Sustainable transition: integrated redevelopment of existing industrial building

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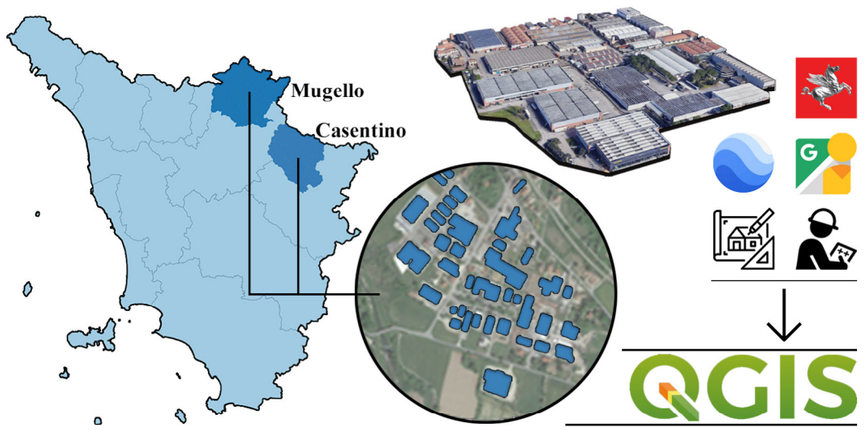
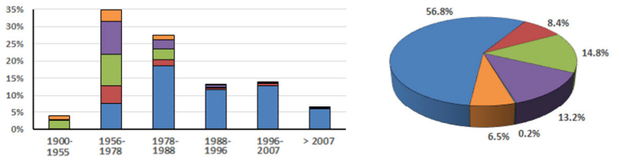
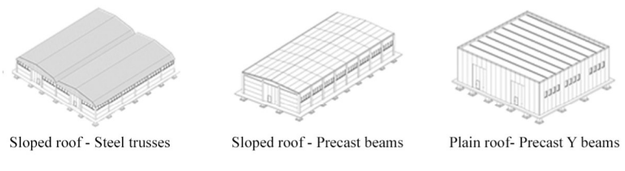
Industrial building stock: survey and georeferenced database

