

# RETHINKING NATURE BASED SOLUTIONS

## Potential of natural and recycled materials for green roof construction to improve their ecological footprints

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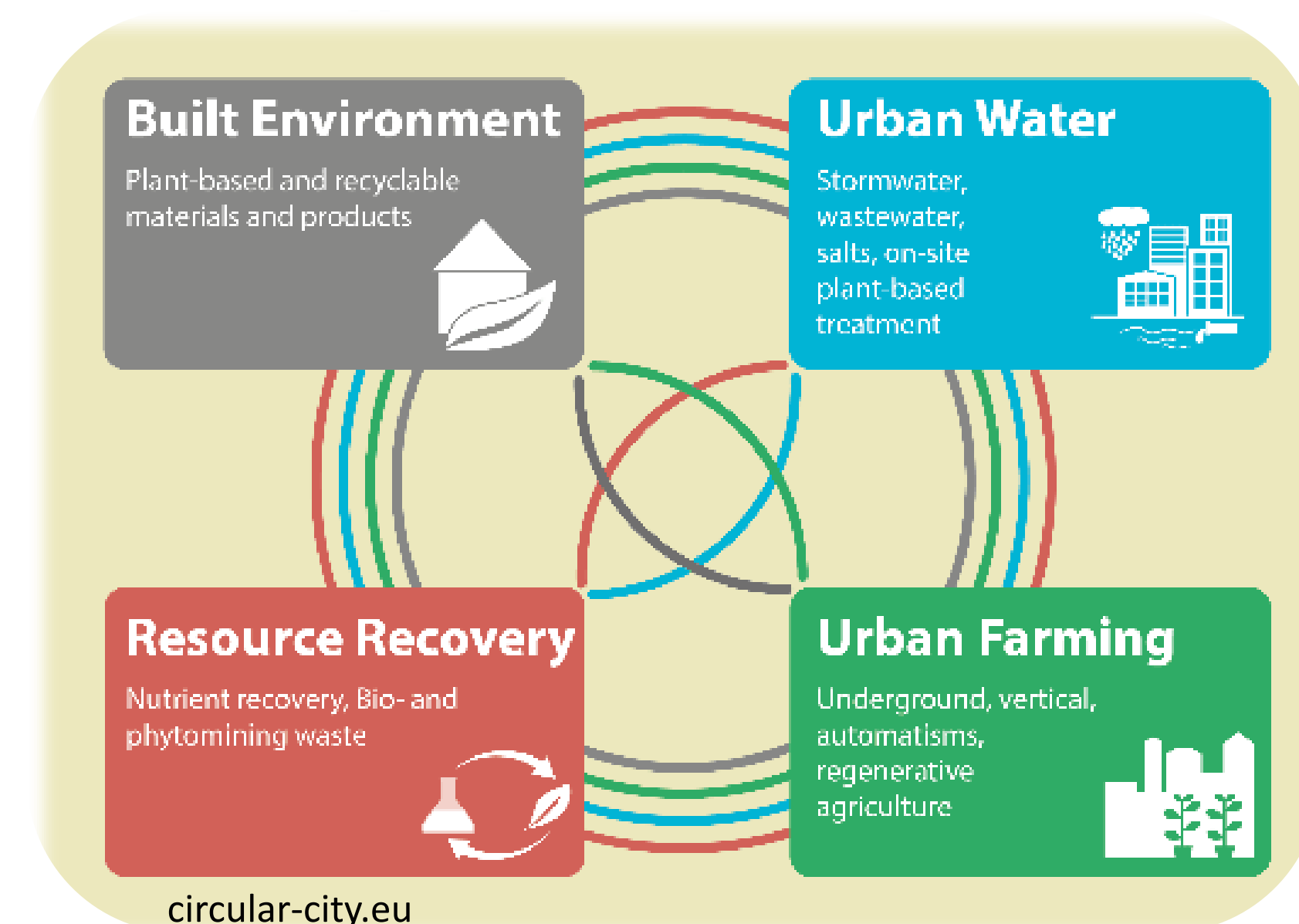
### INTRODUCTION

Nature-based solutions are discussed to sustainably regulate urban climate, to mitigate urban heat islands and thus to counteract urban heat stress. As such, **green roofs are extremely important** especially for South Europe. The discussion of green infrastructures focused mainly on their ecosystem services while the **ecological burdens of their construction materials**, their use and demolition **have not been considered** with the same weight.

