NEWSLETTER – issue 16.05.2014

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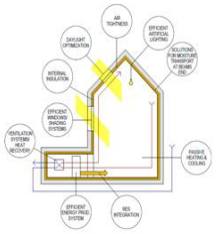

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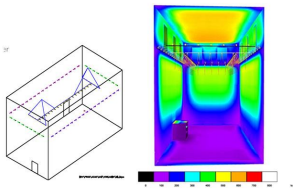

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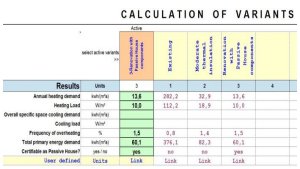

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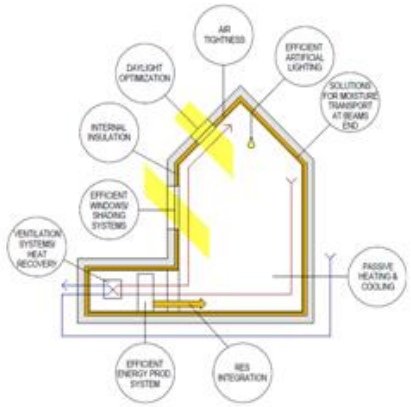
Efficient Energy for EU Cultural Heritage: Highlights, Successes and Lessons Learned



For the last three years, the **FP7 3ENCULT "Efficient Energy for EU Cultural Heritage"** project has worked on bridging the gap between **conservation and energy efficiency.**

By adapting existing retrofit solutions to the specific issue of historic buildings and developing new products, it has demonstrated that a **multi-disciplinary approach** which targets and adapts **energy-efficient solutions** can **reduce energy demands in historic buildings** by Factor 4 or even Factor 10.

In eight pilot projects, buildings were continuously monitored using specially created instruments which helped to identify and install the most suitable energy retrofit solutions, tracked the buildings' energy use once retrofitted and continued to adjust usage for optimum performance.

Tools and concepts were developed to support implementation in different urban contexts and ensure an effective transfer to buildings in different locations. These include a multidisciplinary planning process with an effective transfer to buildings in different locations. These include a multidisciplinary planning process with an ICT plug-in which integrated energy-related considerations into conservation **"Roombook"** software**(historic building information model - hBIM)** and an energy calculation tool adapted for historic buildings **(Passive House Planning Package – PHPP)**.
A number of specific technical solutions were also developed. These include a highly energy-efficient conservation-compatible window prototype, installed at the **Public Weigh House in Bolzano/IT** and now commercially available, and an LED based wall-washer, developed for **Palazzo d'Accursio in Bologna/IT** and already being used in two further buildings.

Other innovations include capillary active internal insulation which is being piloted in four buildings around Dresden/DE, a low impact ventilation system based on the active overflow principle currently being tested at the **Höttinger School in Innsbruck/AT**, wireless sensor networks at the **Palazzina della Viola in Bologna/IT**, and the first version of a dedicated BMS system, under review at the **Engineering School in Bejar/ES**,

3ENCULT has defined a methodological approach that integrates monitoring and control systems in a dedicated BMS system to guarantee a suitable **Indoor environmental Quality (IEQ)** with the lowest possible energy demand. As well as issuing position papers suggesting possible implementations of the present regulation framework for improving the energy efficiency of historic building in urban, the project has given input both to the EPBD and to CEN EPBD working groups under Mandate M/480 and has contributed to the development of a **standard on Energy Efficiency in Historic buildings (CEN TC 346 WG8)**. On local government level, dedicated workshops have reached more than 100 policy makers. Guidelines for integrating municipal sustainability concepts in urban planning have also been published.

Project results have been made publicly available through a Frequently Asked Questions section on the website, a virtual library for sharing technical solutions (**www.buildup.eu**), a handbook for architects on the retrofit of historic buildings, two TV videos, contributions to conferences and workshops run by similar projects experience-sharing in study tours, European conferences and fairs – both in the energy and conservation sector. At AR&PA 2012 the project was awarded "Premio Innovation" for its exemplary actions in boosting links between cultural heritage and society..

