ENERGY PATHFINDER

Approaching Near Zero Energy in Historic Buildings

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R = Document, report

DEM = Demonstrator, pilot, prototype, plan designs

DEC = Websites, patent filing, press & media actions, videos, etc.

Dissemination Level: PU

PU = Public

CO = Confidential, only for members of the consortium, including the Commission Services

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Northern Periphery and Arctic Programme 2014–2020

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User Manual for owners of historic buildings

Repair of a building heritage site

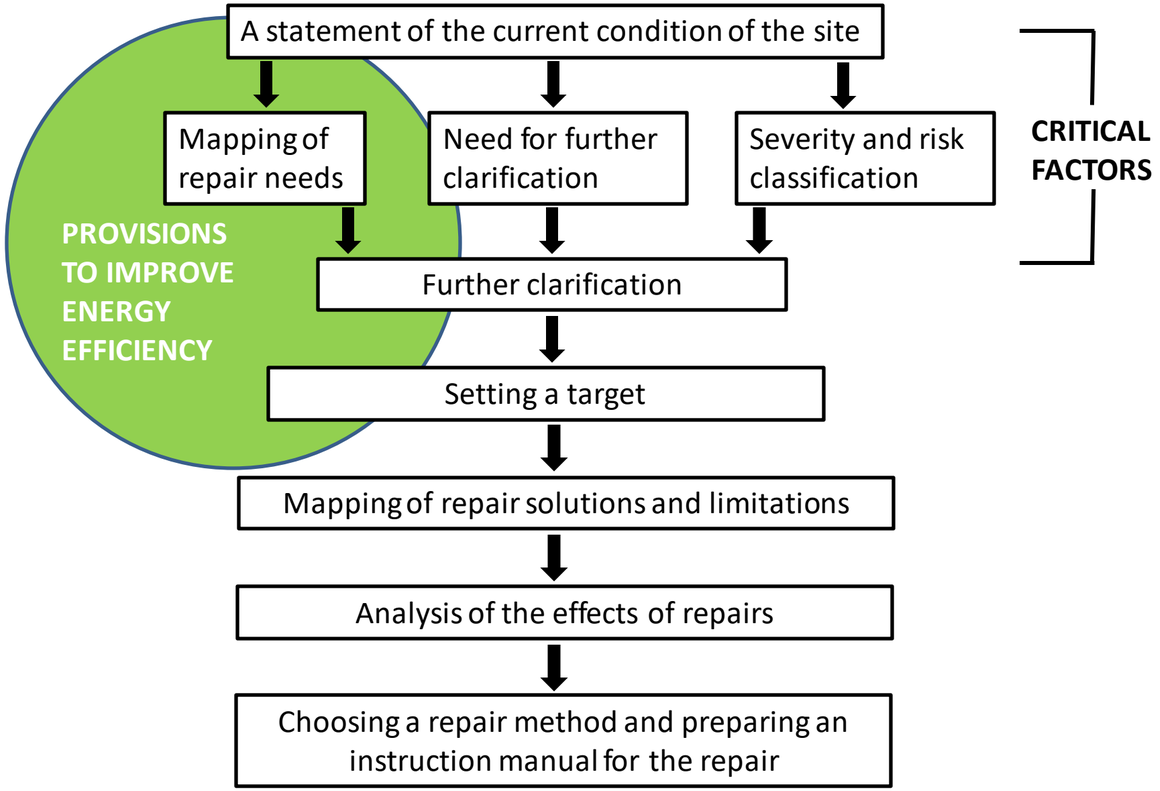
The renovation project must be based on up-to-date information.

The guidelines for cooperation, the responsibilities and how data are collected, analyzed, presented and documented shall be defined.
It is essential to find out the characteristics and special features of the building. In a site found to be of cultural historical value, the specification of values, the requirements of protection, specific conservation targeting and specific features must be clarified.
This requires cooperation with the Museum Authority.

Acquisition of data

Prior to project planning, background information is needed to provide precise criteria for repair options. The starting data shall be:

- the dimensions, construction, building technology, etc. of the building. physical data (drawings)
- archive data (public authorities and private)
- condition assessments and condition studies, damage, maintenance data, conservationist studies, repair history and sensory (simultaneous) examinations of the user and designers before starting design work
- building physical and biological studies (e.g. indoor climate studies)
- building and historical information
- actual operating costs
- the experiences of users and guardians (possible user surveys).



