrete measures, brought together in a coherent and consistent manner in order to explore and maximise all the potential synergies and symbioses.

5.3. Climate Adaptation Plan in Copenhagen, Denmark

Copenhagen published its adaptation strategy in 2011, focusing on cloudbursts and innovative water management.

The Climate Adaptation Plan³⁷, published by the City of Copenhagen in 2011, is part of the municipal strategy to become an ‘eco-metropolis’ (*miljømetropolen*). It is based on approaching the impacts of climate changes as opportunities for development and growth. Copenhagen’s climate adaptation strategy is targeted toward specific areas; at the moment the focus is placed on cloudbursts and on innovative water management technologies.

One of the key pillars of the municipal strategy is to become the ‘Climate Capital of the world’, i.e. that the multiple benefits of innovative, sustainable climate solutions can be implemented and demonstrated to the world while simultaneously branding Copenhagen as a green, sustainable city. Additionally, the city’s Climate Adaptation Plan links to specific plans that target cloudbursts and waste water. The pervasive focus on water reflects the understanding that higher frequencies of heavy rains, cloudbursts and rising sea levels are the main climate change impacts which the city must address. Moreover, Copenhagen experienced severe flooding in 2010 and 2011 with high costs, the latter approximately 750 mill Euro.

Measures focus on management of water during increased precipitation.

As flooding is currently the main challenge for Copenhagen, the initiatives of the Climate Adaptation Plan focus on the management of water during increases in precipitation. This includes local retention of water in green and blue spaces that otherwise are used for other purposes, such as recreation. More specifically, this involves developing the ‘green wedges’ (large areas of land reserved for recreational and agricultural purposes), local green spaces such as parks and green roofs, and wetlands in the coastal areas, as well as a network that connects these and eventually leads the water to the harbour area. The city’s green structures also reduce the stress of increasing temperatures and thus reduce the risk of urban heat islands. In addition, as a novelty in Denmark, the sewage water (black water) and the surface (rain) water (grey water) is planned to be divided, so as to reduce the pressure on the sewage system during extreme weather events. Due to the extensive coast line in Copenhagen, dikes are constructed or reinforced to protect against storm surges and the rising sea levels.

Copenhagen’s strategy integrates adaptation into urban development at multiple levels, and in the short-, medium-, and long-term.

The Climate Adaptation Plan is based on a strategic approach to adaptation that integrates adaptation in the urban development at multiple levels, and in the short-, medium- and long-term. Copenhagen’s Climate Plan builds on basic approaches that are designed to integrate adaptive actions into the city’s development, and to climate proof the city in the long term. This builds on assessing the risk in the different time perspectives. Flexible planning and adaptation are aimed at taking into account new scenarios and new climate related knowledge, innovative local approaches are developed in experimental areas of the city. Climate adaptation is furthermore conditioned by being acknowledged and integrated into the planning of urban development, where adaptation is seen a way to improve urban space through integrating blue and green spaces, making Copenhagen a more attractive city. The city moreover aims to use adaptation to promote green economic growth, and attract investments in green and clean tech climate solutions from national and international actors. Knowledge sharing is central and Copenhagen participates in national and international networks, and has formalised collaborations with neighbouring municipalities. Furthermore, the Climate Adaptation Plan the city recognises the benefits of knowledge sharing and collaboration with local actors (especially the public at large), and engaging private actors and businesses in climate proofing of private buildings.

Requirements of climate proofing constructions in major neighbourhoods such as Nordhavn have been implemented, as have green infrastructures for local water retention. Furthermore, climate proofing of the new metros under construction has begun.

The city sees a clear opportunity in the climate adaptation challenge, which it anticipates will brand the city in an international perspective, push green and

³⁷ City of Copenhagen, 2011.

sustainable urban development and promote green technologies and green growth, attracting investments and offering more jobs. At the same time, the city acknowledges the management of cloudbursts and the scale of investments needed, including by private actors, as major challenges. This is, for example, the case for storm surge protection. In addition to risk analysis, the cost and benefits of different measures are included in the framing of increased heavy rains and cloudbursts where cost benefit analyses (CBAs) serve to assist in the necessary priority of actions, in particular in combination with the size of the cloudburst denoted in frequency, i.e. 10 year rain, 50 year rain etc. Through the CBA, the Cloudburst Plan marks 100 year rains as the point where adaptations are more costly than the losses suffered due to flooding because of the rain.

6. Findings and conclusions

The cases under review reveal key insights on the design and implementation of adaptation strategies in Europe, both nationally and locally. Specifically, they reveal the positive (though, occasionally limited) influence that EU level work on adaptation can have upon NAS processes, while also pointing to several challenges. These challenges include the disruptive influence of short-term political timeframes, and the difficulty in mainstreaming and establishing of strong inter-sectoral coordination. Each of these factors is discussed in more detail in this section.