1) FP7 stands for the 7th European Framework Programme for research. 3ENCULT is co-funded under Grant agreement n°260162

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Alexandra Troi : Retrofitting of historical buildings requires multiple expertise

Making historic buildings more energy efficient is not only a matter of technology, but also a matter of continuous communication between the actors involved.

Making historic buildings more energy efficient is not only a matter of technology, but also a matter of continuous communication between the actors involved

Historical buildings and town quarters are an integral part of the European cultural heritage. However, such buildings are often not very energy efficient and thus contribute substantially to the emission of greenhouse gases. To meet the challenges climate change poses to our living space, experts therefore look for new approaches. Based on eight case studies across Europe, the EU-funded project 3encult aims at finding solutions for an energy efficient retrofitting of historical buildings while at the same time preserving their unique historical value. Here, project coordinator Alexandra Troi, vice head of the Institute for Renewable Energy of the European Academy of Bolzano, Italy, talks to youris.com about the technological and cultural challenges in the project's interdisciplinary works.

What has been the major development in the field of historic building renovation over the past few years?
A real development, is a new openness on the part of architects and conservators for no longer excluding historic buildings from an energy efficient retrofitting. When the first version of the Energy Performance of Buildings Directive came out in 2002, there was this fear that all old buildings would be disfigured, or ruined. This has now changed to a more constructive approach. People want to preserve the buildings, they want to use them and also to make them more energy efficient. But this has of course to be done in a way that is compatible with the heritage value of a building.

What does 'compatibility with the heritage value' actually mean?

Compatibility may be simply a question of aesthetics. But it can also be a question of demonstrating an old technology or of keeping the original material. Previously, for example, double-glazing had considerable weight. An old frame could hardly support it. The use of triple glazing would have been nearly impossible too. Now, there is this so-called thin-layer glazing, which has less glass than the standard insulation glazing and might therefore be installed in historical window frames. Such an approach has been applied in the one of the projects' case study in Bolzano, Italy. It made it possible to use new window frames resembling the aesthetics of the original baroque windows.
Another case study of the project is the Höttinger School in Innsbruck, Austria, which is an example of early modern architecture. The new ventilation system implemented as part of the project uses the potential of the building. There are huge staircases and corridors. A ventilation system with conventional ducts would have altered the building. We applied a so-called active overflow ventilation system, which has been developed in Switzerland in recent years. Without using pipes, fresh air is transferred from the central corridor into the classrooms by means of an active device that has been installed into the walls.

What else can be done using new technological approaches?

Technology can contribute to improve insulation. Historical buildings are often insulated from inside because the façade is decorated or the original plaster still exists. Capillary active insulation systems, which avoid the moisture risk at the old interior walls, are therefore further optimised within the project. Moreover, ways to install the insulation in a reversible way are developed. At the public weigh house in Bolzano, we use a clay-based glue that can be dissolved with water.

Where are the limits for an energy-efficient retrofitting of historical buildings?

There will always be buildings where little can be done. I would not try to turn Neuschwanstein Castle into a low-energy building. That would not be a meaningful approach. But for a large proportion of our old town buildings, there will always be a way to improve the energy efficiency. It often helps to look at the previous function of a building. What did the architects have in mind, in terms of ventilation, shading and so on? There are many ways to save energy within a building. You have to look at the entire building and all possibilities to decide which are the best solutions for each building.

What is the major challenge when it comes to implementing a renovation concept for historic buildings?

I think it is important that all actors involved should talk to each other without any prejudices. If the conservator, for example, only looks at the final product to say either yes or no, then it is hard to find a solution. But if the conservator clearly points out the historical value of a building and the technical experts talk to the conservator already at an early stage and if there is continuous feedback, then a solution for a certain building can be found. But this approach is not very widespread yet. My vision is that conservators, engineers and architects learn to talk to each other to find creative, individual solutions for historical buildings.

By Constanze Böttcher, youris.com

New guidelines and recommendations support cities in bridging the gap between heritage protection and energy efficiency

The refurbishment of existing buildings to very low energy demand is possible and increasingly economically feasible. It represents an area with huge potential for action, particularly in regard to historic buildings. For these buildings the main issue to be addressed is how to balance building protection requirements with the need for optimised energy efficiency.