Ojanen et al. 2013

Getting started with sufficient explanations

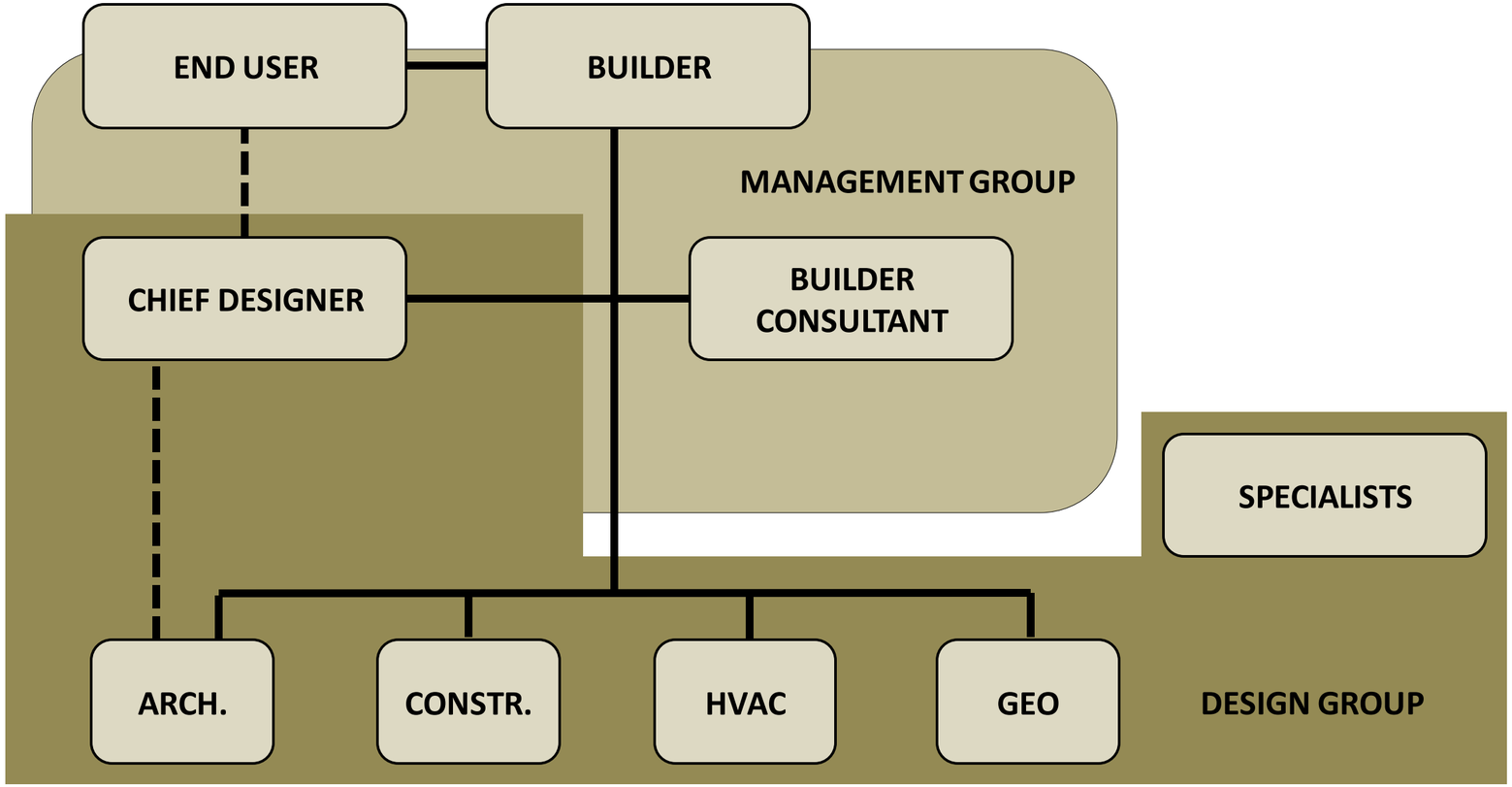
The studies on the condition of the building used as evidence of the starting point for repair or modification shall, taking into account the nature and extent of the construction project, include, to an adequate extent, information on the following facts and any related damage:

1. Load capacity of structures and stability of the building
2. Moisture balance and other building physical functionality of building parts
3. Healthiness of the building's indoor air system
4. Other aspects of the safety and healthiness of the building
5. Methods of settlement used and data of the author of the study
6. Report on the characteristics of the building and the historical significance of the building
7. Information on previous repairs and modifications.

Master planner

The main designer plays an important role, as he is responsible for the overall design and its quality (§48 MRA).

The main designer, in cooperation with the person starting the construction project, is responsible for investigating the building's building history, building characteristics and condition, previous repairs and modifications, as required by the quality and scope of the renovation and modification work. (MrL, Section 48)
The decision-making process must also be documented.



An example of an organization that describes a contractual relationships.

Special skills

In addition to ARCH and Civil eng., HVAC designers, special expertise is needed on a project-by-project basis:

- Property inventory expert (e.g. analysis of fire operation and maintenance safety)
- Building history expert
- Conservator
- Fire technology expert
- Acoustics Designer
- Safety coordinator
- Environmental impact expert
- Data Model Coordinator
- Indoor climate expert
- Energy and conditions expert
- Service book coordinator
- Life cycle planner

Building supervision

Local building authority is the main design partner in the early stages of the project.

