5. Höttinger School - Innsbruck (Austria)

Listed as one of the most important examples of early modern architecture in Tyrol (1929-1931). High heating energy demand and severe overheating problems due to large unshaded glazing areas and overdesigned, not adjustable heater. The last two aspects causes also air quality problems and low thermal comfort. Objective: (energetic) refurbishment already decided, funds are dedicated, start of renovation of two "prototype classrooms" in summer 2012.

6. Warehouse City Potsdam & other (Germany)

Analysis and comparison of different internal insulation solutions at the Schinkelspeicher (19th) in Warehouse City Potsdam and other historic buildings in Dresden, Freiberg and Görlitz. Responsible Contact: TU Dresden.

7. Industrial Engineering School-Béjar/Salamanca (Spain)

The Technical Engineering School of Béjar was projected in 1968 as a building with five floors in the main wall and seven floors in the back façade, built in concrete and brick and with large façades in glass. During the last decades, the building has suffered several redistributions to be adapted to the change in the way of teaching, the new subjects in the different degrees and the new technologies.

8. Strickbau Appenzell (Switzerland)

Old Strickbau-building in Appenzell/Switzerland (17th century). "Strickbau" buildings are prevalent in most alpine regions and consist of layered wooden beams, connected at the corners for stability and typically extending somewhat from the core block.

5   6

7   8

consortium
and partners

Involving experts and stakeholders

The joint task of conservation and energy efficient retrofit is highly interdisciplinary. The 3ENCULT project partners cover a range of expertise and sectors, including conservation experts, technical experts, urban development experts, industry partners, implementation experts and stakeholder associations.

Furthermore, **Local Case Study Teams** bring together those individuals with hands on experience: building owners, local offices for the protection of monuments, city councils, and the architects and engineers in charge of the retrofit activities.

EURAC research	IT
The Royal Danish Academy of Fine Arts	DK
IDK Institut für Diagnostik und Konservierung von Denkmalen in Sachsen und Sachsen-Anhalt	DE
University of Innsbruck	AT
ARUP	UK
University of Stuttgart	DE
CARTIF	ES
Bartenbach LichtLabor	AT
TU Dresden Institute for Building Climatology, Chair of Historic Preservation and Building Research, Centre of Expertise in Urban Regeneration	DE
Comune di Bologna	IT
Passivhaus Institut	DE
TNO	NL
Alma Mater Studiorum - Università di Bologna DEIS, DICAM	IT
Artemis	IT
Grupo Unisolar	ES
Menuiserie Andre	FR
Remmers	DE
ATREA	CZ
youris.com	BE
ICLEI Local Governments for Sustainability	DE
REHVA	BE

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1. Public Weigh House, Bozen/Bolzano (Italy)

The building of Romanesque origins (13th century) is part of the "Portici" of Bolzano, a typical composition of street market for that time. During the project runtime the refurbishment of the building is planned. Among the expected interventions is the development of a conservation compatible highly energy efficient window. Use: commerce, cultural (exhibition). Owner: Stiftung Südtiroler Sparkasse (foundation).

2. Palazzo d'Accursio, Bologna (Italy)

The core of the Town Hall dates back to the 13th century. It was built as the seat of the city government. It has been developed and expanded over the centuries. The expected intervention regards the thermal insulation of a portion of the museum. Uses: museums and seat of the local government. Owner: Municipality of Bologna.

3. Palazzina della Viola Bologna (Italy)

16th Century's light brick masonry structure, lightened by double open gallery, enriched with frescoes and painted wooden ceilings. Functional requalification planned for use as University department. Owner: University of Bologna.

4. Fæstningens Materialegård, The Material Court of the Fortress, Copenhagen (Denmark)

The main building of the Material Court 1756 was first restored in 1994-96. Currently the court is converted to public office spaces. The recent and ongoing restoration commissioned by Realdania Byg, is a pilot project that provides a unique material when it comes to analyze results of energy and cultural heritage.