The **3ENCULT** project has been extensively researching and developing solutions to achieve this aim, and has recently developed a series of guidelines targeted at local authorities. The guidelines developed by **ICLEI** Europe support local leaders who need to make informed decisions by helping them to understand what is possible / not possible in this context of **historic buildings** and monuments, both in the planning phase and in choosing suitable technologies. The summary e-guide for local decision makers **technical guidance** on energy efficient renovation of historic buildings offers a brief summary of technical solutions on the energetic retrofit of historic buildings as identified and used in the 3ENCULT project. Each solution has a short description, an indication of their general replication potential, and some challenges or issues to be considered.

The guidelines on Integrating energy efficient retrofit of historic buildings into policy and planning outline how a local government in Europe, as the owner of historic buildings and monuments, the developer of local strategy and policy, and administrator and regulator of its geographical area, can effectively engage through linking these actions to its broader municipal strategy, e.g. the Urban Master Plan and the **Sustainable Energy Action Plan (SEAP)** or Climate Plan.
The Recommendations for Local Governments on Integrating energy efficient retrofit of historic buildings into urban sustainability explore in more detail what sustainability criteria to include both during the planning and the implementation phase, through proposing indicators and replicable factors for incorporation into the Aalborg Commitments
The Recommendations on transfer and replicability of energy efficient retrofit of historic buildings at urban level focus on outlining the replication potential of the solutions and methods applied to the 3ENCULT case studies.

For more information contact giorgia.rambelli@iclei.org

Romanian local authorities meet in Alba Iulia to discuss energy efficient solutions to preserve your historic buildings

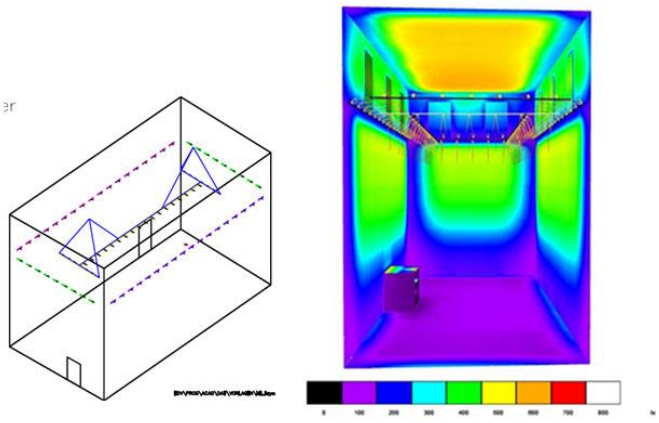
More than 40 local authorities gathered in Alba Iulia (Romania) earlier this month for the final 3ENCULT workshop on energy efficiency and cultural heritage dedicated to local authorities.

Decision-makers responsible for the urban planning and climate protection strategy for their municipality met with technical staff working in monument protection, buildings, and energy planning to discuss ideas and initiatives for promoting energy efficiency and preserving celebrated local architecture. **Workshop** participants shared their experiences and recommendations on the economic feasibility of refurbishing and protecting historic buildings while reducing energy consumption to meet the challenges of growing tourism in European historic centres. **Fabio Andreon** from the **Municipality of Bologna**, who spoke at the event, declared it "an interesting laboratory where projects and participation substantiated and made ambitious ideas concrete".

Resilience, comfort and tourism were also addressed through a series of roundtables which provided opportunities to exchange on the Romanian legal framework for retrofitting buildings. For **Giorgia Rambelli**, representing **ICLEI**, the workshop's success lay in "lively discussion, and interested participants…**Alba Iulia** provided both the perfect setting and its remarkable experience in discussing the integration between cultural heritage and sustainability".

For more information, view the programme or contact : **duru.kunt@iclei.org**.