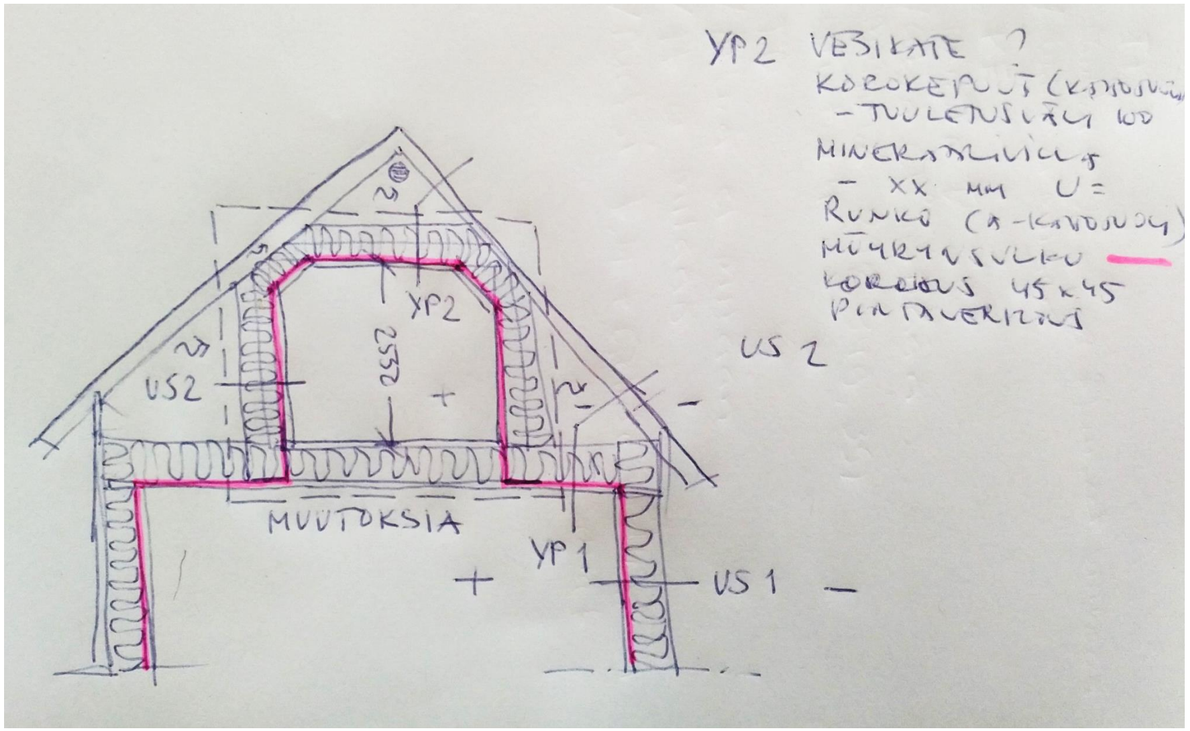
It also provides contacts with the zoning authority and the building protection authority. The starting information, such as the conservation situation, the planning needs responsible for conservation, and the necessary cooperation during the project can be agreed with the Museum Authority.
Active interaction, coordination and effective communication will be emphasized throughout the project.

Get-to-know-you and documentation phase

In connection with the collection and documentation of data, it is clear to what extent the existing data are incomplete and to what extent further studies and data are needed.

When familiar with the site, the accuracy of the data is assessed, for example, whether the plans correspond to the implementation and current state.

Deficiencies are identified, after which the information is supplemented.
This requires surveys and analyses on the site.
If necessary, structural openings, various measurements and studies are carried out and a building history study (RHS) is commissioned.



Objectives of repair

In the renovation of buildings, the aim is, for example, to achieve the best possible energy efficiency while preserving the valuable features and characteristics of the building.

The objectives must be defined taking into account a number of aspects. At least the following areas shall be defined with the following objectives:
Compatibility with architecture, existing structures and technical systems
Energy efficiency
Indoor climate conditions
Sustainable development (e.g. accessibility, environment, life cycle)
Cultural historical significance of the building and its surroundings
Economic conditions
Aspects of operation and maintenance.

Design and studies side by side

The design becomes more specific when studies can be carried out on the object, such as structural openings.

The planner's job is to take a stand or determine what to sort out.
The results are delivered to the designers and allow the designers to refine their plans.
Sufficient time must be reserved for studies and assessments.

