EU-REPAIR
VALUABLE BUILT ENVIRONMENT

Toolkit for Sustainable Optimisation of Valuable Built Environment

National Study Estonia

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List of Abbreviations

AIS - (Arhiivi Infosüsteem) Estonian National Archives' information system

DOCOMOMO – International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern MovementEHR

EHR – (Ehitisregister) Estonian Building Register

EKA – (Eesti Kunstiakadeemia) Estonian Academy of Arts

EEA – European Economic Area

EPBD – Energy Performance of Buildings Directive

EVS – (Eesti Vabariigi Standard) Estonian Standard

HEREIN - European Heritage Network

ICCROM – International Centre for the Study of the Preservation and Restoration of Cultural Property

ICOMOS – International Council on Monuments and Sites

LTRS – Long-Term Renovation Strategy

MTR – (Majandustegevuse Register) Register of Economic Activities

MuIS – (Muuseumide Infosüsteem) Museums Information System

MuKoLa- (Muinsuskaitse ja Konserveerimise Labor) Heritage and Conservation Lab in EKA

NECP – National Energy and Climate Plan

nZEB - nearly Zero-Energy Building

RESTO – Digital renovation-support tool developed in Võru

SDGs - United Nations Sustainable Development Goals

SRIK – (Säästva Renoveerimise Infokeskus) Sustainable Renovation Information Centre

TalTech – (Tallinna Tehnikaülikool) Tallinn University of Technology

UNESCO – United Nations Educational, Scientific and Cultural Organization

VBE – Valuable Built Environment

1. Introduction

The current state of Estonia's housing stock can be characterised by both its typological and chronological distribution (Figure 1). According to the 2021 Population and Housing Census[1] approximately 60% of dwellings are located in apartment blocks and 40% in detached houses. Nearly 80% of these dwellings were constructed before the year 2000 and therefore require renovation to meet contemporary standards. In terms of energy performance, the majority of the existing stock falls into lower classes (E–H), while all newly constructed dwellings since 2020 (2018 for public buildings) must comply with Class A[2] nearly zero-energy requirements[3], with a transition period that allowed small detached houses to be built to Class B standards until June 2025. Existing buildings are targeted for gradual refurbishment by 2050 under the national Long-Term Renovation Strategy (LTRS, 2020)[4], which sets the target of refurbishing* approximately 141,000 buildings (covering 54 million m²) at an annual rate of around 4,700 buildings. Priority is given to Soviet-era apartment blocks and detached houses, which are among the least energy-efficient.

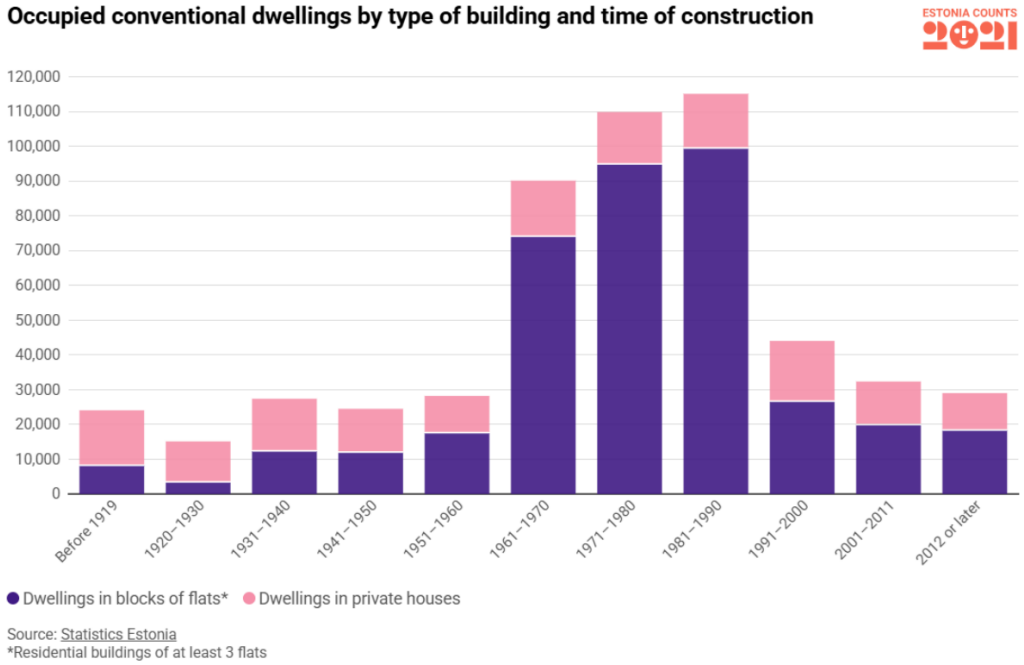


Figure 1. Distribution of dwelling types by construction period, based on the 2021 Population and Housing Census. Source: Statistics Estonia, Population Census.

Alongside these, Valuable Built Environment (VBE) buildings—culturally or historically significant structures over 50 years old—form a distinct category. Refurbishment of VBE buildings progresses more cautiously, supported through heritage-sensitive programmes rather than mass-scale schemes. Although quantitative data on annual refurbishment volumes is limited, available evidence indicates that the pace is slower compared to mainstream housing upgrades. Nevertheless, VBE refurbishments are critical for extending building lifespans and safeguarding

[1] https://www.rahvaloendus.ee/en/results/dwellings-and-buildings-dwellings
[2] https://www.ttja.ee/en/business-client/buildings-construction/energy-efficiency
[3] https://eur-lex.europa.eu/eli/dir/2010/31/oj/eng
[4] https://ekyl.ee/wp-content/uploads/Long-term-strategy-for-building-renovation-in-Estonia.pdf

cultural identity, ensuring that heritage remains integral to Estonia's long-term renovation pathway.

The current national study forms part of the project "Toolkit for Sustainable Optimisation of Valuable Built Environment - EU-REPAIR"[5] (duration 01.02.2025 – 31.05.2027), supported by the European Climate Initiative (EUKI) 2024, with the aim to promote sustainable VBE building refurbishment across five partner countries: Estonia, Germany, Lithuania, North Macedonia, and Serbia. Within this framework, the Estonian study contributes to Output 1, by analysing the specific conditions, challenges, and opportunities in the national context. It highlights the intersection of heritage conservation, energy-efficiency and climate resilience, while addressing the particular complexities of sustainably refurbishing historic buildings as part of the wider building stock.

The purpose of the study is to identify the competencies and institutional mechanisms required to support the transition of VBE buildings toward low-carbon refurbishment models that respect cultural values and architectural integrity. The findings of the Estonian national study contribute to a transnational comparison, highlighting how different partner countries of the EU-REPAIR project address the challenges of sustainable refurbishment. This comparative perspective situates Estonia's experience within a broader European framework, underscoring the relevance of heritage conservation and climate resilience across diverse contexts.

* In this study, the term refurbishment is used consistently to describe the process of improving, upgrading, or repairing existing buildings to bring it back to good condition and/or improve its performance.

[5] https://www.euki.de/en/euki-projects/eu-repair/

2. Methodology and scope

The Estonian national study examines the conditions and frameworks that influence repair-oriented building refurbishment in Estonia, with emphasis on culturally and historically significant structures. The study focuses on VBE buildings that are more than 50 years old. The scope includes analysis of national policies, educational infrastructure, digital tools, funding opportunities, empirical evidence drawn from stakeholder surveys, and case studies relevant to sustainable renovation practices. The study is structured around five core themes: repair and maintenance, energy-efficient renovation, renewable resources, circular economy, and climate change adaptation.

Because public buildings generally have better access to funding and institutional support, this study places particular emphasis on residential and privately owned heritage, where repair needs tend to be more acute and resources more limited.

Methodologically, the study employs qualitative and document-based approaches, including desk research of national legislation, standards, strategic documents and previous flagship projects, alongside EU-level policy frameworks. It also incorporates analysis of digitally distributed survey questionnaires completed by key stakeholders – such as architects, conservators, educators, public officials and residents of historic buildings – and selected case studies that illustrate practical approaches to repair and reuse. Special attention is given to the integration of sustainability measures within heritage contexts and to the institutional conditions that either facilitate or obstruct their application in refurbishment.

The research is guided by the following key questions:

- What are the policy frameworks, institutional arrangements, and practical barriers that shape repair-oriented refurbishment?
- How are heritage values reconciled with sustainability objectives in refurbishment processes?
- What skills, competencies and educational provisions are currently available or lacking to support repair-based approaches?

The methodological design of the study ensures that Estonia's findings can be systematically compared with those of other EU-REPAIR partner countries. Standardised survey instruments, aligned thematic categories, and case study structures enable transnational analysis, allowing national results to feed directly into the project's comparative framework.

Expected outcomes of the study include:

- An overview of policies and practices across the five core themes — repair and maintenance, energy-efficient renovation, renewable resources, circular economy, and climate change adaptation.
- Identification of key factors that support or hinder repair-oriented refurbishment.
- Practical recommendations for training and capacity building that respond to national needs while aligning with EU climate and heritage goals.

3. Heritage Governance Framework

The governance of heritage in Estonia is defined by a set of institutional, legislative, and strategic arrangements that shape how cultural values are preserved and integrated into sustainable refurbishment practices. This chapter provides an overview of the key dimensions of heritage governance, structured into four subsections. The administration subsection (3.1) examines the national heritage protection system and strategic frameworks that connect conservation with other relevant policy areas. The digitalization subsection (3.2) highlights the role of national digital platforms in documentation, compliance monitoring, knowledge dissemination, and decision-making. The education subsection (3.3) explores institutions, resources, and strategic projects that build competencies and capacity for heritage-sensitive renovation. Finally, the standards and legislation subsection (3.4) reviews regulatory framework across the five core themes—repair and maintenance, energy-efficient renovation, renewable resources, circular economy, and climate change adaptation.

Additionally to national dimensions, Estonia's heritage governance is embedded in a wider international framework that encompasses binding conventions, forward-looking strategies, regulatory standards, and legislation. These systems establish shared obligations and principles while also providing strategic direction, ensuring that national practice is aligned with European and global approaches to sustainability, resilience, cultural development, and regulatory governance. Each of these dimensions is discussed in its respective chapter, reflecting their distinct roles in shaping heritage policy and practice.

Considered in combination, these perspectives provide a framework for analysing the ways in which heritage governance facilitates, but also restricts, the move toward repair-oriented and low-carbon refurbishment models.

3.1 Administration

At the administrative level, Estonia's heritage governance is organised through a national protection system that translates legislation into practice and ensures the day-to-day management of cultural assets. Dedicated institutions, most notably the National Heritage Board, oversee implementation, while ministries and local governments provide coordination across policy domains. Strategic policy documents complement this structure by setting

long-term priorities and linking heritage management with cultural, environmental, and societal objectives.

Estonia's heritage administration also operates within a broader international environment, engaging in European and global networks that facilitate methodological guidance, policy frameworks, and professional cooperation. The following subsections present these dimensions in greater detail: the national heritage protection system (3.1.1), the strategic policies (3.1.2), and the international networks (3.1.3) that together reinforce and contextualise heritage governance.

3.1.1 National Heritage Protection System

Estonia's heritage protection system operates through a dual framework that combines national-level regulation with local implementation. The central authority is the National Heritage Board **(**Muinsuskaitseamet)[6], operating under the Ministry of Culture (Kultuuriministeerium)[7], and is responsible for identifying, protecting and managing cultural heritage nationwide. Its core functions include issuing permits, providing expert guidance, coordinating financial support and maintaining two foundational digital platforms: the Museums Information System (Muuseumide infosüsteem, MuIS) and the National Register of Cultural Monuments (Kultuurimälestiste register)**,** both of which are examined in greater detail in the Digitalization subchapter (3.2).

The National Register of Cultural Monuments is the official public database for all immovable heritage objects under national protection. It offers verified legal, technical and spatial data on these objects, including classification, location, ownership, and applicable restrictions. The register supports permit procedures, maintenance planning, and public access to archival documents, serving as a key tool for ensuring transparency, compliance, and informed heritage management.

As of 2025, Estonia has over 5,000 officially protected architectural heritage sites, registered as national monuments[8]. These include historic manor houses, churches, residential buildings, industrial structures, and public facilities spanning several centuries. Owners of these protected buildings are legally obligated to maintain and when necessary, repair their properties to ensure long-term preservation. This obligation is supported by advisory services and financial solutions provided by the National Heritage Board.

Alongside individual monuments, Estonia has established 11 national heritage conservation areas (muinsuskaitsealad)[9] — spatially defined zones where the historical urban fabric, architectural character, and cultural layering are preserved through legally binding regulation. Within these areas, buildings are classified into three value categories based on their architectural integrity, historical relevance, and contribution to the overall heritage context (Figure 2). All interventions within these areas are subject to strict oversight by the National Heritage Board.

[6] https://www.muinsuskaitseamet.ee/
[7] https://www.kul.ee/en
[8] https://www.muinsuskaitseamet.ee/kultuuriparand-eestis/malestised/ehitismalestised
[9] https://www.muinsuskaitseamet.ee/kultuuriparand-eestis/malestised/muinsuskaitsealad

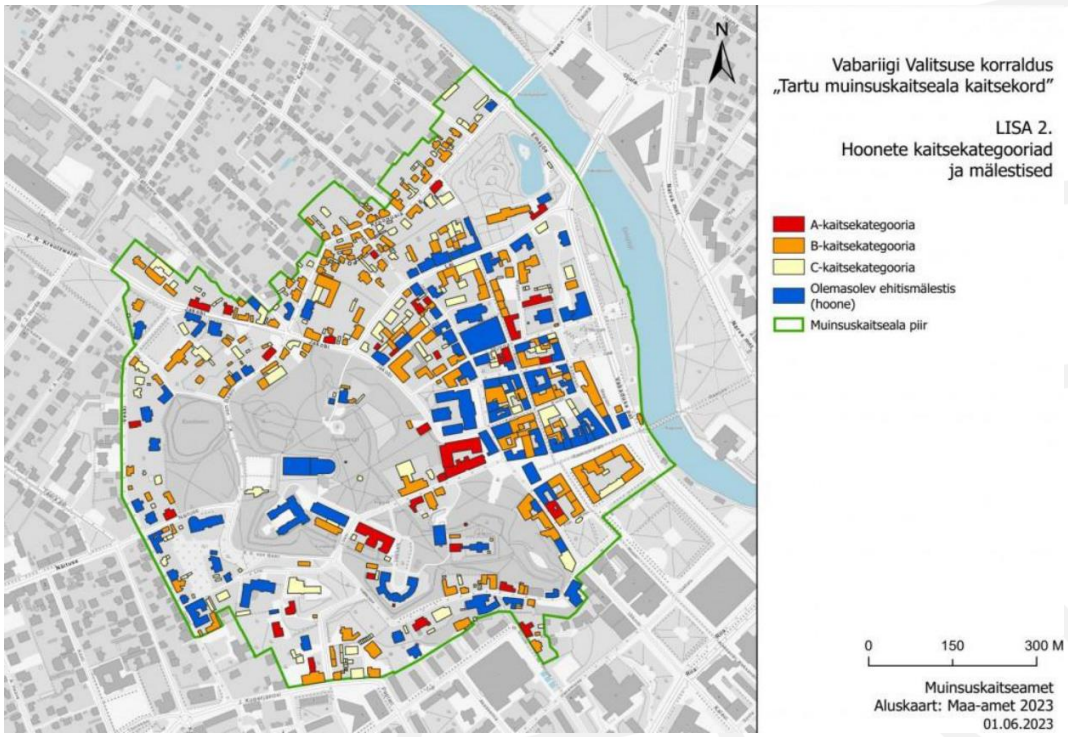


Figure 2. Map of Tartu heritage conservation area. The protected zone is marked with a green line; architectural monuments are shown in blue, other colors indicate building protection categories A, B, and C. Source: https://register.muinas.ee/public.php?menuID=monument&action=view&id=27006

Category A buildings are regarded as highly valuable, often preserving original interiors or carrying symbolic significance. Any alteration, including repairs, requires prior approval, and the preservation of authentic materials and interiors is prioritized to safeguard their integrity.

