SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

Renovating Historic Buildings Towards Zero Energy

IEA SHC Task 59 / EBC Annex 76

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Innsbruck 25.9.2019

TASK 59
RENOVATING HISTORIC BUILDINGS TOWARDS ZERO ENERGY

2018 ANNO EUROPEO DEL PATRIMONIO CULTURALE
#EuropeForCulture

IEA SHC Task 59

Deep Renovation of Historic Buildings towards lowest possible energy demand and CO_2 emission (NZEB)

Operating agent: Alexandra Troi, Eurac Research

Task within the IEA SHC programme
Collaboration with IEA EBC programme on “moderate level” as IEA EBC Annex 76
Collaboration with IEA PVPS programme on “minimum level”

Start: September 2017
End: February 2021

AROUND THE WORLD

Partners & Programmes

TASK SHARING

Twenty five institutions from thirteen different countries. Task59 will benefit from the expertise and previous experiences that the different partners will bring to the project.

Vision

Conservation of historic buildings and climate protection is not an antagonism

In the last 10 years, a shift could be observed,
from **“don’t touch our buildings”**
to **“let’s find the right solutions together”**

DRIVERS

2010 EPBD 2010/31/EU

towards NZEB, exemption for listed buildings

2012 Energy Efficiency Directive 2012/27/EU

deep renovation rate of 3% for public buildings

OBSERVED INITIATIVES

2013 ICOMOS established

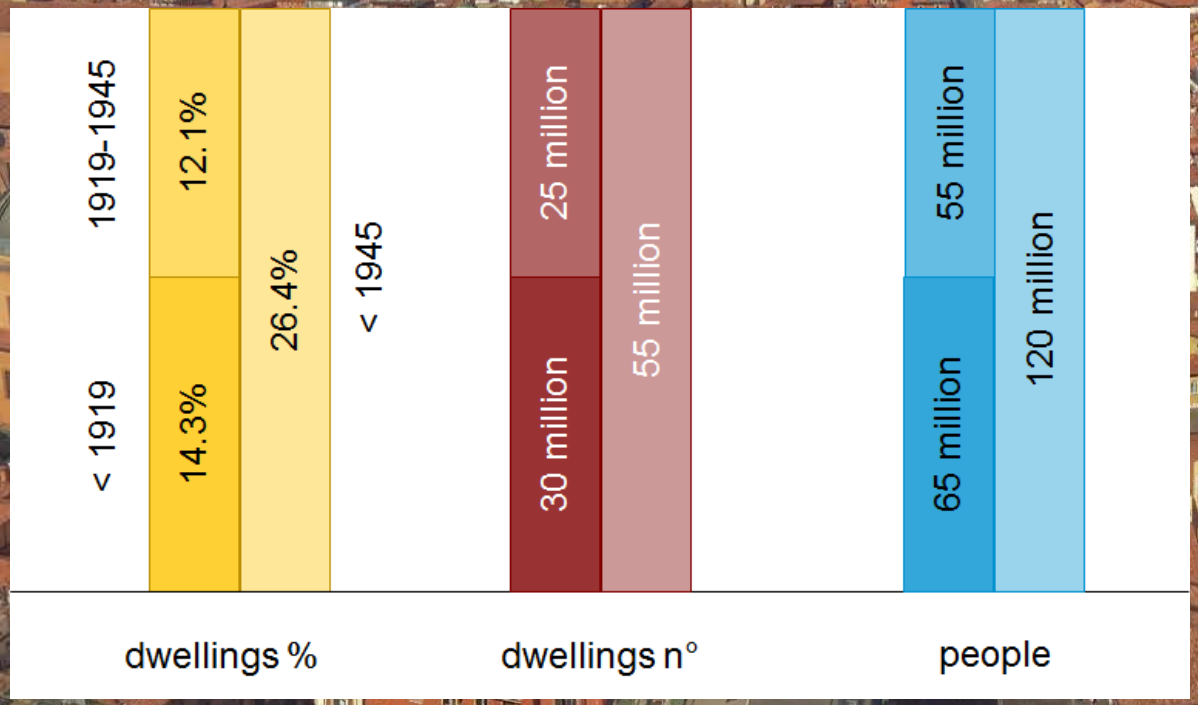
Scientific Committee for Energy and Sustainability

