



Project presentation

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Historic buildings



- ... are the trademark of numerous European cities
- ... are a living symbol of Europe's rich cultural heritage & diversity
- ... reflect the society's identity and need to be protected

- ... show a high level of energy inefficiency
- ... contribute with considerable CO₂ emissions to climate change
- ... do not always offer “comfort” – to people as well as to artworks

Historic buildings

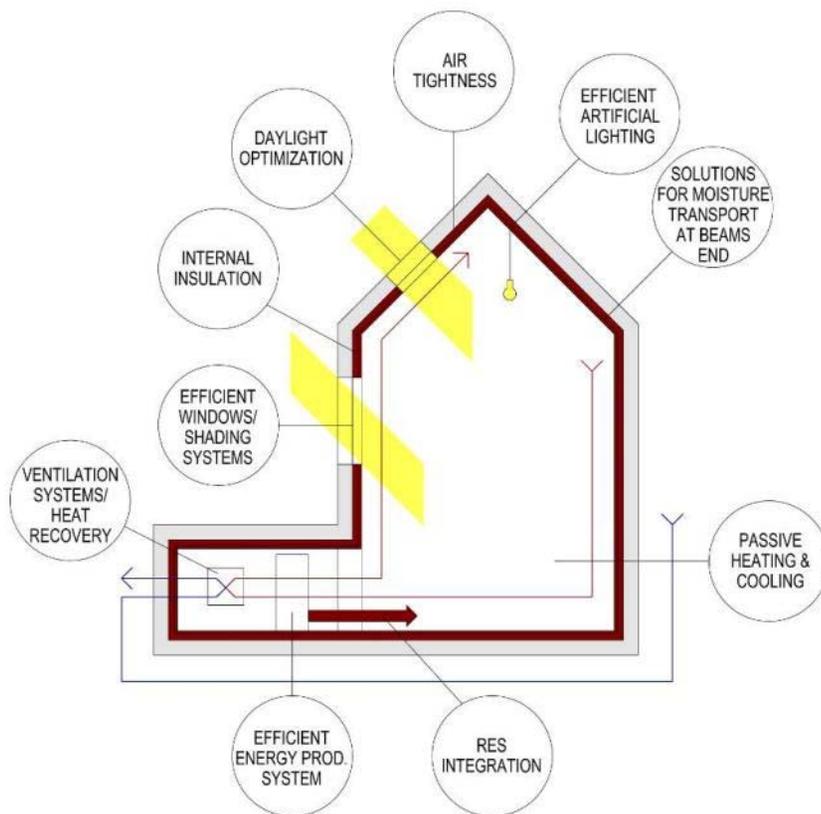


Talking in numbers:

- 150 towns & urban fragments are World Cultural Heritage sites
- 55 million dwellings, home to 120 million Europeans, were built before 1945
- they need 855 TWh of energy and emit 240 Mt of CO₂ (estimated)
- contribute to the income from tourism – which stands for 5.5% of EU GDP and employs 6% of EU workforce

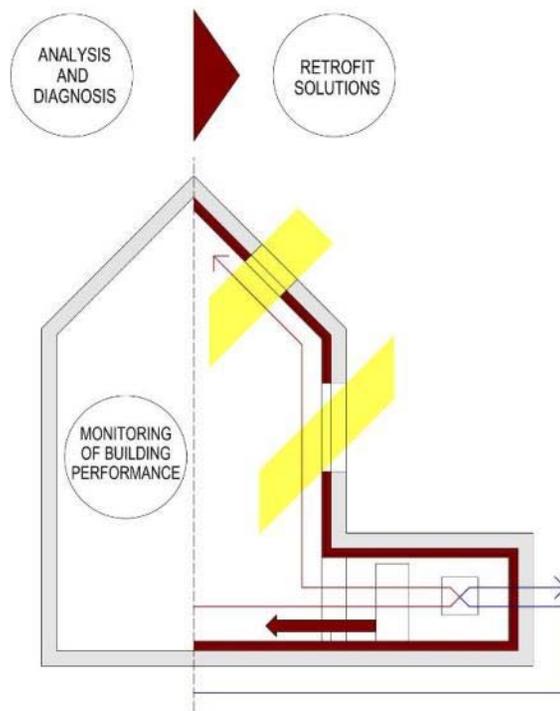
Factor 4 to 10 of energy reduction is achievable, also in historic buildings, respecting their heritage value, if a multidisciplinary approach guarantees the implementation of high quality interventions, specifically targeted and adapted to the specific case.

