Eionet Report - ETC/CCA 2015/3, December 2015

National action supporting urban adaptation in EEA Member States

Authors:
Margaretha Breil (CMCC), Rob Swart (Alterrra)

European Environment Agency
European Topic Centre on Climate Change
Impacts, Vulnerability and Adaptation

Cover design: EEA
Cover photo © Margaretha Breil
Layout: Margaretha Breil

ETC/CCA Consortium Partners:
Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC),
Alterra - Institute within the legal entity Stichting Dienst Landbouwkundig Onderzoek,
Aarhus University - Danish Centre for Environment and Energy (AU-DCE),
Charles University Environment Center (CUNI),
Umweltbundesamt GmbH / Environment Agency Austria (EAA),
Fundação da Faculdade de Ciências da Universidade de Lisboa (FFCUL),
Fresh-Thoughts (FT),
Met Office Hadley Centre (MO),
Finnish Environment Institute (SYKE),
THETIS S.p.A.,
Helmholtz Zentrum für Umweltforschung GmbH (UFZ),
The Chancellor, Master and Scholars of the University of Oxford (UK Climate Impact Programme),
Universidad Politecnica de Madrid (UPM),
Zentralanstalt für Meteorologie und Geodynamik (ZAMG)

European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation
C/o Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC)
Via M. Franceschini 31, 40128 Bologna, Italy
Phone: +39 051 4151411, int. 277
E-mail: silvia.medri@cmcc.it
Website: http://www.cmcc.it/

Contents

Acknowledgements

The authors gratefully acknowledge the contributions received from the National Reference Centres (NRCs) on climate change impacts, vulnerability and adaptation of the EEA's European Environment Information and Observation Network (Eionet), the comments and information provided by the partners of the EEA's European Topic Centres on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA) and on Urban, Land and Soil Systems (ETC/ULS). Finally the authors wish to thank Birgit Georgi (EEA) for crucial information, comments, and suggestions provided throughout this work.

1. Introduction

This report reassumes information provided by the National Reference Centres (NRCs) for climate change adaptation on the request of the EEA in December 2014/January 2015 (20 responses received by April 2015) with regards to national initiatives supporting local climate change adaptation. The information provided by the NRCs has been integrated with facts reported on the Climate-Adapt platform and from the reports delivered under the Monitoring Mechanism Regulation MMR by April 2015 (see Table 1 for details).

For those countries where no such information was available, results from the self-assessment were used which is at the basis of the recent EEA report on national adaptation policies (EEA 2014). Finally some additional information was provided by external reviewers from member states during the final review process of the upcoming EEA report "Urban adaptation to climate change" (EEA 2016).

These sources have been used for retrieving information regarding specific aspects connected to national strategies addressing to urban climate change adaptation. The information was used for describing the state of play for urban adaptation in EEA member states for the EEA report on Urban Adaptation published in 2016 (EEA 2016) . Actions indicated by national representatives either in formal (source: MMR reporting) or informal reporting procedures (the EEA request) and contributions to the Climate-ADAPT platform have been used within the report in order to illustrate good practice achieved so far on national support to urban adaptation. The present report has the intention to organize the access to the collected information available from these sources, providing, as far as possible, links to further resources either in English or in national languages. Not all countries have provided information or detailed indication of sources; to some extend it was possible to retrieve more information by accessing national sources directly.

The EEA request sent out to the NRCs specifically targeted information needs of the EEA report with

Table 1 Country information used for the review

	NRC questionnaire	MMR Report	Climate-Adapt Country pages	Review of the EEA report
Austria	•	•		
Belgium	•	•		
Bulgaria	•	•	•	
Croatia		•		
Cyprus	•			
Czech Republic	•	•	•	
Denmark		•		
Estonia		•	•	
Finland		•	•	
France	•			
Ireland		•		
Germany	•			
Greece	•			
Hungary	•		•	
Italy	•			
Lithuania	•	•		
Luxemburg		•		
Malta		•		
The Netherlands		•		
Norway	•		•	
Poland	•	•		
Portugal	•	•		
Romania		•		
Slovakia	•		•	•
Slovenia	•			
Spain	•	•		
Sweden	•	•	•	
Switzerland	•			•
Turkey	•			•
United Kingdom	•	•	•	•

regards to national action. It was articulated in five questions which essentially aim at describing the national context for local urban adaptation action (see Box 1).

Considering the strategy for information collection (indeed, not all NRCs did provided information, and only part of the information requested could be retrieved from other sources), this overview cannot aim at providing a complete overall picture of national actions in member states, but sheds a light on interesting initiatives and programmes in a policy landscape which is in continuous evolution. Rather than providing a complete overview, the aim is thus to present a source of inspiration for good practice examples.

This report follows the structure indicated by the five questions and is subdivided into two parts: a first part focussing on governance, describing national activities, frameworks and legal initiatives. It aims at understanding how local climate adaptation is framed within the national climate policy, how responsibilities are shared between different levels of governance and which strategies national governments have put in place for facilitating urban adaptation at the local level. The second part focuses on implementation and initiatives. Extracting information from the feedback provided by national reference centres and national reporting, short descriptions and links are provided that allow for insights into potentially interesting good practices, including guidance and knowledge exchange initiatives, local initiatives indicated as interesting examples, participations in international and national projects, and independent local action that has been indicated as being interesting for the urban adaptation report from the side of the national reference centres.

Box 1 Shaping the EEA Report on Urban adaptation: Questions to the National Reference Centres (NRCs)

- Inform us, who is primarily responsible for urban adaptation in your country, and who are additional key stakeholders. It would be very helpful, if you could provide us the relevant internet pages and sections and contact details, so that we can explore certain information in more depth ourselves.
- Share your view on which topics an EEA report in particular should consider and what would be most supportive for your national activities
- How is urban adaptation included in the national adaptation strategy or action plan? (e.g., own chapter or mainstreamed in different chapters)
- Is urban adaptation included in any legal framework? (e.g., mandatory urban adaptation strategies / plans)
- What are key actions and key resources on urban adaptation in your country? (internet platforms, tools, guidance, programmes, initiatives, funding streams, general concepts)

2. Governance and national policies

2.1. How is urban adaptation included in the national adaptation strategy or plan?

Recognizing the importance of urban adaptation at the national level is a first step for creating a governance framework which enables or facilitates local action for adaptation, creating resources, providing for knowledge and capacity generation and creating the legal framework needed for action at the level of local authorities. Most frequently, the importance attributed to urban adaptation for the national adaptation policies is recognized in national Adaptation plans.

In **Austria,** the National Climate Plan provides for the strategic framework of all adaptation activities, and the complementary national Action Plan dedicates a chapter to adaptation needs in urban areas, providing recommendations, and indicating objectives and actors for adaptation action. Further areas of action addressed by the NAP which are of relevance for urban adaptation strategies are housing and construction, health and spatial planning. For each of these areas further recommendations, objectives and actors are defined by the plan. The recommendations made for cities are focussed on urban green and open spaces (source: MMR reporting). Furthermore, some regional (*Bundesländer*) adaptation strategies have been adopted or are under preparation.

In the federal **Belgian** system, each of the regions (Flanders, Wallonia, and Brussels capital region) has its regional autonomy and the federal government intervenes on an equal footing but in different areas. Each of the three regions is creating an adaptation plan for their area of competence and collaborates with the federal government in the National Climate Commission for the definition of a national adaptation plan. The draft national adaptation plan identifies national measures aiming at promoting greater coordination and information sharing between the regional and federal authorities.

The **Belgian** regional and federal climate plans provide the framework for action at their competence level without attributing priorities to single sectors. Priorities are instead discussed within each sector, with the built environment being among the priority issues at regional level (source: MMR reporting).

In the Wallonia Region, the regional climate plan[1] contains one chapter dedicated to adaptation activities addressing risks from heat waves, water scarcity and flash flooding. The indications given in relation to heat waves point at building level measures (shading) underlining the necessity of measures that do not increase energy consumption. This adaptation plan is, as the Brussels plan, part of the Air Climate and Energy Plan. The Brussels Air Climate and Energy plan was under public consultation at the time of the survey in 2015. The Flemish Adaptation Plan is part of the Flemish Climate Policy Plan which was adopted in 2013. The draft federal adaptation plan addresses national adaptation actions for some sectors; two among these, transport and health, are of relevance for urban areas (source: MMR reporting).

The **Bulgarian** adaptation strategy is under preparation. As a first step a Framework document "National

Table 2: Urban adaptation in national climate strategies and plans of 21 EEA member countries

Integration of urban adaptation in national policies	Countries
Urban issues included in a specific part of the national adaptation strategy	Austria, Italy, Slovakia, United Kingdom
Urban issues mainstreamed throughout the national adaptation strategy	Bulgaria, Denmark, France, Turkey
Urban issues mainstreamed thematically into:	
- building and construction	Finland, Spain, Turkey
- spatial planning	Czech Republic, Finland, Germany, Portugal, Spain, Switzerland, Turkey
- health	Belgium, Czech Republic, Finland, Germany, Portugal, Spain, Switzerland
- transport	Belgium, Czech Republic, Finland, Portugal, Spain
- disaster risk management	Czech Republic, Portugal, Turkey
- water management	Netherlands, Portugal, Turkey

climate change risk and vulnerability assessment for the sectors of the Bulgarian economy" was finalized in early June 2014. The sectors covered by the document include the urban environment. This Framework document serves as a basis for the further development of a National Adaptation Strategy, providing the necessary information for the development of specific measures and strategic actions aiming at a reduction of the country's vulnerability to the effects of climate change. The competent authorities will be involved in the development of adaptation measures for each sector, as well as NGOs and the scientific community. In **Bulgaria,** Urban environment will be one of the sectors for which the National Adaptation Strategy will develop specific adaptation measures. In this regard the commitment to draw up a National Adaptation Strategy arises from the Climate Change Mitigation Act where in accordance with article 9, the Minister of Environment and Water, jointly with the competent Ministries and following consultation with the National Expert Council on Climate Change, shall prepare a national strategy containing the key climate change adaptation measures. The Bulgarian third National Action Plan on climate change provides mainstreamed information on urban adaptation which is included in different chapters of the plan. Urban areas appear as the least vulnerable among the sectors considered (source: MMR reporting).

Croatia NAS under development[2].

Cyprus NAS under development[3].

In the National Adaptation strategy for the **Czech Republic**[4], adopted in 2015, linkages between different sectors are considered and interactions between mitigation and adaptation measures highlighted. Adaptation measures are proposed, among others, for urbanized landscape, health and hygiene, crisis situations, civil protection and transport. Up to now, urban areas have not been considered in a specific manner by the vulnerability assessment, but the urban environment will be included in a forthcoming project call for vulnerability assessment considering further sectors (source: MMR reporting).

In **Denmark** both NAS and NAP are in place, an English translation of the National Action Plan is accessible from the national Adaption platform[5]. The plan addresses impacts from rain and cloudburst as an impact from climate change, so implicitly urban adaptation represents a core action in the Danish adaptation plan. The Danish Action plan underlines the need for efforts providing support and knowledge, and green transition to local authorities.

In Estonia no Climate Adaptation Plan is in place, according to self-assessment, the MMR underlines the necessity of preparedness for emergency situations.

Finland considers spatial planning a crucial tool for prevention with respect to climate risks. Among the sectors described in the national strategy adopted in 2005, although urban areas not being explicitly addressed, the strategy focusses on crucial features of urban systems, as transport and communication, land uses, buildings, construction and health are addressed. The National Adaptation Plan adopted in 2014 pays mayor attention to the build environment, and identifies the greatest challenge for the plan in the reinforcement of the capacity of the built environment to changes (Ministry of Agriculture and Forestry 2014, p.16) Specific vulnerability studies have been made for river and urban floods (cloudbursts). Specifically with regards to city planning, vulnerability of cities to flash floods and heat island effect has been explored in a specific study (EARK-ILKKA, 2011-2014) (source: MMR reporting).

In **France** a national strategy has been adopted in 2007, followed by a first national adaptation plan for the years 2011 to 2015 adopted in 2011[6]. Urban areas are considered in both documents and specific actions are dedicated to them, addressing mainly impacts from heat waves (ONERC 2011).

In **Germany**, both NAS and NAP are in place, and urban adaptation is included and mainstreamed in several chapters, dedicated, i.a., to health, and spatial planning.

[2] http://climate-adapt.eea.europa.eu/countries-regions/countries/croatia accessed on 22/06/2016
[3] http://climate-adapt.eea.europa.eu/countries-regions/countries/cyprus accessed on 22/06/2016
[4] http://www.mzp.cz/cz/zmena_klimatu_adaptacni_strategie, in Czech, accessed on 14/06/2016
[5] http://en.klimatilpasning.dk ; accessed on 14/06/2016
[6] Source: http://climate-adapt.eea.europa.eu/countries/france, accessed on 30/10/2016

Greece, according to self-assessment, has no NAP/NAS in place.

Hungary, according to self-assessment, has no NAP/NAS in place according to the country information in the Climate-Adapt Platform, the strategy is currently being adopted[7].

Iceland, according to self-assessment, has no NAP/NAS in place.

In Ireland, the National Climate Change Adaptation Framework has been adopted in 2012 which dedicates a specific chapter to local adaptation planning (Minister for Environment, Community and Local Government, Republic of Ireland, 2012)

In the **Italian** climate adaptation strategy (approved in June 2015), adaptation in urban areas is addressed in a specific chapter and is furthermore mainstreamed into several chapters dedicated to other sectors of activity (e.g. health, hydrogeological risk, energy, coastal areas, tourism, critical infrastructure) (Ministero dell'Ambiente e della tutela del Territorio e del Mare, Repubblica Italiana 2014).

Latvia according to self-assessment no NAP/NAS is in place.

Liechtenstein according to self-assessment no NAP/NAS is in place[8].

The Parliament of **Lithuania** has approved a national strategy for climate change management in 2012, which covers both adaption and mitigation policies. The identification of priority sectors made by the strategy refers to the results of the Baltic Sea Region Climate Change Adaptation Strategy. Further on-going vulnerability studies (including risk assessment and identification of opportunities and indicators for monitoring), are focussing, inter alia, on spatial planning (source: MMR reporting). With respect to support actions, Guidelines for climate resilient construction techniques have been formulated for the building sector aiming at maintaining the sector's competitiveness:

> *"to establish the main goals and objectives for the expansion and development of the Lithuanian construction sector and their implementation tracks till 2020. One of the reasons for the revision of the priorities in this sector are the increasing environmental requirements that are being established by the EU legislation and the impact of climate change that will have the influence on the public prosperity in the future" (Source: MMR reporting).*

The guidelines will furthermore focus on "sustainable infrastructure development of the cities and settlements" (source: MMR reporting).

In **Luxemburg,** according to the self-assessment, no NAP/NAS is in place. The MMR report provided by Luxemburg does not focus explicitly on actions targeting urban areas, but mentions adaptation measures which are relevant for urban areas like treatment of rainwater in urban areas, and the creation of ecologic corridors) (source: MMR reporting).

Malta, according to self-assessment, has a NAS in place; the MMR report does not report on adaptation activities specific to urban areas.

In the **Netherlands** the adaptation strategy adopted in 2007 (Make Space for Climate) is actually being updated by two documents: a new comprehensive and integrated National Adaptation Strategy (NAS) which will be launched in 2016, and the spatial programme (Delta Programme), actually being implemented, which re-evaluates water management in the light of long-term sustainable development and climate change. The Delta Programme provides for plans and measures aiming at guaranteeing flood safety, freshwater supply and urban resilience, including the relevant planning and a cost estimate. The Delta Programme uses an integrated and adaptive approach in finding solutions when tackling the issues of safety, water supply and the role that spatial planning can play in resolving those issues (source: MMR reporting).

Measures relevant for urban areas foreseen in the Delta Programme are:

[7] http://climate-adapt.eea.europa.eu/countries-regions/countries/hungary, accessed on 14/06/2016
[8] http://www.llv.li/#/11514/klimaschutzstrategie (in German) accessed on 14/06/2016

- Delta Decision on Water Safety, the new flood risk management policy, based on a multi-layered approach to improve protection and reduce the consequences of flooding;
- Delta Decision on the Freshwater Supply, a new nationwide approach to limit water shortages and using the freshwater supply optimally in the economy and public utilities;
- Delta Decision on Spatial Adaptation, a new, targeted approach to water-robust and climate-proof (re-) development in the built environment.

The **Norwegian** national strategy for climate change adaptation adopted in 2013 and is summarized and justified in a report to the *Storting* (Norwegian Ministry of Climate and Environment 2013) which provides both an outline of national policies and guidance for adaptation action. It addresses the distribution of responsibilities for adaptive action, including both institutional actors and individuals. Urban adaptation falls under the responsibilities of municipalities.

The **Polish** National Adaptation Strategy identifies objectives and directions for adaptation actions to be taken within the period until 2020; including spatial development and urban developed areas. The latter are recognized as having a crucial role for implementing adaptation action, as adverse effects of climate change are accumulating in urban areas, pointing specifically to impacts from heat waves, droughts and cloud bursts (New financial perspective 2014-2020). Vulnerabilities of these sectors of public policies will be identified based on climate change scenarios adopted for the NAS. Up to now only risk assessments have been performed for urban areas as for other priority areas (source: MMR reporting).

In the **Portuguese** strategy for Adaptation to climate change (ENAAC), urban areas and spatial planning are considered priority areas for action, and national authorities responsible for these areas are members of the group coordinating the implementation of the strategy. In the perspective of a revision of the strategy, spatial planning is among the policy areas which will be reinforced. The strategy identifies nine priority sectors, among these territory and urban. A report on risk prevention and reduction is planned with the aim of defining a Framework for local and regional plans supporting the identification of vulnerable areas, of measures and the integration of measures for risk reduction and prevention into spatial planning plans (Source: MMR reporting).

