

New findings on how to save energy in Europe's historic buildings

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One of the RIBuild case buildings. Nørrebro, Copenhagen. Photo: Tessa Kvist Hansen Credit: Aalborg University

Through rigorous experimentation, simulation and testing, a 5 million Euro EU research project has developed guidelines on how to handle internal thermal insulation in historic buildings. The resulting guidelines are now available to the public on www.ribuild.eu.

Historic buildings built prior to 1945 make up a significant part of the European [building](#) stock. Many of these buildings have great architectonic and cultural value, but they also consume more than 30 % of the total energy consumption of buildings in Europe. Therefore historic buildings make up an important focus area in order to reach the ambitious EU climate and energy targets.

The RIBuild project, which has now been completed after five and a half years of intense activity, has sought to solve the dilemma of having to choose between either the need to care for heritage values or the necessity to bring down energy consumption and CO₂emissions.

RIBuild took place from January 2015 to June 2020 and has involved more than 40 researchers from eight universities and research institutions and people from two companies from the building sector. Around 90 [scientific papers](#), conference presentations, reports, Ph.D. theses and Master's theses have been produced in the course of the project.

"From the onset, the project has been highly ambitious, and we have succeeded in creating accessible guidelines for internal insulation, which serve to guide owners and landlords of buildings and their professional advisors towards the optimal solutions for upgrading a historic building," says Project Coordinator and Senior Researcher Ernst Jan de Place Hansen from BUILD at Aalborg University.

Making internal insulation a viable strategy

In most cases, insulation of existing building would take place externally, but such a solution ruins the composition and detailing of the façades of historic buildings and would pose a threat to their cultural values. What RIBuild has aimed at instead has been to turn internal insulation strategies into a viable solution for historic buildings across Europe.

To that end, ten [research institutions](#) and companies from Denmark, Sweden, Latvia, Germany, Belgium, Italy and Switzerland have contributed to the RIBuild project. In this way, RIBuild has covered diverse climates and building traditions and the resulting guidelines can thus be applied to historic buildings all over Europe.

"Each type of building has specific characteristics that need to be addressed. The guidelines developed in the RIBuild project will help practitioners to determine whether a building is suitable for internal insulation and which solution to choose," says Ernst Jan de Place Hansen, Senior Researcher, Department of the Built Environment, Aalborg University.

The project has demonstrated that energy-efficient internal insulation of the external walls can be a success, even in very different geographical and climatic locations, as energy consumption can potentially be reduced by 15-20 % by installing internal insulation on external walls.

Dealing with the risks

However, installing internal insulation in historic buildings can also be subject to a risk of failure and high costs. Materials behave differently, and the RIBuild researchers have therefore examined various building materials that are common across Europe, namely natural stone, brick and wood.

"Many historic buildings are retrofitted with insulation, but often the insulation creates new problems such as moisture damage. Through experimentation, observation and testing in various locations and with several types of buildings, both rural and urban, we have gained knowledge on how to handle internal insulation in historic buildings," says Ernst Jan de Place Hansen, Department of the Built Environment, Aalborg University.

The RIBuild project shows that several internal insulation systems are available but that they behave differently due to their design, mainly referring to how vapor-tight they are. In general, the thicker a wall, the lower the driving rain load, and the dryer and warmer indoor climate, the more solutions are available for internal insulation. The more vapor-tight the insulation systems are, the more caution should be paid on proper workmanship at constructive details, jointing, etc.

Guidelines for robust internal insulation

It has been a major ambition of the project to disseminate the findings of the RIBuild case studies to the widest possible audience. From the very beginning, conferences, events, informational videos and popular texts have served to keep the public up to date about the project. Now, the interactive website www.ribuild.eu, with guidelines and a knowledge base, will ensure that the results of the RIBuild stay available to both the scientific community and the public.

The website offers guidelines for setting the goal for a renovation, assessing whether a building is feasible for internal insulation, selecting an internal insulation system, validating the environmental impact of the different solutions, etc. Also offered is an [insulation](#) calculator tool (beta version). Lastly, the website contains short introductory videos that explain the basic concepts and information with different levels of detailing.

"The guidelines are crucial in making the results known and usable to both building owners, building professionals and researchers across Europe. We hope they will make a difference in how [historic buildings](#) are renovated and retrofitted in the future," says Ernst Jan de Place Hansen, Department of the Built Environment, Aalborg University.

Provided by Aalborg University

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