Objective 1: Passive and active energy retrofit solutions



- Develop passive and active solutions, as result of **open and constructive dialogue** among stakeholders in several fields
- Starting with materials and products already **available** on the market and from solution already applied for new buildings.
- This with the aim to ensure the **widest possible dissemination** of the achieved results all around Europe

Objective 2: Diagnosis and Monitoring instruments



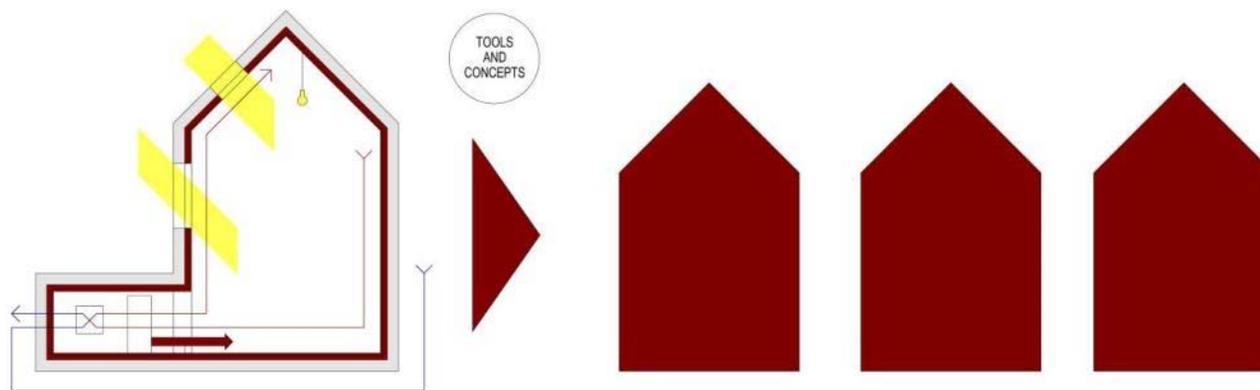
Define **diagnosis and monitoring instruments**

- to study historic buildings and find out the best technological and constructive energy retrofit solutions
- to support their commissioning
- to assess the actual performances of buildings once retrofitted and
- to monitor such performance.

Objective 3: Tools and concepts – the urban context

Develop **tools and concepts**

- supporting the implementation in different urban context
- ensuring their effective transferability to historic buildings located in different locations
- calculation software, solutions inventories, dedicated internet portal, monitoring systems, assessment approaches.