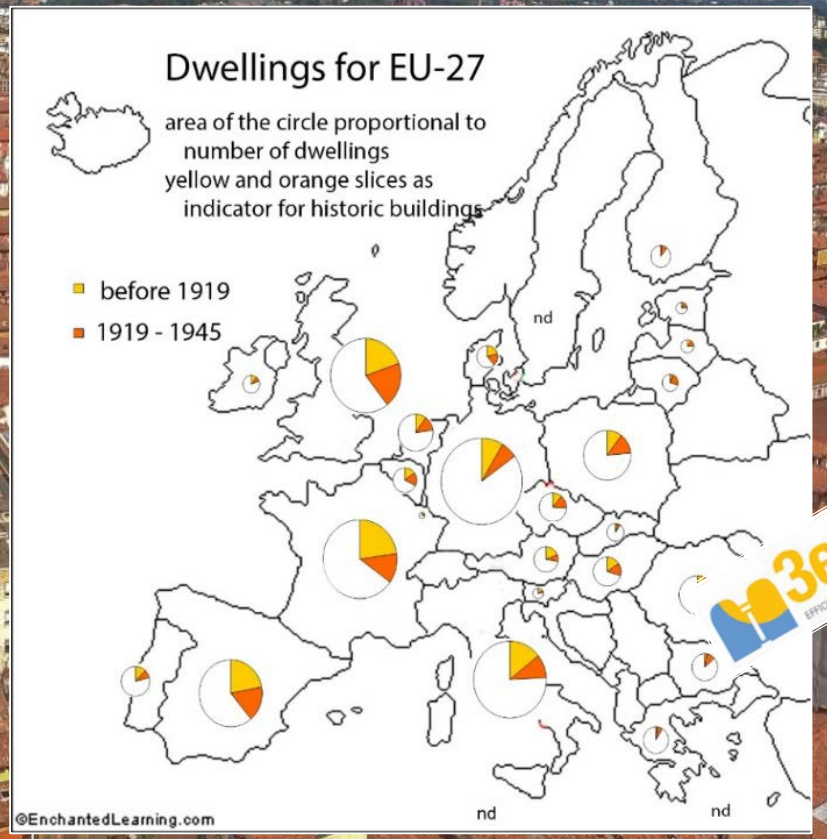
2017 CEN standard 16883

Improving the energy performance of historic buildings

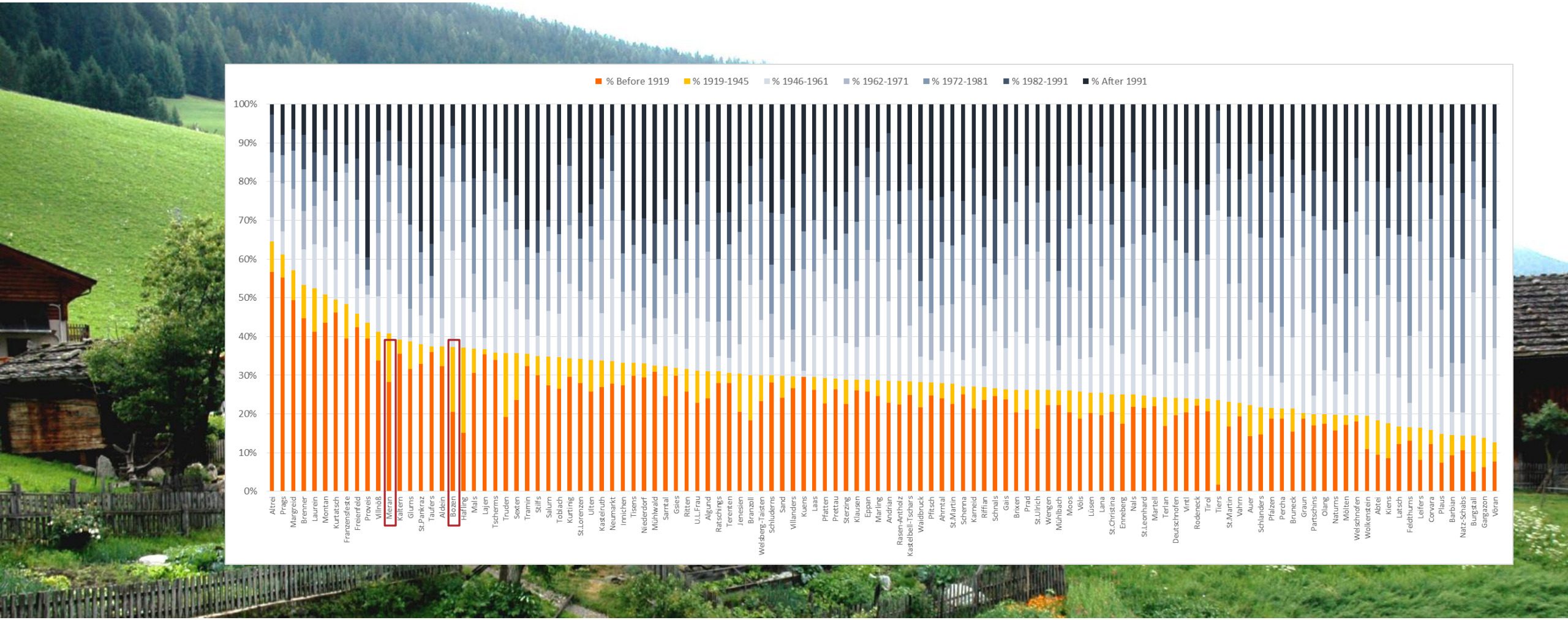
There is a need!

e.g. in Europe





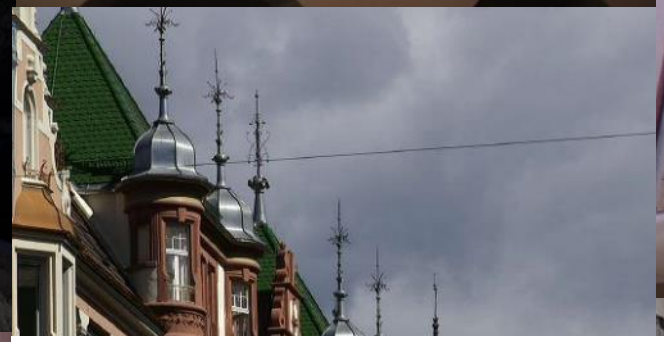
There is a need!



Historic buildings?

*"**Historic buildings*** according EN 16883 all buildings with elements "worthy of preservation"
-> all types & ages, not just listed/protected buildings






NZEB according IEA SHC Task 40 | EBC Annex 52 as equalized energy balance is reached by bringing together architectural design, energy efficiency and local use of renewable

