Aaen ARUP

Preserve or Explain

Part 1: Tool

Service translation of the original document Bevar eller Forklar Del 1: Værktøj

Støttet af

Bevar mere.

Preserve or Explain
Part 1: Tool

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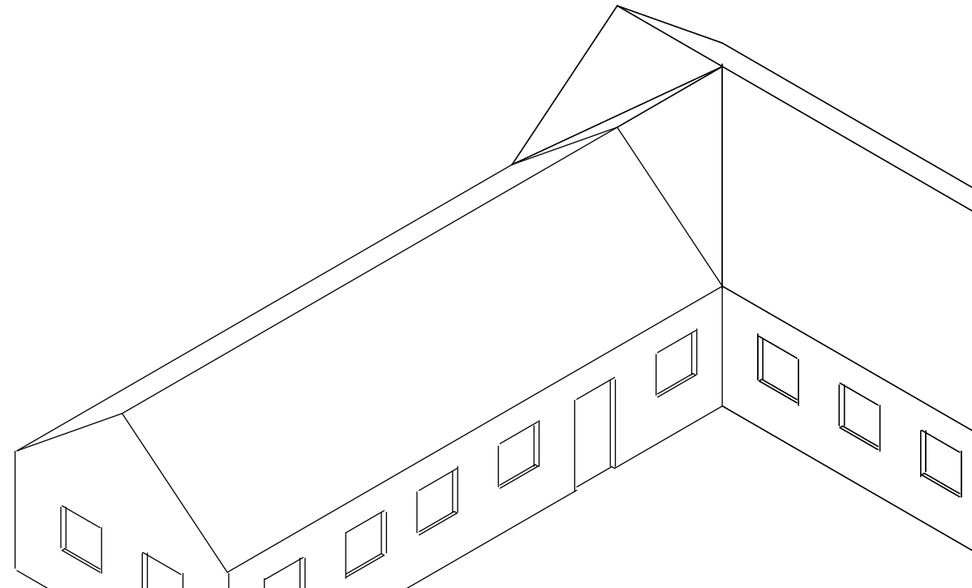


Foreword

Imagine a Denmark where our cities and towns tell stories — not only about the past, but also about our ability to adapt over time. Where former schools become modern community spaces, and industrial buildings are given new life as homes. Where we do not simply demolish and rebuild, but instead prioritise transformation, re-use, and retention — for the benefit of the climate, cultural heritage, and the economy.
This Preserve or Explain tool seeks to help make that future possible.

Today, the Danish construction sector is characterised by high material consumption, a strong reliance on new build development, and limited transformation of existing buildings.
Each year, Denmark generates approximately 5.1 million tonnes of construction and demolition waste, while less than 1 per cent of materials used in construction come from reuse. These figures speak for themselves and highlight a significant potential to increase retrofit, reuse, and the retention of existing buildings, in line with whole-life carbon reduction principles.

This document presents a Danish Preserve or Explain Tool, developed to support municipalities and stakeholders in the built environment in assessing whether existing buildings can be retained, refurbished, or adapted, rather than demolished, across Denmark.
The tool provides a systematic approach that promotes transparency, early dialogue, and documented decision-making, particularly in relation to demolition, refurbishment, and redevelopment, and reflects principles similar to retrofit-first and carbon options appraisal approaches used internationally.

The aim of the project is to strengthen preservation practice and circular economy principles within the Danish building stock, through broad stakeholder involvement and inspiration from international experience.
The tool is intended to support a consistent professional and administrative practice in which circularity, whole-life carbon, and retention considerations are more systematically integrated into decisions concerning the built environment.

The tool emphasises that the concept of preservation should be expanded beyond traditional heritage assessment criteria to also include structural quality, adaptability, retrofit potential, and intangible social and cultural values.
It has also been important that the tool is flexible and can be adapted to different levels of municipal resources and administrative capacity, while still ensuring consistent, fair, and transparent processes across the country.

The following sections present the Preserve or Explain tool.
It is the ambition of the project that a clear and consistent national approach can strengthen public awareness of building culture, circular construction, and climate responsibility, and support both large and small municipalities in making well-founded decisions about retention, retrofit, and redevelopment, in line with whole-life carbon and retrofit-first principles.

Sophie Hæstorp Andersen
Minister of Housing and Social Affairs

Introduction

The Preserve or Explain-tool has been developed by Arup as part of the Preserve More initiative.
The purpose of the tool is to support Danish municipalities in assessing whether an existing building should be demolished, or whether it should — and to what extent — be retained, refurbished, or transformed in accordance with retrofit-first and whole-life carbon principles.

