

# International Overview of current practices

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# 01 INTRODUCTION

International Overview of current practices intends to report on the current energy renovation processes and practices in three project countries: **Croatia, Poland and Hungary**. The value of this document is in identifying similarities and differences in the way project partner countries approach energy renovation of multifamily buildings.

The following topics are addressed for each country:

- retrofit processes and responsibilities
- climate change and awareness
- documentation and legal aspects
- monitoring and verification
- financing

**Analysis of the market situation** provides an up-to-date overview of existing practices and challenges in the multifamily building's energy renovation initiatives. To analyse the situation, each of the Green Building Councils (Croatian, Hungarian and Polish) conducted ten or more interviews with key stakeholders and experts to summarize the current situation on the market regarding energy renovation of multifamily buildings.

Such an up-to-date review of the implementation of energy renovation initiatives provides the necessary knowledge to conduct **educational training and case study workshops** where participants will collaborate with end users on several multifamily buildings that require energy renovation. The results of the workshops will be available on the **online platform** of the Retrofit HUB project, and a **Guidebook for energy renovation** will be generated with the results of the implemented project.





# 01 CROATIA GBC





# 01 CROATIA GBC

## RETROFIT PROCESSES AND RESPONSIBILITIES

An overview of the national market in energy renovation of multifamily buildings is assembled from knowledge gathered during interviews conducted in 2022 with various essential stakeholders (condominium representatives, facility managers, civil engineers, mechanical engineers, representatives of relevant ministries and others).

To start the energy renovation process via national public calls a majority of the co-owners (tenants) need to agree to apply for funding. For the costs that are not co-funded, co-owners need to allocate their funds for what common fund of the building is usually insufficient, and in that case, taking a loan should be considered. In the entire process, **facility managers provide support and collect offers for the preparation of project documentation, the execution of works and the possibility of crediting the renovation process.** The biggest challenge is the consent of co-owners; i.e., **51% consent is required to decide** on construction works on common parts of the building and the biggest problem is the unequal financial

power of co-owners and the intergenerational gap. **The implementation of renewable energy sources (RES) in multifamily buildings still didn't catch on in the Croatian market** because issues occur when different requirements for the consent of co-owners are demanded. For example, HEP ODS (a national energy company) is asking for 100% consent for the installation of photovoltaic power plants on multifamily buildings.

From the facility manager's perspective, the initiative for energy renovation should come from the co-owners. One of the facility managers (participant in an interview) points out **privatised apartments as the specificity of the Croatian market**, which often is an issue in conducting various works on the common parts of buildings, primarily due to the different financial power of the co-owners.

According to the facility manager's opinion, the co-owners of multifamily buildings generally initiate the **renovation of the building envelope**, and

only then does the renovation of the heating and ventilation system begin. The decision to initiate renovation is most often prompted by the opening of **public calls/tenders** for energy renovation of multifamily buildings.

**There is no established system for monitoring energy consumption in multifamily buildings** and encouraging the renovation of buildings according to the actual need. One of the facility managers points out that each building has an **inter-ownership agreement** (the main document at the building level) which defines renovation work. While conducting interviews it was emphasized that inter-owner contracts are not adapted to each building, which demonstrates one of the key issues in bringing decisions on individual cases.



# 01 CROATIA GBC

In the energy renovation process, an **energy audit** is performed to establish the current state of the building and prepare a project assignment for the application of individual renovation measures required for a particular building. Tests can be carried out, for example, air permeability, although such testing is characteristic of new buildings and is difficult to carry out in inhabited buildings because it requires the temporary displacement of tenants; this might be possible in the case of a complete renovation, where it moves from structural renovation to energy renovation. Thermography is also a test that is not mandatory, depends on the co-owners and is rarely carried out. After project documentation is drawn up, the implementation begins and after the renovation is completed, an energy audit is carried out again to establish the energy class of the building achieved after the renovation. Renovation is most often carried out all at once since it is operationally better to carry out all construction works contemporaneously or according to a certain order that is provided by the project task or the main project.

**All interview participants agree that the optimal approach to renovation is to renovate an entire block of buildings or entire neighbourhoods as a whole.** Multifamily buildings are currently renovated as functional, structural and design **architec-**

**tural units**, if funded through public calls. One of the biggest challenges for the renovation of larger spatial units is a large number of participants or co-owners within each multifamily building who need to reach an agreement on all planned works on common parts of the building or in the case of energy renovation, they need to reach agreement at the level of the entire architectural unit. It should be taken into account that in smaller cities there is usually one facility manager, so there is less competition as well as the need for coordination. Local self-government units mainly renovate individual buildings, i.e., institutions such as schools, sports centres and others, although they encourage renovation at the level of the entire area when, for example, it is a matter of changing the heating energy system in a district or spatial unit. The Ministry of Construction, Spatial Planning and State Property also implements or encourages the renovation of individual buildings, but the scope of energy renovation has increased, where horizontal measures are highlighted, improving accessibility for people with disabilities and reduced mobility, implementation of green infrastructure measures (vertical gardens, green roofs). The Ministry of Construction, Spatial Planning and State Property also encourages comprehensive renovation, which, in addition to energy

renovation measures, also includes measures to increase safety in the event of a fire, measures to ensure healthy climatic conditions, and measures to improve the mechanical resistance and stability of the building, especially to reduce the risks associated with earthquakes.



# 01 CROATIA GBC

**Experience has shown that the most common driver of energy renovation of buildings is sharing the experience of neighbouring buildings.** Residents in renovated buildings in almost all cases emphasize their satisfaction with the achieved effects of the comfort of the space.

The question arises whether the modernization of the heating system or the insulation should be started first. According to experts, if the envelope is being renovated, room temperature regulation should be done at the same time through the use of thermostatic control valves to efficiently achieve energy savings. It would be optimal to carry out the renovation of the envelope and the heating system in parallel, which is sometimes more difficult to do due to insufficient financial resources, considering that all work on the common parts of the building is financed from the common funds of the building.

**Newer buildings meet the energy requirements, and one of the facility managers claims that the housing stock that was created between 1970 and 2000 includes the largest number of buildings that require renovation.**

Such buildings are most often characterized by low-quality and intensive construction.

The Environmental Protection and Energy Efficiency Fund cooperates with the Ministry as a support in the implementation of public calls for the renovation of buildings.

Programs, plans and public calls at the state level encourage comprehensive renovation of multi-family buildings. Facility managers claim that the problem most often lies in the individual approach to renovation, where the co-owners decide on the works for the renovation of the building, considering the financial structure. Therefore, they usually initiate only the renovation of the building envelope. Experts emphasize that a comprehensive approach is optimal, with a balanced approach to the implementation of reconstruction measures.

