



Permeable and ventilated roofs:
an emerging solution for building
comfort and climate mitigation in
urban centers.
The Project LIFE SUPERHERO.

TBE CONGRESS 2023

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SUPERHERO project

Sustainability and **P**erformances
for **H**EROtiles – based energy efficient roofs



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SUPERHERO - LIFE19 CCA/IT/001194

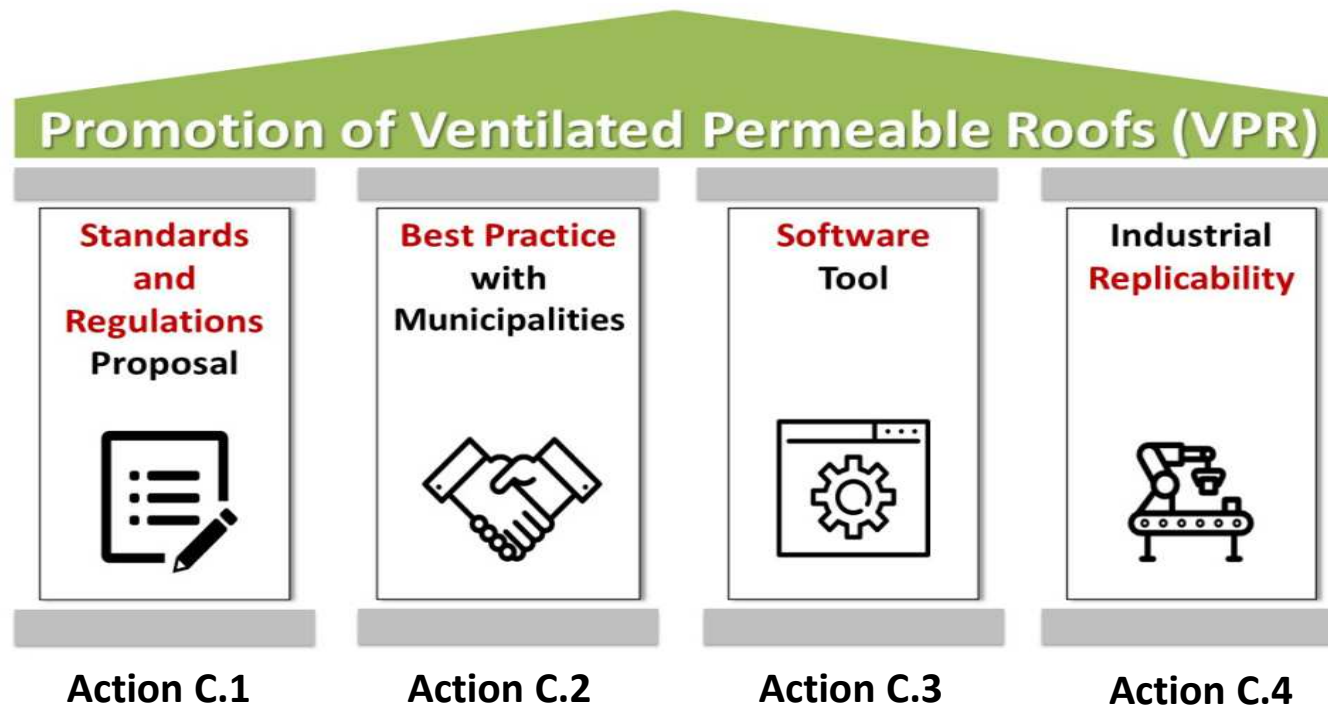
- TOPIC: CLIMATE CHANGE ADAPTATION
- SECTOR: URBAN ADAPTATION/PLANNING
- TOTAL AMOUNT: 3,032,924€
- EU CONTRIBUTION: 1,563,160€ (55% of eligible costs)
- STARTING DATE: **1/07/2020**
- ENDING DATE: **30/06/2025**