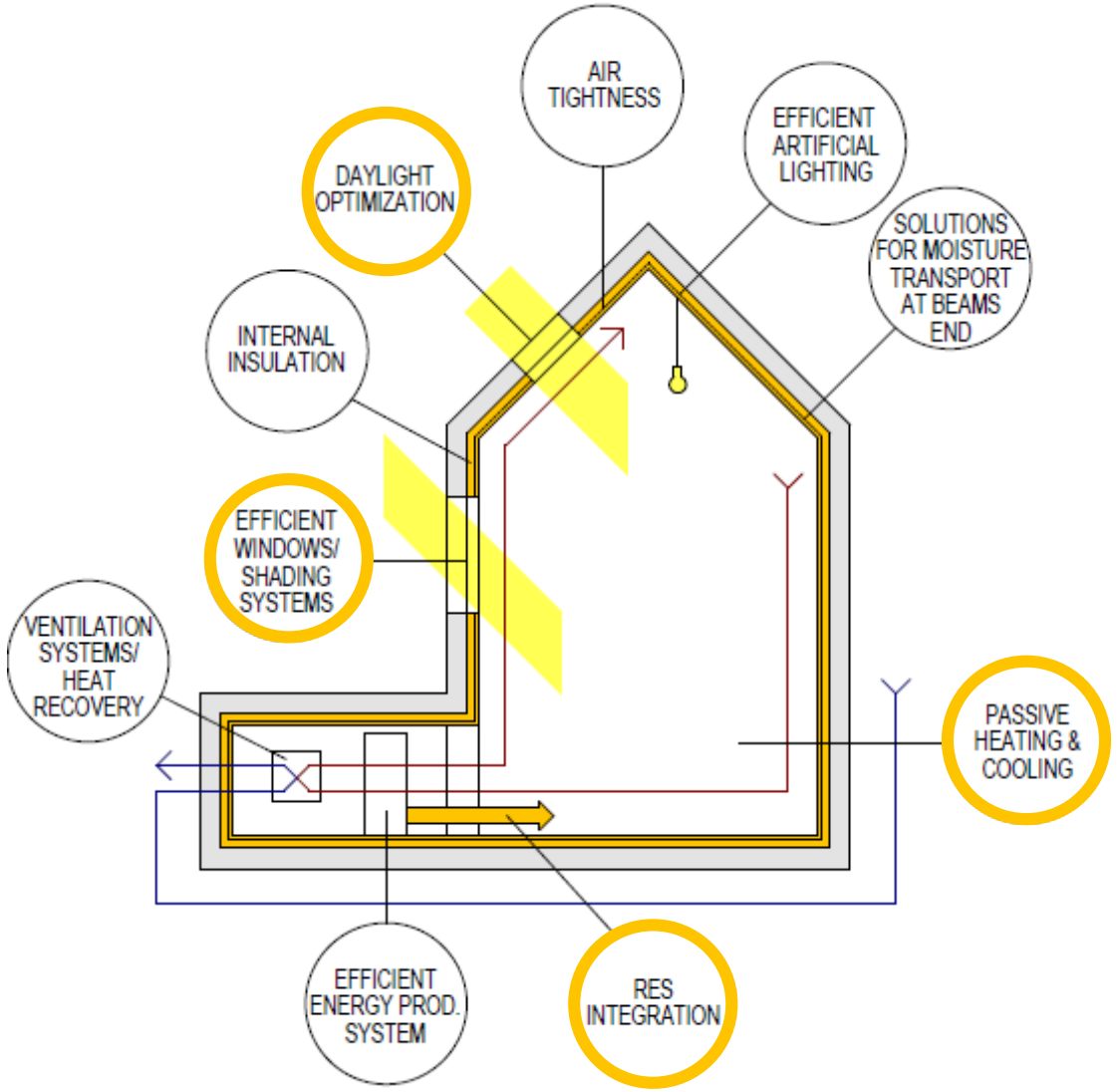
Holistic approach – Solar renovation

① REDUCE DEMAND

② PROVIDE FROM SUSTAINABLE SOURCES

Whole range of solar!

- Daylighting
- Passive solar energy
- Solar thermal
- Photovoltaics
- Hybrid



Proposed Task Structure

A. Knowledge Base

B. Multidisciplinary planning process

C. Conservation compatible retrofit solutions

D. Demonstration and dissemination

SubTask B - Multidisciplinary planning process

EN 16883:2017

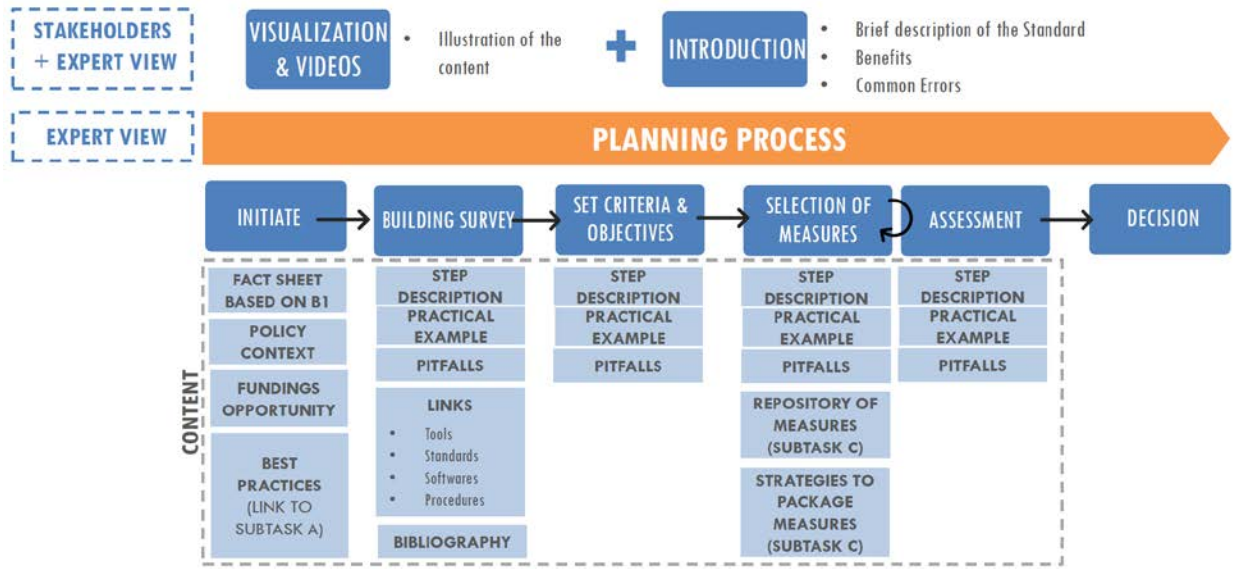
Conservation of Cultural Heritage

Guidelines for improving energy performance of historic buildings

... is **NOT** a standard that makes the **decision for the end** user by defining requirements and providing solutions.

