OUR-CEE
Overcoming Underperforming Renovations in Central and Eastern Europe

Supported by:
Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Bridging the Energy Performance Gap

Guidelines for Achieving High-performing Renovations in Central and Eastern Europe

OUR-CEE

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March 2026

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Bridging the Energy Performance Gap. Guidelines for Achieving High-performing Renovations of Public Buildings

Please cite as

Energy Policy Group (2026). Bridging the Energy Performance Gap. Guidelines for Achieving High-performing Renovations of Public Buildings. March 2026

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Contents

List of abbreviations

BEMS	Building Energy Management Systems
BRP	Building Renovation Passport
BRR	Building Renovation Roadmap
CEE	Central and Eastern Europe
EED	Energy Efficiency Directive
EnPC	Energy Performance Contracting
EPC	Energy Performance Certificate
EPBD	Energy Performance of Buildings Directive
ESCO	Energy Service Company
EU	European Union
EC	European Commission
FDD	Fault detection and diagnostic
HVAC	Heating, Ventilation and Air Conditioning
IEQ	Indoor Environmental Quality
KPI	Key Performance Indicator
M&V	Measurement and Verification
MEPS	Minimum Energy Performance Standards
nZEB	near Zero-Energy Building
OUR-CEE	Overcoming Underperforming Renovations in Central and Eastern Europe
PDCA	Plan-Do-Check-Act
SRI	Smart Readiness Indicator
ZEB	Zero Emissions Building

1. Executive Summary

New energy performance standards, along with targets for the rate and depth of renovations in buildings, introduced through EU Directives, namely the revised Energy Performance of Buildings Directive (EPBD) and the Energy Efficiency Directive (EED), reflect an intensified push to reduce emissions from the EU's buildings sector. The aim is to align the sector more closely to the decarbonisation pathway, towards the goal of climate neutrality by 2050. These efforts, though, risk being undermined when, once completed, renovations fail to achieve the expected energy savings and reductions in CO_2 emissions.

Public buildings are expected to lead the way in terms of the rate, depth and quality of renovations. However, evidence shows that many renovations failed to deliver the intended energy savings. The energy performance gap represents the discrepancy between predicted (calculated) performance and actual (operational) energy performance. While some deviation is expected due to modelling assumptions, research indicates that the gap can be significant. In Central and Eastern European (CEE) countries, data on the scale and the drivers of this gap remain limited.

The present guide draws on country assessments in Bulgaria, Romania, Poland and Croatia, stakeholder consultations, and dissemination activities carried out under the OUR-CEE project with the purpose of developing a set of actionable measures for national and local policymakers to address underperformance in public building renovations. Based on the barriers and amplifying factors identified in all four countries and the wider region, the measures are structured to cover all stages of the renovation process: financing, planning, project implementation as well as building use, post-renovation.

Financing:

- Design funding programmes to support the achievement of the highest performance standards, including integration of post-renovation monitoring into eligible costs.
- Use building renovation roadmaps (BRR)/building renovation passports (BRP) to spread investment over multiple budget cycles.
- Where possible, link funding to verified energy savings, through schemes such as Energy Service Company (ESCO).
- Combine public grants with loans or other private funding.

Planning:

- Create and maintain a consistent database of building characteristics, energy use, system performance, and past interventions.
- Prioritise renovations in cases of high energy use and high operating costs.
- Develop renovation plans at the local level with clear goals for transforming the public building stock into a highly efficient one.

- Use BRP or BRR to structure interventions and achieve incremental performance targets; ensure that measures are compatible and do not create a lock-in effect.
- Ensure alignment between technical, financial, and administrative actors throughout the planning phase.

Implementation:

- Use performance-oriented procurement strategies that integrate energy performance targets, quality standards, and monitoring obligations.
- Strengthen on-site supervision and control to ensure compliance with design specifications.
- Ensure high-quality execution from the procurement stage by establishing conditions for contractors to ensure workforce is properly trained in energy efficient construction methods.
- Expand the skills, knowledge, expertise, and capacity of municipal staff to deliver public building renovations at the highest energy performance standards.

Monitoring:

- Ensure systematic tracking of energy performance to verify whether expected savings have been achieved under operating conditions, using building energy management systems (BEMS) where available, or energy bills as a more basic monitoring tool.
- Ensure consistent data collection at the municipal level to support both local management and renovation plans for public buildings, and national reporting.
- Establish monitoring frameworks, specifying KPIs such as energy consumption, CO_2 emissions, and indoor environmental quality (IEQ).
- Leverage existing frameworks and tools, Energy Performance Certificates (EPC), Smart Readiness Indicator (SRI), BRP/BRR, to support tracking and compliance.

