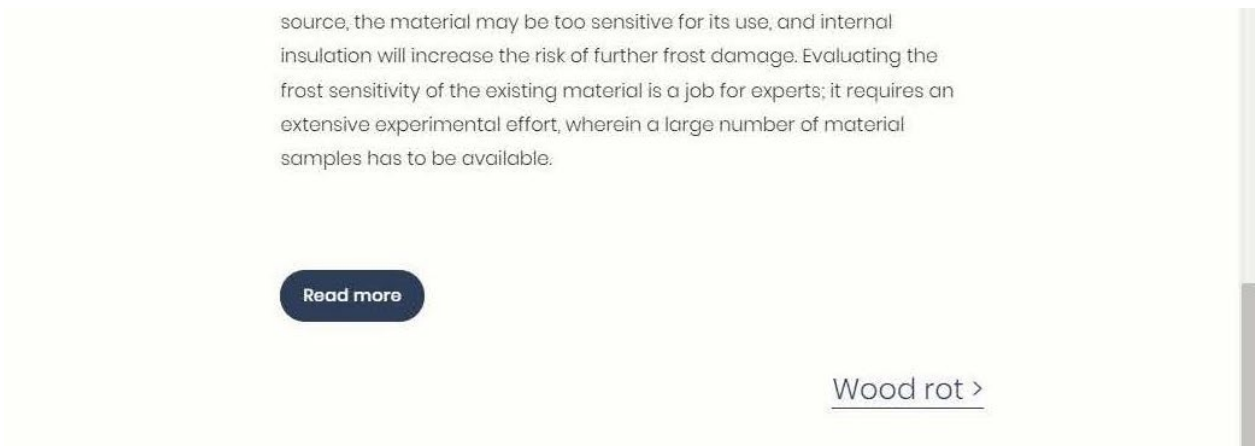


User guide to the RIBuild website www.ribuild.eu

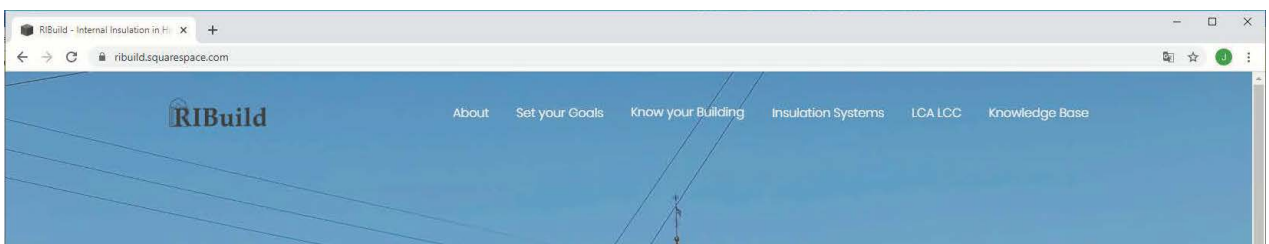
The RIBuild website is created as a user-friendly and intuitive platform for knowledge sharing of valuable research about internal insulation in historic buildings.

General structure

- Two levels of knowledge: first level on website, second entered through *Read more*-buttons presenting text parts from deliverable D6.2



- Fixed top menu is a direct access to all topics and provides the user with a constant overview of the multiple options wherever they are
- The themes and topics have been ordered to naturally follow the content of the written guidelines (D6.2) without the need to explore sections or features in a specific order



- Fixed footer holds contact information, direct access to the four guidelines and link to LinkedIn to follow news about project
- To top-function on each page to minimize scrolling and quick navigation back to top menu with access to all topics



^
[To top](#)

Contact

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Guidelines

[Set your goals](#)
[Know your Building](#)
[Insulation systems](#)
[LCA & LCC](#)

Follow

[LinkedIn](#)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 637268

- Links to related information on the RIBuild-webpage or to external relevant sources of information for easy access to valid sources of information relevant to the project
- Links to the publication base are placed at the end of each *read more*-text

RIBuild - Internal Insulation in Historic Buildings

ribuild.squarespace.com/knowledge-base

Research

The full research reports on internal insulation in historic buildings: Robust Internal Thermal Insulation of Historic Buildings

Work Packages (WP) The project has been divided into 8 work packages. One work package takes care of overall project management.

Deliverables (D) Deliverables summarizes the work in each work package during the whole project period.

[Publication base](#)

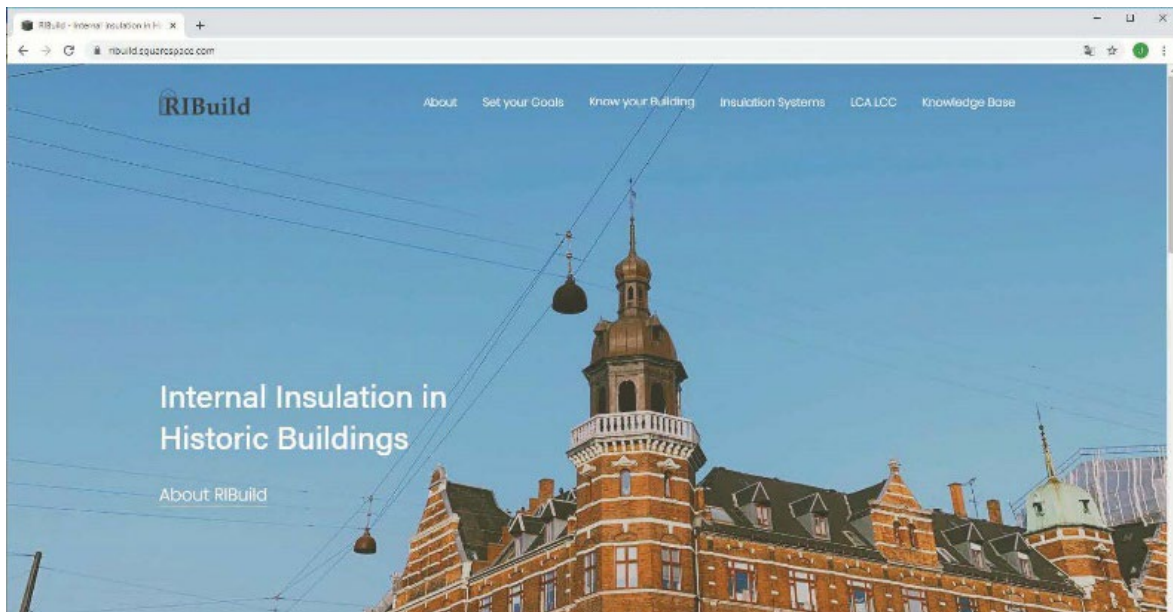
WP1: Pre-renovation assessment	WP2: Material characterisation	WP3: Case studies and laboratory measurements	WP4: Probabilistic assessment insulation so
Examines common structural elements of historic buildings.	Provides data for material properties and threshold values	Supports the research with high	Develops an effici

- Clicking on the RIBuild-logo in the left corner leads back to the landing page
- If the website is accessed in a google-browser as Google Chrome, the website can be translated into any national language by right-clicking at a random place on the website and selecting translate.

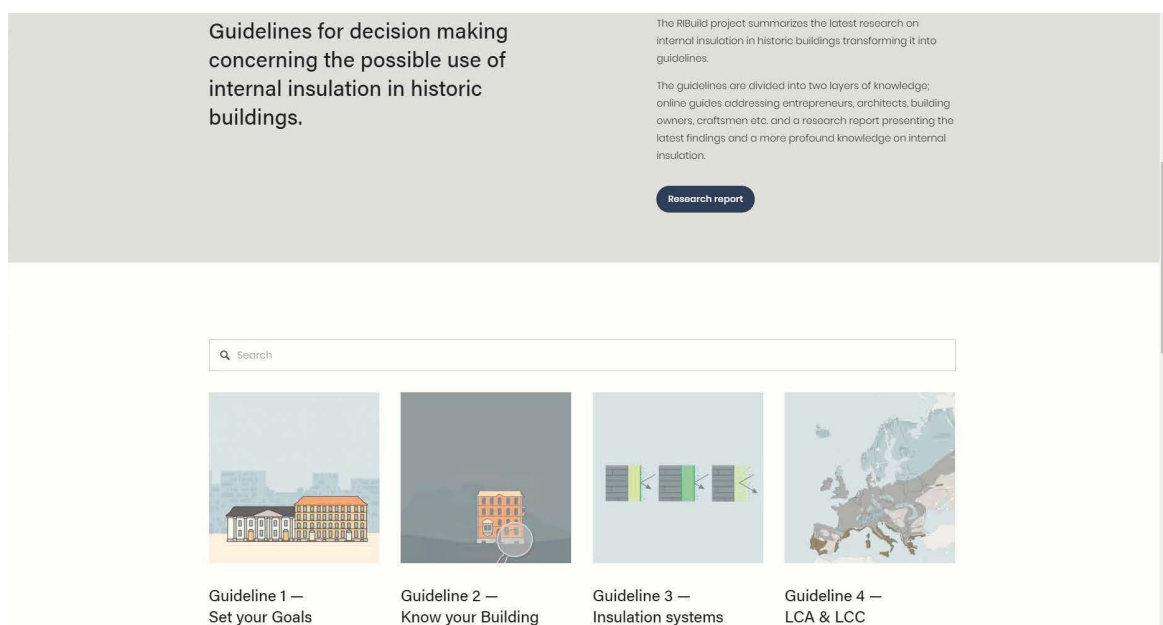
The following presents a step-by-step list of the topics, knowledge and features presented on the website, proceeding through topics in the top menu:

Landing page includes

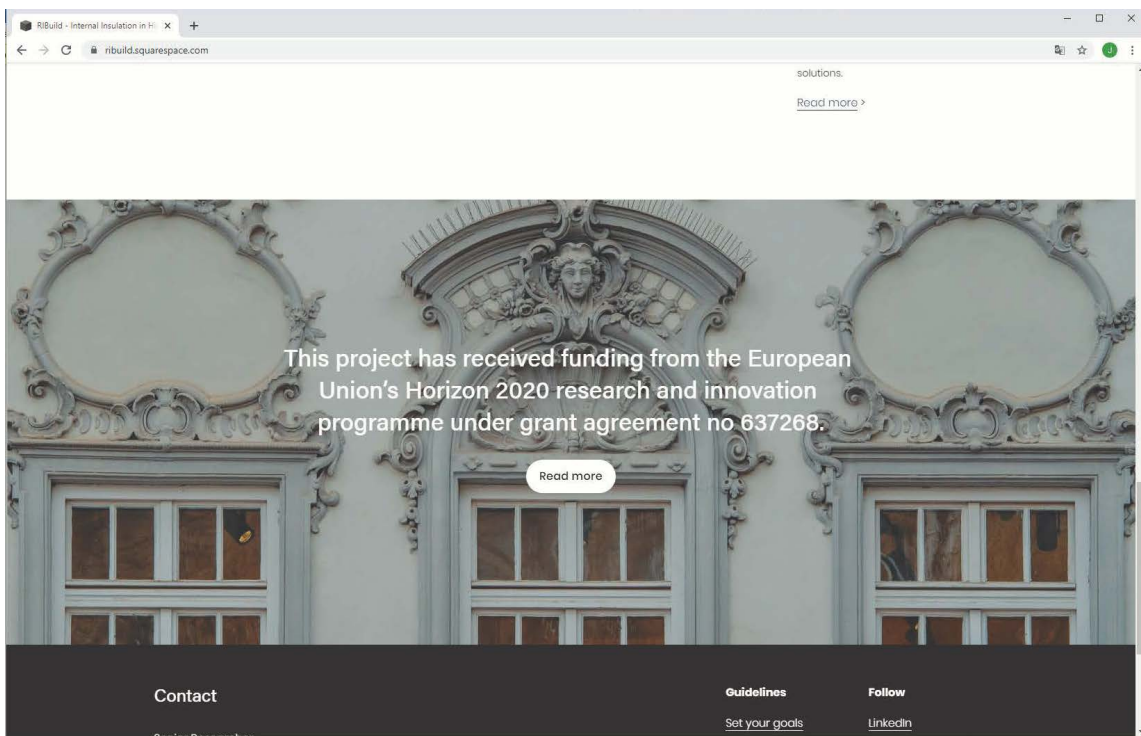
- Link to *About RIBuild*
- A brief presentation to the RIBuild-project through text and video
- Link to the full written report (deliverable D6.2)



- Search function
- Presentation and direct access to the four guidelines (1. Set your Goal, 2. Know you building, 3. Insulation Systems and 4. LCA/LCC)



- Clicking on *Read more* leads directly to the European Commission-website (for further knowledge about the European Union’s Horizon 2020 research)



About

- Summarizes the RIBuild-project and research process through text and videos
- Presents involved project partners through logos from institutions
- Direct link to deliverable D6.2

Guideline 1: Set your Goal

- Information on how to set a goal for the building renovation and decision criteria
- Three areas of knowledge:
 - a. the holistic approach when setting a goal
 - b. the five types of goals described in the RIBuild project (reduction of energy consumption, reduction of environmental impact, reduction of energy and other costs, improvement of indoor climate and loss of floor area)
 - c. an introduction to building regulations
- Interlink leads to a more profound explanation of each goal with examples
- Link to the Directive of the European Parliament and of the Council on energy performance of buildings
- *Read more* leads to part of deliverable D6.2 about national building regulations

RiBuild - Internal Insulation in Historic Buildings

ribuild.squarespace.com/goals

Guideline for setting the goal of application of internal insulation

Deciding whether and how to implement energy efficiency in historic buildings is a complex process that involves technical solutions, heritage value, indoor environment, cost efficiency, interests of stakeholders etc.

Holistic approach

Application of internal insulation is a manifold process composed of either several independent or interlinked variables. The variables include hygrothermal properties of existing and applied building materials, indoor and outdoor climate, energy costs, operation and maintenance costs, human behavior, occupation loads, mechanical and engineering systems in the building, environmental impact, heritage value, financial resources and their availability, location of the building, building regulations, productivity etc.

The decision-making process starts with setting either a single or several parallel goals described by one or more criteria. Definitions of main goal and decision criteria for process assessment, alternative solutions, estimation of performance, evaluation, solutions and proposals are strongly interlinked. Decisions taken in the renovation planning process will therefore determine whether the goal will be reached without compromising hygrothermal behavior of existing wall and heritage value.

[Read more](#)

RiBuild - Internal Insulation in Historic Buildings

ribuild.squarespace.com/goals

Main goals to combine

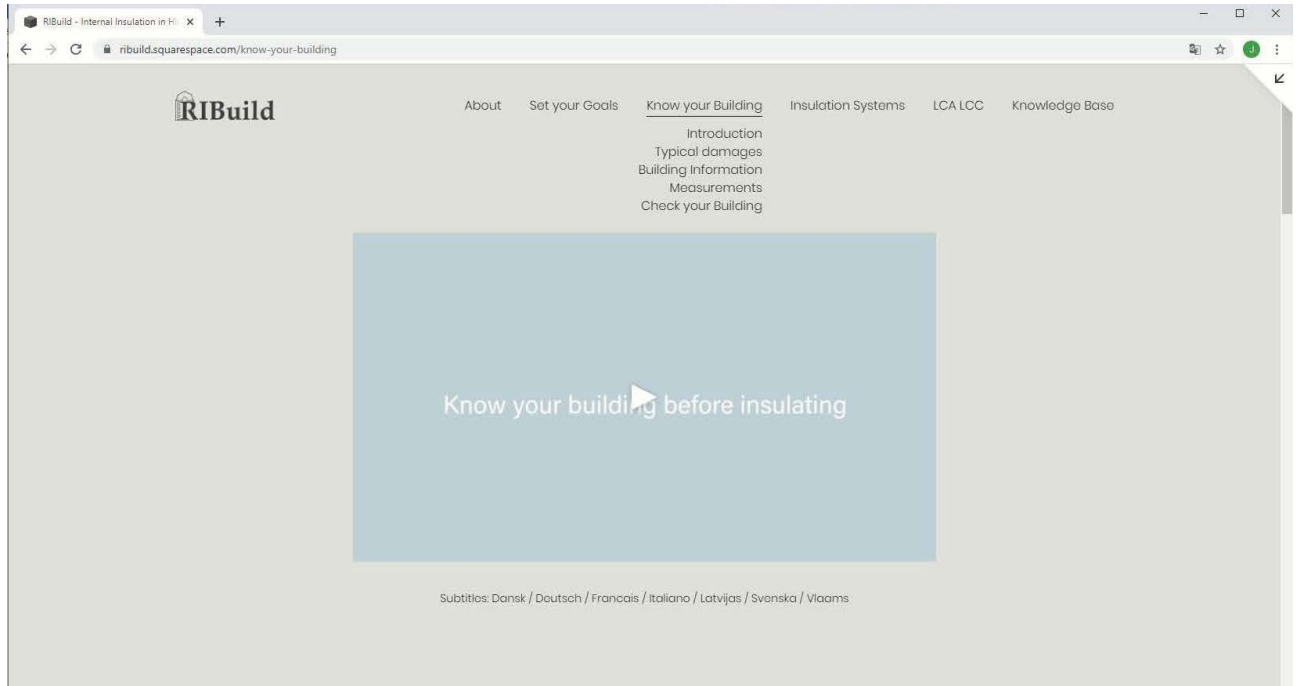
```

graph TD
    A((Goals of application of internal insulation in historic buildings)) --- B((Energy consumption reduction))
    A --- C((Reduction of energy and other costs))
    A --- D((Indoor climate improvement))
    A --- E((Reduction of environmental impact))
    A --- F((Loss of floor area))
  