Category B encompasses structures that are contextually important to the ensemble. Interventions are permitted on a limited scale, such as routine maintenance or minor repairs, provided that key features are retained and all changes remain compatible with heritage values.

Category C includes buildings that contribute to the protected urban fabric but do not meet the higher classification criteria. These structures are not individually protected, yet they must respect the character of the area. Replacement or demolition may be allowed, but only when aligned with overarching conservation principles.



Figure 3. Map of local scenic heritage area in Tallinn: Lille district in Kristiine borough. The boundary of the zone is marked with a red dotted line, different shades indicate building types from cultural monuments and highly valuable buildings to milieu-valuable and less valuable buildings. Source: https://www.tallinn.ee/et/media/479222

Parallel to this, many municipalities have designated local scenic heritage areas (miljööväärtuslikud alad)[10] through spatial planning solutions (Figure 3). These areas are not protected under national law but are regulated by local governments through building restrictions and design guidelines that support heritage-compatible development. While they lack formal

monument status, local scenic heritage areas play a critical role in safeguarding historically layered environments, guiding renovation practices, and preserving the character of everyday heritage. Property owners in these areas may access technical advice and, in some cases, financial support through municipal programmes or the National Heritage Board, particularly when buildings hold overlapping protection status.

Buildings in the local scenic heritage area reflect a diverse range of urban and rural typologies. The most common are historic wooden housing districts in cities such as Tartu, Viljandi, and Tallinn, valued for their vernacular architecture and cohesive street patterns. Old town extensions and early 20th-century residential zones also feature prominently. Less frequently designated are garden suburbs and villa districts, which emphasize green space and detached housing, and industrial or railway-adjacent areas, representing infrastructural heritage. Alongside this, several municipalities have identified rural village landscapes and dispersed settlement areas as local scenic heritage areas, particularly where traditional farmsteads, historic road networks, and cultural land use patterns remain intact. These rural designations highlight

[10] e.g. https://www.tallinn.ee/en/ehitus/scenic-areas-tallinn

the expanding scope of heritage planning beyond dense urban centres, acknowledging the cultural value of the historic countryside.

In summary, Estonia's heritage protection system combines national regulation with local implementation, supported by digital infrastructures and a clear division of responsibilities. The framework encompasses individual monuments, conservation areas with differentiated value categories, and locally designated scenic heritage areas, ensuring that both nationally significant and everyday environments are addressed. While the system provides a solid legal and institutional basis, its effectiveness ultimately depends on collaboration between state authorities, municipalities, property owners, and conservation professionals.

3.1.2 Strategic Policy Directions

Estonia's approach to heritage conservation and climate resilience is increasingly shaped by strategies at national, municipal, and private sector levels. These strategies integrate circular economy principles, energy efficiency measures, and sustainable urban development goals, thereby linking heritage protection to broader environmental and socio-economic agendas.

Together, they provide the policy foundation for pilot projects, targeted funding resources, and legislative adjustments in the built environment sector. In this context, heritage conservation is not treated as an isolated domain but as an integral component of climate adaptation, spatial planning, and innovation policy. The strategic orientation underscores the need to balance preservation with modernization, ensuring that cultural heritage contributes to long-term resilience, community identity, and sustainable growth. These national and municipal strategies operate within the broader international frameworks outlined earlier, ensuring coherence between Estonia's heritage policies and global sustainability agendas.

The Culture Development Plan 2021–2030[11] positions cultural heritage as a pillar of sustainable development and explicitly links heritage to Estonia's national SDG framework. The plan emphasises the long-term maintenance of heritage assets, the strengthening of community-based stewardship, and the integration of cultural heritage into regional development and education. For the valuable built environment (VBE), the strategy reinforces the need for preventive maintenance, high-quality restoration skills, and the use of digital tools to support decision-making and transparency. It also highlights the importance of cultural continuity and identity, framing heritage buildings as active contributors to social cohesion and sustainable territorial development.

The Long-term Strategy for Building Renovation[12] provides Estonia's national framework for upgrading the pre-2000 building stock by 2050. It combines energy-efficiency requirements, regional balance, and climate adaptation measures, while promoting technological innovation and circular use of materials. Importantly for VBE, the strategy recognises that heritage buildings require flexible performance pathways and context-sensitive solutions. It encourages the development of technical guidelines, integrated renovation services, and monitoring systems that support safe, compatible and phased renovation. By treating renovation as both a social and

[11] https://www.kul.ee/en/culture2030?utm_source
[12] https://kliimaministeerium.ee/renoveerimislaine

environmental priority, the strategy positions the built environment as a valuable resource for resilience and sustainable growth.

The Tallinn Circular Economy Development Plan 2035[13] (2024) sets out strategic priorities for the capital city, where construction, procurement, and waste management are guided by circular principles. Scheduled for phased implementation from 2024 onwards, the plan emphasizes the preservation and adaptive reuse of existing building stock as a cornerstone of urban sustainability. It introduces city-wide circular economy centres, supports repair and sharing infrastructures, and embeds circular principles into public procurement and spatial planning. These measures directly support repair-oriented interventions and reinforce the role of cultural heritage—not only as a static legacy, but as an active resource in shaping resilient, low-carbon, and socially inclusive urban environments.

The Rohetiiger Construction Roadmap 2040[14] (2023) outlines a private-sector vision for transitioning Estonia's construction sector toward climate neutrality and circularity. The roadmap was developed in collaboration with representatives from the Estonian Association of Architects, the Estonian Green Building Council, the Ministry of Climate, Tallinn University of Technology, and the Estonian Academy of Arts. It proposes reducing the sector's environmental footprint through lifecycle-based planning, low-carbon materials, and digital traceability. Key measures include mandatory carbon calculations for buildings, reuse-oriented design principles, and the development of a national material passport system. The roadmap emphasizes cross-sectoral

cooperation, integration of ESG (Environmental, Social, Governance) criteria, and regulatory reform to support circular construction practices. It also highlights the importance of education and capacity building to ensure long-term sectoral transformation.

At the national level, the Circular Economy White Paper (2022)[15] establishes a framework for transitioning to a regenerative, low-waste economy by 2030. It outlines strategic goals across material efficiency, product longevity, and systemic reuse, with a strong emphasis on cross-sectoral coordination and innovation. The document highlights the built environment as a key intervention area, promoting the reuse of construction materials, repair-friendly design, and lifecycle-based planning. These principles embed circularity into spatial governance and strengthen the role of existing assets—both cultural and material—in shaping resilient, resource-conscious urban and rural futures.

The Long-term Strategy for Building Renovation (2020)[16] provides Estonia's national framework for upgrading the pre-2000 building stock by 2050. It combines energy-efficiency requirements, regional balance, and climate adaptation measures, while promoting technological innovation and circular use of materials. By treating renovation as both a social and environmental priority, the strategy positions the built environment as a valuable resource for resilience and sustainable growth.

[13] https://www.tallinn.ee/et/media/561541
[14] https://ehitus.rohetiiger.ee/wp-content/uploads/EHITUSE-TEEKAART-2040-v1.2-1.pdf
[15] https://ringmajandus.envir.ee/sites/default/files/2023-02/Ringmajanduse%20valge%20raamat.pdf
[16] https://ekyl.ee/wp-content/uploads/Long-term-strategy-for-building-renovation-in-Estonia.pdf

The National Energy and Climate Plan 2030 (NECP 2030)[17] sets Estonia's targets for reducing greenhouse gas emissions by 70% by 2030 and transitioning to a low-carbon economy. It includes 71 sector-specific measures, with key actions in energy, transport, agriculture, forestry, and buildings. In the construction sector, the plan promotes renovation of public and residential buildings, implementation of minimum energy performance standards (with flexibility for heritage structures), and adoption of renewable heating solutions. It also supports circular construction practices—such as reuse of materials, development of digital material databases, and pilot projects—to extend building lifecycles and reduce waste.

The Climate Change Adaptation Development Plan (until 2030)[18] outlines strategic measures to increase resilience across eight sectors, including infrastructure, buildings, land use, and public health. In the built environment, it emphasizes the need to adapt renovation and maintenance practices to climate risks such as moisture damage, extreme weather, and temperature fluctuations. For heritage buildings, the plan promotes context-sensitive repair strategies that preserve cultural value while improving durability and functionality. It also encourages municipalities to integrate climate risk assessments into spatial planning and building regulations, ensuring long-term sustainability and preparedness.

At the international level, Estonia's strategic orientation is framed by European and global agendas that embed cultural heritage within wider sustainability and climate policies. The European Green Deal (2019) and its Renovation Wave initiative (2020) set binding priorities for energy-efficient refurbishment of the building stock, explicitly recognising the need to balance performance targets with heritage values.

Complementary strategies such as the EU Circular Economy Action Plan (2020) and the New European Bauhaus (2021) promote repair, reuse, and design innovation, linking cultural heritage to circular resource flows and socially inclusive urban transformation.

In parallel, the European Climate Adaptation Strategy (2021) and the Sendai Framework for Disaster Risk Reduction (2015) emphasise resilience, urging member states to integrate risk-sensitive maintenance and adaptive repair into spatial planning and building regulation. These international strategies establish a coherent policy environment in which Estonia's national and municipal approaches to heritage conservation are aligned with broader European objectives for low-carbon transition, climate resilience, and repair-oriented innovation in the built environment.

Heritage governance in Estonia is linked to the United Nations Sustainable Development Goals (SDGs). While the global framework comprises 17 goals, Estonia has adopted 18 national sub-categories, adding culture as a distinct dimension. This underscores the recognition of cultural heritage as integral to sustainable development and situates Estonian practice within both global and nationally adapted frameworks.

These strategies articulate a shift toward integrated planning in which repair and maintenance, energy-efficient renovation, renewable resources, circular economy, and climate adaptation are

[17] https://kliimaministeerium.ee/en/national-energy-and-climate-plan

[18] https://kliimaministeerium.ee/sites/default/files/documents/2021-06/Climate%20Change%20Adaption%20Development%20Plan%20until%202030%20%28in%20English%29.pdf

treated as part of a broader sustainability agenda. In parallel to formal strategies, Estonia's policy landscape is complemented by applied initiatives such as the Tartu Circular Renovation Project (pilot project)[19], the Legal Analysis on Requirements for Construction Projects (regulatory study)[20], and the Assessment of Estonia's Circular Economy Potential (academic analysis)[21], which provide practical and analytical input for implementing circular and repair-oriented approaches across the built stock.

3.1.3 Professional Regulation and Licensing

The professional practice of heritage conservation in Estonia is subject to professional regulation to ensure competence and accountability. Under the Heritage Conservation Act[22] interventions on cultural monuments, heritage conservation areas, and their environments may only be undertaken by qualified specialists.

Activities such as preparing conservation conditions, drafting restoration projects, archaeological fieldwork, or supervising works require an activity licence issued by the National Heritage Board, which evaluates applicants' qualifications, professional experience, and compliance with established standards.

Before commencing work, professionals must submit an economic activity notice to the Register of Economic Activities (MTR)[23], specifying the field of heritage conservation in which they operate. Licensing applies to a range of heritage professions, including architects, conservators, archaeologists, engineers, and other specialists whose work directly affects protected monuments and areas, and is linked to occupational qualification standards defined in the Estonian Qualifications Framework Kutsekoda.[24]

Regulation extends beyond individual monuments to heritage conservation areas, where all construction and restoration activities require prior authorisation from the National Heritage Board. In local scenic heritage areas, designated by local governments, specific planning and design requirements are set at the municipal level. These areas do not in themselves require a national heritage activity licence, such a licence is only needed if a nationally protected monument is located within the area. Compliance with municipal regulations and the involvement of suitably qualified specialists remain essential.

This system safeguards the integrity of Estonia's cultural heritage by ensuring that interventions are performed by competent experts, monitored by national authorities, and aligned with European standards for heritage professions.

[19] https://www.tartu.ee/en/circularrenovation
[20] https://kliimaministeerium.ee/sites/default/files/documents/2024-12/Ehitusprojektile%20esitatavate%20n%C3%B5uete%20%C3%B5igusanal%C3%BC%C3%BCs.pdf#:~:text=Ehitusmaterjalide%20ja%20-toodete%20korduskasutus%20ja%20ringlus%20ning%20selle,ehitusprojektile%20esitatud%20n%C3%B5udeid%2C%20tuginedes%20parimatele%20teadmistele%20ja%20praktikatele.
[21] https://keskkonnaportaal.ee/sites/default/files/2025-05/Ehitussektor_0.pdf
[22] https://www.riigiteataja.ee/en/eli/504062019001/consolide
[23] https://www.eesti.ee/eraisik/en/artikkel/licences-and-notices-of-economic-activity/heritage-conservation/notice-of -economic-activities-for-operating-in-the-field-of-heritage-conservation
[24] Example of a qualification standard for the architectural conservationist profession, by Kutsekoda: https://www.kutsekoda.ee/wp-content/uploads/2019/ENG_veeb/Architectural-Conservationist-level-6-14.pdf

3.1.4 International Networks and Cooperation

The protection of architectural heritage in Estonia is embedded within a broad network of international organisations and initiatives that shape both conceptual frameworks and practical approaches to conservation. The Estonian National Committee of International Council on Monuments and Sites (ICOMOS)[25] plays a central role in adapting global charters and

recommendations to the national context, ensuring that local practices align with internationally recognised standards of care.

Although not legally binding, ICOMOS guidelines provide professional recommendations for repair techniques, material compatibility, and documentation standards. Foundational charters such as the Venice Charter (1964)[26] and the Burra Charter (2013)[27] have further influenced these principles, embedding authenticity, minimal intervention, and community engagement into Estonian conservation practice.