... it should rather allow the user to make an **"informed decision"**

Tools for its implementation



DO YOU KNOW A GOOD TOOL?

GET IN TOUCH!

Task59@eurac.edu

SubTask C - Conservation compatible NZEB solutions

Focus on

Retrofit solutions

- Windows
- (Interior) Insulation
- Ventilation
- Solar integration

and

Retrofit strategies

DO YOU KNOW A CONSERVATION COMPATIBLE NZEB RETROFIT SOLUTION?

GET IN TOUCH!

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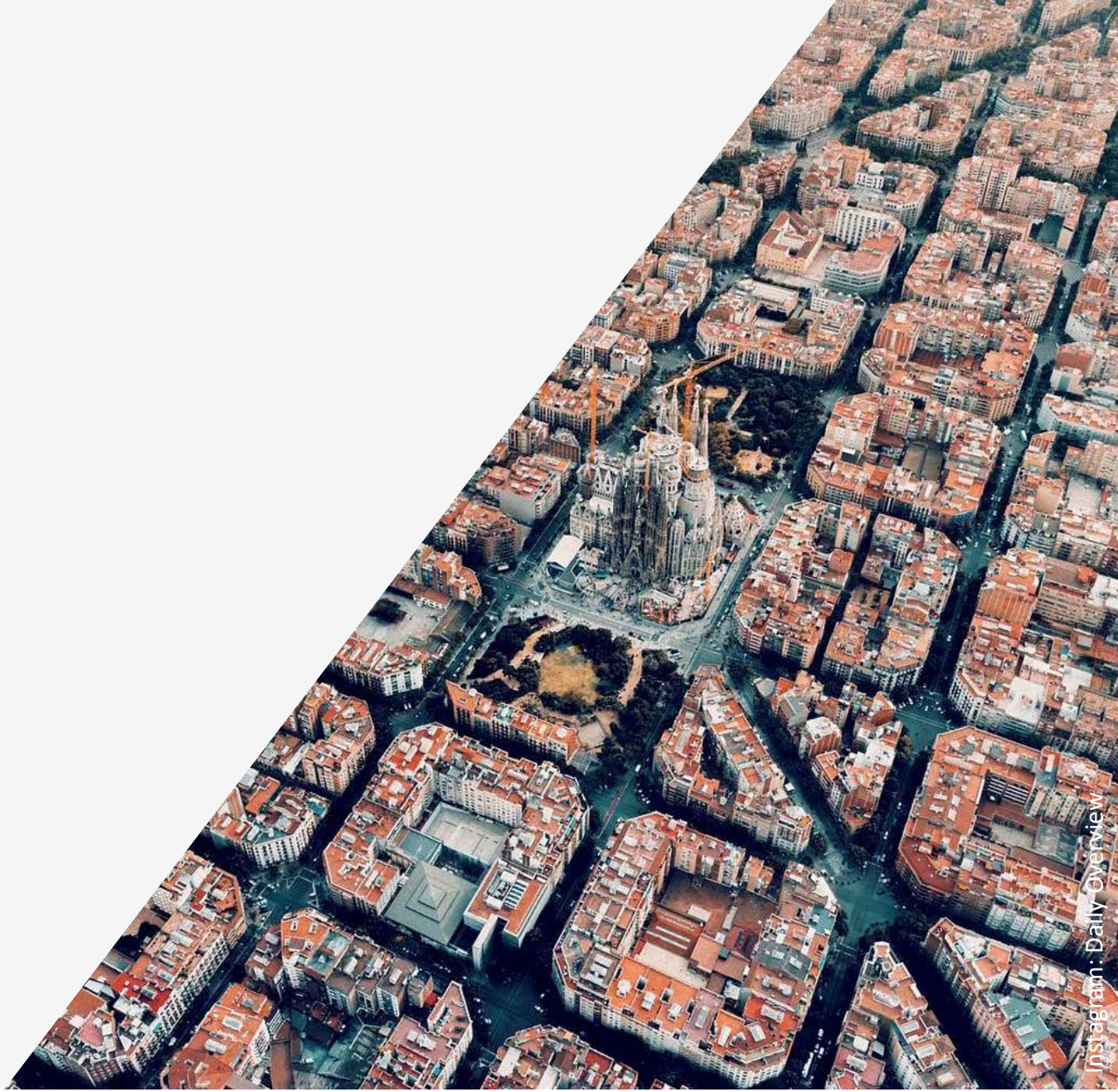
SubTask D - Demonstration & dissemination

- Conferences
  - EEHB 2018 in Visby, BHÖ 2019 in Wien, EEHB 2020 in Benediktbeuren
- Policy Events
  - Renovate Europe Day at the European Parliament
- Traveling Exhibition
  - Kicked off at BHÖ in Vienna 15/16 October 2019

INTERESTED IN HOSTING?

BOOK YOUR SLOT



SubTask A - Knowledge Base
Selection criteria for case studies

- Renovation of whole building
- Significant reduction of energy consumption (“better than business as usual”)
- Project has been implemented
- Heritage value assessed and respected
- Documentation of technical solutions & monitoring data (energy/costs) available

Innovation vs. Respecting the historic value

- What is the adequate balance between improving energy performance / comfort and respecting the historic value? -> no general rule
- General risk of innovation -> mid term/long term effects?
  - Mould growth
  - Poor indoor air quality
  - Growth of wood-decaying fungi
  - Inappropriate use of the building
- Internal reviewing of each case study
  - Technical perspective AND
  - Heritage perspective

