



Appendix 4: Review of adaptation strategies

Adaptation Strategies for European Cities: Final Report

This is part of the Final Report of the project "Adaptation Strategies for European Cities" which has been compiled by Ricardo-AEA for the European Commission Directorate General Climate Action



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Adaptation strategies in early mover cities - Technical Report

Prepared by adelphi

Aim / purpose of the sub-task

The aim of this sub-task is to undertake a more detailed assessment of information on adaptation at the city level in Europe by analysing adaptation strategies from early mover cities. The guiding question for this task is: “What is the state-of-the-art regarding the development of urban adaptation strategies?” Hence, the general aim of this task is to carve out different approaches for developing a strategy as well as typical structures and components regarding procedural stages taken and topics that are recurring in different types of strategies.

One of the key outputs for this task is a two-page factsheet for each selected case study highlighting issues that will be of interest to other cities in Europe as they seek to develop their own adaptation strategies. Thereby this sub-task also serves to contribute to a stable and up-to-date knowledge base for the development of training materials and consultations with municipalities within the project.

Concept and approach taken (methodology, including justification for decisions)

For the purpose of this task, “early mover cities” are defined as cities who already have an adaptation strategy in place or are in an advanced stage of its development and are considered forerunners in urban adaptation by experts and stakeholders within the adaptation community. “Adaptation strategy” is defined as a dedicated document of a municipality that sets out steps to be undertaken for dealing with the impacts of climate change in said municipality. It can include mitigation aspects and should be public and in writing. Due to the definition of early mover cities, draft documents were also included in the desk-based review.

Compiling a long list of early movers

adelphi compiled a long list of 20 early mover cities using the following criteria:

- Appropriate geographic spread (i.e. as a minimum, coverage of north, south, west and eastern European cities and, where relevant, internationally);
- Coverage of key climate impacts and vulnerabilities: e.g. extreme events (heat waves, heavy precipitation, storms) or sea-level rise
- Diversity of approaches (e.g. format, structure and design of the strategy);
- Pragmatic considerations (e.g. the context that the strategy is relevant to a range of European cities, even if it originates out with Europe, comprehensiveness, innovative approach);
- Good practice (i.e. presence of lessons relevant to the purpose of the task)

The compilation was created using different sources:

- Published grey literature such as
 - ETC/ACC – European Topic Centre for Air and Climate Change (2010) Urban Regions: Vulnerabilities, Vulnerability Assessments by Indicators and Adaptation Options for Climate Change Impacts. ETC/ACC Technical Paper 2010/12, 208 pp.

- Ecologic Institute, Berlin/Vienna; AEA group; ICLEI - Local Governments for Sustainability; European Secretariat Regional Environmental Center for Central and Eastern Europe (REC) (2011): Adaptation to Climate Change. Policy instruments for adaptation to climate change in big European cities and metropolitan areas: European Union Committee of the Regions. 289 pp.
- Online web searches using different search engines and combinations of the following keywords: adaptation, climate, change, strategy, plan, program, programme, concept, urban, city; searches were conducted in seven different EU languages;
- Online platforms such as
 - <http://cigrasp.pik-potsdam.de>
 - <http://www.stadtklimalotse.net>
 - <http://www.prepared-fp7.eu>
 - <http://www.grabs-eu.org>
 - <http://infobase.circle-era.eu>
- Input from project partners, especially the ICLEI network;
- adelphi's contacts to municipalities;
- The project proposal;

While numerous early mover cities regarding adaptation could be identified, only a few of them had already published adaptation strategies or comparable documents. Others are currently developing or finalising adaptation strategies or are participating in projects that are concerned with singular adaptation measure but not with overarching strategies.

Please note that different criteria can be competing, e.g. a strategy can be rather comprehensive and very innovative but not stem from a city within EU-27. Therefore, sometimes there was a need to strike an appropriate balance between the criteria.

