



European
Commission

Climate adaptation of major projects

A stock-taking of available
resources to assist the
development of climate
resilient infrastructure

Case studies brochure

*Regional and
Urban Policy*

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The Directorate General for Regional and Urban Policy commissioned a study to mapping the information availability for climate change adaptation in the 28 Member States that could facilitate the climate change adaptation at project level (mostly for major projects) in 2014-2020 funding from the European Structural and Investment Funds (ESIF). The study covers the year 2017 and examines the availability of seven study criteria: data availability, guidance, methodologies, tools, design standards, system and legal framework, and institutional capacity. It covers the transport, broadband, urban development, energy, water and waste sectors. The study's final report includes a general and a country-specific part with project examples for each Member State. The study provides a stock-taking of resources available for all Member States with regards to applying the climate change adaptation requirements of the 2014-2020 programming period.

This brochure presents a diverse set of case studies to demonstrate the wide variety in climate change adaptation projects and approaches to integrate climate change in project preparation.

The featured case studies are replicable, innovative, and present significant added value, and they offer examples of varying methodologies, of innovative adaptation measures, of stakeholder involvement, and of inclusion of climate change adaptation into projects at varying stages of its development. Additionally, over 60 case studies are found in the final report and its accompanying country reports.

The selection does not reflect a quality assessment, but merely ensures a geographical spread and a variety of case studies.

The present examples of climate adaptation practice are categorised based on the observed best practices according to the seven study criteria: data availability, guidance, methodologies, tools, design standards, system and legal framework, and institutional capacity.

The Study 'Climate change adaptation of major infrastructure projects' is found at the website of DG REGIO: https://ec.europa.eu/regional_policy/en/information/publications/studies/2018/climate-change-adaptation-of-major-infrastructure-projects



Data Availability

Urb-ADAPT (Ireland)

A project that seeks to identify the impact of climate change on Dublin City and the surroundings. It involves carrying out climate modelling of temperature, coastal inundation and flash flooding out to 2060. The project aims to identify possible risks to the population living in the Greater Dublin Region and future risks posed under a changing climate for future populations. The present project poses the fundamental question: What data do we need to start planning for adaptation in urban areas?

Urb-ADAPT will support decision-makers within the transport sector by providing enhanced accuracy in discerning likely areas of vulnerability to pluvial events and coastal flooding and to outline their response capacity accordingly.

Learn more about the Urb-ADAPT project at: www.urbadapt.com

Smart City Project: Cloud-based Flood Prevention and Monitoring System (Estonia)

Storms and floods are two of the three major natural threats to Europe, and institutions are asking to invest in risk reduction policies to adapt to the ongoing climate change. The [Flood](#) technology is based on the employment of ultra-low-cost environmental monitoring devices designed to enable, through a cloud-based data collection mechanism, extensive and real-time monitoring of the status of floods in urban areas, towards increasing the understanding of these phenomena, as

well as providing an effective tool for issuing early warnings to the population and improve existing prediction models. The proposed early detection solution is aimed at creating a shift from just dealing with the consequences of a flood towards increasing the time to prepare for a flood and thus reducing the consequential (in)direct costs. This could result in saved lives and decreased damage to land and property, but also introduce a novel tool for Insurance and Risk Assessment, improved best practices for flood protection equipment providers and rescue services.

More information at www.flydogmarine.com/products/smart-city

Methodologies

New Ringway Utrecht (the Netherlands)

The Ring Utrecht is the hub of the Dutch motorway network and important for the accessibility of the region. Without measures, the flow of traffic and the quality of the environment will decrease in the future. The approach has a dual objective: to improve traffic flow and road safety around Utrecht and to keep the quality of the living environment equivalent and where possible improve. During the feasibility studies for the new ringway Utrecht, the project team considered whether climate change impacts were a differentiating factor for choosing the exact location of the new road. During the planning process, climate adaptation was further investigated, including an exposure analysis using climate scenarios.



This resulted in the integration of adaptation measures, namely increased water buffering, in the project proposal ('most environment-friendly alternative'). The approach followed in this pilot project will be used in other road development projects by Rijkswaterstaat. The method has been documented and can be replicated.

Further info at the website of [Ring Utrecht: adapt to climate change](#)

Identification of flood-sensitive sections (blue spots) (Sweden)

This project aims at identifying flood-sensitive areas in the Swedish road network. Effects of climate change have become one of the focus areas for national road authorities. However, the uncertainties inherent in predictions of future climate make it difficult to precisely quantify the changes in terms of, for example, the magnitude and frequency of rainfall. It provides an assessment of TEN-T road sections vulnerable to extreme daily precipitation in southern Sweden. Based on topographic identification, the results showed a total of 1,254 blue spots near the TEN-T roads.

Further info at the publication [The Blue Spot Concept: Methods To Predict And Handle Flooding On Highways](#)

Tools

Development of data-modelling system and decision tool (Estonia)

The objective of the project is to develop data-modelling system and the decision support tool for the integrated marine and inland water management for use of institutions related to water management in Estonia. The outcome of the project is a decision support tool for water policy planning and implementing and more specifically main output is a modelling system for inland water and coastal water management. The project involves partnership of different key stakeholders, including Estonian Environmental Agency (national and international reporting), the Environmental Inspectorate (monitoring), Agricultural Board, Health Board, Estonian Environmental Research Centre, local governments and water enterprises. This will ensure better understanding of the use of an integrated model in adapting to climate change.