Model jobs and test repairs

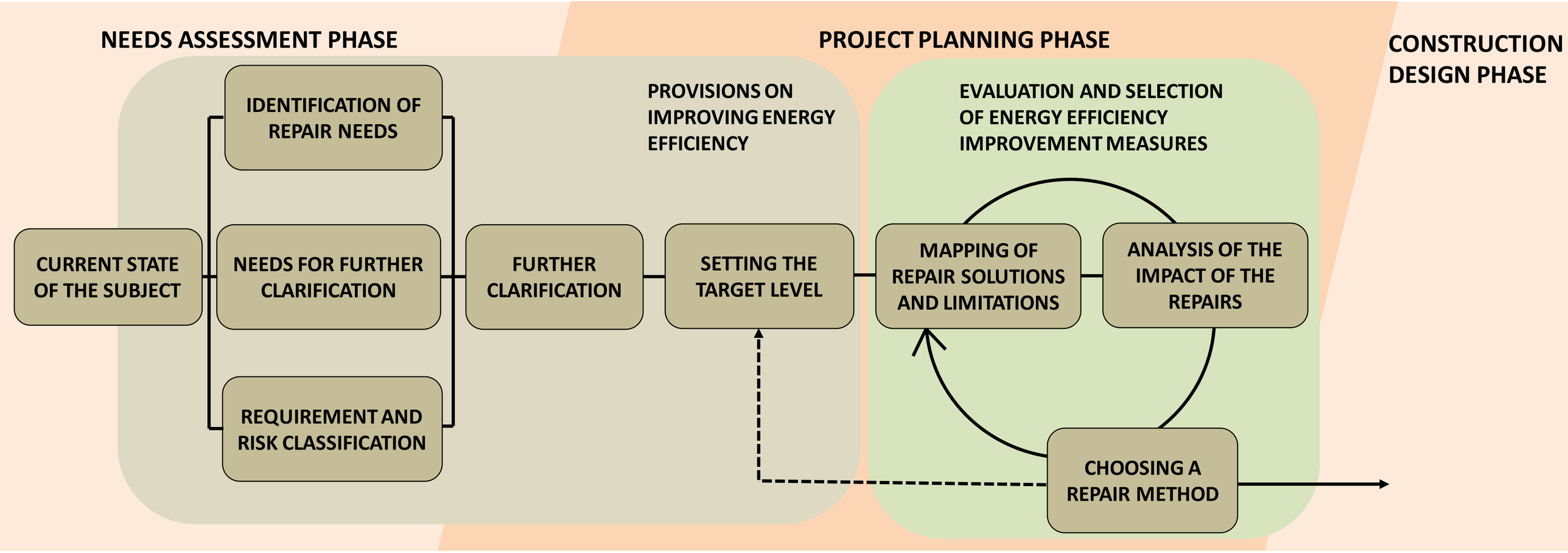
The suitability and feasibility of repair solutions is ensured by experimentation.

At the same time, the test fixes can be used to refine and agree on technical details in a very concrete way. Model work and test repairs can be carried out already at the design stage or only at the site stage, depending on the case.

Only at the site stage can repair and modification solutions be ensured for each site.

Construction project phases

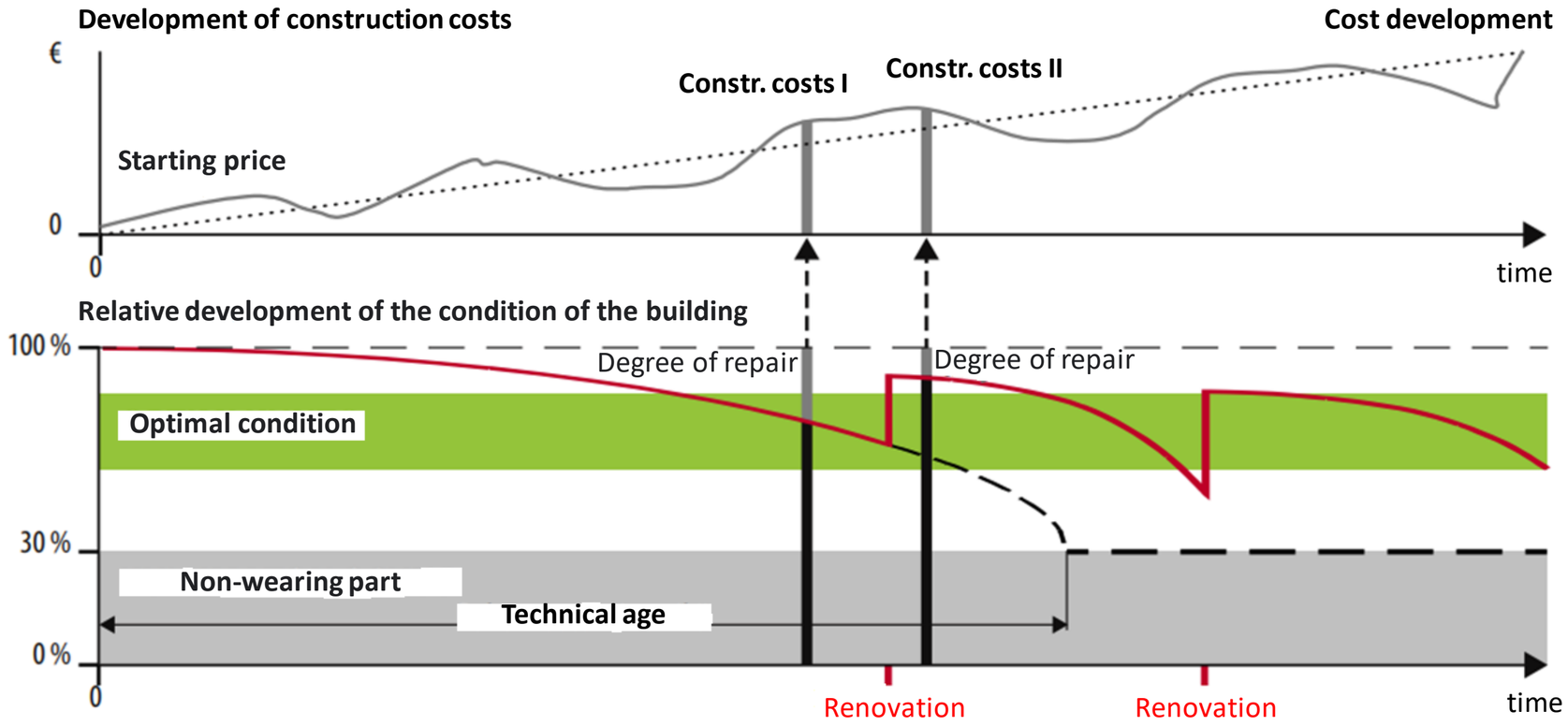
Identify the need to improve energy efficiency