Romania, according to self-assessment, a NAS is in place. According to the MMR report, the climate strategy adopted in 2013 covers both mitigation and adaptation issues. Among the 13 sectors addressed by the strategy, urban areas are not explicitly mentioned, but sectors relevant for urban adaptation like public health, construction and infrastructure, flood protection are included and municipal authorities are named in different contexts as the responsible authorities for implementing relevant parts of sectoral strategies.

In **Slovakia** a national Adaptation strategy was adopted in 2014, which was stimulated by the impacts and damages generated by extreme weather events. It contains a special chapter dedicated to settlements, which indicates urban heat islands, flash floods flood protection, water supply and sewerage and urban infrastructures as major issues caused by future climate change impacts.

In **Slovenia** adaptation strategies for some sectors are in place for the forestry and agriculture sectors, urban issues are not addressed.

The **Spanish** National Plan for Adaptation to Climate Change (PNACC), adopted in 2006, works as a framework coordinating public administrations for impacts and vulnerability assessment and for planning of climate change adaptation activities (focussing on the public domain, and on cooperation with private actors). The implementation of the plan is organized in 6 - year - work programmes areas (Pillars); urban areas are considered in the third programme which is actually being developed (2014-2020), and will be covered with the four areas of action: knowledge generation and impact/vulnerability analysis, integration into legislation, development of indicators for monitoring and stakeholder mobilization. Urban areas are considered both as a geographic entity and in terms of sectorial interventions (planning, construction, transport, energy). Sectors envisaged as particularly relevant are services, and planning and management at the local level, which will play an important role for minimizing vulnerability to climate change.

The description of the **Swedish** climate strategy (NAS) does not refer explicitly to urban adaptation action, but points to the need of a broad involvement of the entire society, and of integration into sectorial

policies. Responsibilities for the execution of preventive measures have been given to different national authorities, but no national coordinating authority has been established or appointed. Important coordination functions are held by regional government offices (CABs) which have the overreaching responsibility for coordinate climate adaptation at a regional level and collaborate with a broad selection of both public and private stakeholders, including regional and municipal authorities, industry and universities. CABs play an important role to increase knowledge of climate change and its impacts and encourage adaptation actions in a close dialogue with stakeholders. However, they lack the power to ensure that adaptation takes place. The actual decision making powers for spatial planning and infrastructures lie with politically controlled organizations such as Regions or Regional Development Councils which cooperate with the municipalities when it comes to development planning [9].

The **Swiss** national adaptation strategy has identified the expected increase in heat waves in urban areas as one of the main challenges to be dealt with in terms of health and spatial development policies. For reasons of federal constitution, the central government has hardly any competences in the field of urban planning, limiting its activities to support to local and regional (cantonal) authorities.

The **Turkish** climate strategy, approved in 2010, addresses both adaptation and mitigation activities. It calls for the development of some specific strategies for urban areas with potential both for mitigation and adaptation: efficient land-use for preventing urban heat island effect, reduction of urbanization pressures on rural areas, flood and river basin management, as well as measures for sustainable urban water management, use of appropriate architecture and building materials, and protection of urban ecosystems are mentioned among the measures to be implemented.

The **UK** National Adaptation Programme report (2013) identifies actions to be undertaken and designates government, businesses, local government and other organisations responsible for their execution. Areas of action relevant for urban adaptation concern flood and coastal erosion risk management and spatial planning. The same chapter dedicated to the built environment furthermore addresses the need for increasing adaptive capacities and resilience. A separate chapter is dedicated to local governments, focussing on awareness raising and capability building, a framework for action and commitments to action by core cities, the Local Government Association and London Councils. Prior to a change in the National Government, performance of local authorities was measured and compared using a specific choice authorities made from set of indicators. One of these indicators (Indicator 188) addressed planning for climate change adaptation, provided guidance for planning at the local level and helped measuring progress of adaptation planning processes. With the cancellation of the whole system of monitoring, this indirect incentive given to local governments for proceeding with adaptation planning has been cancelled, too (Lorenz et al. 2015). National guidance for local action has been replaced by the provisions of the National Planning Policy Framework (NPPF), which sets out planning which still requires Local Planning Authorities to 'adopt proactive strategies to mitigate and adapt to climate change' in their Local Plans (DCLG 2012: 22, cited by Lorenz et al. 2015).

The Scottish and Welsh Climate Adaptation Strategies focus, inter alia, on resilience for buildings, infrastructures and communities, while the Northern Ireland strategy does not mention sectors of direct relevance for urban adaptation (source: MMR reporting).

2.2. Is urban adaptation included in any legal framework?

Including urban adaptation into existing legal frameworks is a relevant step towards mainstreaming of adaptation to climate change into on-going activities, like spatial planning, building layout, and design of infrastructures. To some extent, having climate change included into legal frameworks can furthermore facilitate the access to financial resources as it provides incentives for including measures aiming at protection against climate change impacts into diversified financial strands.

The **Austrian** Adaptation Strategy has not been translated into a separate legal framework which would provide a legally binding background for local action. Nevertheless, as a form of mainstreaming specific

[9] Source: http://climate-adapt.eea.europa.eu/countries-regions/countries/sweden accessed on 9/06/2016

adaptation measures have been included in existing sector-specific regulations, especially into federal building laws and legal frameworks for urban planning.

In the **Czech** republic, where the national adaptation plan has been adopted only very recently, urban or local adaptation activities are promoted by financial measures both from sectorial national programmes (flood and landscape protection) or by funding provided from EU and EEA sources. Integration of adaptation measures into legal frameworks for urban planning and building design are envisaged by the Strategy.

In **Denmark**, the planning act has been amended in 2012, in order to enable municipalities to include climate change adaptation directly into municipal development plans. Following the obligations created by the revision, all **Danish** municipalities will have finalized their climate change adaptation action plan by spring 2015, consideration of adaptation issues includes flood risk mapping as a basis for establishing priorities for the local climate change adaptation measures (source: MMR reporting).

This comes with an agreement between municipalities and central government to increase municipal investments into climate change adaptation for wastewater collection and treatment by DKK 2,5 billion (ca. €336 million); relying on risk assessment and municipal climate change adaptation plans. Complementary to this the legislation regarding water sector was amended in the same year, clarifying that wastewater service providers are allowed to invest in climate change adaptation (source: MMR reporting). In Copenhagen this amendment allowed the water utility to start adapting the sewerage system to cloudbursts, charging the *investment costs in adaptation measures on water users*.

In **Finland**, management of storm-water has been taken into consideration in the Land Use and Building Act since an amendment of this act in 2014 (source: **MMR Finland**).

In **France**, according to the French law on climate action "*loi Grenelle*"[10], local climate action is codified within Territorial Climate-Energy Plans (PCET)[11], which consider all forms of climate action for both climate change mitigation and adaptation[12]. Furthermore, several national plans have identified specific action and provide funding for activities at local level, related to drought and flash floods (Ministère du Développement Durable 2011).

Although urban and spatial planning is a state (*Bundesländer*) competence in the federal **German** structure, the federal level nevertheless has used its legislative competences for mainstreaming urban adaptation into sector laws as the town and country planning code (*Baugesetzbuch*)[13].

Ireland uses statutory planning guidelines for supporting local action. The most recent version of the guidelines, published in 2015, integrates indications for climate change adaptations into local planning. (source: MMR reporting).

Urban adaptation in **Italy** is not included in any legal framework, but the National Strategy for Adaptation encourages the adoption of local strategies/plans within the framework of Mayors Adapt. The Strategy has not been yet translated into operational documents but it is expected that adaptation will be among the land management/planning competences of the Regions, while adaptation interventions at urban level will be under the competences of the Municipalities. To date, an example of carried out initiatives concerning legal framework is represented by the Trento Province[14] which issued a Law on environmental impact assessment, which provides specific indications for climate change adaptation.

In a similar manner, also **Norwegian** local authorities are requested both by building legislation and by legislation regarding civil protection, to consider adaptation measures in their planning processes. In this

[10] Law 2010-788 of 12 July 2010
[11] http://www.pcet-ademe.fr/a-savoir/quest-ce-quun-pcet accessed on 30/10/2015
[12] Source:. http://climate-adapt.eea.europa.eu/countries/france, accessed on 30/10/2015
[13] BauGB, latest version dating from 23. September 2004 (BGBl. I S. 2414),
[14] The province of Trento has a larger status of autonomy than other Italian provinces.

sense, the revised Planning and Building Act (2008) strengthens county municipalities' role as planning authorities[15].

In **Slovakia**, flood protection and prevention measures have been integrated into the Landscape Revitalization and integrated River Basin Management Programme (Government resolution no 744/2010). For the time being, urban adaptation has not been mainstreamed into planning legislation, but EU funding (Structural Funds) are being used, especially ERDF for Regional development programmes under the strand of "Sustainable Urban Planning". Although adaptation in urban areas has not been ranked highly among the priorities of the national adaptation strategy up to now, there are actually plans for actualizing the national strategy of regional development in order to provide for indications on urban adaptation (source: MMR reporting).

For **Spain**, neither the PNACC nor the third working program, which both address urban adaptation action, foresee mandatory activities for local authorities in the field of urban adaptation.

In **Sweden**, several tasks related to climate change adaptation have been assigned to different administrative levels and governmental agencies. The Swedish Planning and Building Act requires municipalities to consider climate change impacts in their spatial development plans[16]. Nevertheless, as far as what can be understood from the communication made by the Swedish NRC, local authorities are free to consider climate change impacts and measures for adaptation in the context of their spatial development and civil protection plans, or to define separate plans of guidelines for adaptation planning. In 2014, Municipalities represented by SALAR (the Swedish Association of local authorities and Regions) pledged the national Government asking for clear attribution of responsibilities and financing mechanisms (SKL 2015). According to the MMR reporting, Swedish Municipalities are obliged to consider climate change impacts in their spatial development plans according to the Swedish Planning and Building Act. Financial resources of approx. €2,5 million for protection measures have been made available by the Swedish contingency agency. These resources can be used to finance max. 60% of eligible costs (or max. 60% of the object's value), for protection measures against landslides and flood. Furthermore, since 2009, approx. 100 million SEK (ca. €10,5 million) have been spent every year for financing prevention and awareness raising activities, including administrative expenditures. (source: MMR reporting).

The **Swiss** federal government is evaluating whether the consideration of climate change adaptation should be included as a guiding principal in the federal law for spatial planning (Schweizerische Eidgenossenschaft 2014, p.48).

For **Turkey**, the Law on Transformation of Areas under the Disaster Risks[17] entered into force in 2012. The scope of the law is to determine the procedures and principles regarding the rehabilitation, clearance, and renovation of areas and buildings at disaster risks in accordance with relevant standards with a view to creating healthy and safe living environment. Although focussing primarily on Earth quake risk, the Law and the By-law on the Implementation of the Law of Transformation of Areas under the Disaster Risks contributes urban regeneration by reinforcing intervention mechanisms in relation to risks from natural disasters related to climate change at urban level.

In the **UK**, local action for adaptation (preparation, planning and creating a resilient local environment) is addressed in various pieces of the national legislation:

- the Civil Contingencies Act 2004, which delivers a single framework for public protection in the UK, mainly in the resilient communities sector and health related, with Local Resilience Forums being established;
- the Flood and Water Management Act 2010, which aims to create a simpler and more effective means of managing the risk of flooding and coastal erosion, improve the sustainability of water resources and protect against drought. There are particular responsibilities for local authorities,

[15] Source: http://climate-adapt.eea.europa.eu/countries-regions/countries/norway, accessed on 8/06/2016
[16] Source: http://climate-adapt.eea.europa.eu/countries/sweden accessed on 30/10/2015
[17] Law No. 6306

- the Planning Act 2008 and the Localism Act 2011 (supported by the National Planning Policy Framework, NPPF) – require local planning authorities to develop policies and to adopt proactive strategies to mitigate and adapt to a changing climate, taking full account of flood risk, coastal change and water supply and demand considerations. The NPPF is accompanied by planning practice guidance.

2.3. How are responsibilities shared between institutions and stakeholders at different governmental levels, how is coordination provided for?

In most European countries, relationships between local authorities and national governments are based on a more or less accentuated interpretation of the principle of subsidiarity underlying the national constitutional asset, which assigns tasks to the lowest compatible policy/administration level in order to keep decision processes close to citizens. Under this perspective, planning for urban areas is generally, in the European context, a task of local administrations. Activities belonging to the area of disaster risk management, and connected prevention measures are l*ess generally* attributed to local competences, but are, for the sake of optimizing the use or resources and coordination, concentrated at higher levels, in more than one case at national level.

In **Austria**, local authorities are in charge of spatial planning (as well as for the protection of cultural heritage) public services, potentially relevant areas for action such as transport, water, energy, housing, health care and nature protection are actually under local competences. Local authorities are furthermore responsible for planning disaster control and protection. Intermediate administrative levels at state (*Land*) level provide for coordination, and articulate, in some cases, their own adaptation strategy, for example in the case of Oberösterreich (Land Oberrösterreich 2013). The different sector-specific competences at national level are coordinated, with respect to climate change, by the Federal Ministry for the Environment, which is in charge of coordinating the implementing the national Adaptation strategy.

The strong federal character of **Belgium** determines stronger competence for the intermediate (Regional) level which is used also for coordinating policies: the three regions (Flanders, Wallonia and Brussels Capital Region) intervene together with the federal government on an equal footing but in different areas of competence. This is used also for coordinating policies, as the Regions are defining each their own adaptation strategy. National actions and decisions are discussed and adopted in either the national Climate Commission or by the Coordination Commission for international environmental policy, or by their working groups on adaptation. The working group is preparing a national adaptation plan. The role of this plan is seen mainly in facilitating interaction and complementing the different regional and federal plans. The reference level for local adaptation action are the regional adaptation plans. Some local climate plans are under development taking into account adaptation.

In **Bulgaria**, where no national adaptation strategy is in place, the Climate Change Policy Directorate within the Ministry of Environment and Water, is responsible for carrying out assessment and planning and for preparing a National Adaptation Strategy. Horizontal coordination mechanisms exist within the governance system, with division of responsibilities. The 2014 Law on Climate Change Mitigation clarifies the responsibilities of different institutions with regards to climate change, including adaptation. Horizontal coordination currently is focused on the preparation of the National Adaptation Strategy.

Institutions with responsibilities for integration of climate change (both for mitigation and adaptation) include: the Ministry of Agriculture and Food; the Ministry of Transport, IT and Communications; the Ministry of Finance; the Ministry of Interior; the Ministry of Foreign Affairs; the Ministry of Health; the Ministry of Education and Science; the Ministry of Labor and Social Policy; and the Environment Executive Agency. Moreover, some adaptation measures have been taken at the national level by the Ministry of Economy, the Ministry of Energy, and the Ministry of Regional Development. Relevant ministries are in charge of climate change adaptation in their respective sectors.

Article 3, paragraph 4 of Climate Change Mitigation Law governs the establishment of the National Expert Council on Climate Change as an advisory body to assist the Minister of Environment and Water in the

elaboration of positions, statements and taking initiatives to fully implement the state policy on mitigation and adaptation to climate change. It consists of representatives of the governmental sector, National Association of Municipalities in Republic of Bulgaria, Regional governmental authorities, Bulgarian Academy of Sciences, environmental NGOs and business.

In the **Czech** Republic, local authorities (including municipalities, and protected areas) are the principal agents in charge of adaptation action. The national level provides funding for adaptation measures focussing on water, nature and landscape protection. Furthermore, EEA and EU Grants are used inter alia, for creating systems of information exchange in support of the creation of adaptation strategies and measures are used.

In **Denmark,** climate change adaptation is principally conceived a task to be developed at local level by municipal authorities, companies or individuals, stating that "individual stakeholders know the local conditions best, and are consequently in the best position to make decisions on adaptation" (source: MMR reporting). The role of the central government lies in the establishment of a framework for local action by adapting laws, regulations, ensuring coordination and providing the necessary information. The central government has furthermore some direct responsibilities being owner of infrastructures, buildings and land (source: MMR reporting).

In **Estonia**, adaptation is considered, according to the Ministry of the Environment, a task for regional and local development plans (Peleikis 2011). Ongoing adaptation activities for urban areas are reported so far refer to the context or disaster risk preparedness in coastal cities, developed in response to weather extremes experienced in the recent past.

The **Finnish** National Adaptation Strategy implemented under the coordination of the Ministry for Agriculture and Forestry aims at integrating "adaptation into routine planning, implementation and development processes. The Strategy is being implemented within the sectors, the ministries in cooperation with different actors..."[18] , the Adaptation Plan states that, while the "responsibility for adaptation and the financial costs incurred rests primarily with those engaged in operations or owners and possessors of property that involve climate-related risks,... " the State has the main responsibility for promoting adaptation actions necessary for securing functions vital to the society and the overall promotion of adaptation in cooperation with the municipalities, business operators and citizens and various organizations representing these." (Ministry of Agriculture and Forestry 2014, p.20).

Responsibilities for local adaptation action under the **French** law are mainly delegated to the Regional Climate, Air and Energy Schemes (SRCAE), and local adaptation actions are designed, according to the French laws on climate action "loi Grenelle"[19], within local Climate-Energy Plans (*Plan Climate Energie Territorial,* PCET)[20], which consider all forms of climate action for both climate change mitigation and adaptation[21].. Furthermore, several national plans have identified specific action and provide funding for activities at local level, related especially to drought and flash floods (Ministère du Développement Durable 2011).