The tool is primarily intended for use by municipalities in the assessment of demolition applications, or during the early dialogue with a developer as part of the local development plan process.
Developers are responsible for preparing the Preserve or Explain assessment, which must be submitted to the relevant municipal planning authority and included as part of the decision-making basis when considering potential requirements for retention or preservation.
Municipalities are therefore considered the primary target group for the tool, while developers and other actors in the construction sector constitute the secondary target group.
The task is understood as a shared responsibility, requiring close collaboration across all stakeholders involved in the built environment.

The purpose of the tool is to provide municipalities with a structured methodology that supports transparency, early engagement, and evidence-based decision-making, particularly in relation to proposals involving demolition.
In this way, the tool strengthens the basis for requiring full or partial retention of existing buildings, including the preparation of preservation-led local plans where relevant, and aligns with approaches comparable to Retrofit First policies and carbon options appraisal used in international planning practice.

The tool is intended for use in cases where full or partial demolition of existing buildings is proposed and where the project triggers the requirement for a local development plan under Section 13(2) of the Danish Planning Act.
This scope has been defined in close dialogue with the municipal partners in the project and reflects their input on how the tool can be implemented as a supplement to existing procedures within the planning process.
The Preserve or Explain assessment should therefore be regarded as an addition to the studies already used as part of the decision-making basis in local plan processes, including assessments of the wider social, cultural, and environmental value that a project may bring to the area.
Figure 1 provides a visual overview of where the Preserve or Explain tool is positioned within the local plan process.

It is recommended that municipalities implement the tool in accordance with their specific local context.
This includes determining an appropriate level of detail in the required assessments, as well as adapting the tool to different project types, building typologies, and local planning priorities.
Municipal building and planning authorities should therefore ultimately determine how the tool is to be integrated and applied in practice.

Biodiversity — both on the construction site and across the value chain — is not currently included as a formal parameter within the tool.
However, municipalities are encouraged to set relevant requirements themselves and to integrate these locally in line with their own biodiversity policies and strategies, as part of the local development plan process.

It is further recommended that, in the future, the tool is developed into a model that can also be applied in cases that do not trigger the preparation of a new local plan, such as single-family houses or other low-density residential buildings.
This would allow the requirement to apply the tool to be extended to all projects involving full, substantial, or partial demolition of existing buildings, regardless of building size or project scale.
Such projects will typically fall within the scope of the municipal building permit process rather than the statutory planning process.

Figure 1 provides an overview of where the Preserve or Explain tool is positioned within the existing local development plan process.

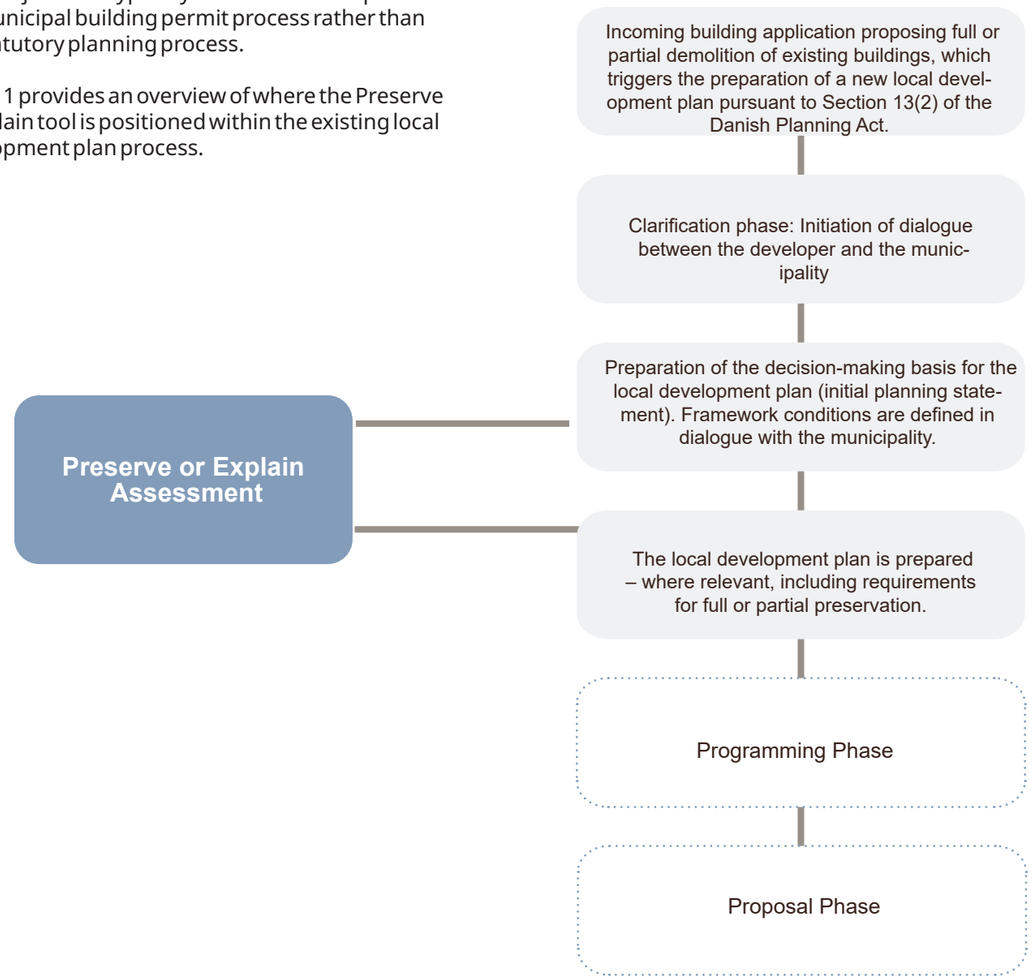
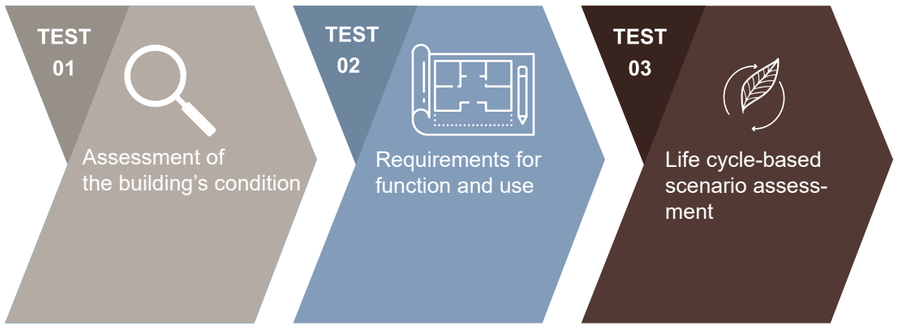