Short listing process

Bearing in mind that only a limited number of cities have produced and published adaptation strategies or are in an advanced stage of development, the following criteria were applied to compile a short list of eight case studies for further analysis (order of list reflects hierarchy of criteria):

- Selected strategies have high information density and high transparency;
 - Procedural stages taken to develop the strategy are described;
 - Measures and next steps for implementation are disclosed;
 - Responsibilities and preferably time horizon are addressed;
 - Details on impact, vulnerability or risk assessment are provided
- Overall selection of strategies is diverse;
 - Wide coverage of EU Member States;
 - Range of locally relevant impacts;
 - Differing city sizes (number of inhabitants);
 - Geographic location;
- Selected strategies have high level of political buy-in

Due to the requirement of reviewing eight case studies as well as providing wide geographical coverage, no more than one early mover study per country could be considered for the analysis. The criteria were applied to the items in the long list by the adelphi project team, resulting in a short list

of eight strategies suggested for review. The list was supplemented by four more strategies that were close to being short listed and thus could be potential alternatives to the items in the short list, which was then reviewed by the Commission. The following eight cities were selected for analysis: Copenhagen (DNK), Kalamaria (GRC), London (GBR), Malmö (SWE), Rotterdam (NLD), Schmallenberg (DEU) and the two non-EU cities Melbourne (AUS) and Santa Cruz (USA). The latter two strategies were selected because they each displayed characteristics that could not be found to this extent in strategies from the EU-27 (Melbourne: very well structured scientific approach; Santa Cruz: very high transparency and information density regarding development and implementation of the strategy). Rotterdam is the only city of the selected eight case studies that has not published an adaptation strategy but is very active with regards to climate change adaptation and in the state of finalising the “Rotterdam Adaptation Strategy”.

Analysis of strategies and compilation of fact sheets

Bearing in mind the level of available information and the constraints of a two-page fact sheet, the following aspects were examined in each strategy:

- Key climate change impacts
- Structure and content
- Partners and stakeholders involved in the process
- Procedural stages followed
- Evidence base
- Identified actions and responsibilities for implementation

Each resulting case study provides the document title, year of publication, number of pages and link at the top of the fact sheet. A photo as well as a short introduction to the city and the context of strategy development are also included.

In the case of Rotterdam, a document of the Rotterdam Climate Adaptation Programme “Climate Proof”, relevant official websites and information provided by the Programme Manager of Climate Proof were used to complement the fact sheet.

Findings from the analysis (results)

General approach

The majority of the eight selected early mover cities has produced stand-alone adaptation strategies (London, Rotterdam, Malmö, Melbourne) or adaptation (action) plans (Copenhagen, Kalamaria, Santa Cruz), whereas the municipality of Schmallenberg has developed an integrated mitigation and adaptation concept. For reasons of practicality all the documents are referred to as “adaptation strategies”. Within the group of early movers a **multitude of approaches** to the development of such a document can be observed. Adaptation strategies on city level are diverse and vary in terms of their thematic focus, format, layout, design, page length or impetus each aiming to fulfil the strategic purpose that was chosen for the document.

Usually, adaptation strategies take the shape of reports but vary in design and page length. Kalamaria and Malmö, for example, have produced short(er) documents. They have developed their strategies within the Interreg IV C GRaBs project – and in the case of Malmö the document specifically targets local politicians and municipal authorities. Schmallenberg geared the contents of its strategy towards external requirements as it served as an entry to a public competition for

winning the title of “climate(conscious)municipality”. Some cities emphasised the foundation for their strategy and pursued a distinct scientific approach (London, Copenhagen, Melbourne, Santa Cruz) which resulted in more extensive documents.

All of the strategies were produced by the individual cities usually assigning the development process to an internal sustainability or adaptation team and were embed in the cities’ general sustainability efforts. Rotterdam’s approach rests on the three pillars knowledge, actions and marketing. Although the adaptations strategy still has to be finalised the city is already implementing adaptation measures and draws on findings from substantial research that has been conducted over the last years.