20 Municipalities 1224 Industrial/Manufacturing buildings

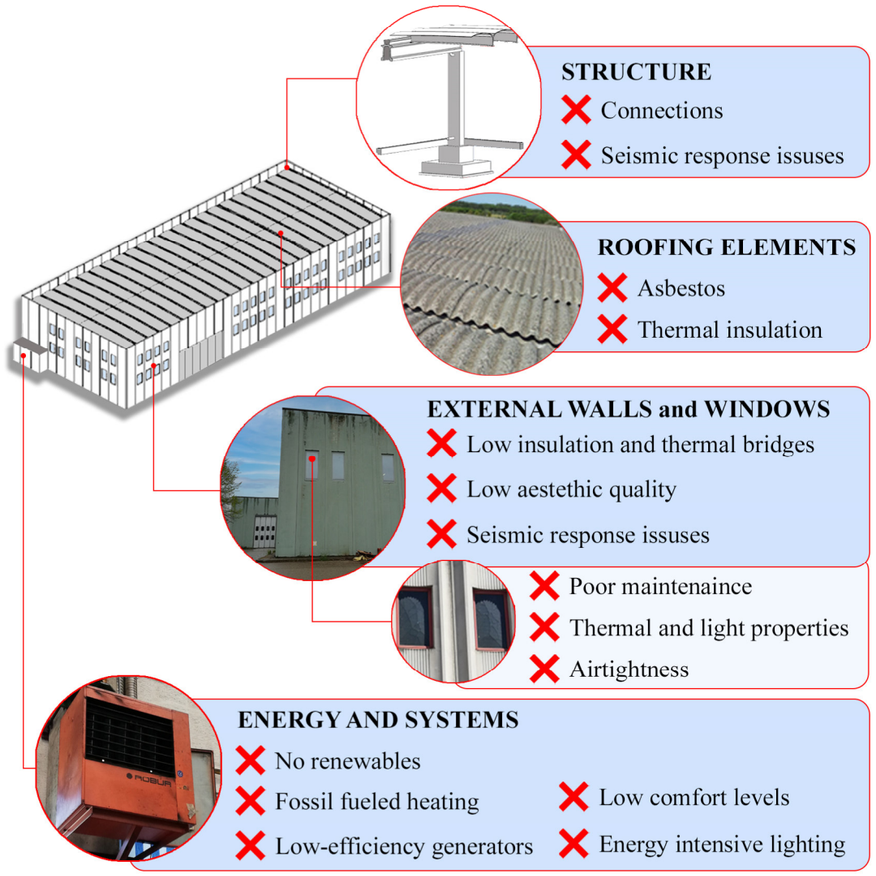


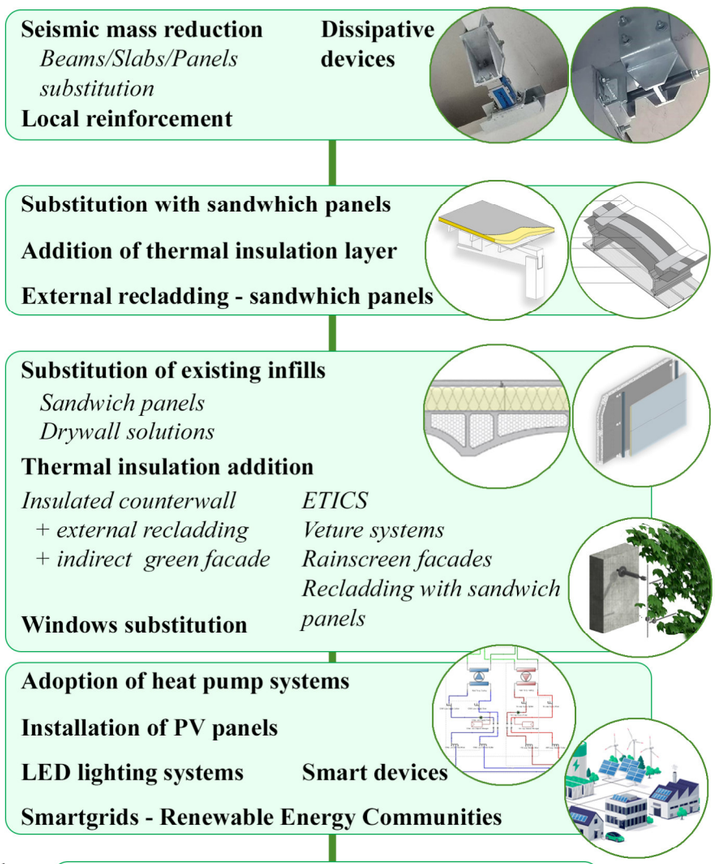
Typological variants assessment

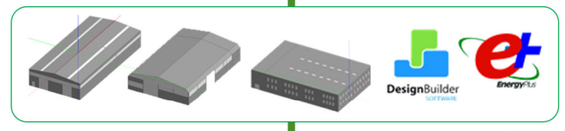


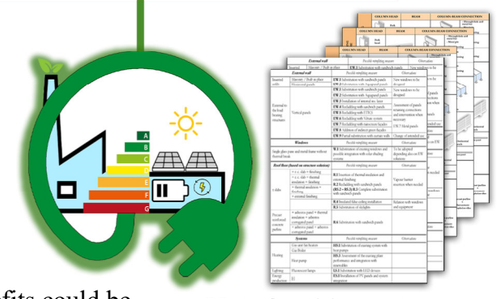


Protocol for integrated retrofitting









Nowadays buildings account for one – third of the global total final energy consumption energy demand and 37% of CO_2 emissions. In Italy one of the most energy-intensive sector is the industrial one: in addition to energy demand for production activities, also the operational phase of industrial facilities has an impact often underrated. Most of the current Italian industrial building stock was built before 90s without any effective standards or references concerning energy and environmental requirements. Moreover, these buildings generally show also inadequate seismic response.

Considering the context highlighted so far, initiative to promote the integrated and sustainable retrofitting (architectural, structural, and environmental) of the Italian industrial building stock is evidently necessary. The research aims at defining a protocol to be adopted for the integrated redevelopment of existing industrial buildings. The preliminary phase of the research is based on the analysis of the existing industrial building stock of two different areas in Tuscany (Mugello and Casentino). Data about over 1000 facilities were collected to create a georeferenced database, obtained using GIS tools, and postprocessed aiming at defining the most recurrent typological variants of precast reinforced concrete industrial buildings In order to provide a series of tailored and effective retrofitting interventions, .

By this way it was possible to formulate different hypothesis for integrated redevelopment addressing the deficiencies of building and system components to improve the overall performance of facilities. To validate and test the effectiveness of the measures pointed out, real case study buildings were selected among the investigated ones for each category and energy models produced. Dynamic energy simulations were carried out starting from current state conditions, whose results were validated comparing them with real bills, and then updated to account for retrofit interventions. Energy saving potential up to 70% was assessed acting both on envelope and system components. Moreover, the wide roof surfaces, show a considerable solar potential currently not exploited and whose benefits could be enhanced within a renewable energy community perspective or smart grid adoption resulting in positive economy, environmental and social effects at urban scale.

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