





Acronimo progetto: SAFER - REBUILT

Titolo del progetto: Sustainable Approaches For Earthquake Resistant_REhabilitation solutions for the BUILT environment"

Ambito di finanziamento: Bando a Cascata, emanato con Decreto Rettorale n. 3658 del 12/10/2023 dell'Università degli Studi di Bari Aldo Moro a valere sul Progetto dal titolo "multi-Risk sciEnce for resilienT commUnities undeR a changiNg climate", codice identificativo MUR PE00000005 finanziato nell'ambito dell'Avviso n. 341 del 15.03.2022 Piano Nazionale di Ripresa e Resilienza (PNRR), Missione 4 Componente 2 Investimento 1.3 "Partenariati estesi a Università, centri di ricerca, imprese e finanziamento progetti di ricerca" — finanziato dall'Unione Europea NextGenerationEU – tematica n. 3

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Coordinatore tecnico – scientifico delle attività svolte da Unicas – prof. ssa Maura Imbimbo

Descrizione del progetto/Description of the project

Providing sustainable and integrated solutions able to simultaneously reduce seismic vulnerability and improve energy performance of the existing buildings, is drawing an ever-growing attention from the academia. The real innovation of SAFER_REBUILT is the symbiotic integration of such goals into a broader multiobjective strategy that, thanks to life cycle thinking and life cycle approaches, goes beyond the current state of the art and produce solutions that maximise: a) seismic and energy performance, b) efficient use of materials, c) use of renewable natural-based materials, d) reversibility, and e) durability of the intervention; while simultaneously minimizing: i) costs, ii) intervention time, iii) downtime and invasiveness, and iv) environmental impacts.

Partner di progetto/ Partners of the project

The project team is articulated in five research units

University of Basilicata, UniBAS RU1; University of Bergamo, UniBG RU2; University of Brescia, UniBS RU3; University of Cassino and Southern Lazio, UniCAS RU4; University of Trento, UniTN RU5 (UniBAS, UniBG, UniBS, UniCAS, UniTN. Each research unit involves researchers of Structural Engineering with key competence in Earthquake Engineering. Some research unit involves also researchers of Geotechnical Engineering, Sanitary Engineering, Applied Thermodynamic Engineering and Architectural Engineering. The project team includes senior and young researchers (19/23) and researchers with less than 10 years from PhD position (4/23). The project team has been constituted seeking to keep a gender balance, therefore a good percentage of female researchers (7/23) is involved in the project. Gender balance which will be also guaranteed accounting for that all University







partners are committed to gender equality through their respective internal practices. Further, the Project management will act in order to raise the amount of researchers with less than 10 years from PhD and of female researchers through future possible recruitment, compatibly with the time and budget constraints of the project.

Obiettivi di ricerca del progetto/Main objects of the project

The integrated and sustainable renovation of the vulnerable building stock is now acknowledged as a priority in order to pursuit the global targets in terms of both greenhouse gas emission reduction and seismic risk mitigation. In order to design sustainable retrofit interventions, the definition of innovative retrofit solutions has to be coupled with the setting of new performance objectives and design targets, by considering a Life Cycle Thinking (LCT) approach to renovation, i.e. aimed at minimizing the environmental, social, and economic impacts along the building's life cycle. The current definition of performance objectives does not indeed take into account the enormous environmental impacts associated with the construction sector, which is approaching our society to the point of no return. Recently, many concepts of integrated retrofit interventions have been proposed, however, in order to design those solutions, new multi-performance based design framework and new performance objectives of be defined to allow the design of truly sustainable solutions. In line with the scientific objectives of the PE RETURN, as well as to enhance risk assessment and to optimize prevention, adaptation and mitigation methodologies, the SAFER_REBUILT project essentially aims to define:

i) new performance objectives based on LCT principles: low-carbon materials to reduce environmental impacts; design for low disruption; design for durability; design for adaptability during the service life, design for damage and loss minimization, thus enhancing resilience in case of earthquakes; design for waste minimization during deconstruction phase; design for recyclability/reusability at the end of life; ii) new integrated techniques/systems for the sustainable refurbishment of both existing reinforced concrete (RC) and unreinforced masonry (URM) buildings compliant with the new LCT-based renovation objectives.

Risultati attesi / Results of the project

The research activities of SAFER_REBUILT meet the main objective of the call in defining innovative and sustainable solutions for reducing the vulnerability of the built environment with a specific focus on residential buildings which represents the vast majority in medium to large urban areas. The proposed solution will be specifically conceived and tested in the framework of the LCT approach by following the entire cycle of retrofitted building's life, starting from design (using renewable materials and low-impact solutions) to construction phase (using easy-to-install precast systems with modular components), maintenance program (effective procedure to reintegrate or substitute the degraded/damaged components) and, finally, taking into account the reuse/recycle of the waste produced, for example, in the case of damaging earthquakes. Therefore, the proposed solutions aim at stimulating the building industry to change its paradigm in all phases (design, construction, maintenance and disposal).

Through these solutions, SAFER_REBUILT enhances the prospects of a rehabilitation strategy at large scale based on rapid, sustainable and integrated retrofit interventions with a direct benefit in terms of social and economic loss reduction mainly relevant to the residential building stock, thus certainly contributing to make "SAFER" the BUILT environment.