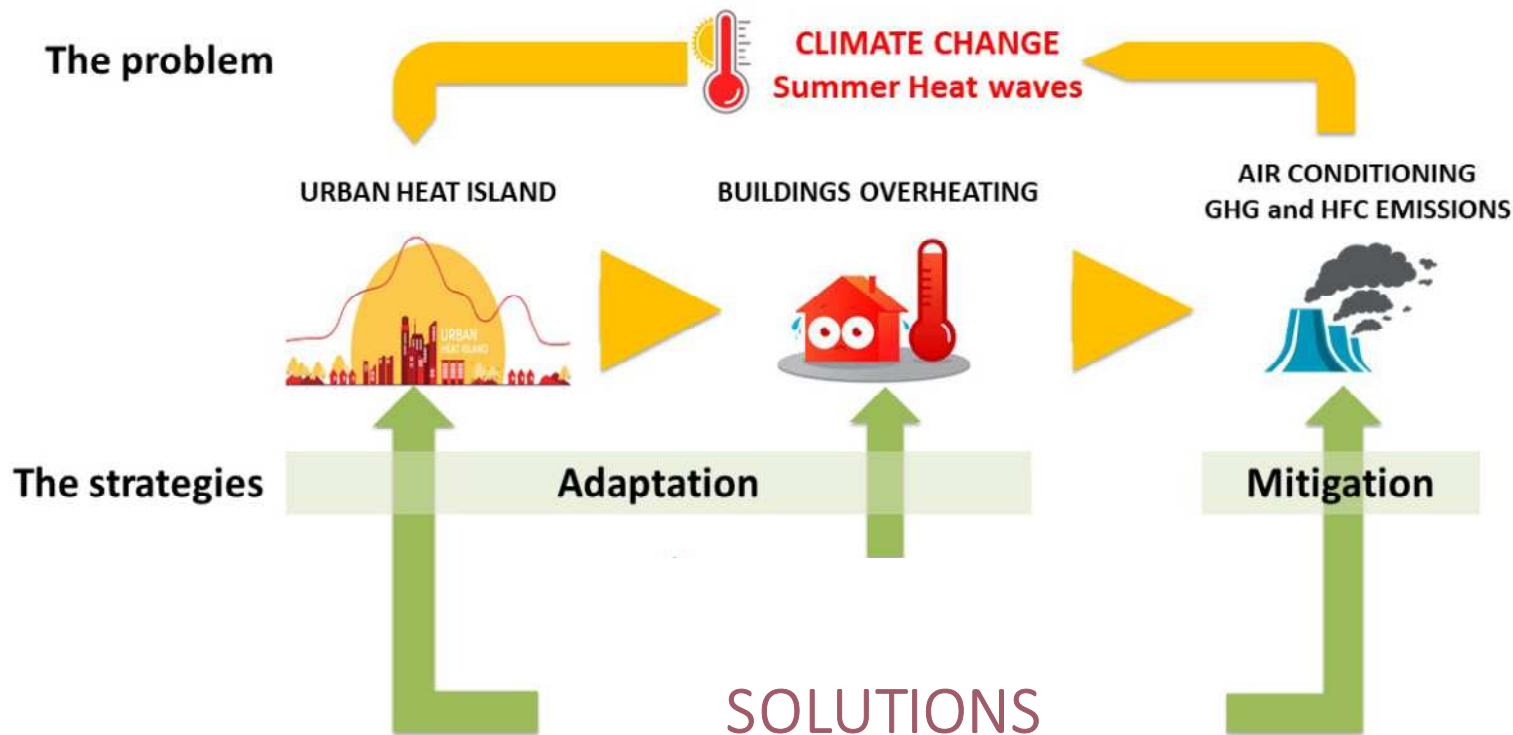
Objectives and Strategies



LIFE SUPERHERO is a **Best-Practice project**: it promotes the use of ventilated permeable roofs (VPR) as sustainable and cost-effective solutions for “**passive cooling**” of building, increasing building occupants’ and cities summer comfort (**adaptation**) and decreasing buildings’ energy and green-house gasses emissions (**mitigation**). The strategy of the project is based on 4 pillars:

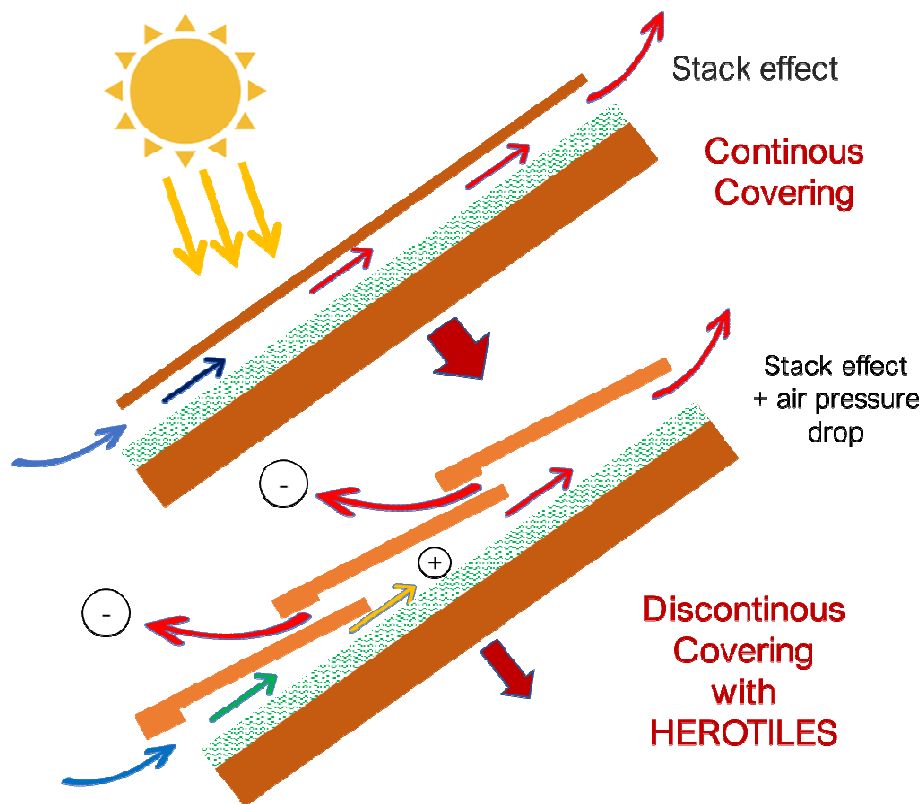


The problem targeted



The International Energy Agency (IEA) has estimated that energy demand for air conditioning will be more than triple by 2050.

The solution proposed



The use of Ventilated and Permeable Roofs (VPR) is the most sustainable and promising strategy to reduce building overheating.

A **vented roof** can be obtained through an air space between installed roof covering and the roof sheathing.

If this ventilation is coupled to high “**air permeability**” roof tiles, it is possible to obtain a considerable increase of the cooling performance