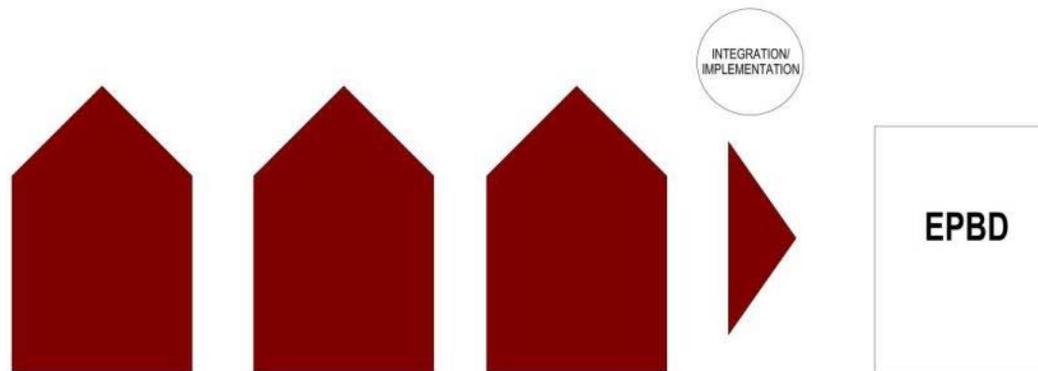


Objective 4: Integration of the present regulation framework



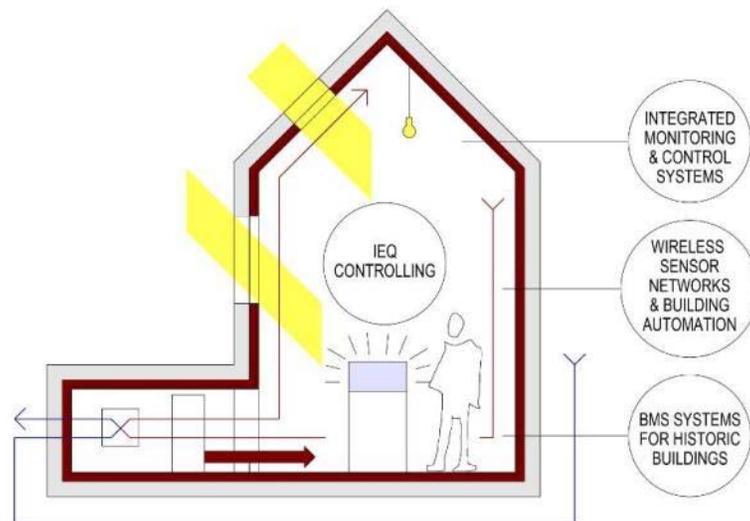
Issue position papers suggesting possible **integrations and/or implementations of the present regulation framework** for improving energy efficiency of historic building in urban areas and in particular:

- EPBD - Energy Performance of Building
- CEN TC 346
- EIA as well as the SEA Directives and SUIT guidelines



Objective 5: IEQ controlling

Define a methodological approach in order to use the developed monitoring system also for **IEQ controlling** in historic buildings where cultural heritage collections are located (comfort for users and “comfort” for heritage collections).