2. Introduction

Improving the energy performance of buildings has become increasingly urgent as the European Union (EU) strives to meet its Green Deal energy and climate targets. The building sector remains one of the largest consumers of energy in Europe, and renovation of the existing building stock is key to reduce energy demand and greenhouse gas (GHG) emissions. Nonetheless, progress in achieving the EU's energy consumption and renovation targets has been insufficient, prompting the introduction of stronger regulatory frameworks to accelerate renovations and higher energy performance standards, mainly through the revision of the EPBD, adopted in 2024. The directive introduces more stringent minimum energy performance requirements (MEPS) for building renovations, places particular emphasis on improving the worst-performing segments of the building stock, both public and residential, imposes stricter deadlines for achieving zero emissions building (ZEB) standards, and emission reduction targets. In addition, the EED emphasises the exemplary role of public buildings renovations that must meet mandatory rates.

Despite efforts to improve the energy performance of the public building stock, evidence shows that many renovations fail to deliver the intended energy savings. The discrepancy between the predicted energy performance of a building and its actual one after renovation is commonly referred to as the **energy performance gap**.

Concerns about the energy performance gap have surfaced since the introduction of energy performance predicting models. Energy performance modelling tools evaluate the energy demand of buildings under standard conditions, using calculations based on factors such as climate, envelope characteristics, typical usage. The results are used to classify buildings according to the EPCs rating system, which ranks buildings from least to most efficient. While some degree of deviation between modelled and operational performance is expected, research has shown that the difference can be substantial.

In CEE countries, research on the performance gap has been relatively limited, regarding both the scale of the gap and the specific factors that add to it. The OUR-CEE project delved into this issue, focusing on four countries in the region: Romania, Bulgaria, Croatia, Poland. The regional baseline assessment that was developed within the project, and informed by research and stakeholder consultations, cautioned on a multitude of barriers for both undertaking energy renovation at the required depth and for achieving the expected energy performance. Importantly, these barriers were found to occur at different stages along the renovation process (financing, planning and design, construction, and operational stages) and include inefficient policy tools and funding mechanisms, skill shortages among planning and design professionals, limited resources among local authorities to plan, manage and procure specialised services and products, as well as monitor the project execution. Finally, even the best-designed, most efficient building can underperform because of occupants' behaviours, leading to wide variations in actual energy consumption.

Thus, addressing underperforming renovations and tackling the many causes of performance gaps require a comprehensive approach, which involve coordination among multiple actors and improvements across the entire renovation value chain, from policy instruments and support mechanisms, institutional upgrades, skills improvements, monitoring and verification practices to increasing occupants' awareness on responsible consumption behaviours.

Against this backdrop, these guidelines aim to support national and local policymakers in achieving high-performing renovations in public buildings. The document begins with an overview of the energy performance gap, with the main drivers identified in Romania, Bulgaria, Croatia, and Poland in Section 3. Following this range of drivers, Section 4 focuses on overarching priority areas for addressing them and narrowing the energy performance gap: financing, planning, project implementation, and monitoring and verification. Finally, Section 5 consists of a self-assessment tool to support local authorities in implementing renovation projects on public buildings and achieving energy savings.

3. Understanding the Challenge

3.1. Energy performance gap

The concept of **energy performance gap** has garnered increasing attention in both research and policy discussions over the past two decades. Energy performance gap is commonly defined as the "significant difference between predicted (calculated) energy performance of buildings and actual measured energy use, once the building is in operation" (De Wilde, 2014). Predicted performance is typically derived from building energy simulation models, which estimate energy use under standard conditions.

This definition distinguishes between the calculated and the operational energy performance. The former is derived from simulation or modelling of energy consumption under standardised assumptions, using national calculation methodologies to estimate the primary energy needs of buildings. It refers to the amount of energy that must be generated in order to meet the demand required to operate a building, covering the energy actually delivered plus the energy required for power generation, transmission and distribution. It is expressed in $kWh/m^2/year$ and can enable comparison across buildings, thus forming the basis of Energy Performance Certificates (EPCs), which rate buildings' energy performance based on a class system.

For its part, operational energy performance refers to the actual energy consumed by end users during building's operation. It is based on metered energy consumption as recorded, for example, in energy bills, and captures real conditions instead of standardised assumptions. Operational performance is gauged as final energy consumption, generally expressed in kWh/year, representing the total energy delivered to the building.