```

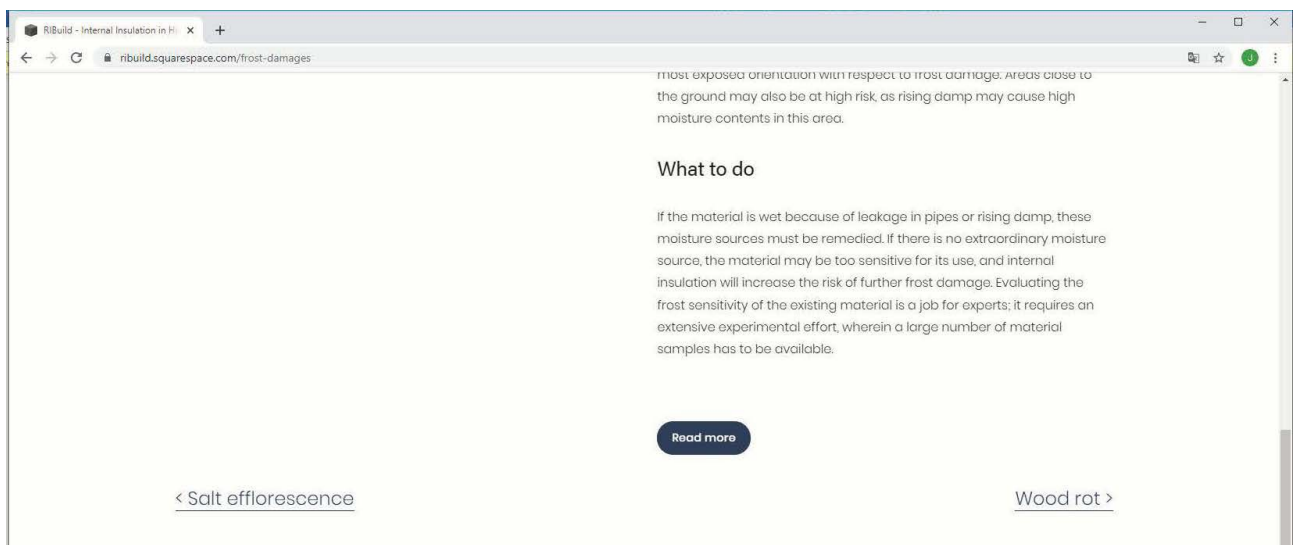
- **Reduction of energy consumption**
aims at minimizing building energy consumption, expressed as energy spent for either heating, ventilation or cooling of the building regardless the energy source.
- **Reduction of environmental impact**
aims to reduce possible environmental impact when applying internal insulation. It can be either reduction of CO2 emissions to lower the impact on climate change during operation phase of the building or reduction of environmental impact considering all three phases of a building lifetime - the construction phase, the operation and maintenance phase and the end of life phase.
- **Reduction of energy and other costs**
includes all costs for application of internal insulation, particularly energy, material and installation costs as well as life cycle costs or other case-specific costs.
- **Improvement of indoor climate**
aims to improve the indoor thermal comfort. Unsatisfactory thermal comfort is related to low surface temperature of the wall which causes thermal asymmetry.
- **Loss of floor area**
focuses on minimizing the loss of the room floor area

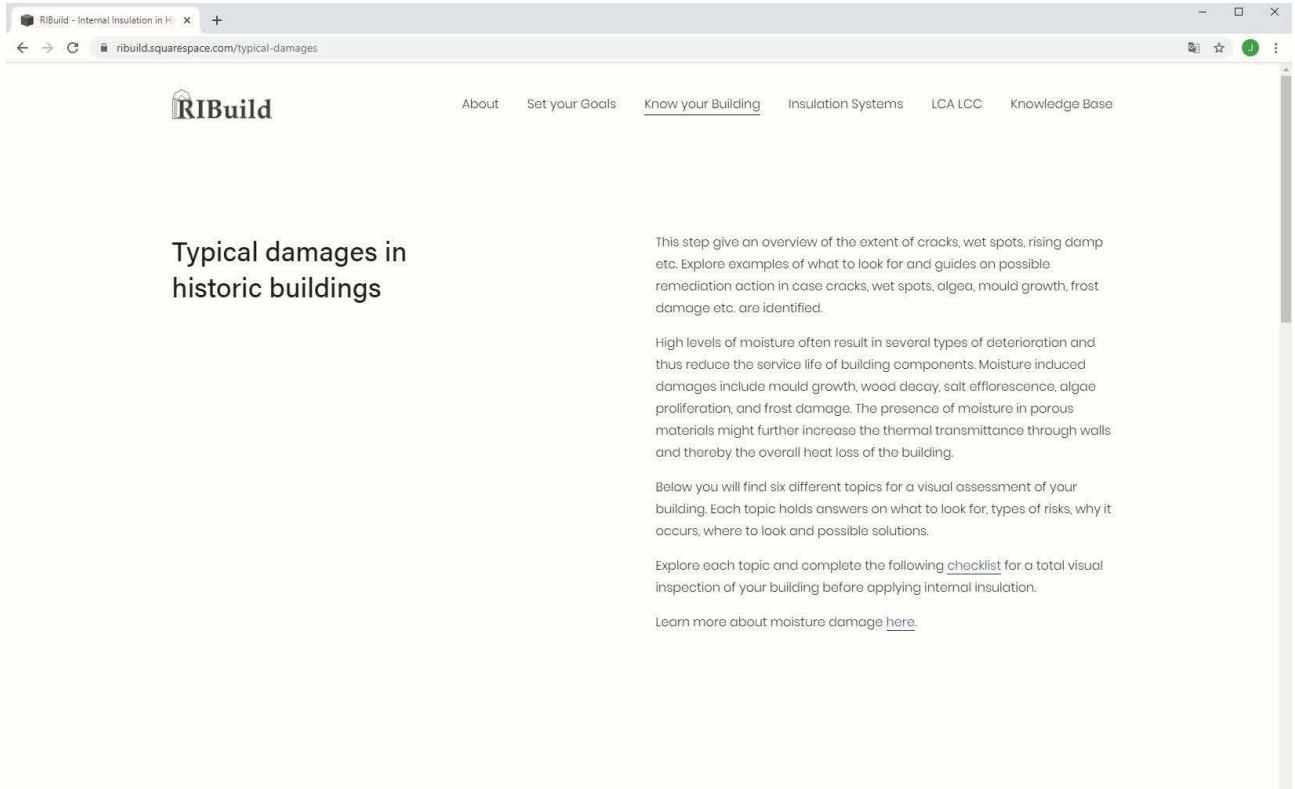
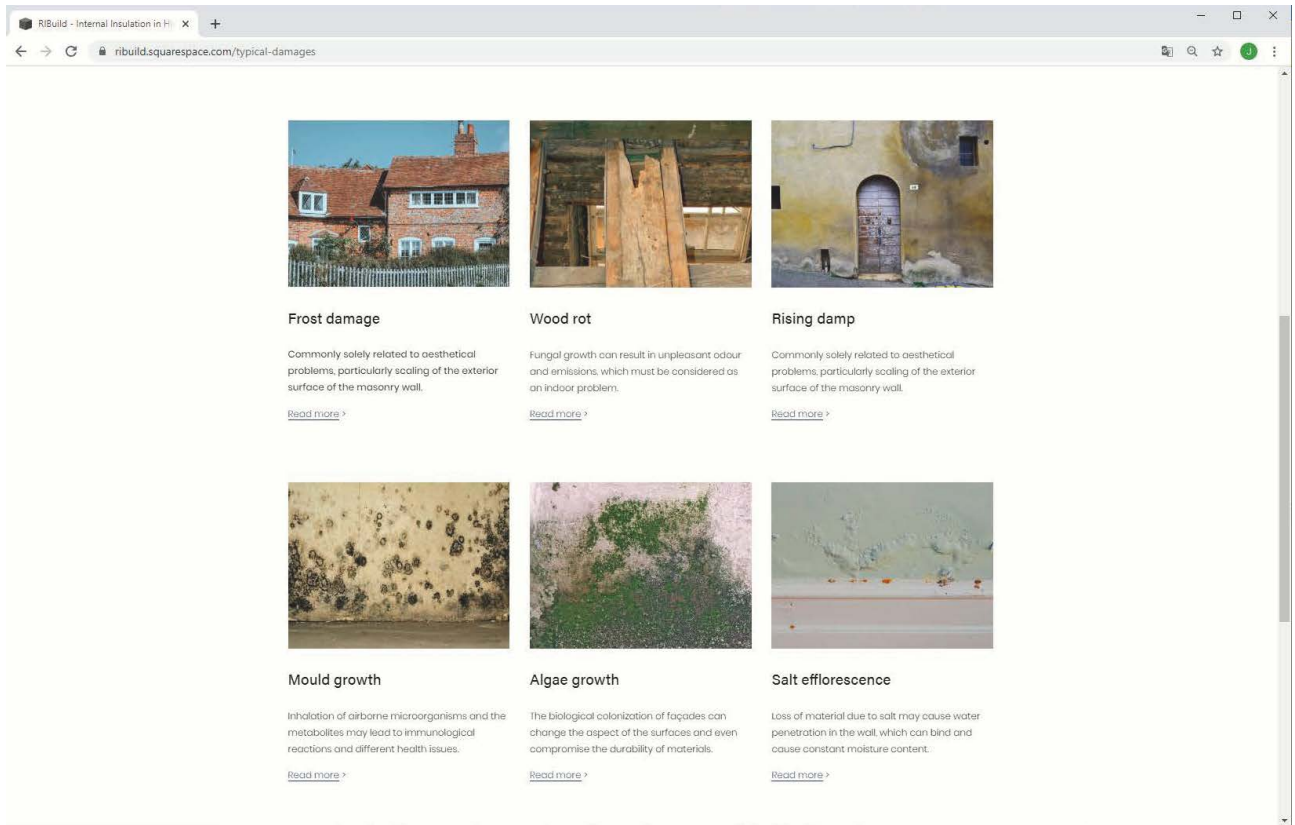
Guideline 2: Know your Building

- Contains five topics: Introduction, Typical damages, Building information, Measurements and Check your Building
- **Introduction**