The EU Adaptation Strategy appears to have positively influenced the design of Member State NAS's, though occasionally in a limited manner.

Some of the strategies examined in the case studies appear to have been spurred or influenced by the adoption of the EU Adaptation Strategy, while others stand as pre-existing initiatives reflecting the unique political contexts and needs of the member states in question. For example, some countries, such as Denmark and Finland, began their NAS's as an independent reaction to the emerging consensus that negative impacts of climate change in those countries would be significant, and that adaptation was necessary to minimise vulnerability. Outside of these more 'entrepreneurial' Member States, however, the importance and influence of the EU in encouraging and shaping adaptation strategies amongst Member States is apparent.

The clearest evidence of this can be seen in those processes that have occurred since the 2013 adoption of the EU Adaptation Strategy. In terms of the case studies examined, the Italian NAS, for example, whose design occurred at least partially after the EU Adaptation Strategy, is found to be in alignment with many of the components of the EU Adaptation Strategy, such as the principles outlined in the 'Guidelines on developing adaptation strategies'. The influence of the EU's approach can even be seen in some of the processes occurring prior to April 2013. The Czech NAS, begun in 2009, was motivated by the EU White paper - Adapting to climate change: towards a European framework for action. The Finnish NAS, initially implemented well before the EU Adaptation Strategy, planned the timing of future processes so as to be able to incorporate the guidance of EU Adaptation Strategy once adopted.

This influence was not, however, present in all case studies. The case of the 2008 Danish NAS, which was adopted prior to the delivery of the EU Adaptation Strategy, produced a looser strategy intended to be implemented locally in a more ad hoc fashion, and does not feature the same focus on mainstreaming adaptation throughout policy processes that is encouraged by the EU Adaptation Strategy. This difference in focus can be understood by the fact that the Danish NAS was adopted prior to the 2009 White Paper. The more limited scope of its ambitions reflects the political and economic realities under which it was adopted, and the absence of guidance from the EU that might have otherwise steered policy making.

Even where the EU Adaptation strategy can be seen to have influenced the structure of Member State NAS's, limitations can be seen in the case studies. For example, Italy's NAS has been shown to be generally aligned with the principles outlined in the EU's 'Guidelines on developing adaptation strategies'³⁸, but the impacts assessment and vulnerability analysis is still mainly built upon a qualitative approach. Hence,

³⁸ The guidelines provided by the EU are comprehensive and cover the full process of design and implementation of NAS's. As such, they are too extensive to overview in the context of this policy brief. For more information, see: SWD(2013) 134 final

In multiple cases, the design and implementation of NAS's has been delayed and disrupted by electoral cycles.

further focus must be placed on supporting the non-normative approach to climate adaptation with quantitative information.

Another common challenge relates to timeframes. The processes through which a Member State designs or revises its national adaptation strategy is by necessity a complex and iterative process, requiring extensive stakeholder consultations to ensure coordination between different sectors, and that the adopted strategy is both appropriate and accepted. Unfortunately, the long timeframes involved in such processes are frequently not coterminous with the shorter timeframes of political processes, such as electoral cycles. Indeed, it has been noted that adaptation policies, where present, often focus on short-term objectives to the detriment of long-term planning.³⁹ This reflects issues of long-term uncertainty, as well as the constraints posed by the short time frames of electoral cycles (mostly 3-5 years) and the annual nature of budgetary cycles. These challenges can disrupt or prevent effective, long term adaptation planning.

In particular, changes in governments have resulted in disruptions, delays and other problematic outcomes for several of the strategies examined in this policy brief. As adaptation strategies are government policies, changes in government can result in strategies being shelved or completely changed as the new government distances itself politically from its predecessor, regardless of the content of the policy itself. For example, the long period of time it has taken for the Czech Case NAS to advance from initial planning to being adopted is attributable to disruptions from the legislative elections of 26 October 2013, as in 2014 the new government extended the timeline for adoption of the NAS to 2016. Similarly, the election of a new government in Denmark in 2011 impacted implementation of the 2008 Danish NAS, as the 2012 Action Plan established new organisational processes and foci, undoing previous work.

NAS's should be designed to link short- and long-term objectives to enhance continuity across shorter political timeframes.

In order to ensure that short-term priorities do not undercut long-term needs, efforts must be made in the design of adaptation strategies to link short- and long-term goals, in order to create a more stable framework that stretches across electoral and fiscal cycles. To this end, the high profile nature of the EU Adaptation Strategy may help in establishing these processes. Additionally, it appears that the enhanced perception of vulnerability that tends to result from extreme events has previously provided windows for establishing stronger, long-term adaptation strategies, and could be leveraged similarly in the future⁴⁰.