This distinction is important, as it implies that calculated and measured energy performance are not directly comparable; consequently, part of an observed energy performance gap may stem from methodological and measurement differences rather than evincing underperformance of the building itself. Indeed, a certain degree of deviation between predicted and measured energy performance in operation is generally considered unavoidable and does not necessarily represent a performance gap.

Models used to calculate the energy performance of buildings are simplified abstractions of complex building systems and rely on a range of input parameters, such as weather data, occupancy schedules, user behaviour, and system performance, which are subject to varying degrees of uncertainty. In practice, building energy performance is dynamic and influenced by continuously changing conditions that cannot be fully captured in modelling approaches. For example, assumptions of standardised occupancy or fixed internal heat gains do not strictly match how buildings are actually used. (van Dronkelaar, et al., 2016) (Menezes, et al., 2012).

In many cases, however, the observed performance gap exceeds what could reasonably be attributed to modelling uncertainties or measurement variability, estimated at around 5-10%. The wider use of automated meter reading technologies has made these discrepancies more visible, and studies report an average overconsumption of around 30% relative to the calculated levels in the case of public buildings (van Dronkelaar, et al., 2016). This indicates that the gap is not just a minor deviation but a substantial mismatch with important implications: it undermines the credibility of energy performance assessments, reduces the reliability of expected energy savings, and poses significant challenges to the achievement of climate and energy policy objectives.

Beyond environmental and policy concerns, the energy performance gap also has important financial implications. When actual energy consumption exceeds predicted levels, the expected cost savings from energy efficiency measures are not fully realised. This leads to reduced returns on investment, longer payback periods, and higher operational costs than initially anticipated. Subsequently, it can discourage private investments in building renovations.

The energy performance gap arises from a combination of factors throughout a building's lifecycle. At the **design stage**, beyond the inherent limitations of energy modelling practices, additional factors compound the emergence of this gap. These include skill gaps among design professionals, the use of inappropriate modelling methods or tools, inaccuracies in input data, as well as other shortcomings in the modelling process. In addition, limited coordination among project stakeholders, miscommunication regarding design intent, and unclear expectations for energy savings can have an impact on energy performance gap.

In the **construction stage**, the quality of execution is another factor influencing the outcomes of building renovations. Differences between planned and implemented measures can reduce expected energy savings. Some studies identify insufficient insulation quality, incorrect installation of technical systems, and limited quality control as frequent causes of performance gaps (Bordass, et al., 2004) (van Dronkelaar, et al., 2016). These issues are more likely in renovation projects with tight budgets and time constraints, which are common in many CEE countries.

Post-renovation, the buildings' operation also has a significant impact on energy performance. Even carefully designed and well-executed renovations can underperform. Research shows that lack of trained facility management staff and poor system control are major contributors to higher energy consumption in public buildings (Bordass & Leaman, 2013). In many CEE public buildings, advanced technical systems are installed, but remain poorly operated due to limited staff knowledge, and are insufficiently optimised during daily operation.

Behavioural patterns related to occupancy and use of equipment in renovated buildings significantly influence the heat gains and losses, and load profiles. While improved building envelopes enhance heat retention, higher occupancy levels or increased use of devices can result in greater internal heat gains than assumed in initial models. Moreover, user behaviour also plays a role in ventilation and air quality. Following renovation, more airtight buildings necessitate mechanical ventilation systems to maintain adequate levels of indoor air quality, yet occupants may override these systems by opening windows or switching off ventilation due to discomfort caused for instance by noise. Such actions lead to more frequent air exchange with the external environment than anticipated, thereby increasing heating or cooling demand (Paone & Bacher, 2018).

The impact of these behavioural consumption patterns on the energy performance gap can be mitigated through feedback and engagement mechanisms. Evidence suggests that occupants who receive real-time information on energy use and appropriate guidance are more likely to adjust their behaviour in line with design assumptions, thereby reducing the performance gap (Darby, 2010). In contrast, where such feedback and engagement mechanisms are lacking, patterns of use tend to persist in ways that diverge from those assumed in energy performance predictions. Understanding the nature and causes of energy performance gap is an important step towards addressing underperformance in public building renovations.

While many of the factors succinctly described above, spanning the technical, project implementation, and behavioural dimensions, are common across contexts, they are also compounded by inefficiencies in the national implementation of regulatory and policy instruments for building renovations, limitations in financing programmes, prevailing cultural practices, and other national and region-specific challenges. The following chapter therefore examines how these challenges manifest in CEE countries, where structural, financial, and institutional conditions further contribute to underperforming renovations.