Complementing this, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)[28] strengthens professional capacities through training and research, particularly in areas requiring technical expertise and long-term maintenance strategies. Civil society networks also contribute significantly. Europa Nostra[29] mobilises communities and professionals across Europe, recognising exemplary achievements in conservation and restoration while drawing attention to sites at risk through its "7 Most Endangered" programme. Such initiatives highlight collective responsibility and embed heritage within wider societal narratives. Similarly, DOCOMOMO (Documentation and Conservation of Buildings, Sites and Neighborhoods of the Modern Movement)[30] has expanded heritage discourse by safeguarding twentieth-century architecture, thereby broadening the scope of values beyond traditional monuments.

UNESCO[31] provides the overarching global framework within which national heritage policies are situated. Estonia's participation in UNESCO conventions has reinforced the recognition of sites such as the Historic Centre of Tallinn and the Struve Geodetic Arc, both inscribed on the World Heritage List. These designations affirm the universal value of Estonian heritage and embed local conservation strategies within global discourses on safeguarding cultural environments for future generations.

At the policy level, the Council of Europe has established conventions and comparative frameworks that integrate heritage into democratic participation and cultural identity. Its Initiatives such as the Faro Convention[32] and the HEREIN[33] network, encourage member states to view heritage not only as a matter of preservation but also as a shared societal resource. Public

[25] https://estonia.icomos.org
[26] https://admin.icomos.org/wp-content/uploads/2025/03/Venice_Charter_EN.pdf
[27] https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf
[28] https://www.iccrom.org/
[29] https://www.europanostra.org/
[30] https://docomomo.com/
[31] https://unesco.ee/en/
[32] https://www.coe.int/en/web/culture-and-heritage/faro-convention
[33] https://www.coe.int/en/web/herein-system

engagement is further reinforced through the European Heritage Days[34], which open historic sites to citizens and foster awareness of cultural landscapes in everyday life.

In recent years, new collaborative platforms have further expanded the international landscape. The European Heritage Hub (launched in 2023 with EU support)[35] functions as a central knowledge and cooperation platform, connecting policymakers, researchers, and civil society to align heritage governance with European Green Deal objectives, digital innovation, and social inclusion. It provides comparative data, policy recommendations, and pilot projects that strengthen the integration of heritage into sustainability agendas. The Climate Heritage Network[36], established in 2019, is a global coalition of cultural institutions, local governments, and NGOs working to embed heritage into climate action. Its initiatives highlight the role of repair, reuse, and traditional knowledge in reducing emissions and adapting communities to climate change. Estonia's participation in these frameworks ensures that conservation practice remains responsive to global challenges while reinforcing the country's integration into evolving European and international cooperation structures.

These networks and organisations provide Estonia with a multi-level framework that enriches national strategies, strengthens professional practice, and situates local heritage within a wider European and global context. While international charters and networks establish normative values and professional guidance, Estonia's heritage governance is equally shaped by binding European Union strategies and legislation, which translate these principles into regulatory requirements. These aspects are examined in detail in the relevant chapters (see Subchapter 3.1.2 and Chapter 3.4).

3.2 Digitalization

Digital tools play an increasingly important role in heritage governance, providing accessible information, supporting regulatory compliance, and enabling informed decisionmaking in the refurbishment of the VBE. In Estonia, several practical applications integrate spatial data, documentation systems, and technical guidance into everyday heritage management.

The Estonian Land Board's geoportal[37] (Figure 4) includes layers for cultural monuments, protected buildings, and heritage zones, and a range of environmental and climate-risk datasets, such as flood-risk areas and other hazard maps. This allows planners, researchers, and local authorities to identify heritage-sensitive areas, understand key constraints, and align renovation strategies with conservation requirements and climate-oriented repair priorities, ensuring that cultural heritage is fully integrated into resilience and adaptation planning.

[34] https://www.europeanheritagedays.com/
[35] https://www.europeanheritagehub.eu/
[36] https://www.climateheritage.org/
[37] https://xgis.maaamet.ee/xgis2/page/app/kultuurimalestised

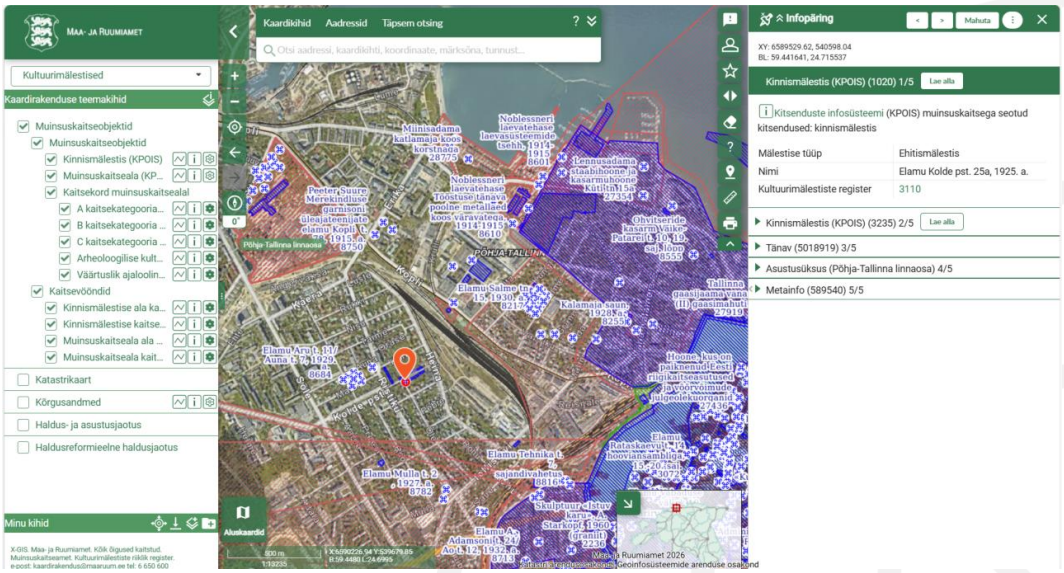


Figure 4. Densely layered view from the Estonian Land Board's geoportal, illustrating heritage protection zones, listed monuments, and associated regulatory information for a specific site. Source: https://xgis.maaamet.ee/xgis2/page/app/kultuurimalestised

The National Heritage Board complements this with an extensive set of online instructions and manuals[38], including restoration principles, sample solutions for building components, and guidelines for risk management and spatial planning. By consolidating these resources digitally, the Board enables both professionals and private owners to access authoritative guidance and align their activities with national requirements and best practices.

The Estonian Building Register (EHR)[39] further strengthens digital heritage governance by providing online access to permits, construction documents, and regulatory information. For protected buildings, EHR ensures transparency and traceability of interventions, allowing authorities and owners to monitor compliance and maintain accurate records. Its integration with other national databases supports efficient coordination between conservation requirements and broader construction regulations.

Equally central to heritage governance is the National Register of Cultural Monuments[40], maintained by the National Heritage Board. The register functions as a legally binding digital database that consolidates information on more than 26,000 listed monuments, buildings, sites, and heritage zones across Estonia. Each entry includes metadata on protection status, location, typology, and regulatory constraints, providing an authoritative reference for planners, owners, and researchers. By ensuring transparency and accessibility of conservation data, the register supports compliance with heritage legislation and facilitates integration of cultural

heritage considerations into spatial planning, renovation strategies, and climate-oriented repair practices. As a publicly accessible platform, it serves both as a governance tool and as a research infrastructure, anchoring VBE-related decisionmaking in verifiable and up-to-date information.

[38] https://www.muinsuskaitseamet.ee/juhised-ja-opetused/juhised
[39] https://livekluster.ehr.ee/ui/ehr/v1
[40] https://register.muinas.ee/public.php?lang=en

Beyond formal heritage registers, the Estonian Museums Information System (MuIS)[41] and the National Archives' information system (AIS)[42] provide useful supplementary sources for gathering contextual information about individual buildings. MuIS offers access to museum collections and visual materials that can support background research, while AIS provides digitised historical documents such as drawings, permits, maps, and photographs. These systems help build a more comprehensive understanding of a building's history and development.

Another key digital resource is the Construction Guide (Ehitusgiid)[43] platform, which provides practical guidance for the repair, refurbishment and construction of buildings, including solutions relevant for both older structures and contemporary construction. Available online, it consolidates instructions, sample solutions, and recommendations for traditional materials and construction techniques. By offering accessible and authoritative information, the guide supports homeowners, designers and contractors in making informed decisions throughout the repair and construction process. Its digital format ensures wide dissemination and helps embed good building practice into everyday renovation and construction work.

A regionally developed example is RESTO[44], a digital renovation-planning tool from Võru County that structures building-condition data, translates technical requirements into practical recommendations and is already used in pilot municipalities. It shows how locally developed digital solutions are beginning to support more consistent renovation decisions.

These digital resources form a practical infrastructure that strengthens heritage governance in Estonia, bridging regulation, technical guidance, and everyday practice, and ensuring that professionals, authorities, and homeowners have access to reliable information for the sustainable upkeep of VBE buildings.

3.3 Education

Education in the built environment in Estonia plays a central role in linking cultural heritage with sustainability objectives. It provides the means through which principles of heritage valuation, repair-oriented practices, and technical innovation are transmitted to new generations. Alongside heritage-specific programmes, Estonia also offers broader training in EU-Repair oriented themes such as maintenance, energy-efficient renovation, renewable-energy integration, circular-economy practices, and climate-adaptation measures. While these topics are widely

taught within engineering, construction, and environmental education, systematic tailoring to the specific needs of historic buildings remains limited, with specialised guidance provided mainly by heritage-focused institutions.

By combining theoretical perspectives with practical skills, education ensures that the built environment is understood as both a cultural and ecological resource, and that professionals are prepared to address challenges of renovation, resource efficiency, and climate adaptation.

[41] https://www.muis.ee/?lang=en
[42] https://ais.ra.ee/en
[43] https://livekluster.ehr.ee/ui/ehr/v1/abi/ehitusgiid
[44] https://finestcentre.eu/project-pilot/renovation-strategy-tool/

3.3.1 Educational Institutions

In Estonia, education in the heritage field is delivered through a range of institutions, each with distinct curricula and levels of study. Programmes are offered at vocational, undergraduate, graduate, and doctoral levels, but they remain largely institution-specific and operate in parallel rather than in synergy. This fragmented structure means that students acquire valuable competences in conservation theory, engineering solutions, or traditional repair skills, yet integration across disciplines is limited.

The Estonian Academy of Arts (Eesti Kunstiakadeemia, EKA), is the only higher education institution in Estonia offering academic degrees in heritage conservation, art conservation and restoration, and architecture at BA, MA, and PhD level. The heritage conservation curriculum[45] focuses on material cultural heritage, with specialisations in architectural heritage and the conservation and restoration of objects and artworks, and at the master's level, museology. Studies include heritage valuation frameworks, documentation, conservation theory and practice, and integration of conservation into design. Alongside theoretical modules, BA studies and workshops emphasise hands-on skills such as painting restoration, gilding, and other craft techniques, ensuring that students acquire practical competences. Programmes in architecture and urban planning, as well as art history, also engage with heritage-related themes, addressing the cultural and historical dimensions of the built environment.

Also, the academy offers a study programme in circular economy and circular design, which approaches sustainability from a broader systems perspective but is not specifically focused on buildings or built heritage. These programmes provide the most comprehensive academic framework in Estonia for engaging with the preservation, interpretation and sustainable management of heritage within VBE contexts.

The academy also hosts MuKoLa[46], the digital research laboratory, which develops advanced methods for surveying, documenting, and analysing heritage sites and objects, employing techniques such as 3D laser scanning (Figure 5), photogrammetry, and digital modelling to ensure precise recording and interpretation of architectural and artistic heritage. This combination of practical craft training and digital innovation positions EKA as a central institution for sustaining both traditional and contemporary approaches to conservation.

[45] https://www.artun.ee/en/curricula/cultural-heritage-conservation/
[46] https://www.artun.ee/en/curricula/cultural-heritage-conservation/mukola/



Figure 5. Laser scanning of a wooden sculpture from Berndt Notke's Altarpiece in the Church of the Holy Ghost in Tallinn, carried out as part of a 2021 workshop organised by EKA. Source: Triinu Väikmeri.

At Tallinn University of Technology (Tallinna Tehnikaülikool, TalTech)[47] civil engineering and building services programmes at BA, MA, and PhD level cover several dimensions of repair-oriented renovation. Courses in building physics, structural analysis, and renovation practices address issues of repair and maintenance, while modules on energy systems and performance simulation focus on energy-efficient refurbishment.

Teaching in sustainable construction and materials management introduces renewable resources and circular economy principles, including resource efficiency and waste reduction. Climate-related modules highlight resilience and adaptation to climate change. Although framed around the optimisation of contemporary buildings, these competences are transferable to the repair and refurbishment of VBE structures. Direct heritage-specific content remains limited, with attention to historic buildings depending on individual projects or supplementary training rather than dedicated courses. TalTech complements its curricula with specialised laboratories in construction and materials science, where research on building performance, durability, and energy efficiency provides applied knowledge relevant to sustainable refurbishment of the built environment.

Beyond the institutions directly engaged with architectural conservation, several universities in Estonia address heritage in broader cultural and environmental terms. At the Estonian University of Life Sciences (Eesti Maaülikool, EMÜ), teaching focuses on landscape architecture at MA level[48], where the emphasis lies on ecological design and the management of green

environments while the curriculum also includes modules on the restoration and protection of cultural heritage sites, without directly addressing the conservation of the architectural fabric.

Tallinn University (Tallinna Ülikool, TLÜ)[49] contributes through cultural studies, history, memory research, and cultural management programmes, which provide theoretical approaches on

[47] https://taltech.ee/en/
[48] https://www.emu.ee/en/landscape
[49] https://www.tlu.ee/en

heritage rather than practical building conservation. The knowledge gained is transferable to the upkeep and interpretation of the VBE, with emphasis on policy and cultural awareness over technical refurbishment.

At the University of Tartu (Tartu Ülikool, TÜ), heritage is approached more comprehensively: the Institute of Cultural Research[50] offers BA, MA, and PhD programmes in ethnology, folkloristics, and applied heritage studies, while archaeology is taught within the Faculty of Arts and Humanities, covering excavation, analysis, and interpretation of material heritage. These cultural research programmes build advanced analytical competences and disciplinary depth that enrich understanding of the VBE, while remaining outside the scope of technical refurbishment.

Within the University of Tartu, the Viljandi Culture Academy (Viljandi Kultuuriakadeemia, TÜ VKA) provides BA-level programmes in cultural heritage and traditional building crafts[51], where students acquire practical competences in a range of technologies, including woodworking, stone masonry, and vernacular construction techniques. At MA level, the focus shifts towards cultural heritage management and community-based conservation, deepening competences in analysis, leadership, and sustainable practices. These curricula engage with heritage as a cultural and social phenomenon, ensuring that students acquire competences in documentation, interpretation, and management, even though they do not directly address architectural conservation or repair-oriented practices.