case
studies

3encult
EFFICIENT ENERGY FOR EU CULTURAL HERITAGE

1   2

3   4
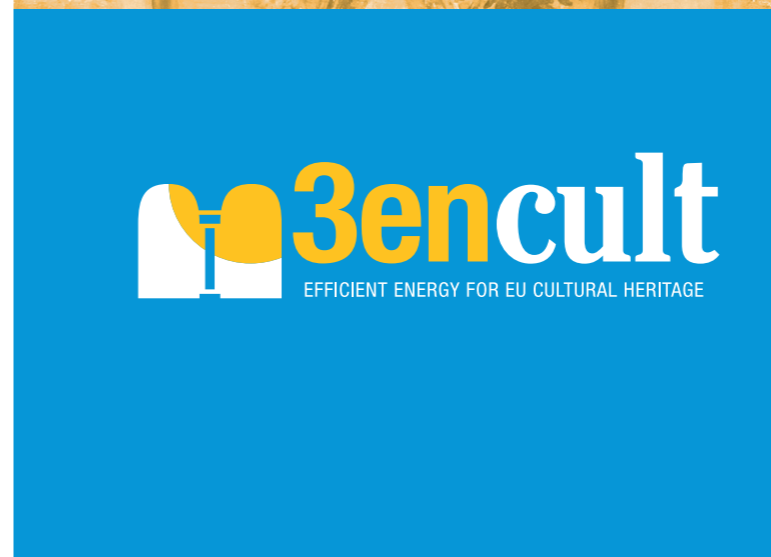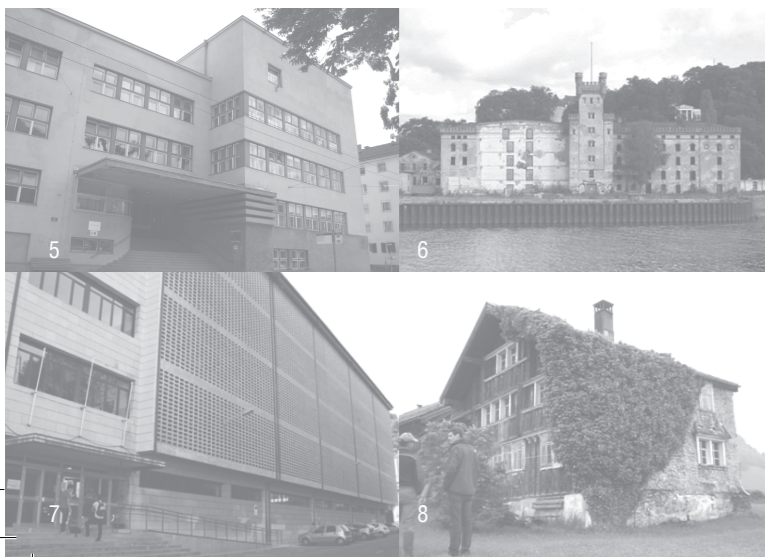
background
and objective

/

areas of
intervention

/

workplan and
dissemination

/

expected
impact

Why focus on historic buildings?

Historic buildings are the trademark of many European cities, towns and villages. From the Vatican in Rome to a small church in any village on the continent, historic quarters are what make our cities unique, a living symbol of Europe's rich cultural heritage, and a reminder of times past, which made our cities what they are today.
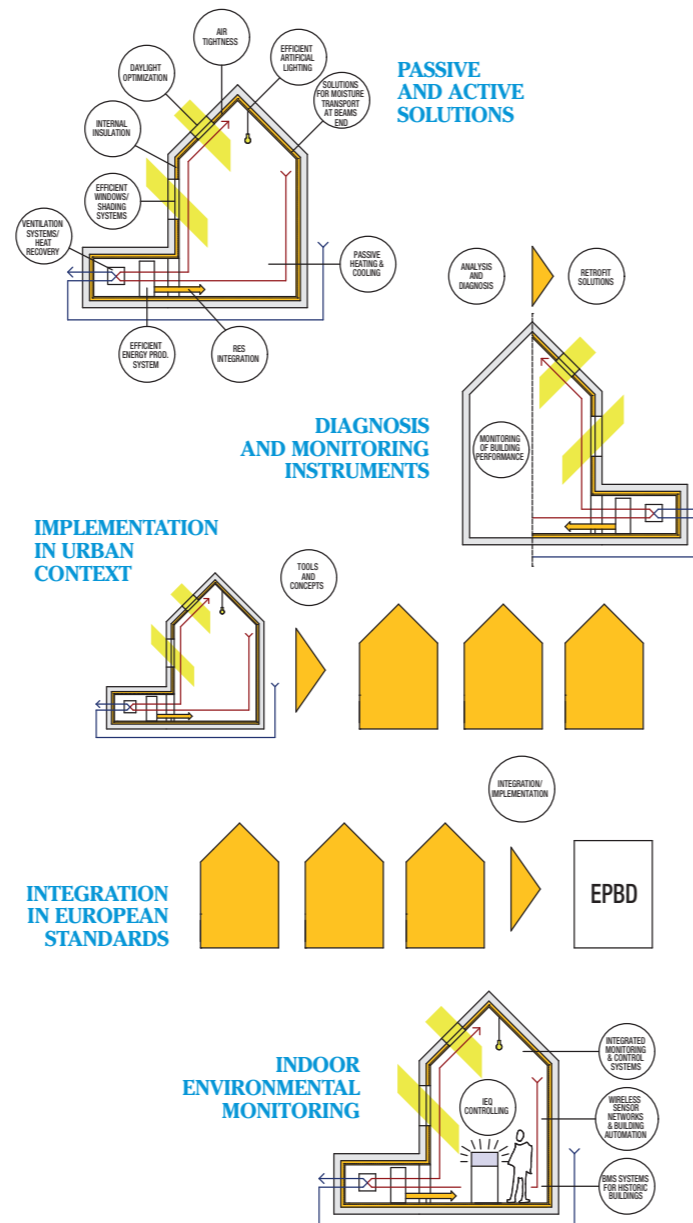
However, it is clear that these buildings are not energy efficient and are substantial contributers to greenhouse gas (GHG) emissions and rising energy bills. At a time when climate change poses a real and urgent threat to humanity and its infrastructure, it is vital to initiate an improved approach to the refurbishment of historic buildings, which in many cases are in danger themselves.

