

# **PRIORITISATION OF ITALIAN RESIDENTIAL BUILDINGS FOR SEISMIC AND ENERGY PERFORMANCE UPGRADING**

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## **ABSTRACT:**

Given the ambitious carbon emission reduction targets, enormous resources are being invested in Europe to foster environmental, economic and social sustainability. An urgent response, foreseen by the 2030 Agenda for Sustainable Development, is also demanded by the European Commission to all the Member States for the energy requalification of buildings, which are responsible for about 36% of European greenhouse gas emissions. Although the ambitious carbon emission reduction target is a common objective for the Member States, the innate diversity between them, which do not share the same seismic risk level and social problems, can not be overlooked. For this reason, specific metrics should be considered to achieve an appropriate level of resilience (energy, seismic and social) of the overall existing building stock. This paper presents an integrated framework specifically developed for Italian residential buildings, based on primary metrics defined for regional assessment, namely expected loss of life, economic loss, space heating energy consumption, CO<sub>2</sub> emission and socioeconomic capacity. The framework metrics encompass single and multi-sectoral indicators, which in turn provide different prioritisation patterns and different refinement scales, from province-level to national-level. The most updated fragility models for the Italian building asset were selected and combined through a logic tree strategy. The space heating energy consumption and CO<sub>2</sub> emissions were directly taken from a collection of all the energy performance certificates of buildings, while national and European indices were used to account for socioeconomic aspects. The proposed framework and the prioritisation patterns obtained in this work can support the Italian government to foresee economic support and strategic financial planning for seismic strengthening and energy renovation interventions on existing buildings, including socioeconomic features, and favouring national funds in those regions where the needs are higher.

**KEYWORDS:** building renovation, energy requalification, seismic risk, regional assessment, prioritisation framework