3.2. Why renovations underperform in CEE countries

Desk research and stakeholder consultations held in all the CEE countries that are the focus of the OUR-CEE project identified several key causes of underperformance in public building renovations, reflecting a combination of systemic weaknesses across financing frameworks, planning, implementation, and operational stages of renovations projects. As rendered in the OUR-CEE regional assessment, underperformance is often rooted in structural challenges, such as data availability, insufficient monitoring practices, fragmented financing and commissioning frameworks, as well as gaps in technical and institutional capacity, and limited resources, particularly at the local level.

Shortcomings in the planning stage encompass incomplete and unreliable data on energy performance, a lack of comprehensive building stock inventories which hampers authorities' ability to plan and prioritise public buildings for renovations. Funding frameworks often prioritise procedural compliance over verification of achieved savings after projects' implementation, meaning they may be deemed successful only if formal eligibility criteria are met.

Procurement and construction practices can deepen this disconnect. In the four CEE countries, general practice is to award renovation contracts primarily on the basis of the lowest price, usually at the expense of quality considerations. This may entail, for example, using lower grade materials and equipment to remain within the project budget, employing construction workforce with insufficient skills or experience in energy renovations. During the project execution, limited oversight can lead to deviations from the original project design.

Finally, once buildings are in use, lack of maintenance and monitoring will result in deviations in energy consumption. In many cases, there is no regular comparison between projected and actual performance. Without structured tracking of energy consumption, regular inspection to identify faults, and maintenance of building components and system optimisation, it becomes difficult to evaluate and sustain a low energy consumption

Throughout the region, these patterns establish a context where implementation risks are often not identified early enough and verifying actual energy performance remains inconsistent (Energy Policy Group, 2024).

Romania

Romania's efforts to enhance building energy performance face obstacles such as fragmentations in policy, funding, and governance, as well as a lack of accurate building stock data. Although EPCs play an important role in assessing and tracking building performance, Romania lacks a comprehensive and centralised EPC database. As in other EU countries, EPCs in Romania are primarily based on calculated, modelled energy performance. A 2021 study by the Ministry of Development, Public Works and Administration on obtaining near zero energy building (nZEB) certification in energy efficiency renovations concluded that the actual results did not always correspond to the energy performance calculations (Energy Policy Group, 2024).

Romania's building stock is also subject to considerable seismic risk, and regulations mandate that buildings with identified structural vulnerabilities undergo structural reinforcement measures before energy renovation works. These additional requirements significantly increase project costs, and dependence on public funding schemes that are targeted for such projects.

Nevertheless, deep renovation projects face significant financial constraints in Romania, as they require substantial upfront investment. Therefore, the renovation of public buildings is almost exclusively reliant on national and EU funding. This creates a degree of vulnerability, particularly for the less wealthy municipalities, which are more exposed to a range of financial risks, including changes in policy priorities and funding availability, as well as limited ability to absorb budget overruns when project costs exceed initial estimates. Moreover, these financing programmes have not treated monitoring and verification as eligible costs, which limited the ability to track actual energy performance on renovated public buildings.

Other constraints include lack of resources and expertise within local authorities in implementing ambitious, high performing renovations. Likewise, many municipalities encounter difficulties in attracting and retaining qualified professionals, which affects project preparation and management.

Patterns of building use and occupant behaviour also play a role in the actual energy performance. In Romania, preferences for natural ventilation and manual control of indoor conditions are widespread, with occupants frequently opening windows and doors to regulate temperature. During periods of extreme outdoor temperatures, this practice leads to increased heating and cooling demand. Expectations regarding thermal comfort, such as maintaining indoor temperatures of at least 22°C during winter in urban areas, result in higher energy consumption. These behavioural factors, influenced by cultural and social norms, can diverge from standard modelling assumptions, which use different standardised indoor temperatures.

Bulgaria

Renovation underperformance in Bulgaria reflects systemic features of policy design, planning practices, procurement structures and monitoring regimes rather than isolated technical shortcomings. The national baseline assessment (Center for Energy Efficiency EnEffect, 2024) confirms that renovated public buildings frequently achieve lower energy savings than both cost-optimal benchmarks and projected audit results.

For more than a decade, regulatory requirements for building renovation in Bulgaria were aligned with minimum energy performance thresholds rather than cost-optimal levels. Achieving energy class C was considered sufficient for major renovation until 2022, despite national analyses indicating that class B, and even class levels A for some building types were economically justified.