Background

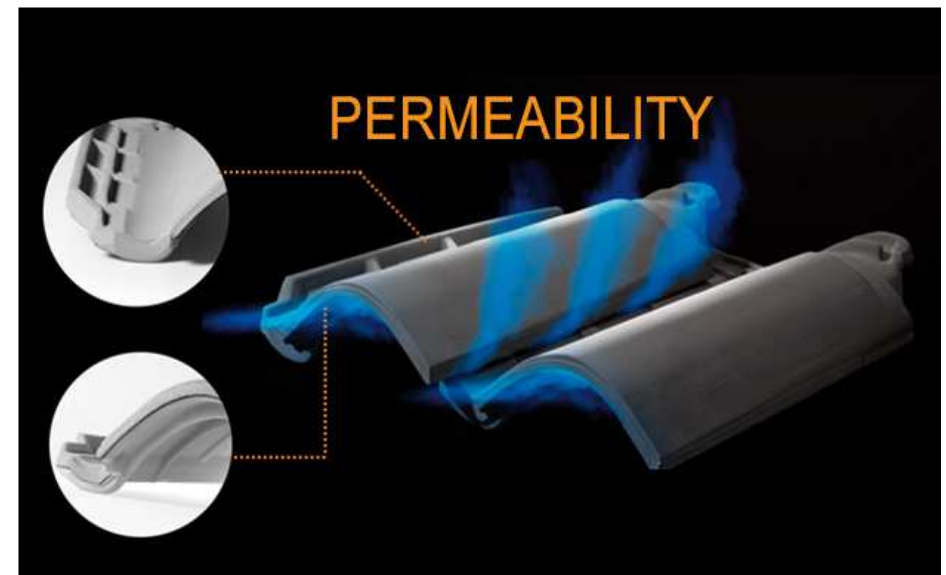


LIFE HEROTILE developed new types of roof tiles named HEROTILES-based roof (**HBR**) which allow a **reduction in cooling energy (until 50%)** compared to other solutions.

General public, professionals and stakeholders need to be aware of **ventilated permeable roofs** and their environmental-friendly behavior (**VPR & HBR**)



The SUPERHERO PROJECT
SUsustainability and **PER**formances for
HEROtiles – based energy efficient roofs



C.1-Air Permeability Test



HOW

A Round-Robin test is on going to characterize the VPR performance, in 3 independent laboratories (CC, UNIVPM, CTMNC) to collect data and figures for the definition of standards ETA and CEN. The industrial partners (EDILIANS, ICP, TERREAL) supply the 18 type of roof tiles to be tested including the HEROTILES roof tiles (to be used in Actions C2 & C4)



British Standard BS 5534 – Annex L: Method of test for air permeability of unsealed small element roofing assemblies

C.1-Air Permeability Test



- **TEST ANGLE:** 0°, 10° and 25° as inclination angle
- **SEALING:** test is performed according to the BS 5534 standard (4 unsealed elements)
- **DATA ACQUISITION:** test is performed considering a pressure up to 100 Pa (blowing and sucking air)

FIRST CONSIDERATIONS:

- The results do not seem to depend on the slope of the roof
- Initial and final pressure difference depend on specific tiles shape opening section
- Considering the same type of roof tile, disassembly/assembly operations have an impact on results