More information at: <http://www.klab.ee/veemudelid/en/>

Integral adaptation strategies to mitigate flooding effects (Slovenia)

The TUPAS university is demonstrating how to devise climate adaptation strategies in a participatory manner, and provides decision makers with the necessary building blocks. [A Flood Damage Assessment](#) is promoted to provide quantitative monetary estimates



of flood consequences and risk, and to gain insight into how the system works (e.g. which components contribute most to risk). A **SPRAWL MONITOR** tool provides trends and changes on the urban fringe in order to integrate in adaptation strategies related to suburban development and flood risk management. The **GO GREEN** module is promoting the understanding of decisions involved in the planning process, and sharing good practice in terms of planning, designing, installing and managing urban green infrastructure. The **Multi-benefit Flood Retention** approach of integrated measures with multiple co-benefits for the development of an overall flood risk management strategy.

Learn more at www.turas-cities.org

Guidance

High Speed 2 (HS2) (UK)

The UK government is currently planning a new high-speed rail network that will run from London to Birmingham and to Manchester and Leeds, this is known as HS2. The Environmental Statement (**Technical Appendices: Resilience to impacts from climatic conditions**) for HS2 Phase 1 assessed the risks faced from climate change impacts on interdependencies, such as the rail network, electricity supply, and ICT. In addition to these other risks identified were potential flooding of tracks and tunnels, as well as the overheating of tunnels. A 'green infrastructure' approach will be used in development. This approach will result in a landscape that is designed to

incorporate flood defense measures which will in turn contribute to decreased vulnerability and increased resilience.

High Speed Information Paper: [Adaptation and Resilience 2013](#)

AQUA KNIGHT

The project Aqua Knowledge and Innovation Transfer for Water Saving in the Mediterranean Basin (AQUAKNIGHT) applied international best practice to evaluate and control water losses through the implementation of five pilot projects in the cities of Limassol (Cyprus), Genoa (Italy), Alexandria (Egypt), Tunis (Tunisia) and Aqaba (Jordan).

The project realises the wide dissemination of best practice to control and manage water losses and make sure that its tools reach a wide group of stakeholders in the participating countries and in other Mediterranean countries. It develops a guiding manual of best practice for reducing commercial water losses in the water networks of the Mediterranean area. It also provides guidance on how to increase water utilities' staff knowledge and capacity to reduce water losses with the consequent benefits in operational and financial terms.

Learn more at <http://www.gisig.eu/aquaknight/project-overview>



System and legal Framework

Addressing governance challenges that “cross” administrative boundaries: supporting 15 municipalities in the Central Denmark Region in adaptation planning (Denmark)

The cost of inaction on climate change is significant for Denmark and the wider EU. As a result, the Danish government made it mandatory in 2013 for municipalities to draw up climate change adaptation plans. It also encourages the integration of the climate change adaptation action plans into the municipal spatial planning covering all spatial areas including cities and countryside. The C2C CC project will provide a comprehensive base for implementation, evaluating the results and the process, as well as providing local authorities with the tools for better integrated planning, taking into account the uncertainties of future climate change.

The C2C CC project expected results include a 3D hydrological model of flooding that combines flood events owing to rainwater, rivers and the sea, new business models that consider climate change adaptation activities, new methods for city planning that can help prevent flooding (e.g. permeable surfaces), early warning systems for flooding, network governance and integrative planning of large catchment areas, and a range of capacity building events.

Visit www.c2ccc.eu to find out more!

KerkeBEEK – Flood risk management plan and implementation (Belgium)


Eight governmental organisations (local municipality to regional administrations) signed a ‘river contract’ committing themselves to look for solutions to flood risk in the area of the Kerkebeek, together with citizens, companies in the area and other stakeholders and this in a one-year process. Over 200 people participated in the workshops to define adaptation measures, including both infrastructure works and ‘soft’ adaptation measures. The participatory approach provides an answer to dealing with uncertainty and remaining risk, whilst, creating both awareness and creative solutions. Thinking about adaptation together with the different stakeholders has led to an inspiring process that will be replicated in other flood risk management projects.

Further info in the report: [ORBP-analyse West-Vlaanderen](#)

Institutional Capacity

Development of urban adaptation plans for cities with more than 100,000 inhabitants in Poland (Poland)

The Let’s Feel the Climate is a big scale project, which involves 44 of Poland’s largest



cities. The goal of the project is to identify and analyse adaption and mitigation challenges each city may face, draft plans for local authorities, indicate sources of funding and raise awareness for the need of adaptation. This is the only initiative in Europe in which the Ministry of the Environment supports the authorities and local administration in coordinating the activities adapting to the effects of climate change in several dozen cities at the same time. This project should contribute to protecting about 30% of the Polish citizens against the climate change effects. This is a good practice in term of developing the documents that will identify the levels of vulnerability, resilience and adaptive capacity of the cities. Based on that, the necessary adaptation measures will be chosen and customised to local conditions.

Learn more on the project's website: [Wczujmy się w Klimat](#)

Design Standards

The Resin project

In the RESIN project, the aim is to link the requirements for critical infrastructure to the development of standards. The Standardisation Institute of the Netherlands (NEN) is working with the project partners in streamlining the project's outputs into European standardised approaches. The project is currently exploring the feasibility of standardisation and certification, framed by the three RESIN topics (impact and

vulnerability, selecting and prioritisation adaptation option and decision tool) and the three priority sectors identified for the project (energy infrastructure, transport infrastructure, and buildings).

Learn more about at the [standardization page of the RESIN project](#)