Objective

The **3ENCULT** project bridges the gap between the conservation of historic buildings and dealing with climate protection. While this may seem like a contradiction, historic buildings have a higher chance of survival when they are retrofitted in an energy efficient way, as these:

- are properly maintained as living spaces,
- focus on user comfort yet maintain historic interests,
- support structural protection,
- reduce energy needs, and
- assist the proper management of historic buildings that are part of heritage collections.

3ENCULT will demonstrate that it is feasible to reduce energy demand by between 75% and 90%! This of course also depends on the case in question and the heritage value.

PASSIVE AND ACTIVE SOLUTIONS

AIR TIGHTNESS · EFFICIENT ARTIFICIAL LIGHTING · DAYLIGHT OPTIMIZATION · SOLUTIONS FOR MOISTURE TRANSPORT AT BEAMS END · INTERNAL INSULATION · EFFICIENT WINDOWS/ SHADING SYSTEMS · VENTILATION SYSTEMS/ HEAT RECOVERY · PASSIVE HEATING & COOLING · EFFICIENT ENERGY PROD. SYSTEM · RES INTEGRATION

ANALYSIS AND DIAGNOSIS · RETROFIT SOLUTIONS

DIAGNOSIS AND MONITORING INSTRUMENTS

MONITORING OF BUILDING PERFORMANCE

IMPLEMENTATION IN URBAN CONTEXT

TOOLS AND CONCEPTS

INTEGRATION/ IMPLEMENTATION

INTEGRATION IN EUROPEAN STANDARDS

EPBD

INDOOR ENVIRONMENTAL MONITORING

IEQ CONTROLLING · INTEGRATED MONITORING & CONTROL SYSTEMS · WIRELESS SENSOR NETWORKS & BUILDING AUTOMATION · BMS SYSTEMS FOR HISTORIC BUILDINGS

Starting in work package 2 with an analysis of the challenge to be approached and the needs for comprehensive diagnosis, work package 3 and work package 4 will investigate technical solutions for the energy enhancement as well as smart monitoring and control. Work package 5 will allow the demonstration of the developed solutions while work package 6 will give (i) stimulus for the solution development and (ii) successively feedback. Work package 7 gathers the development of design tools, quality assurance within and after the project as well as contributions to standards and knowledge transfer. Work package 8 is focused on the dissemination of results to a wide range of stakeholders.

The developed solutions and new products will be presented trough different channels:

- Handbook with design guidelines for planners & FAQ platform
- University & Professionals Training
- Presentation at conferences & fairs
- Publications in journals
- Study tours to Case Study sites
- Workshops and guides for local governments
- Video news realise & regular press releases
- e-Newsletter
- www.3encult.eu

Don't hesitate to get in contact!

In the EU 14% of EU building stock were constructed dates before 1919, 26% before 1945. Although – and even if only a certain amount of these buildings are protected (listed), most of them have historical significance and should be treated with care.

By reducing a building's energy demand (~855 TWh) by 75% would result in more than 180 Mt of CO_2 could be saved (3.6% of EU-27 emissions in 1990)

- **3ENCULT** triggers significant energy savings in historic buildings and carbon dioxide (CO_2) reductions
- **3ENCULT** improves living conditions in historic buildings
- **3ENCULT** improves quality management in historic urban areas
- **3ENCULT** contributes to Europe's Economic Recovery and Energy Policy

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