At the level of local self-government units, according to the representative who took part in the research, the renovation process begins with a check of the land registry extract to determine property legal relationships, followed by an energy audit and investment budget. It also depends on whether the building is protected or in a protected zone, or whether it has certain conservation requirements. Likewise, they are faced with the prob-

lem of changing the project documentation, since there is a long wait for public calls, and the proposed heating and envelope renewal systems become outdated and require changes.

Representatives of the Ministry of Construction, Spatial Planning and State Property point out that obtaining an energy certificate is still necessary; however, more and more emphasis will be placed on healthy climatic conditions to avoid the sick building syndrome. The implementation of measures for energy renovation is recommended, and in the case of the need to improve earthquake resistance, it is necessary to first stabilize the roof, gable walls, and chimneys and join vertical walls, and then proceed with other renovation measures.

The role of supervisory engineers is extremely important because it determines whether the performed works are harmonized and complete and whether they are following the main project. **The Croatian market doesn't have enough experts (about 50 companies) for the preparation of documentation and the execution of energy renovation works;** therefore, at the time of public calls for energy renovation, the prices of materials and performance will increase because the available companies cannot cover the sudden high demand.



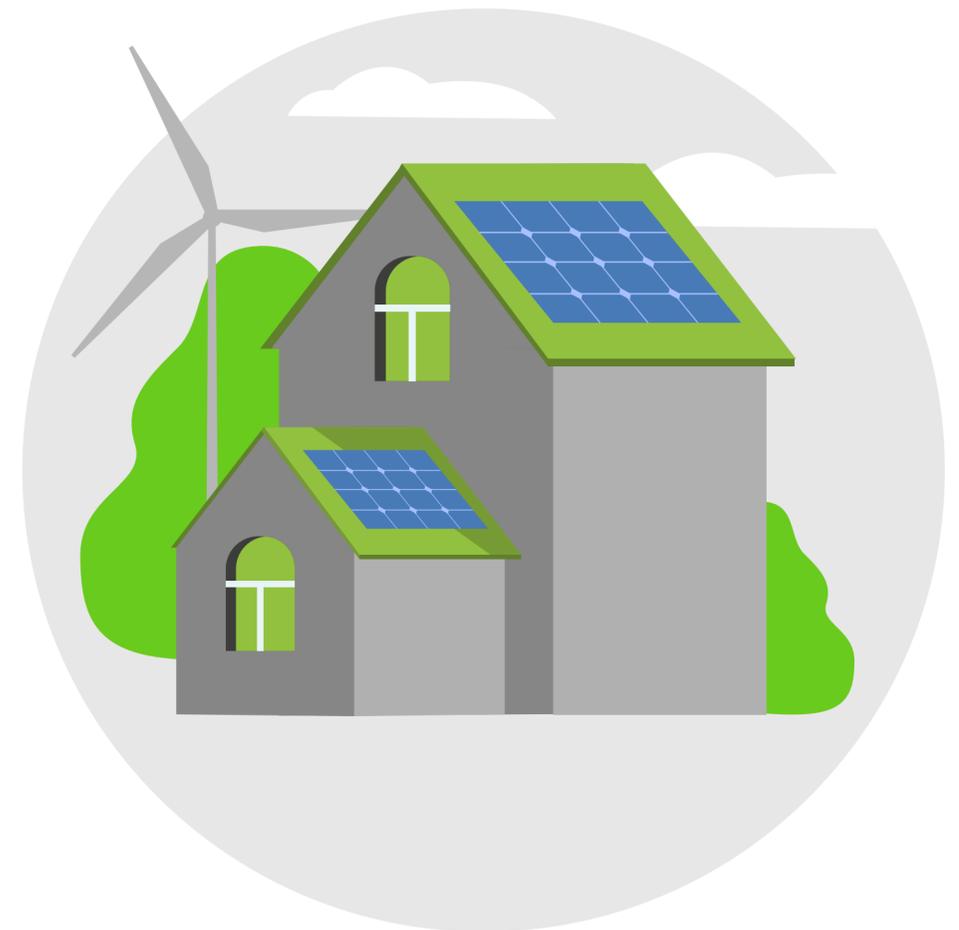
# 01 CROATIA GBC

## CLIMATE CHANGE AND AWARENESS

Buildings are responsible for 40% of energy consumption in the EU and 36% of CO<sub>2</sub> emissions. Additionally, they are responsible for 50% of all world-extracted materials and 35% of total waste generation. Croatia should rebuild more than 70% of its housing stock by 2050. The area of residential buildings that need to be renovated is 110,143,965 m<sup>2</sup>. The renovation of buildings in Croatia is planned for ten-year periods until 2050, and in each period, it is planned to restore more than 20 million m<sup>2</sup> (Long-term Strategy for the Renovation of the National Building Fund until 2050; 2020). In order to achieve the set goals, it is necessary to provide knowledge and information to all stakeholders in the renovation and to raise awareness of the need for efficient action in order to reduce the impact of the construction sector on climate change.

The president of the facility manager's association believes that passive buildings and energy renovation should be pursued. The representatives of the co-owners are aware that energy renovation contributes to less consumption of resources, more efficient heating and cooling, more comfortable life and a longer life span of the building.

**They see the primary motivation for energy renovation primarily in lower bills, and the secondary is the reduced amount of CO<sub>2</sub> emissions.** Energy renovation also affects the appearance of the city, and renovated buildings also gain value on the market, and what is even more valuable, the comfort of the space is improved.





# 01 CROATIA GBC

## DOCUMENTATION AND LEGAL ASPECTS

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The collection of documentation includes formal documents that prove legality, ownership, co-owner relations, and technical documentation based on which the renovation is financed and the works that will be performed to achieve the effects of the renovation.

**If several entrances of the building are applying for energy renovation as an architectural unit, then one representative of the co-owner or facility manager is authorized to apply on behalf of all entrances.** After renovation, an energy certificate is always required to prove the effects that have been designed. According to the experience of the representative of the Environmental Protection and Energy Efficiency Fund, collecting significantly more complex technical documentation is always easier than collecting formal documentation that should be regular: building permit, use permit, ownership, lists of co-owners, etc.