INSPIRATION

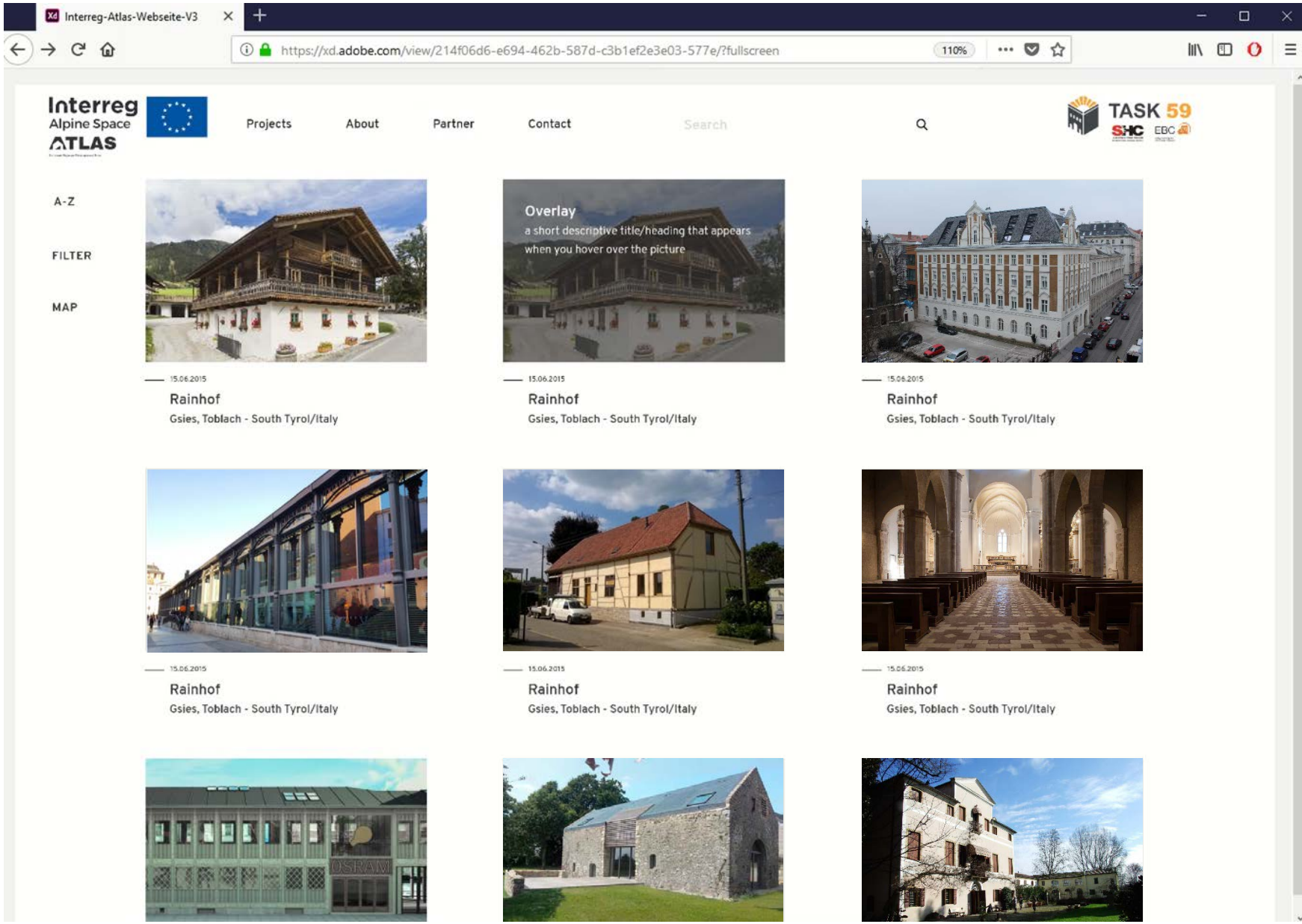
to trigger the demand

Focus on browsing experience

Visual information as a mean to reach end-users

Short and narrative texts, “magazine style”