Project Consortium

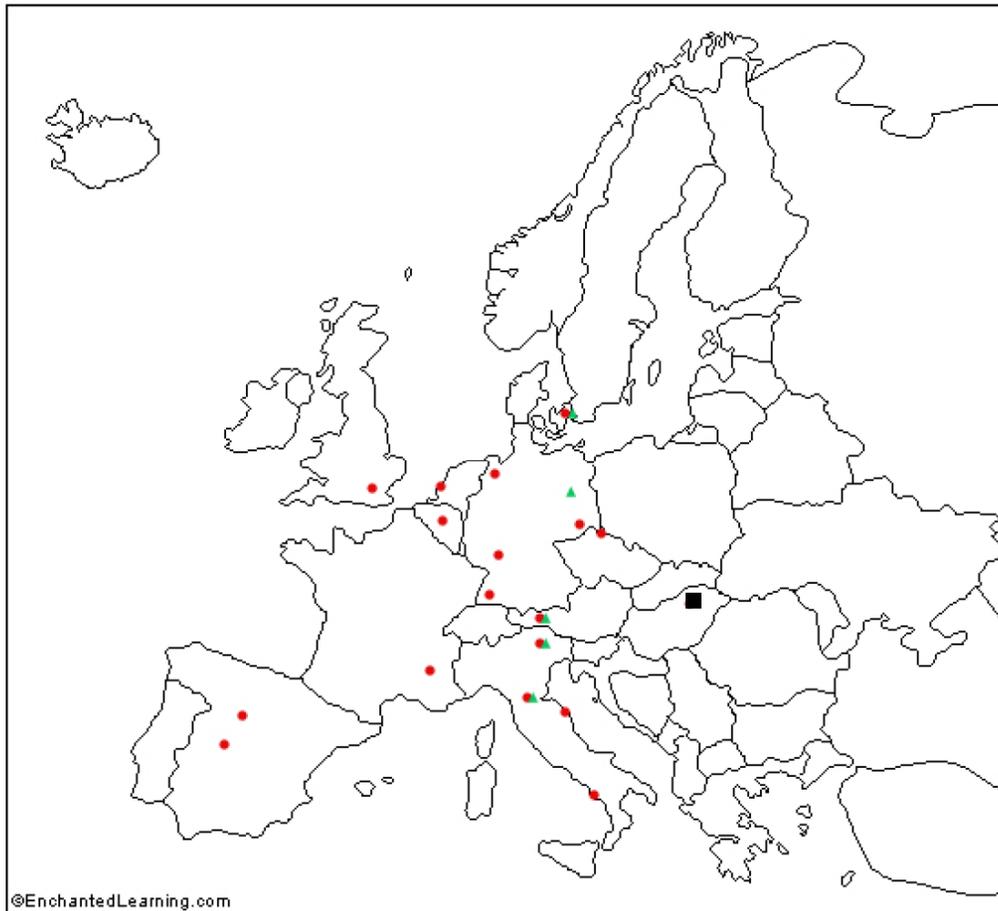


The direct project partners cover:

- Conservation experts
- Technical experts
- Urban development experts
- Industry partners
- Implementation experts and stakeholder associations

Furthermore **Local Case Study Teams**, with one project partner as focal point and scientific partner, gather building owner, representatives from the offices for the protection of historic monuments, representatives from other local bodies concerned (e.g. city council) as well as the architects and engineers in charge of the retrofit works