An operating model for identifying energy efficiency improvement needs and defining improvement measures.

Ojanen, Tuomo, Nykänen, Esa ja Hemmilä, Kari. Rakenteellinen energiatehokkuus korjausrakentamisessa, Opas. 2016.

The value of the property can be maintained by systematically repairing



Ojanen, Tuomo, Nykänen, Esa ja Hemmilä, Kari. Rakenteellinen energiatehokkuus korjausrakentamisessa, Opas. 2016. Rakennuksen nykyarvon määritys (Viljakainen 2004).

Renovation project planning

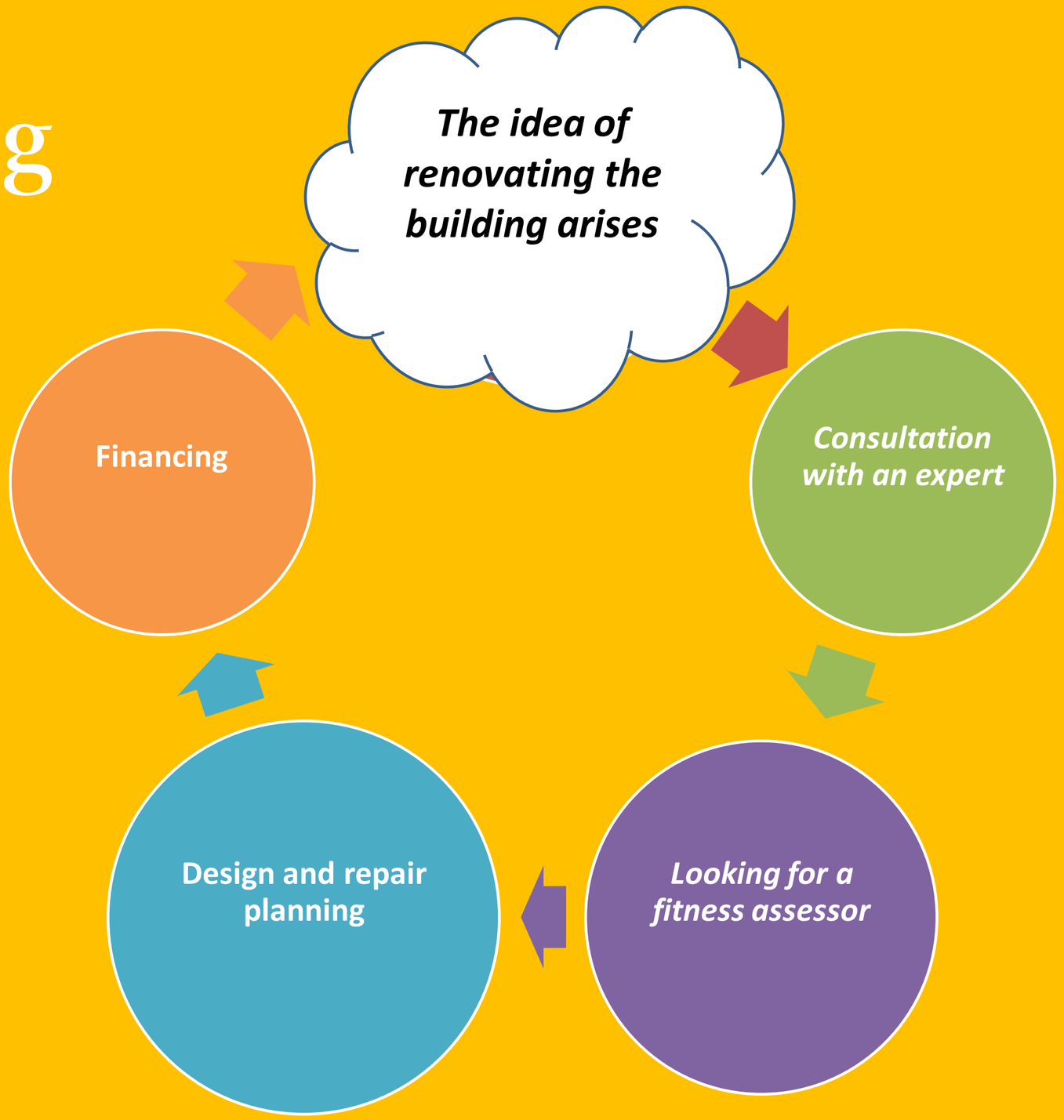
Renovation project planning

1. Compile a comprehensive list of possible measures – At this stage, the building's features or cultural historical significance are not yet taken into account.
2. Exclude unsuitable measures – Removal of clearly inappropriate measures.
3. Assess the remaining measures – Impact assessment taking into account risk and benefit considerations. The end result is a list of e.g. appropriate energy efficiency improvement measures in order of priority.
4. Select measures – The actions are combined into entities. The combinations are evaluated as entities in order to find the most appropriate measures.