3encult wallwasher in Sala Urbana – contracting started



The main goal of the efficient lighting installation in Palazzo d'Accursio is to allow for comfortable viewing of the frescoes and to slow down deterioration of materials.
The final design was defined at a multidisciplinary workshop in Bologna. Architects, constructional engineers, conservators and lighting designers combined their talents to create a slim structure to hold the luminaires. Aesthetic doubts were overcome by reshaping the housing of the luminaire to make it nearly invisible, because of its small dimensions and its specific and precise light intensity distribution.
The contracting with www.projektleuchten.de is ongoing and installation is expected before the end of April.
An 8.5m cornice was considered to hide the linear ceiling luminaries. During pre-diagnosis of the ceiling conditions, two anchor points appeared. These are thought to be the holding points for the suspended double-T bar structure, which bears the 3encult wallwasher luminaire. This is shown in the picture, where you can also see the homogeneous illuminance distribution along the walls.

For more informations see the contacts below:
Christian Jenewein (lighting design at Bartenbach.com): christian.jenewein@bartenbach.com
Jörg Wittenberg (manufacturer www.projektleuchten.de): Wittenberg@projektleuchten.de
Manuela Faustini (architect at comune di Bologna): Manuela.Faustini@comune.bologna.it

iQ-Therm – 'Intelligent' Interior Insulation for Historic Buildings

Developed in the framework of the 3ENCULT project, the innovative iQ-Therm system provides an effective way to refurbish buildings from the inside. The product provides intelligent interior insulation, significantly upgrading a building's insulation properties whilst allowing it to remain fully breathable. The system is targeted at buildings where external wall insulation is not viable due to conservation restrictions, or where traditional wall insulation methods cannot be adopted..

The **iQ-Therm System** also manages to stop rain water from causing damage - even if driving rain penetrates the facade, the system enables it to dry. At no time does moisture form on the surface of the interior wall, which could lead to infestation with mould.
Presented as a prize winning innovation at the **Munich Bau exhibition in Germany**, this intelligent insulation consists of a breathable rigid polyurethane foam panel, added to the structure walls either with a lime-cement based or - for a better reversibility - a loam based adhesive mortar (originally tested in 3ENCULT). The system is then rendered and painted with compatible products to offer a solution which **solves condensation, mould and heat loss issues.** The case study **'Public Weigh house'** in Bolzano (Italy) illustrates the benefits of the system.
With an immense capacity to store and transport moisture, the system buffers peak moisture loads in the air of the room, regulating the climate.

Over the long term, buildings can dry out and make significant energy savings. This is monitored in two other 3ENCULT case studies: the **Monumental School in Innsbruck (Austria)** and a **Wilhelminian-style villa in Dresden** (Germany).

For more information, contact Jens Engel (Remmers) **Jengel@remmers.de**, Rudolf Plagge (TU Dresden) **rudolf.plagge@tu-dresden.de**, and Ayman Bishara (TU Dresden) **Ayman.Bishara@tu-dresden.de**

Conservation of Cultural Property: Finding the European Standard for Energy Efficiency

As economic and political pressure mounts for an energy-efficient Europe, finding a balance between heritage conservation and energy conservation in historic buildings becomes more urgent. A systematic approach is required that takes into account technological, environmental and economic factors and their impact on the heritage value of historical properties..

The project “Conservation of Cultural Property” (known as CEN TC 346) has created a working group that aims to give European curators of heritage sites clear standards and guidelines for their conservation and restoration work. CEN, the European Committee for Standardization, also wants to ensure that experts in both heritage conservation and energy efficiency exchange knowledge and experiences that can harmonise testing and analysis standards in Europe..

As part of this endeavour, the 3ENCULT project is laying the foundation for greater cooperation within this CEN work on energy efficiency. 3ENCULT is participating in two technical committees, CEN/TC 346/WG4-TG15 “Protection of Collections” and CEN/TC 346/WG8 “Energy Efficiency of Historic Buildings”.

Augmenting this knowledge base is the competence of the partners in the Energy Performance of Building (EPBD) Directive. Their work is contributing to a CEN-standard for energy efficiency in historic and protected buildings, by liaising with national standard organisations and assisting in the cooperation between CEN TC 346 and other CEN initiatives on energy efficiency calculation techniques.