Part of the documents is related to forms that are standard in calls for co-financing from the European Union, and this can be accessed through the IT system NPOO (2021 - 2026) - <https://fondovieu.gov.hr/prijava-odabir>

The representative of the Ministry of Construction, Spatial Planning and State Property claims that the novelty of the new call is the alignment with the principle of the Do No Significant Harm (DNSH), which will be expressed at three levels within the project by the designer, contractor and Supervising Engineer.

To prepare the application for the public call for co-financing, an energy audit is carried out, an energy certificate is drawn up and the master project of the energy renovation (including all maps and related studies if applicable) is prepared. In the context of the call, there is also the awarding of small value de minimis grants, which means that potential applicants will submit statements about the used grants, if applicable (for example, in the case when a co-owner in a building performs economic activity in a residential unit).

**Experts from the Environmental Protection and Energy Efficiency Fund provided applicants with professional support** in documentation preparation as part of the public call for co-financing of the energy renovation of multi-apartment buildings in 2022.





# 01 CROATIA GBC

## MONITORING AND VERIFICATION

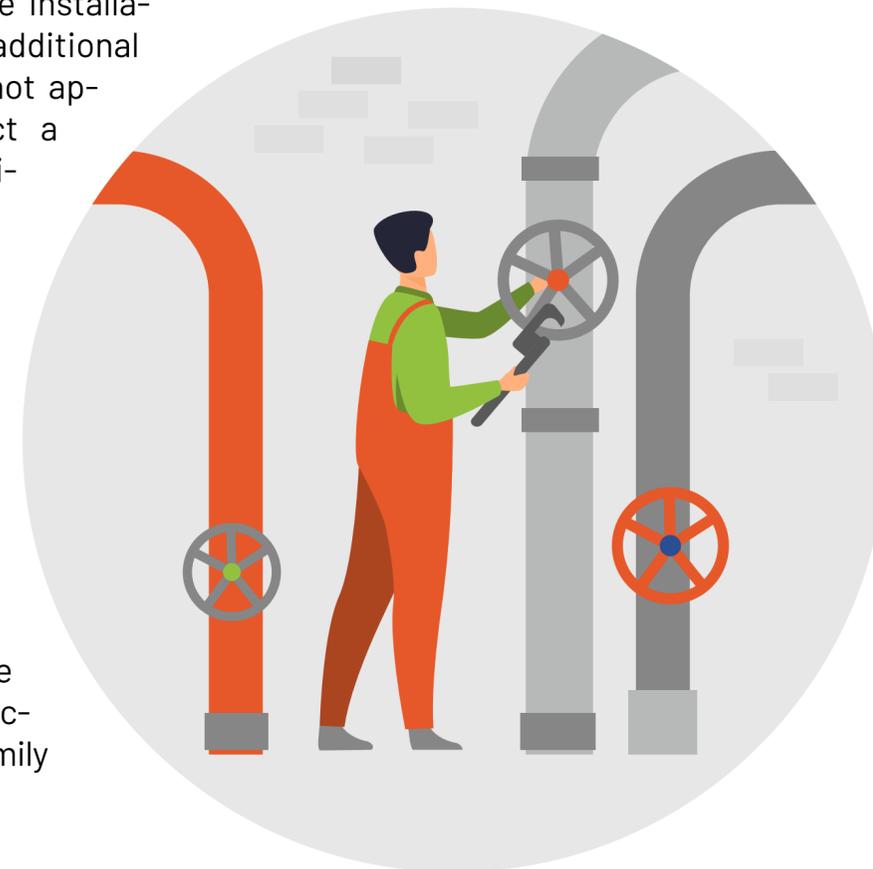
An energy certificate should be obtained every ten years, and the facility manager should take care of other annual inspections.

One of the engineers participating in the interview claims that the EU is moving towards guidelines for monitoring energy consumption in multifamily buildings as well, which means that if there is district heating at the substation level, energy consumption can be monitored remotely. He pointed out that it is important to follow the EPBD regulation and what will be required of residential buildings in the future, through the following three elements: envelope, the efficiency of sources and elements of the heating and cooling system, and monitoring of energy flows inside the building.

**According to the management contract, the facility manager is obliged to inspect the building once a year.** This inspection includes a visual inspection, a determination of the factual situation and an inspection of the installations. When talking about gas installations, it is the responsibility of the gas plant, which has periodic inspections. Regarding supply and drainage installations, inspections are

usually carried out when there is a malfunction. The age of the pipes is known and certain preventive maintenance and repairs can be carried out, but it all comes down to the willingness and will of the co-owner. Facility managers offer the possibility of inspecting, for example, drainage installations with cameras. However, this is an additional cost that the co-owners may or may not approve. The facility managers conduct a basic visual inspection, define the condition of the building, and determine the need for an additional inspection of individual segments.

It is important to note that each building that is managed hires professionals for a particular segment: there is a person for fire protection, there is a representative for electrical works, a representative for mechanical engineering (chimneys, central heating) and a representative for construction. Everyone in their professional field performs inspections, which means that each multifamily building has several inspections per year.





# 01 CROATIA GBC

## FINANCING

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**All interview participants agree that the amount of fund foreseen by the public calls are not sufficient.**

The representative of the Ministry of Construction, Spatial Planning and State Property claims that 584 projects were contracted for the energy renovation of multifamily buildings in a 2016 public call with the allocation of HRK 554.34 million, and in the end, 542 projects were implemented with allocation from approx. HRK 523 million. Furthermore, HRK 300 million was foreseen for funding within the call from NPOO in 2022 which certainly won't be enough to co-finance 300 projects, both due to rising prices on the construction market and due to the possible implementation of a larger number of energy efficiency measures (including measures on the technical systems of buildings) and horizontal measures within projects.

Furthermore, **when estimating costs, many co-owners give up on certain measures and stay within the framework of what will bring a quick financial result (return).**

Another challenge is the age gap between retirees and young families in the same building. One of the facility managers interviewed pointed out that pensioners often don't see the benefit in investing at a later age. On the other hand, young people usually advocate renovation as soon as possible for the sake of their health and well-being.

Another reason why pensioners have no interest in the renovation is that they have weak purchasing power. Since the renovation is not 100% co-financed, it is necessary to take out a loan for the rest, which will then result in an increased reserve or another measure.





## 02 HUNGARY GBC





## 02 HUNGARY GBC

In preparation of the project, we reviewed related literature and ongoing projects, conducted a questionnaire-based online survey (13) and in-depth interviews (10), and examined building energy renovation initiatives currently underway, analysing their benefits and drawbacks, potentials and barriers to their implementation.