Procedural stages followed

All of the selected early mover cities involve a wide range of **stakeholders** in the development process, such as relevant city authorities and departments (mainly urban planning, economic development and environment) and representatives of public health, community or fire services, private companies including banks or insurance companies and representatives from energy, water and transport sectors, research institutes and citizens’ organisations and NGOs. Most strategies provide information on the **procedural stages** that were followed during the development of the document. However, some keep this section fairly short or refer to brief information in the appendix (Copenhagen, Malmö, Melbourne), others describe the development process more prominently and transparently (Schmallenberg, Kalamaria, Santa Cruz). Santa Cruz, for example, describes the whole process from the formation of an adaptation team, the preparation of a vulnerability study, formulation of potential actions and timelines to the decision of the adaptation team on adaptation actions and the development of a draft strategy. Within the document a full list of meetings and dates is provided highlighting the transparency of the chosen approach.

The consultation and involvement of stakeholders generally starts early in the process, encompasses regular meetings or workshops and plays a major role regarding the development of the evidence base and/or prioritisation of risks and actions. The development process in Rotterdam is characterised by several multi-level meetings. The core team of Rotterdam Climate Proof meets twice a month and regular meetings are held within the national Knowledge for Climate Programme with national and city representatives as well as knowledge institutes. Twice a year, the Rotterdam Climate Proof Recommendations Committee meets with representatives from the city, water boards, research institutions and the economic sector.

Also particularly noteworthy are the following participatory approaches: Kalamaria included input from the wider public by conducting a web-poll and organising a social network with meetings of local community stakeholders (unions). London created a web-platform for Londoners to upload ideas and cast their votes on which paths to pursue. Santa Cruz placed an initial list of prioritised actions on the city’s website along with a mechanism for the community to respond to them.

Aims and objectives of city-level adaptation strategies

Among city-level adaptation strategies, a number of common themes for adaptation objectives are emerging. The overarching objective of developed adaptation strategies is the improvement of each individual city’s **ability to cope** with climate change and the challenges at local level. The strategies provide a knowledge base regarding potential climate change impacts, hazards and risks and enable the identification of adequate adaptation options.

The second main objective is to **protect and increase the quality of life** and hereby enhance the city’s attractiveness for its citizens. In this context, it is recognised that adaptation to future climate change leads to better living conditions in the long run and the majority of early mover cities

emphasises the ambition to promote urban sustainability (London, Copenhagen, Malmö, Schmallingenberg, Rotterdam, Santa Cruz).

There also is a clear tendency towards dealing with the consequences of climate change in a proactive way by turning climate challenges into opportunities. The aim is to keep (future) expenses down while improving the current situation. This is in line with the third major objective that could be identified in the analysis: the creation of **positive effects for the local economy** and the attraction of (international) investment.

Some cities deliberately intend to act as regional/national (Schmallingenberg, Kalamaria) or international pioneers and offer to export their knowledge, expertise and, if applicable, technology to other cities (Copenhagen, London, Rotterdam, Santa Cruz).

Key climate change impacts

All cities have identified several climate change impacts that are addressed within their strategy. Extreme **precipitation and flash flooding** are key concerns on city level and are covered by all of the eight early mover adaptation strategies. Not surprisingly, all cities located on the coast (seven) consider sea-level rise as key climate change impacts. Heat waves, drought and river floods are covered by six strategies. Extreme wind events are considered by only three, bushfires by two strategies. The reason for the latter seems to be previous experience with such events.

A few cities specifically consider the impacts on **economic sectors** of local importance, such as forestry and/or tourism (Schmallingenberg, Santa Cruz) or **cross-cutting issues**, e.g. human health, state of the environment, general economy and infrastructure (London). Other indirect impacts like groundwater formation and quality, coastal or general soil erosion, the spread of vector borne diseases, loss of biodiversity are only marginally covered (Kalamaria, Santa Cruz, Copenhagen).

Common components with regard to content and structure

As there is no single approach to the development of adaptation strategies, the individual documents also differ regarding content and structure. However, some common themes can be identified.