According to the **German** federal governance framework, competence for urban planning is, at first hand, attributed to municipalities according to the subsidiary principle, and covers all issues where no territorial coordination is necessary. At national level, responsibility for urban adaptation is with the national ministry for the Environment which has acted as a coordinator for the national strategy for climate change adaptation. The main task of the strategy is to provide a framework for regional and local action. The national action plan foresees national activities in terms of knowledge generation and the creation of a framework for local and regional action (integration of adaptation into national sector relevant legislation and funding streams). National activities supporting adaptation, with regards to urban adaptation are mainly limited to modifications in the national Building Code (*Baugesetzbuch*) and to external policies,

[18] http://climate-adapt.eea.europa.eu/countries/finland; accessed on 18/04/2015
[19] Law 2010-788 of 12 July 2010
[20] http://www.pcet-ademe.fr/a-savoir/quest-ce-quun-pcet ; accessed on 18/04/2015
[21] Source:. http://climate-adapt.eea.europa.eu/countries/france, accessed on 30/10/2016

especially with regards to international communication and support of adaptation in developing countries. At state level (*Länder*), regional climate change adaptation strategies have been defined which provide, with regards to urban adaptation, further regionally relevant support for local action.

In absence of a national adaptation strategy, the **Greek** Ministry for Environment, Energy and Climate Change is catering for coordination of regional and local and sectorial initiatives.

The same holds for **Italy**, where the Italian Ministry for the Environment, Land and Sea has been promoting the preparation and the adoption of the National Climate Change Adaptation Strategy (Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Repubblica Italiana 2015) which has been previously approved by the "*Conferenza Unificata*" (a Committee of Ministers, Regions and Municipalities that delivers advices on area of its jurisdiction). Regional legislations and Regional agencies are active in some cases. In order to address activities and needs at regional level, in coherence with NAS, and provide technical support for the implementation of regional adaptation strategies, the Sardinia Region has been appointed to carry out the coordination of an interregional panel on climate change adaptation. Nevertheless, some regional initiatives have been taken and can significantly contribute to the implementation of the NAS. The Lombardy Region has adopted a Regional Strategy (December 2014) and is defining a Regional Adaptation Plan. Other Regions are working towards their regional strategies and plans (i.e. Sardegna, Abruzzo). Some Regions (i.e. Emilia Romagna and Tuscany) have defined climate plans which include adaptation measures and use their environmental agencies for research and monitoring.

In the **Netherlands** the national government is responsible for issues of national interest including flood risk management and the management of the main water system. The provincial level is responsible for spatial planning and setting out of a framework for the management of the water system, whereas regional water boards supervise and manage the regional and the major part of the primary flood protection system, and cares for water availability and quality. Municipal authorities cater for the spatial planning of the territory of their competence, and for the public areas within their duty of care under the Water Act. They are furthermore the first contact point in case of flooding events. At national level, plans and programmes have been set up and implemented following nation-wide strategy for protection and enhancement of resilience, as for instance the Room for the River plan, approved by the national Government in 2007. with the entering in force of the Delta Act (Act on Flood Risk Management and the Freshwater Supply) in 2012, a special intervention framework with annual intervention programmes (Delta Programmes) was introduced which aims at protecting the country "from (coastal and river) flooding, at working towards climate resilient urban areas and at ensuring adequate supplies of freshwater for generations ahead" (source: MMR reporting). It was decided to cluster all measures and projects implemented under the Delta Programme within the Delta Plan on Flood Risk Management and the Delta Plan on Freshwater Supply. The measures may involve adaptations of the physical system, such as dyke improvements or pumps, as well as spatial reservations for future measures or instruments to promote desirable behaviour. In addition, regional measures may be incorporated into the Delta Plans (Kabat et al. 2005; Ministerie van Infrastructuur en Milieu 2015a). The Delta Act defines furthermore, the allocation of national funding for the entire duration of the programme. Funding is targeted both to implementation and research need. The form of governance is based on the figure of a special commissioner appointed by the government who is directly responding to the cabinet (source: MMR reporting). The commissioner presents annual reports to the Parliament alongside with indications of appropriate policy responses which are accepted by the cabinet as government policy, to be elaborated in national legislation and administrative agreements. Financial resources for implementation and research are provided by the national government at a level of a minimum of €1 billion a year (source: MMR reporting) an amount defined in the Delta Act. Co-finance to 50% of construction and improvement costs for primary flood defence systems is provided by water boards. Advice on how to target the budget on implementation measures and supporting research is given by the Commissioner's annual Delta Programme; these investments are approved by the Minister of Infrastructure and the Environment decides who bears the political responsibility (source: MMR reporting).

In **Norway**, national adaptation policies are coordinated by the Ministry of Climate and Environment, supported by the Norwegian Environment Agency. Regional and local activities are coordinated and followed up by county governors, providing support to local authorities especially with regards to

vulnerability analysis and spatial planning and coordinating at the regional level, for local civil protection activities for preparedness and for preventive measures. County governors function as a controlling instance for the translation of national adaptation policies into local assessments of vulnerability and risk and in land use plans. County councils furthermore provide guidance and regulation in relation to local planning, having received increased competences by the 2008 reform of the national planning and building act.

The **Polish** national adaptation strategy attributes the main responsibility for urban adaptation to local and regional governments. The national government with the Ministry of environment is supporting local adaptation efforts with the (planned) publication of guidelines for local adaptation planning and by a specific national project addressing adaptation needs for cities with more than 100.000 inhabitants, providing organizational and financial support for local authorities. This project is part of the national Household Plan "New Financial Perspective" 2014 – 2020. This support for the implementation of adaptation action in cities with more than 100.000 inhabitants both in organizational and financial terms, anticipates the creation of a future basis for integrated urban adaption actions. Participation of local authorities in this process is voluntary.

In **Portugal** there is an articulated scheme of competences supporting or complementing local authorities' activities. A national working group coordinates the implementation of the national climate adaptation strategy which is intended to be defined at sectorial, local and/or regional levels. Members of the group are the General Directorate for Territory (DGT), and the National Association of Portuguese Municipalities. With regards to inland and coastal waters, climate change adaptation is programmed, coordinated and implemented by the level of the authority for water management. Furthermore, the National Authority for Civil protection coordinates activities related to risk and disaster reduction, so most climate change adaptation measures fall under their competence, too. Urban planning is coordinated by territorial management instruments. Measures for climate change adaptation are implemented by local authorities, in most cases in coordination with the relevant national bodies mentioned. Monitoring of weather and climate and alerts for extreme events are provided by the national Meteorological office. Civil society has access to planning exercises participating in public consultation processes which are foreseen for all public planning processes.

In **Spain**, a dedicated office for climate change (OECC) was created in 2001 within the Ministry of Agriculture, Food and Environment, which has the task of coordinating, managing and monitoring the implementation of the national plan and the work programmes. National plans have been detailed by most regional authorities (Autonomous Communities), defining their own climate change adaptation plans or strategies. The Spanish network for Cities and climate, which is a section of the national association of Municipalities and Provinces, provides technical support for local authorities and a platform for knowledge exchange and experiences, supporting local authorities who are planning and implementing measures for adaptation to climate change. The aim of the network goes beyond adaptation, aiming at supporting local authorities committed to sustainable local development and climate protection.

Sweden did not assign overarching responsibility to a single national authority, but decided to follow, for the national policy, a scheme of distributed responsibilities, divided mainly according to specific sectorial competences. This corresponds to a policy goal aiming at a permeation of adaptation activities into the entire society, and a general mainstreaming of adaptation action into sector policies. Nevertheless, within the hierarchy of territorial authorities, adaptation activities are distributed across three levels: national, regional and local, where the intermediate level (Regional Administrative Board (CAB) has a coordinating role and reports to the government annually about actions taken. Within this system, local authorities have extended responsibilities, which comprise planning regulations and management of infrastructures (water, sewerage system, energy, waste, hospitals schools, care facilities) as well as for emergency protection facilities and services like emergency plans and rescue services[22].

[22] Source: http://climate-adapt.eea.europa.eu/countries/sweden accessed on 30/10/2015

In **Switzerland**, the principal needs of adaptation action in relation to urban areas are seen in the health and the spatial planning sector. Responsibilities for these sectors lie, according to the federal system, with local and cantonal administrations, whereas the role of the national government is limited to providing the general legal framework and support to local and cantonal governments for the development and the implementation of adaptation policies.

The **Turkish** National Climate Change Adaptation Plan designates local administrations as responsible organizations of some actions, whereas in general, the "relevant" role for local authorities and the need for "integrating the issue of climate change into their own strategic plans and programmes " and for preparing Local Climate Change Action Plans .

As mentioned above, in the **UK**, local governments are held responsible for planning and implementing adaptation measures for urban areas. The national government sees its own role in supporting and enabling locally driven, bottom up adaptation activity. This is illustrated by the actions undertaken which seek to ensure the policy framework continues to support councils increasing resilience, and by the fact that support is given to sector led initiatives that help councils take locally driven action. Local government, which provides local services, support and information, plays a major role in shaping local places by taking decisions and providing guidance, through the local democratic process, in the form of the urban landscape, the built environment and green or natural spaces. Local Authorities also play a key role in the management of the local natural environment. The Planning Act 2008 and Localism Act 2011 (supported by the National Planning Policy Framework, NPPF) requires local planning authorities to develop policies and adopt proactive strategies to mitigate and adapt to a changing climate, taking full account of flood risk, coastal change and water supply and demand considerations. The NPPF is accompanied by planning practice guidance. This National Planning Policy Framework (NPPF) is actually framed as an enabling activity, replacing previous, more proactive, strategies, which used, inter alia, a system of incentives connected to the national monitoring system for local authorities. Among the activities monitored, the National Indicator 188 addressed local 'planning to adapt to climate change' The indicator was abolished in October 2010 by the national government in line with broader position of allowing decisions to be made at the local level with local needs taken into account (UKCIP 2011).

There are a number of local networks, such as the Local Government's Climate Local initiative, which drive, inspire and support council action on climate change. The Local Adaptation Advisory Panel has been established as a platform for two-way dialogue between local and central government in identifying ways to support local adaptation action. Participants in this platform are representatives from the Department for Environment Food & Rural Affairs (DEFRA), from other government departments and from local governments.

3. National and Local Initiatives

3.1. International research projects

Austrian local authorities have participated in several international research projects and networks, such as the C3Alps project (Smart knowledge on Climate Change Adaptation, 2012-2014) [23], which was led by the Austrian Environment Agency, with the Austrian *Mostviertel* being one of the pilot areas. The project aimed at activating and transferring climate-change adaptation knowledge to the local level, adjusting and disseminating relevant knowledge to local target groups and key actors in the communities. Among the project, an overview on knowledge platforms on climate change is provided[24].

The C3Alps knowledge transmission strategy built, inter alia, on the results of the CLISP Project (Climate Change adaptation by Spatial Planning in the Alpine Space, 2007-2011)[25] funded under Alpine Space Programme and led, again, by the Austrian Environment Agency.

In **Bulgaria**, the national Agency of Sustainable Development in Sofia participated in the FP7 research project Urban Nexus (2011-2014)[26]; a project aiming at adaptation and urban sustainability. The City of Varna participated in the F:ACTS project (Forms for Adapting to Climate Change through Territorial Strategies, 2010-2012)[27], where a study for an urban flood model was developed[28].

The Croatian City of Koprivnica participated in the project ORIENTGATE (2012 - December 2014)[29]. The ORIENTGATE project aimed to implement concerted and coordinated climate adaptation actions across South Eastern Europe, whereas Zadar was a Partner in the EU - Cities adapt project (2012-2013) and has developed a vision for climate change readiness and a draft Action plan for adaptation to climate change.

Estonia has used the ASTRA project[30] (Developing Policies & Adaptation Strategies to Climate Change in the Baltic Sea Region, 2005-2007) for setting up an autonomous early coastal flood warning system. The Project aimed at assessing regional impacts of climate change and at developing strategies and policies for climate change adaptation. Two of the three Estonian case studies involved in the project were urban areas (Tallinn and Pärnu) which are affected mainly by impacts and cascading effects from heavy rainfall and coastal flooding[31].

Among **Greek** regions, the region of Achaia in Western Greece has participated in the INTERREG IVC project F:ACTS (Forms for Adapting to Climate Change through Territorial Strategies, 2010-2012)[32] focusing on increasing resilience of risk prone areas to climate change effects, the region of Crete was partner of the in the RegioClima project (Regional Cooperation towards Adaptation to Climate Change, 2008 - 2011)[33], which aimed, inter alia, at the elaboration of adaptation strategies and the creation of EU-wide networks. Among urban areas, Patras had participated in the Life+ Project 'Act-Adapting to Climate Change in Time (2010 – 2013)'[34] and in the CC-Waters Project (Climate Change and Impacts on Water Supply, 2009 - 2012)[35] which addressed Climate Change and impacts on Water Supply. The Attica Region, the Centre for Technological Research of Crete and Goulandris Natural History Museum participate as partners, while Ministry of Environment, Energy and Climate Change and the Municipality of Komotini participated as associated

[23] http://www.c3alps.eu, accessed on 09/05/2016
[24] http://www.c3alps.eu/index.php/en/further-information-menu/web-platforms-on-adaptation-menu accessed on 09/05/2016
[25] www.Clisp.eu accessed on 09/05/2016
[26] http://www.eurocities.eu/eurocities/projects/URBAN-NEXUS&tpl=home; accessed on 09/05/2016
[27] http://www.factsproject.eu/home/Pages/default.aspx accessed on 11/05/2016
[28] http://www.factsproject.eu/SiteCollectionDocuments/Handbook/BOX22.pdf accessed on 11/05/2016
[29] http://www.orientgateproject.org, accessed on 09/05/2016
[30] http://www.astra-project.org accessed on 11/05/2016
[31] http://www.astra-project.org/02_estonia_tallin_paernu.html accessed on 09/05/2016
[32] http://www.factsproject.eu/home/Pages/default.aspx accessed on 11/05/2016
[33] http://regioclima.eu/ accessed on 11/05/2016
[34] http://www.actlife.eu/EN/index.xhtml accessed on 13/05/2016
[35] http://www.ccwaters.eu/ accessed on 11/05/2016

partners to the OrientGate project (A network for the integration of climate knowledge into policy and planning, 2012-2014)[36]. The OrientGate project aimed to implement concerted and coordinated climate adaptation actions across South Eastern Europe. The partnership comprised 19 financing partners, 11 associates and three observers, covering 13 countries, that explored climate risks faced by coastal, rural and urban communities, contributing to a better understanding of the impacts of climate variability and climate change on water regimes, forests and agro ecosystems. The Region of East Macedonia and Thrace and the Decentralized Administration of Crete participated in the MED Programme: COASTGAP Capitalisation Project **(**Coastal Governance and Adaptation Policies in the Mediterranean, 2013 - 2015)[37]. COASTGAP aimed to capitalize 12 best practices from 9 projects of the cluster (from MED and other programmes), to produce governance and adaptation policies aimed to reduce risk along coastal zones and foster their sustainable development. In order to provide an operational and coherent strategy for the 2014-2020 financial period, supported by multi-level agreements among coastal Administrations, COASTGAP aims to design, characterize and prepare to launch the Joint Action Plan on Adaptations to Climate Changes in Mediterranean Basin.

The **Greek** Municipality of Patras was partner in the LIFE ACT project (Adapting to Climate Change in Time, 2010 – 2013)[38].

In **Italy**, the Municipalities of Ancona and Bologna have been active in Life + projects: The Municipality of Ancona participated in the project LIFE ACT[39] – *Adapting to Climate change in Time* , 2010 - 2013); the Municipality of Bologna: LIFE BLUEAP – Bologna Adaptation Plan for a resilient city (2012 – 2015) [40] (). Furthermore, Rome and Milan are part of the 100 Resilient cities initiative. The Municipalities of Alba and Padua participated as Training Cities, and the municipality of Ancona as a Peer City in the EU Cities Adapt project (Adaptation Strategies for European Cities, 2011-2013)[41]. Furthermore, the municipality of Padua is one of the pilot areas chosen in the Central Europe UHI - *Urban Heat Island* Project[42].

In **Latvia**, the capital city of Riga has started activities for the assessment of risks and opportunities in the project "Integrated Strategy for Riga City to Adapt to the Hydrological Processes Intensified by Climate Change Phenomena" (2010 - 2012)[43], co-financed by the Life + programme. The activity aims at identifying risks and strategies for protection with respect to hydrogeological risks. Furthermore, the municipality of the city Salacgrīva has adopted the Declaration on Green municipality[44] and has also prepared its own Climate Change Adaptation Strategy under the project *"BaltCICA. (Climate Change: Impacts, Costs and Adaptation in the Baltic Sea Region* 2007-2013)[45].

Liechtenstein has participated in the C3Alps project[46] and is actually using resources provided by the project for assessing climate change impacts and vulnerabilities of the country and for identifying needs for adaptation; a specific focus on urban vulnerabilities is not explicitly mentioned among the activities indicated.

In **Lithuania**, inundation schemes as well as high-risk zones were analysed for the Klaipeda Seaport in the project "*ASTRA*[47] *(Developing Policies and Adaptation Strategies to Climate Change in the Baltic Sea 2005-2007)*. The Lithuanian partners involved in this project were the Environmental Centre for Administration and Technology, Vilnius University, the Institute of Geology and Geography, and the City of Klaipeda. The city of Klaipeda participated also in the project *"BaltCICA. (Climate Change: Impacts, Costs and Adaptation*

[36] http://www.orientgateproject.org/ accessed on 09/05/2016
[37] http://coastgap.facecoast.eu/ accessed on 09/05/2016
[38] http://www.actlife.eu; accessed on 13/06/2016
[39] http://www.actlife.eu accessed on 13/06/2016
[40] http://www.blueap.eu/site/ accessed on 05/05/2016
[41] For the final report of the project, refer to the Climate-Adapt platform (http://climate-adapt.eea.europa.eu/metadata/publications/eu-cities-adapt-adaptation-strategies-for-european-cities-final-report)
[42] http://eu-uhi.eu/ accessed on 05/05/2016
[43] http://www.rigapretpludiem.lv/eng/; accessed on 13/06/2016
[44] http://www.salacgriva.lv/eng/salacgrivas_novads/green_municipality/; accessed on 13/06/2016
[45] http://www.baltcica.org/ accessed on 11/05/2016
[46] http://www.c3alps.eu, accessed on 09/05/2016
[47] http://www.astra-project.org/0_home.html accessed on 05/05/2016

in the Baltic Sea Region 2007-2013)[48], where adaptation options for the city and the district of Klaipeda were developed[49], and the implementation process initiated. In the project "Baltadapt[50]" (2010-2013) Lithuania as a partner contributed to the review of state-of-the-art knowledge on climate change in the Baltic Sea Region, of information needs for designing appropriate adaptation measures and to the identification of impacts from climate change on coastal zones. The aim of the project was to develop a Baltic Sea Region-wide climate change adaptation strategy. While it is understood that such a strategy cannot be adopted by "Baltadapt", the project can ensure its preparation and clear the ground for its adoption.