Figure 1: Overview of the local plan process and the positioning of the Preserve or Explain assessment

Preserve or Explain Tool

The Preserve or Explain tool contains the following tests:

Process Overview



Process Overview

This process overview illustrates the procedure for assessing the stepwise tests that together constitute the Preserve or Explain-tool. As shown in Figure 2, the process comprises three "Tests", each involving specific requirements for investigations and documentation. The figure and the associated process apply to building projects where demolition is proposed and which trigger the preparation of a (new) local plan.

It is not a given that all three tests will be carried out. Instead, the tests are applied sequentially (from Test 1 to Test 3) until the local authority determines that sufficient documentation has been provided to justify demolition. Consequently, the municipality may impose requirements for preservation within the local development plan in cases where the Preserve or Explain assessment does not demonstrate adequate grounds for demolition.

Prior to preparing the Preserve or Explain assessment, the developer should initiate an early dialogue with the municipality to ensure that the assessment is undertaken on a basis aligned with both the developer's and the municipality's ambitions and in accordance with the local planning process.

Third-party verification is required for the test that forms the basis for the decision on demolition. Such verification must be carried out by a qualified professional, appointed in dialogue with the municipality. This verification constitutes an independent assessment confirming that the specific requirements relating to calculations and the analysis of preservation and transformation scenarios comply with applicable legislation and standards[1].

Based on the initial dialogue with the municipality and as part of Test 1, the developer (or the developer's technical advisor) prepares three project scenarios. These comprise a baseline scenario representing full demolition and new construction, a preservation scenario retaining, for example, 50% of the existing building, and a preservation scenario retaining, for example, 80% of the existing building. It is important to emphasise that the preservation scenarios applied in the assessment must be defined through feasibility studies undertaken as part of Test 1 and through dialogue with the relevant municipal department; the degree of preservation is therefore not predefined.

In parallel with the stepwise tests, an ongoing resource mapping exercise is carried out with the purpose of exploring the potential for integrating circular practices into the construction process. The resource mapping shall be undertaken in accordance with the Executive Order on the Management of Waste and Materials from Construction and Demolition Activities (Executive Order No. 496 of 21 May 2024), Section 9, concerning selective demolition, and is based on the preservation scenarios assessed as part of the Preserve or Explain assessment.