General aims and objectives regarding the strategies are generally disclosed in an introductory part or executive summary. Some cities provide a political statement by the mayor to underline the importance of adaptation at the beginning of the document and/or devote a separate chapter to the description of aims and objectives (Copenhagen, London, Kalamaria, Santa Cruz).

One major component of urban adaptation strategies is the development of an **evidence base** usually providing general information regarding climate change, (local) climate change projections on the basis of different emission scenarios and a risk or vulnerability assessment. Some cities keep this section relatively short and refer to or summarise external studies and reports (Schmallingenberg, Kalamaria, Malmö, Santa Cruz); others present this section very prominently (Copenhagen, London, Melbourne). Climate change projections are often presented for 2070 and 2100 and some cities present projections for 2030 (Melbourne), 2020 and 2050 (London) or 2060 (Copenhagen). Some cities provide an analysis of their urban system's status quo and enclose population, demographic and economic data (Schmallingenberg, Kalamaria) or focus on important economic sectors (London, Melbourne). In the case of Melbourne, for each climate change impact "cascading consequence diagrams" highlight complex consequences within the urban system. The **assessment of risks** is partly done through SWOT (Strengths-Weaknesses-Opportunities-Threats) or comprehensive risk analyses and modelling approaches – as is the case for Copenhagen, London and Melbourne – where risk is determined by the probability of an event happening and the consequence. Melbourne assigned a rating of 1-5 for each of the two indicators and critical risks were deemed those with a

combined rating of seven or more. London's approach does constitute a risk rating but is characterised by an explicit assessment of adaptation gaps for each climate impact and the connected risks. The issue of costs is incorporated in Copenhagen's approach of risk assessment, where risk is the probability of an event happening times the costs of the event.

The major common component is the identification of **adaptation actions**, which are most commonly presented in one or several tables. They cover a wide range of activities, among them:

- individual constructions measures, e.g. flood barriers, improvement of the drainage system;
- the promotion of several research projects to improving knowledge of city staff;
- the development of specific risk management or heat-wave plans to a change in certain (planning) standards;
- more public communications efforts or the strategic use of green and blue infrastructure (green spaces and water bodies).

Regarding the latter, sustainable storm water use, the increase of tree cover and park/green spaces and the application of a green space factor in all planning are emphasised. The presentation of such identified actions is often combined with details on **implementation** or assigned **responsibilities** (London, Kalamaria, Malmö, Santa Cruz) and/or the provision of a clear timeline until respective actions are to be implemented (Copenhagen, London, Rotterdam, Santa Cruz). Usually, the identified adaptation **actions are prioritised**. Some cities define strategic/lead projects in addition to actions (Schmallenberg, Rotterdam) or group adaptation actions according to certain levels of priority (Copenhagen, Santa Cruz, Melbourne). Regarding the prioritisation of adaptation actions, only Copenhagen has chosen and applied a cost-benefit approach. The City of Santa Cruz emphasises that it has carried out a "low-level review of potential costs and benefits" to classify actions and will pursue in-depth studies in the future. Malmö and London also plan to carry out cost-benefit analyses but will concentrate on specific aspects such as eco-system services or, as is the case for London, flooding. Interesting regarding the presentation of adaptation actions are the following two examples: Melbourne differentiates between short-, medium- and long-term adaptation measures and Malmö categorises actions as relevant for the city, district and neighbourhood level. With respect to **monitoring**, all cities emphasise that their strategies will be revised "regularly". If details on review and evaluation cycles are specified, they often range between three and five years. However, this issue is rarely covered in a stand-alone chapter (except for Kalamaria and Santa Cruz).

