



ADAPTING HEALTH SYSTEMS FOR A CHANGING CLIMATE

LIFE RESYSTAL PROJECT USER GUIDE



LIFE RESYSTAL: CLIMATE CHANGE RESILIENCE FRAMEWORK FOR HEALTH SYSTEMS AND HOSPITALS

Facing the climate challenge for hospitals and health services



Europe's climate is changing at a record pace, and the health impacts are already being felt. The continent is warming faster than anywhere else on Earth. In 2024, Europe faced its hottest year on record, marked by extreme heat and the worst flooding in Western Europe in more than a decade. Extreme weather events like these put enormous pressure on healthcare facilities, just when people need them most. Floods, storms, and heatwaves can damage hospital buildings, disrupt electricity and water supplies, and block access to care. They also bring new health risks, from heat-related illnesses to the spread of infectious diseases.

The impacts go beyond the hospital walls: Climate change is disrupting the supply of medicines, equipment, and essential services that healthcare depends on. More patients arrive during crises, stretching staff and resources to breaking point. Without preparation, these pressures could overwhelm health systems.

In this context, the LIFE RESYSTAL project has developed and pioneered the first comprehensive framework for climate resilience in European healthcare facilities. It offers practical tools and guidance to help hospitals and other healthcare services build climate resilience: the capacity to “anticipate, respond to, cope with, recover from, and adapt to climate-related shocks and stress,” all while continuing to provide safe, high-quality care and protect population health, despite an unstable climate.²

By supporting healthcare providers to integrate climate resilience into strategic planning and everyday operations, LIFE RESYSTAL helps protect patients, safeguard critical infrastructure, and maintain the continuity of healthcare services as climate risks intensify.

This **User Guide** introduces the LIFE RESYSTAL project and its climate resilience framework. It outlines the project's objectives, key outputs, and results, and explains how these can be used by healthcare decision-makers, planners, and practitioners to strengthen resilience in their own settings.

1. Copernicus Climate Change Service (C3S) and World Meteorological Organization (WMO), 2025: European State of the Climate 2024, climate.copernicus.eu/ESOTC/2024, doi.org/10.24381/14j9-s541

2. World Health Organization (WHO), 2022: Measuring the climate resilience of health systems, <https://www.who.int/publications/i/item/9789240048102>

ABOUT LIFE RESYSTAL

Enhancing climate resilience in the healthcare sector

Running from 2021 to 2026, the LIFE RESYSTAL project was funded by the European Commission through the LIFE programme. The project aimed to build tools and resources that boost the resilience and capacity of Europe's healthcare systems and connected critical infrastructures. The graphic on the next page illustrates the six objectives driving this mission.



PROJECT DETAILS AND PARTNERS

Duration

September 2021 - February 2026

Budget

€5 157 112, 55% funded by the LIFE programme

TECHNICAL PARTNERS



PILOT HOSPITALS



PROJECT OBJECTIVES



Create a network for climate resilience

Set the basis for a European network committed to the climate resilience of the European healthcare sector:

- The Facilitation Board, a network of experts on climate resilience and healthcare
- The Scaling Network, composed of healthcare providers.



Develop science-based solutions

Provide science support for implementing Climate Change Adaptation (CCA) measures applicable to healthcare infrastructure.

- The LIFE RESYSTAL Toolbox, guiding and supporting in the implementation of climate adaptation actions.



Promote best practices at healthcare facilities

Demonstrate, in diverse climate conditions, healthcare infrastructure measures to enhance facilities' climate resilience.

- Pilot hospitals' green and blue infrastructure interventions



Communicate and disseminate

Foster healthcare climate resilience across the sector by sharing project results widely.

- Webinar: Championing Healthcare Climate Resilience in Europe
- Webinar: Shaping Climate-Resilient Healthcare in Europe Through Policy and Practice



Establish Communities of Practice

Engage stakeholders and policymakers who can support healthcare organisations in strengthening their climate resilience.

- Community Approach Replication Guide



Increase climate resilience

Produce innovative climate resilience solutions, tools and guidance specific to the healthcare sector.

- Procuring for adaptation: incorporating climate adaptation into healthcare investment decisions
- Practical Guide for Building Climate-Resilient Health Systems

PROJECT OUTPUTS

The LIFE RESYSTAL project has produced a wide array of resources that can support European healthcare facilities and systems in building climate resilience.

As demonstrated in the diagram, the main outputs consist of:

- The **Upscaling Adaptation Starting Package (UASP)**, an open-access package comprising the resources, methods and processes developed during the project and will be available open source on the project's website.
- The **Toolbox**, a market solution that gathers all the project tools. Healthcare facilities can access it to find ways to build their climate resilience capacities.