5. Assess the measures in comparison with the objectives – Finally, the measures selected for implementation are compared with the previously set targets. If the result does not meet the objectives, the measures included in the package shall be amended and the assessment reassessed or the targets amended.
6.

Project planning

The renovation project will be started by project planning, which will examine the current state and need for repairs to the premises and structures or HVAV systems that are being repaired.
At the same time, the content and scope of the repair work and the timetable for the implementation of the repair project will be defined and approved.
Let's decide how to implement it.

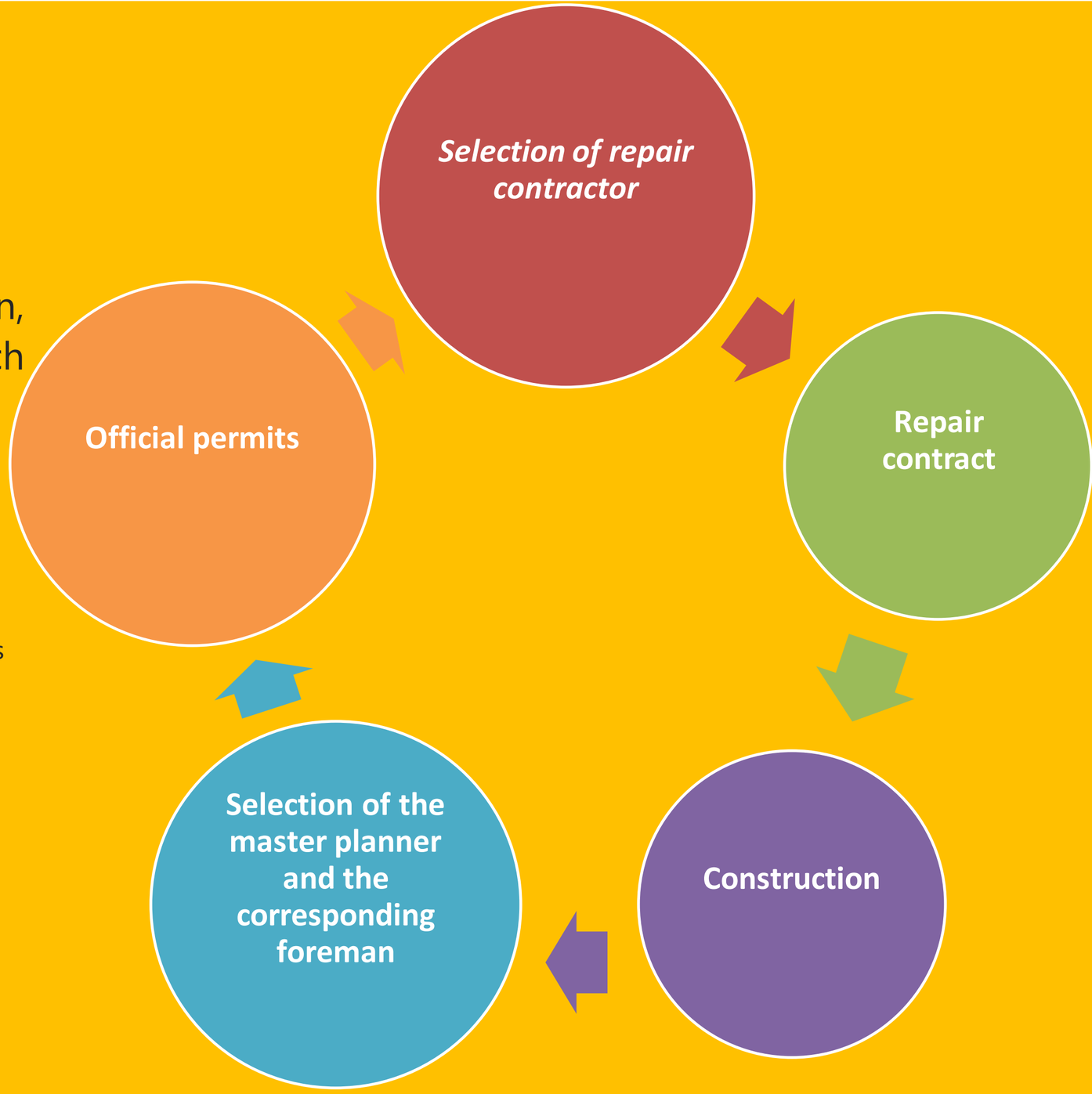
During the use of the building, the condition assessment examines repair needs at intervals. The necessary repair work is defined in the property maintenance plan (PTS).
Corrective advice: https://www.ymparisto.fi/fi-FI/Rakentaminen/Korjaustieto/Korjausneuvonta
Useful assist links:
https://www.ara.fi/fi-FI/Lainat_ja_avustukset/Korjausavustukset
http://www.nba.fi/fi/kaavakkeet



