

Energy Renovation Roadmap - Multi-apartment buildings

PARTNERI



Imagine a home that is
warm in winter,
comfortable in
summer, with lower
bills and cleaner,
healthier air.

A home that harnesses
the power of the sun,
protects the
environment, and gives
more to you and your
family.

Energy renovation is
not just about repairing
walls or roofs – it is an
investment in a
healthier, more
valuable home.
It's a step towards
smarter and more
sustainable living.

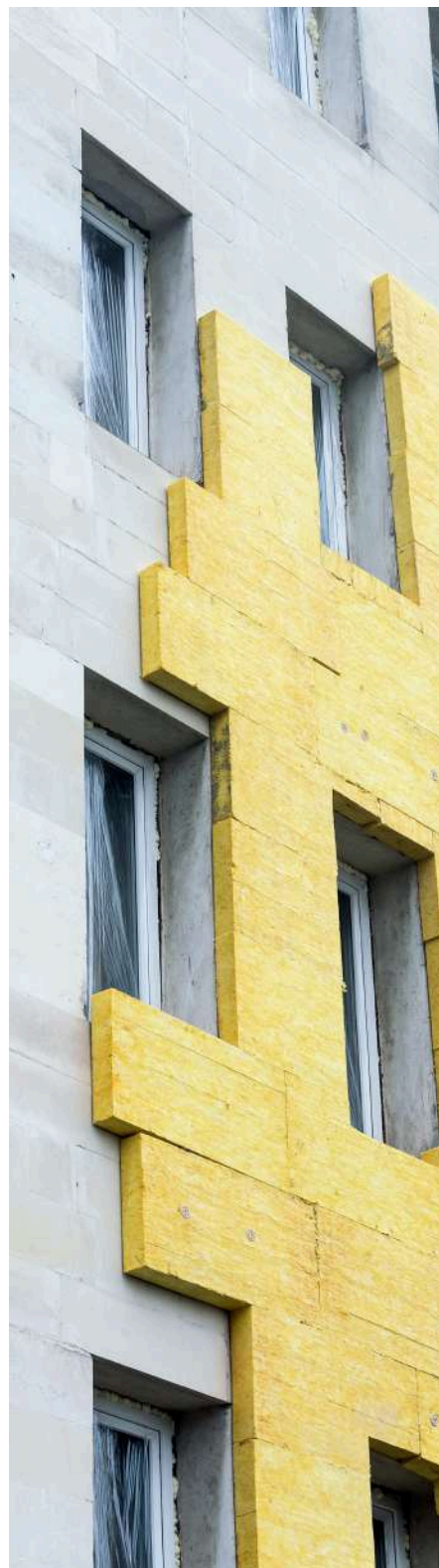


AN ENERGY-EFFICIENT HOME – A HOME THAT GIVES MORE

This roadmap is designed to lead you clearly and practically through every stage of the **multi-apartment renovation** process.

They help you:

- understand what the **renovation** includes,
- learn which documents and experts you need
- use scheme that is, a guideline for:
 - selecting **insulation technology,**
 - selecting a **ventilation system,**
 - selecting a **renewable energy systems (solar panels, heat pumps)**
 - and selecting a **heating system**



CATEGORIES OF ENERGY RENOVATION

1. Integral Energy Renovation

- Involves a combination of several energy efficiency measures, primarily on the building envelope (facade, roof, windows, doors, etc.).
- Must include at least one measure on the thermal envelope that achieves a minimum of 50% savings in annual heating energy needs compared to the pre-**renovation** state.
- Focuses on reducing heat loss and improving insulation performance while ensuring comfort and basic modernization.

Typical measures:

- Wall and roof insulation
- Replacement of windows and doors
- Elimination of thermal bridges
- Basic upgrades to heating systems if needed

CATEGORIES OF ENERGY RENOVATION

2. Deep Energy Renovation

- Includes comprehensive measures on both the building envelope and technical systems (heating, cooling, ventilation, and domestic hot water).
- Achieves at least 50% savings in both annual heating energy demand (QH_{nd}) and annual primary energy (E_{prim}) compared to the existing condition.
- Focuses on systematic modernization of the building's structure and energy systems, integrating renewable energy sources where possible.
- Typical measures:
 - Complete thermal insulation of envelope
 - High-efficiency windows and doors
 - Modernization of heating, cooling, and ventilation systems
 - Integration of renewable energy systems (solar panels, heat pumps)