UASP

Open-access, composed of:

- Methods, processes and tools
- Experience feedback from pilots
- Best practices



TOOLBOX

A market solution, composed of:

- Methods, processes and tools
- Service from project partners
- Licenses to use the 7 modules, which are:



MODULES

1. Infrastructure / Assets / People (IAP)
2. Climate Hazard (CH)
3. Risk & Vulnerability (RV)
4. Economic Loss (EL)
5. Adaptation Solutions (AS)
6. Cost-Benefit Analysis (CBA)
7. Climate Adaptation Pathways & Plan (CAPP)
8. Crisis Management (CM)

LIFE RESYSTAL UASP: A Starter Kit for Climate-Resilient Healthcare

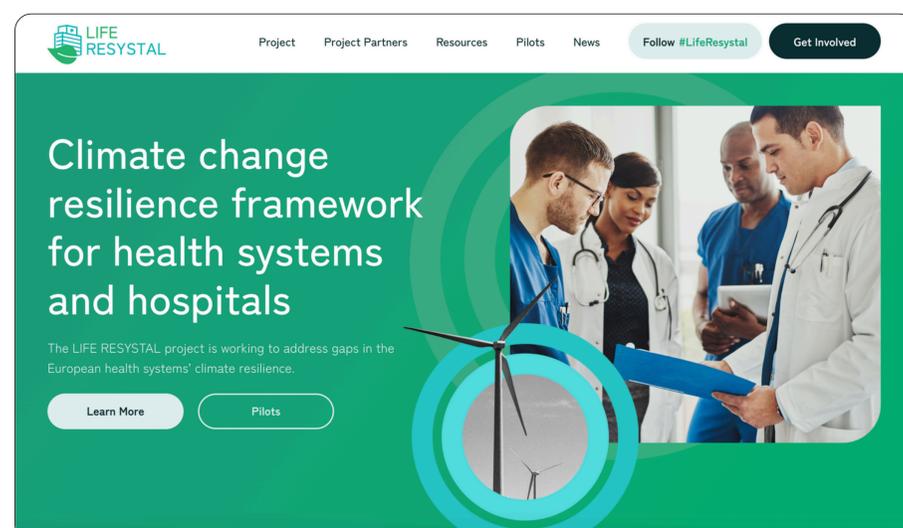
The LIFE RESYSTAL project has created a set of practical resources designed to help healthcare organisations take practical steps toward climate resilience. Together, these resources form the **Upscaling Adaptation Starting Package (UASP)** – a ready-to-use bundle for hospitals and health systems looking to protect their people, infrastructure, and services from the impacts of climate change.

The main resources contained in the UASP are:

- Community Approach Replication Guide: A step-by-step method for creating a local Community of Practice – a network of people and organisations working together to support climate adaptation in healthcare. This guide draws on LIFE RESYSTAL’s own experience in setting up four such communities during the project.
- Procuring for Adaptation: An easy-use guide to making climate-smart investment and procurement decisions. It helps hospital managers, finance teams, and procurement professionals choose solutions, secure funding, and procure interventions that physically adapt their buildings and infrastructure to a warmer, more extreme climate. It helps make sure upgrades and new projects are future-proof. present.
- The Practical Guide for Building Climate-Resilient Health Systems: An actionable guide for integrating climate resilience into healthcare planning. It explains what resilience means, why it matters, and outlines the steps needed to achieve it through the development of a Climate Resilience Plan. The guide is supported by real-world examples from LIFE RESYSTAL pilot health systems, along with a separate catalogue of case studies and a resource repository.



Together, these form the health system–level guidance component of the LIFE RESYSTAL project. With the UASP, healthcare leaders have both the know-how and the practical tools they need to turn climate challenges into a plan for action.