Poland has initiated the Adaptcity project (Preparation of a strategy for adaptation to climate change of the city of Warsaw with the use of city climate mapping and with public participation, 2014-2018)[51] in collaboration with the Verband Region Stuttgart (D) for the preparation of an adaptation strategy of the city of Warsaw, using funding by the LIFE + instrument. In the context of the ASTRA project, in the Polish case study, a climate impact map for the area of the Gulf of Gdansk was produced which included the cities of Gdansk and Sopot, focussing on impacts connected to precipitation and sea level rise[52].

Portugal has participated in the F:ACTS project (Forms for Adapting to Climate Change through Territorial Strategies, 2010 - 2012)[53] with a rural case study (Baixo Vouga Lagunar), and has contributed to the redaction of the Adaptation Handbook produced by the project (García et al. 2012). Using EEA funding and co financing by the Portuguese Carbon Funds, the Project Climadapt.Local (2015- 2016)[54] aims at improving the capacity of Portuguese muncipalities to integrate adpation to climate change into muncipal planning. Financed within the AdaPT Programme, this profect provides guidance and training for planning of adaptation for 26 Portuguese municipalities. Furthermore, the PO_SEUR Programme[55] (Operational Programme for Sustainable and Efficient Use of Resources 2014 - 2020), a financial framework gathering 5 European Structural and Investment Funds - ESIF, Cohesion Fund, ESF, EAFRD and EMFF), considers municipal and regional planning for adaptation to climate change.

The **Slovak** Self-Governing Region of Bratislava (BaSGR) was a partner of the RegioClima project[56] (Regional cooperation towards Adaptation to Climate Change, 2008 - 2011) for assisting societies in adapting to the new climate conditions both by minimising the risk of damage and exploiting new opportunities arising from a changing climate. The city of Bratislava has furthermore participated in the EU cities Adapt project (Adaptation Strategies for European Cities, 2011-2013)[57].

In the context of the SEERISK[58] project, case studies have been produced on heat wave risk assessment in Western **Romania**'s urban Areas (source: MMR reporting). The World Bank is contributing to assessments to some of the priority including the urban sector in the OPERA CLIMA project[59], among others formulating recommendations for mitigation and adaptation action on the basis of international experiences project (Hammer et al. 2014).

The **Spanish**, Municipality of Bullas was partner in the LIFE ACT project[60] (Adapting to Climate Change in Time, 2010 – 2013).

[48] http://www.baltcica.org/ accessed on 11/05/2016
[49] http://www.baltcica.org/casestudies/klaipedacity.html and http://www.baltcica.org/casestudies/klaipedadisctrict.html accessed on 11/05/2016
[50] http://www.baltadapt.eu/ accessed on 11/05/2016
[51] http://adaptcity.pl/english/about/ accessed on 11/05/2016
[52] http://www.astra-project.org/02_poland.html accessed on 11/05/2016
[53] http://www.factsproject.eu/pilotprojects/baixovougalagunar/Pages/default.aspx; accessed on 11/05/2016
[54] http://climadapt-local.pt/en/ accessed on 11/05/2016
[55] https://poseur.portugal2020.pt accessed on 13/06/2016
[56] http://regioclima.eu/ accessed on 13/06/2016
[57] For the final report of the project, refer to climate adapt (http://climate-adapt.eea.europa.eu/metadata/publications/eu-cities-adapt-adaptation-strategies-for-european-cities-final-report)
[58] http://www.seeriskproject.eu/ accessed on 13/06/2016
[59] http://www.worldbank.org/en/country/romania/brief/romania-climate-change-and-low-carbon-green-growth-program accessed on 13/06/2016
[60] http://www.actlife.eu; accessed on 13/06/2016

In the **UK,** a number of local authorities, particularly cities, have expressed an interest in EU funding programmes/projects, such as the ERDF and Mayor's Adapt, including the new Twinning Programme where the cities of Edinburgh, Glasgow and Stirling acts as a partner cities[61].

3.2. National finance and research projects

Specific national financing and research programmes for urban adaptation set up at national level are mainly targeted to knowledge generation and capacities building at local level, promoting pilot actions in selected cities.

Austria has activated a series of climate related activities at municipal level, frequently acting both towards mitigation and adaptation. Two main funding channels are focussing on climate change related research and implementation: the national climate research programme StartClim[62] and the Climate and Energy Fund[63] (especially its Austrian Climate Change Research Programme - ACRP) provide both important and forward-looking results also for the area of urban adaption.

The Austrian Energy award, an action corresponding to the European Energy Award started in 1998 providing municipalities with practical, long-term support in the fields of energy efficiency and climate protection. The focus on energy efficiency generates some synergies with adaptation options, for instance promoting measures for increasing thermal comfort in summer, generating disaster risk plans and heat protection plans). The program is managed by the Austrian Energy Agency as part of the initiative "Klima:aktiv" of the Austrian Federal Environmental Ministry[64].

The Klima:aktiv initiative aims at market transformation towards more sustainability and includes mitigation measures which are closely linked to adaptation. The initiative plans to promote, until 2020, soft measures in the fields of energy efficiency, as well as mitigation measures closely linked to adaptation. The transport strand of the programme offers consultation and financial support for municipalities.

In a similar manner, the Austrian Smart-Cities-Initiative[65], funded by the Federal Ministry of Transport, Innovation and Technology focusses on mitigation of climate change impacts, but still offers a good opportunity to further address urban adaptation issues in a smart technology centred approach to sustainability.

The project Klimanetz – vernetzt im Klimawandel[66] aims at developing tools and indicators for the assessment of the role of human and social capital for adaptation. It has been financed by the Austrian Climate and Energy funds under the name of "Capital Adapt".

The Austrian Climate and Energy Funds (Austrian Climate Change Research Programme ACRP) has been used for several adaptation focussed projects, among these the CC TALK! (Communicating climate change adaptation - Effective approaches for Austria, 2012 - 2014)[67].

Furthermore, reporting from NRC mentions existing (financial) support programmes on different administrative scales (state, provinces, municipalities and cities), targeting adaptation action by individuals as well as communities/municipalities).

The PACINAS project (Public Adaptation Costs: investigating the Nationals Adaptation Strategy, 2014 - 2016)[68] analyses budget impacts of major public adaptation measures on a case study based approach combines with a macroeconomic assessment. The assessment takes into consideration both extreme events and slow onset changes. Complementary to this the project PATCH:ES (Private Adaptation Threats

[61] http://mayors-adapt.eu/taking-action/city-twinning/, accessed on 16/06/2016
[62] http://www.austroclim.at/startclim; (in German) accessed on 11/05/2016
[63] http://www.klimafonds.gv.at/home-en-US/; accessed on 11/05/2016
[64] http://www.klimaaktiv.at/english.html; accessed on 09/05/2016
[65] http://www.smartcities.at/home-en-us/ ; accessed on 09/05/2016
[66] http://www.klimanetz.at/; accessed on 09/05/2016
[67] http://www.klimawandelanpassung.at/ms/klimawandelanpassung/de/anpassungandenklimawandel/kwa_schwerpunkt/kw_kommu/ accessed on 10/05/2016 (in German)
[68] http://www.iiasa.ac.at/web/home/research/researchPrograms/RISK/PACINAS.html accessed on 09/05/2016

and CHances: enhancing Synergies with the **Austrian** NAS Implementation) will investigate into private adaptation with regards to actors, extent of action, drivers and as well as risks of maladaptation. The assessment will be based on three case studies (Agriculture, Tourism and private households) (source: MMR reporting).

In the Flanders region in **Belgium**, a think tank of experts on adaptation to climate change has been subsidised for three years by the Flemish regional government which focuses on spatial planning. It aims at developing and spreading knowledge generated in a trans-disciplinary approach. It further more discusses the required measures and identifies in advance conditions and barriers to implementation (source: MMR reporting).

Research programs from the federal science policy provide funding opportunities for adaptation research projects, such as CCI-HYDR (Climate change impact on hydrological extremes along rivers and urban drainage systems in Belgium)[69].

In **Croatia**, as part of the initial assessments for the development plan for the City of Zagreb, an analysis of the future climate impacts was conducted, leading to a set of 47 measures which aim at improving resilience to climate change, including protection and response measures for heat waves, (buildings and green infrastructure), water management adaptation of transport infrastructure, improvement of energy infrastructure and mitigation of climate change effects on landslides.

Research activities set up in the **Czech** Republic aim primarily on the integration of adaptation measures into environment protection policies, enhancing potential environmental services. The Czech Ministry for the Environment has set up three funding schemes focussing on Water, Nature and Landscape protection, which foresee planning and implementation of measures which have also adaptation effects. Two of the three programmes are funded by national resources (Landscape programme and Programme for the renewal of the natural function of the landscape). Among the interventions foreseen by a third programme (Operational Environment programme) funded by the EU, those aiming at the reduction of flood risks and on the improvement of landscape and nature, are those most relevant for adaptive action. Further finance both from national and EU resources aiming at improvement of agricultural practices potentially could provide side effects in terms of adaptation. None of these activities has a specific focus on urban areas. The Czech Globe Institute performs research activities, in part financed also by Czech Ministries, which focus also on urban adaptation solutions, including nature based solutions[70]. The Czech Urban Adapt project (2015-2016)[71] has proposed and evaluated suitable adaptation measures and actions with the support of ecosystem-based approaches in the three pilot cities in the Czech Republic (Prague, Brno, Pilsen). The project was funded by the EEA grant programme from Iceland, Liechtenstein and Norway dedicated to the Czech Republic. In a similar manner, the EEA grants funded project Adaptation of Residential Areas to Climate Changes – Practical Solutions and Experience Sharing (2015-2016)[72] is analysing impact of climate change at local level providing guidance and recommendations for adaptation of cities.

The **Finnish** research programme on Climate Change (FICCA) has set up a number of research projects in the field of river and urban floods (TOLERAT$E[73] and IRTORISKI[74] projects), on health risks for elderly, and a specific project on urban planning exploring vulnerabilities of cities to flash floods an heat island effects (EAKR-ILKKA (2011-2014)[75]. Furthermore some targeted research projects focussed on durability of facades and balconies in a changing climate (in 2010), on the cultural environment (in 2008) and a research project on the urban environment focussing on questions related to the living environment and climate change (VTT, Technical Research Centre of Finland SYKE et al. concentrating, inter alia, on interconnections between mitigation and adaption activities).

[69] http://www.kuleuven.be/hydr/CCI-HYDR.htm accessed on 17/06/2016
[70] http://www.czechglobe.cz/en/projects/?project=adaptation&provider=&year_from=&year_to=&q= accessed on 12/05/2016
[71] http://urbanadapt.cz/en
[72] http://www.adaptacesidel.cz/en
[73] https://www.vatt.fi/en/research/projects/tolerate accessed on 12/05/2016
[74] https://helda.helsinki.fi/handle/10138/26744?locale-attribute=en accessed on 12/05/2016
[75] http://ilmastotyokalut.fi/en/ accessed on 12/05/2016

The German ministry for the Education and Research has initiated and financed a series of regionally focussed projects for climate change adaptation, called Klimzug, aiming at the "development of innovative strategies for adaptation to climate change" (Bundesministerium für Bildung und Forschung 2016)[76]:

- KLIMZUG-NORD – Strategies adapted to climate changes concerning the metropolitan area of Hamburg;
- KLIMZUG-Nordhessen – Regional Network for Climate Change Adaptation - Northern Hessen;
- Dynaklim - Dynamic Adaptation to the Effects of Climate Change in the Emscher-Lippe Region(adaptation for a part of an heavily urbanized polycentric former industrial region);
- RADOST – Regional adaptation strategies for the Baltic coastline of Germany;
- INKA BB - Innovation Network of Climate Change Adaptation Brandenburg Berlin;
- nordwest2050 – Prospects for Climate-Adapted Innovation Processes in the Model Region Bremen-Oldenburg in North Western Germany;
- REGKLAM – Development and Testing of an Integrated Regional Climate Change Adaptation Programme for the Model Region of Dresden.

Further to these regionally focussed projects, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety has financed, under the KFM/Klimazwei programme (2008-2011), a sector oriented research project on Climate Change Adaptation, focussed, inter alia, on climate effects in the metropolitan areas of Hanover-Braunschweig-Göttingen-Wolfsburg, for the State of Lower Saxony, the region of Starkenburg[77]. Further adaptation action with focus on urban areas is being financed by the ministry for Building and the Environment, like the ExWoSt project – Climate change-proof urban development: countering the causes and impact of climate change with urban concepts[78].

The **Lithuanian** city of Klaipedia was partner in the BalCICA project (Climate Change: Impacts, Costs and Adaptation in the Baltic Sea Region 2007-2013)[79], where adaptation options for the city of Klaipeda and the district of Klaipeda have been addressed.

In the **Netherlands**, a specific capacity building and research programme Knowledge for climate[80], has been concluded in 2014. subsequently, a capacity building and mainstreaming programme has been set up aiming at engaging regional and local policy makers, institutes an businesses in the promotion of climate proof and water resilient cities for the year 2020. It provides funding for participants supporting the implementation of programmes (source: MMR reporting).

For **Norway**, information resources, networks for sharing experience, and cooperation with regional authorities plays an important part in climate change adaptation work at municipal level. There are several climate change adaptation, and among these urban adaptation, pilot projects and activities that are being planned or implemented at local and regional level. The Large-scale Programme on Climate Research, KLIMAFORSK, is the Norwegian Research Council's initiative for climate research. Launched in 2014, the programme will run through 2023 and is also including various climate change adaptation research[81]. Furthermore, a pilot project in Troms aimed at guiding local authorities in how to integrate CCA efforts in social and spatial planning. The project partners were the County Governor of Troms, the Directorate for Civil Protection (DSB), the Norwegian Met Office, the Norwegian Water Resources and Energy Directorate (NVE) and four municipalities in Troms. The project's aim objective was to provide an overview of the existing knowledge base for Troms county – including available knowledge, the existing legal basis (legal acts and sections, guidelines and directives, tools and resources) useful and relevant for the municipalities in their CCA efforts. By February 2015, the project launched a report summarizing experiences from the project and presented how the municipalities can integrate CCA on different levels in their social and spatial planning, in a very detailed and concrete way. The project was also a pilot for the Norwegian

[76] http://www.klimzug.de/en/index.php accessed on 12/05/2016
[77] http://www.fona.de/de/10058 accessed on 17/06/2016
[78] http://www.bbsr.bund.de/BBSR/EN/RP/ExWoSt/ accessed on 17/06/2016
[79] http://www.baltcica.org/ accessed on 12/05/2016
[80] http://www.knowledgeforclimate.nl/ accessed on 12/05/2016
[81] http://www.forskningsradet.no/prognett-klimaforsk/Programme_description/1253987906604 accessed on 12/05/2016

Climate Service Centre, giving input to what kind of data the municipalities need and how to present the data in a way that is useful for them. The Norwegian government has furthermore financed a collaborative project between the Government and the 13 largest cities in Norway aiming at reducing greenhouse gas emissions and adapting to a changing climate called Cities of the Future (Framtidens byer, 2008-2014)[82]. The Programme ran from 2008–2014. The 13 cities were: Oslo, Bærum, Drammen, Sarpsborg, Fredrikstad, Porsgrunn, Skien, Kristiansand, Sandnes, Stavanger, Bergen, Trondheim and Tromsø. The "Cities of the Future" was an important driving force for the climate change adaptation work in Norway. The cities' work has helped to speed up the climate change adaptation planning process in other municipalities. This collaboration with the largest cities on adaptation continues.

In **Poland**, the project "Development and implementation of a strategic adaptation plan for the sectors and areas vulnerable to climate change" with the acronym KLIMADA[83] has been implemented from 2011 to 2013. It aimed at providing the basis for the preparation of a strategic plan for adapting the country to climate change aiming both at providing information on climate impacts and on strategies for mainstreaming climate change adaption into national policies[84].

The **Romanian** Project Flood Risk Management Plans (FRMP) which finished in 2015 addressed both structural and non-structural measures mitigating flood risk, including early warning and communication, spatial aspects of flood management (mapping, design of retention areas, development restrictions in flood prone areas and adaptation measures for critical infrastructures for water management. (source: MMR reporting) The national project Ro Risk (2016- 2018)[85] will explore 9 types of hazards at national scale, among these, also flash floods.

Although focussed mainly on mitigation, the project "**Slovenia** is reducing CO2: best practices"[86] was one of the actions of partnership in communicating EU-level issues between the European Commission, the Government of the Republic of Slovenia and the European Parliament. The project is implemented by Umanotera, the Slovenian Foundation for Sustainable Development, and its webpage represents a database and a platform for the promotion of best practices, dissemination of knowledge and encouragement to change. One of the focus areas of the project is also adaptation to climate change. In this respect further to the Climate policy website, a dyke project in response to floods in September 2010, as examples of good practice is presented.