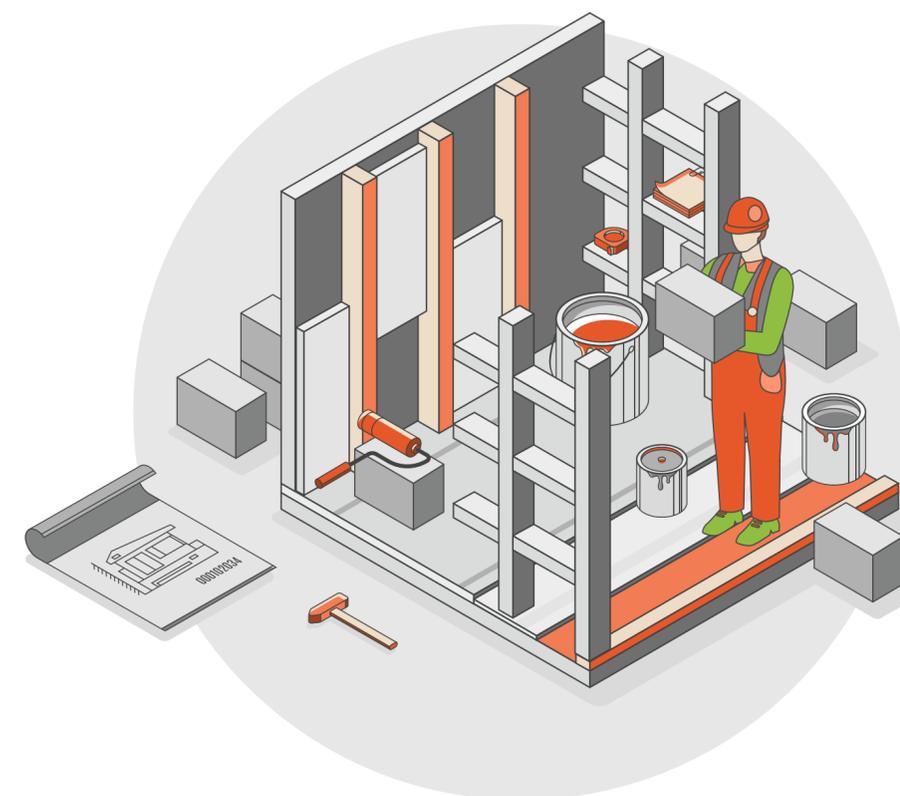
### RETROFIT PROCESSES AND RESPONSIBILITIES

In Hungary, home owners carry out a wide range of home maintenance and modernisation works. **The number of building renovation activities is high, but their depth is low, and energy consumption is often not reduced after renovations.**

Based on micro-census data published by KSH<sup>1</sup> in 2016, 75 to 85% of occupied homes were repainted inside. Interior finishing/flooring was replaced or mended in 42.5% of homes on average. Exterior renovation was carried out in less than one in three homes. Engineering equipment were replaced in 26.9% of the maintenance projects conducted due to the ageing of engineering systems. New meters were installed mostly in Budapest (19.86%). In response to higher summer temperatures due to climate change, more and more people have air conditioning installed especially in Budapest (17.47%), but also at county seats, in cities with county rights and in towns (above 10%).

**In the context of energy-saving modernisation, 23.2% of homes received thermal insulation, 17.4% upgraded their heating system and 38.1% replaced windows and doors.** The distribution of these projects by type of settlement is fairly even thanks to nation-wide grant systems.

**The renovation of historical buildings is hindered by the protection of historic monuments, local or townscapes.** The thermal insulation of external walls is the biggest problem, but the need for period windows or the more restrictive use of materials increases the cost of renovation. The permit and implementation procedure of buildings included in Hungary's national heritage is slower than usual and often puts an extra burden on property owners. The cost of technologies applied is also higher.



<sup>1</sup>KSH (2016): Micro-census 2016, Central Statistical Office, <http://www.ksh.hu/mikrocensus2016/>



## 02 HUNGARY GBC

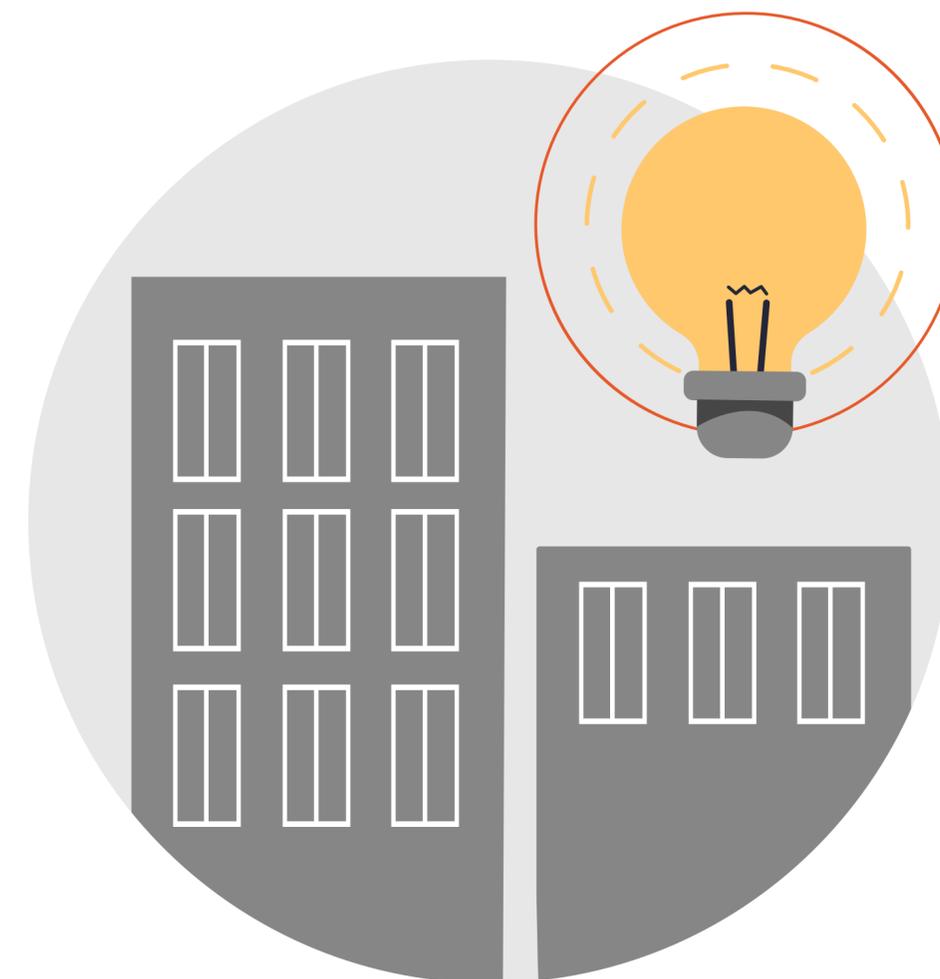
**Full-scale renovation** and modernisation are **not typical in Hungary**. House and home owners **often cannot afford the associated high costs**, and they are **not in a position to accept the longer implementation lead times** resulting from the complexity of such projects and cannot tolerate the burden imposed on property owners by full modernisation.