Preserve *or* Explain

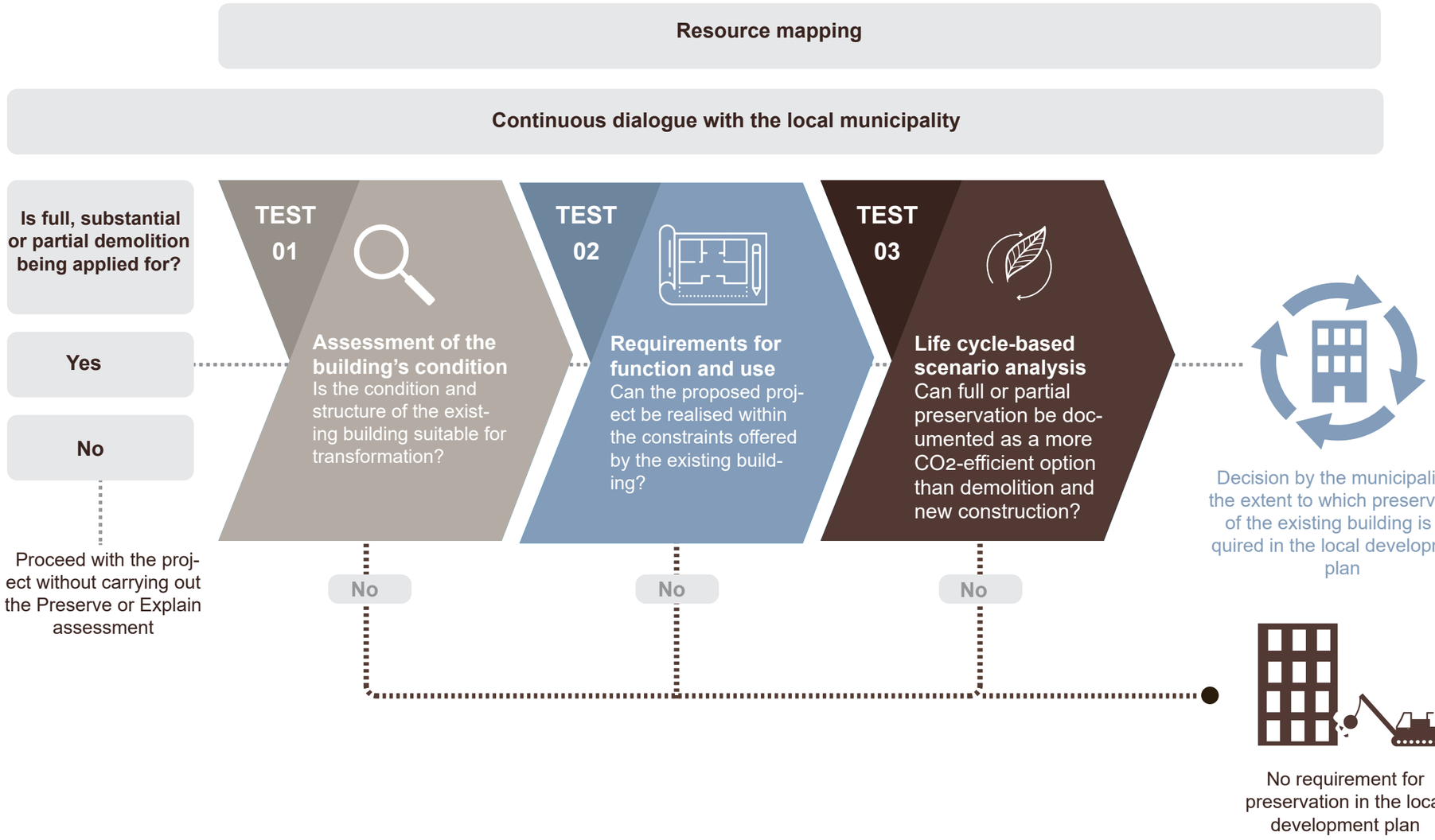


Figure 2: Process overview of the Preserve or Explain assessment

Renovation Classes

In this project, the principles of Westminster's Retrofit First policy have been applied, whereby the preservation and upgrading of existing buildings are prioritised over demolition and new construction. The approach has been adapted to a Danish context and further developed through close dialogue with the project's partners from the construction sector, with the aim of establishing an operational and practice-oriented basis for differentiating renovation levels that reflect both the extent of interventions and the building's overall climate and resource impact.

For a more detailed explanation of renovation classes in a Danish context, see Preserve or Explain – Part 2: Background report.

Figure 3 illustrates the different levels of preservation and how the associated definitions of renovation classes are applied within the Preserve or Explain tool.

Renovation classes and degree of preservation

Renovation	Replacement of external building elements (façade and roof), finishes, and routine maintenance works. Works on parts of the load-bearing structure to facilitate extension.	*Full preservation (85–100%)*
Renovation + extension	Replacement of external building elements (façade and roof), surfaces, and maintenance works. Localised works to parts of the load-bearing structure to facilitate the replacement of elements above. Works on parts of the load-bearing structure to facilitate extension.	*Substantial preservation (50–85%)*
Deep renovation	Replacement of external building elements (façade and roof), finishes, and routine maintenance works. Demolition of up to and including 50% of floor slabs.	
Deep renovation + extension	Replacement of external building elements (façade and roof), finishes, and maintenance works. Demolition of up to and including 50% of floor slabs. Works on parts of the load-bearing structure to facilitate extension.	*Partial preservation (15–50%)*
New construction	Replacement of external building elements (façade and roof), finishes, and maintenance works. Demolition of more than 50% of floor slabs or load-bearing structures.	*Minimal or no preservation (0–15%)*