TTK University of Applied Sciences (Tallinna Tehnikakõrgkool, TTK)[52] provides applied higher education in architecture, construction, civil engineering, geodesy, and property management. The programmes focus on building design, technical performance, and maintenance, equipping students with practical competences relevant to contemporary construction. While heritage conservation is not a formal focus, the skills gained are indirectly transferable to the upkeep of the VBE, particularly through technical expertise that supports durability and efficient management of the built stock.

Pallas University of Applied Sciences (Kõrgem Kunstikool Pallas) offers a BA programme in conservation and restoration[53], focusing on furniture, wall paintings, and interior decorative elements. The curriculum provides broad competences in the preservation of cultural objects and historic interiors, contributing to the care and interpretation of the VBE. The emphasis is on

artistic and material sensitivity, connecting decorative heritage to sustainable resilience rather than structural refurbishment.

At Haapsalu Vocational Education and Training Centre (Haapsalu Kutsehariduskeskus, HKHK)[54] furniture restoration is taught within the broader wood and handicraft field, with an emphasis on traditional repair and conservation methods. Viljandi Vocational Training Centre (Viljandi Kutseõppekeskus, VIKK) likewise offers a furniture restoration programme[55]. While these

[50] https://kultuuriteadused.ut.ee/en
[51] https://ut.ee/et/oppekavad/parandtehnoloogia
[52] https://www.tktk.ee/en/studies/bachelor-studies-in-estonian/
[53] https://pallasart.ee/en/admissions/departments/core/
[54] https://hkhk.edu.ee/en/node/1058
[55] https://www.vikk.ee/et/tule-opi/erialad/materjalide-tootlemise-ope/mooblirestauraator-2-sessioonope

curricula transmit valuable artisanal competences, their focus lies primarily on movable heritage and craft traditions rather than on the architectural fabric.

Tallinn Construction School (Tallinna Ehituskool, TEK) provides vocational education at secondary and postsecondary level, covering general construction trades such as masonry, carpentry, roofing, and finishing. Among its specialised programmes, the curriculum for restorer-finisher[56] is directly relevant to heritage contexts, focusing on traditional surface treatments, lime plastering, and decorative repair techniques (Figure 6). The school also teaches furniture restoration[57], ensuring continuity of craft-based skills in woodworking and finishing.

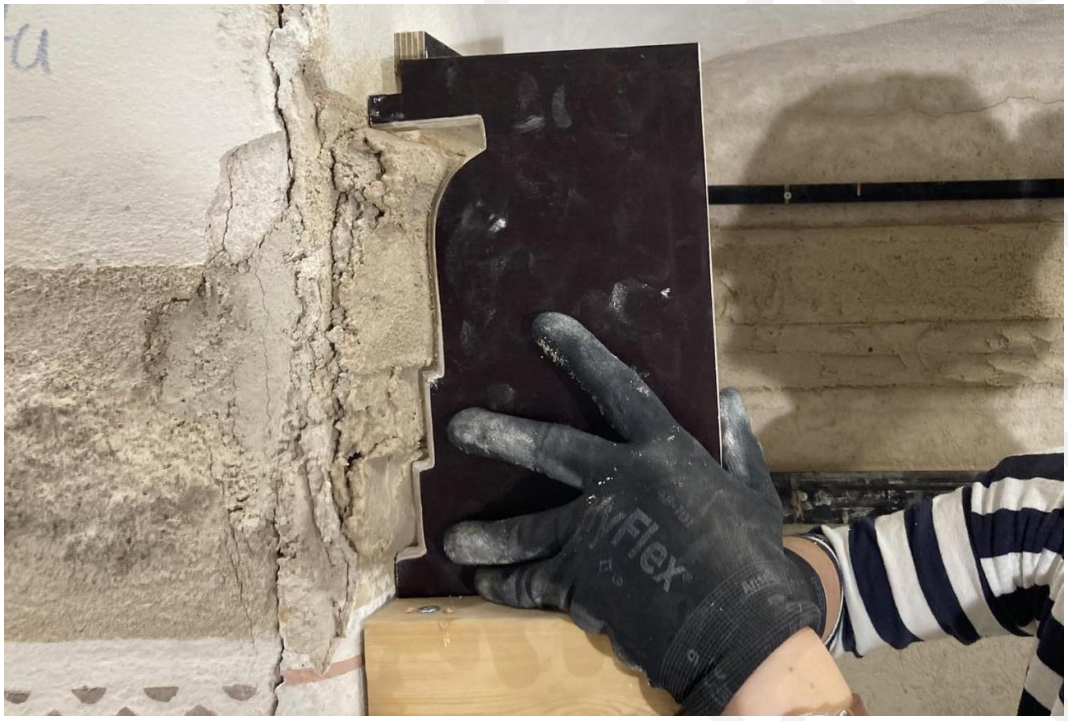


Figure 6. Student of the Restorer-Finisher programme at Tallinn Construction School practising traditional craft skills by modelling a stucco cornice in lime plaster. Source: Triinu Väikmeri

At secondary school level, heritage education is supported by initiatives such as the heritage guardian, "pärandivader" system[58], coordinated by the National Heritage Board. Through extracurricular stewardship of selected sites, students are introduced to the principles of heritage valuation and basic maintenance. While not part of the formal curriculum, this early engagement fosters responsibility and awareness that can encourage further vocational or academic studies in the field. Beyond that, elements of cultural and architectural heritage are embedded in the national curriculum and are sometimes expanded through teacher-initiated elective courses, although the extent of this depends largely on individual schools and teachers.

3.3.2 Educational Resources

Beyond formal curricula, Estonia has developed supplementary educational resources that strengthen competences in repair-oriented renovation and heritage awareness. At the Estonian Academy of Arts, continuing education programmes provide fee-based micro-degree courses in

[56] https://www.ehituskool.ee/et/sisseastumine/Erialad-ja-vastuvott/restauraator-viimistleja-5
[57] https://www.ehituskool.ee/et/sisseastumine/Erialad-ja-vastuvott/mooblirestauraator-4
[58] https://xn--prandivaderid-bfb.ee/

architectural heritage conservation and restoration[59]. Designed for architects, engineers, heritage professionals, museum staff, and interested members of the public, these modules focus on theoretical frameworks, assessment methods, and conservation planning. They provide participants with competences needed for evaluating historic buildings and understanding conservation principles, while also serving as part of the qualification pathway for professional certification in heritage construction. As well as heritage-specific content, the micro-degree also addresses topics aligned with broader EU-REPAIR priorities, including material reuse, circular-economy principles and the impact of climate-related risks on historic buildings. In this way, the courses strengthen expertise required for the sustainable refurbishment of the VBE.

Tallinn University of Technology offers specialised continuing education for civil engineers in the field of heritage conservation and restoration[60]. This fee-based programme equips professionals requiring certification to work on protected buildings with competences in structural assessment, conservation planning, and supervision of restoration works. Alongside core heritage-engineering skills, the programme also introduces issues, such as the effects of climate-related stresses on historic structures, long-term material performance and approaches that support resource-efficient repair. By integrating engineering expertise with conservation principles, the course ensures that technical specialists can contribute effectively to the sustainable refurbishment of historic buildings.

Several organisations complement these academic programmes by providing audiovisual and written materials that translate specialist knowledge into accessible formats. The Centre for Rural Architecture at the Estonian Open Air Museum (Eesti Vabaõhumuuseumi Maaarhitektuuri Keskus) maintains a comprehensive repository[61] of videos, articles, manuals, and seminar

recordings on topics ranging from energy efficiency and moisture damage to traditional construction techniques and maintenance practices. By documenting expert lectures and practical demonstrations, the repository makes guidance on repair-oriented renovation and vernacular heritage available to a wide audience, from professionals to homeowners.

The Centre also coordinates an annual heritage maintenance training programme[62] for owners of traditional rural houses and local practitioners, offering practical instruction in everyday maintenance routines such as roof care, log wall repair and moisture-damage prevention. It also maintains a network of local advisors who provide on-site guidance, while its website lists recommended craftsmen for specialised restoration tasks. In this way, vernacular heritage values are preserved through informed action.

The NGO Vanaajamaja[63], based in Mooste manor, complements this work with practical courses on log-building, wooden house maintenance, and traditional craft methods. Alongside on-site training, the organisation provides consultation services for homeowners and practitioners, and maintains a YouTube channel[64] with instructional videos documenting the use of traditional materials and repair practices. Vanaajamaja also participates in international traditional building

[59] https://www.artun.ee/et/avatud-akadeemia/arhitektuuriparandi-konserveerimine-ja-restaureerimine/
[60] https://taltech.ee/kursus/44304
[61] https://evm.ee/maaarhitektuur/teabekogu
[62] https://www.maamaja.eu/koolitus/Iga-aastane_vana_hoone_hooldusring
[63] https://vanaajamaja.ee/en/home/
[64] https://www.youtube.com/@vanaajamaja3505

projects, promoting disappearing skills and exchanging best practices across cultures. Through courses, advisory support, audiovisual resources, and cross-border collaboration, it ensures that vernacular building knowledge remains accessible and transferable across generations.

The Sustainable Renovation Information Centre (SRIK)[65], based in Tallinn, consolidates expertise on environmentally responsible refurbishment through training, guidelines, and advisory materials. Its Restoration Centre in Tartu operates an open workshop[66] and produces instructional videos[67] documenting practical methods and approaches. Under the guidance of a master, participants can practise traditional skills such as repairing wooden doors and windows, preparing lime plaster, or restoring decorative details. The workshop is open both to professionals refining their competences and to homeowners maintaining historic houses, thereby bridging expert knowledge with everyday practice.

Beyond these organisations, several regional initiatives, such as practical workshops occasionally held at Raikküla Manor[68], also contribute to the transmission of traditional building skills. While smaller in scale, these activities complement the broader landscape of non-formal heritage training in Estonia.

As a whole, these supplementary resources form an essential layer of heritage education in Estonia. They bridge the gap between academic programmes and everyday practice, ensuring that both professionals and homeowners can access the knowledge required for the sustainable upkeep of VBE buildings.

3.3.3 Flagship Projects

In recent years, Estonia's heritage conservation practice has shifted towards sustainability, owner-led maintenance, and small-scale interventions that extend the life cycle of a valuable built environment. Flagship initiatives have demonstrated how regular upkeep, compatible materials, and community engagement can strengthen resilience while aligning historic buildings with contemporary climate and energy goals.

The LIFE BuildEST IP programme (2022–2028)[69], co-funded by the EU LIFE platform and coordinated by the Ministry of Climate, represents Estonia's most ambitious effort to accelerate renovation across the national building stock. By supporting the Long-Term Renovation Strategy and contributing to the EU Renovation Wave, it combines policy innovation, financial means, and pilot projects with circular construction practices. Its scope encompasses private homes, apartment blocks, and heritage-sensitive structures, ensuring that technical solutions are adapted to diverse building types. Research on rural homeowner readiness, surveys of damage in wooden and masonry structures, and guidance inspired by New European Bauhaus principles have provided practical tools for low-impact, maintenance-based renovation. Pilot sites in Võru, Tartu, and Annelinn have tested repair-oriented approaches in real-life settings, generating empirical evidence for scalable community-based models and demonstrating how staged renovation can extend building life cycles with minimal disruption.

[65] https://renoveeri.net/about-us
[66] https://www.restaureerimiskeskus.ee/tookoda
[67] https://www.youtube.com/channel/UC4zLg0PPTwkHPnR2yXev4qg/videos
[68] https://www.raikkylamois.ee/koolitused/
[69] https://kliimaministeerium.ee/elukeskkond-ringmajandus/buildest

The programme also integrates climate risk assessment and resilience planning, including flood adaptation and downscaled data collection, which are increasingly relevant for older and heritage-sensitive buildings. In parallel, BuildEST advances reuse and circularity through studies on construction waste, digital material banks and certification frameworks, helping to clarify how secondary materials can be safely and transparently incorporated into renovation processes. These activities create a knowledge base that links technical performance, cultural value and resource efficiency within a coherent renovation ecosystem.

Complementing this, the LIFE heritageHOME project (2023–2026)[70] addresses the specific challenge of improving energy performance in heritage homes without compromising architectural integrity. Coordinated by the Ministry of Culture in collaboration with the Estonian Academy of Arts, the National Heritage Board, Tallinn University of Technology, and other partners, it builds on the European Heritage Green Paper to demonstrate how exempted buildings under the Estonian Building Code can still contribute to the green transition.

The project develops integrated renovation services that guide homeowners through the process of technical planning, regulatory navigation, financing, and implementation. Pilot applications in selected heritage homes test how this service model works in practice and help refine owner-centred renovation pathways. Training programmes for local governments, professionals and contractors strengthen institutional capacity and improve the consistency of guidance provided to owners. Public outreach and stakeholder engagement promote a shared understanding that conservation and energy efficiency are compatible objectives when approached with appropriate methods. Policy recommendations derived from the project's findings aim to improve regulatory clarity and support the wider uptake of low-impact, heritage-sensitive renovation across EU Member States.

Earlier experience from the CoolBricks project (2010–2013)[71], implemented under the INTERREG IVB Baltic Sea Region Programme, focused on improving energy efficiency in historic masonry buildings while safeguarding their cultural and architectural value. Although centred on traditional masonry, the project addressed the broader building-physics challenges that arise in heritage renovation, including moisture behaviour, ventilation, thermal bridges and the interaction between walls, roofs, basements and windows.

CoolBricks produced technical guidelines and pilot renovations demonstrating how low-impact, repair-oriented measures can reduce energy demand without damaging historic materials. Training programmes and policy recommendations strengthened professional skills and clarified how conservation requirements can be aligned with energy-efficiency goals. The project remains a key reference for understanding safe and compatible renovation strategies in older masonry buildings.

Collectively, these initiatives supply the technical knowledge, service concepts and policy insights needed to advance repair-oriented renovation. Their tools, pilots and methodological outputs provide a transferable foundation for EU-REPAIR, demonstrating how heritage value, climate goals and resource efficiency can be integrated into renovation practice at scale.

[70] https://www.kul.ee/heritagehome
[71] https://renoveeri.net/projektid/coolbricks-0

3.4 Standards and Legislations

In Estonia, the regulation of the built environment combines European Union directives with national legislation and professional standards. The Energy Performance of Buildings Directive (EPBD)[72] is transposed into the Estonian Building Code, requiring nearly zero-energy building (nZEB) standards for all new construction and minimum performance levels for major renovations. Heritage buildings are formally subject to these requirements, but flexibility in the Code and related guidance allows cultural values and fabric to be safeguarded in practice. The European Climate Law (Regulation (EU) 2021/1119)[73] sets a binding target of climate neutrality

by 2050 and at least a 55% reduction in greenhouse gas emissions by 2030, anchoring Estonia's building regulation and renovation strategies within Union-wide decarbonisation goals.