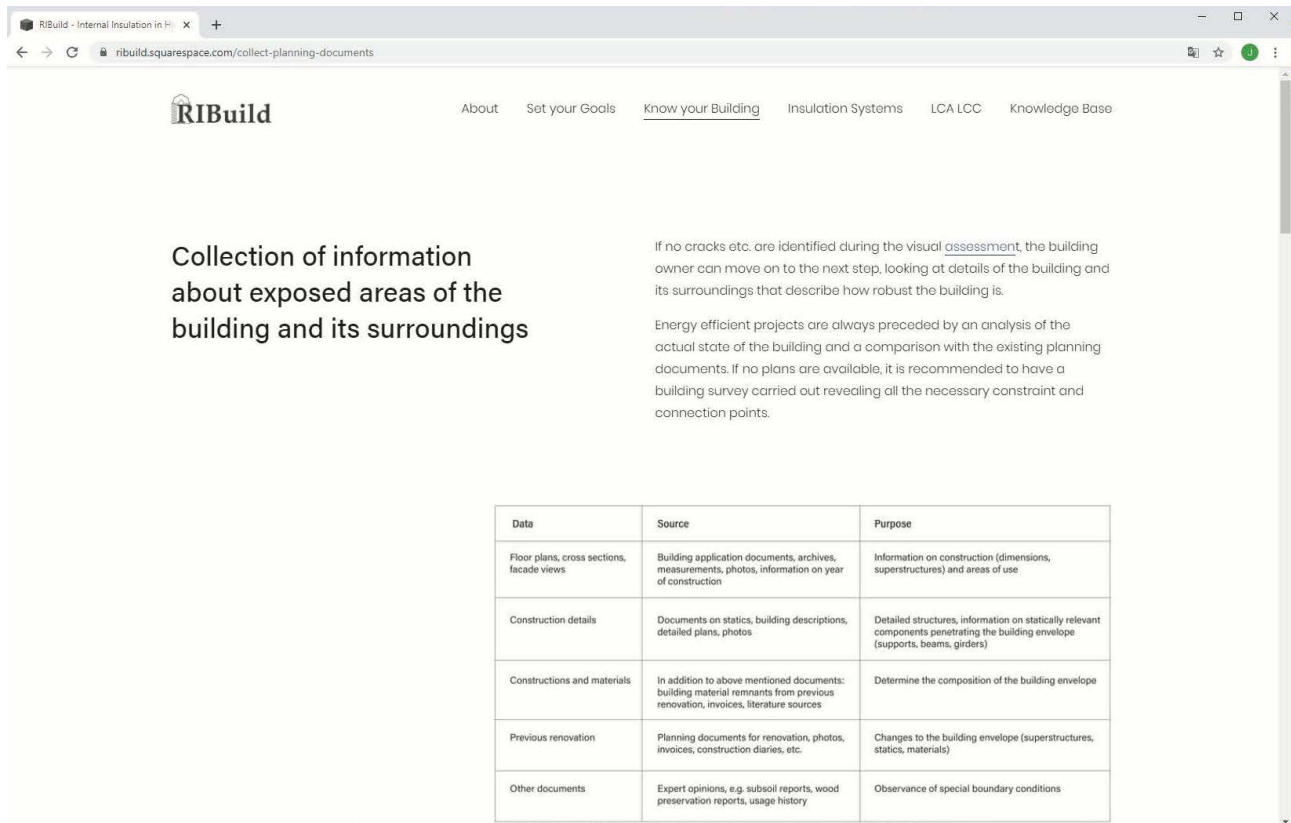


- **Typical damages** cover six most common areas of risks to assess before starting a renovation process; frost damage, wood rot, rising damp, mould growth, algae growth and salt efflorescence, with brief answers on what, why and where to look for occurring risks and what to do
- **Read more** leads to text part from deliverable D6.2 covering the topic
- A visual gallery at the bottom presents examples of damages
- Arrows guide to other typical damages among the six





- **Building information** presents types of important data documents and useful sources of information about the building and surroundings
- Five sensitive building areas to assess during the analysis are pointed out



- **Measurements** presents on-site and laboratory methods through text, flow charts, videos and photo collections
- Emphasizes the need for measurements as part of the decision process during a renovation
- Interlink leads to printable material on the DIY-material test in Knowledge Base
- *Read more* leads to section describing measurements procedures and equipment for tests in deliverable D6.2

RIBuild - Internal Insulation in H... x +

ribuild.squarespace.com/measurements

RIBuild

About Set your Goals Know your Building Insulation Systems LCA LCC Knowledge Base

Measurements of building constructions and materials

Measurements are often needed to decide whether the façade is robust enough to be internally insulated.

Depending on the task, the renovation objective and the scope of measures, it may be necessary to determine the building physical properties of the existing structure before selecting an internal insulation system. Measurements can take place on-site or in a laboratory.

In principle, laboratory measurements offer significantly higher measurement accuracy than on-site tests. In addition, some characteristic values can be determined exclusively by laboratory measurements. These laboratory measurements require samples to be taken, e.g. in the form of core drillings or stone samples.


The choice of measurement activities depends on:

- Available time for measurements
- Non-destructive vs destructive: How much material can be removed for tests?
- Cost of tests
- Derivable material properties
- Measuring accuracy (high, medium, low)
- Measurement prerequisites/flexibility (local, etc.).

Measurements of building materials and constructions

RIBuild - Internal Insulation in H... x +

ribuild.squarespace.com/measurements




Laboratory

The video illustrates how to test the hygrothermal properties of bricks in a laboratory.

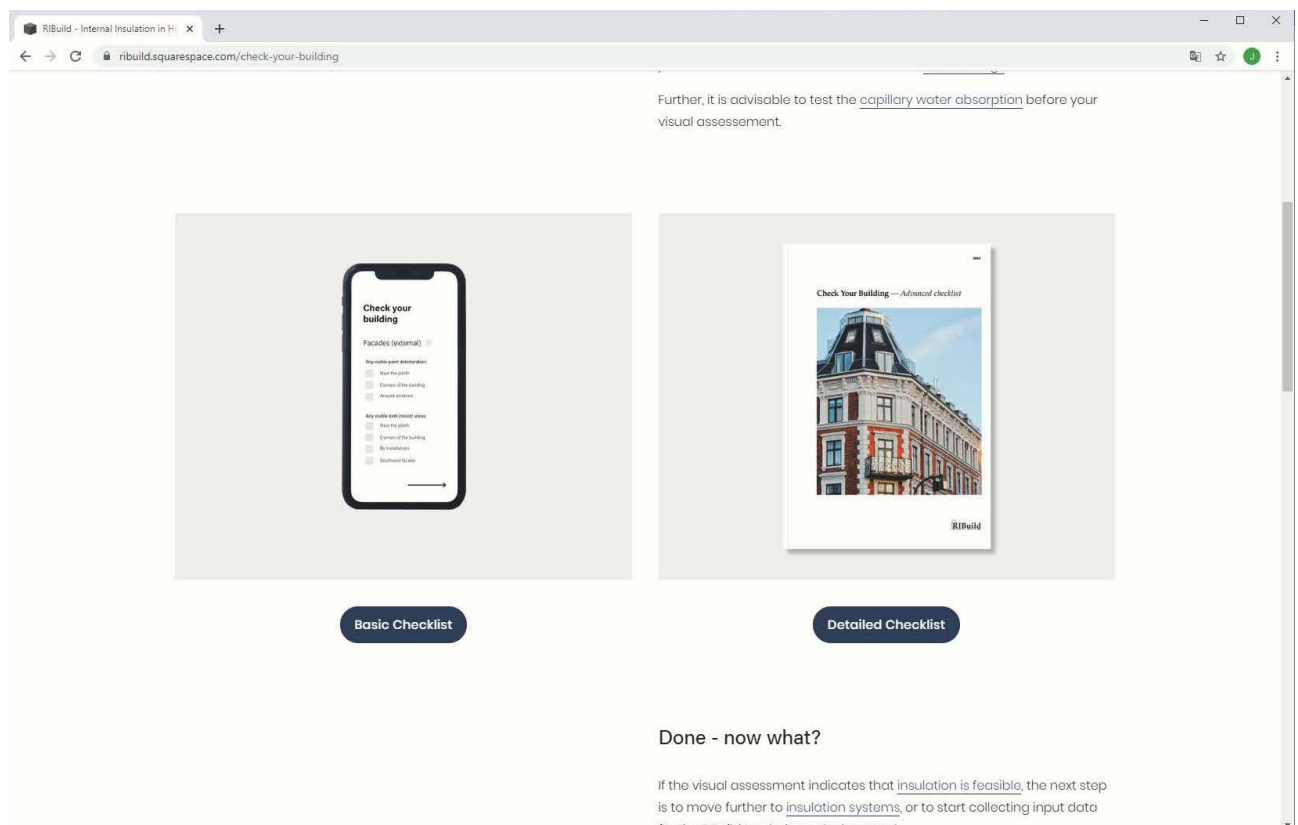
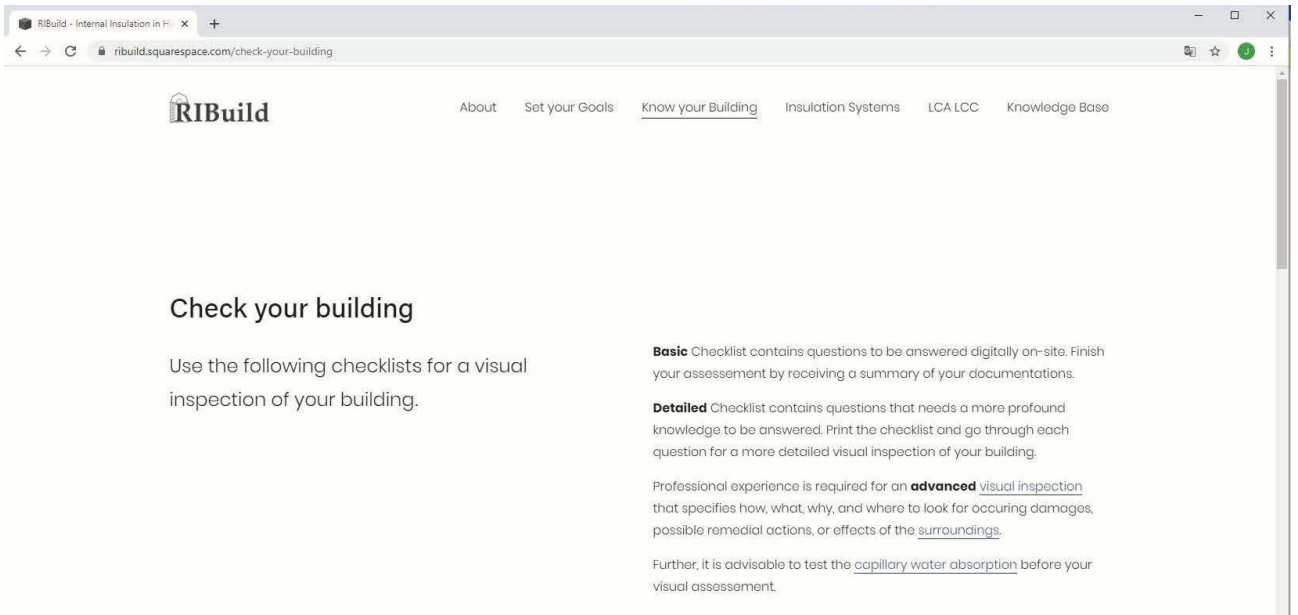
DIY material test