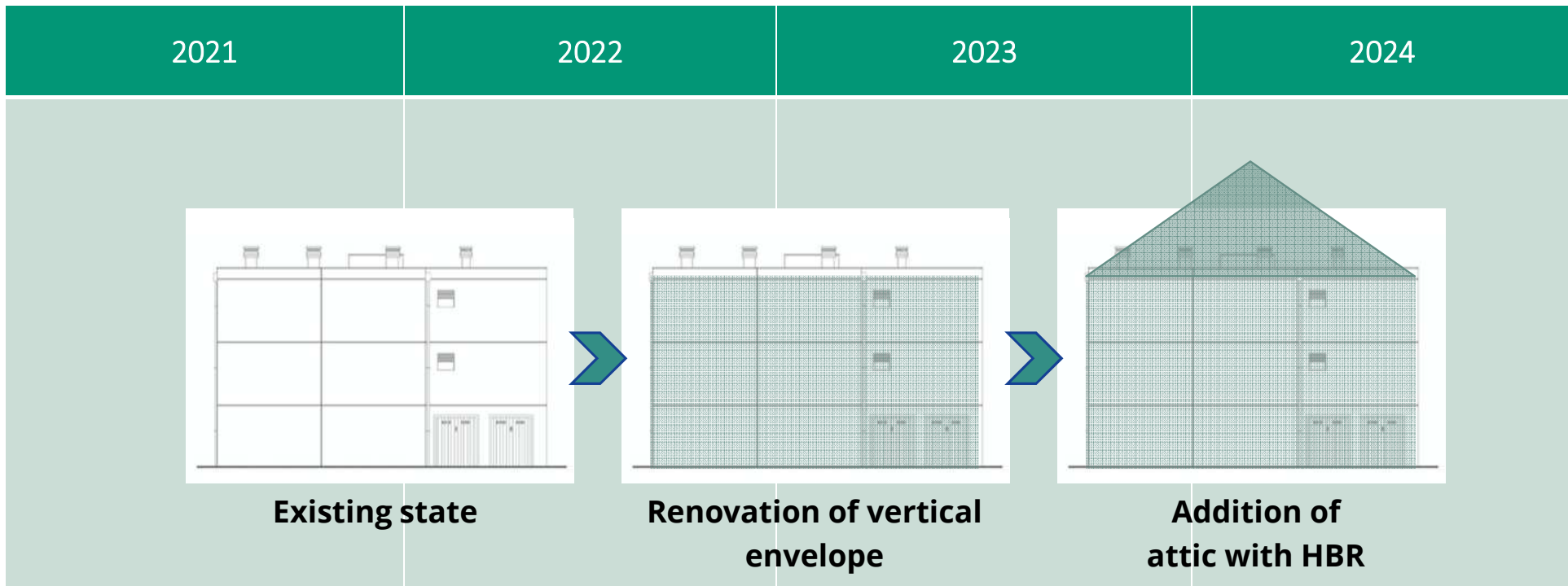
C.1-Air Permeability Test



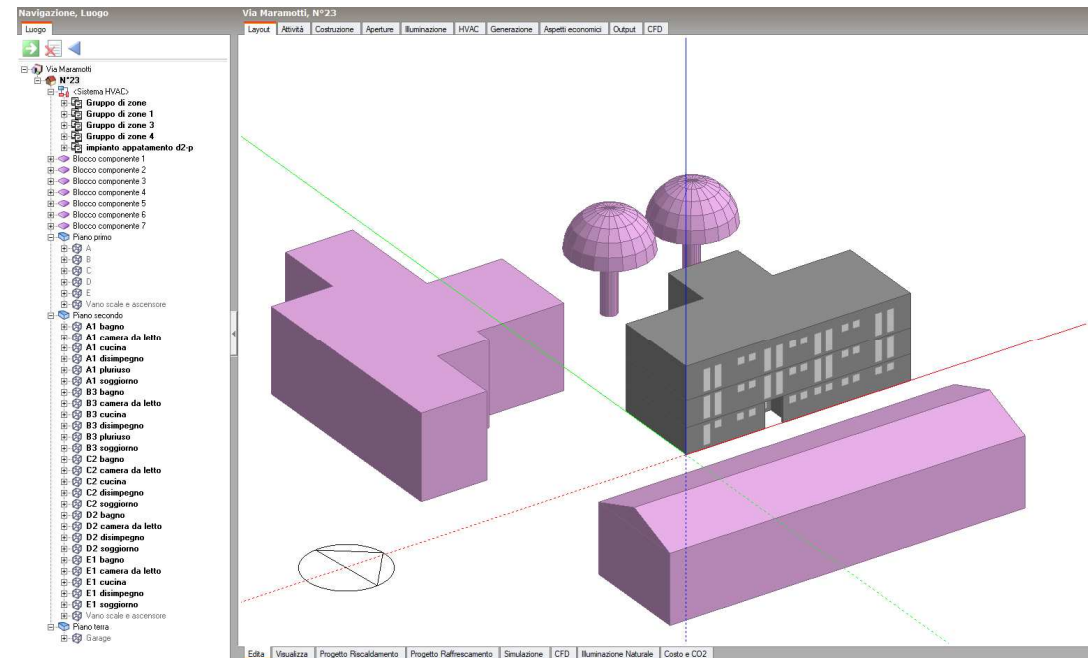
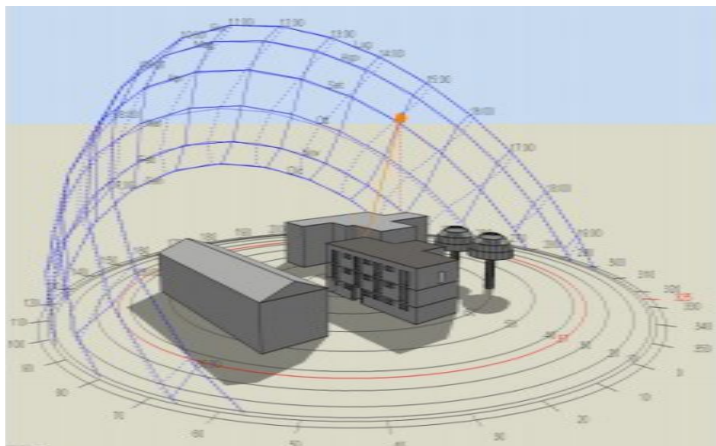
REGULATORY INSTRUMENT	STRATEGY N.1	STRATEGY N.2
Italian building code DM 26 June 2015 “Minimal requirements”	Roof solar reflectance -0,65 (flat roof) -0,30 (tiled roof)	Passive cooling technologies (e.g.: ventilation, green roofs)
Italian Building GPP DM 11 ottobre 2017 CAM (Rev. 06/08/2022) DM 23 June 2022 n. 256 , GURI n. 183 08/08/2022	Green Roofs Ventilated Roofs	SRI greater than: -29 (slope > 15%) -76 (slope < 15%)
Building green rating system “Protocollo Itaca”	Green Roofs	SRI greater than: -29 (slope > 8,5°) -76 (slope < 8,5°)
Building green rating system “LEED”	SRI (after 3 years) greater than: -32 (slope > 15%) -64 (slope < 15%)	Green Roofs