Another obstacle is that for joint investment projects **a consent needs to be obtained from each homeowner affected**. In many cases, not everyone is willing or able to pay the costs and the community cannot make a decision due to the different financial standing of homeowners. Besides differences in income, the efficiency of decisions is also reduced or fully undermined by **multi-party ownership**.

Owners are driven by their own personal interests when making decisions. When deciding about building renovations, owners tend to make decisions to address urgent issues rather than to complete large-scale projects.

Due to the **limited technical knowledge** and qualifications of owners' **representatives**, more and more condominiums hire a property management company to take care of maintenance and modernisation.

**The majority of respondents were Facility Managers or Condominium Representatives**, who are responsible for managing renovation works on the whole of the building. 69.3% of the respondents engaged in less than half of the building portfolio retrofits, 15.4-15.4% of them completed 50-75% and 76-100% renovation works.



We identified three basic scenarios: traditional buildings built before 1945 (**Scenario 1**), traditional buildings built after 1945 (**Scenario 2**) and prefabricated buildings (**Scenario 3**). The most common works in the different scenarios are as follows (the three highest highlighted):

**OTHER WORKS IDENTIFIED:**

- roof renovation (53,8%)
- water and sewage pipelines reconstruction (30.8%)
- gas pipeline reconstruction (30.8%)
- electrical network renovation (23,1%)
- staircase renovation (23.1%)
- renovation and waterproofing of suspended corridors and ceilings (23.1%)
- facade renovation (23.1%)
- renovation and modernisation of elevators/lifts (15.4%)
- renovation and greening of courtyards (7.7%)

When renovating the heating system, the most common scope of works include the installation of central regulating equipment (76.9%), the installation of thermostatic radiator valves (76.9%) and the improvement of the insulation of distribution pipes (23.1%).

	Scenario 1	Scenario 2	Scenario 3
Replacement of windows	0,0%	23,1%	23,1%
Insulation of external envelope	7,7%	23,1%	30,8%
Roof/roof insulation	7,7%	15,4%	23,1%
Insulation of basement ceiling	0,0%	15,4%	23,1%
Renovation of the heating system	30,8%	38,5%	38,5%
Renovation of the hot water system	30,8%	15,4%	15,4%
Renovation of the ventilation system	0,0%	0,0%	30,8%
RES (Renewable Energy Sources)	0,0%	0,0%	7,7%
Cooling systems	7,7%	7,7%	0,0%
Passive heat protection (e.g. shading)	0,0%	0,0%	15,4%
Renovation of lighting system	46,2%	38,5%	38,5%
Smart building management	0,0%	0,0%	23,1%



## 02 HUNGARY GBC

### CLIMATE CHANGE AND AWARENESS

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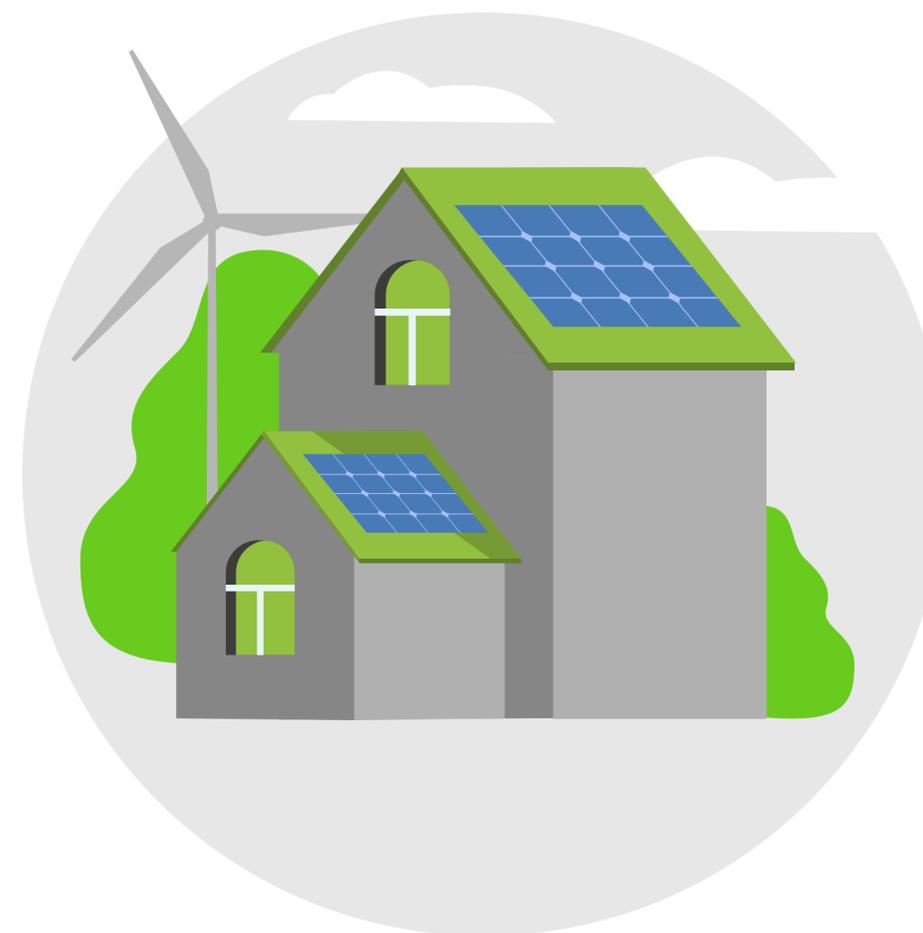
In many cases, house and home owners are **unable to make the right decisions** or tend to delay them. One of the reasons is that they are not aware of the environmental, social and economic benefits of renovation. Therefore, they **cannot foresee the returns on short-term financial considerations** including the associated non-financial values. The results of work already carried out are not sufficiently presented, even though they could support decisions. It is little known that energy renovations improve comfort (healthy air quality, headache-free homes).