From Climate Risk to Resilience: Inside the LIFE RESYSTAL Toolbox

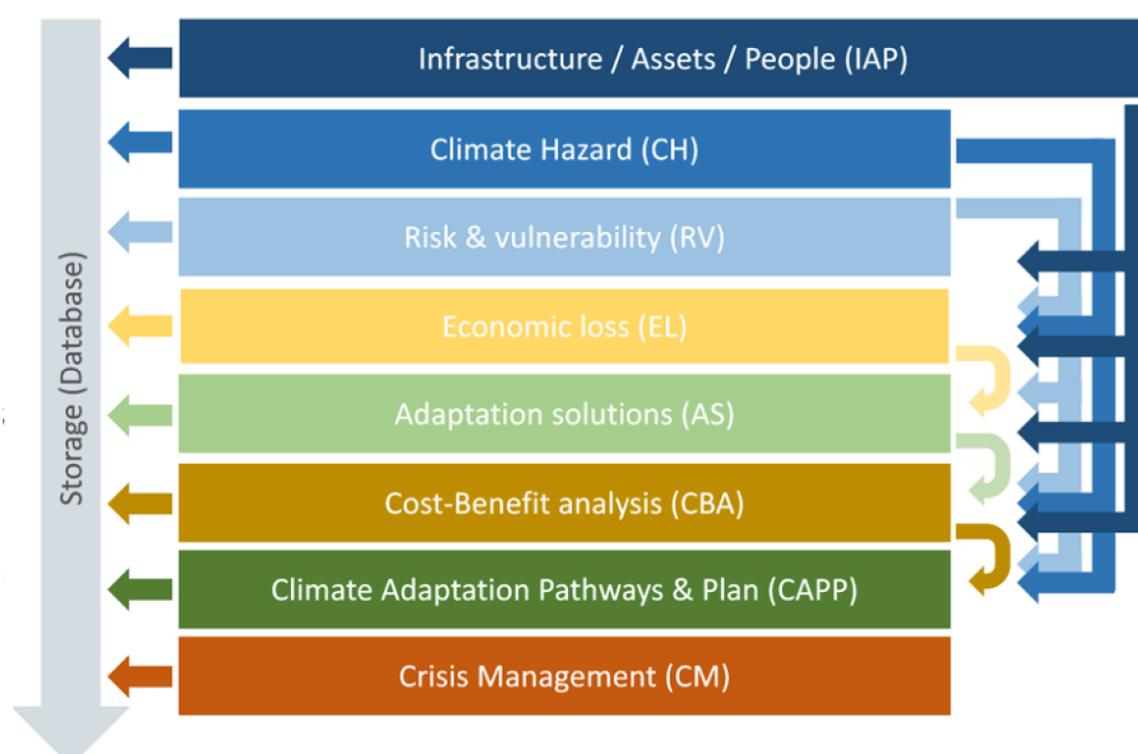
The LIFE RESYSTAL Toolbox is a set of eight practical modules designed to help healthcare facilities understand, prepare for, and adapt to the impacts of climate change. The modules are interconnected, working together as a single, powerful resource – guiding hospitals from the first risk assessment through to the development of an adaptation plan.

It starts with three foundation modules: Infrastructure / Assets / People (IAP), which gathers essential details about the facility; Climate Hazard (CH), which analyses likely climate scenarios and hazards; and Risk and Vulnerability (R&V), which measures how exposed and sensitive the facility is to these threats.

Once the risks are clear, the toolbox helps facilities estimate the economic cost of inaction versus action (Economic Losses, EL) and run a Cost-Benefit Analysis (CBA) to identify the most effective measures. The Adaptation Solutions (AS) module supports selecting the right strategies, while the Climate Adaptation Pathways and Plan (CAPP) module provides a clear roadmap for implementation.

Finally, the Crisis Management (CM) module helps healthcare facilities to continue delivering services during extreme weather events.

The toolbox turns climate challenges into a practical action plan, helping healthcare systems protect people, safeguard infrastructure, and stay operational in a changing climate.



Pilot hospital case studies: Infrastructural measures

For a comprehensive approach to climate resilience, the project's pilot hospitals have implemented experimental measures to decrease the impact of climate change on the hospital infrastructures. They consist in large part of nature-based solutions (NBS), e.g. greening hospital areas, which present both adaptation, mitigation, and health benefits: they reduce the impact of heatwaves, improve rainwater management, increase energy efficiency of hospital buildings, and positively impact the well-being of patients, staff, and visitors.

Policlinico di Bari | Italy

Green wall: Climbing plants (star jasmine, yellow jasmine, bignonia) will cover the west side of the hospital perimeter wall. The installation of the green wall aims to mitigate the effect of heat reflection from bare building walls into the surrounding air, reducing localised temperature and improving thermal comfort. The Policlinico has also installed monitoring stations that record data on air quality, temperature, humidity and soil conditions.

Ecological sidewalk: Located along the north side of the hospital perimeter wall, the sidewalk is characterised by draining and sustainable materials to facilitate the flow of rainwater. The pedestrian path is flanked on both sides by a tactile area for people with visual impairments and green flowerbeds, irrigated with a low-consumption drip system, which also features a well for extracting groundwater for irrigation.