Figure 3: Degree of preservation and associated renovation classes applied in the Preserve or Explain tool

TEST 01

Assessment of the building’s condition

The building’s key data, condition, and load-bearing structure are critical to assessing the potential for preserving and transforming the existing building on the site. As part of Test 1, a general description and an engineering-based structural assessment are prepared to establish the condition of the building and its structural system and to evaluate the possibilities for full, substantial, or partial preservation of the existing building.

If the condition of the structure is such that preservation of the building is not considered technically feasible by a qualified building surveyor and structural engineer, or if the necessary repair and renovation works are assessed to be disproportionately extensive in relation to a realistic development of the building, the developer may argue that no requirement for preservation of the existing building should be included in the local plan, with reference to this test and without the need for further documentation in the other tests.

If the condition of the structure demonstrates that preservation of the building is technically feasible, the developer/applicant must proceed by following the sequence of the stepwise tests.

Stakeholders

Below is an overview of the stakeholders who should be involved as part of the preparation of Test 1.

Test Requirements

This test is positioned as the first in the sequence of stepwise tests, as it establishes which preservation scenarios—full, substantial, or partial preservation—are technically feasible based on the existing structure on the site.

As a result, subsequent assessments in the remaining tests are based on project designs that are realistically achievable. Since a structural assessment is typically prepared as part of the preliminary work for demolition and new construction, this investigation should be carried out early in the planning process, as part of the clarification phase and the initial planning statement within the local plan process, as also illustrated in Figure 1.

As part of the documentation for Test 1, a resource mapping is also undertaken to identify the potential for material reuse on the site, in accordance with the Executive Order on the management of waste and materials from construction and demolition activities (Executive Order No. 496 of 21 May 2024).

A complete list of documentation requirements is provided as follows.

Documentation Requirements for Test 1

Information on the Existing Building

- Description of the existing building, including municipal building registry data records, key building data such as year of construction, and any known constraints or restrictions.
- Archival records for the building, including information on whether the building is SAVE (heritage)-listed with a value that triggers preservation requirements under the Municipal Plan.
- Timeline of changes, documenting alterations to the structure, changes in use, and any known previous damage.
- Completed building surveys and investigations, undertaken to identify the structural system, load-bearing capacity, and unknown conditions, where such information is not available from archival material.
- Environmental screening, identifying the risk of hazardous substances in accordance with Section 4 of the Executive Order on the management of waste and materials from construction and demolition activities (Executive Order No. 496 of 21 May 2024).

Load-bearing capacity

- Assessed residual load-bearing capacity of all critical structural components, including foundations, basement structures, load-bearing elements, and floor slabs.
- Potential strengthening measures for structural elements, where relevant.

Structural Function

- Potential preservation scenarios for the existing building that could prevent full or partial demolition.
- Adequacy of the existing building to comply with applicable fire safety and accessibility requirements.
- Overview of risks associated with the reuse of the existing structure.

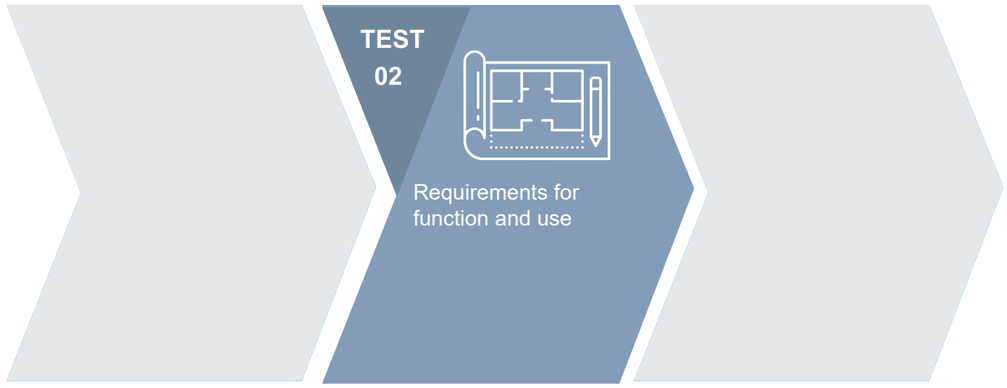
Resource Mapping

- Resource mapping in accordance with the Executive Order on the management of waste and materials from construction and demolition activities (Executive Order No. 496 of 21 May 2024).