Since 2021, Estonia has applied a national methodology for calculating the life-cycle carbon footprint of construction works[74], aligned with EN 15978[75] and the EU Level(s) framework[76], enabling embodied emissions to be assessed alongside operational energy use. At present, the collection of CO_2 emission data for buildings is mainly applied in pilot projects and comprehensive national datasets are not yet available. Under the forthcoming EPBD recast, life-cycle carbon reporting will become mandatory in the late 2020s, while heating fuels will be included in the EU Emissions Trading System II[77] from 2027, directly linking operational emissions to user costs. For VBE projects, these regulations apply flexibly: operational efficiency targets must be pursued, while repair-oriented strategies reduce embodied emissions by conserving existing structures. Heritage buildings are not exempt from future reporting obligations, but tailored methodologies will allow cultural values to be safeguarded while meeting climate neutrality goals.

Heritage conservation in a national level is primarily regulated by the Heritage Conservation Act (Muinsuskaitseseadus)[78], which provides the legal framework for protecting monuments, archeological sites, and valuable built environments, including procedures for designation, conservation and restoration, and requirements for documentation, maintenance and professional competence.

The Building Code (Ehitusseadustik)[79] and Planning Act (Planeerimisseadus)[80] complement this by defining owners' responsibilities, regulating interventions in protected areas and embedding conservation principles into construction and spatial planning. The Waste Act (Jäätmeseadus)[81] adds obligations for construction and demolition waste management, reinforcing reuse and circular economy principles relevant to repair-oriented refurbishment. Professional standards further strengthen regulatory practice. The Estonian Centre for Standardisation and

[72] https://eur-lex.europa.eu/eli/dir/2024/1275/oj/eng
[73] https://eur-lex.europa.eu/eli/reg/2021/1119/oj/eng
[74] https://etag.ee/wp-content/uploads/2022/04/MKM-CO2_lopparuanne.pdf
[75] https://www.evs.ee/en/evs-en-15978-2011
[76] https://circular-cities-and-regions.ec.europa.eu/support-materials/eu-regulations-legislation/sustainable-buildings-l evels
[77] https://climate.ec.europa.eu/eu-action/carbon-markets/ets2-buildings-road-transport-and-additional-sectors_en
[78] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/520102025004/consolide
[79] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529012026001/consolide
[80] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529122025004/consolide
[81] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/522012026001/consolide

Accreditation (EVS)[82], operating under the Product Conformity Act (Toote nõuetele vastavuse seadus, RT I 2010, 31, 157)[83], coordinates the adoption of International

(ISO)[84] and European (EN)[85] standards into the EVS system. While being voluntary, the standards provide methodological consistency and quality assurance in documentation, condition assessment, and material compatibility and their application is widely used as reference documents. Among these, EVS-EN 17429:2020 Conservation of cultural heritage – Procurement of conservation services and works[86] provides a structured framework for planning, commissioning and supervising conservation and repair works, covering preventive measures, remedial interventions, investigations and project management. EVS-EN 16096:2012 Conservation of cultural property – Condition survey and report of built cultural heritage[87] provides guidelines for assessing, documenting and reporting the condition of historic buildings, while EVS-EN 16853:2017[88] defines the conservation process from decision-making and planning to implementation and documentation for tangible cultural heritage, including the built environment. Although not legally binding and still relatively little known in everyday practice, these standards offer a structured, repair-compatible framework for condition surveys and conservation planning that could be more systematically applied in VBE contexts.

International certification systems such as BREEAM (Building Research Establishment Environmental Assessment Method)[89] and LEED (Leadership in Energy and Environmental Design)[90] have also been introduced in Estonia, mainly for office and commercial developments driven by international investors, signalling the influence of global sustainability standards on local practice. Although their application to heritage refurbishment remains limited, they illustrate the potential for repair-oriented and low-carbon renovation models to be evaluated against internationally recognised criteria, while also highlighting the need to adapt such standards to the specific requirements of the VBE.

These legislative and standardisation frameworks establish the systemic conditions under which repair, maintenance, energy-efficient renovation, renewable resource integration, circular economy practices, and climate adaptation can be scaled. The following subchapters examine these domains thematically, mapping the current legal and standardisation landscape and identifying gaps or inconsistencies that are relevant for value-based, repair-oriented renovation.

3.4.1 Repair and Maintenance

Although Estonian legislation places strong emphasis on energy performance and carbon reduction, repair and maintenance remain central to minimizing embodied emissions and extending the lifespan of existing structures. In heritage contexts, the principle of minimal intervention reinforces this approach by prioritising the retention of original fabric and ensuring

[82] https://www.evs.ee/en/about-the-estonian-centre-for-standardisation-and-accreditation
[83] https://www.riigiteataja.ee/en/eli/513112013013/consolide
[84] https://www.iso.org/about
[85] https://www.cencenelec.eu/about-cen/
[86] https://www.evs.ee/en/evs-en-17429-2020
[87] https://www.evs.ee/en/evs-en-16096-2012
[88] https://www.evs.ee/en/evs-en-16853-2017
[89] https://breeam.com/
[90] https://www.usgbc.org/leed

that buildings remain functional without compromising their cultural significance. By reducing the need for carbon-intensive new construction, repair-oriented approaches align with the national life-cycle carbon footprint methodology and contribute to long-term sustainability.

The Heritage Conservation Act[91] provides the strongest regulatory foundation for repair-first practices. It defines repair as improving the condition of a protected monument or a building within a heritage conservation area without altering its appearance, structure or details, and requires the use of original or equivalent materials (§ 7(2)). Owners are obliged to maintain and, when necessary, repair such structures (§ 33(3)), and financial support is available from the Heritage Board for maintenance, repair, conservation and restoration (§ 35(1)). The Board may issue guidance or prepare maintenance plans that specify appropriate materials, techniques and timing (§§ 44–45). Routine repair that meets the criteria of § 7(2) does not require a permit (§ 52(7)1)), while a work plan is mandatory only for permit-based interventions (§ 49). In practice, the Board may recommend a work plan for complex repairs or when financial support is requested.

Other legislation influences repair more indirectly. The Building Code[92] regulates construction activities but does not define repair as a separate category, which leads to interpretative ambiguity. The Planning Act[93] shapes repair through spatial planning tools that allow municipalities to designate conservation areas and set conditions for building use; its principle of improving the living environment (§ 8) supports the preservation and upkeep of existing structures as part of coherent urban spaces. The Waste Act[94] reinforces repair and reuse by promoting durable and reparable products (§ 21(2)2)), ensuring access to spare parts and technical information (§ 21(2)5)), and prioritising waste prevention in the national hierarchy (§ 22^1), thereby supporting continued use over replacement.

Technical standards relevant to repair and maintenance provide methodological clarity for assessing condition and planning interventions. EVS-EN 16096:2012[95] establishes protocols for condition surveys of built heritage, forming the basis for determining when repair is necessary and how it should be carried out. EVS-EN 15898:2011[96] standardises conservation terminology, supporting consistent documentation of repair processes. CEN/TS 17135:2020[97] provides terminology for describing alterations, enabling clear recording of repair outcomes. EVS 807:2024[98] offers a general framework for facility maintenance management that can support systematic planning and documentation of repair activities, although its link to heritage practice is functional rather than heritage-specific.

These legal and technical tools enable low-impact, heritage-sensitive renovation pathways that preserve cultural value while reducing resource use and embodied emissions.

[91] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/520102025004/consolide
[92] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529012026001/consolide
[93] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529122025004/consolide
[94] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/522012026001/consolide
[95] https://www.evs.ee/en/evs-en-16096-2012
[96] https://www.evs.ee/en/evs-en-15898-2011
[97] https://www.evs.ee/en/cen-ts-17135-2020
[98] https://www.evs.ee/en/evs-807-2024

3.4.2 Energy-Efficient Renovation

Energy-efficient renovation in Estonia is shaped by national regulations, EU directives and selected technical standards that aim to reduce operational carbon emissions while preserving the cultural and material integrity of valuable built environments. Major renovations must meet national minimum energy performance requirements, yet heritage-sensitive projects are allowed tailored solutions that acknowledge structural limitations and the need to safeguard authenticity. This approach reflects the broader European objective of achieving climate neutrality without compromising cultural value.

The Regulation on Minimum Energy Performance Requirements for Buildings[99] sets mandatory thresholds for all new and majorly renovated buildings. From September 2025, new construction must reach energy class A, while major renovations must improve the building's class by at least one level. The performance indicator is expressed in kWh/m² per year, using national conversion factors of 2.0 for electricity, 0.9 for district heating and 0.65 for wood fuels. Although no separate exemption exists for heritage buildings, adjustments are permitted for traditional constructions: machine-produced log houses with wall thicknesses of at least 180 mm may apply a correction factor of 1.2, and handcrafted log houses of the same dimension a factor of 1.25. These corrections recognise the physical constraints of traditional structures while ensuring compliance with indoor climate, ventilation and safety requirements.

The Estonian Building Code[100] embeds energy performance obligations into permitting procedures but exempts monuments and buildings in conservation areas from standardised requirements when these would conflict with heritage protection. The national Long-Term Renovation Strategy[101] reinforces the need to improve the energy performance of the building stock, including older and heritage buildings where feasible, though implementation remains uneven due to the absence of conservation-sensitive technical guidance and limited coordination between energy and heritage authorities.

Technical standards relevant to energy-efficient renovation in historic contexts provide methodological support for planning compatible interventions. EVS-EN 16883:2017[102] offers a structured decision-making framework for improving the energy performance of historic buildings while respecting heritage values, making it the most directly applicable standard for VBE

renovation. EVS-EN 16247 (Energy audits)[103] supports systematic assessment of existing conditions, and EVS-EN ISO 52000-1[104] provides the overarching framework for calculating building energy performance. These standards do not prescribe specific solutions for heritage buildings but help ensure that interventions are evidence-based and aligned with European climate objectives.

In practice, energy-efficient renovation of valuable built environments often relies on case-by-case negotiations with the National Heritage Board, as unified national guidelines for

[99] https://www.riigiteataja.ee/akt/119022025004
[100] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529012026001/consolide
[101] https://kliimaministeerium.ee/sites/default/files/documents/2023-06/Hoonete%20rekonstrueerimise%20pikaajali ne%20strateegia.pdf
[102] https://www.evs.ee/en/evs-en-16883-2017
[103] https://www.evs.ee/en/search?OnlySuggestedProducts=false&query=EVS%E2%80%91EN+16247&Search=Search
[104] https://www.evs.ee/en/evs-en-iso-52000-1-2017

conservation-sensitive energy upgrades are still lacking. Some municipalities have issued advisory guidance for heritage areas, but coverage remains inconsistent. EU-funded initiatives such as LIFE heritageHOME contribute by piloting integrated service models and developing scalable approaches tailored to historic buildings. These regulatory and technical frameworks situate energy-efficient renovation of VBE within a broader system that seeks to balance climate ambition with cultural responsibility.

3.4.3 Renewable Resources

Renewable energy integration in Estonia's building stock is driven by national energy policy and EU climate legislation, which require reductions in operational emissions and preparation for the inclusion of heating fuels in the EU Emissions Trading System II[105]. For valuable built environments, this transition is constrained by heritage protection rules that prioritise visual integrity, material compatibility and reversibility, making the placement and form of technologies such as solar panels and heat pumps a central concern. The Regulation on Minimum Energy Performance Requirements for Buildings[106] obliges new buildings and major renovations to meet nearly zero-energy building standards, implicitly encouraging the substitution of fossil fuels with renewables. Heritage buildings are not exempt from energy performance obligations, but tailored solutions are permitted to account for traditional constructions and historic materials, provided that indoor climate, ventilation and safety requirements are met.

The Building Code[107] and Planning Act[108] require that installations of renewable energy systems on or near protected buildings be coordinated with the National Heritage Board, including assessments of visual impact and reversibility. In practice, rooftop solar arrays, façade-mounted collectors and external heat pump units often trigger lengthy permitting processes, with outcomes determined through case-by-case negotiations rather than uniform criteria. This creates uncertainty for owners and project managers who seek to decarbonise heating and electricity supply in VBE while complying with conservation requirements.

Technical standards offer only partial support. EVS-EN 16883:2017[109] provides a decision-making framework for improving the energy performance of historic buildings, including the evaluation of renewable energy options in relation to heritage values. EVS-EN ISO 52000-1[110] defines the overarching methodology for assessing building energy performance, and EVS-EN 16247[111] Energy audits support systematic analysis of renewable scenarios. None of these standards, however, constitutes a dedicated protocol for renewable energy integration in heritage contexts, leaving significant gaps in practical guidance on issues such as panel placement, system reversibility or the treatment of historic roofscapes.

In response, pilot projects and some municipal initiatives have begun to explore context-sensitive solutions, including ground-mounted solar installations, shared neighbourhood systems and internal upgrades that avoid altering historic exteriors. EU-funded programmes under Horizon

[105] https://climate.ec.europa.eu/eu-action/carbon-markets/ets2-buildings-road-transport-and-additional-sectors_en
[106] https://www.riigiteataja.ee/akt/119022025004
[107] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529012026001/consolide
[108] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529122025004/consolide
[109] https://www.evs.ee/en/evs-en-16883-2017
[110] https://www.evs.ee/en/evs-en-iso-52000-1-2017
[111] https://www.evs.ee/en/search?OnlySuggestedProducts=false&query=EVS%E2%80%91EN+16247&Search=Search

Europe, Interreg and LIFE provide opportunities to test and scale such models, positioning renewable energy integration in VBE within a broader regulatory and technical ecosystem where climate ambition must be reconciled with the preservation of cultural value.

3.4.4 Circular Economy

Circular economy principles are increasingly embedded in Estonia's construction and environmental legislation, reflecting the national carbon footprint methodology, which highlights the significance of embodied emissions. By prioritising reuse, recycling and repair, these approaches reduce construction-related CO_2 emissions and extend the life cycle of materials within valuable built environments. In heritage contexts, such practices align naturally with conservation principles by minimising waste and preserving authenticity, yet their systematic application remains limited.

The Waste Act[112] provides the legal foundation for reuse and recycling, establishing a waste hierarchy (§ 22[1]) that prioritises prevention and the continued use of existing products over disposal. Requirements related to reparability and access to spare parts (§ 21(2)) reinforce repair-first approaches, while lifecycle-based planning obligations support long-term durability. The Construction Products Regulation[113] complements this framework by mandating performance declarations and material traceability, enabling the development of material passports and digital documentation tools. These methods create opportunities for tracking the provenance and condition of building components, although heritage-specific protocols have not yet been formalised.