In the context of civil protection measures in **Sweden**, government grants for preventive measures are provided to municipalities which host constructions vulnerable to landslides, or flooding. These grants are allocated by the Swedish Civil Contingencies Agency (MSB). For 2015 there is 25 million SEK or about € 2.5 million available for the municipalities.

Since 2014 the **Swiss** Federal Office for the Environment (FOEN) in collaboration with other federal offices is undertaking the Pilot Program Adaptation to Climate Change. It aims to initiate and support the implementation of the Swiss adaptation strategy on local, regional and cantonal levels. Three of the 31 pilot projects deal with urban-specific topics, i.e. "Effects of heat waves on mortality in the cities and urban areas", "The importance of trees for adaptation in urban areas", and "Urban development adapted to climate change". The projects will be completed in 2017. As a knowledge base for the pilot projects, the Swiss regional climate scenarios were down-scaled and adapted to Switzerland's six geographical regions. One of these is the virtual region "cities and urban areas" (MeteoSwiss 2012). Furthermore, as a basis for the implementation and further development of the adaptation strategy, FOEN conducts an assessment of risks and opportunities related to climate change in Switzerland. The assessment comprises eight regional case studies which are representative of the six major regions of Switzerland. Two studies focus on Basel and Geneva and are representative of the virtual region 'urban areas'. They will be completed in mid-2015.

[82] https://www.regjeringen.no/no/tema/kommuner-og-regioner/by--og-stedsutvikling/framtidensbyer/id547992/ (in Norsk), accessed on 15/05/2016
[83] http://klimada.mos.gov.pl/en/ accessed on 30/04/2015
[84] http://klimada.mos.gov.pl/en/about-project/ accessed on 30/04/2015
[85] http://www.igsu.ro/index.php?pagina=analiza_riscuri; accessed on 17/07/2016, (in Romanian)
[86] http://www.slovenija-co2.si/ accessed on 17/07/2016, (in Slovenian)

In **Turkey**, several measures and projects have been initiated by international projects and donors: The country has benefitted from a programme financed by the United Nations Joint Programme within the MDG Achievement Fund called "Enhancing the Capacity of Turkey to Adapt to Climate Change" (2008-2011). Further to developing the national adaptation strategy and having it approved, it included (technical and administrative) capacity development and mainstreaming programmes as well as pilot activities, among these, 18 community based pilot projects concentrated in the Seyhan River basin. This includes the projects on "Establishing, supporting and developing the adaptation capacity of the people of Yuregir against climate change" and "Designing and establishing a local global climate change monitoring and prediction, social collaboration network and an internet based global climate change geographical monitoring and prediction decision support system in Adana and Nigde provinces. The Gaziantep Municipality developed the first local action plan on climate change in 2011 with the support of the French Development Agency (AFD). Within this action plan, adaptation issues were also covered. Furthermore, the UK Foreign and Commonwealth Office's Prosperity Fund supported the Turkish Ministry for Environment and Urbanization in the development of a Pilot project for "building capacity to prepare city-level climate change adaptation plans in Turkey" implemented in 2013. In the Framework of this programme, capacity building and training was provided to the Metropolitan municipality of Bursa, aiming at creating capacity for development and implementation of a city level climate change adaptation plan. The initiative is provided through the UK Foreign and Commonwealth Office's Prosperity Fund with support from the Ministry for Environment and Urbanization. Furthermore, the Project developed a Cities Adaptation Support Package (CASP) tailored to the specific Turkish situation aiming at providing guidance other cities across Turkey in the development of climate change adaptation. The project aims furthermore at assisting the Turkish Ministry in developing a roadmap for continuing support for city-level adaptation planning, implementing Turkey's national climate change policy. In 2015, the activities of the Project "Capacity Building of Local Governments in the field of Climate Change" has been initiated for Turkey. Within this project, a stocktaking analysis including the technical and administrative capacities of municipalities will be performed and training and seminars on climate change which also include adaptation issues, will be organized(Ricardo-AEA 2015).

In the **UK**, by law the Environment Agency (EA) and Natural Resources Wales (NRW) must produce flood risk management plans (FRMPs) for each River Basin District. These Flood Risk Management Plans must cover flooding from main rivers, the sea and reservoirs. Lead Local Flood Authorities (LLFAs) must legally produce Flood Risk Management Plans for all Flood Risk Areas (Department for Environment and Rural Affairs 2014) covering flooding from local sources (surface water, ordinary watercourses and groundwater). Lead Local Flood Authorities may either do a separate Flood Risk Management Plan or contribute to a joint partnership Flood Risk Management Plan for the River Basin District. Lead Local Flood Authorities that are not in Flood Risk Areas may contribute to a joint partnership Flood Risk Management Plan. Other River Managing Authorities can also contribute to developing the joint partnership Flood Risk Management Plan for the River Basin District. Such contributions are carried out on a voluntary basis and will result in better co-ordinated flood management. Certain Lead Local Flood Authorities have a legal duty to prepare Flood Risk Management Plans under the Flood Risk Regulations[87]. The guidelines[88] provide more guidance for these authorities. The Environment Agency and Natural Resources Wales must publish Flood Risk Management Plans prepared by them and Lead Local Flood Authorities s by 21 December 2015, and report information to the European Commission (EC) by 22 March 2016. In addition, the **UK**'s Adaptation and Resilience in the Context of Change (ARCC) Network brings together researchers and stakeholders involved in adaptation to technological, social and environmental change, including climate change, in the built environment and infrastructure sectors. It provides a UK-wide network to develop and exchange knowledge/information and evidence from across the research community to better inform policy and practice. Much of this research is funded by the UK's national research councils.

Handbooks, guidelinesThe **Austrian** FAMOUS project (Factory of Adaptation Measures operated at different Scales, 2011-2013) which had been financed by the National Climate and Energy fund has

[87] http://www.legislation.gov.uk/uksi/2009/3042/contents/made accessed on 21/06/2016
[88] https://www.gov.uk/guidance/flood-risk-management-plans-frmps-how-to-prepare-them accessed on 21/06/2016

produced a Handbook as a support tool for policy makers in provinces, region and cities, providing tools guidelines for strategic and proactive action related to climate change impacts at regional, county, and local level (Prutsch, Felderer, et al. 2014). The handbook is divided in two parts: part 1 describes a typical adaptation process divided in three phases: phase 1 is dedicated to the creation of prerequisites adaptation processes, phase 2) to the identification of risks and solutions, and phase 3) to implementing and monitoring actions. the second part of the handbook presents, for each of the phases described in part 1, description of measures and tools that can be employed for these activities in form of fact sheets, checklists, guidelines, etc. (source: MMR reporting). Further to such generic guidelines, specific handbooks have been published: An Adaptation Communication Guideline has been developed in the CcTalk! Project (Vom Wandel zum Handeln: Effektive Kommunikation zu Klimawandel und Anpassung" 2012- 2014), funded by the national climate and energy funds[89] (Prutsch, Glas, et al. 2014). At regional level, the Land Oberösterreich has published in collaboration with the regional Energy Saving Agency (Oberösterreicher Energiesparverband) a short guidance leaflet for Summer suitable construction [90], which provides guidance for planning of more heat resistant buildings. The project Klimanetz - Vernetzt im Klimawandel[91] (see above) has developed a handbook supporting the assessment and development of the human and social capital for climate change adaptation in local communities (Feiner et al. 2012).

The **Belgian** Department for Environment, Nature and Energy (LNE), is creating an adaptation toolkit to help Flanders' cities and municipalities to design and implement their adaptation plans[92].

In **Wallonia, Belgium**, a guidance tool[93] consisting of an excel sheet which supports cities in diagnostics of vulnerability has been developed and already used in the province of Liège for developing its climate plan (Province de Liège 2015).

The **Finnish** association of Local and Regional Authorities has published a handbook "Local authorities and Climate change" where the key role of local authorities for adaptation is emphasized and examples of good practices realized throughout Finland are presented. Furthermore, also in the context of the EAKR-ILKKA project (Climate-Proof City, 2012-2014), an online guidance tool for planners has been developed providing insight into tools and best practices with the aim of developing climate-proof planning procedures and growing knowledge of city officials and decision-makers[94].

French national Environment & Energy Management Agency (ADEME) has put in place a series of knowledge and capacity building tools: a vulnerability assessment tool[95], as well as a vulnerability assessment guidebook (ADEME 2013a) which combines guidance for local vulnerability assessment with a presentation of international good practices; a guidebook for local strategy or action which is based on the presentation of international experiences and draws conclusions for the French situation (ADEME 2013b), and finally a guidebook for adaptation monitoring and review of local action (ADEME 2013c).

In **Germany**, a series of internet based guidance tools exist: for example, the German climate portal[96] provides extensive information and pathways to climate relevant information also for urban planning, and is linked to the INKAS tool[97], a simulation tool providing a ex ante assessment of impacts of different spatial solutions for urban climate. The Future Cities project ("urban networks to face climate change") an INTERREG-funded project among several regional city associations and cities from northern France,

[89] http://www.klimawandelanpassung.at/ms/klimawandelanpassung/de/kwa_news/kwa_schwerpunkt/kwa_cctalk_nl/ (in German) accessed on 13/05/2016
[90] http://www.energiesparverband.at/fileadmin/redakteure/ESV/Info_und_Service/Publikationen/Sommertauglich_Bauen_2013.pdf, accessed on 13/05/2016
[91] http://www.klimanetz.at/english/ accessed on 13/05/2016
[92] http://www.climateadaptationservices.com/en/adaptatie-instrumentarium-vlaanderen accessed on 23/06/2016
[93] http://www.awac.be/index.php/mediatheque/nosetudes/item/79-outil-d-aide-a-l-evaluation?highlight=WyJvdXRpbCIsImRlIiwiZGlhZ25vc3RpYyIsIm91dGlsIGRlIiwib3V0aWwgZGUgZGlhZ25vc3RpYyIsImRlIGRpYWdub3N0aWMiXQ== in French, accessed on 21/06/2016
[94] http://ilmastotyokalut.fi/en/about-the-project/ accessed on 12/05/2016
[95] http://multimedia.ademe.fr/catalogues/Guides_adaptation_au_changement_climatique/uk/catalogues/impact_climat/appli.htm accessed on 12/05/2016
[96] http://www.deutschesklimaportal.de/EN/Home/home_node.html; accessed on 19/05/2016
[97] http://www.dwd.de/DE/klimaumwelt/klimaforschung/klimawirk/stadtpl/inkas/inkas_node.html; accessed on 19/05/2016

Belgium, the Netherlands, and North Rhine Westphalia, has produced an "Adaptation Compass" which consists of excel sheets and several guidance documents for cities[98].

Under the initiative or the **Hungarian** EU presidency and in cooperation with several European countries and cities (Ministry of Interior, 2011) which has been developed for supporting European cities and towns in their combat against climate change by widening the European knowledge base. Furthermore an expert team coordinated by the Hungarian Society for Urban Planning with expertise from VÁTI Hungarian Regional and Urban Development, several Hungarian universities, and the Hungarian Meteorological Service prepared a Guide on Climate Friendly Urban Policies[99] for local governments.

The **Irish** government has revising their guidelines supporting local planning in order to promote mainstreaming of adaptation into local level planning[100]. The update of the guidelines has been financed by an Environmental Protection Agency (EPA) research programme. These will replace existing guidelines which are part of the urban planning policies, published by the Minister for the Environment, Community and local Government, as part of the implementation of the national Planning and Development act. Once published, the subsequent cyclic updates of local development plans should be enhanced to "de facto" local adaptation plans. The guidelines will be integrated by a decision support tool, "the Local Authority Adaptation Support Framework" which will be made available on the Climate Ireland" website[101] (Source: MMR reporting).

In **Italy**, handbooks and guidance have been produced primarily within funded projects, as the "*Planning for adaptation to climate change – Guidelines for Municipalities*" (LIFE ACT Project,[102]) and the handbook on "*Climate change planning for regional and local authorities*" (EnercitEE – SubProject CLIPART (Marletto et al. 2012)). Furthermore, "*Guidelines for a regional plan for adaptation to climate change*" have been issued by the Lombardy region. The guidelines have been developed with the input of the Lombardy Foundation for the Environment[103].

In **Lithuania,** the Ministry of the Environment is preparing policy guidelines for climate resilient construction which address competitiveness of the construction sector. Priorities for this sector need to be revised front of increasing environmental requirements by the EU legislation and by climate change expected to influence public welfare and by the need of a sustainable development of infrastructures for cities and settlements (Source: MMR reporting).

The **Dutch** Knowledge portal for spatial adaptation is part of the instruments developed by the Dutch Delta Programme. It contains, among others, a guide to spatial adaptation planning an advisory document to the steering committee of the Delta Programme regarding climate proof cities. This guidebook offers assistance for climate proofing and water resilient planning in a structured manner, (Moons et al. 2013, in Dutch). It is part of an articulated set of guiding tools collected in the Dutch guidance portal regarding information on spatial climate proofing and adaptation processes in three main areas (Ambition, Analysis and Action) and comprises, further to showcases of good practices, simulation tools on different aspects as flooding, heat islands, and the benefits of green areas (Ministerie van Infrastructuur en Milieu 2015b).

In early 2015, **Norway** has published a guidance, "the Climate Companion" which aims at supporting authorities in ensuring security and climate change adaptation planning under the Planning and Building Act.

[98] http://www.future-cities.eu/ accessed on 20/06/2016
[99] www.mut.hu/?module=news&action=getfile&fid=182647 in Hungarian, accessed on 19/05/2016
[100] http://www.epa.ie/newsandevents/news/name,59413,en.html accessed on 30/05/2016
[101] http://www.epa.ie accessed on 20/06/2016
[102] http://www.actlife.eu/medias/306-guidelinesversionefinale20.pdf accessed on 13/05/2016
[103] http://www.reti.regione.lombardia.it/shared/ccurl/778/935/Linee%20guida%20PACC%20Lombardia_Abstract.pdf accessed on 21/08/2015

In **Portugal**, a handbook providing a framework for the definition and implementation of integrated spatial strategies addressing climate change adaptation in risk areas has been produced by the INTERREG IVC project F:acts! (García et al. 2012)[104].

The **Romanian** Environment Protection Agency Sibiu has promoted a project for the central region (region 7) aiming at developing a set of good practices on adaptation to climate change, and providing good practice models, focusing on the following objectives: 1.) Increase capacity, knowledge and awareness for assessing and reducing vulnerability to climate change in the institutions, organizations and in the large public, 2.) provide strategies and measures for adapting to a changing climate and 3.) improve energy efficiency of public buildings of in some pilot cases. These pilot cases were LEPA Sibiu, Grimm Brothers Kindergarten and Social Center Tîrgu Mureş (homeless people). The initiative of developing guidelines aims at compensating the shortage of good realized examples, data and experts in the field (source: MMR reporting).

In **Spain**, the Network of cities for the Climate (*Red de Ciudades por el Clima)* within the Federation of Municipalities and Provinces has created a guidance document dedicated to the Local climate change strategy providing guidance for impact and vulnerability assessment and promoting local action for adaptation has been created (Red Española de Ciudades por el Clima n.d.). Two further guidelines for urban climate action have been created by the regional government of the Basque country. Both Handbooks provide an overview and guidance for holistic approaches to local climate action, providing suggestions also for integrating adaptation into local agenda21 processes (IHOBE 2011) and addressing mitigation, adaptation and synergies between these climate action and local sustainability strategies (UDALSAREA21 2012).

In **Switzerland**, the Federal Office for Spatial Development published a guideline on "Climate Change and Spatial development". Among others, guidance is provided on the importance of open and green space in urban areas to increase the quality of life, also with respect to adaptation to climate change.

In **Turkey**, in the context of the Project Pilot project for "Building capacity to prepare city-level climate change adaptation plans in Turkey" implemented in 2013 (see above) a Cities Adaptation Support Package (CASP) was developed which is tailored to the specific Turkish situation and aims at providing guidance cities across Turkey in the development of climate change adaptation plans[105]

In the **UK**, many examples of guidance and tools that have been developed. Two key examples are:

Kent's Severe Weather Impact Monitoring System (SWIMS) allows the County Council to collect data about how the services provided by Kent Partners (including Kent County Council, Kent Police, district and borough councils and the Environment Agency) involved during severe weather events. This allows them to understand the impact of these weather events and to plan better for the future. Kent partners can build up a picture of their vulnerability to severe weather and develop business cases for taking appropriate action. Partners can use the system, for example, to:

- record details about how their service and service users have been affected;
- record information on how they have responded to an event, both in the immediate aftermath of the event and any longer-term responses;
- generate a report to show how their organisation has been affected by severe weather;
- share data with other organisations to identify common barriers and areas of vulnerability
- share best practice, expertise and lessons learnt;
- to support business cases for resilience actions.

The Uk Environment Agency, in collaboration with Climate UK, are rolling out SWIMS, so that all councils can begin to record the real time impacts severe weather has on council services and assets. This work will help develop a more quantified understanding of the impacts severe weather has on councils to make the

[104] http://www.factsproject.eu accessed on 24/05/2016
[105] http://www.ricardo.com/en-GB/News--Media/Press-releases/News-releases1/2014/Turkey-publishes-Ricardo-AEA-prepared-Cities-Adaptation-Support-Package/ accessed on 24/05/2016

case for future resilience work. The Northamptonshire County Council has developed a flood tool kit to help homeowners, businesses, landowners and communities assess flood risk and provides advice on how to address the risk[106].

The Welsh Government has published its "Preparing for a Changing Climate" statutory guidance which helps organizations in Wales assess, prepare and act on risks from a changing climate. The guidance is based on a five-part, cyclical risk assessment approach for building resilience and developing a planned response to the threats and opportunities from climate change [107].