CATEGORIES OF ENERGY RENOVATION

3. Comprehensive Energy Renovation

- The most advanced level of renovation, combining energy, structural, and safety improvements for long-term sustainability.
- Must include either integral or deep renovation measures, plus additional actions that enhance the building's overall resilience and safety.
- Aims not only for energy savings but also for improved seismic resistance, fire safety, indoor air quality, and structural stability.
- Requires a minimum 10% increase in seismic resistance compared to the pre-renovation state.
- Typical measures:
 - All elements of deep renovation
 - Seismic strengthening and structural reinforcement
 - Fire safety system improvements
 - Installation of ventilation and air quality control systems
 - Accessibility upgrades and integration of green infrastructure

LOCAL ENERGY POVERTY ROADMAP

City of Gospić (2026–2030)

As part of the LIFE Rehabita activities, the roadmap **“Local energy poverty roadmap”** was published, listing 9 measures for the City of Gospić.

One of measures is **“Energy renovation of multi apartment buildings”** - national funds covering up to 100% of renovation costs for energy poor households,

In line with goal of the LIFE ReHabitat project to renovate 100 residential units within multi-apartment buildings in Gospić, the **“Energy renovation of multi apartment buildings”** measure was selected. This roadmap provides detailed guidelines on how this goal can be achieved.

A detailed overview of **“Local energy poverty roadmap”** can be found on website of city of Gospić and DOOR.

LOCAL ENERGY POVERTY ROADMAP

List of measures

1. Establishment of a system for collecting and monitoring data on energy poverty
2. Program for combating energy poverty
3. Running already established ReHABITA office as one-stop shops (OSS) to support energy renovation for energy poor households
4. Small energy efficiency measures - Energy box
5. Replacement of household appliances
6. Heating system improvements
7. RES integration – PV system
8. Energy renovation of multi-apartment buildings
9. Energy renovation of family houses

Energy Renovation Roadmap

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Multi-apartment buildings



LOCAL ENERGY POVERTY ROADMAP

Energy renovation of multi-apartment buildings

Responsible entity: City of Gospić, National Ministry responsible for public call for deep renovation

Period for implementing measure: 2026 - 2030

City budget: No budget planned

Action design: The Program for mitigating energy poverty, including renewable energy use in residential buildings in special state areas until 2025, will now be implemented through the Social Climate Plan. For Gospić, classified as an area of special state concern with limited fiscal capacity, national funds covering up to 100% of renovation costs are crucial. Key measures include replacing windows and doors, adding external façade insulation, and improving central heating (no district heating exists). The national ministry finances and oversees the program, while the City of Gospić manages local implementation - providing administrative support, preparing documentation, offering training, and coordinating with the ministry.

Barriers:

- Since financing and technical frameworks are determined nationally, Gospić has limited flexibility to tailor solutions to local needs.
- Permits and documentation may delay implementation.

Optimal extent of energy renovation

Selection of the ventilation system

Selection of insulation technology

Selection of the heating system

Selection of a renewable energy sources (RES) system

FINANCING ENERGY RENOVATION OF ENERGY POOR HOUSEHOLDS

Energy renovation in Croatia

As part of the LIFE Rehabita activities, the brochure **“Financing Energy Renovation of Energy-Poor Households”** was published, listing all available options for the City of Gospić. However, within this guidance, we have specifically highlighted the financial instruments mentioned above that are relevant for implementing these guidelines for the **renovation of multi-apartment residential buildings**. A detailed overview of financial instruments for other activities can be found in the brochure on website of city of Gospić and DOOR.

FINANCING ENERGY RENOVATION OF ENERGY POOR HOUSEHOLDS

List of financial instrument for City of Gospić

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1. Programme of energy renovation of family houses 2014 – 2020 – extended
 2. Programme of energy renovation of multi-apartment buildings for the period 2021 – 2030
 3. Program to combat energy poverty, which includes the use of renewable energy sources in residential buildings in subsidized areas and areas of special state care for the period until 2025.
 4. Program for the Energy Renovation of Buildings with Cultural Heritage Status for the Period up to 2030
 5. Banking Instruments

Upcoming

Social Climate Fund - starting from 2026



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Selection of Ventilation Systems

Before you begin renovating a space, it's worth pausing to ask a few key questions. These are not only technical guidelines, but also the first steps toward creating a healthier, more comfortable, and long-term functional home

Is this part of a comprehensive renovation?

If so, this is the ideal time to consider ventilation and air quality. When a space is being thoroughly redesigned, it opens up the opportunity to install advanced systems that improve comfort and energy efficiency.

Do all rooms have access to ventilation?

If the answer is "yes," check the existing openings and ducts — they may only need to be cleaned or cleared. If the answer is "no," consider installing mechanical ventilation with heat recovery and possibly replacing windows and doors.

Are there stale odours or excessive humidity?