Galician Health Service (SERGAS) | Spain

Green pergolas: Located in front of the main entrance of the hospital of Ourense, the green pergolas will provide shade to employees, visitors, and patients and create a cooling effect.

Green roof: Located on the roofs of two sections of the hospital building in O Barco, the green roof will increase the building's stormwater management capacity and provide insulation, potentially lowering the need for heating and cooling.

Rainwater collection system: aimed to reduce the burden on the underground water and to water the lawn and plants surrounding the hospital area. It has a capacity of 75000 L, meaning it can last one month. The water collected will be disinfected both on the way in and out.

General Hospital of Nikaia Agios Panteleimon | Greece

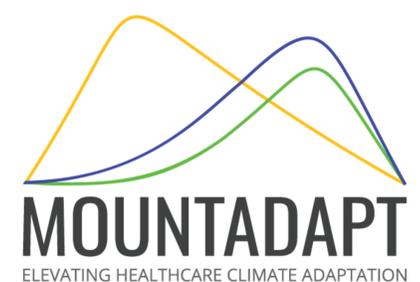
Rewilding of green areas and tree planting: The rewilding took place in front of the hospital's central entrance. Covering about 1,000 m² of grass lawns, the selected tree species were chosen for their ability to locally cool the surrounding environment.

Updating the heating/cooling system at Gennimatas Building: This measure will include installing one heat pump unit, one air handling unit, and air ducts for the neonatal intensive care unit, as well as one chiller to update the overall building's cooling system.

Project continuity: Life after LIFE RESYSTAL

The outcomes and lessons of LIFE RESYSTAL have already been transferred to and further developed within another European project. In 2024, three LIFE RESYSTAL partners – the National Center for Scientific Research Demokritos (NCRRD), CrisiSoft, and Health Care Without Harm (HCWH) Europe – joined the consortium of MOUNTADAPT, a Horizon Europe project. In this MOUNTADAPT, they contribute knowledge, resources, and expertise gained through LIFE RESYSTAL to support the project's mission to reduce the direct and indirect impacts of climate change on people's health, safety, and well-being, while strengthening the capacity of health systems to protect public health in a changing climate. LIFE RESYSTAL was replicated within MOUNTADAPT through four complementary approaches:

- 1. Communities of Practice (CoPs):** MOUNTADAPT established Communities of Practice in both demonstration and replication sites, following the Community Approach Replication Guide developed under LIFE RESYSTAL. This was complemented by the development of a Quick Guide to Building a Community of Practice.
- 2. Risk and Vulnerability Assessment:** The MOUNTADAPT demonstration sites applied the first three modules of the LIFE RESYSTAL toolbox (IAP, CH, and RV) to assess their levels of risk and vulnerability.
- 3. Application and Adaptation of the Practical Guide:** The MOUNTADAPT demonstration sites are applying the Practical Guide for Building Climate-Resilient Health Systems, which is also being adapted to develop a checklist to evaluate the actions and measures implemented by respondents to enhance climate resilience.
- 4. Crisis Management:** The MOUNTADAPT demonstration sites will test and adapt the MenKorn CALL crisis management tool to their needs and context.



Ongoing access to LIFE RESYSTAL resources and results

All LIFE RESYSTAL resources remain available through the project's Knowledge Hub, hosted on the LIFE RESYSTAL website, managed by Health Care Without Harm (HCWH) Europe. Here, you can explore practical guidance, tools, and case studies developed to help health systems build climate resilience. These results are also available on the HCWH Europe website.

LIFE RESYSTAL outcomes can also be explored through the Global Green and Healthy Hospitals (GGHH) network, managed by Health Care Without Harm Europe, which brings together healthcare providers from around the world to share experiences and solutions for reducing climate impacts and protecting public health.



Learn more about the Global Green and Healthy Hospitals network

Key insights from the ongoing use and application of LIFE RESYSTAL tools are regularly presented at leading sector events, including [CleanMed Europe](#) and the [European Healthcare Climate Summit](#). These events offer opportunities to exchange ideas, gain new insights, and connect directly with experts and practitioners across the sector working to build sustainable healthcare.

Finally, LIFE RESYSTAL resources are featured on major European knowledge platforms such as Climate-ADAPT and the ATACH Resource Repository, making it easy for organisations everywhere to discover the project's results and start using the materials in their own work. Together, these channels ensure that LIFE RESYSTAL's knowledge continues to support action, learning, and collaboration well beyond the project's lifetime.

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PILOT HOSPITALS

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Project consortium members at CM8, Policlinico di Bari, May 2025



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