At condominiums where successful renovation is carried out, **a change of mindset is also taking place**. Knowledge of the impacts will strengthen the contribution to climate change and motivate further contributions.

Unfortunately, **there is no appropriate data system available** to capture building renovations and their impacts. Such a system could serve as the basis for the credible presentation of the necessary steps of building renovations to home owners.

Utility cost subsidy system has a negative impact on financing as well as on the environmental awareness and the willingness of residents to renovate. Currently, households do not face the real costs of energy including external costs and the scarcity of resources. The political events of recent months are likely to accelerate change in this respect. Today, in many cases, the results of renovation are not even detectable – instead of a reduction in energy consumption, comfort levels increase, which is appropriate for energy-poor housing, but in most cases results in overheating in winter or overcooling in summer.

Furthermore we have to take into account the **Jevons paradox: the results of renovation are not detectable** – instead of a reduction in energy consumption, comfort levels increase.





## 02 HUNGARY GBC

### LEGAL ASPECTS

In technical terms, the national legal framework for construction is provided by laws and implementing regulations<sup>2</sup> on construction<sup>3</sup> and townscape protection<sup>4</sup>. At a local level, renovations are regulated by local building codes and townscape decrees.

From a legal and operational perspective, the rules for the establishment and safe maintenance of a condominium property, the orderly, professional and safe operation of condominiums and the enforcement of the interests of owners is regulated by **the Condominium Act**<sup>5</sup>. Similarly to the Condominium Act, **the Housing Cooperatives Act** provides for the establishment of housing cooperatives and the rights and obligations of their members (home owners) and employees.

**The TNM Decree**<sup>7</sup> applies to energy-saving renovations, to major renovations<sup>8</sup> involving at least 25% of the total surface area of bordering structures<sup>9</sup>, but not to minor works as well as monuments and locally protected buildings and their elements where compliance with minimum energy performance requirements would result in a change to the value of the monument or locally protected building.

Several **other legal regulations contain additional requirements**. The **complexity of the legal and regulatory framework** and its **often-changing requirements** create uncertainty. Although much data is available in municipal e-government systems, the lack of interconnected e-systems creates an unnecessary burden (typically, documents

available in the various sub-systems have to be retrieved and submitted separately each time).



<sup>2</sup>Implementing regulations: Government Decree 253 of 1997 (XII. 20.) Korm. on national urban development and building requirements (OTÉK); Govt. Decree 314/2012 (XI.8.) Korm. on the concept of urban development, on the integrated strategy of urban development and urban planning instruments, as well as on special legal institutions for urban planning; Government Decree 419/2021. (VII. 15.) Korm. on the contents of settlement plans, the order of their development and acceptance, as well as the special legal institutions for settlement planning

<sup>3</sup>Act LXXVIII of 1997 on the Development and Protection of the Built Environment (Étv)

<sup>4</sup>Act LXXIV of 2016 on Townscape Protection

<sup>5</sup>Act CXXXIII of 2003 on Condominiums

<sup>6</sup>Act CXV of 2004 on Housing Cooperatives

<sup>7</sup>Ministry without Portfolio Decree No. 7/2006. (V.24.) on the determination of buildings' energy performance (TNM Decree)

<sup>8</sup>According to the TNM Decree: "the retrofitting, replacement or addition of a building element affecting the energy performance of an existing building, or a change to the essential characteristics of a building element, or conservation, repair or maintenance work to maintain the original condition of an existing building that is economically feasible, including phased renovation".

<sup>9</sup>The retrofit thermal insulation of the basement slab or attic slab of a one-storey building is not considered to be a major renovation if no other modernisation of the building is carried out.



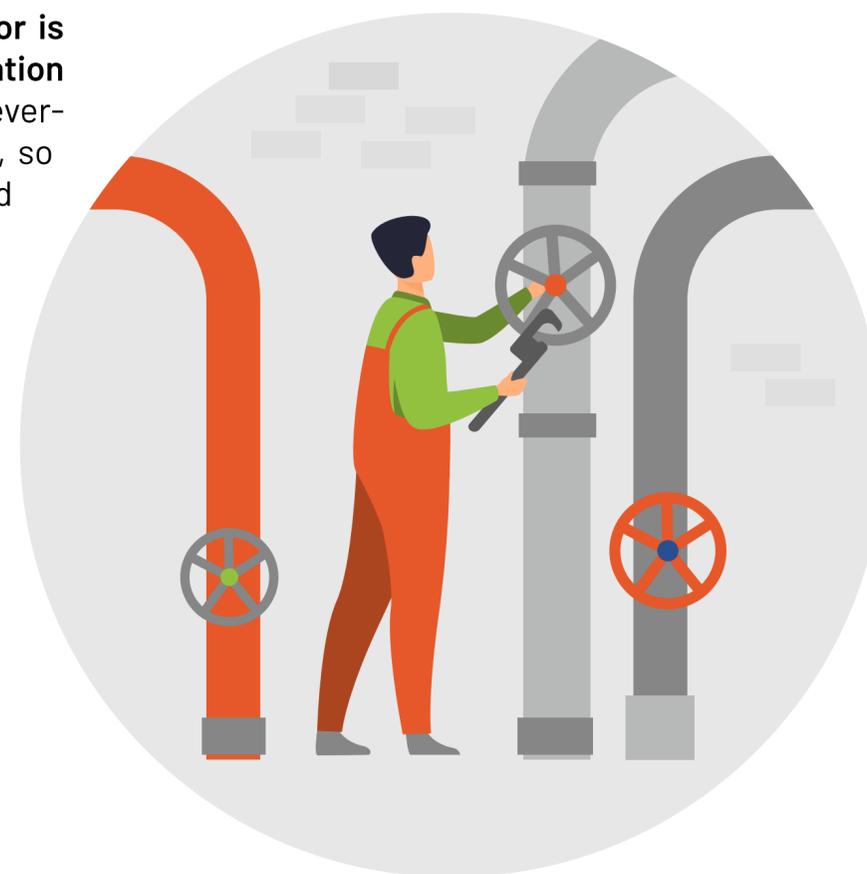
## 02 HUNGARY GBC

### DOCUMENTATION, MONITORING AND VERIFICATION

**Technical documents are not available** for residential buildings to be renovated. The documents stored in land registers and archives are incomplete and they do not include engineering systems. The costs of assessing a building are considerable, so they are undertaken by residents only if there's a meaningful grant scheme available. When renovation is carried out, stability and structural evaluation/analysis usually takes place, but building and thermographic diagnostics, energy certification and energy audits are completed only in exceptional cases.