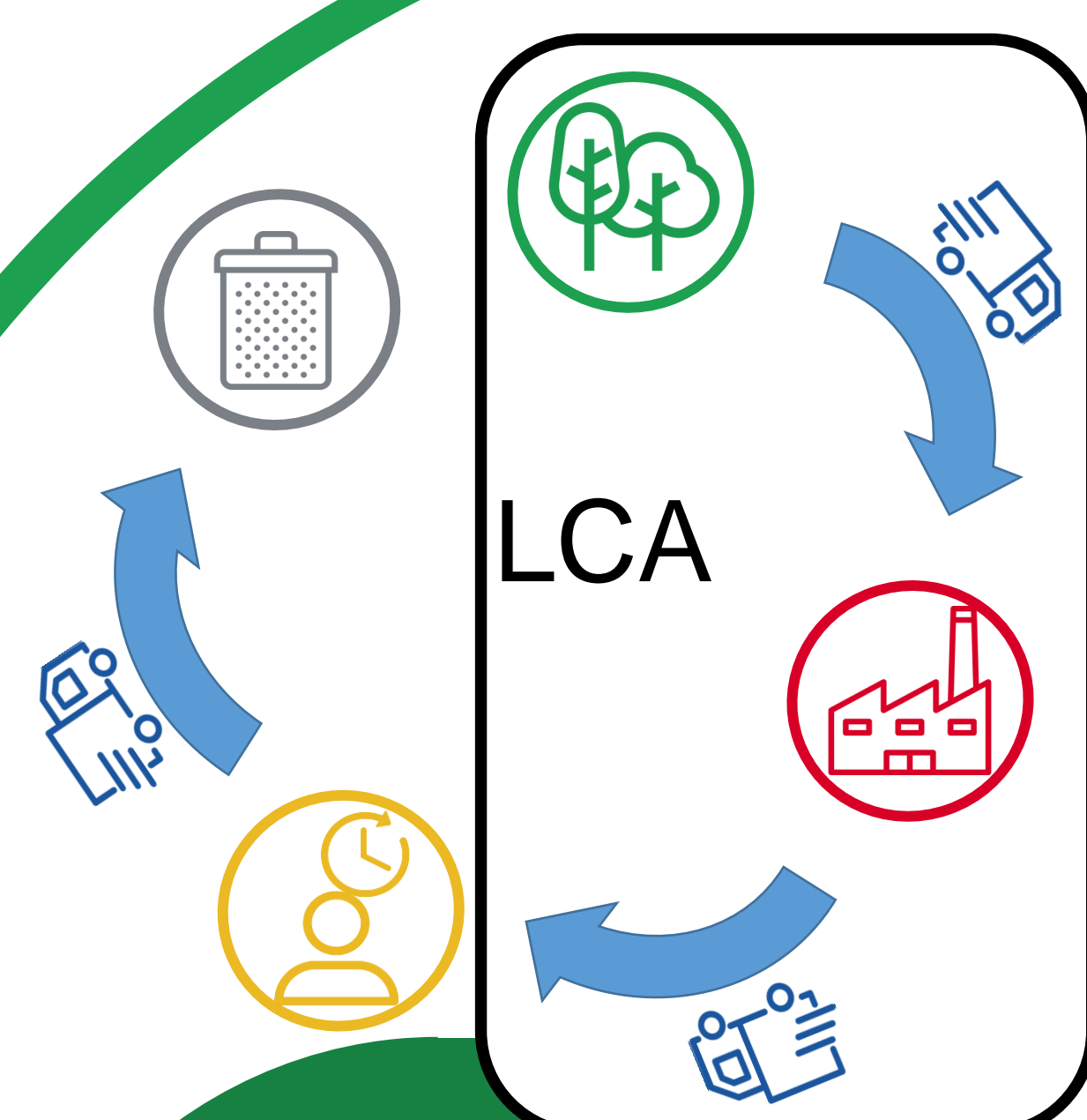
In the framework of COST Action -Circular city- a **cooperation** was established between the **CIIMAR**- Interdisciplinary Centre of Marine and Environmental Research of the University of Porto and the **Technische Universität Berlin**. Within this cooperation, we want to assess the use of **insulation cork board (ICB) as an alternative** for the conventional drainage layer materials and look for alternative soil-like materials to make green roof as green as possible.






### FRAMEWORK

The European Cooperation in Science and Technologies (COST) offers various actions that enhance the cooperation within the European science field. Within the COST action 17133: **“Circular city: Implementing nature based solutions for creating a resourceful circular city”** we were funded to evaluate the use of cork as an alternative for synthetic liners to further develop and to rethink design strategies for nature-based solutions. To create bottom-up, excellence-driven, open and inclusive networks for suitable solutions the circular city consist of the four sectors: **built environment, urban water, urban farming and resource recovery** that work together interdisciplinary.



### METHOD



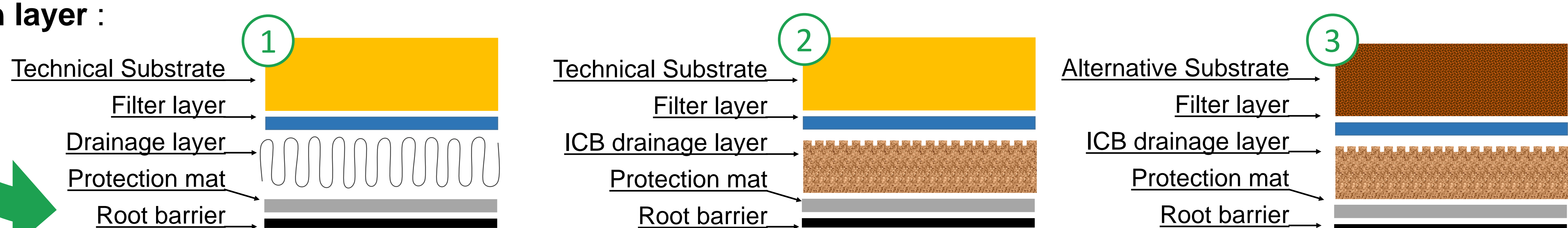
The evaluation of the materials will be conducted with a **live cycle analysis (LCA)** (DIN EN ISO 14040). The functional unit is: kg CO<sub>2</sub>/m<sup>2</sup> material used for the scenario of an extensive green roof with 9 cm substrate depth. This includes: mining of the **virgin material** , **preparing the material**  and **the transport** . The usage phase  is not included due to the many different options, neither is demolition  because of a lack of information.

The amount of **CO<sub>2</sub> taken up by sedum sp.** (typical plant on green roofs) **over 45 years** (average life span of a green roof) is taken **as a reference** to evaluate the impact of the materials.

**Three different scenarios** are in the focus of this evaluation:

1. **Conventional** layers and substrate
2. **Cork (ICB)** implemented as a drainage layer and technical substrate
3. **Cork (ICB)** implemented as drainage layer and **alternative soil-like substrate**

**LCA conducted for each layer :**



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