

## Doctoral Programme in Civil, Environmental and Mechanical Engineering

Research subjects proposed for the 40<sup>th</sup> cycle – second call

Additional position with scholarship

### Curriculum D - Architecture and Planning, Landscape

**Reference persons:** Rossano Albatici (UNITN/DICAM), Stefano Avesani (Eurac Research)

Participants: Simone Torresin (UNITN/DICAM), Francesco Babich (Eurac Research)

***D2 - scholarship on reserved topics***

Funded by: University of Trento – [Eurac Research](#).

**Title: Multi-domain driven co-design approach for user-oriented green building envelopes for people well-being and sustainability**

Greenery integration in buildings can generate important impacts on users' well-being, building sustainability, and other co-benefits for the indoor and outdoor environment.

This research project aims to develop a multi-domain driven co-design evaluation framework for user-oriented greenery integration in building envelopes with the purpose of fostering people wellbeing and whole building lifecycle sustainability. Based on an initial comprehensive literature review, both methodological and technological, in this project, modelling and simulations of green integration will be performed to evaluate the operation and the effects of building integrated green technology solutions with capabilities of adaptation to context dynamics. This research will also include the definition of greenery integration taxonomy/ontology, and the evaluation of design, assembly, installing, disassembly time, analysis risks/costs in installation, O&M, end-of-life of the proposed solutions.

The effect of green facades (external and internal) on people's well-being and health will be considered in a participatory design vision, where are needed adequate knowledge and tools in the field of architecture and construction, being complementary to sociologic and psychological angle, trying to understand if there are mechanisms for using the facade itself, or individual modules, to induce people to behave in ways that are virtuous for the environment and their lifestyle.

A final thorough evaluation matrix will then be used to collect metrics about aspects such as energy balance, IEQ, timing, LCC analysis and LCA, analysis of green perception, evaluation of co-benefits for people, community, and environment.

Main research outcomes:

- Methodological approach for a performance-based, multi-domain driven co-design/participative approach for user-oriented building integrated green technology solutions.
- Integrated greenery technology solution (e.g. 2-3 for different boundary conditions), with technical details, production, logistic, installation, O&M, end-of-life handling approach, and performance characterization.
- Ontology of integrated greenery in building.