If the applicant proposes demolition and intends to use Test 1 as documentation, the following evidence must be provided:

Documentation requirements for justification of demolition

- Documentation demonstrating that the proposed full or partial demolition is unavoidable due to insufficient quality of the existing structure or its structural performance.



TEST 02
Requirements for function and use

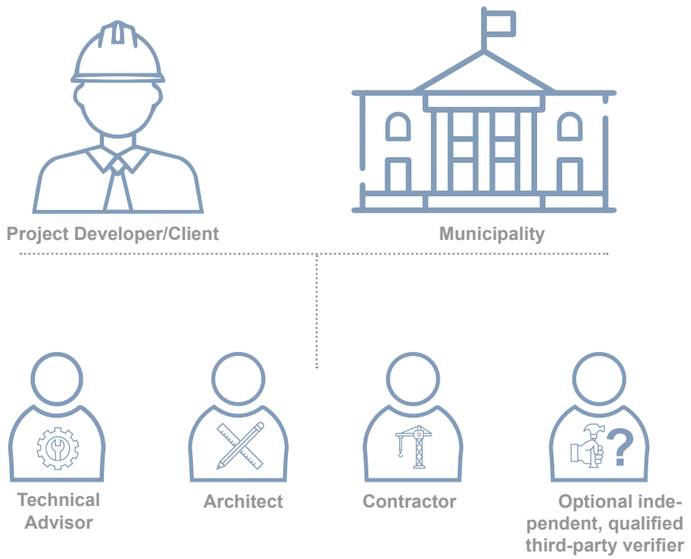
An assessment of functional and use requirements must be submitted in support of Test 2, where Test 1 has demonstrated that full, substantial, or partial preservation of the existing building is structurally feasible. If a proposal includes uses that do not involve any specific changes to operational or access requirements of the existing building, this test may be omitted, and applicants may proceed directly from Test 1 to Test 3.

The purpose of Test 2 is to assess the potential of the existing building to accommodate the functional and use requirements of the proposed project. This potential must be evaluated against the preservation scenarios defined and assessed in Test 1.

There may be cases where a change of use is necessary and where it is not possible to comply with use requirements while preserving the existing building. In cases where the existing building prevents or significantly restricts the ability to develop the site in compliance with use requirements, Test 2 may constitute the decision-making basis for justifying demolition. Use requirements primarily refer to the requirements set out in the Danish Building Regulations (BR18), including, among others, rules relating to accessibility, fire safety, internal layout, energy consumption and climate impact, structural requirements, as well as conditions related to acoustics, daylight, and views.

Stakeholders

Below is an overview of the stakeholders who should be involved in the development of Test 2.



Test Requirements

Test 2 focuses specifically on requirements related to (new) use. It therefore does not take operational requirements relating to the quality of use into account. The test may constitute documentation for a decision to grant permission for demolition in cases where the proposed use cannot comply with requirements under full or partial preservation of the existing building.

Accessibility measures such as ramps, signage, and lighting should be prioritised and assessed within the constraints of the existing building in accordance with the Danish Building Regulations (BR18). Only where such measures have been fully explored may limited accessibility justify a decision to grant permission for demolition.

Partial, substantial, or full demolition based on speculative assumptions about future use requirements should not be approved without evidence confirming the necessity of those requirements, for example in the form of a binding agreement or contract. This is to ensure that demolition and new construction are not based on requirements that subsequently prove unnecessary for the actual future use.
A complete list of documentation requirements is provided as follows.

Documentation Requirements

Proposed Use

- The proposed development complies with the applicable municipal plan and local plan with regard to the designated location and use.
- The proposed use can be achieved within the constraints of the existing building in accordance with the Danish Building Regulations (BR18).

Operational and Access Constraints and Requirements

- Constraints of the existing building, including access conditions, floor-to-ceiling heights, internal columns, daylight availability, building form factor, and similar limitations.
- Description of specific use requirements for the proposal, including ventilation, electrical installations, lifts, and other relevant technical systems.
- Explanation of any mismatch between constraints and requirements, and why it is not possible, through contemporary design practices, to meet the requirements through full or partial preservation of the existing building.

Resource Mapping

- Resource mapping of materials, carried out in accordance with the Executive Order on the management of waste and materials from construction and demolition activities (Executive Order No. 496 of 21 May 2024).

If the applicant proposes demolition and intends to use Test 2 as documentation, the following evidence must be provided:

Documentation Requirements for the Justification of Demolition

- Evidence demonstrating that demolition is unavoidable in light of the stated use requirements for all proposed preservation scenarios, including full, substantial, or partial preservation.

TEST 03

Life cycle–based scenario analysis

An LCA and an LCC scenario analysis must be submitted as Test 3. Test 3 shall be carried out in cases where it has been demonstrated, on the basis of Test 1 and Test 2, that full, substantial, or partial preservation of the existing building is feasible.