For more information, read “Position Paper on criteria regarding the assessment of energy efficiency measures regarding their compatibility with conservation issues”

Photo credit: Metropolitan Transport Authority Flickr.com

Making Europe’s cultural heritage more energy efficient

Conservators and energy experts seek new solutions for a climate-friendly retrofitting of historic buildings.

A well-accepted measure for climate protection involves reducing greenhouse gas emissions. And buildings have the greatest energy saving potential, according to the official EU Energy Efficiency Plan 2011. Because of their lack of energy efficiency, historic buildings – including listed buildings and buildings generally worthy of preservation – may play an important role in meeting climate targets. This is precisely what the EU-funded project 3encult is aiming at: combining energy efficiency with the preservation of Europe’s rich cultural heritage in historic buildings.

Making old buildings more climate-friendly is not an easy task. Local conservation bodies set tight limitations to what can be done during renovation. Countries such as Germany or Austria have already set up regional or national guidelines for the energy efficient renovation of historic buildings.

There are also plans for European guidelines. “But in heritage conservation, each case has to be seen individually,” project scientist Franziska Haas tells youris.com. She is also a research associate at the department of heritage conservation and design at the Technische Universität Dresden, Germany. Haas believes that solutions have become easier to implement as conservators have given up the notion to entirely preserve historic buildings. “It is now not only a question of how to conserve a building but also of how to further develop it,” she says.

Refurbishing windows, for example, is a useful approach for reducing energy loss in old buildings. In one of the project’s case studies in Bolzano, Italy, the project partners had the opportunity to completely replace the windows. “Preserving the old windows

was neither necessary from a conservator's point of view nor economically reasonable," Haas says. The building was therefore fitted with new energy efficient windows. "Thanks to professional planning, the new design could be individually adapted to suit the baroque façade," she says.

Compromises can also be reached on the way the energy is supplied to old buildings. For example, ensembles of historic buildings could benefit from district heating by combined heat and power plants. "This does not interfere with the historical character," Haas says. By contrast, solar panels are not suited if they destroy the entire roofscape of old towns.
Experts acknowledge the challenges of this approach. "It is important to find technical solutions that [preserve] the aspect of historic buildings," comments Tor Broström, professor at Uppsala University Campus Gotland and coordinator of the Swedish research programme for energy efficiency in cultural heritage buildings.

He also considers district heating as a very good example for saving energy because it has little impact. However, improving a building's envelope, such as walls or windows, is often "the most difficult part because it affects the appearance," Broström says. "Compromises are very individual," he adds, such as in the case of Bolzano. Architects or conservators have to decide whether they would be willing to accept such solutions for their building.

An individual solution could also be found for the project's case study in Innsbruck, Austria. There, the initial plan was to insulate the outer walls of a school building from the 1920s to protect the concrete façade. This, however, went against the conservators' view. "Now there will be an interior insulation in two classrooms that accounts for aspects of the interior design," Haas says. Along with other measures, the effects of the new insulation are currently monitored to determine whether the chosen approach is suitable for the entire building. One of the advantages of the project is the empirical data it provides, according to Johannes Sima, head of the department for architecture and building technology at the Federal Office for the Protection of Monuments, in Austria. There was initially no consent on how to approach the renovation of the Innsbruck case study, "but the communication has improved," he says.

He is, however, more generally doubtful whether improving the energy efficiency of historic buildings will substantially contribute to reducing greenhouse gases. "You should not try to crack a nut with a sledgehammer," Sima says. In Austria, about 3.6% of the existing buildings are listed with only about one percent being actually heated. In his view, instead of changing historic buildings, changing the actual behaviour of users – such as better control of heating and opening windows – has the "highest potential" to save energy.

One of the lessons already learned throughout the project is the need for continuous dialogue, Haas points out. "The best solutions can be found if all actors involved – energy consultants, conservators, building physicists, architects – communicate with each other from the very beginning," she says. "The dialogue between the actors is important," Broström agrees, "but you need an idea how to do this."

By Constanze Böttcher, youris.com

Restore History and Save Energy

Restoring historic buildings and saving energy at the same time is now a reality. Watch the video and get inspired!