Circular economy centres have emerged as practical actors promoting the reuse of traditional components such as bricks, windows and timber elements. Their advocacy for material

passports and digital inventories aligns with EU initiatives on sustainable construction, including the European Green Deal[114] and the Circular Economy Action Plan[115]. However, integration with heritage conservation frameworks remains fragmented, and no unified national protocol exists for applying circular principles to protected buildings. This gap limits the scalability of reuse strategies in heritage renovation, where regulatory clarity and methodological guidance are essential.

Technical standards provide partial support. EVS 807:2024[116] introduces lifecycle-based maintenance planning and references sustainability goals, but does not explicitly address reuse strategies for heritage components. EVS-EN 15978:2011[117] offers a methodology for assessing the environmental performance of buildings, including embodied emissions, while EVS-EN 17472:2021 supports transparent documentation of material impacts through environmental product declarations. These standards help align repair-oriented renovation with circular economy objectives, though they stop short of prescribing heritage-specific solutions.

[112] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/522012026001/consolide
[113] https://eur-lex.europa.eu/eli/reg/2011/305/oj
[114] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640
[115] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0098
[116] https://www.evs.ee/en/evs-807-2024
[117] https://www.evs.ee/en/evs-en-15978-2011

EU-level programmes such as Horizon Europe and LIFE offer opportunities to pilot circular renovation models, while Interreg facilitates cross-border collaboration on material reuse and resource efficiency. Despite growing interest in cooperation between circular economy actors and heritage authorities, institutional frameworks remain fragmented. Although strategic alignment with European climate and resource policies is evident, cultural heritage renovation has yet to be prioritised within mainstream circular economy funding streams. As a result, heritage-sensitive projects continue to rely on case-specific negotiations and pilot initiatives rather than unified national guidance.

3.4.5 Climate Change Adaptation

Climate change adaptation in Estonia's heritage sector remains underdeveloped, despite the intersection of CO_2 regulations with broader resilience policies. Energy efficiency and carbon-reduction measures contribute indirectly to adaptation, yet historic buildings are rarely addressed in national strategies, risk assessments or funding mechanisms. As a result, adaptation measures such as flood protection, moisture control and ventilation upgrades are implemented inconsistently and often without reference to wider resilience frameworks.

The Planning Act[118] and the Environmental Impact Assessment Act (Keskkonnamõju hindamise seadus)[119] provides general tools for site-level risk analysis and development planning, but they do not include heritage-specific criteria. This omission limits the systematic integration of adaptation into conservation practice, leaving municipalities and property owners to rely on ad hoc solutions. National climate policy documents, including Estonia's Climate Change Adaptation

Development Plan (2017–2030), acknowledge the vulnerability of the built environment but do not offer detailed pathways for safeguarding heritage assets.

Technical standards offer only partial guidance. EVS 807:2024[120] references maintenance planning and environmental considerations, yet it lacks detailed provisions for climate-related threats such as flooding, rising humidity or extreme temperature fluctuations in historic structures. At the European level, ISO 14090:2019 (Adaptation to climate change – Principles, requirements and guidelines)[121] and ISO 14091:2021 (Adaptation to climate change – Vulnerability, impacts and risk assessment)[122] provide structured frameworks for resilience planning, but their application to heritage contexts in Estonia remains limited. Similarly, the EU Strategy on Adaptation to Climate Change[123] calls for mainstreaming adaptation across sectors, but cultural heritage is not explicitly prioritised.

Pilot projects have begun to bridge this gap. The LIFE heritageHOME initiative demonstrates integrated approaches by developing crisis response plans, site-specific risk assessments and stakeholder training tailored to heritage buildings. These efforts highlight the potential of combining conservation with resilience planning, yet scaling requires stronger policy alignment,

[118] https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/529122025004/consolide
[119] https://www.riigiteataja.ee/akt/116112010013
[120] https://www.evs.ee/en/evs-807-2024
[121] https://www.iso.org/standard/68507.html
[122] https://www.iso.org/standard/68508.html
[123] https://climate.ec.europa.eu/eu-action/adaptation-and-resilience-climate-change/eu-adaptation-strategy_en#:~:text=Adopted%20in%202021%2C%20the%20EU%20Adaptation%20Strategy%20is,actions%2C%20such%20as%20protecting%20homes%2C%20businesses%2C%20and%20farms.

dedicated funding and the explicit inclusion of heritage assets in national and municipal climate strategies. Without binding standards or coordinated frameworks, adaptation in heritage contexts remains fragmented, dependent on project-based experimentation rather than systemic regulation.

CO_2 regulations intersect with adaptation policies, as energy efficiency and carbon-reduction measures also enhance resilience. Estonia's climate framework illustrates how climate neutrality goals can be aligned with adaptation strategies, ensuring that heritage buildings remain both sustainable and resilient. However, adaptation is not yet systematically embedded in legislative or planning instruments. While national policy acknowledges the vulnerability of the built environment, historic buildings are rarely addressed in adaptation strategies, risk assessments or funding instruments.

The absence of binding standards for climate resilience in historic buildings reinforces this gap. EVS 807:2024[124] references maintenance planning and environmental considerations but does not provide detailed guidance on climate-related threats or mitigation techniques tailored to heritage contexts. Projects such as LIFE heritageHOME have begun to address this by piloting integrated approaches to adaptation and conservation, including crisis response planning, risk assessment and stakeholder training. Scaling these efforts requires stronger policy alignment,

dedicated funding and the explicit inclusion of heritage assets in national and municipal climate planning.

[124] https://www.evs.ee/en/evs-807-2024

4. Funding

The restoration and sustainable renewal of Estonia's built heritage relies on a multilayered system of national and international funding instruments. Access to these resources depends on ownership status, project scope, and alignment with conservation and sustainability objectives, ensuring that financial support is directed toward interventions that balance cultural value with long-term resilience. At the national level, Tallinn City Heritage Grants provide direct support for the preservation, maintenance, and restoration of listed buildings and heritage assets located in protected areas. Administered by the Heritage Department of the Tallinn Urban Planning Authority, these grants cover works such as roofs, façades, windows, doors, chimneys, porches, fences, and interiors protected as national monuments. The scheme covers up to 75% of eligible costs, capped at €35,000 per object, with a total budget of €750,000 in 2025. Projects must be pre-approved, based on three cost estimates, and completed within the same calendar year, with funds disbursed after the submission of financial documentation.

The National Heritage Board complements municipal support through annual and emergency funding for state-protected monuments and buildings within heritage zones. The regular call for 2026 allocates €2.5 million, with grants ranging from €200 to €100,000 and co-financing requirements between 10–50%. Emergency funding addresses urgent works caused by unforeseen damage or newly discovered cultural values, although the 2025 round has been suspended due to budget exhaustion. Additional support is available through the Ownership Reform Reserve Fund, which provides €30,000–200,000 for returned heritage properties, also requiring 10–50% co-financing. Rural heritage previously benefited from the Traditional Rural Architecture Support Scheme, which between 2019 and 2024 funded the restoration of pre-1940 dwellings using regionally characteristic materials and techniques. Although widely regarded as effective in safeguarding vernacular heritage, the scheme was discontinued in 2025 due to budget cuts, leaving a significant gap in support for traditional rural buildings.

Parallel to heritage-specific instruments, energy-efficient renovation of older residential buildings is now supported through the Eesti Energia- ja Elamumajandusfond (EIS), which has replaced the former KredEx system. EIS reconstruction grants target single-family homes, duplexes, and row houses, with eligible works including insulation, window and door replacement, heating and ventilation upgrades, solar panels, and EV charging infrastructure. The 2025 call attracted more than 700 applications totalling €28 million, far exceeding available resources. Grants are conditional on improving the building's energy class by at least one level, embedding energy-efficiency criteria into repair-oriented renovation while excluding interior works. The transition from KredEx to EIS has tightened eligibility requirements and increased competition, reflecting broader national priorities in energy performance and climate policy.

International funding opportunities broaden the scope of heritage financing and connect Estonian projects to transnational networks. Creative Europe integrates heritage restoration into cultural and community-based initiatives, while Horizon Europe supports research and innovation in energy efficiency, digital documentation, and smart heritage technologies. Interreg facilitates cross-border cooperation, enabling joint heritage and sustainability projects with neighbouring countries such as Finland. Recognition from Europa Nostra provides visibility and

leverage for further financing, while global organisations such as the World Monuments Fund and the Global Heritage Fund support endangered heritage sites of international significance. Erasmus+ strengthens professional capacity through education, mobility, and training programmes, and the LIFE programme funds environmental and climate-related pilot projects, including circular construction, carbon reduction in buildings, and climate adaptation initiatives. These international resources enable Estonia to combine local repair traditions with European research, education, and sustainability agendas, reinforcing the integration of conservation practice into broader climate and resource strategies.

Overall, Estonia's funding landscape for built heritage is diverse but increasingly constrained. National schemes prioritise maintenance, repair, and the safeguarding of cultural value, while energy-efficiency grants introduce climate-related performance criteria. The discontinuation of the Traditional Rural Architecture Support Scheme and the consolidation of reconstruction grants under EIS illustrate the volatility of funding structures and the growing competition for limited resources. Strengthening long-term funding stability and aligning heritage-specific instruments with climate and sustainability objectives remain key challenges for ensuring the resilience of Estonia's built environment.

5. National Survey Results

As part of Output 1 of the EU-Repair project, surveys were conducted in each partner country among stakeholders engaged in the renovation of historic buildings over 50 years old and holding cultural or architectural significance. In Estonia, the survey was administered via Google Forms between 16 July and 7 October 2025.

A total of 76 people responded to the national questionnaire. About the respondent's profile, most were women aged 30–50 with higher education living in densely populated areas (cities or small towns). While respondents' professional backgrounds and workplaces were very diverse (most of them professionals in specific fields), the majority have some connection to historic buildings. Many of them are living in historical buildings or are owners of apartments in such buildings.

A large number, 67 respondents, have participated in renovation projects of historically valuable buildings, most commonly in restoration/renovation, architectural design or construction work. The most common reason for not receiving funding was that the program's budget had been depleted. Two main motivations for participating in historic building renovation projects were highlighted: the desire to preserve the buildings and professional interest in heritage.

In general, respondents were unable to evaluate the effectiveness of legislation. Respondents were most familiar with the legal framework for building renovation. Since most respondents are not officials familiar with the full legal framework, this kind of distribution of answers is to be expected; they are able to assess only the legislation relevant to their own field of work (which quite often was renovation/construction/planning field).

National and local regulations are best known and most consistently followed. There is a tendency for a decrease of awareness when the requirements and standards originate from more geographically distant sources (e.g. EU-directives). However, this is not seen as a problem, as these directives are indirectly followed - EU-directives are continuously integrated into national laws and standards.

The main gaps in legislation were identified as insufficient interaction between heritage protection and environmental legislation, unclear or overlapping responsibilities between institutions, and the lack of unified guidelines. Also, the specific characteristics of historical buildings are not taken into account in CO_2 calculation methodologies, and in the context of climate change adaptation and energy policy, historical buildings are not seen as playing a positive role. Typical renovation solutions may not be suitable for historical buildings, and openness to flexible object-base solutions is limited.

For the successful implementation of renovation projects, the most important measures were considered to be financial support, access to guidelines and good examples, and technical training and instruction materials. There is an expectation for more flexible loan and insurance conditions to finance building renovations and for the enhancement of competencies or interdisciplinary collaboration among specialists.

A variety of support measures were regarded as equally important: direct subsidies for renovation, tax incentives, low-interest loans, and project-based EU or other kinds of funding. Continuity of support is crucial, with funding measures and calls for applications made sufficiently known in advance to enable the planning of renovation projects that are both costly and time-consuming.

To continue, a wide variety of sustainability measures have been applied in renovation projects for historically valuable buildings. The most commonly used measures include traditional materials, circular economy principles, energy-efficient windows and insulation solutions, traditional techniques, natural ventilation and daylighting solutions, the use of recycled or locally sourced materials, and ensuring good indoor climate. Renewable energy sources have been used less frequently, which can be partly explained for example by restrictions on installing solar panels on historical buildings in order to preserve their valuable exterior.

Respondents were less familiar with methods for assessing the impact of refurbishment projects; 47 respondents reported not having used any such methods. Among the limited number of responses, energy savings assessment was the most commonly applied method. Its

use may be linked to the requirements of renovation project funding (EIS funding), which often require documentation of energy savings before and after the renovation.

The majority of respondents perceived public interest in the preservation of valuable buildings as high, while a quarter rated it as neutral. It was emphasized that heritage valuation should be approached on a case-by-case basis, as there are no black-and-white situations. Three-quarters of respondents considered community involvement in renovation projects to be important or very important.

All forms of public engagement in renovation projects were considered relevant (training sessions, seminars, workshops, meetings, and consultations with specialists), with slightly fewer responses for the online survey option. The need to raise awareness prompted respondents to specify engagement methods. Greater coverage of heritage topics in education, volunteer activities for the maintenance or restoration of public buildings, tours, and exhibitions were all seen as important. Involving the community in the procedural aspects of renovation projects would also increase awareness, as would better dissemination of information on successful projects. It was also suggested that vacant buildings could be used more frequently for temporary purposes. Television, radio, printed, and social media were consistently highlighted as playing a major role in raising awareness. This suggests that valuable built heritage is currently not highly visible in public discourse.

The main obstacles to renovation projects were identified as lack of funding, low awareness, and insufficient motivation. Low awareness can lead to opposition to heritage protection and cautious hesitation due to fear of potential mistakes.

People involved in the renovation of historical buildings need the most support in three areas: technical skills in refurbishment of valuable built environment (VBE) buildings, project management for heritage objects and sites, and legal and regulatory compliance workshops. About half of the respondents are definitely willing to participate in training sessions and

information days, while a quarter of respondents might be willing to participate. They are most interested in the following topics: technical skills in preservation of VBE buildings, circular economy principles, and project management for heritage objects and sites.

Respondents expect that the national and local governments demonstrate better leadership in the preservation, maintenance, and renovation of historical buildings; the society takes its cue from this example. The competence of state and local government officials is seen as insufficient, and there is a desire to collaborate with heritage-aware and open-minded officials.

The unsuitability of contemporary requirements and energy-efficiency calculation methods for historical buildings was also widely highlighted as a problem; their necessity should be communicated clearly and understandably. Alongside various impact assessment methods, a heritage impact assessment methodology is proposed, which would be more suitable for

historical buildings and provide an alternative. Raising public awareness and presenting successful renovation examples remain ongoing challenges.

6. Best practices

Best practices in heritage-sensitive refurbishment in Estonia extend beyond individual renovation projects to encompass broader infrastructures and guidance systems that support repair-oriented and low-carbon approaches into everyday practice. Central to this framework is the emphasis on repair and maintenance, which remains the most effective and culturally sensitive pathway to sustainability.