During the revision of CAM, we have been successful to include the ventilated roof as a possible solution strategy to reduce UHI effect

C.2-LIFE SUPERHERO buildings



C.2-LIFE SUPERHERO buildings



The calibrated models for energy simulation

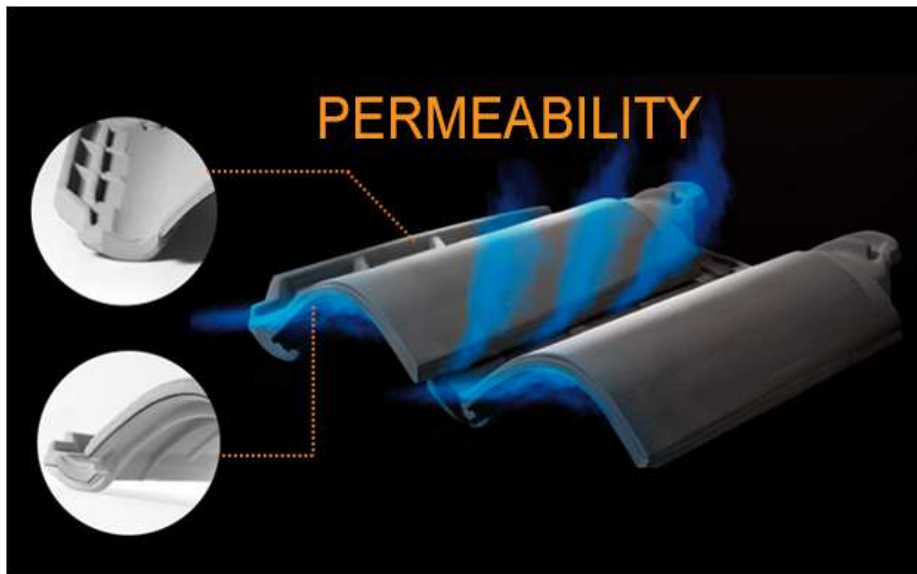


C.3-Industrial replicability



HOW

The design principles of the HEROTILES will be transferred to 2 representative tiles of European market. Pilot production will be done and submitted for characterization in Action C1.



The examination of the principles of the HEROTILES made possible to extract the proper characteristics of the product.

Same arrangement is being applied to **two types** of roof tiles of EDILIANS production, now finished in 3D design.



Thank You!



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