Conclusions

There is a variety of approaches towards the development process and the final outcome, i.e. design/layout of the strategy. Some strategies, like Melbourne's, set the focus on a very scientific and profound evidence base, whereas Kalamaria's or Schmallenberg's, for example, concentrate on local stakeholder and public participation providing a description of steps that were taken during the development process. Other cities have chosen approaches somewhere along the continuous scale in between these approaches, some can be very brief with a focussed structure targeting local politicians. Each document serves the individual purpose it is designed for. Therefore, when developing an adaptation strategy it is imperative that a clear aim (or aims) for the purpose of the strategy has been formulated. With regards to general aims of strategies analysed in the sub-task it can be stated that adaptation to climate change can be a lever for protecting and/or increasing the quality of life. Also, the local economy can not only benefit from potential greater investment but

cities can also export their knowledge and technology to others. Ideally, the adaptation efforts and strategy are embedded in a general urban sustainability approach.

Due to the multitude of approaches there also is a variety of structures and components of adaptation strategies. However, regarding structure, content and procedural stages the following conclusions can be drawn:

- Policy statements or general aims and objectives at the beginning of the document set a clear focus of the strategy and demonstrate a high level of political buy-in, thus enhancing awareness and acceptance within the city administration and the public, respectively.
- Stakeholder involvement and participation early on in the process assists in shaping the evidence base and defining adaptation actions. It is important to not only include relevant municipal and public institutions but also research institutions, representatives from the private sector and NGOs to increase the document's integrity.
- Observations from the analysis indicate that the bigger the metropolitan area and the more stakeholders and research institutions were involved, the more profound and detailed was the resulting evidence base for the strategy. Many times, vulnerability assessments were conducted by research institutions on behalf of city authorities and results presented in the strategy. Sometimes, more complex risk approaches were chosen and risk ratings were applied. Smaller cities were less likely to carry out comprehensive vulnerability assessments but referred more often to existing (national) studies and often perform SWOT-analyses (Strengths-Weaknesses-Opportunities-Threats).
- Approaches in public participation help creating a general level of acceptance and awareness within the municipality. Usually, the draft documents or draft lists of adaptation measures were published for (public) consultation and finalised according to the received input. Sometimes, this was achieved by uploading them to the internet or direct participation of local community representatives (unions, citizens' organisations) in meetings. The latter approach is more likely to be chosen by smaller cities.
- The key impacts considered in adaptation strategies were dominated by flooding issues: sea-level rise, extreme precipitation and flash flooding, drought, heat waves and river floods. Storm events and bush/forest fires are usually covered by those cities that had already experienced such events in the past. However, indirect impacts on water quality, human health or biodiversity etc. should not necessarily be neglected.
- Adaptation actions were usually presented in a list or table at the end of document. Sometimes, actions were assigned different levels of priority or labelled important for short and long-term, respectively. A clear allocation of responsibilities (relevant city departments; stakeholders at the city, district and neighbourhood level) and timelines facilitates the implementation as well as the process of monitoring. However, the latter two aspects do not seem very prominent among the selected early mover cities.
- Cost-benefit analyses of adaptation actions were rarely conducted and included in the strategies. Reasons could be the complexity of such an analysis and/or the lack of reliable data.

- Adaptation actions are diverse and, not surprisingly, vary among the eight early mover cities. However, three general clusters regarding adaptation actions could be identified: research and increase of knowledge, public communication and awareness raising, urban planning (including construction measures, change of standards/procedures or the preparation of other strategies and plans, e.g. heat wave plan). Regarding urban planning, there seems to be a consensus that the protection, modification and increase of green and blue infrastructures have great potential to reduce multiple risks.

In general, research for this sub-task shows that most adaptation strategies have only been published recently and few have been implemented beyond first steps and it seems, at this stage, that central, northern and north-western Europe are most advanced in the process of adaptation strategy development. Moreover, coastal cities seem to be more likely to have an adaptation strategy. Their location and the immediate affectedness by sea-level rise might create a greater awareness and lead to active engagement with the issues climate change and adaptation. However, the cities' national or international (economic) importance and the participation in EU-funded projects (e.g. GRaBs) or city networks (e.g. ICLEI or Climate Alliance) are other important factors for early action. Therefore, both the EU and city networks play an important role regarding the exchange of knowledge and experience on climate change adaptation.