Such symptoms often point to blocked ventilation pathways. Sometimes it is enough to open grilles and clean the ducts to allow air to circulate freely again and improve the overall quality of the indoor environment.

Is there moisture or mould present in the space?

These signs may clearly indicate an imbalanced indoor climate. If ventilation is insufficient, regular short airing can serve as a temporary solution until an effective long-term ventilation system is put in place.

Before planning a ventilation system, it is important to consider the spatial and protective conditions of the building. The appearance of the façade, roof structure, and any heritage protection requirements may determine where air inlets and outlets are allowed, as well as how installations may be carried out

Is the building listed as a protected structure?

If so, every intervention must be planned with great care. Installations may only run along room corners or through existing wall chases, without adding installation boxes to masonry façades whose original appearance has been preserved. Additionally, façade openings must not disrupt architectural lines or alter the original form of the building.

Is the building located in a protected area?

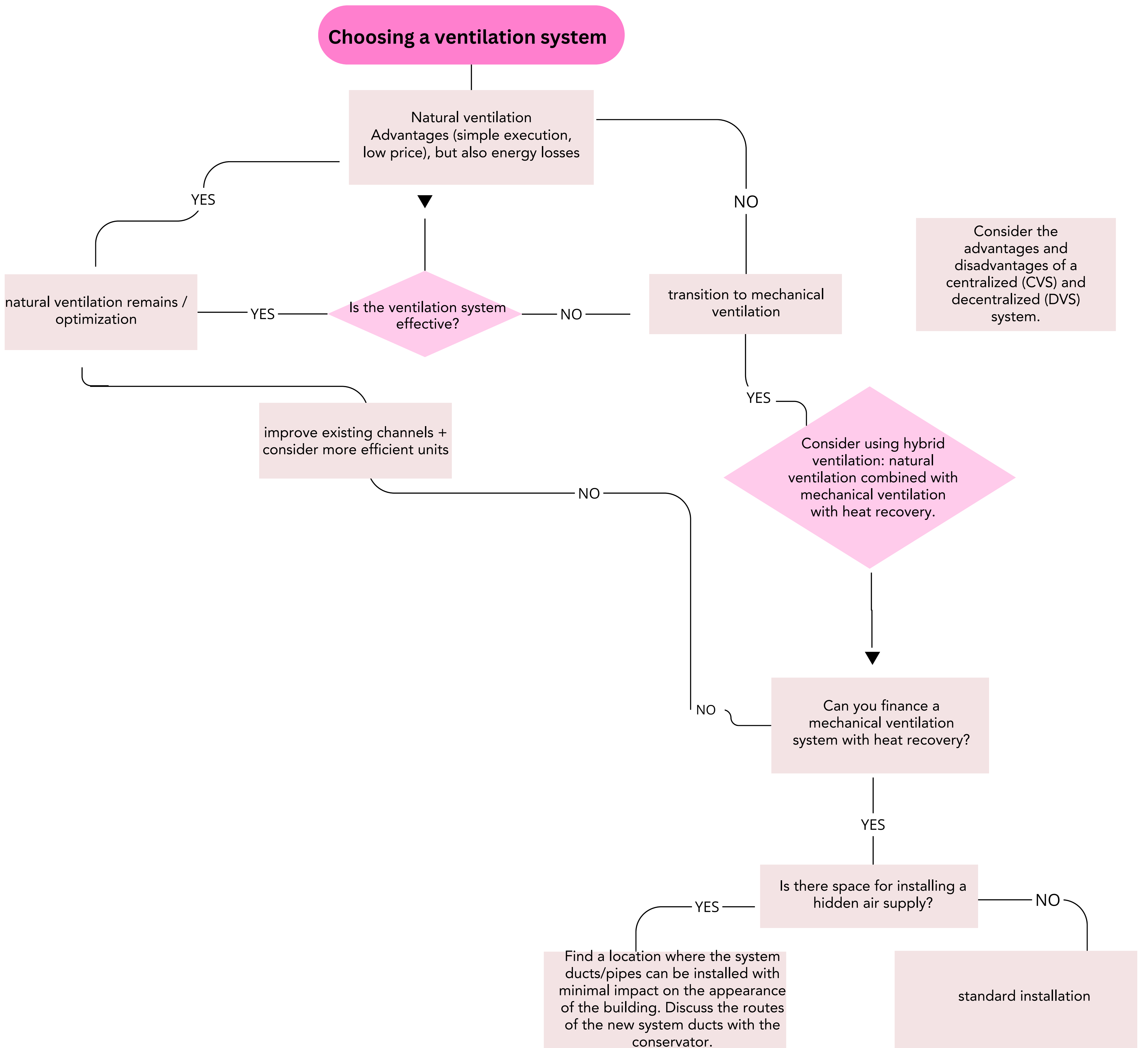
If the answer is yes, solutions must be adapted to the requirements of the responsible heritage authorities. The aim is to find a balance between modern functionality and respect for the cultural, historical, and visual value of the space.