Dynamic layout compatible with different screens: mobile, laptop, large screens

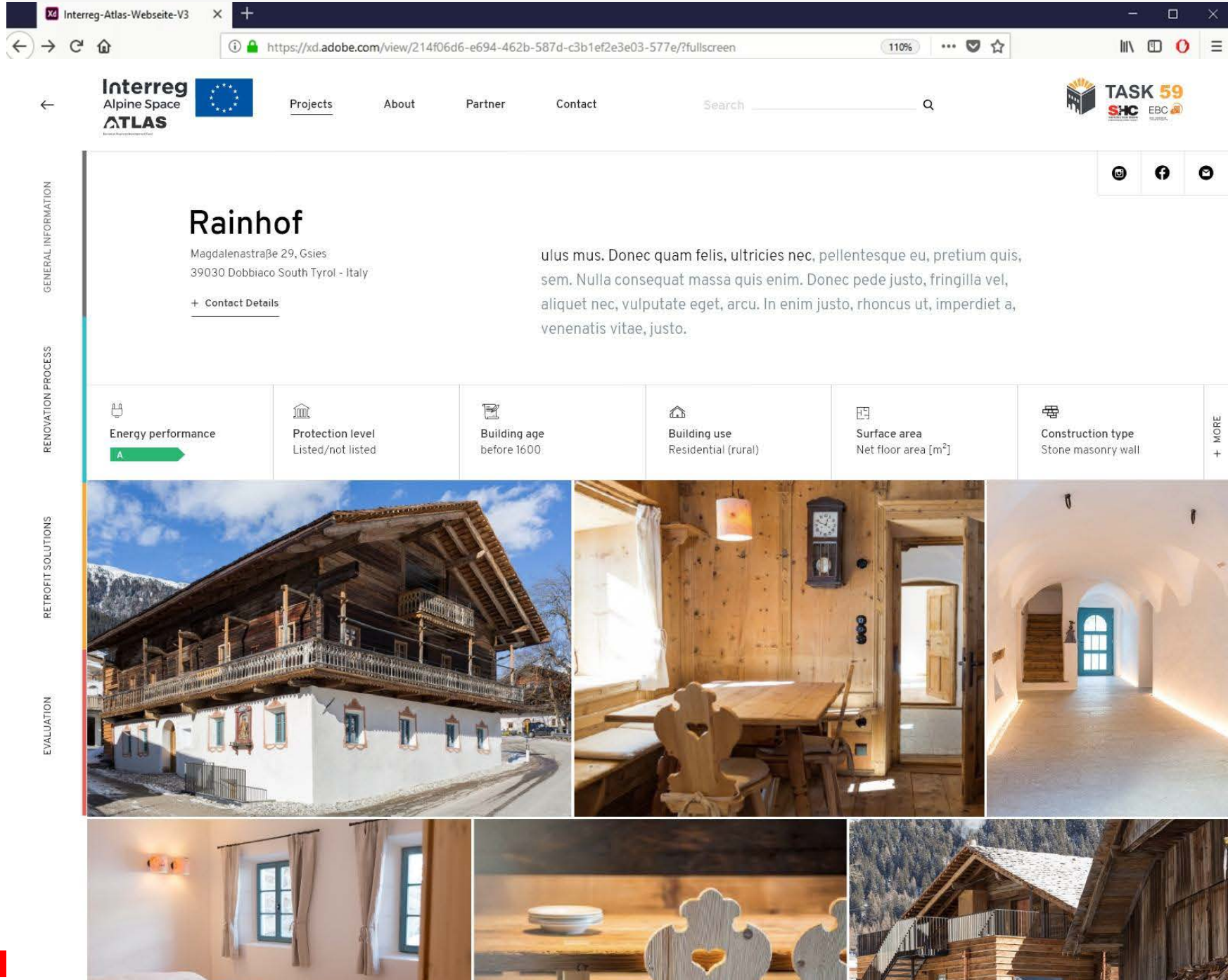


LEARNING

from the experience

A first level of data including enough information to describe the intervention:

- Basic contact details
- Short summary
- Images and plans
- General description of
  - building
  - aim
  - solutions

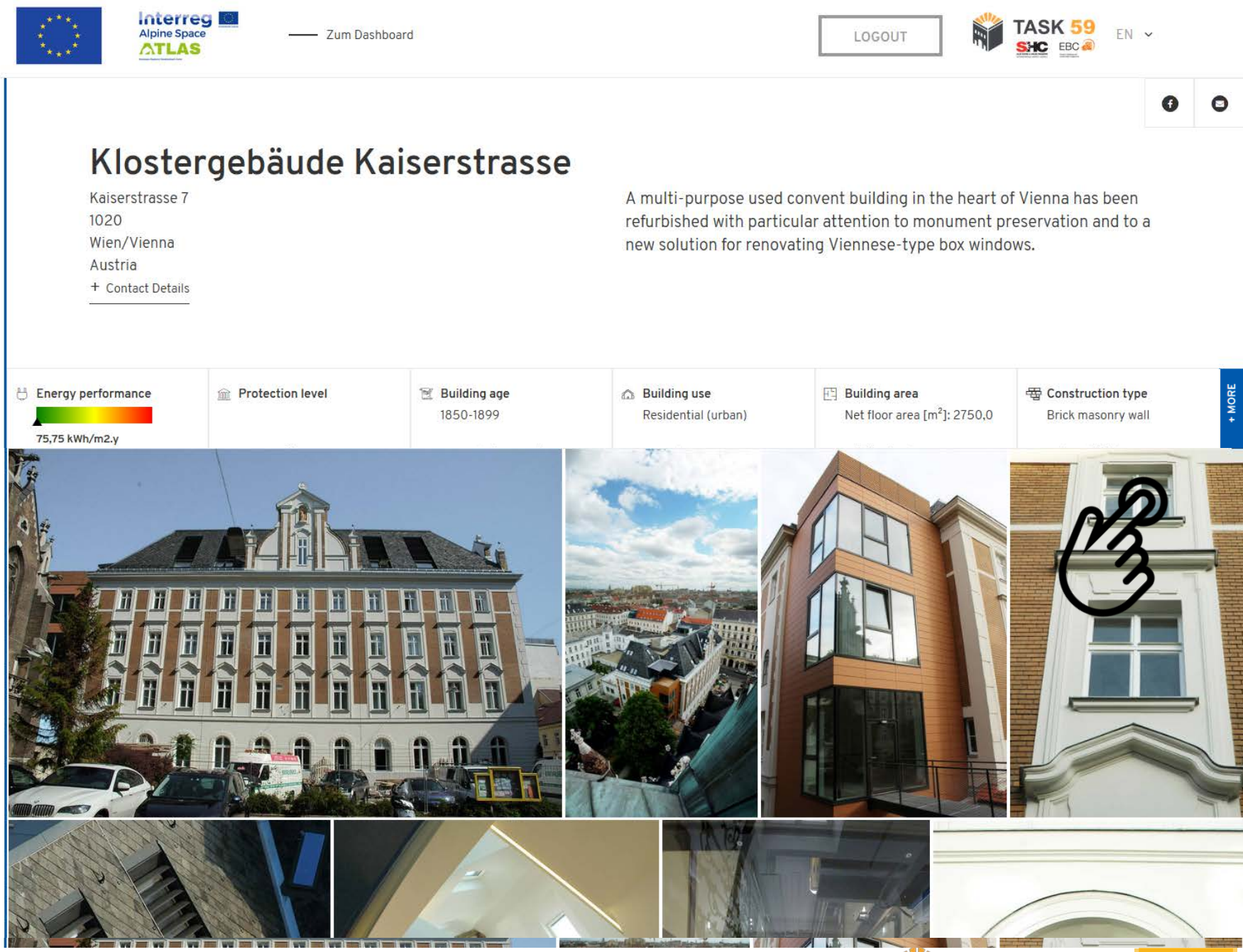


DETAILS

for a deeper understanding

Second level of detail data and information:

- Contact details (including all agent involved)
- **Context: full explanation**
- Solutions: technica details and drawing
- Evaluation: Results and available data



DETAILS

for a deeper understanding

GENERAL INFORMATION
RENOVATION PROCESS
RETROFIT SOLUTIONS
EVALUATION

Second level of detail data and information:

- Contact details (including all agents involved)
- Context: full explanation
- **Solutions: technical details and drawings**
- Evaluation: Results and available data

RETROFIT SOLUTIONS

External Walls

PLASTERED FACADE WITH FACING BRICKS | EXTERIOR WALL OF EXTENSION

The existing facade was made of ceramic clinker tiles. Conservative measures such as substance-saving cleaning and repair of the facing brick surfaces, supplementing the historical clinker tiles and hydrophobing were made. The ceramic statue in the wall niche of the southern ornamental gable has been restored. The circular sandstone slabs, sandstone cross ornaments and sandstone coverings on the eastern and southern ornamental gables were cleaned, repaired and color-matched. Articulated facades and profiled plaster surfaces, such as cornices, window casings, window roofs and ornamented roof gable incl. figural representations were repaired and restorated as follows: - Manual removal of various later lime-cement coating - Surface cleaning, mechanical manual exposure of various decorative elements - Stabilisation of the sanding surface, closing of cracks - Plaster additions with cement-free natural hydraulic finished products

Paint systems were used in consultation with the Federal Monuments Authority Austria according to the following procedure: - Etching the facade - Pore-filling lime mud for closing cracks and small bumps - Double silicate glass topcoat

+ MORE

U-value (pre-intervention) [W/m2K]:
0,917 W/m²K

U-value (post-intervention) [W/m2K]:
0,444 W/m²K

Windows

VIENNESE BOX WINDOW | SLANTED GLAZING IN MONUMENT PROTECTION

The outer wings of the box windows in listed facades were renovated and on the inside a new wooden window with special interior insulation was added. The solution sets the new inner wing completely flush with the inner wall and improves the thermal situation through internal insulation and reveal insulation. The sunshades are positioned between the wings in the lintel in existing roller blind niches. This layout represents a novel solution for old buildings.

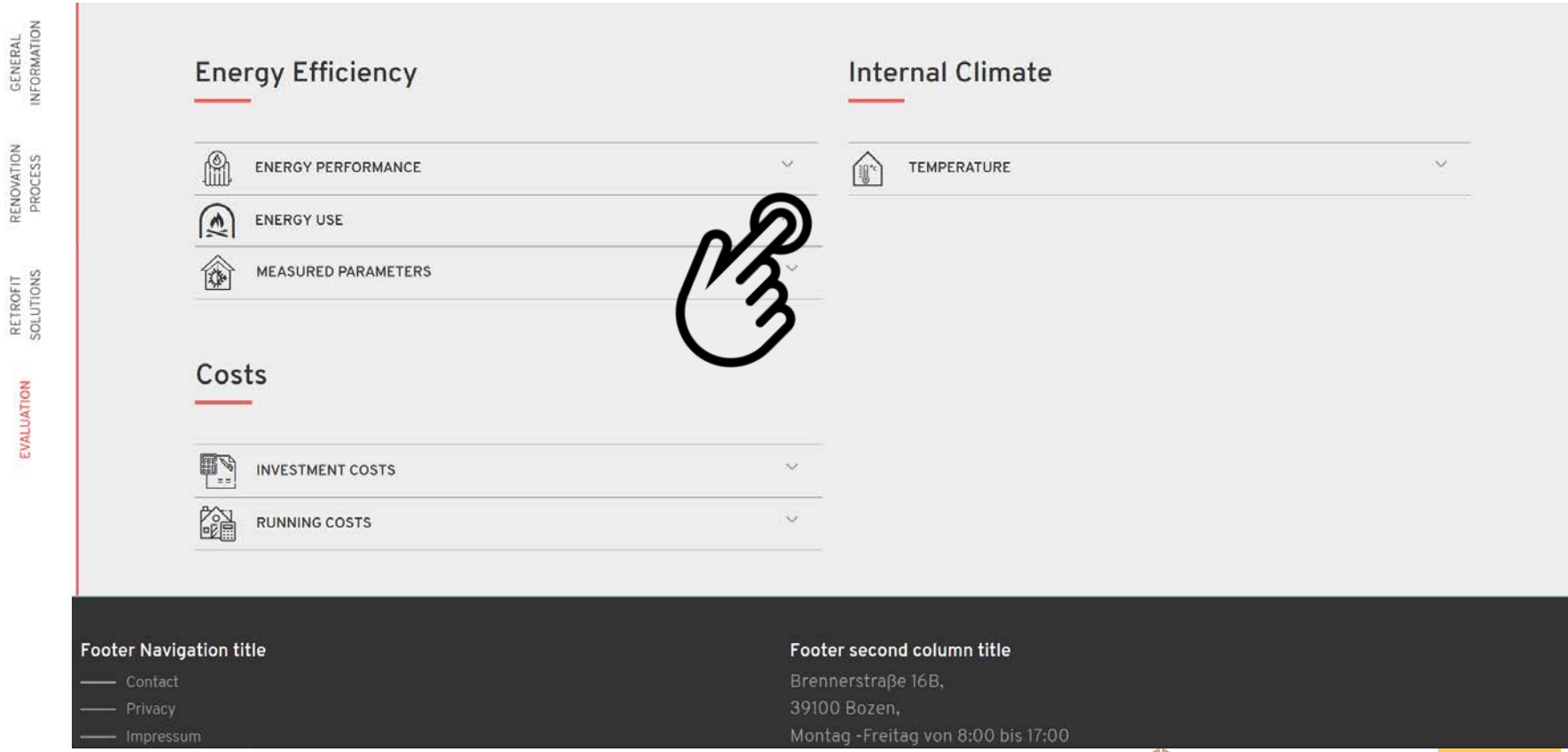
Some parts of the window were maintained (e.g. frame)

DETAILS

for a deeper understanding

Second level of detail data and information:

- Contact details (including all agents involved)
- Context: full explanation
- Solutions: technical details and drawings
- **Evaluation: Results and available data**