Project Consortium

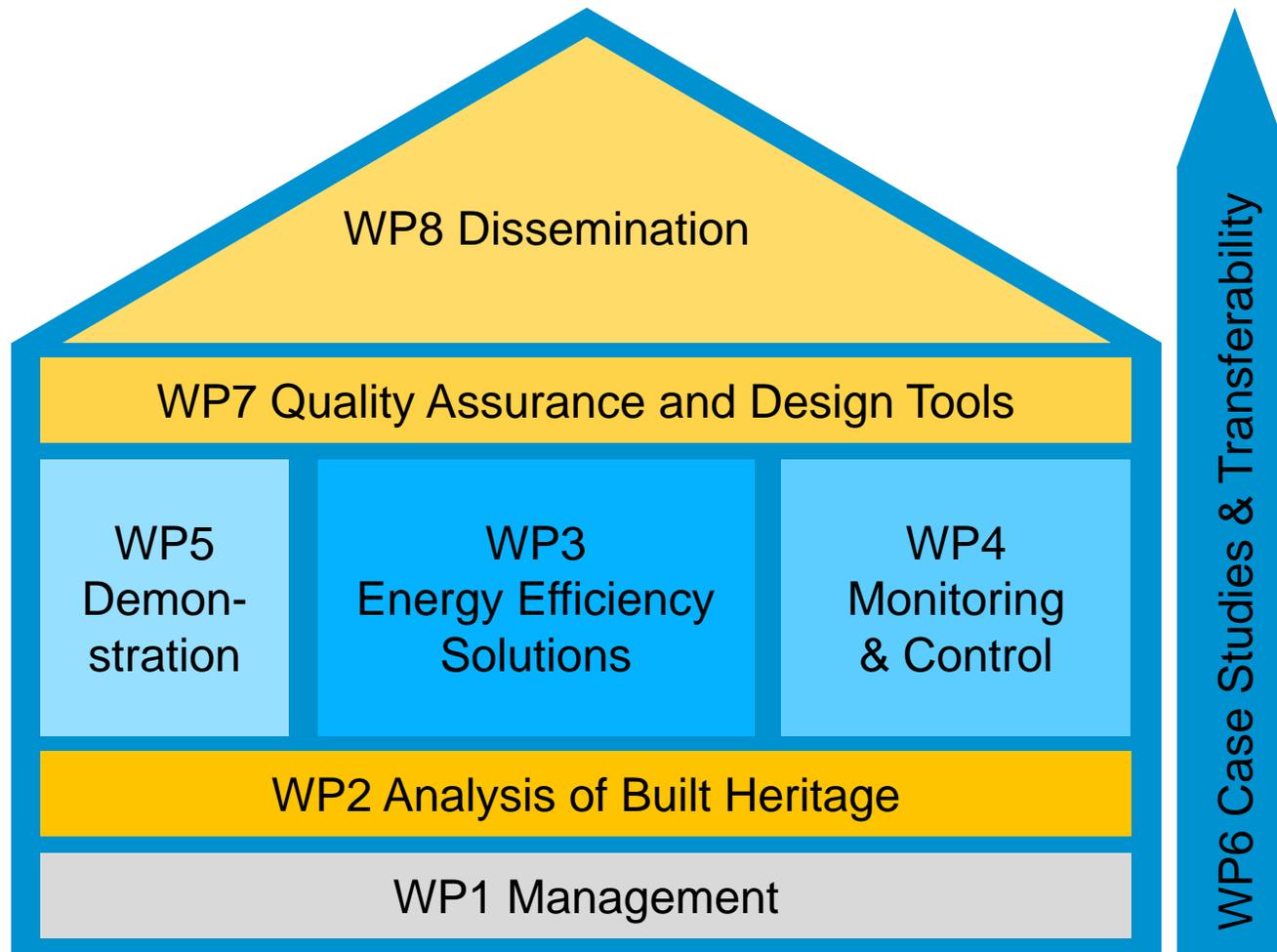


- 22 partners from 10 countries (IT, DE, AT, DK, UK, ES, BE, NL, FR, CZ)
- **Technical solutions**
Eurac, Uni IBK, TU Dresden, Passivhaus Institut, ARUP, Bartenbach Lichtlabor, Cartif, TU Darmstadt, Uni Bologna
Industry/SMEs on insulation, windows, HVAC, light and solar systems
- **Urban context**
Danish Academy of Fine Arts, TU Dresden, ICLEI
- **Conservation**
TU Dresden, Uni Bologna, Artemis, IDK, Danish Academy of Fine Arts
- **Dissemination**
TNO, ICLEI, youris, REHVA
- **Local Case Study Teams**

		Country		Case study	Role			
					"Technical solutions"	"Urban context"	"Conservation"	"Dissemination"
1	EURAC research	IT	Coordinator, WP1 & WP8 lead	x	x			
2	The Royal Danish Academy of Fine Arts	DK	WP2 lead	x		x		
3	IDK - Institut für Diagnostik und Konservierung an Denkmalen	DE	WP2 co-lead				x	
4	Universität Innsbruck	AT	WP3 lead	x	x			
5	ARUP	UK	WP3 co-lead		x			
6	Universität Darmstadt	DE	WP4 lead	x	x			
7	Cartif	ES	WP4 co-lead	x	x			
8	Bartenbach Lichtlabor	AT	WP5 lead		x			
9	TU Dresden	DE	WP6 lead	x	x		x	
10	Comune di Bologna	IT	WP6 co-lead	x		x		
11	Passivhaus Institut	DE	WP7 lead		x			
12	TNO	NL	WP7 co-lead					x
13	Alma Mater Studiorum Università di Bologna	IT	diagnosis & monitoring	x			x	
14	Artemis	IT	diagnosis & monitoring				x	
15	Elettronica Gelbison	IT	lighting solutions		x			
16	Grupo Unisolar	ES	solar solutions		x			
17	Menuseries Andre	FR	window solutions		x			
18	Remmers	DE	insulation solutions		x			
19	ATREA s.r.o.	CZ	ventilation solutions		x			
20	youris.com	BE	dissemination					x
21	ICELI - Local Governments for Sustainability	EU	dissemination			x		x
22	REHVA	BE	dissemination					x



Project structure



Case studies



- The research activities are **accompanied** and **stimulated** by the involvement of different case studies.
- At the same time, the different case studies will allow the **assessment** of the developed solutions.
- From here an analysis will be conducted to generalize proposed solutions, identify **replicable factors** and the context where replication is possible.

- 3ENCULT will contribute to the **diagnosis**, **support the design** and planning phase and **give feedback** with its monitoring
- The project **cannot**, however, contribute financially to the **intervention itself**.

It was thus important to select case studies, where the owners are committed to implement dedicated solutions and where the planned intervention's time schedule matches the project's time schedule.