Taking notes

It is also worth taking technical and conservation requirements into account in advance, as well as making use of existing openings, chimneys, and ducts to avoid additional work.

Taking notes

When using mechanical ventilation with heat recovery, you will need to renovate the building (external inspection, masonry, and installation passages).



Choosing insulation technology

FOUNDATION AND BASEMENT

Is the basement damp?

NO

YES

Do not insulate from the outside.

Avoid digging around basement walls.

Ensure natural drainage of rainwater around the building; consider installing a facade garden where possible.

Will the basement be heated?

NO

Do not insulate the basement walls and floor.

If the height of the basement allows, consider insulating the ceiling with fireproof material.

Ensure proper natural ventilation.

Always use highly vapor-permeable finishes and paints.

Eliminate the cause of excess moisture; ensure natural drainage and evapotranspiration of water that collects around the building; consider installing vertical gardens whenever possible.

Remove impermeable paint and flaking plaster, especially if it is cement-based.

Ensure effective basement ventilation.

Consider disinfection and desalination; allow the basement to dry by providing additional ventilation.

Consider installing a mechanical ventilation system or improving natural ventilation.

Choose a plaster with high vapor permeability; consider capillary-active thermal insulation plaster.

Za bolju toplinsku izolaciju koristite mineralne termo ploče.

Use non-absorbent materials such as foam glass or XP boards to insulate the basement floor.

YES

Is mechanical ventilation with heat recovery used?

Eliminate all places with air leakage around windows, doors and technical gaps.

FACADE

If the building is only used occasionally or if it is a hall with a high ceiling and high thermal capacity of the walls (e.g. church, old warehouse, etc.), consider not insulating the walls, but ensuring local thermal comfort with low-temperature infrared heating systems (IR-C) or heating mats placed under benches/workstations.

Renew or modernize windows and doors; remove thermal bridges around them.

Is the building individually protected or is it located in a protected area?

NO

YES

Will the external insulation distort the facade?

NO

Apply external insulation and consider using low-glycium materials and diffusion-resistant walls; to maintain their original openings and visible dimensions, move them outwards for the full thickness of the insulation applied.

YES

Should the original interior be fully preserved?

NO

Consider the application of interior plaster and potential thermal bridges.

NO

Ensure proper natural ventilation.

Consider applying insulating plaster and paint (if the original is damaged); take into account the need to retain facade decorations, table frames, original plaster; consider applying insulating paint.

Ask the conservator if it is acceptable to use thicker insulation on the back of the facade - consider that reversibility is important; use breathable, low-carbon materials.

FLAT ROOF

Is the stability and strength of the roof sufficient for installing a green roof?

NO

Is it possible to reinforce the structure so that it carries the weight of an inverted/green roof?

YES

YES

Consider that intensive and extensive green roofs provide protection from overheating and noise, reduce stormwater runoff, have a positive impact on the climate, increase biodiversity and purify the air.

When designing new buildings, take into account the function/intensity of the green roof and its maintenance; calculate the capacity of the retention drainage layer and the thickness of the vegetation layer.

Ensure waterproofing on the original structure, take into account the capacity of the retention drainage layer and the thickness of the vegetation layer.

Consider the choice of thermal insulation material and its thickness.

Apply standard insulation; choose between a warm roof with ventilation channels; consider moisture drainage, snow removal from the roof, and rainwater collection options.

NO

SLOPED ROOF

Check and, if necessary, repair the tightness of the roof, roof structure, gutters, downspouts and sheets.

Will the attic be used/heated?

NO

Apply insulation to the ceiling above the highest heated floor.

YES

Does the roof structure need to be reinforced?

YES

Consider installing insulation above existing roof joists, between additional joists.

NO

Is the building on the list of protected buildings?

YES

To restore the original roof, carry out only necessary repairs.

NO

Consider thermal insulation of the roof between and under the rafters. Consider installing photovoltaic cells or a solar collector on the roof.

Apply diffusion-permeable insulation, such as silicate or organic wool, clay/lime plaster, between the roof rafters.

Is ventilation provided from outside, under the roof?

YES

Use a vapor barrier on the interior surface.

NO

Use only capillary-active insulation, such as wood wool and clay/lime plaster.

In interiors with high humidity, use a variable diffusion membrane.

Choosing a heating system