Building owners **are not obliged to complete technical testing, building/engineering health checks** on their buildings on an annual basis. Sector-specific policies require the periodic fulfilment of obligations, but they are not uniform.

Unless it is required by funding programs, **renovation is typically not underpinned by studies**. Owners are not willing to accept the costs and lead times of proper preparations, so a **contractor is often selected without a detailed implementation design** or precise technical specification. Nevertheless, owners expect professional delivery, so the role of technical inspectors has increased and their costs are more and more readily accepted.





## 02 HUNGARY GBC

### FINANCING

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Renovations are typically financed from a **renovation fund or ad-hoc payments**. The establishment of a **renovation fund is not mandatory under law**, but it is in the best interest of every condominium to set up a renovation fund, since this is required in order for it to be eligible for state interest subsidies<sup>10</sup> to housing renovations and water utilities and it is also a common requirement when applying to funding programs.

Housing saving funds was one of the most popular forms of housing savings due to the related 30% subsidy. In October 2018, however, this subsidy was cancelled which discouraged condominiums from renovating and committing to more comprehensive projects. Housing saving funds allowed people to organize their own financial resources into a renovation fund. Condominiums had financial reserves for 4 to 5 months and started planning the next phase while the current renovation phase was underway.

Due to the high costs of renovations that pay back in the long run, **there is a strong need for funding schemes**. Most condominiums **participate in building energy programs**. The proper development of an application to such programs takes at least 4 to 6 months (technical documentation, bank loan administration, obtaining documents, decision by the condominium owners).



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<sup>10</sup>KSH (2016): Micro-census 2016, Central Statistical Office, <http://www.ksh.hu/mikrocensus2016/>



# 03 POLISH GBC





## 03 POLISH GBC

In 2022 PLGBC conducted a series of interviews with stakeholders in Poland (mainly residential facility managers) on process and practices related to building renovation at all its stages (from planning to implementation). The purpose of the interviews was to gather information on five main aspects of building energy renovation - the renovation process and responsibility for it, knowledge of the environmental impact of the building renovation process and responsibility for it, knowledge of the environmental impact of renovation and tenants awareness of the benefits of renovation, documentation and benefits of renovation, documentation and legal aspects of renovation, monitoring of the effects and ventilation of the quality of the work done and financing.

Ten stakeholders took part in the interviews, including representatives of associations, site managers, representatives of municipal companies

and private managers. Among the building stock managed their building stock included public buildings, multi-family buildings and buildings under the protection of the conservation officer - mostly residential buildings built a dozen or more years ago, which do not comply with contemporary standards of energy efficiency, not to mention the high standards of comfort and quality of life of the residents.

In addition, a survey was conducted to gather responses from a larger number of stakeholders, but due to low interest only three responses could be collected. For this reason, the results of the survey were only used to supplement the knowledge gained during the interviews.

The information collected allowed the identification of current practices, problems and barriers in carrying out effective, comprehensive building renovations, as well as identifying similarities and differences in approaches to implementing the measures and to identify good practices.



### RETROFIT PROCESSES AND RESPONSIBILITIES

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All the facility managers interviewed carry out various types of renovation works in the buildings they manage, but depending on various factors, such as the availability of funds, technical capabilities or the attitude of the owners, the scope of renovation varies considerably. The most common works carried out include insulation of the external envelope, roof and the ceiling over the basement, replacement of the heat source or connecting the building to a district heating network, replacement of the hot water heating system. The introduction of heat meters in individual units located in all the apartments or the replacement of installations remain very popular. Only in a few cases have photovoltaic panels been installed, and in one building a heat pump was installed.

**The first appropriate step to carry out an effective energy renovation is to draw up an energy audit of the building, which indicates, in turn, the measures to be taken, their effectiveness and the simple payback time.** However, in the course of the interviews, it became apparent that audits are

performed very rarely. Most often, however, facility managers rely on renovation projects, drawn up prior to carrying out renovation works, and on their own experience of the measures that yield the greatest and quickest energy savings, as well as on the technical condition of the building (based on the annual mandatory inspections of the technical condition of the building, which indicate irregularities and repairs that need to be carried out). Importantly, in many cases it is the technical condition of the building that determines the order in which the work is carried out.

**In the case of privately owned multi-family buildings, comprehensive renovation is carried out relatively rarely,** which is due to the lack of sufficient financial resources, as well as the attitude of the residents, who are not convinced to take out large loans. It is important to note that private facility managers represent the owners, and therefore the approval of the building renovation with its scope must be given by a majority of the owners at a community meeting, which often

blocks or slows down the process. It is also worth noting that private facility managers rarely perform building energy audits prior to renovation, which involves an additional cost that is most often not agreed to by the residents.

The situation is different in the case of municipal buildings, managed by units subordinate to municipal authorities. Energy audits are carried out for every building that is to undergo renovation works, especially in the case of renovations covered from external funding.

In this case, the scope of renovation is usually comprehensive, including insulation of all building elements, modernisation of the heating system including connection to the district heating network, renovation of the hot water system, installation of thermostatic control valves and regulation of the system, as well as replacement of windows and doors.