3.3. Platforms, initiatives for knowledge exchange

In **Austria, t**he platform *Klimawandelanpassung*[108] financed by Climate and Energy Funds and managed by the National Environmental Agency has been created as a knowledge platform, which provides access to results from research projects and presents the contents of the Austrian strategy on climate change. Furthermore, the association Climate Change Centre **Austria** (CCCA) has been formed among institutions conducting climate research in order to strengthen the climate change research, promoting research, supporting knowledge transfer between researchers, and providing advice to policy and society[109].

In **Belgium**, several national Universities and Research institutions have created, together with the national ministry for the Environment, an Academic Research Platform "KLIMOS" which provides scientific support for policy makers with scientific research on Research activities will focusing, inter alia on the management of natural resources for multiple ecosystem services, of sustainable energy systems and urban infrastructures, on innovations in governance and institutional reform, and on sustainability monitoring & evaluation. The platform aims and capacity building and knowledge pooling targeting national policy makers at all governance levels as well as for development cooperation [110].

In the **Czech Republic** a series of online platforms has been activated by different actors: the CZECH CLIMATE COALITION[111] is a platform created by Czech non-governmental environmental organizations working in the areas of climate change and adaptation. The platform "Climate change adaptation in the Czech Republic"[112] is a knowledge exchange platform showcasing the Czech adaptation strategy as well as adaptation measures and strategies including those for urban areas. The platform has been activated using the EEA Grants programme for Adaptation (EEA Funds 2009-2014). The EEA grants funded project "Adaptation of Residential Areas to Climate Changes – Practical Solutions and Experience Sharing" has created a web based platform for showcasing and exchange of best practices[113].

The **Danish** Portal for Climate Change Adaptation[114] provides information to experts, policy makers and the general public, and showcases good examples of adaptation, presenting technologies and technological development. It combines the presentation of tools with prospects of financing and government subsidies. It furthermore set up a "mobile team … (that) offered guidance and facilitates collaboration between municipal authorities and other stakeholders in the field, for example with regard to preparing the municipal climate change adaptation plans" (Source: MMR reporting).

The national climate change adaptation web portal, which includes a section for municipalities, is provided by the **Estonian** Environmental Research centre as part of the institute's homepage[115]. The webpage is regularly updated with new information, with relevant adaptation procedures, guidelines and materials throughout the development of NAS[116].

[106] http://www.floodtoolkit.com/ accessed on 24/05/2016
[107] Source: http://climate-adapt.eea.europa.eu/countries-regions/countries/united-kingdom accessed on9/06/2016
[108] http://www.klimawandelanpassung.at accessed on 24/05/2016
[109] https://www.ccca.ac.at/ accessed on 31/05/2016
[110] http://ees.kuleuven.be/klimos/ accessed on 21/06/2016
[111] http://www.zmenaklimatu.cz/cz/english-content; accessed on 24/05/2016
[112] http://www.regio-adaptace.cz/en/ accessed on 24/05/2016
[113] http://www.adaptacesidel.cz/en accessed on 24/05/2016
[114] http://www.klimatilpasning.dk/ accessed on 24/05/2016
[115] http://www.klab.ee/kohanemine/en/ accessed on 21/06/2016
[116] source: http://climate-adapt.eea.europa.eu/countries-regions/countries/estonia accessed on 21/06/2016

In a similar manner, also the web portal created in **Finland** targets specific knowledge needs of local decision makers, as well as those of the general public, offering easy to understand information from research, observational data and climate scenarios, information on impacts and step-by step guidance supporting both mitigation and adaptation action. The web portal Climateguide.fi[117] provides research based information on climate change and adaptation, including map-tools, data and info graphics and also case descriptions addressing both citizens ad experts. It represents a platform for depositing and exchanging research results and information. In Finland, Publication of research results has to follow the principle of open science, in order to "promote better utilisation of the research information" and providing access to information materials including publications, research data and methods to all those interested in this information. This principle should furthermore enhance the opportunities for citizens to participate in the production and use of knowledge and information.

In **France** an online-knowledge collaborative platform on climate change adaptation has been created which addresses also issues related to urban adaptation (WIKLIMAT[118]), and provides a territorial (but not sectorial) mapping of local initiatives. Wiklimat is part of a set of initiatives dedicated to local action within a larger knowledge platform organized by the French Ministry for the Environment, the national observatory on climate change (***Observatoire National sur les Effets du Réchauffement Climatique* (ONERC)**)[119] which provides information on climate change impacts an scenarios, and possible actions for mitigation and adaptation. ONERC is also part of the institutions which have initiated the ViTeCC Club project, a platform for "exchange and non-partisan debate, through combining international expertise on the impact and financial mechanisms of climate change with feedback from its members, who include both companies and local authorities"[120]. The project which is based on membership (national institutions, regional and local authorities) is running since 2008, and organizes regular meetings and reports, addressing knowledge needs regarding climate change impacts as well as funding opportunities for adaptation projects.

In **Germany**, within the Ministry for environment, an internal centre for climate change adaptation, Kompass[121] has been created, which has provided, inter alia, an internet platform "Anpassung.net". Further to this comprehensive platform, the Federal institute for spatial research has created a specific web page addressing issues of adaptation in urban areas[122] which includes also an interactive online tool "Stadtklimalotse" which aims at providing support to decision making for local authorities[123]. Also the German meteorological service (Deutscher Wetterdienst) hosts a web-based climate services platform. It provides, inter alia, specific services and simulation tools for urban climate and climate change related information for urban areas[124]. Furthermore, la *Helmholtz Gemeinschaft*, (the association of top-level research institutions in Germany) has created the "*Klimanavigator*" a knowledge platform for climate related knowledge which provides links to climate and adaptation related research and knowledge[125]. Further to this broad knowledge platform, it manages three regionally and thematically oriented Climate offices[126], of which the central one focuses on adaptation strategies and on the impact of climate change on the environment, land use and society, comprising thus also competences on urban adaptation. The aim of the Climate offices is to "integrate regional climate change information based on latest research projects and make scientific results understandable to the public" (Anon n.d.). Finally, the national platform „Future

[117] http://Ilmasto-opas.fi accessed on 24/05/2016
[118] http://wiklimat.developpement-durable.gouv.fr/index.php/Wiklimat:Accueil accessed on 30/05/2016
[119] http://www.developpement-durable.gouv.fr/-Observatoire-National-sur-les- accessed on 30/05/2016
[120] http://www.i4ce.org/go_project/vitecc-club-projet/ accessed on 30/05/2016
[121] http://www.umweltbundesamt.de/en/topics/climate-energy/climate-change-adaptation/kompass accessed on 30/05/2016
[122] http://www.klimastadtraum.de/DE/Home/home_node.html accessed on 30/05/2016
[123] http://www.klimastadtraum.de/DE/Arbeitshilfen/Stadtklimalotse/stadtklimalotse_node.html;jsessionid=61B77808A3D39D087CA2CE2C35372E55.live2053, accessed on 30/05/2016. Interestingly, this webpage addresses, further to local authorities, also private actors, for instance the real estate and private business. in German.
[124] http://www.dwd.de/DE/klimaumwelt/klimaforschung/klimawirk/stadtpl/inkas/inkas_node.html; accessed on 19/05/2016
[125] http://www.klimanavigator.de (in German); accessed on 30/05/2016
[126] http://www.klimabuero.de/index_en.html; accessed on 30/05/2016

City"[127] has a special focus on (urban) infrastructure development under changing climate conditions, tackling, inter alia, the question of how leverage(s) for a transformation of infrastructures can be individuated.

In **Ireland**, a national information platform[128] (ICIP) is being developed by the University of Cork, using funding by an EPA Research Programme aiming at supporting local adaptation decision making. In its final version, it will provide access to data analysis and decision support tools supporting vulnerability assessment and decision making.

The **Lithuanian** Ministry for the Environment is developing, in accordance with Action plan for the period of 2013-2020 defined in the National Strategy for Climate Change Management Policy, a web-based platform on climate change adaptation[129]. Further to generic climate change related information already available, it will contain an analysis of EU Member State experiences and of documents prepared by the European Environmental Agency with regards to effective adaptation measures, and to measures for enhancing the implementation of these measures will be part of a national study to be finalized in 2015.

In the **Netherlands**, the knowledge portal for climate research has been created as a result of a research programme focusing, inter alia, on flood risk management, climate proof cities, governance and policy tools. In this programme, scientists studied together with stakeholders various subjects in so called hotspots, such as Rotterdam and Schiphol airport among others[130]. The portal presents knowledge for urban adaptation in a dedicated section. Furthermore, the "Knowledge portal for spatial adaptation" has been created to support the delta decision for spatial adaptation and serves, further to supporting the broad Dutch spatial adaptation strategy, for disseminating knowledge on climate change, targeted to information needs for spatial and urban adaptation (Ministerie van Infrastructuur en Milieu 2015b)[131]. The "Delta portal" provides access to knowledge in a web-based geographical presentation that supplies information about the Delta Programme. It focuses on challenges facing water safety and freshwater and on possible solutions in the form of strategies[132]. The Foundation for Climate Adaptation Services, a cooperation of Dutch research agencies, provides, in addition to the information provided in the Knowledge portal for spatial adaptation (see above) provides furthermore the Climate Adaptation Atlas which visualises "(future) threats for river- and coastal floods, urban floods, drought and heat in the Netherlands based on national climate scenarios" (Klimaat Adaptatie Services n.d.). Maps can be explored in an interactive way detailing information at local scale.

The **Norwegian** adaptation platform provides guidance and practical tools, case studies, guidelines and information on climate change adaptation tailored specifically to meet the needs of those responsible for spatial planning in the municipalities[133]. Furthermore, in February 2015, a new guidance tool was launched, "the Climate Companion" focussing on how to ensure social security and climate change adaptation planning under the Planning and Building Act. The Norwegian Climate Change Adaptation Portal showcases, inter alia, different activities undertaken by municipalities. These presentations aim at supporting local action providing inspiration. The portal provides furthermore, information on on-going activities, research outputs and climate data[134]. Furthermore, the CCA web site presents case studies from different municipalities which participated in the "Cities of the Future" project[135].

In **Poland,** the adaptation web-portal, KLIMADA[136] includes information on climate change at global, EU, Polish and sub-national level, as well as some information per sector (source: MMR reporting). The need

[127] http://www.nationale-plattform-zukunftsstadt.de; only available in German, accessed on 30/05/2016
[128] http://www.climateireland.ie/ accessed on 30/05/2016
[129] http://www.am.lt/VI/en/VI/index.php#r/200 accessed on 30/05/2016
[130] http://www.knowledgeforclimate.nl/ accessed on 20/05/2016
[131] http://www.ruimtelijkeadaptatie.nl/en/ accessed on 20/05/2016
[132] http://www.deltaportaal.nl accessed on 20/05/2016
[133] http://www.klimatilpasning.no, accessed on 20/05/2016
[134] http://www.miljodirektoratet.no/no/Klimatilpasning_Norge/Om-klimatilpasningno/English/ accessed on 20/05/2016
[135] https://www.regjeringen.no/en/topics/municipalities-and-regions/by--og-stedsutvikling/framtidensbyer/the-participating-cities-/id548188/ accessed on 21/06/2016
[136] http://klimada.mos.gov.pl/en/ accessed on 12/05/2016

for capacity building was identified as a major issue, leading to the project "Good climate for the counties" in 2010. It is targeted to all types of actors – in particular local officials – and informs about climate change, providing practical tools and mechanisms to support adaptation and mitigation activities. At a sub-national level, a community of practice initiative has been created for knowledge transfer, the Mazovian Climate Agenda, which acts as a forum for cooperation and exchange of knowledge and good practices of different entities in an urban context, using the example of the Warsaw Agglomeration. Furthermore, the Partnership for Climate Platform carries out comprehensive, innovative educational and promotional activities related to climate change issues. Within the framework of the Platform, different types of events are organised, including conferences, debates and exhibitions intended to raise public awareness on climate change issues (source: MMR reporting).

In **Portugal**, a website will be published in support of the AdaPT project (see national initiatives) in 2016. It is planned as an "easy platform for the general public making available, namely: time series, climate change projections and sectorial climatic indicators for the geographical coverage of mainland Portugal" (source: MMR reporting). The project AdaPT aims, furthermore, at creating a community of municipal actors which are aware of climate change issues and trained for using decision support for climate change adaptation. These activities are supported by the web portal[137] and "Help Desk" platform provided by AdaPT (source: MMR reporting).

Although focussed mainly on mitigation, the platform realized within the **Slovenian** project "Slovenia is reducing CO2: best practices" showcases, among de-carbonization projects, also projects for adaptation to climate change. In this respect further to the Climate adapt website, a dyke project in response to floods in September 2010, is presented as example of good practice[138].

In **Sweden**, the Swedish Meteorological and Hydrological Institute (SMHI) is in charge of establishing a National Knowledge Centre for Climate Change Adaptation[139]. The "Knowledge Centre" provides information on climate change addressing knowledge needs of different actors, with a responsibility for, or interest in, Sweden's adaptation to impacts of climate change. It provides tools and information to help society cope with a changing climate. A main task is to collect, develop and share research, information and good examples to facilitate sound decision making. A major tool used by the Knowledge Centre is the Swedish Climate Change Adaptation Portal[140], a result of a joint effort of national authorities and regional governments. The portal provides support to municipalities and county councils within activities relating, inter alia, to spatial planning, emergency preparedness and energy. In addition to this, the Swedish Association of Local Authorities and Regions (SALAR) has established an Internet-based network for exchanging experiences with the aim of strengthening municipalities in the process of adaptation. The network offers a forum for dialogue and exchange of experiences between municipalities but also between the SALAR and members. Access to the resources is free. For the time being, there is no planned physical meeting for members of this network, but if there is interest, this may be arranged according to SALAR. The Swedish MMR report states that local action is triggered "above all" by extreme weather events; especially those municipalities hit by extreme events actually started adaptation activities. (Source: MMR reporting).

In **Spain**, the Ministry for the Environment has created a generic information platform which provides access to political information on climate policies and to knowledge and research projects[141]. Furthermore, the platform AdapteCCa[142] has been created for promoting information, exchange and knowledge transfer between administrations, scientific community, planners and public and private managers. It contains a knowledge repository system allowing, further to the information retrieval, for uploading, storing and exchanging of knowledge relevant for climate change. It works furthermore as a platform for permanent and ad hoc working groups for specific purposes (source: MMR reporting).

[137] http://climateadapt-local.pt/ accessed on 12/05/2016
[138] http://www.slovenija-co2.si accessed on 30/05/2016; available in Slovenian only.
[139] http://www.smhi.se/en/theme/climate-centre accessed on 30/05/2016
[140] www.klimatanpassning.se accessed on 30/05/2016
[141] http://www.magrama.gob.es/es/cambio-climatico/temas/default.aspx accessed on 30/05/2016
[142] http://www.adaptecca.es/en accessed on 30/05/2016

A web platform with information on adaptation in **Switzerland** was launched following the adoption of the national adaptation framework. The Information Platform on Adaptation is incorporated in the website of the Swiss Federal Office for the Environment[143]. It provides information about the national adaptation strategy, the results from assessment of climate change risks and opportunities, the pilot program and on further adaptation activities on the federal, cantonal and local level. The platform targets administrative bodies and features relevant documents and studies, adaptation activities on Federal and cantonal level as well as responsibilities. Furthermore, the science and policy platform of the Swiss Academy of Science has created a forum for Climate and Global Change (ProClim) which serves as an interface for communication between science, public administration, politics, economy and the public, publishing reports, factsheets and Publication Series, including policy statements and organizing meetings, conferences and round tables addressing both mitigation and adaptation policies[144]**.**

In the **UK**, information on national climate change policy and on adaption to climate change is provided on the UK government website[145]. This includes information on the Environment Agency Climate Ready Support Service (EA CRSS). The EA does not host its own adaptation platform, but delivers its online tools and guidance through partner organisations such as Climate UK and Climate Local[146]. The EA CRSS helps to raise awareness, build capability and provides tailored sector support to help the public sector and businesses in England adapt to climate change. Adaptation information and knowledge are also disseminated in each of the devolved administrations: Scotland[147], Northern Ireland[148] and Wales[149] and supporting local authorities, as well as by the Uk Climate impact programme (UKCIP) at the University of Oxford Environmental Change Institute. The UKCIP platform provides support to local authorities in making decisions for adaptation, documenting best practice examples and providing a decision making tool and enabling exchange between practitioners, researchers and policy[150]. In 2011, the **UK**'s Department for Environment, Food and Rural Affairs (DEFRA) set up a Local Adaptation Advisory Panel, supported by the EA CRSS, aimed at allowing an efficient platform for two-way dialogue between local and central government to identify ways in which to support local adaptation action. During 2014/15 the LAAP's work included delivering a communications work programme, providing support to develop the local business case for adaptation and promoting the case for integrating adaptation within emerging growth plans, as being progressed by Local Enterprise Partnerships. The work programme for 2015-16 included informing government policy on local adaptation, developing a communications plan, finalising the business case for local authorities report and engaging with the Adaptation Sub-Committee on its statutory 2015 report. ClimateUK provides support and tools for knowledge sharing to local organisations via a national network of 12 Climate Change Partnership organisations across the UK[151]. The Local Government Association's Climate Local initiative, supported by EA CRSS, provides tailored support to local authorities[152]. The UK Royal Town Planning Institute (RTPI) keeps, amongst other things, a Climate Change Compendium: Adaptation, providing national, regional and city strategies and guidance. Adaptation Scotland offers an online platform which provides access to data on climate trends and impacts in Scotland, as well as access to tools, guidance and advice on adapting to the impacts and information to support adaptation planning and action. This includes, inter alia:

[143] http://www.bafu.admin.ch/klima/13877/14401/index.html?lang=de (available in French, German and Italian) accessed on 30/05/2016
[144] http://www.naturalsciences.ch/organisations/proclim, accessed on 21/06/2016
[145] https://www.gov.uk/government/policies/climate-change-adaptation, accessed on 31/05/2016
[146] http://climateuk.net/ and http://www.local.gov.uk/climate-local, accessed on 31/05/2016
[147] See http://www.adaptationscotland.org.uk/1/1/0/Home.aspx ; funded by the Scottish Government and delivered by Sniffer (knowledge brokers for a resilient Scotland) , accessed on 31/05/2016
[148] See http://www.climatenorthernireland.org.uk; funded by the Department of the Environment in Northern Ireland, accessed on 31/05/2016
[149] http://gov.wales/topics/environmentcountryside/climatechange/?lang=en# and http://thecccw.org.uk; accessed on 31/05/2016
[150] http://www.ukcip.org.uk/ accessed on 31/05/2016
[151] http://climateuk.net/ accessed on 31/05/2016
[152] http://www.local.gov.uk/climate-local accessed on 31/05/2016

- Training resources for Strategic Development Planning Authorities to identify opportunities to include adaptation within strategic development plans;
- A 'climate risk management plan' template providing businesses with a simple, streamlined approach to assessing and managing their climate risks;
- Public sector guidance on five steps to managing your climate risks guidance[153], giving the public sector a standard approach for adaptation planning and reporting;
- Online resources for communities including climate story films and workshop materials which help communities start to identify local climate change impacts and actions that they can take to build resilience.