Introduction

LCA

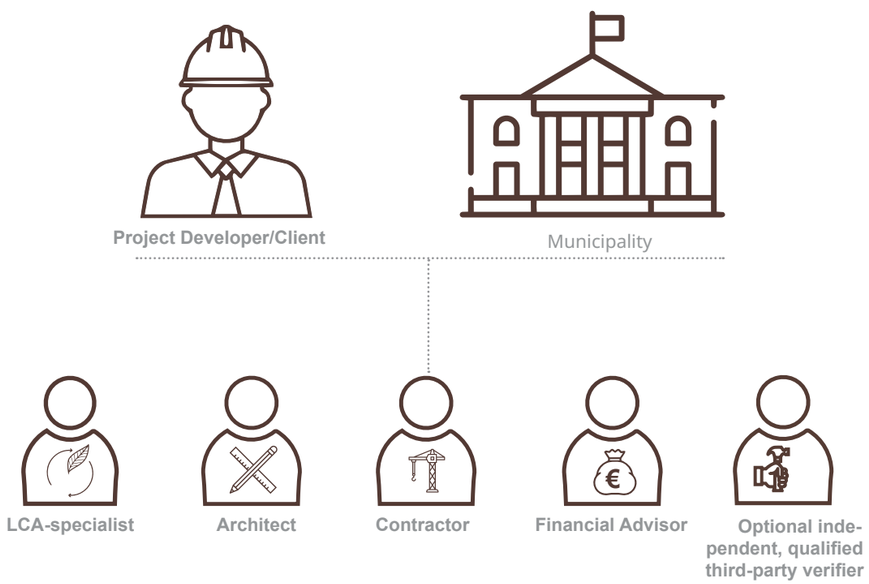
Life Cycle Assessment (LCA) is a measure of climate impact, expressed as contributions in carbon dioxide equivalents (CO_2e) over the entire life cycle of a building. LCA variant studies of the proposed project designs shall be carried out to compare the climate impacts associated with the assessed preservation scenarios. The overall methodology for calculating the climate impact of buildings is based on DS/EN 15978:2012 *Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method*, as implemented under the Danish Building Regulations (BR18).

LCC

Life Cycle Costing (LCC) is a method used to assess the total costs of a building or infrastructure asset over its entire life cycle. This includes not only capital costs, but also costs related to operation, maintenance, repair, replacement, and end-of-life disposal. The purpose of LCC is to provide a stronger decision-making basis by making the long-term economic implications of different solutions transparent. The method is described and standardised in ISO 15686-5:2017 Buildings and constructed assets – Service life planning – Part 5: Life cycle costing, which sets out principles, definitions, and calculation methods for life-cycle costs in relation to buildings and infrastructure assets.

Stakeholders

Below is an overview of the stakeholders who should be involved in the preparation of Test 3.



The results of Test 1 and Test 2 form the basis for determining which scenarios are subject to life-cycle assessment, ensuring that only feasible scenarios are included in the comparison.

The comparison shall include the LCA modules A1–A5, B4, B6, C3–C4, and D, in accordance with the Danish Building Regulations (BR18). As a minimum, the analysis shall compare the baseline scenario (new construction) with the two preservation scenarios defined in the earlier stages of Test 1. The alternatives assessed shall be defined in dialogue with the relevant municipal planning and/or building permit authorities and should reflect the technically feasible project designs/scenarios demonstrated to be achievable through Test 1 and Test 2. The calculations shall include the building as a whole as well as primary building elements.

In addition, an overarching LCC analysis shall be carried out for the scenarios included in the LCA scenario analysis, using the same system boundaries in order to ensure transparency between economic costs and environmental impacts across the assessed scenarios. This enables municipalities to make informed decisions based on both climate-related and economic impacts of the proposed scenarios before imposing preservation requirements in the local plan.

If this test is used to justify partial, substantial, or full demolition, the anticipated climate impact of a new-build scenario must be the lowest among the scenarios assessed.

A complete list of documentation requirements is provided on the following page.

Documentation Requirements for Test 3

The range of opportunities explored

- Dialogue with the relevant municipal planning and building permit authorities shall determine the scenarios that form the basis for the comparative LCA.
- Scenarios shall prioritise the reduction of embodied carbon (A1–A3) in the LCA calculations, in particular through the direct reuse of materials.
- An overarching LCC analysis shall be prepared, outlining the total life-cycle costs for the baseline scenario and the preservation scenarios included in the comparative LCA.

LCA-methodology

- The LCA methodology shall comply with DS/EN 15978:2012, in accordance with the Danish Building Regulations (BR18).
- The assessment shall include the LCA modules A1–A5, B4, B6, C3–C4, and D.