Construction

During the preparation of the construction, tender documents will be submitted, which will be sent to contractors specializing in renovation construction.

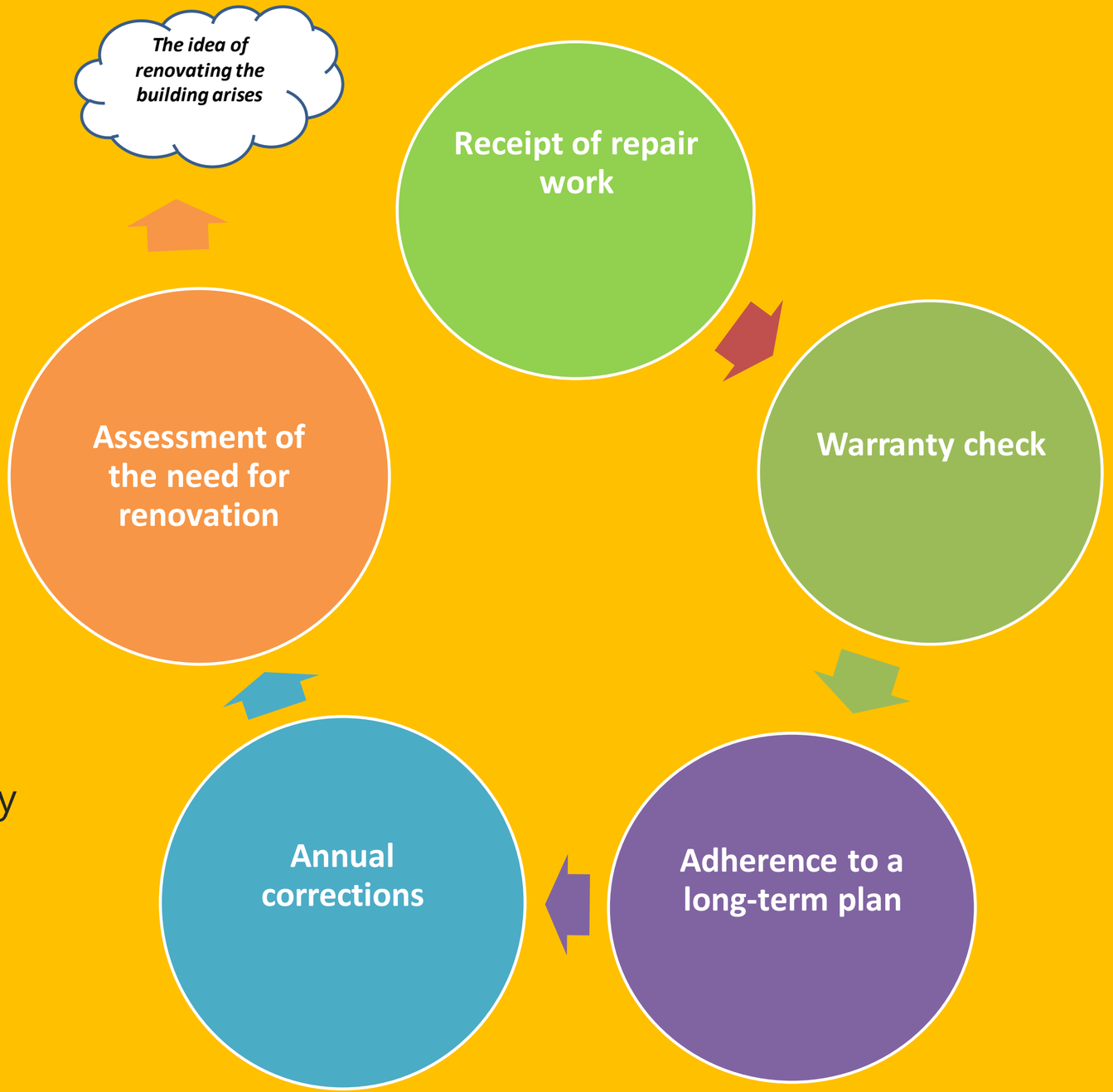
In construction and renovation, the construction of wet rooms (sauna and washrooms) requires special expertise.
A written contract is always concluded for the works contract, which is accompanied either by the general terms and conditions of the works in 1998 or by the contract in accordance with the terms of the small contract. The general terms and conditions to be complied with, if they are to be complied with, are already indicated in the invitation to tender.
The small contract template (contract with one contractor) is rt 80265 and the contract is drawn up by RT16-10703.



