



RESIN **Climate Resilient Cities and Infrastructures**

RESIN was an EU-funded research project running 42 months from 2015 to 2018. It developed standardised methods and decision support tools for developing local adaptation strategies. It was one of the first large-scale research projects based on the conceptual approaches of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. The change in risk and vulnerability concepts introduced in this report led the researchers to explore the combination of approaches from climate change adaptation and disaster risk management.

On this basis, the project has developed a suite of tools that support city climate adaptation officers and infrastructure managers in developing strategies and plans to be prepared for the impacts of climate change. The project follows a four-stage approach in planning for adaptation:

1. Assessing climate risks
2. Developing adaptation objectives
3. Prioritizing adaptation options
4. Developing an implementation plan

Within each of these stages, the effort was oriented at standardising the approach and the tools needed. To support the first stage of adaptation planning, RESIN developed *IVAVIA (Impact and Vulnerability Analysis of Vital Infrastructures and build-up Areas)*, a modular, widely applicable, risk-based vulnerability assessment process, supported by a suite of software tools. IVAVIA consists of seven modules aimed at supporting practitioners and end-users through the risk-based vulnerability assessment process, beginning with a systematic selection of hazards and drivers in their local context, and ending with a standardized presentation of the resulting outcomes to decision makers and stakeholders.

Additionally, RESIN has developed a *European Risk Typology*. Developed around the spatial unit of NUTS3 regions, the *European Climate Risk Typology* allows cities and regions to strategically screen for the climate hazards that they face, and their levels of exposure and vulnerability to hazards. Such an overview can be used as a starting point for a more detailed risk assessment of IVAVIA.

The RESIN project has further developed a library of adaptation options with, as far as possible, harmonized information on the effectiveness of the adaptation measures. The library supports stage 2 and 3 in the adaptation planning process and is linked to the impact chain modelling technique of IVAVIA, on the level of climate threats and exposed sectors. All tools are linked together in the *e-Guide*, an internet-based guide and workspace for developing adaptation strategies, or parts thereof.

The RESIN methods and tools have been developed in a close co-creation process with the cities of Bilbao (Spain), Bratislava (Slovakia), Greater Manchester (United Kingdom), and Paris (France). Nevertheless, processes, methods, and tools are standardised and can be applied to all European urban population centres, while they at the same time can be tailored to the specific needs of a municipality, depending on the stage and maturity of the local adaptation processes.