Complementary infrastructures reinforce this repair culture at the nationwide level. Since 2001, the Sustainable Renovation Information Centres (SRIK)[125] have operated across seven towns, offering advice, training, and community engagement in traditional building practices. In Tallinn and Paide, SRIK also maintains material banks where reusable doors, windows, stoves, and timber elements are collected and redistributed, supplying authentic components for VBE buildings. By combining knowledge hubs with material reuse facilities, the SRIK network sustains both skills and resources, embedding repair-oriented approaches into everyday renovation practice.

Within the field of energy-efficient renovation, efficiency gains can be achieved without compromising historic materials. Guidance such as the "Energy Efficiency ABC for Old Houses"[126] highlights maintenance-based measures such as roof repair, sealing of original wooden windows, restoration of shutters, and servicing of heating systems. These practices can reduce heating demand by 20–30% while preserving cultural authenticity, though their main limitation is that the savings are incremental compared to those achieved through comprehensive upgrades. In parallel, SRIK's guidance for local scenic heritage area buildings[127] proposes technical solutions including interior insulation methods that avoid altering facades, careful restoration of original wooden windows with improved airtightness, and integration of ventilation systems with heat recovery. While these measures can achieve reductions of heating demands up to 30–40%, they risk introducing interventions that may alter historic fabric if applied without sufficient sensitivity. As energy performance certificates and systematic monitoring of energy consumption before and after refurbishment are not mandatory for historic buildings in Estonia (except when required by specific funding schemes, such as EIS), it is difficult to quantitatively assess their positive impact. This lack of data may become an obstacle for accessing future funding instruments and other support measures; therefore, monitoring energy consumption in historic buildings is recommended. These examples illustrate both the potential and the challenges of reconciling energy efficiency with heritage preservation.

The circular economy is increasingly embedded in refurbishment practice through infrastructures that enable reuse and resource efficiency. Tallinn's network of four circular economy centres[128] – Lilleküla (Figure 7), Paljassaare, Pääsküla and Lasnamäe – provide facilities for sorting, repairing, and redistributing construction materials, furniture, and household items. These centres allow reclaimed doors, windows, timber, and fittings to be reintegrated into repair-oriented projects, strengthening sustainability in heritage-sensitive renovation. While Tallinn currently hosts the

[125] https://renoveeri.net/
[126] https://evm.ee/maaarhitektuur/vana-maja-taastamine/energiatohususe-abc
[127] https://www.renoveeri.net/sites/default/files/Srikjuhendveebi.pdf
[128] https://www.tallinn.ee/et/ringmajanduskeskus

most developed system, national strategies foresee the gradual expansion of similar centres to other cities, creating a broader infrastructure that embeds circular practices into everyday refurbishment.

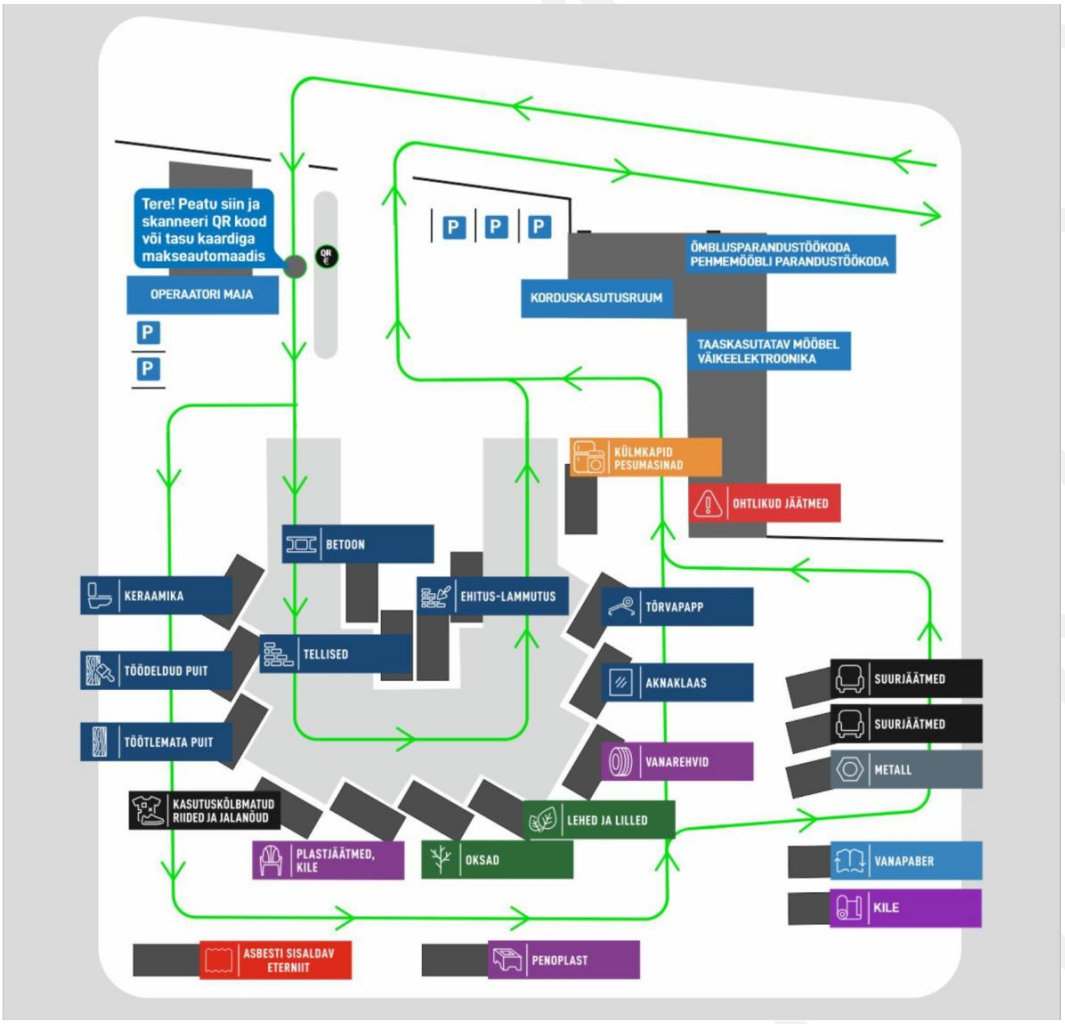


Figure 7. Layout showing the different functions of the Lilleküla Circular Economy Centre. Source: https://www.tallinn.ee/et/ringmajanduskeskus/lillekula-ringmajanduskeskus

An exceptional circular economy example is the relocation of a Soviet-era collective farm dwelling to the Estonian Open Air Museum[129]. In cooperation with TalTech, the 1970s apartment building was dismantled, transported, and re-assembled, demonstrating that even Soviet-period housing can be preserved as cultural heritage. The project provided TalTech with a research base on construction methods and material performance, while offering the public an authentic view of collective farm life. It proved that circular economy principles can extend beyond recycling materials to reusing entire buildings, broadening the scope of the VBE.

With regard to renewable resources, the Estonian company Roofit.Solar[130] has developed building-integrated solar roofs that visually resemble traditional metal roofing (Figure 8), making them suitable for valuable scenic heritage buildings. This solution enables renewable energy production without disturbing the architectural character and offers a replicable model for

[129] https://evm.ee/exhibition/stand-alone-objects/kolkhoz-apartment-building
[130] https://roofit.solar/

combining cultural preservation with low-carbon innovation, though wider scalability remains constrained by technical requirements and heritage protection regulations in protected areas.



Figure 8. Apartment building in Tartu with Roofit.Solar roof, showing how solar technology blends with traditional architecture. Source: https://roofit.solar/et/reference/tartu-apartment-building/

Climate change adaptation emerges as another dimension of heritage-sensitive refurbishment, demonstrated through pilot projects assessing the resilience of building materials and refurbishment solutions under conditions of humidity, flooding risk, and temperature fluctuations. In 2025, the LIFE IP BuildEST programme with the support of the Ministry of Climate and partner institutions consolidated these efforts by producing guidance framework and handbook for the Estonian Union of Housing Association[131], targeting apartment building cooperatives and residents who need practical tools for improving indoor climate quality, affordability and

resilience to extreme weather. By aligning technical upgrades with cultural and environmental values, BuildEST demonstrates how European frameworks can be tailored to local contexts to strengthen resilience and inclusivity.

These broader practices illustrate how Estonia is shaping a framework for heritage-sensitive refurbishment. While repair and maintenance are generally highlighted as the most sustainable approach, in practice different perspectives coexist, and not all stakeholders agree on prioritising repair over other strategies. The following case studies provide detailed examples of how these principles are interpreted in specific building contexts.

6.1 Case study I: Tartu 31 in Viljandi

The stone-and-timber apartment building at Tartu 31 in Viljandi (Figure 9) represents a distinctive example of slow-paced restoration within Estonian conservation practice. The project was privately initiated and financed through the owner's other projects. Its lead, Andres Uus, a

[131] https://kliimaministeerium.ee/sites/default/files/documents/2025-06/Hoonete%20renoveerimise%20kliimakin dluse%20n%C3%B5ustik.pdf

building restorer and structural engineer with a strong sense of mission, embodies with this case the Estonian proverb “tark ei torma” (“the wise do not rush”).

The restoration process spanned five years and was completed in 2022. As a result, a culturally and architecturally valuable building in Viljandi’s historic town centre was preserved. The building had previously been listed for demolition due to its severely deteriorated condition: it had stood empty for 15 years; at the time of purchase, the roof was leaking and the floor structures between levels had collapsed. The building’s location on a steep hillside had caused structural damage to accumulate over time, as lateral soil pressure, water and moisture failed to drain away and instead penetrated the construction. Due to these damages, the renovation had to be carried out in stages and was engineering-wise highly demanding: the log structure had to be restored, the hillside-facing section of the foundation was rebuilt and reinforced, and an effective waterproofing system was installed. Consistent with the historic surroundings, the building’s rubble-stone (granite) plinth, wooden exterior (partly reused old boarding), and clay-tile roof were all restored.

Although the building at Tartu 31 was not listed as a national monument, its renovation was approached with great sensitivity, preserving valuable details wherever their condition allowed. For example, one surviving historic window was restored and new windows were crafted based on its model; the old wooden interior staircases and apartment doors were also kept. The high quality of the renovation was recognised by the National Heritage Board, which nominated the project for its annual awards.

During the renovation of the building at Tartu 31, training on the maintenance and restoration of historic buildings were organised. Participation fees were used to raise funds for restoration works in a parallel project: the restoration of the historical main door of Oru 7a, a small wooden apartment house in Viljandi.

Project lead Andres Uus summed up the essence of slow renovation particularly well in his comment: "Having spent 25 years restoring old buildings as best I could, I have come to understand that their renovation requires time – time to act patiently, to reflect, and to observe. And if one is going to dedicate one’s own time and life to something, it is essential to enjoy the process rather than focus solely on the outcome. For me, this makes restoring old buildings not just work, but also a hobby. An expensive, yet deeply rewarding one."[132]

[132] Heritage Yearbook 2022, p 27-28. https://muinsuskaitseamet.ee/sites/default/files/documents/2024-02/Muinsuskaitse%20aastaraamat%202022. pdf



Figure 9. Tartu 31 in Viljandi, Estonia is a good example of slow restoration of valuable architectural heritage.

Source: Kärt Petser, National Heritage Board homepage.

6.2 Case-study II: F. R Kreutzwaldi 2 in Võru

The wooden apartment building at F. R. Kreutzwaldi 2 (Figure 10), located in the Võru old town conservation area in South Estonia, is a good example of balanced collaboration between heritage conservation specialists and (energy) engineers. In Estonia, where most towns date back to the middle ages, Võru is relatively young, it was founded by Empress Catherine II in 1784. However, it is precisely because of its founding history that the town is truly unique in Estonian context.

The building was likely constructed in the second half of the 19th century.[133] For the wider context, many of Estonia's culturally valuable wooden buildings have shared a similar fate: during the Soviet period, wooden apartment houses were inadequately maintained, and by today the

backlog of repairs has grown considerably. Few owners have the capacity to restore such buildings, and even fewer can afford a full-scale renovation. Only urgent repairs had been carried out on the Kreutzwaldi house, and its original windows had been replaced with unsuitable plastic ones. Heating was provided mainly by wood-burning stoves.

[133] https://register.muinas.ee/public.php?menuID=heritage&action=view&id=1001



Figure 10. F. R. kreutzwaldi 2, Võru, Estonia. Source: Google Maps street view

The building at F. R. Kreutzwaldi 2 was part of the development and research project LIFE IP BuildEST.[134] The project's activities, such as neighbourhood-based renovation, studies mapping renovation challenges[135], learning labs[136], and analyses of "renovation locks"[137], brought valuable historic buildings in Võru into focus, giving local residents and municipal representatives an opportunity to reassess their cultural heritage from a new perspective.

Inspired by these efforts, a digital renovation-support tool RESTO[138] was developed in cooperation with the city. In recent years, Võru has become noticeably more active in seeking funding opportunities and participating in international projects to ensure that its historic buildings are preserved, energy-efficient, and contribute to an improved urban environment. It is

important to emphasise the regional dimension: the impact of such projects has reached smaller Estonian towns. Typically, these kinds of initiatives have been concentrated in larger cities such as Tallinn, Tartu, and Pärnu.

The apartment building at F. R. Kreutzwaldi 2 was planned to be reconstructed into a Class B energy-rated building while fully complying with all heritage protection requirements to preserve its historical appearance and architectural details. The goal was to ensure that, after renovation, the building would look as close to its original form as possible.

The project involved the complete reconstruction of the structure and the optimisation of all technical systems to operate based on actual demand. As a result, the building's carbon emissions were planned to be reduced by 25%.[139] Specifically, the renovation included upgrading

[134] https://kliimaministeerium.ee/buildest
[135] https://kliimaministeerium.ee/sites/default/files/documents/2025-08/Interim%20Report%20of%20the%20V%C3%B5ru%20living%20lab%20for%20historical%20buildings%20%282022-2024%29.pdf
[136] https://www.sirp.ee/voru-renoveerimise-opilabor/ https://build-up.ec.europa.eu/en/resources-and-tools/articles/energy-renovations-historic-homes-insights-historic-b uilding-living-lab
[137] https://kliimaministeerium.ee/sites/default/files/documents/2025-05/Step-by-step%20renovation%2C%20renov ation%20locks.pdf
[138] https://digileht.vorumaateataja.ee/arhiiv/voru-linna-leht/1658-voru-linna-leht-detsember-2022
[139] https://digikogu.taltech.ee/et/item/7c8f3c77-1765-4a80-adfd-9adbd9e91e8c

the exterior walls, connecting the house to the central heating network, refurbishing the heating systems, and installing an apartment-specific ventilation system with heat recovery. A rooftop solar panel system was also introduced to generate electricity. Common areas (e. g corridors) were made to be heated, which contributes to overall energy efficiency and improves the building's structural health.