The building owner can carry out do-it-yourself (DIY) material tests and assess dry density, porosity, specific heat capacity, water uptake, and moisture content. Download the DIY guide here.

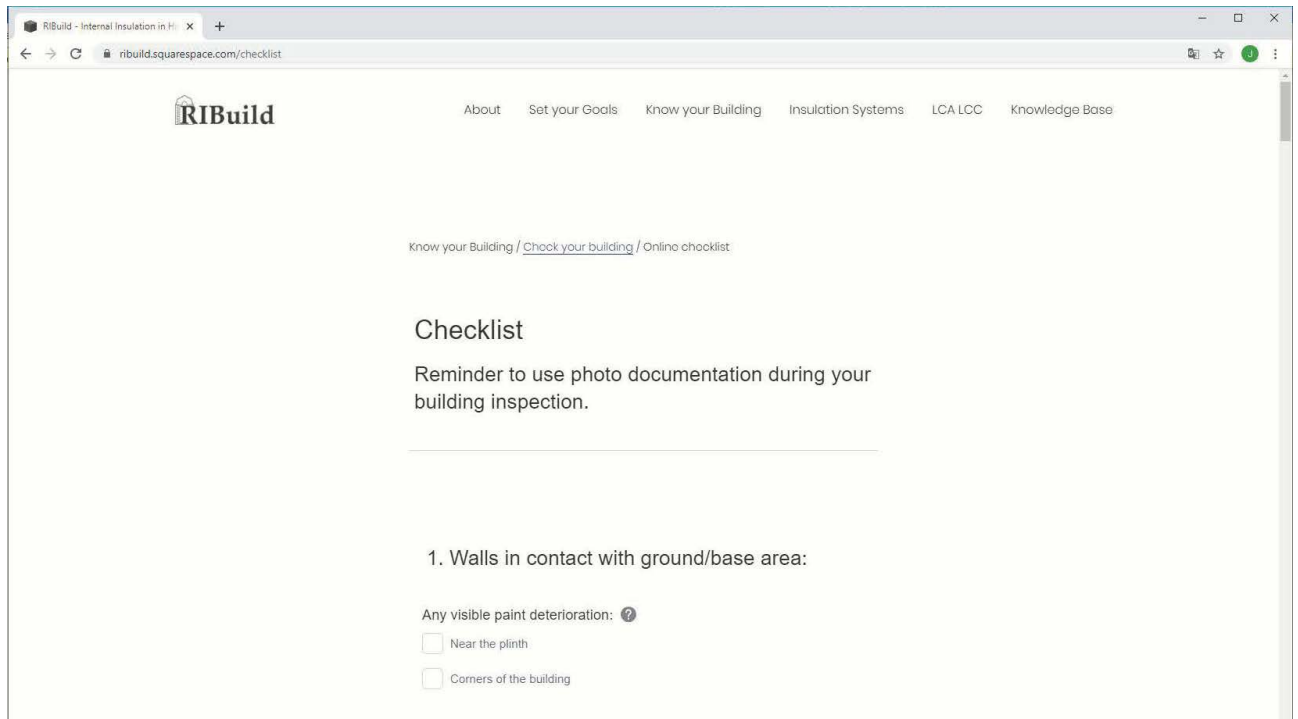
The video illustrates how to test the hygrothermal properties of bricks in a simple



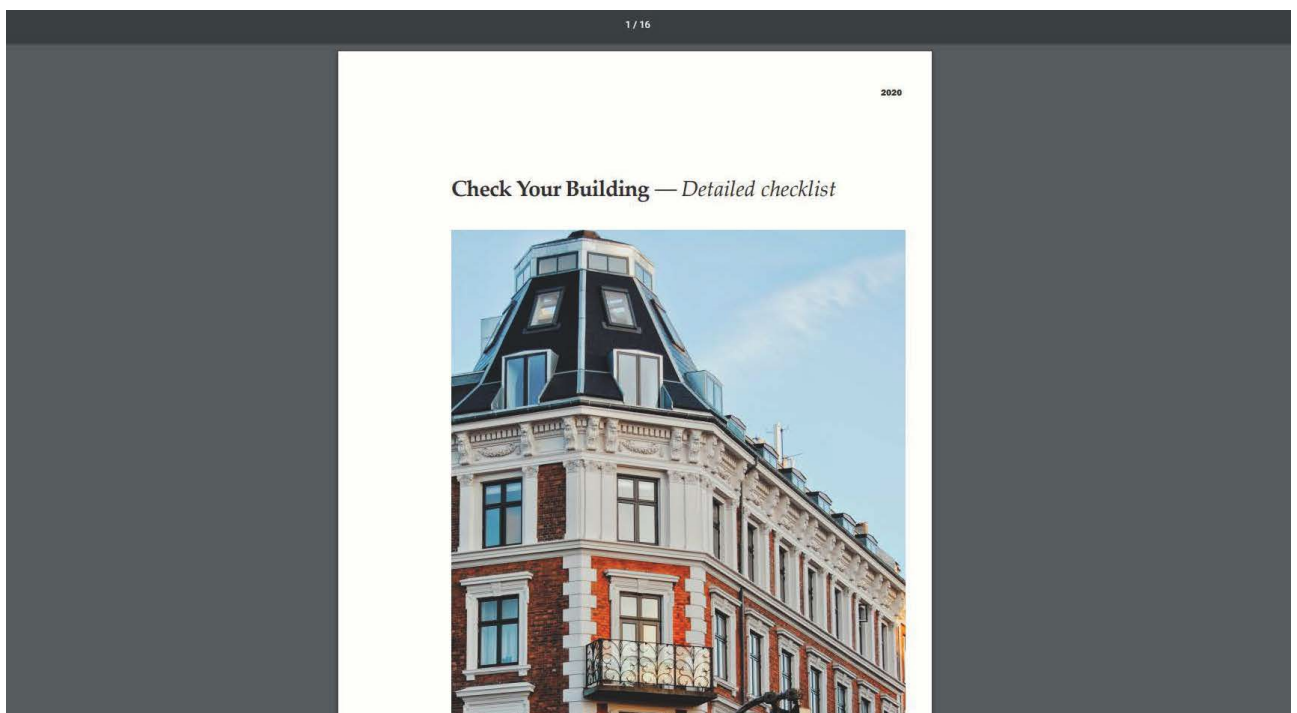
- **Check your building** presents two checklists for building assessment