A brand new window with thin-layer glazing combines energy efficiency with the aesthetics of a baroque window. Passive house window expert Franz Freundorfer developed the heat-saver for the Waaghaus in Bolzano, a building from the 13th century. Combining new technology and old traditions the scientists want to bridge the gap between the conservation of **historic buildings** and improving **energy efficiency**..

Also the **Palazzina della Viola built in Bologna** in 1497 was given a make-over. Preserving delicate original material had limited the energy savings, but even though the heating and cooling loads were reduced by 12% and 30% respectively. Also the indoor climate conditions were improved for achieving comfort and artworks preserving conditions. Today the building is the headquarter of the University´s Department of International Exchange serving 7.000 students every year Passive house window expert Franz Freundorfer developed the heat saver together with researchers and exprerts of the 3encult project for the **Waaghaus in Bolzano**, a building from the 13th century.

Enjoy the **video.**

Contact: elisabeth.schmid@youris.com

Photo credit: Vollmond11 CC-BY-SA-3.0, Wikimedia Commons.

Calculation tool for historic buildings: energy savings, cost-effectiveness and verification of certification criteria

CALCULATION OF VARIANTS

		Active					
	select active variants >>	3-Renovation with Passive House components	Existing	Moderate thermal insulation	Renovation with Passive House components		
Results	**Units**	3	1	2	3	4	
Annual heating demand	kwh/(m²a)	13,6	282,2	32,9	13,6		
Heating Load	W/m²	10,0	112,2	18,9	10,0		
Overall specific space cooling demand	kwh/(m²a)						
Cooling load	W/m²						
Frequency of overheating	%	1,5	0,8	1,4	1,5		
Total primary energy demand	kwh/(m²a)	60,1	376,1	82,3	60,1		
Certifiable as Passive House?	yes / no	yes	no	no	yes		
User defined	Units	Link	Link	Link	Link		

The Passive House Planning Package (PHPP) has long been the standard tool for design and certification of Passive Houses. At the core of the package are worksheets for heating and cooling energy balances, heat distribution and supply, electricity demand, and primary energy demand.

Within 3ENCULT, the PHPP has been supplemented with useful features for energy retrofit of historic buildings. This includes:

- Parallel calculation of the pre-intervention status as well as subsequent refurbishment steps in one PHPP file
  Parallel calculation of different variants of the same energy retrofit measures (e.g. different glazing qualities).
- Comparison of these variants regarding energy savings, minimal interior surface temperatures, and financial net profit (life-cycle calculation).
- Verification of compliance with PHI's EnerPHit standard for energy retrofit of historic and other buildings.
- Database of typical construction elements of old buildings

EnerPHit verification has already been included in the current official PHPP release. The other new features will be added with PHPP 9, to be released in the second quarter of 2014. Please refer to http://passiv.de/en/04_phpp/04_phpp.htm for more information.
3ENCULT is now developing a set of recommendations on ways to integrate energy efficiency retrofits of historic buildings into local sustainability processes and strategies. Local Governments across Europe are invited to take part in the discussion on overcoming barriers to implementation, and exploring solutions for the advancement of this sustainability target through an inclusive process of consultation.

ICLEI Europe and the 3ENCULT project consortium warmly invite you to join a FREE workshop on energy efficient solutions to preserve your historic buildings in Alba Iulia, Romania on 4 March 2013

This workshop aims to ensure exchange and knowledge-sharing on topics such as the economic feasibility of **refurbishing historic buildings**, recommendations and experiences on how to **save** historic buildings and **energy** to meet the challenges of growing **tourism** in European historic centres,.

The event is aimed at **local political decision-makers** who guide the urban planning strategy and/or climate protection work of the municipality and **technical staff** working with monument protection, buildings, energy planning.

Explore with us how historical buildings can be adapted to achieve higher energy efficiency and improved levels of comfort while contributing to the outcomes of a broader climate mitigation strategy.

Please find here the **latest draft of the** programme.

Secure your city one of the **seats available** to observe, learn about, and experience ambitious options for sustainable energy efficiency!

For more information and to register for the study tour, please contact elisa.kerschbaumer@iclei.org and giorgia.rambelli@iclei.org

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PROJECT INFORMATION

» Info
» Partners
» Case Studies
» Deliverables

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