The Welsh Government has created a Knowledge Transfer Programme which aims at building climate change resilience through the exchange of knowledge, skills and resources, whilst understanding stakeholder's needs and requirements. The programme has focused on how to embed adaptation within organisations and developing tools and resources to help sectors and organisations adapt. Resources include: (1) The Welsh Local Authority Adaptation Resource which supports a clear business case for why planning for the long term is relevant now. The resource includes a publication and accompanying spread sheet, focussing at the service risks, actions that can be taken and provides links to further resources, and (2) the Climate Resilience and Extreme Weather Knowledge Hub which is a community of practice on adaptation to support reporting authorities, providing a database of resources for organisations and sectors to help them in their adaptation planning[154].

3.4. National City Networks

Within the **Danish** Association of Local Governments (LDK)[155] a climate network has been created which comprises some of the 98 Danish local authorities.

The **Hungarian** Alliance of Climate-Friendly Cities[156], initiated by the Institute of Sociology of the Hungarian Academy of Sciences is a partnership of local governments and NGOs providing technical advice, tools, case studies and information to cities on climate change adaptation and mitigation. Currently, it has 18 Hungarian member cities and all of them have prepared or started to prepare their local climate change strategies.

The **Italian** Local Agenda21 Committee[157] is coordinating and promoting local authorities' initiatives addressing, further to sustainability, also climate change and resilience, promoting the exchange of experiences and good practices among member cities. Members of the association are municipalities and administrations of the intermediate level (Regions and Provinces). The network "*Il clima cambia la città*" (Climate is changing the city) has been established, under the initiative of Padova, Bologna, Ancona and Alba and with the support of the IMELS and the Italian Local Agenda21 Coordination, in order to promote and disseminate at national level the projects on climate change adaptation being implemented at urban level in Italy.

Within the **Romanian** Municipalities Association[158], a consultative process was launched "The Romanian Municipalities Association Commitment for Climate Change Effects Prevention", which has so far been signed by 35 out of 109 municipalities. One aspect of this commitment is related to the assessment of climate change risk and implications for public services and local communities and their capacity to adapt to climate change.

[153] http://www.adaptationscotland.org.uk/5/170/0/Five-steps-to-managing-your-climate-risks.aspx accessed on 21706/2016
[154] Source: http://climate-adapt.eea.europa.eu/countries-regions/countries/united-kingdom accessed on 21/06/2016
[155] http://www.kl.dk/ accessed on 31/05/2016
[156] http://klimabarat.hu/ accessed on 31/05/2016 (in Hungarian)
[157] http://www.a21italy.it/ accessed on 31/05/2016 (in Italian)
[158] http://www.amr.ro/ accessed on 31/05/2016

In **Spain**, the Federation of Municipalities and Provinces has created a *Red de Ciudades por el Clima* (Network of cities for the climate)[159], which aims at providing technical support to municipalities committed to achieving sustainable urban development. Further to the guidelines for municipalities (see above) the network has furthermore produced, in 2010, an assessment of climate change vulnerabilities in all associated municipalities.

The **Swedish** Civil Contingencies Agency (MSB) is coordinating the participation of Swedish municipalities in the international Making Cities Resilient Campaign: six municipalities in Sweden are acting as role-model-cities (**Arvika, Göteborg, Jönköping, Karlstad, Kristianstad and Malmö)**[160].

In the **UK**, the National Adaptation Programme involves several national networks, such as the Local Government Association's Climate Local initiative, which provides support and a knowledge platform to local authorities for comprehensive climate action, both in terms of carbon reduction and in increasing resilience. As at July 2015 there are 102 councils signed up to the Climate Local initiative. Of these, 86 have published their Climate Local action plans, and 47 have shared a progress report. Climate Local is the follow-up initiative to the Nottingham Declaration on Climate Change, aimed at increasing energy efficiency, which was signed by more than 300 English councils. ClimateUK is a sub-national network of climate change partnerships covering the UK[161]. Its aim is to share knowledge and learn about tackling the consequences of climate change in the UK, and to maximise the benefit from each partnership's work. The 8 largest English cities (Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield) plus Glasgow and Cardiff have created an informal group (Core Cities). This group collaborated, together with the London Councils[162] and the Greater London Authority to form a commitment, contained in the NAP, around the challenges faced by cities from a changing climate. The Core Cities group was invited to work with the government in promoting a supportive framework on climate adaptation and possibly tackling specific policy barriers to enable councils to take more effective action on climate risks. The Government is developing a work programme, working closely with cities, to take forward its part of the cities commitment, particularly drawing on London and in close partnership with EA CRSS. For its part Core Cities are developing proposals to build local climate resilience for key priorities. Further local Adaptation Advisory Panel networks in the UK are

- the Local Government Association;
- the Climate Local initiative, which includes local Government network (email, Knowledge/K-hub);
- LGA Bulletins (email, website) and First Magazine (print, website);
- EA networks – Area Sustainable Places teams engaged in work with local authorities and internal newsletters;
- Climate UK newsletter (email) and regional climate change partnership newsletters (email);
- ADEPT (website, email, meetings), led by Local Adaptation Advisory Panel;
- Core Cities Group and associated networks.

3.5. Local Activities

In **Austria**, the energy association of the region of Oberösterreich provides comprehensive information on adaptation to increasing summer temperatures and increasing number of heat waves. The information in a brochure and a handbook containing guidelines targets both citizens and architects. The handbook covers in detail issues of "reduction of heat entry", "heating/cooling storage" "optimization of the use of daylight", "technical building systems", and "the use of greening and plants" . The guidelines published by the city of **Vienna** point into a similar direction, underlining the multiple advantages of plants in the urban environment; These guidelines target architects, planners, builders, citizens and public institutions. The

[159] www.redciudadesclima.es / accessed on 31/05/2016
[160] Source: http://climate-adapt.eea.europa.eu/countries-regions/countries/sweden, accessed on 9/06/2016
[161] http://www.climateuk.net/ , accessed on 9/06/2016
[162] Cross party organisation, which develops policy and provides a London-wide service, representing London's 32 Borough Councils and the City of London

brochure provides an overview of various greening systems, provides support for the choice of suitable plant species and information about irrigation, maintenance and engineering.

The project Austrian project Klimanetz[163] is using two case study cities, Virgen and Klosterneuburg for investigating and raising awareness about the importance of human and social capital for climate change adaptation.

In **Belgium,** the city of **Iepern** has developed a residential area "De Vloei" which is adapted to climate change[164] (Future Cities, urban Networks to face climate change). In **Brussels,** an operational strategy for sustainable neighbourhoods has been developed which includes green roofs, sustainable water management and climate mitigation measures; by 2015, 15 neighbourhoods have been created following this strategy. The city of **Gent** has undertaken activities for awareness raising creating a Climate Coalition with the aim of increasing resilience to climate change and making the city climate neutral by 2020. In **Antwerp**, initiatives for reducing heat island effect and reduce the effect of flash floods have been set up, using green roofs; the "onze kaaien" (our quays) project on aims at protecting the city against sea level rise, mainly by raising flood dykes in the urban area[165]. The **Sigmaplan** projects aims at planning for the protection of the estuarine part of the Belgic Scheldt River against flooding connected to sea level rise.

In Bulgaria, projects for the improvement of efficiency of public urban transport (**Sofia**, **Plovdiv**, **Varna**). Further to these projects aiming at energy efficiency and improvement of air quality in urban areas, in the context of projects for the improvement of quality of life in urban areas, flood protection measures and for the improvement of run off have been implemented in Plovdiv, combining flood protection measures with urban greening and measures improving urban living conditions. In **Varna**, a project focussing on local and territorial planning strategies has been implemented which aims at for capacity building and knowledge exchange between participating organizations.

Cyprus has implemented local and pilot projects in the field of coastal zone adaptation (CAMP, COASTANCE, MAREMED) regarding the city and district of **Larnaca**.

Among **Estonian** cities, adaptation action plans have been set up in response to extreme winter storm and consequent coastal flooding in the cities of **Tallinn**, **Parnu** and **Haapsalu**, following a regional risk assessment and crisis management plans. Assessments and measures put in place focus on extreme weather events, as storm and (coastal) flooding. For **Tallinn** and **Pärnu** (both cities were represented in the ASTRA Project[166]), early warning systems and tools for awareness rising among citizens have been set up, which are connected to meteorological forecasting systems. In Tallinn, further to early warning, increased maintenance efforts are dedicated to the sewerage system in order to prevent impacts from cloudbursts.

In **Paris**, **France**, the local climate vulnerability assessment and the adaptation framework have recently been updated. Furthermore, a heat wave plan is implemented each year by the regional Health agency.

Documentation on **German** urban Case study can be found on the Webpage organized by the Federal Environmental Agency (UBA) in a database called *Tatenbank*[167] (in German).

As interesting cases city initiatives have been indicated in Essen, Jena, Karlruhe, Nürnberg, Regensburg, Dresden and Bocholt.

Among **Greek** regional authorities, initiatives have been taken with regards to sectorial climate adaptation strategies, mainly related to flood protection measures in coastal cities and regions (Thessaloniki, Heraklion)., The Strategic Plan for **Athens** and Attica 2011[168], has been published by the Organization for

[163] http://www.klimanetz.at/ in German, accessed on 31/05/2016
[164] http://www.future-cities.eu/project/pilot-projects-locations/ accessed on 31/05/2016
[165] http://www.agvespa.be/onze-kaaien/homepage, in Flemish, accessed on 31/05/2016,
[166] http://www.astra-project.org/02_estonia_tallin_paernu.html accessed on 09/05/2016
[167] http://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/werkzeuge-der-anpassung/tatenbank , in German, accessed on 09/05/2016
[168] http://www.organismosathinas.gr/userfiles/file/%CE%A1%CE%A3%CE%91%202021/Parousiasi%20RSA_2021_ENGLISH_VERSION.pdf accessed on 31/05/2016

the Master Plan and Environmental Protection of Athens. This plan also takes into account adaptation to climate change in specific sectors (spatial planning, environmental protection etc.).

In **Hungary**, several municipalities have developed local climate change strategies, this is the case of the 18 cities which are member of the Hungarian Network of climate-friendly cities (See above for networks), which have all started working on their local climate strategy. The following cities have adopted local climate change strategies: **Tatabánya**, **Hosszúhetény**, **Pomáz**, **Albertirsa**, **Eger**, **Szekszárd**, **Tata**, the XIIth district of **Budapest**, **Tata** and **Gyöngyös**. The Handbook for climate friendly cities (see above, handbooks and guidelines) illustrates some of these local initiatives.

In **Italy**, some cities are already implementing actions to face the impacts of climate change even without a specific national adaptation plan. The focus of urban adaptation actions has been mainly on hydrogeological risk, energy, urban planning, health, water resources. Actions rely mainly on soft measures, but some cases of grey and green measures are found (see the survey on urban adaptation capacity mentioned below) (Giordano et al. 2014, in Italian). Two central bodies have financing/promotion functions for local activities: a mission/office at Council of Ministers Presidency focusing on hydrogeological risk and the Civil Protection Department working together with the Health Ministry.

In **Latvia**, the capital city **Riga** has started activities for the assessment of risks and opportunities in the project "Integrated Strategy for Riga City to Adapt to the Hydrological Processes Intensified by Climate Change Phenomena"[169] co-financed by the Life + programme. The activity aims at identifying risks and strategies for protection with respect to hydrogeological risks. Furthermore, the municipality of the city Salacgrīva has adopted the Declaration on Green municipalities[170] and has also prepared its own Climate Change Adaptation Strategy under "BaltCICA" project.

Climate adaptation action in **Malta** have been focussed mainly measures addressing impacts from drought and water scarcity and on flooding. Measures considered include a national flood relief plan, preservation of river basin systems, fiscal incentives and economic measures like metering the use of ground water.

In the Netherlands, initiatives set in place by the city of Rotterdam with the Rotterdam adaptation strategy171 have been widely publicised. It aims at translating challenges from climate change into an opportunity for the city, adopting measures that create benefits and contribute to the economic and social development of the city. Further to this initiative, natural climate buffers have been used for mitigating climate impacts, for instance in the context of restoration of flood areas for river ("Room for the River") vegetation is used for maintaining soil humidity with positive impact on the local climate during heat waves. Examples for the use of ecosystem services (although not explicitly addressing urban adaptation issues) are:

- Water retention in sponge-forest Weerterbos, **Eindhoven/Weert;**
- Greening the **IJsselpoort**[172]**;**
- Water retention in Eelder and Peizen Made, **Groningen**[173]**.**

In a similar way the Room for the River Plan adopted in 2007[174] enhances flood security along the major Dutch rivers, reducing thus flood risks also for the urbanized areas.

In **Slovakia**, an urban flood protection system has been realized for the city of **Bratislava** designed for a return level of floods of 100years.

In **Spain**, local experiences with climate change adaptation have been made in **Playas de Palma** with a the Town Planning Consortium for the improvement and landscaping of Palma Beach, in the **Segura and Tagus river basin**, where urban water consumption is one of the issues to be addressed in relation to increasing

[169] http://www.rigapretpludiem.lv/eng/ accessed on 31/05/2016
[170] http://www.salacgriva.lv/eng/salacgrivas_novads/green_municipality/ accessed on 31/05/2016
[171] http://www.rotterdamclimateinitiative.nl/uk accessed on 31/05/2016
[172] http://www.klimaatbuffers.nl/g-a-green-ijsselpoort accessed on 31/05/2016
[173] http://www.klimaatbuffers.nl/g-peizer-and-eelder-maden accessed on 31/05/2016
[174] https://www.ruimtevoorderivier.nl/english/ accessed on 31/05/2016

phenomena of drought and water scarcity, and in the **Madrid** Gomeznarro park, where an example of Sustainable urban water management (SUDS) has been realized[175].

In **Sweden**, there are six municipalities acting as role-model-cities in the Making Cities Resilient Campaign: **Arvika**, **Göteborg**, **Jönköping**, **Karlstad, Kristianstad and Malmö**. Also the municipality of **Jokkmokk** is participating in the Swedish network.

In **Switzerland** the three major cities are engaged in coping with the challenges of climate change. **Zürich** has completed an analysis of its local climate and identified neighbourhoods which are most vulnerable to climate change in terms of air quality and heat[176]. The results will be considered in the city's further development. **Geneva** is developing a "Plan Climat" which aims to identify synergies between existing policy fields and mitigation as well as adaptation, and to provide a strategic tool for the canton's future development. **Basel** has analysed the impacts of climate change, identified adaptation measures and estimated their costs.

In **Turkey**, the municipality of **Bursa** benefitted from a capacity building project financed by the UK Foreign and Commonwealth Office's Prosperity Fund, aiming at the definition and implementation of a local adaptation plan.

In the **Uk**, several local initiatives have been developed, some examples from **Birmingham** and **Bristol**:

Birmingham City Council:

- **Birmingham Green Commission & Smart Commission -** Birmingham is supported by two Commissions - populated by non-city council experts from right across the economic and social spectrums; they have interpreted the impact and consequences of Birmingham's aim to become a leading global green city; to produce two inter-linked visions.
- **Birmingham Carbon Roadmap –** the visions from the Commissions have been articulated into a collective Carbon Roadmap that conveys the steps to be taken to reduce the carbon emissions by 60% for the whole city, by 2028; but more importantly across all areas of business;
- **5 Themed Roundtables -** actions are owned by five roundtables, covering Green Growth & behaviour, Buildings and efficiencies, Energy and resources, Transport and mobility and Natural Capital and adaptation. Each Roundtable is now populating action plans to deliver these goals, with complete integration between mitigation and adaptation, throughout.
- **The draft Birmingham Development Plan** - currently being examined through the Planning Inspector, but contains integrated actions to address climate change and adaptation.
- **A draft Supplementary Planning Document** is being prepared to serve as a sustainable development policy, with specific requirements for all development to address climate change and adaptation.
- **Birmingham Green Living Spaces Plan** – is based on the UK's first comprehensive ecosystem services assessment of the entire city's natural environment and how it serves the population-through multiple benefits. The Plan introduces 7 cross-cutting policies, enshrined in both the above draft plans - starting with An Adapted City, with additionally linking the City's Blue Network, A Healthy City, the City's Productive Landscapes, the City's Green Networks, the City's Ecosystem and the City's Green Living Spaces.

Bristol City Council:

- Bristol is a member of the global **Rockefeller Foundation 100 Resilient Cities network**, affording opportunities to learn from the best in the world on how to improve the city's resilience to shocks and stresses, including climate change.

