



# Introduction

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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 **CO<sub>2</sub> emissions** to climate change
- ... do not always offer "**comfort**" to people as well as to artworks

Factor 4 to 10 of reduction in energy demand 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.



# Multidisciplinary Exchange







# Multidisciplinary Exchange



#### Within the project team ...

				Role				
			Case	"Technical	"Urban	"Conser-	"Dissemi	
			study	solutions"	context"	vation"	nation"	
EURAC research	п	Coordinator, WP1 & WP8 lead	x	x				
The Royal Danish Academy of Fine Arts	DK	WP2 lead	x		x			
IDK - Institut für Diagnostik & Konservierung an Denkmalen	DE	WP2 co-lead				x		
Universität Innsbruck	AT	WP3 lead	x	x				
ARUP	UK	WP3 co-lead		x				
Universität Stuttgart	DE	WP4 lead	x	x				
Cartif	ES	WP4 co-lead	x	x				
Bartenbach Lichtlabor	AT	WP5 lead		x				
TU Dresden	DE	WP6 lead	x					
Institute for Building Climatology Chair for Historic Preservation & Building Research Centre of Expertise in Urban				x	x	x		
Comune di Bologna	IT	WP6 co-lead	x		x			
Passivhaus Institut	DE	WP7 lead		х				
TNO	NL	WP7 co-lead					x	
Alma Mater Studiorum Università di Bologna	IT	diagnosis & monitoring	x					
DICAM						x		
Artemis	ІТ	diagnosis & monitoring		x		x		
Grupo Unisolar	ES	solar solutions		x				
Menuseries Andre	FR	window solutions		x				
Remmers	DE	insulation solutions		x				
ATREA s.r.o.	CZ	ventilation solutions	N.	x				
youris.com	BE	dissemination					x	
ICLEI Europe	DE	dissemination			x		x	
REHVA	BF	dissemination					x	



#### ... and in Local Case Study teams





# **Holistic Approach**







# Research & development



"3ENCULT aims at developing necessary solutions, both adapting existing solutions to the specific issues of historic buildings and developing new solutions and products."







# Tools and concepts – the urban context



#### Develop tools and concepts



Integrations and/or implementations of the present regulation framework





## Case studies Overview



THINK

RESDEN

CS7

CS8



**CS1:** Public Weigh House, Bozen

- CS2: Palazzo d'Accursio, Bologna
- CS3: Palazzina della Viola, Bologna
- CS4: The Material Court of the Fortress, Copenhagen
- CS5: Monumental School, Innsbruck
- CS6: Warehouse City Potsdam and other, Germany
- CS7: Industrial Engineering School, Salamanca.
- CS8: Strickbau Appenzell, Switzerland

## CS1: Public Weigh House in Bolzano/ Italy (13<sup>th</sup> century)



The main part of the existing structure of the public weigh house is from 13<sup>th</sup> Century





## CS2: Palazzo d'Accursio Bologna (13<sup>th</sup> century)



#### Palazzo d'Accursio is one of the most ancient building of Bologna



Improvement of the energy and environmental performance of the building



## CS3: Palazzina della Viola Bologna (15<sup>th</sup> century)



A light brick masonry structure from the 15<sup>th</sup> Century



The CS3 has installed the developed WSN (Wireless sensor network) compos by 36 nods and up to 150 sensors



## CS4: The Material Court of the Fortress, Copenhagen (18<sup>th</sup> century)

#### The listed Material court of the Fortress in Copenhagen was built in 1756



The main aim was not only at giving its contribution to CO2 emission reduction, but also at showing, how this can be achieved for listed buildings in Denmark



### CS5: Monumental School Innsbruck (20<sup>th</sup> century)



Höttinger school in Innsbruck /Austria is listed as one of the most important example of early modern architecture and was built in 1929



high heating energy demand and severe overheating problems as well as air quality problems and low thermal comfort



# CS6: Warehouse City Potsdam and other, Germany





The objective of the CS6 analysis and comparison of different internal insulation solutions at four historical building in four different cities with four different architecture styles



# CS7: Industrial Engineering School Salamanca (20<sup>th</sup> century)

The technical engineering school of Bejar was built in the 1968



Overheating, cooling system result in discomfort in many areas, lighting installation oversized, natural light and solar radiation aren't being exploited

## CS8: Strickbau Appenzell Switzerland, (17<sup>th</sup> century)



The old Strickbau-building in Appenzell/Switzerland was built in 1630



Finding solutions to be repeated in similar buildings – in Switzerland and all over Europe



# **Work Packages**







# Requirements



- Energetic retrofit on European monuments is a challenging task and pending issue
- Neither such alteration on heritage is impossible nor is this easy
- No energy saving measure on a building is conservation compatible or incompatible per se
- Always to refer specific solutions to specific real objects and their problems
- $\rightarrow$  3ENCULT approach to come to a sustainable answer:
  - $\rightarrow$  starting with a monument as a specific case
  - collect without prejustice possible & effective energy solutions



## Requirements



- → balance impact on the monument, on the heritage value, the loss of original material and the change of the appearance
- assess any damage risks and the reversibility of the addition
- specific developed and object adapted results, which most often are a perfect combination of existing standard solutions
- Additional effort in planning does lead to an improved and forward looking result for energy efficiency in the important European Cultural Heritage.



# **Keep updated!**



#### Website (<u>www.3encult.eu</u>)

- 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.

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