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Concurrent seismic and energy retrofitting of RC and masonry building envelopes using inorganic textile-based composites combined with insulation materials: A new concept

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1 Concurrent Seismic and Energy Retrofitting of RC and Masonry 2 Building Envelopes Using Inorganic Textile-Based Composites 3 Combined with Insulation Materials: A New Concept

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11 Abstract

12 *This paper explores innovative techniques by combining inorganic textile-based composites with*
13 *thermal insulation for the simultaneous seismic and energy retrofitting of the existing old buildings. A*
14 *brief state-of-the-art review on energy and seismic retrofitting materials and techniques is initially*
15 *made, followed by the introduction of a novel concept for the simultaneous seismic and energy*
16 *retrofitting of the Reinforced Concrete (RC) and masonry building envelopes, combining Textile*
17 *Reinforced Mortar (TRM) jacketing and thermal insulation materials or systems. The hybrid*
18 *structural-plus-energy retrofitting solutions examined are based on inorganic materials providing*
19 *both cost effectiveness and fire resistance for the building envelope. The overall effectiveness of the*
20 *combined energy and seismic retrofitting is demonstrated via a case study on a five stories old-type*
21 *RC building. Moreover by proposing a common approach based on the expected annual loss (of*
22 *consumed energy or expected seismic loss), it is possible to evaluate the financial feasibility and*
23 *benefits of the proposed combined retrofitting approach. It was shown that the proposed concept is*
24 *economically efficient as the payback period of the intervention (return of the retrofitting*
25 *investment) can be significantly reduced for seismic zones when energy is applied concurrently with*
26 *seismic retrofitting by exploiting advanced construction materials, thanks to large savings related to*
27 *the labour costs.*

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32 **Keywords:** Building envelopes, Textile Reinforced Mortar (TRM), Insulation materials, combined
33 retrofitting, Existing buildings, Seismic risk, Energy efficiency

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