[175] http://climate-adapt.eea.europa.eu/metadata/case-studies/the-refurbishment-of-gomeznarro-park-in-madrid-focused-on-storm-water-retention accessed on 31/05/2016
[176] https://www.stadt-zuerich.ch/gud/de/index/umwelt/umweltpolitik/klimaanalyse.html accessed on 31/05/2016 (available in German)

- **Bristol European Green Capital 2015** – In summer 2013 Bristol City Council was awarded the European Green Capital award for the year 2015. This offers a platform to the city as a pioneer of sustainability and local empowerment. Bristol's vision is to become a global leader in sustainable urban living and this includes a focus on future proofing Bristol city systems to ensure a secure food and energy supply, good public health and social and economic security.
- **Council Capital Projects** - key schemes include an Eco-Impact Assessment, which considers if the proposals are likely to affect emissions of greenhouse gases and the city's vulnerability to climate change.
- **Energy Infrastructure** - the European Investment Bank's European Local Energy Assistance programme awarded the Council £2.5million technical assistance grant to develop an energy efficiency and renewables investment programme in Bristol, with the potential of up to £140million investment. This will improve Bristol's energy security and continuity of supply, through reducing energy consumption and renewables energy generation.
- **Climate South West Highways Resilience Project** - the Council is working with other highways authorities in the region to develop a toolkit to help identify critical parts of the network and the impacts of different climate variables such as flood, heat and snow now and in the future.
- **Bristol Local Flood Risk Management Strategy** - actions include mapping existing groups, networks and agencies for engagement with communities, producing a programme of community engagement activities including flood plan development, and producing a community engagement activity to manage highway gullies and debris clearance.

3.6. Surveys on urban adaptation activities and monitoring

In **Belgium**, the Flemish Environment Agency (VMM) is developing a specific indicator for the urban heat island for the Flemish Region in Northern Belgium (Brouwers J. et al. 2015, in Flemish).

In 2010, the **Danish** information centre on climate change has carried out a survey study among Danish municipalities aiming at collecting information on the knowledge and experience among local authorities in terms of climate change adaptation. A result of this survey states that climate change adaptation is high on local policy agendas.

In **Germany**, a survey with questionnaires among local authorities has been performed in the region North Rhine-Westphalia; it was started in 2014, the website[177] describing the survey strategy provides also a pdf version of the questionnaire, but no results have so far been published.

In **Italy**, a survey on the status of urban adaptation in local authorities had been launched in 2014 by the Institute for Environmental Protection and Research (ISPRA), the national environment agency which has yielded about 40 completed questionnaires returned to the agency (Giordano et al. 2014, in Italian).

In 2013, the **Swedish** regional government offices were asked to investigate local adaptation work and to develop regional action plans. In 2014 Sweden had 21 regional action plans with nearly 800 proposed actions. The main actions proposed in the plans are flood protection, protection of drinking water, shoreline protection, infrastructure (roads, railways) adaptation of agriculture and forestry, heat waves and health. The plans include regional calls for national coordination, clear roles, responsibilities and funding, especially with respect to the existing built environment. The need of internal information and training to enable the integration of adaptation into planning processes is also highlighted. When adopting the climate and energy policy in 2009, the Swedish Parliament also decided on a "Control station" in 2015 to analyze developments in relation to the climate change objectives as well as the adaptation to a changing climate and the state of knowledge. The control station is not to cover the basic direction of politics but is to lead to adjustments of policies and instruments. SMHI was given the task in 2013 to coordinate the assessment and report to the government. The assessment has been on-going during the whole of 2014 and the report was handed in to the Government Office on 2015-02-27. The assessment includes recommendations to customize regulations, clarify roles and responsibilities, strategies and objectives. It will also highlight the

[177] http://www.plattform-klima.de/index.php?id=48 accessed on 31/05/2016, (in German)

need of clarification of how funding is distributed between different actors, and how to ensure resources for necessary actions. Further need for investigation is indicated to fill the need for knowledge of for example early warning systems and long-term monitoring of adaptation.

In **Turkey**, within Project "Capacity Building of Local Governments in the field of Climate Change", a stocktaking analysis, including the consideration of technical and administrative capacities of municipalities will be performed.

In the **UK**, the local Government Agency publishes annual progress reports on the work councils are doing to tackle climate change. In autumn 2014, the UK's Adaptation Sub-Committee of the Committee on Climate Change commissioned a survey of local council work on resilience. This survey includes a sample of 90 local authorities considered to be at high risk from flooding, surface water and coastal erosion. For these councils, independent consultants conducted a web-based analysis of the strategies/plans held on their websites and the extent by which these documents account for climate risk both now and in the future.

The UK's National Adaptation Programme Cities Commitment contains an action on the part of the Core Cities Group, London Councils and the Greater London Authority to promote adaptation action within the councils of England's largest cities. The relationship with the London Councils network has been difficult due to resource restraints, but DEFRA is currently endeavouring to rebuild this relationship. In terms of the Commitment itself, the key task of government, primarily DEFRA, is to provide a supporting policy framework for other partners.

4. References

ADEME, 2013a. *Assessing regional climate change vulnerability. Compendium of international experiences.*, Angers (F): Agence de l'Environnement e de la Maitrise del'Energie (ADEME). Available at: http://multimedia.ademe.fr/catalogues/Guides_adaptation_au_changement_climatique/uk/catalogues/recueil1/appli.htm [Accessed May 19, 2016].

ADEME, 2013b. *Elaboration and implementation of a local adaptation strategy or action plan*, Angers (F): Agence de l'Environnement e de la Maitrise del'Energie (ADEME). Available at: http://multimedia.ademe.fr/catalogues/Guides_adaptation_au_changement_climatique/uk/catalogues/recueil1/appli.htm [Accessed May 19, 2016].

ADEME, 2013c. *Monitoring and evaluating climate change adaptation at local and regional levels. Learning from international experience to develop an M&E methodology*, Angers (F). Available at: http://multimedia.ademe.fr/catalogues/Guides_adaptation_au_changement_climatique/uk/catalogues/recueil3/appli.htm [Accessed May 19, 2016].

Anon, Regional Climate Offices of the Helmholtz Association. Available at: http://www.klimabuero.de/index_en.html [Accessed April 29, 2015].

Brouwers J. et al., 2015. *MIRA Klimaatrapport 2015, over waargenomen en toekomstige klimaatveranderingen.*, Alst, (B): Vlaamse Milieumaatschappij i.s.m. KU Leuven, VITO and KMI. Available at: http://www.milieurapport.be/Upload/main/0_Klimaatrapport/342195_Klimaatrapport%20toegankelijk.pdf [Accessed June 21, 2016].

Bundesministerium für Bildung und Forschung, 2016. BMBF-Klimzug: About KLIMZUG. Available at: http://www.klimzug.de/en/160.php [Accessed April 29, 2015].

Department for Environment and Rural Affairs, 2014. Map of agreed Flood Risk Areas in England and Wales. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307085/FRMPs_Flood_Risk_Areas.pdf [Accessed June 21, 2016].

EEA, 2014. *National adaptation policy processes in European countries — 2014*, European Environment Agency. Available at: http://www.eea.europa.eu/publications/national-adaptation-policy-processes.

EEA, 2016. *Urban adaptation to climate change in Europe 2016: Transforming cities in a changing climate*, Available at: http://www.eea.europa.eu/publications/urbanadaptation-2016.

Feiner, G. et al., 2012. *Gesund in den Klimawandel? So steigern Sie Abwehrkräfte in Ihrer Gemeinde! Mit Therapievorschlägen und erwünschten Nebenwirkungen*, Vienna, Austria: SERI Nachhaltigkeitsforschungs und -kommunikations GmbH. Available at: http://www.klimanetz.at/wp-content/uploads/2012/08/KlimaNetz_Gesund-in-den-Klimawandel_Handbuch_web.pdf.

García, A.M. et al. eds., 2012. *facts! Forms for Adapting to Climate chagne through Territorial Strategies. The Handbook*, Spain: F:ACTS! consortium. Available at: http://www.factsproject.eu/SiteCollectionDocuments/Handbook/HandbookDEF.pdf.

Giordano, F. et al., 2014. Adattamento ai Cambiamenti Climatici nelle Città Italiane: Risultati del Questionario ISPRA. In *Focus sulle città e la sfida dei cambiamenti climatici*. Rome, Italy: ISPRA — Istituto Superiore per la Protezione e la Ricerca Ambientale.

Hammer, S. et al., 2014. *Romania - Climate change and low carbon green growth program : urban sector rapid assessment - component B sector report.*, Washington D.C.: World Bank Group. Available at: http://documents.worldbank.org/curated/en/2014/01/18869282/romania-climate-change-low-carbon-green-growth-program-component-b-sector-report-urban-sector-rapid-assessment.

IHOBE, 2011. *Guía para la elaboración de Programas Municipales de adaptación al Cambio Climático*, Bilbao (E): Sociedad Pública de Gestión Ambiental (Eusko Jaurlaritza - Gobierno Vasco, IHOBE). Available at: http://www.udalsarea21.net/Publicaciones/ficha.a

spx?IdMenu=892e375d-03bd-44a5-a281-f37a7cbf95dc&Cod=1bf8d3dc-3d9a-43e1-a50f-ebc7150feedd&Idioma=es-ES&Tipo=.

Kabat, P. et al., 2005. Climate proofing the Netherlands. *Nature*, 438(7066), pp.283–284.

Klimaat Adaptatie Services, Climate Adaptation Atlas. Available at: http://www.climateadaptationservices.com/en/klimaateffectatlas [Accessed May 22, 2015].

Land Oberrösterreich, 2013. Oö. Klimawandel Anpassungsstrategie. Available at: http://www2.land-oberoesterreich.gv.at/internetpub/InternetPubPublikationDetail.jsp?SessionID=SID-4C2FA64C-F9CDE56C&xmlid=Seiten%2F111202.htm&pbNr=300156&dest=ooe [Accessed June 15, 2016].

Lorenz, S. et al., 2015. *Adaptation planning and the use of climate change projections in Local Government in England and Germany*, Leeds, UK: Sustainability Research Institute, Univ. of Leeds, Centre for Climate Change Economics and Policy (CCCEP). Available at: http://www.cccep.ac.uk/Publications/Working-papers/Papers/220-229/WP-226---Lorenz-et-al.pdf [Accessed September 23, 2015].

Marletto, V. et al., 2012. *Climate change planning for regional and local authorities.*, Bologna: Arpa Emilia-Romagna. Available at: http://www.enercitee.eu/Sub-Projects/CLIPART---Climatic-Planning-and-Reviewing-Tools-for-regions-and-local-authorities,58/.

MeteoSwiss, 2012. *Klimaszenarien Schweiz - eine regionale Übersicht.*,

Minister for Environment, Community and Local Govenrment, Republic of Ireland, 2012. Building Resilience to Climate Change: National Climate Change Adaptation Framework. Available at: www.environ.ie/en/Publications/Environment/ClimateChange/FileDownLoad,32076,en.pdf [Accessed June 14, 2016].

Ministère du Développement Durable, 2011. The national climate change adaptation plan. Available at: http://www.developpement-durable.gouv.fr/The-national-climate-change.html [Accessed April 18, 2015].

Ministerie van Infrastructuur en Milieu, 2015a. Background to the Delta Programme - Delta Programme - Delta Commissioner. Available at: http://english.deltacommissaris.nl/delta-programme/contents/background-to-the-delta-programme [Accessed April 14, 2016].

Ministerie van Infrastructuur en Milieu, 2015b. Kennisportaal Ruimtelijke Adaptatie. Available at: http://www.ruimtelijkeadaptatie.nl/en/over-ons [Accessed May 22, 2015].

Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Repubblica Italiana, 2015. Strategia Nazionale di Adattamento ai Cambiamenti Climatici. Available at: http://www.minambiente.it/pagina/adattamento-ai-cambiamenti-climatici-0 [Accessed June 14, 2016].

Ministry of Agriculture and Forestry, 2014. Finland's National Climate Change Adaptation Plan 2022. Available at: http://mmm.fi/documents/1410837/1888935/MMM-%23193086-v1-Finland_s_National_climate_Change_Adaptation_Plan_2022.pdf/c2bfec7b-ae73-4247-b666-26a3ed363f99 [Accessed April 13, 2016].

Minstry of Interior, 2011. *Climate-Friendly-Cities. - A Handbook on the Tasks and Possibilities of European Cities in Relation to Climate Change*, Budapest: Minstry of Interior, Hungary - VÁTI (Minstry of Interior, Hungary - VÁTI Hungarian Nonprofit Ltd. for Regional Development and Town Planning. Available at: http://www.vati.hu/index.php?article=21857&langcode=hu&menu=21226 [Accessed May 19, 2016].

Moons, A. et al., 2013. Manifest Klimaatbetstendige Stad. Available at: http://www.ruimtelijkeadaptatie.nl/l/library/download/urn:uuid:66e21a25-2a2e-4673-a61e-b6a5581ca183/manifest+klimaatbestendige+stad.pdf?format=save_to_disk&ext=.pdf.

Norwegian Ministry of Climate and Environment, 2013. *Climate change adaptation in Norway. Recommendation of 7. May 2013 from the Ministry of the Environment, approved in the Council of State the same day. (White paper from the Stoltenberg II Government)*, Oslo: Translation from Norwegian. For information only. Available at: https://www.regjeringen.no/contentassets/e5e7872303544ae38bdbdc82aa0446d8/en-gb/pdfs/stm201220130033000engpdfs.pdf [Accessed June 21, 2016].

ONERC, 2011. *Plan national d'adaptation de la France aux effets du changement climatique 2011*

- *2015*, Paris, France: Observatoire National sur les Effets du Réchauffement Climatique (ONERC). Available at: http://www.developpement-durable.gouv.fr/IMG/pdf/ONERC-PNACC-complet.pdf.

Peleikis, J., 2011. *Climate Change Adaptation in the Baltic States. Current Developments on National Adaptation Strategies.*, Hamburg: Baltic Environmental Forum (BEF). Available at: www.bef-de.org/ fileadmin/ files/ Publications/ Energy/ activity1_paper_adaptation-to-climate-change_final.pdf.

Province de Liège, 2015. Plan Climat | Province de Liège. Available at: http://www.provincedeliege.be/fr/node/8896 [Accessed August 19, 2015].

Prutsch, A., Glas, et al., 2014. *Klimawandel findet statt. Anpassung ist nötig. Ein Leitfaden zur erfolgreichen Kommunikation*, Wien: Umweltbundesamt. Available at: http://www.klimawandelanpassung.at/fileadmin/inhalte/kwa/pdfs/cctalk_strategie_Druckversion.pdf.

Prutsch, A., Felderer, A., et al., 2014. *Methods and Tools for Adaptation to Climate Change. A Handbook for Provinces, Regions and Cities.*, Vienna, Austria: Environment Agency Austria. Available at: http://www.klimawandelanpassung.at/fileadmin/inhalte/kwa/pdfs/HANDBUCH_EN.pdf.

Red Española de Ciudades por el Clima, *Estrategia Local de Cambio Climático.*, Madrid, Spain: Red Española de Ciudades por el Clima, Ministerio de Medio Ambiente, NOVOTEC. Available at: http://www.redciudadesclima.es/files/documentacion/6e89324d2176154e9bccfa7d495ba026.pdf.

Ricardo-AEA, 2015. Turkey publishes Ricardo-AEA prepared "Cities Adaptation Support Package" - Ricardo. Available at: http://www.ricardo.com/en-GB/News--Media/Press-releases/News-releases1/2014/Turkey-publishes-Ricardo-AEA-prepared-Cities-Adaptation-Support-Package/ [Accessed May 2, 2015].

Schweizerische Eidgenossenschaft, 2014. *Anpassung an den Klimawandel in der Schweiz. Aktionsplan 2014–2019. Zweiter Teil der Strategie des Bundesrates vom 9. April 2014*, Bern, Switzerland: Bundesamt für Umwelt (BAFU). Available at: http://www.bafu.admin.ch/publikationen/publikation/01762/index.html?lang=de&download=NHzLpZig7t,lnp6I0NTU042l2Z6ln1acy4Zn4Z2qZpnO2Yuq2Z6gpJCHd4B2gGym162dpYbUzd,Gpd6emK2Oz9aGodetmqaN19XI2IdvoaCVZ,s-.pdf [Accessed April 17, 2015].

SKL, 2015. Klimatanpassning i den fysiska planeringen - SKL. Available at: http://skl.se/klimatanpassning [Accessed May 19, 2015].

UDALSAREA21, 2012. *Manual de Planeamiento Urbanístico en Euskadi para la mitigación y adaptación al cambio climático*, Bilbao (E). Available at: http://www.udalsarea21.net/Publicaciones/Ficha.aspx?IdMenu=892e375d-03bd-44a5-a281-f37a7cbf95dc&Cod=e9dcf80c-d20d-4193-9b6a-d494e08fefb8&Idioma=es-ES&IdGrupo=PUB&IdAno=2012&IdTitulo=020 [Accessed August 17, 2015].

UKCIP, 2011. *Planning to adapt to climate change in the new policy landscape: UKCIP internal working paper,* Oxford, United Kingdom: UK Climate Impacts Programme (UKCIP).

European Topic Centre on Climate Change Impacts,
Vulnerability and Adaptation
C/o Fondazione Centro Euro-Mediterraneo
sui Cambiamenti Climatici (CMCC)
Via M. Franceschini 31, 40128 Bologna, Italy
Phone: +39 051 4151411, int. 277
E-mail: silvia.medri@cmcc.it
Website: http://www.cmcc.it/

The European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA) is a consortium of European institutes under contract of the European Environment Agency.

European Environment Agency
European Topic Centre on Climate Change
Impacts, Vulnerability and Adaptation