From a technical and policy perspective, engineers have pointed out that heritage renovation in Estonia often faces tension between regulatory rigidity[140] and practical energy goals. This perspective is directly relevant to the renovation of Kreutzwaldi 2, where external insulation or window replacement had to be carefully considered to avoid altering the façade or decorative details. Instead, solutions such as internal insulation, restoration of original wooden windows, and selective sealing were used to enhance performance while maintaining authenticity.



Figure 11. F. R. Kreutzwaldi 2 renovation project, author ROK-Projekt.

This case-study highlights the importance of energy modelling and monitoring in heritage renovation, showing that modest improvements, when applied systematically, can produce substantial energy savings without damaging the historical envelope. These lessons were instrumental in defining the technical scope for buildings like Kreutzwaldi 2, where moisture control, ventilation, and material compatibility are crucial for long-term heritage conservation. However, the renovation work is still ongoing, and the final outcome, the one that meets the expectations of both heritage conservators and engineers, will only be seen in the future.

6.3 Case-study III: The Importance of Renovation Grants for VBE

Renovation grants, also their availability and continuity, proved to be crucial in renovation of VBE, as highlighted in the national survey. The regional dimension is equally important: historically valuable buildings are being restored in areas far from major centres, revitalising local environments, motivating communities, and opening doors to new initiatives. The impact of a single well-renovated building can be difficult to fully grasp, yet it sparks positive change in local scale. Below is a selection of buildings restored through the project "Historic Old Town Centres with Cultural Heritage Protection Areas."

[140] https://digi.geenius.ee/blogi/teadus-ja-tulevik/taltechi-ekspert-muinsuskaitse-voiks-ajalooliste-hoonete-renoveeri misele-eritingimusi-seades-olla-paindlikum/

Under the programme “Local Development and Poverty Reduction” between Estonia and the EEA countries Norway, Iceland, and Liechtenstein, support was provided for revitalising protected historic town centres. The project focused on historic urban cores as contemporary, living environments, also places affected by seasonality and depopulation, yet whose long-term sustainability depends strongly on active local communities. Planned activities included the publication of nine books introducing heritage conservation areas as historic living environments, exhibitions, guided city walks and photo competitions, training for municipalities and heritage experts. Additionally, the programme funded the renovation of several buildings in different regions of Estonia. Three of these are highlighted below. Both the so-called “soft activities” and the restoration of buildings play an essential role in improving heritage conservation.

Lihula Manor’s historical vodka granary

Lihula Manor’s historical vodka granary (Figure 12) was planned to be renovated to become the community’s handicraft house and heritage conservation information centre. Although the building, located in a prominent position in front of the manor main building, was successfully restored, project conditions have made it difficult to find a tenant or operator of the information centre. The building is renovated, but still waiting for tenants.



Figure 12. Lihula Manor’s historical vodka granary. Source: Martin Siplane

Kesk 19, Valga

The old wooden historic building at Kesk 19, Valga (Figure 13) was restored. It is located next to the newly refurbished town square. The project's main initiator and leader was the local municipality. Preparatory studies for the renovation revealed that it is also one of the oldest

surviving buildings in the town, which changed the understanding of its values. The building now houses a cafe, giving both residents and visitors a reason to spend more time in the town centre.



Figure 13. Kesk 19, Valga. Source: Martin Siplane

Karja 24, Haapsalu, Museum of Evald Okas

The museum dedicated to the highly regarded Estonian artist Evald Okas (Figure 14) has for years been run with great dedication by the artist's descendants. Over time, however, the building's condition had deteriorated to such an extent that even opening it during the summer season had become uncertain. The project focused primarily on restoring the museum's interior: the structural elements were reinforced, modern ventilation and heating systems were installed. The museum is now open for most of the year (except during the winter months), helping to revitalize the historic centre of Haapsalu.



Figure 14. The museum of Evald Okas. Source: Martin Siplane

6.4 Case study IV: Bottom up renovation projects of VBE

Across different regions of Estonia, numerous renovation projects have been carried out on historic buildings. Much of this work has been driven by heritage enthusiasts with a strong sense of mission, often relying on volunteer efforts to preserve local cultural heritage and support the continuity of life in more remote areas. Below are three such examples. **Leesi village shop**[141]

The village shop in Leesi (Figure 15) was built in 1908. Until 2019, the building served as the heart of village life, housing both the shop and the post office. When the shop was closed, local residents took matters into their own hands. A cooperative was formed, with a membership fee of 1,000 euros, with the aim of raising funds to renovate the building and reopen the shop. Around 80 members joined the cooperative. Additional support of 15,000 euros was received from LHV Bank. Renovation work took place during COVID-19 restrictions, meaning tasks had to be carried out in small groups that did not interact with each other. Despite these challenges, the shop was successfully reopened in 2020, led by the cooperative members themselves.

[141] https://www.facebook.com/LeesiKauplus/



Figure 15. The renovated Leesi shop is the centre of village life. Source: Sõnumitooja

Lalsi church

The Lalsi Orthodox Church of St Nicholas (a national monument, built in 1873) in Viljandi County (Figure 16) had fallen into a critical condition by 2016. Years of roof leaks had brought the structure to the brink of collapse. With a very small congregation, the church found it difficult to undertake major renovation works on its own. In 2017, the NGO Vanaajamaja, whose members include construction and cultural heritage specialists from various backgrounds, initiated renovation works together with the church and the local community[142].

Over five years, one building element at a time, with each year bringing a slightly larger scope of work and a larger budget, the church roof, domes, cornices, bell tower, and windows and doors were repaired. Alongside this, the altarpiece and iconostasis were conserved. Every summer, Vanaajamaja organised a two-week volunteer work camp with around 30 participants, with additional preparatory and follow-up work carried out before and after the camp. The process also activated the local community, who now take care of the church. The renovation was financed through various grants.

[142] https://vanaajamaja.ee/en/community-projects/lalsi/



Figure 16. Lalsi church after renovation works. Source: Navicup

Konna house[143]

The Türi community house, known as the Konna House (Figure 17), serves as a local community hub that hosts a cafe, an event space, and several workshops. The building's history stretches back about 150 years; it was most likely constructed in 1868 as a workers' dwelling for the Särevere Manor. Renovation began in 2017, when the local municipality relocated the social housing units that had occupied the building and planned to put the property up for sale. Heritage-minded community members reached an agreement allowing them to use the house free of charge for 15 years. Today, thanks to volunteer work and small grants, the building has been restored to the point that all rooms have a purpose and can be used throughout the year.



Figure 17. The Türi Konna House has been renovated step-by-step in order to make the building usable again. A wide range of reuse and recycling principles have been applied throughout the process. Source: Puhka Eestis, Silver Köster

[143] https://www.facebook.com/tyrikogukonnaselts/

7. Gaps, Obstacles and Lessons Learned

The Estonian case study of renovation in the valuable built environment shows a clear pattern: strong technical skills and innovative pilot projects exist, but they are held back by structural gaps, procedural barriers, and uneven coordination between institutions. A major weakness is the lack of a national system that collects and tracks data on renovation work, building performance after renovation, and life-cycle carbon impacts. Without this continuity, lessons from pilots do not translate into national practice. Another gap is the absence of practical, building-type-specific technical guidance that would turn general EVS and EN standards into clear solutions for moisture-safe detailing, renewable energy integration, and material documentation for masonry buildings, log houses, and apartment blocks. Funding structures also remain poorly suited to heritage needs: small grants, phased financing, and predictable maintenance support are limited, while existing schemes favour large, one-time renovations. Skills development is uneven, as strong craft training does not consistently lead to recognised qualifications or licensed professional roles. Digital systems are advanced, but data exchange and long-term monitoring pipelines are not yet coordinated across institutions.

These gaps create practical obstacles that slow down or discourage repair-first, heritage-sensitive renovation. Permitting is often slow and inconsistent, with case-by-case decisions increasing owner risk and delaying small, staged repairs. Coordination between heritage, energy, waste, and climate authorities is weak, leading to unclear guidance, especially when energy upgrades intersect with heritage requirements. Funding rules make incremental repair difficult, as co-financing thresholds and project-size expectations favour major renovations instead of maintenance-first approaches. Technical risk aversion is common: owners and contractors worry about moisture problems, incompatible materials, and poorly designed details,

which limits the adoption of energy measures and renewable energy solutions. Skills shortages appear in critical areas such as airtightness, ventilation systems in historic buildings, and the use of compatible materials like lime-based products. Circular economy solutions face logistical barriers, including limited inspection, certification, storage, and matching services for reused materials. The lack of widely available retrofit packages for typical heritage building types further restricts owners' ability to make safe and informed choices.

Despite these challenges, the case study highlights several important lessons that point toward effective solutions. Pre-renovation studies that combine heritage value assessment with building physics and moisture behaviour analysis are essential for safe and successful interventions. A repair-first approach reduces embodied carbon and spreads financial and technical risk over time, making complex projects more manageable for private owners and communities. Integrated service models—one-stop renovation hubs that offer technical assessments, help with permits, contractor matching, and financing advice—significantly reduce transaction costs and improve project outcomes. Pilot projects become scalable only when supported by standardised monitoring, documented detail libraries, and clear pathways for integrating successful solutions into national standards and municipal guidelines. Community-led and volunteer-based projects add social value and strengthen local stewardship, but they require basic planning and small amounts of activation funding to remain viable. Digital tools such as the national monument

register, EHR, MuIS, and geoportals improve transparency and decision-making, especially when combined with practical resources like Ehitusgiid. Educational strengths exist across institutions, but joint modules, micro-credentials, and continuing professional development can quickly close competence gaps.

These insights outline a strategic direction for turning isolated pilot successes into a stable national practice. This includes making pre-renovation studies a standard requirement for public funding, ensuring consistent post-renovation monitoring, creating regional one-stop renovation hubs, developing predictable micro-grant schemes, publishing illustrated retrofit packages for common building types, and recognising heritage-sensitive skills within licensing and procurement systems. Implemented together, these measures would provide the data continuity, regulatory clarity, funding flexibility, and recognised competencies needed to mainstream repair-first, low-carbon renovation across Estonia's built environment.

8. Recommendations

The evidence gathered in this study outlines a clear and practical pathway for embedding repair-first, heritage-sensitive and low-carbon renovation into Estonia's wider building culture. The first priority is to improve clarity and predictability in policy and regulation. National authorities should publish guidance that aligns EPBD and national energy requirements with heritage exemptions and tailored performance pathways, and establish a coordinated protocol between heritage, energy, waste and climate institutions so that permitting and funding decisions are consistent and timely. A more balanced funding architecture is also needed:

predictable micro-grants, phased financing options and a modest emergency reserve for urgent conservation works would support staged delivery and preventive maintenance, while blended finance products should recognise incremental interventions as eligible co-funding.

A national evidence infrastructure is essential for turning pilot experience into policy. Short pre-renovation studies that combine heritage value assessment with building-physics analysis should be a condition for public funding, and all publicly supported pilots should include standardised post-occupancy monitoring of energy use, moisture behaviour, indoor climate and basic life-cycle carbon metrics. These results should feed into a national register that informs standards, grant scoring and municipal templates. Technical standardisation should follow an iterative pilot-to-norms pathway: representative pilots across key building types—masonry townhouses, machine-made and handcrafted log houses, and small apartment blocks—should be funded and monitored, with their solutions documented in a detail library and translated into EVS annexes and illustrated retrofit menus that form nationally endorsed practice.

Strengthening skills and professional recognition is equally important. Micro-credentials and continuing professional development modules in heritage-sensitive retrofit should be formalised and integrated into licensing and procurement criteria. Regional training hubs should link vocational craft skills with contemporary building-physics competencies, ensuring that practical know-how and technical understanding develop hand in hand. Service delivery should be reorganised around regional one-stop renovation hubs that provide pre-renovation studies, permitting support, contractor matching, material-passport services and access to small grants. These hubs would reduce transaction costs for owners, accelerate project delivery and serve as focal points for monitored pilots and material-reuse logistics.

Circular economy measures require a national material-passport platform and investment in regional reuse hubs with inspection, cleaning and certification services, supported by procurement incentives that favour documented reuse in publicly funded projects. Community-led and bottom-up models should be strengthened through starter kits, volunteer-camp accreditation, micro-loans for tenanting and activation grants, and by embedding viability planning and activation budgets into adaptive-reuse funding criteria to prevent post-restoration vacancy. A national learning platform should be established to aggregate project costs, technical measures, measured performance and lessons learned, feeding directly into grant design, municipal permitting templates and public communication to build visibility and political support.

A further strategic measure is the development of a national heritage-education pathway at primary and secondary school level. The Ministry of Education and Research should lead the creation of a heritage-literacy strategy that introduces pupils to traditional materials, local building cultures, maintenance skills and the environmental value of repair-first approaches. Such early-stage education would strengthen long-term stewardship, support future skills pipelines and embed cultural heritage within broader sustainability learning.

9. Summary

This study synthesises Estonia's regulatory, technical, financial and practice-based evidence on renovating the valuable built environment to show how repair-first, heritage-sensitive and low-carbon approaches can move from isolated pilots to routine practice. Estonia already has strong foundations: a functioning heritage protection system, transposed EPBD requirements, a national life-cycle carbon methodology, active advisory and reuse infrastructures, and a growing body of demonstrator projects that prove the compatibility of conservation, energy efficiency and circularity. Education and training networks provide additional depth and continuity.

Despite this, the study identifies several systemic weaknesses that limit wider uptake. Data on renovation, performance and climate risk remains fragmented, and nationally endorsed, typology-specific technical guidance is still missing. Funding instruments favour large, one-off retrofits rather than staged, maintenance-first approaches, while coordination between heritage, energy, waste and climate authorities is uneven. Owners face variable permitting pathways, skills shortages in performance-critical details, logistical barriers to material reuse and inconsistent recognition of micro-credentials. These factors increase transaction costs, amplify owner risk and discourage incremental, repair-led renovation.

At the same time, lessons from pilots and community projects demonstrate what works: thorough pre-intervention studies, phased delivery, integrated one-stop renovation services, monitored demonstration projects and active community involvement reliably reduce embodied carbon, protect authenticity and improve project viability. Digital platforms and education systems already offer the tools needed to scale these practices, provided that institutional and financial frameworks evolve accordingly.

The study therefore concludes that Estonia's progress depends on embedding pilot-tested solutions into national and municipal routines, strengthening heritage-specific adaptation protocols, formalising pathways from vocational training to licensed practice, and anchoring continuous datasets on performance, damage and climate exposure within national digital infrastructures. A coordinated package of measures—including diagnostic requirements for public funding, predictable micro-grants and phased-finance instruments, regional one-stop hubs, material-passport platforms, and the integration of heritage-sensitive skills into licensing and procurement—would create the regulatory clarity, financial stability and professional capacity needed to mainstream repair-first, low-carbon conservation across Estonia's building stock. These steps position Estonia to translate its strong heritage values and sustainability ambitions into a resilient, future-proof approach to managing its built environment.

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