Case studies selection criteria



DIFFERENT KINDS OF UTILISATION

Case studies reflect typical utilisations in urban areas and range from **residential** use over **commercial** and **office** use to **educational** use for a school and university. Furthermore, in order to cover also the special case of the preservation of cultural heritage collections in historic buildings, a building with **museum** use was also inserted.

DIFFERENT KINDS OF BUILDING STRUCTURE AND EPOCH

The buildings date from **different epochs** – ranging from middle age (13th century) to the 20th century. As regards the buildings structure, the most common types ranging from **stone**, over **masonry** and **clinker** to **wooden** structures are covered.

DIFFERENT KINDS OF CLIMATE

The sites chosen cover all major European climates.

Case studies Overview



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■ 8 case studies

- ▲ Waaghaus, Bozen/Italy
- ▲ Palazzo d'Accurso, Bologna/Italy
- ▲ Palazzina della Viola, Bologna/Italy
- ▲ Arsenal, Copenhagen/Denmark
- ▲ Höttinger School, Innsbruck/ Austria
- ▲ Speicherstadt, Potsdam/Germany
- ▲ University building, Bejar-Salamanca/Spain
- ▲ Strickbau, Appenzell/Switzerland



Case studies

Short information



CS1: Public weigh house, Bolzano (IT)

- **Object**
Building of Romanesque origins (**13th century**). Rehabilitation intervention necessary. Use: commerce, residential, (exhibition). Owner: Stiftung Südtiroler Sparkasse (foundation)
- **Proposed activities**
 - diagnosis & support for architecture competition
 - support during planning phase (insulation, windows, energy system)
 - transfer to concept on urban scale



CS2: Palazzo d'Accursio, Bologna (IT)

- **Object**
13th century nucleus, developed over centuries. Use: museum, public administration. Owner: Comune di Bologna
- **Proposed activities**
 - diagnosis & NDT
 - support during planning phase (insulation, windows, HVAC, lighting?)
 - transfer to concept on urban scale

Case studies

Short information



CS3: Palazzina della Viola, Bologna (IT)

- **Object**
15th century, lightened by double open gallery, enriched with frescoes and painted wooden ceilings. Intervention and functional requalification planned. Use: university. Owner: University of Bologna
- **Proposed activities**
 - diagnosis & NDT,
 - modelling
 - verification of intervention results



CS4: Fæstningens Materialegård, Copenhagen (DK)

- **Object**
Built mid of 18th century, part of the fortress next to Frederiksholm Canal. Use: public administration. Owner: Realea (Foundation)
- **Proposed activities**
 - diagnosis & NDT, monitoring
 - transfer to concept on urban scale

Case studies

Short information



CS5: Höttinger School, Innsbruck (AT)

- **Object**

Building from 1929-31, Architect Franz Baumann, Early building in . High Energy consumption, overheating, low air quality and problems with humidity. Use: school. Owner: Innsbrucker Immobilien GmbH&Co KG

- **Proposed activities**

- high efficiency passive house windows with integrated shading
- insulation of walls and roof
- - ventilation system with heat recovery



CS6: Warehouse City, Potsdam (IT)

- **Object**

Schinkelspeicher (19th century), refurbishment already completed, monitoring data available to 3ENCULT. Persiusspeicher (17th century), refurbishment planned. Use: Residential, offices, exhibition. Owner: Speicherstadt Potsdam

- **Proposed activities**

- diagnosis of historical constructions
- development of energy efficiency solutions (insulation, windows, energy system)

Case studies

Short information



CS7: University Building, Bejar/Salamanca (ES)

- **Object**
Salamanca University Building (19th century). Project in advanced state, (photovoltaic galleries, semi-transparent atriums, analyze air tightness ...)
- **Proposed activities**
diagnosis of historical constructions, support in design phase



CS8: Strickbau, Appenzell (CH)

- **Object**
Old Strickbau-building in Appenzell/Switzerland (17th century). Permission to dismantle the old wooden building with the constraint to make it available to research for one year.
- ... this allows for **outstanding activities**
 - to analyze behaviour of wooden constructions after extreme interventions
 - to use destructive analysis techniques usually not applicable on historic wooden buildings.
 - to realise different thermal and moisture conditions