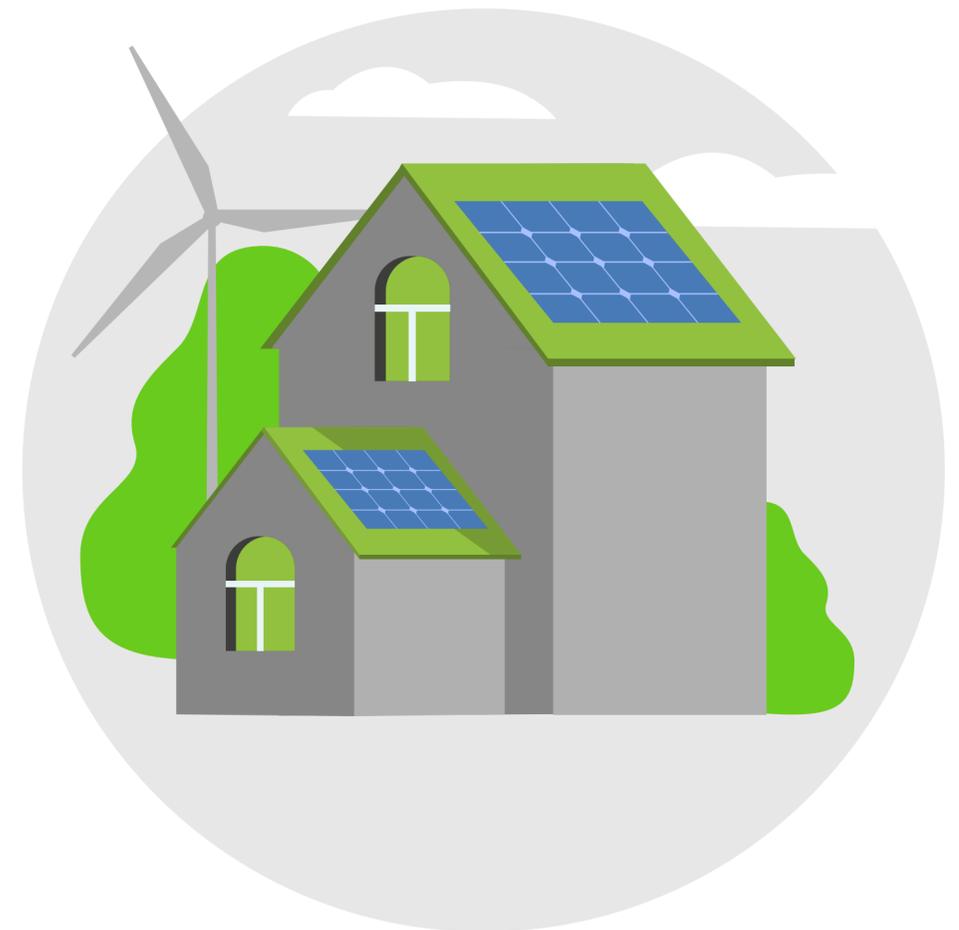
### CLIMATE CHANGE AND AWARENESS

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Some owners are reluctant to undertake renovations work, which involves a high initial financial outlay, despite keeping their monthly bills the same, which is particularly important at a time of constant increases by energy suppliers and an increase in the market value of the property. For others, the most important aspect of the building they live in is the external appearance and welcoming environment.

A major problem is posed by buildings in the custody of the municipal conservation officer, which cannot be insulated on the outside walls and sometimes do not have an adequate ventilation system. The available modernisation solutions involve the owners making premises available for the work to be carried out, as well as a slight reduction in the usable area resulting from the insulation of the external walls inside the building or the creation or widening of ventilation openings, not to mention the installation of mechanical ventilation. Therefore, the thermo-modernisation of such buildings is usually limited to changing the heat source, insulating the roof, the roof slab or the ceiling above the cellars, or adjusting the installations.

This shows how low the residents' awareness of the personal benefits of modernisation is, and how much there is to do in terms of raising the owners' awareness and encouraging them to take joint action as a responsible community.





## 03 POLISH GBC

### DOCUMENTATION AND LEGAL ASPECTS

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Building renovation is regulated by the Construction Law, Public Procurement, the Civil Code, the Premises Ownership Act and other implementing regulations.

Municipal entities managing buildings must act according to the Public Procurement Law, so tenders must be held to select contractors for the execution of renovation works. The regulations relating to record-keeping and the legal requirements for carrying out renovations are fairly well known to facility managers, and training courses covering all legal aspects of property operation are available on the market.

**In order to carry out renovations in the most efficient way, the first step should be to draw up an energy audit of the building, in which the most efficient actions are indicated, together with a simple payback time, which allows for optimal selection of the sequence of works to be carried out if the renovation is to be carried out in stages.** Unfortunately, in the course of the interviews, it became apparent that drawing up energy audits is not standard practice - private facility managers

are not in the habit of commissioning audits, but rely only on their own experience and modernisation project. On the other hand, audits are always carried out in the case of subsidies and always in the case of buildings belonging to municipalities, regardless of whether they apply for subsidies or not. In addition, in the case of old buildings that do not have any building documentation (e.g. project), it is necessary to carry out an inventory, based on which a renovation project will be developed.

An important document for each building is also the building log book, in which different kinds of records are kept - e.g. results from inspections and technical condition checks carried out on the building, repairs and alterations during the life cycle of the building.





### MONITORING AND VERIFICATION

The law in Poland obliges facility managers of multi-family buildings to carry out annual inspections of the technical condition of buildings, which include: a chimney sweep, a review of the gas installation and a review of ventilation ducts. Additionally, every five years facility managers must carry out general building inspections, which include: inspection of the electrical system, central heating and sewage system, inspection of the external walls, roof, other external elements of the building, fire protection, smoke and ventilation ducts and inspection of the facade. As far as the verification of completed work phases is concerned, apart from the typical investor supervision, it is not a common practice to carry out tests and analyses to confirm the proper quality of workmanship, e.g. air tightness tests or thermal imaging tests. Although such tests allow for the introduction of possible corrective measures to ensure maximum improvement of the energy efficiency of the retrofitted building, they are only carried out in specific cases, e.g. when specific defects are suspected. Without appropriate legislative changes, it will not be possible to perform such verifications on a large scale, mainly due to

the additional costs involved. **Of utmost importance from the perspective of national and EU assumptions on increasing the rate of building renovation is the monitoring of energy efficiency both before and after renovation. Ideally, the energy consumption of a building should be tracked over a certain period of time before and after renovation in order to estimate its effect in terms of energy saved.** Unfortunately, the monitoring of energy consumption is not a common practice, mainly due to the lack of data on buildings where individual heat sources are installed and the lack of specific legislative requirements at municipal or national level. Data on energy consumption for heating and domestic hot water preparation is available for buildings connected to the district heating network and, on the basis of this data, orders thermal power from the energy supplier.





## 03 POLISH GBC

### FINANCING

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**One of the main problems standing in the way of comprehensive building renovation and an increase in the renovation rate globally is insufficient financing streamline.**

The facility managers interviewed have benefited from available subsidies for carrying out renovation of buildings:

- the energy renovation bonus,
- EU funds, municipal support programmes, bonuses from the Energy Regulatory Office,
- commercial loans,
- renovation fund and funds from their own budget.

Facility managers are well aware of the available subsidies, but they cannot always receive them. It happens that members of the community are not willing to take out a loan to carry out comprehensive renovation works, which would entail an increase in the renovation fund and thus the rent, so the work has to be divided into stages. Often such decisions are taken without a comprehensive analysis of the profitability of renovation in the context of rising energy prices and potential savings resulting from reduced energy consumption as a result of renovation (according to a reliable audit). Currently, there are various forms of financial support for renovation, which are periodically updated, ending and new ones appearing, however, each of them is connected with fulfilling certain conditions (e.g. the need to carry out an energy audit before renovation, demonstration of energy savings).





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