LCA and LCC-results

- Assumptions shall be clearly stated, including whether the values used are based on default values, estimates, or calculations.
- Impacts from demolition activities shall be included in the scenario analysis.
- Estimates shall be based on industry-representative averages.
- Uncertainties shall be quantified where relevant, including expected ranges of deviation for best-case and worst-case scenarios.
- Emission factors shall reasonably account for anticipated future reductions in CO_2-equivalents related to energy consumption, for both embodied and operational emissions.
- Appropriate measures shall be taken to ensure a fair comparison between transformation and new construction scenarios.
- Results shall be presented clearly and using templates provided by the municipality.
- Results shall be presented as absolute climate impacts using the LCA impact category Global Warming Potential (GWP), expressed in kilograms of CO_2-equivalents (kg CO_2e) as the primary unit. Other relevant impact categories may be included as supplementary information (e.g. Land Use, Eutrophication Potential (EP), Water Depletion).
- The LCC shall be prepared in accordance with ISO 15686-5:2017 and shall cover the same life-cycle modules as those applied in the LCA methodology.
- LThe LCC shall include considerations related to potential additional revenue from surplus building materials that can be reused or recycled.
- LCC results shall be presented in Danish kroner (DKK).

Documentation Requirements for Test 3

Resource Mapping

- Continuation of the resource mapping in accordance with the Danish Executive Order on the management of waste and materials from construction and demolition activities (Executive Order No. 496 of 21 May 2024).

Conclusions

- The assessment statement shall provide an overview of the options explored, the rationale behind the CO_2-saving measures, and a detailed comparison of the alternatives.
- An overview of the LCC results for the assessed scenarios shall be provided.

If the applicant proposes demolition and intends to use Test 3 as documentation, the following evidence must be provided:

Documentation Requirements for the Justification of Demolition

- A statement confirming that the life-cycle assessment of the proposed project demonstrates a lower climate impact than all other assessed alternatives.
- An overview of the LCC results for all assessed scenarios.

Early stakeholder involvement

In connection with Test 1, Test 2, and Test 3, a number of key stakeholders are expected to be involved in order to ensure a holistic assessment and a robust basis for decision-making. The section "Involved stakeholders" in each of the three tests provides an overview of the disciplines and entities that are typically relevant to the preparation of the tests within the Preserve or Explain tool.

It is important to emphasise that this overview is indicative. The specific stakeholder configuration will depend on both the nature of the project and the organisational structure of the municipality. In some cases, broader cross-disciplinary involvement will be required, for example in complex transformation projects or in development areas. The visual overviews should therefore be understood as flexible working tools that can be adapted to local needs and experience, while simultaneously illustrating the typical competencies that can contribute to qualifying the assessments carried out in the three proposed tests.

Results from the Preserve or Explain assessment

The results of the completed tests shall be submitted collectively to the municipality as part of the case documentation. The purpose is to ensure transparency, a consistent assessment approach, and a robust decision-making basis in the municipal handling of the case.
It is recommended that the results are systematically incorporated into the results template shown below (Figure 4). By compiling the test results for both the baseline scenario and the preservation scenarios in a single template, the conclusions from each individual test as well as the overall assessment are clearly presented, including which of the documentation requirements have been decisive. This supports efficient and comparable processing across municipalities and projects.
Overall, the submission of test results in a standardised results template ensures a more robust, transparent, and well-documented process, providing the municipality with a clear basis for assessing whether there is sufficient professional justification for not imposing preservation requirements, or for imposing requirements for full, substantial, or partial preservation in subsequent local planning.

Concluding Remarks

The methodology, data collection, and empirical basis underpinning the Preserve or Explain tool are presented in the Preserve or Explain – Background Report (part 2 of this publication). The background report also sets out the conclusions, recommendations, and next steps identified through the project, which are critical for the successful implementation of the Preserve or Explain tool and for driving a change in how building planning is approached in Denmark.

		Baseline scenaro	Preservation scenario 1	Preservation scenario 2	Example
Test 1	*Sufficient quality of the existing structure*				*The condition and load-bearing capacity of the building allow for this scenario* ✓
Test 2	*Functional and use requirements can be met*				*All access requirements can be met* ✓
Test 3 LCA	*CO2 footprint is lower than the baseline scenario (100% demolition and new build)*				*This preservation scenario has a lower CO₂ footprint than the baseline* ✓
Test 3 LCC	*LCC*				*Expected costs are 7% higher than the baseline scenario*

Figure 4: Result table

References and endnotes from Preserve or Explain – Part 1: The Tool

1. The concept of third-party verification should be further developed in the next phase of the Preserve or Explain tool's development.
2. https://webshop.ds.dk/preview/M240512
3. https://www.iso.org/standard/61148.htmlw

References from Preserve or Explain – Part 2: Background Report

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