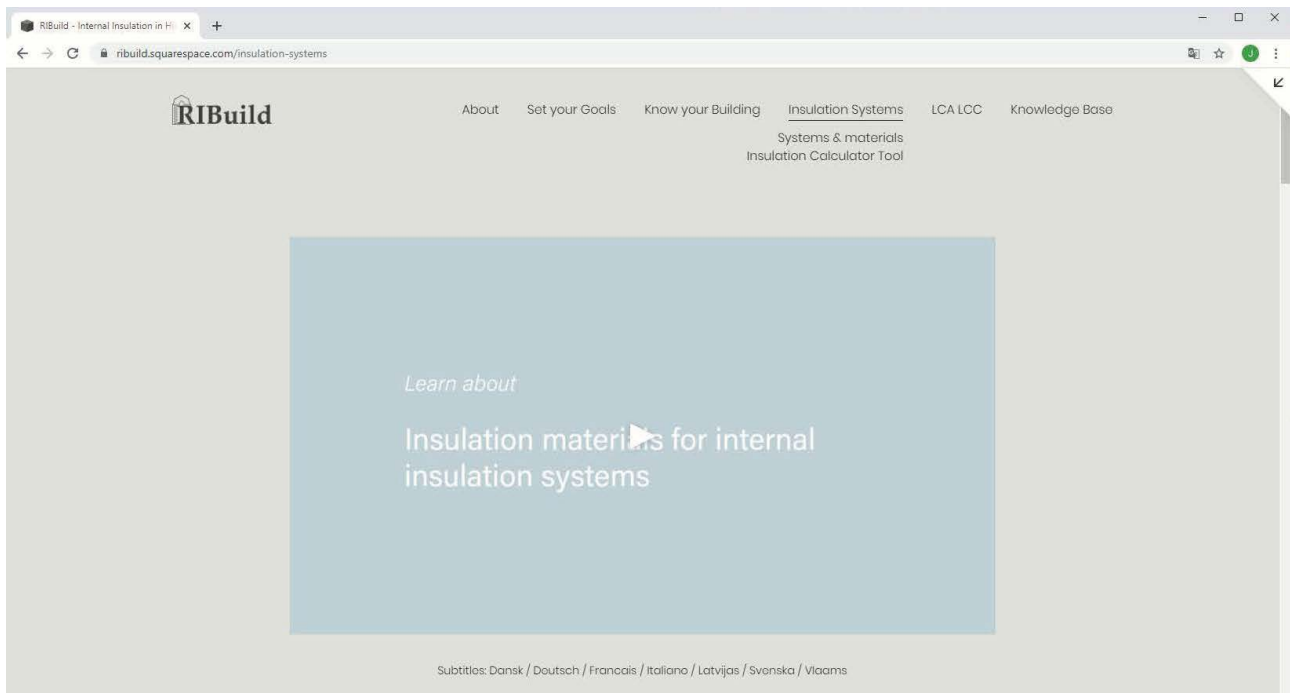
- *Basic checklist* corresponding to first level of knowledge on the website holds yes-no-questions, possible to answer online or on print. Mouse-over function elaborates each question with text and photo. Final replies can be sent directly to personal mail



- *Detailed checklist* corresponds to professional expertise and knowledge from second level (D6.2), aimed at building professionals with elaborated knowledge and need for specific drawings and notes during assessment, therefore in a printable version



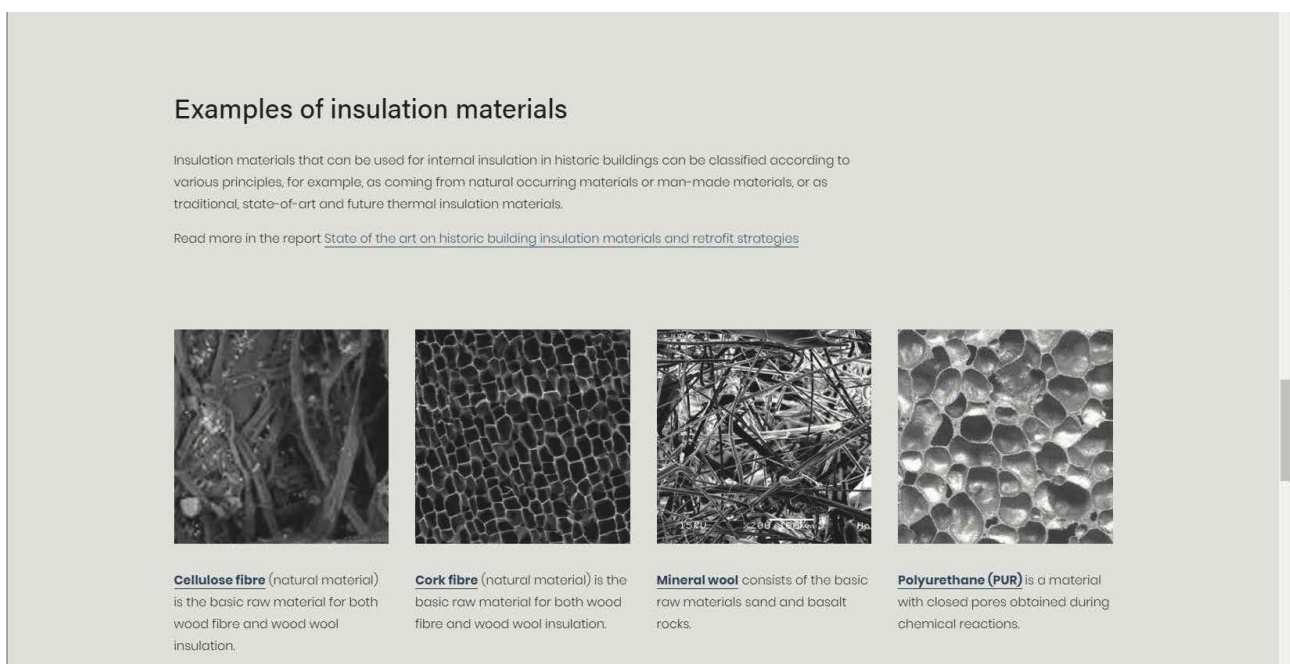
Guideline 3: Insulation Systems



Systems & materials presents

- The main types of systems; vapour-tight and vapour-open internal insulation systems through text, table and illustration
- Phases in the installation procedure
- A photo gallery of examples of insulation materials

Clicking on the different materials will lead to an extended description of the qualities of each material. A interlink leads to deliverable D1.2 with research on insulation materials



Insulation Calculator tool is a direct link to the WP6 web tool (beta-version) presenting suitable insulation systems for a specific building case.

The screenshot displays the RIBuild webtool interface. On the left, there is a sidebar with various input parameters: Location (with a map of Europe), Distance to Weather stations (50km), Wall material (Brick selected), Wall thickness (110-897), Wall orientation (0-360), Plaster (Internal and External selected), and Insulation system (Reference - no insulation, Calcium Silicate $\lambda=0.04$ W/(mK), Calcium Silicate $\lambda=0.06$ W/(mK), and Calcium Silicate $\lambda=0.07$ W/(mK) are all selected).

The main content area shows the RIBuild webtool logo and a brief explanation of the simulation results. Below this, two simulation scenarios are presented:

Reference - no insulation

This is an average of 117 simulations across 84 weather stations.

Sim. U-Value (W/m ² K)	Mould (Index)	Algae (Index)
2.72 <small>0.44 - 15.09</small>	0.1 <small>0 - 3.5</small>	1 <small>1 - 1</small>
Heat loss (W/m ² /year)	Min. surface temperature (°C)	Env. Impact (kg CO ₂ eq/m ²)
76749 <small>3663 - 302543</small>	14.1 <small>1.1 - 19.8</small>	99 <small>99 - 99</small>

90 mm Phenolic Foam $\lambda=0.02$ W/(mK)

This is an average of 582 simulations across 84 weather stations.

Sim. U-Value (W/m ² K)	Mould (Index)	Algae (Index)
0.7 ref. 2.72 <small>0.06 - 2.78</small>	0 ref. 0.06 <small>0 - 3.5</small>	1 ref. 0.99 <small>0 - 1</small>
Heat loss (W/m ² /year)	Min. surface temperature (°C)	Env. Impact (kg CO ₂ eq/m ²)
25173 ref. 76749	18.7 ref. 14.06	99 ref. 99

Guideline 4: LCA LCC

- Presentation of knowledge for evaluating energy saving potential, environmental impact and life cycle costs through text and flow chart
- Interlinks lead to deliverable D5.1 and D5.2 presenting documentation for the probabilistic methodologies for calculation of building life cycle and costs

The screenshot shows a web browser window with the URL `ribuild.squarespace.com/lcacc`. The page title is "Guideline for evaluating energy saving potential, environmental impact and life cycle cost". The navigation menu includes "About", "Set your Goals", "Know your Building", "Insulation Systems", "LCA LCC", and "Knowledge Base".

The main content area contains the following text:

The LCA and LCC probabilistic methodology developed and documented in the [Probability based Life Cycle Impact Assessment](#) report and the [Probability based Life Cycle Cost](#) report has been implemented into a software tool. The software tool allows the real-time calculation of the economic and environmental impacts of insulation systems applied to wall case studies under several possible scenarios (energy scenarios and calculation periods) with a small calculation time.

Furthermore, the software tool can be used to assess other possible renovation measures than internal insulation, in order to maximize the impact of building renovation. The main idea behind the software is to allow a flexible use of it: it already includes a database with national case studies of data inputs on national case studies on internal insulation, that can be edited or enriched according to user preferences.

A "Read more" button is located below the text.

To the right of the text is a flowchart diagram titled "Guidelines: 7 m² of an opaque historic facade". The diagram shows a process flow starting with "Facade level recommendations for hygrothermal assessment and energy saving potential (using the U-value)". This leads to a box: "Probabilistic hygrothermal assessment with DELPHIN precalculated cases in a webtool". From this box, two arrows point to two separate output boxes:

- Left box: "Outputs for the hygrothermal guidelines: Hygrothermal outputs showing if interior insulation (as design options) can be applied. Risk and threshold for the insulation."
- Right box: "Outputs for the energy saving potentials of the facade: Heat losses and U-value of the wall with interior insulation. Heat losses."