From renovation to continuous evaluation

After the construction work has been completed, an acceptance check will be carried out, which will be the subject of an acknowledgement of receipt.
The minutes shall record, for example, errors and deficiencies that the contractor is obliged to rectify in order to meet the quality requirements set by the customer for repair work.

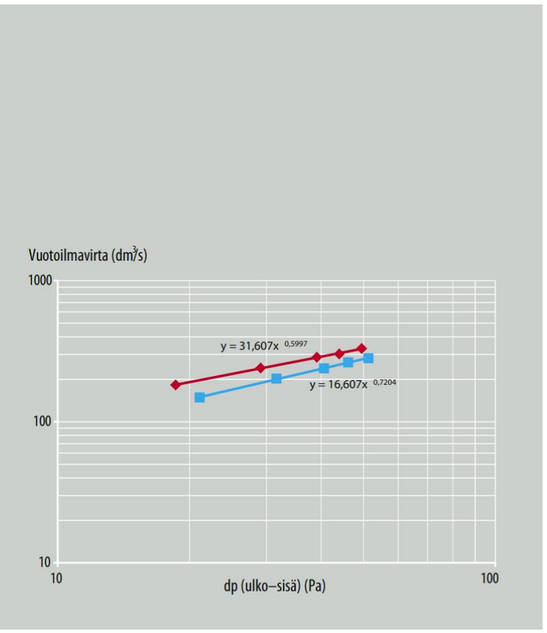
Repair work must be guaranteed for a period of at least two years. The customer must require a guarantee for repair work already during the contract phase of the contract.
The YSE-based agreement agreed on guarantees in according the YSE-1998.



Improving thermal insulation of a traditional building

Thermal camera photography and determination of the airproofing of the building

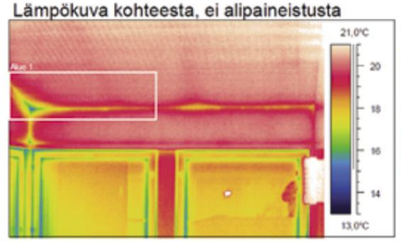
In the study of the functionality of the building, it is useful to know the airproofing of the building and its main air leakage points, as well as structural cold bridges.
In Hatar, air leaking structures often experience uncontrolled air leaks between indoor and outdoor air. These cause draws, increase energy consumption and can cause moisture build-up in structures, as well as the passage of impurities into the room.



Valokuva kohteesta

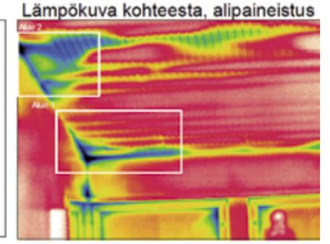
Ulkolämpötila	-2
Sisälämpötila	19
Paine-ero	Ei alip. ja -50 Pa
Tuuli	-
Pilvisyys	puolipilvinen

Lämpökuva kohteesta, ei alipaineistusta



Alue 1 : max	20,5 °C
Alue 1 : min	15,0 °C
Alue 1 : avg	19,5 °C
0.7-kriteerin lpt.	12,7 °C
Kriteeri (Alue 1)	0,81

Lämpökuva kohteesta, alipaineistus



Alue 1 : max	20,1 °C
Alue 1 : min	9,4 °C
Alue 1 : avg	18,2 °C
0.7-kriteerin lpt.	12,7 °C
Kriteeri (Alue 1)	

Ojanen, Tuomo, Nykänen, Esa ja Hemmilä, Kari. Rakenteellinen energiatehokkuus korjausrakentamisessa, Opas. 2016.