Another common trend across the case studies relates to the challenge of coordinating between sectors and mainstreaming adaptation into all areas. Methods and organisations for achieving these goals are often weakly proscribed in national strategies. This is apparent, for example, in the design processes of the Italian and Czech NAS, and was revealed as a key challenge in the reviews undertaken by Finland.

As noted in the Czech and Portuguese case studies, these challenges could be addressed by action plans highlighting specific needs for adaptation actions in each sectors, similar to the new Finnish strategy, or the 2012 Danish Action Plan (though broader in scope, as the Danish Action Plan focuses on cloudbursts and interactions between precipitation and sea level rise). A key step identified in the case studies to overcoming this challenge is ensuring public participation in the design of an NAS.

Additionally, the case studies reveal other common obstacles to the effective design and implementation of NAS. Lack of awareness is often apparent, not only amongst the general public, but amongst individuals in sectors relevant to adaptation activities. The need to raise awareness is demonstrated by the findings of the review of the Finnish NAS, and the survey of the technical body conducted in Cascais. While many of the strategies examined in this policy brief take awareness raising into account, active campaigns of engagement and dissemination should nevertheless be further

³⁹ UNECE, 2009.

⁴⁰ Swart et al, 2009.

encouraged, and further influence should be placed on the importance of participatory processes.

The challenges identified in this policy brief are significant, and demand further research. It is in this context that the BASE project will provide guidance on improved practices for designing, implementing and reviewing adaptation strategies. Through representative case studies organised by themes (such as water management, agriculture and coastal cities) across the EU, BASE will identify critical lessons and practices that can be replicated in other regions and scaled to other levels. BASE will also produce and utilise empirical information to generalise and model costs and benefits of adaptation strategies and options. Through tools to assess physical changes, this information will be placed within a cross-cutting policy context. The needs of decision makers in Europe are diverse, but the need to find sustainable solutions is common across sectors and regions. Through the provision of a suite of integrated data and analyses, current research on adaptation will improve possibilities for delivering effective adaptation strategies at the national and local levels across Europe.

7. References

- Avelar, D. e Lourenço, T. C. 2010. 'PECAC - Sector Adaptação. Relatório Final do Plano Estratégico de Cascais face às Alterações Climáticas, Câmara Municipal de Cascais'. Fundação da Faculdade de Ciências da Universidade de Lisboa, Lisboa. 33 pp. Available online at: <http://www.siam.fc.ul.pt/PECAC/pdf/adaptacao.pdf> [Accessed on 23 February 2014].
- Bosello, F., Boteler, B., Campos, I., Capriolo, A., Hilden, M., Jeuken, A., Penha-Lopes, G., and Reid, A. 2013. 'Challenges to planning climate adaptation strategies in Europe'. Available online at: <http://base-adaptation.eu/base-policy-brief-challenges-planning-climate-adaptation-strategies-europe> [Accessed 20 February 2014].
- Carvalho, A., Schmidt, L., Santos, F.D., Delicado, A. 2014. 'Climate Change Research and Policy in Portugal' in WIREs *Clim Change* 2014, 5:199-217
- Charter, Aalborg. "Charter of European cities and towns towards sustainability." Charter approved by the participants at the European Conference on Sustainable Cities & Towns in Aalborg, Denmark on. Vol. 27. 1994. Available online at: http://www.sustainablecities.eu/fileadmin/content/JOIN/Aalborg_Charter_english_1_.pdf [Accessed on 26 February 2014].
- City of Copenhagen. 2011. 'Copenhagen Climate Adaptation Plan'. Available online at: https://subsite.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/LivingInCopenhagen/ClimateAndEnvironment/ClimateAdaptation/~/_media/9FC0B33FB4A6403F987A07D5332261A0.ashx [Accessed on 27 February 2014].
- Danish Government. 2008. 'Danish strategy for adaptation to a changing climate'. Available online at: http://www.ens.dk/sites/ens.dk/files/dokumenter/publikationer/downloads/klimatilpasningsstrategi_uk_web.pdf [Accessed on February 28].
- Danish Government. 2012. 'How to manage cloudburst and rain water: Action plan for a climate-proof Denmark'. http://en.klimatilpasning.dk/media/590075/action_plan.pdf
- ENAAC. 2010. 'Resolução do Conselho de Ministros n.º 24/2010'. Available online at: <http://dre.pt/pdf1sdip/2010/04/06400/0109001106.pdf> [Accessed on 28 February 2014].
- European Commission. 2013. 'An EU Strategy on adaptation to climate change' COM(2013) 216 final.