3ENCULT TRIGGERS SIGNIFICANT ENERGY SAVING IN HISTORIC BUILDINGS

- Build upon experience, solutions based on already market available products
- Demand side fostered with ICLEI, involving a network of engaged municipalities
- Supply side prepared addressing REHVA's associated enterprises and construction sector

3ENCULT LEADS TO SUBSTANTIAL CO₂ REDUCTION

- ECTP vision: 30% retrofitted by 2030, 100% by 2050
- Factor 4 reduction = 180 Mt of CO₂ less! (3.6 % of EU-27 emissions in 1990)

3ENCULT IMPROVES LIVING CONDITIONS WITHIN HISTORIC URBAN AREA

- Better indoor comfort (perceived temperature, avoided air draught, daylight ...)

3ENCULT LEADS TO IMPROVED QUALITY MANAGEMENT OF HISTORIC CITIES

- ICLEI works with committed local governments (Cities for Climate Protection – CCP campaign) on replicable factors to be fed back to the Leipzig charter process

3ENCULT FOSTERS SUSTAINABLE RENOVATION AND LONG TERM CONSERVATION OF OUR BUILT HERITAGE

- Real protection by integration in everyday life
- Comprehensive diagnosis for sustainable conservation and selection of compatible (or even beneficial) measures
- SUIT – concept of “active conservation”

3ENCULT CONTRIBUTES TO EUROPE’S ECONOMIC RECOVERY

- Smart investment (European Recovery Plan)
 - Action 9: energy efficient systems and material in new and renovated buildings to reduce radically their energy consumption and CO₂ emissions
 - Action 6: set demanding targets
- Demonstration and guidelines, how to use existing products and materials
 - large number of construction enterprises across Europe
- Development of very specific solutions
 - with a number of innovative European enterprises

3ENCULT PRESERVES THE BASIS FOR CULTURAL TOURISM, A SIGNIFICANT ECONOMIC FACTOR IN EUROPE

- By providing solutions for the conservation-compatible retrofit of historic buildings, 3ENCULT supports the preservation of the diverse urban landscape in Europe, our typical ‘Old towns’, historic grown structures and public spaces.

3ENCULT HELPS IMPLEMENT THE EU ENVIRONMENTAL IMPACT ASSESSMENT DIRECTIVES WHEN APPLIED TO HISTORIC BUILDINGS

- Enhancement hypothesis for SUIT “Summary Guidance and the Active Conservation principle”, introducing energy issues and more detailed standard references and thresholds in a well framed methodological approach.

3ENCULT CONTRIBUTES TO EUROPEAN ENERGY POLICY

- EU climate action and renewable energy package – 2020 goals
- EPBD: proposal for a more differentiated approach with the aim to integrate historic buildings
- CEN: contribution to the development of 2nd generation standards related to EPBD
- RES integration

3ENCULT SUPPORTS THE STRATEGIC RESEARCH AGENDA OF THE EUROPEAN CONSTRUCTION TECHNOLOGY PLATFORM (ECTP) AND ITS FOCUS AREA IN CULTURAL HERITAGE (FACH)

- ECTP-Priority A: healthy and safe indoor environment
- ECTP-Priority C: efficient and clean buildings
- ECTP-Priority D: avoid demolition and improve LCA
- ECTP-Priority F: assessment, diagnosis and monitoring (F1), use of RES (F4) and sustainable management (F5) of cultural heritage
- to create a global map of different refurbishment and renovation options
- to assess technologies of “energy optimised buildings”, RES

Contribution to three key targets of FACH vision for 2030

- Promotion of energy efficiency in historic buildings
- Reduction in dependence on fossil fuel
- Contribution in reduction of CO₂

Keep updated!



- Website (www.3encult.eu)
 - Information on project
 - Description of Case Studies
 - All public deliverables
- Newsletter
- FAQ platform
- Workshops for local governments
- Study tours to case studies
- Handbook
- Conferences, Publications, University & Professional training, Trade fairs, Final Workshop, etc.

Contact the coordinator for further information:

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