CONNECTIVITY

Combining efforts - Linking online resources

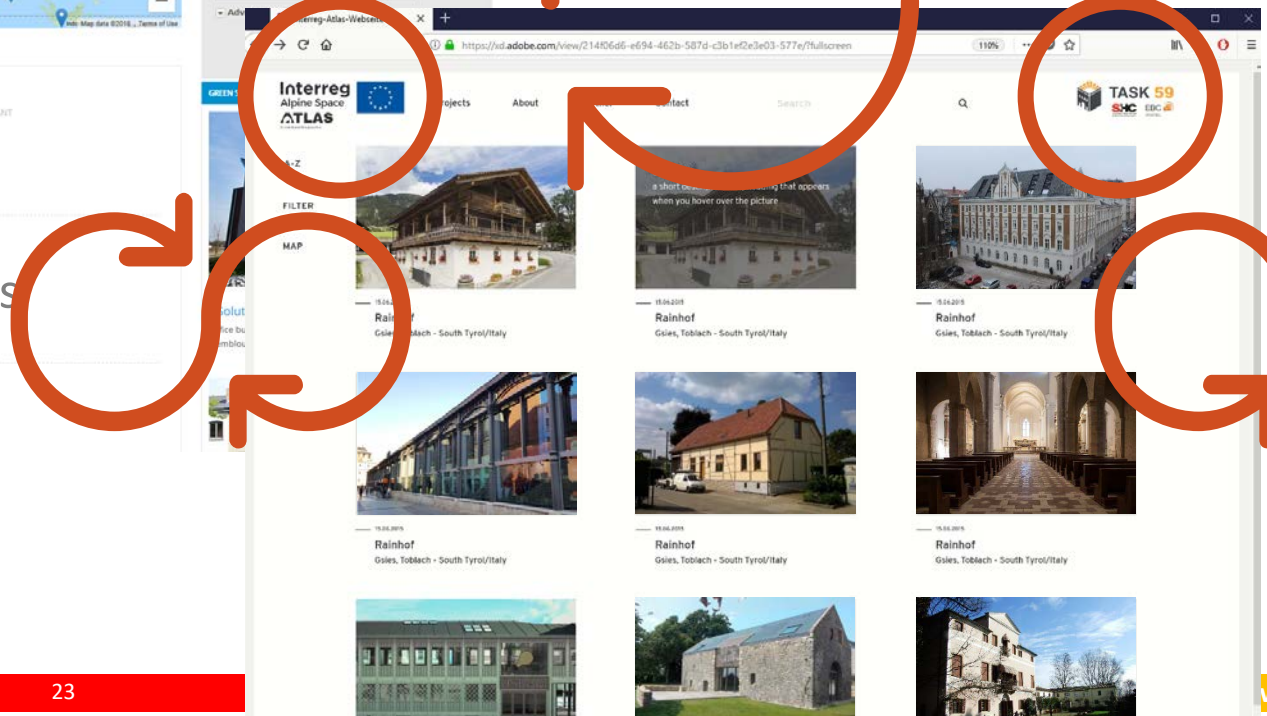
6 countries

8 partners

21 observers

60 case studies

100+ examples



TASK 59

RENOVATING HISTORIC BUILDINGS TOWARDS ZERO ENERGY

VIOLET

Interreg Europe

12 countries

24 partners

50 case studies

Overview on case studies

Interim status, Sept. 2019

Project	City	Country	Period of construction	Building use			Building area			Protection level			Intervention			Construction details				HVAC				enevable energy source				Evaluation / Monitoring data				BGF
				Residential (urban)	Residential (rural)	Non-residential	Small	Large	(Area)	listed / protected	conservation area	non-listed / non-protected	Renovation	Renovation + extention	Other	External walls	Windows	Roof	Ground floor	Heating	Cooling	Ventilation	Air conditioning	PV	Solar	Biomass	Geothermal	Energy efficiency	Costs	Internal climate	Environment	
Osramhuset (The Osram Building)	Copenhagen	DK	1945-1959														plan														824,0 m²
Rainhof	Gsies	IT	before 1600													plan		plan	plan												390,0 m²
Villa Castelli	Bellano	IT	1850-1899														plan	plan	plan												564,0 m²
Klostergebäude Kaiserstrasse	Vienna	AT	1850-1899														plan	plan													2 750,0 m²
Klitgaarden	Hundested	DK	1850-1899																												221,0 m²
Basilica di Santa Maria di Collemaggio	L'Aquila	IT	before 1600																												2 140,5 m²
Lichtmayrgütl in Graming	Graming	DE	before 1600													plan	plan	plan	plan												150,0 m²
Beim Jäger	Baierbrunn	DE	before 1600															plan	plan												308,0 m²
Notarjeva vila	Tolmin	SLO	1900-1944																												412,2 m²
Hof 6, Schwarzenberg, Voralberg, Austria	Schwarzenberg	AT	1600-1700														plan	plan	plan												300,0 m²
Mercado del Val, Valladolid (Spain)	Valladolid	ES	1850-1899																												3 936,0 m²
...																															
...																															
...																															

Case studies Timeline

Period of the construction, timeline; Interium status: Sept. 2019

Mariahilfer Straße

STADT der Zukunft

Nominiert für Staatspreis Architektur und Nachhaltigkeit 2019

Rainhof

Lichtmayrgütl in Graming

Basilica di Santa Maria di Collemaggio

Beim Jäger

Mercado del Val, Valladolid

Klitgaarden

Villa Catelli

Klostergebäude Kaiserstrasse

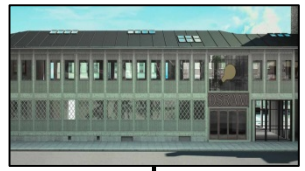
STADT der Zukunft

Nominiert für Staatspreis Architektur und Nachhaltigkeit 2014

Hof 6, Schwarzenberg

Notarjeva vila

Osramhuset (The Osram Building)



before 1600

1600-1700

1850-1899

1900-1944

1945-1959

DO YOU KNOW A GOOD EXAMPLE? **GET IN TOUCH!**

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