- European Environment Agency (2012), Climate change, impacts and vulnerability in Europe 2012: An indicator-based report. EEA Report No. 12/2012. Copenhagen: EEA.
- Finnish Government, 2001. 'Kansallinen ilmastostrategia: valtioneuvoston selonteko eduskunnalle' Government Report to the Parliament 27.3.2001. Available online at:
[http://ktm.elinar.fi/ktm_jur/ktmjur.nsf/All/58DF3F554AE83273C2256A1C00240943/\\$file/selonteko_1503_lopullinen.pdf](http://ktm.elinar.fi/ktm_jur/ktmjur.nsf/All/58DF3F554AE83273C2256A1C00240943/$file/selonteko_1503_lopullinen.pdf) [Accessed 21 May 2014]
- Finnish Ministry of Agriculture and Forestry, 2005. 'Finland's National Strategy for Adaptation to Climate Change'. Available online at:
http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/5g45OUXOp/MMM_julkaisu2005_1a.pdf [Accessed February 27].
- Finnish Ministry of Agriculture and Forestry, 2009. 'Evaluation of the Implementation of Finland's National Strategy for Adaptation to Climate Change 2009'. Available online at:
http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/2009/5IEsngZYQ/Adaptation_Strategy_evaluation.pdf [Accessed February 25].
- Finnish Ministry of Agriculture and Forestry. 2013. 'Ilmastonmuutoksen kansallisen sopeutumisstrategian arviointi Helsinki 2013'. Available on:
http://www.mmm.fi/attachments/mmm/julkaisut/tyoryhmamuistiot/2013/6MoQ7USVg/Ilmastonmuutoksen_kansallisen_sopeutumisstrategian_2005_arviointi.PDF [Accessed on February 25].
- Government of the Czech Republic, 2014. 'Policy Statement of The Government of The Czech Republic'. Available online at: http://www.vlada.cz/assets/media-centrum/dulezite-dokumenty/en_programove-prohlaseni-komplet.pdf [Accessed on February 28].
- IPCC, 2007. 'Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change'. [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.
- Kuoppamäki, P. 1996. 'Impacts of Climate Change From a Small Nordic open Economy Perspective'. Research Institute of the Finnish Economy (ETLA), Helsinki, Finland, 147 pp.
- Kuusisto, E., Kauppi, L., and Heikinheimo, P. 1996. 'Ilmastonmuutos ja Suomi' Academy of Finland and Helsinki University Press, Helsinki, Finland, 265 pp.
- Käyhkö, J. and Talve, L. (eds.) 2002. 'Understanding the Global System: The Finnish Perspective' Final report of the FIGARE programme 1999-2002. Finnish Global Change Research Programme FIGARE, Turku, Finland, 232 pp.
- Portuguese Environmental Agency. 2013. 'Relatório de Progresso: Estratégia Nacional de Adaptação às Alterações Climáticas'. Available online at:
http://www.apambiente.pt/_zdata/Politic/AlteracoesClimaticas/Adaptacao/EN AAC/RelatProgresso/Relat_Progresso.pdf [Accessed on February 28].
- Soimakallio, S. and Savolainen, I. (eds.) 2002. 'Technology and Climate Change CLIMTECH 1999-2002' Technology Programme Report 14/2002. TEKES National Technology Agency TEKES, Helsinki, Finland, 259 pp.
- Swart, R., Biesbroek, R., Binnerup, S., Carter, T., Cowan, C., Henrichs, T., Loquen, S., Mela, H., Morecroft, M., Reese M., and Rey, D. 2009. 'Europe Adapts to Climate Change: Comparing National Adaptation Strategies'. PEER Report No 1. Helsinki: Partnership for European Environmental Research.
- United Nations Climate Change Secretariat. 2012. 'The National Adaptation Plan Process: A brief overview'. Available online at:
http://unfccc.int/resource/docs/publications/publication_ldc_napp_2013.pdf [Accessed 19 February 2014].

UNECE. 2009. 'Guidance on Water and Adaptation to Climate Change'. United Nations: New York and Geneva. Available online at: <http://www.unece.org/index.php?id=11658> [Accessed 5 March 2014]

Authors:

This policy brief was written by Alessio Capriolo (ISPRA), Roos Den-Uyl (Exeter), Francesca Giordano (ISPRA), Mikael Hildén (SYKE), Anne Jensen (Aarhus), Eleni Karali (CMCC), Eliska Lorencova (CzechGlobe), Kirsi Mäkinen (SYKE), Helle Ørsted Nielsen (Aarhus), Gil Penha-Lopes (FFCUL), Andrew Reid (Ecologic), Duncan Russel (Exeter), and Hans Sanderson (Aarhus). It was edited by Andrew Reid (Ecologic).

Acknowledgements

The authors would like to express their gratitude to Ms. Jana Kontrošová (Ministry of the Environment of the Czech Republic), who provided valuable information on the current status of the National Adaptation Strategy.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under Grant Agreement No. 308337 (Project BASE). The views expressed here are the sole responsibility of BASE and can in no way be taken to reflect the views of the European Union.