An arrow points downwards from the bottom of these two boxes.

- *Start here* leads to the LCA LCC-tool
- Specification on the related consequences of the energy saving potentials and life cycle costs of the hygrothermal optimized insulation solution

The screenshot shows a banner for the "LCA / LCC tool". The background is a photograph of a large, white, classical building with a pediment and columns, surrounded by green trees and a lawn. The text on the banner reads:

LCA / LCC tool

A software tool developed using the open source software R. The software tool includes both the LCA and LCC Monte-Carlo based methodologies developed in the project.

A "Start here" button is located at the bottom left of the banner.

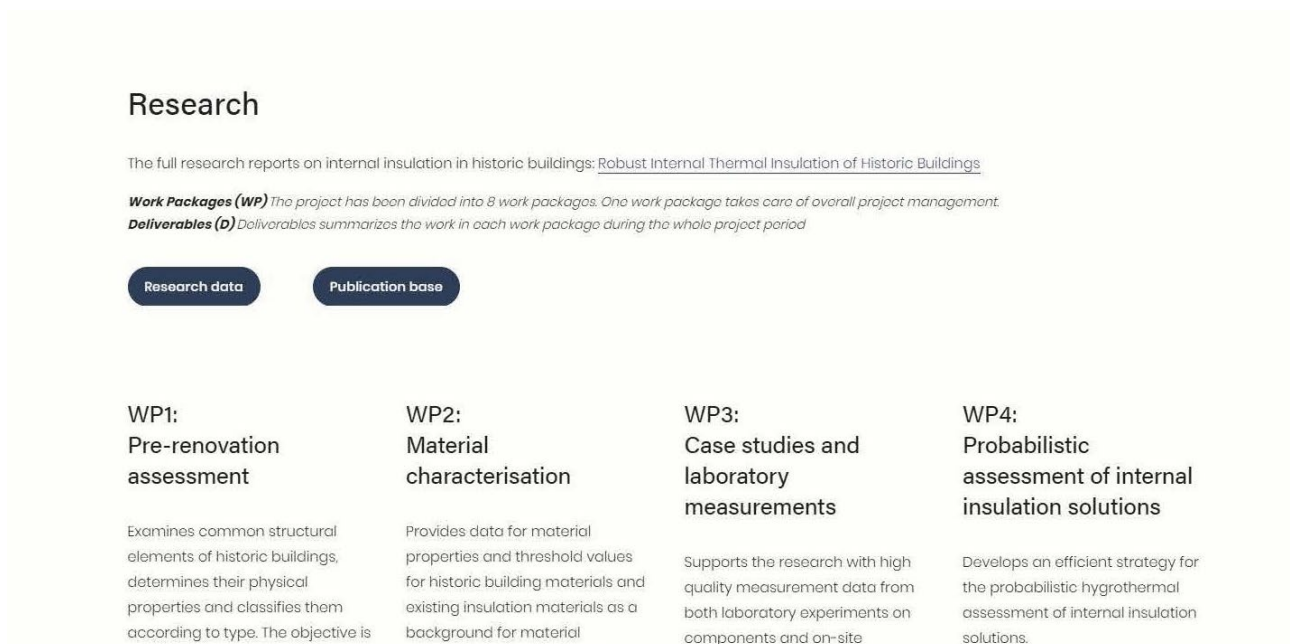
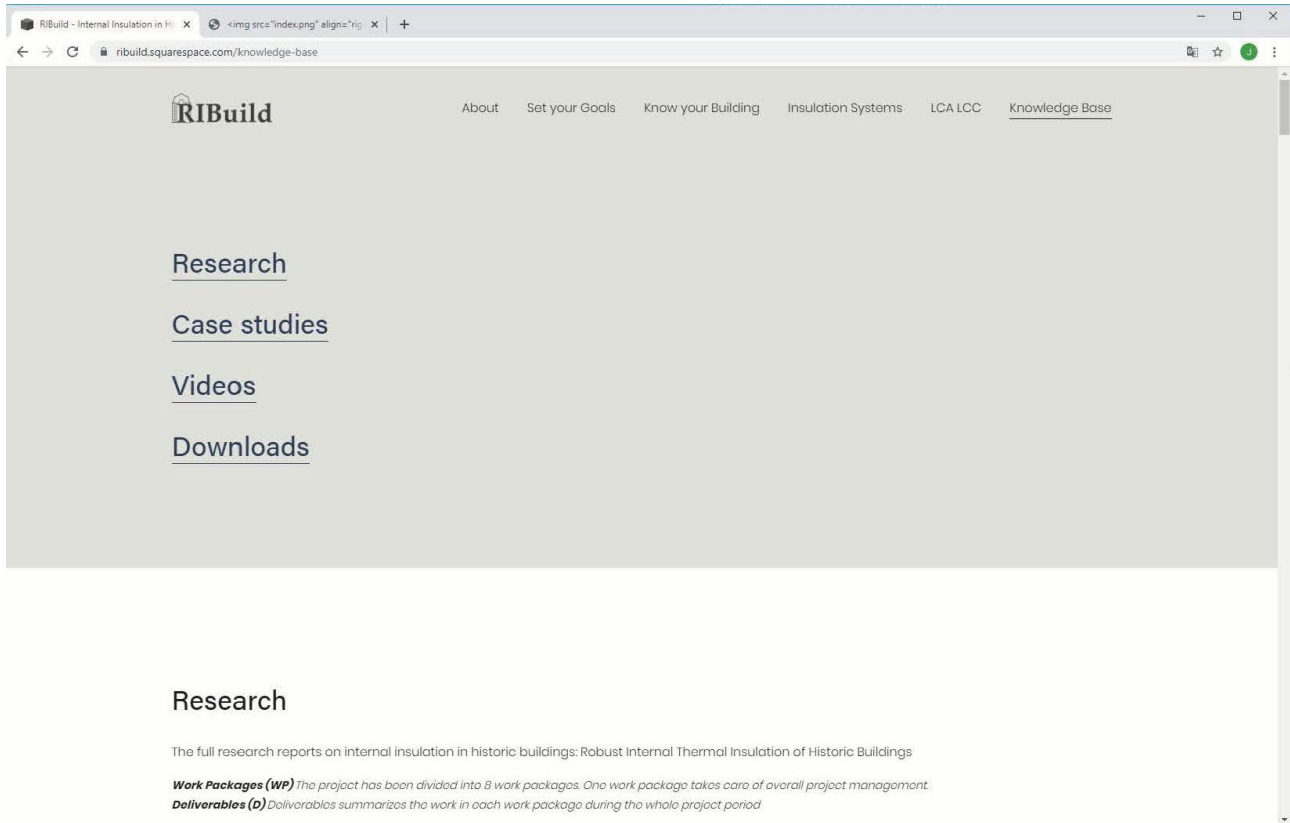
About LCA & LCC

In addition to the insulation systems recommended by the RIBuild Insulation Calculator [Tool](#), it is advisable to understand the related consequences of the energy saving potentials in terms of greenhouse gas emissions and life cycle costs of the

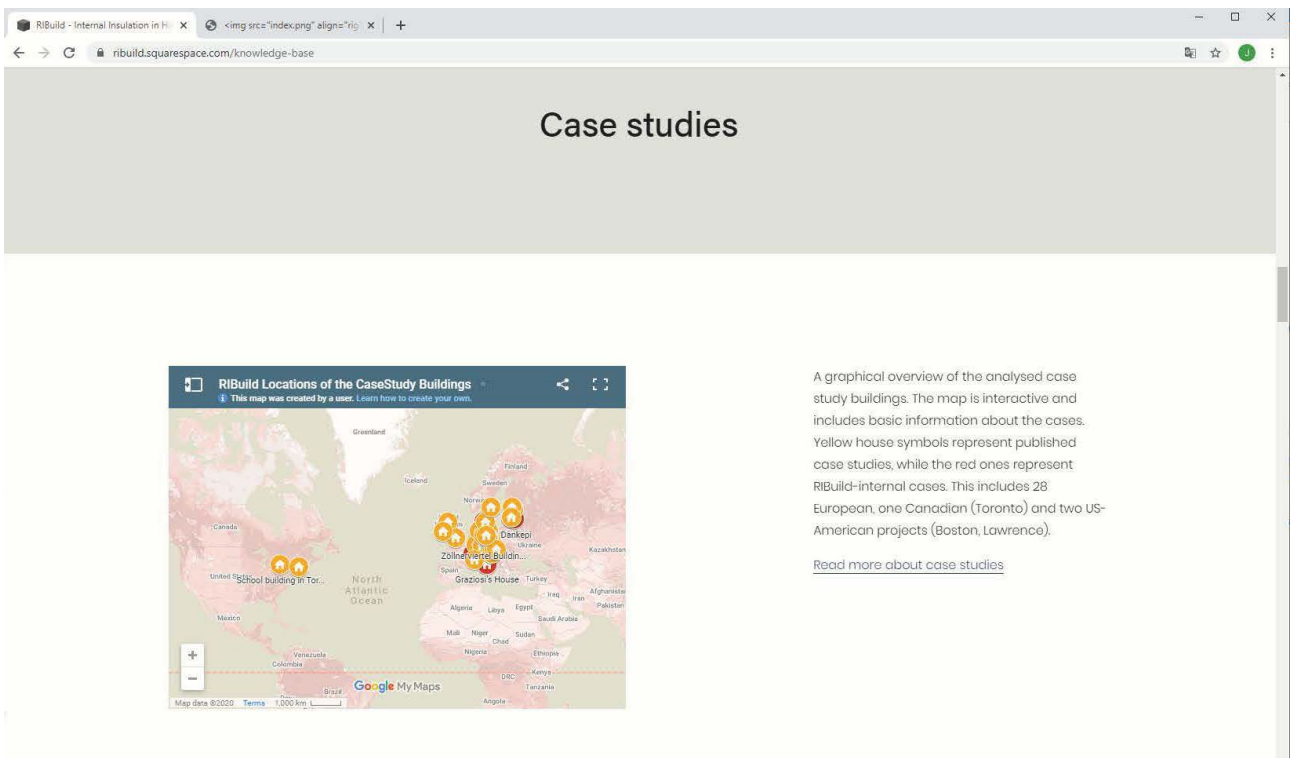
Knowledge base

Contains a RIBuild research library with easy overview and access to research materials:

1. Link to the publication base with all scientific publications prepared as part of RIBuild
2. Research deliverables (reports) from all project WPs



3. Case-studies through an interactive map and a interlink to D3.2



Case studies

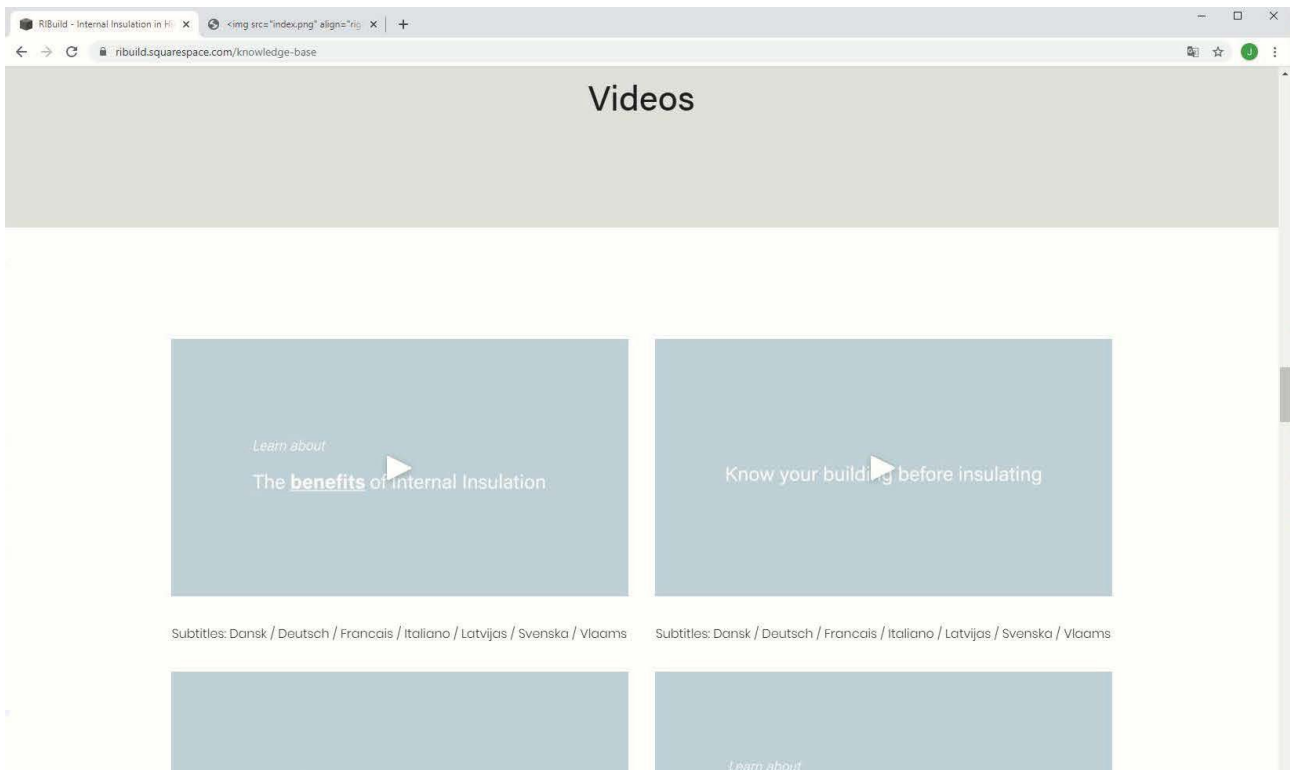
RiBuild Locations of the CaseStudy Buildings
This map was created by a user. [Learn how to create your own.](#)

A graphical overview of the analysed case study buildings. The map is interactive and includes basic information about the cases. Yellow house symbols represent published case studies, while the red ones represent RiBuild-internal cases. This includes 28 European, one Canadian (Toronto) and two US-American projects (Boston, Lawrence).

[Read more about case studies](#)

4. Videos with case examples

5. Videos explaining the RiBuild-project



Videos

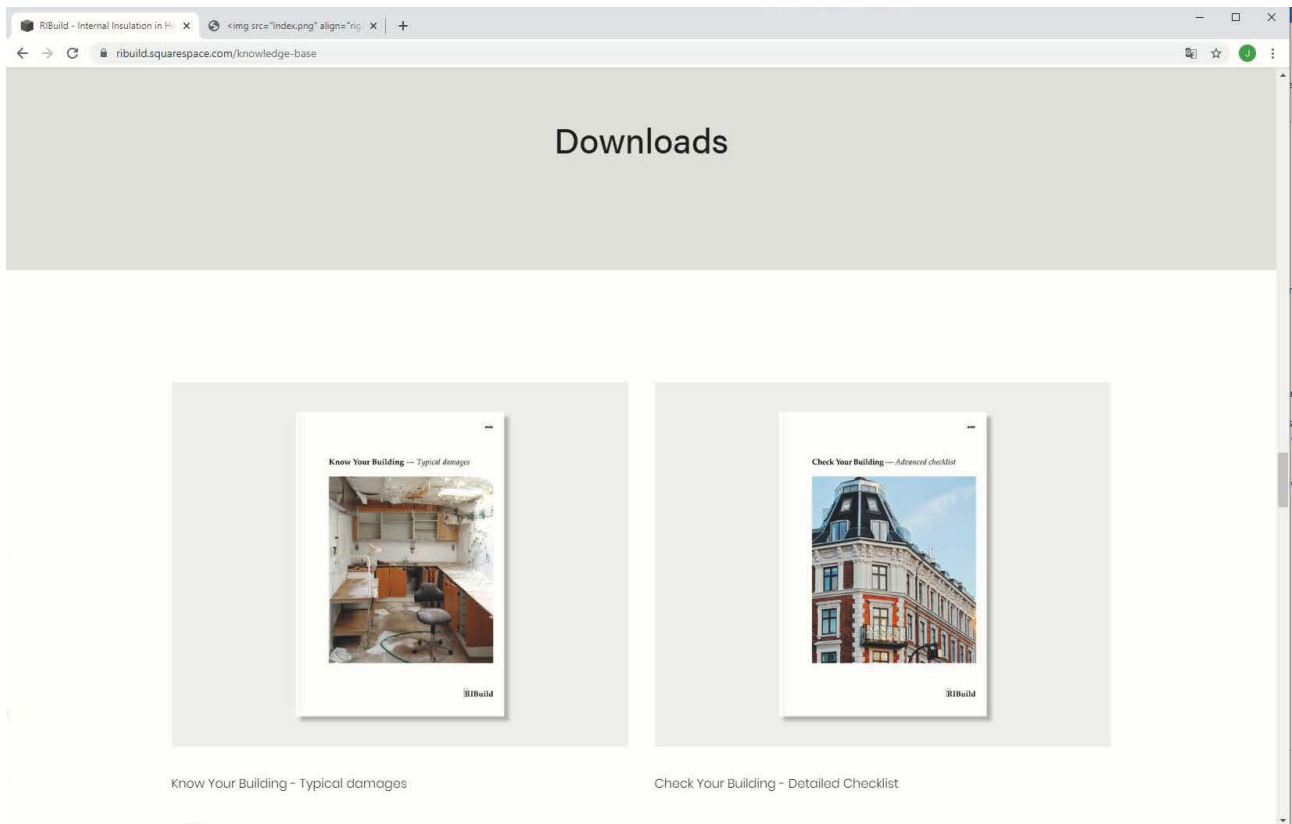
Learn about
The **benefits** of internal Insulation

Know your building before insulating

Subtitles: Dansk / Deutsch / Francais / Italiano / Latvijas / Svenska / Vlaams

Learn about

6. Downloads covering information on Typical damages, Detailed Checklist, DIY materials test and Information folder for print or online reading



7. *Research data* includes a link to research data from RiBuild (e.g. measurement data from test stands etc. and data for historic building materials)

Research

The full research reports on internal insulation in historic buildings: [Robust Internal Thermal Insulation of Historic Buildings](#)

Work Packages (WP) *The project has been divided into 8 work packages. One work package takes care of overall project management.*

Deliverables (D) *Deliverables summarizes the work in each work package during the whole project period*

[Research data](#) [Publication base](#)

WP1: Pre-renovation assessment	WP2: Material characterisation	WP3: Case studies and laboratory	WP4: Probabilistic assessment of internal
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