At the same time, public renovation programmes – primarily financed through EU funds offered grant rates close to or equal to 100%. While this significantly increased renovation activity, it also shaped project behaviour. Municipalities naturally prioritised eligibility and procedural compliance over long-term performance optimisation. Renovation packages were typically designed to meet funding thresholds rather than maximise long-term performance, and monitoring of achieved savings was rarely required. Consequently, policy incentives favoured shallow renovation.

Underperformance is often embedded already at the planning stage. Evidence from the national energy audit registry shows that recommended post-renovation performance levels frequently exceed cost-optimal benchmarks and are often close to the upper limit of the targeted energy class. Energy audits are commonly prepared in anticipation of specific funding calls, and terms of reference implicitly prioritise compliance with eligibility criteria. Systematic evaluation of alternative renovation scenarios and life-cycle cost optimisation is limited. As a result, performance ambition is constrained before implementation begins.

A second layer of the performance gap emerges during procurement and construction. Comparative analysis between projected and achieved energy performance indicates systematic deviations across building categories, with certified post-renovation performance often 10-30% worse than predicted. Procurement procedures dominated by the "lowest price" criterion, insufficient technical detailing, material substitutions during execution and limited supervisory capacity at municipal level reduce the likelihood that planned performance levels are fully realised. Performance risk is rarely allocated clearly, and contractors are typically not contractually accountable for achieving projected energy outcomes.

Finally, monitoring and verification of actual energy savings is generally not mandatory in publicly funded renovation projects. Although financial and procedural compliance is strictly audited, performance outcomes are seldom verified after completion. This results in limited reliable data on achieved savings, weak feedback loops for improving future projects and reduced accountability for underperformance. Institutional capacity constraints reinforce the problem, as many municipalities operate with limited technical staff and approach energy planning as a formal requirement rather than a strategic decarbonisation instrument.

In conclusion, the energy performance gap in Bulgarian public building renovation is the cumulative result of compliance-oriented regulation, funding programmes not aligned with cost-optimal or deep renovation levels, audit practices shaped by eligibility criteria, procurement systems prioritising lowest price and the absence of systematic post-renovation monitoring. Addressing underperformance therefore requires a shift from procedural compliance toward performance-oriented renovation governance across the entire project cycle.

Croatia

Renovations of public buildings in Croatia have frequently underperformed, with actual energy savings falling below predicted levels. This stems from a combination of technical, institutional, regulatory, and financial factors that together create a persistent energy performance gap. Many projects implement only basic interventions, such as partial insulation or lighting upgrades, without more comprehensive measures that could maximise energy efficiency. Despite achieving modest improvements, these buildings are often considered as “already renovated”, leaving substantial untapped potential and creating a perception that renovation objectives have been met.

A contributing factor is the insufficient integration of lifecycle and long-term energy considerations into project planning. Decision-makers often prioritise measures with lower upfront costs rather than strategies that deliver greater long-term benefits. Deep renovations – with full building envelope insulation, high-efficiency heating and cooling systems, and integration of renewable energy sources – are therefore underutilised, partly due to the technical complexity of planning and executing them. Insufficient post-renovation monitoring further compounds this problem, as predicted energy performance is rarely compared with measured operational energy use. Without systematic measurement and evaluation, underperformance cannot be reliably identified, and lessons from previous projects are difficult to incorporate into future renovations.

Institutional and capacity constraints further limit renovation outcomes. Local authorities and project teams sometimes lack technical expertise in managing complex renovation processes, supervising construction quality, or applying advanced energy performance modelling. These gaps increase the risk of implementation errors and quality execution, ultimately reducing the predicted/calculated energy savings. Regulatory frameworks, while broadly aligned with EU directives such as the EPBD do not always provide robust mechanisms for enforcing minimum performance standards or verifying post-renovation outcomes.

In addition, incomplete and outdated building energy data makes it challenging to plan and prioritise interventions effectively. When reliable and up-to-date information on actual energy consumption, building characteristics, and system performance is lacking, decision-makers have limited capacity to identify the most energy-intensive buildings or the measures with the highest potential impact. This data gap often leads to renovation strategies based on generalised assumptions rather than building-specific evidence, reducing the effectiveness of interventions and increasing the risk of misallocated resources.

Financial and procedural barriers also contribute to underperformance. Although funding programmes are available, they are often short-term, unpredictable, or insufficiently structured to support ambitious renovations. Complex application procedures and co-financing requirements can discourage investment in deeper measures, leading to a focus on simpler, low-cost solutions that achieve limited savings. These intertwined factors—limited ambition, insufficient planning, weak monitoring, institutional capacity gaps, regulatory shortcomings, and financial constraints—create an environment in which public building renovations in Croatia consistently underperform relative to their potential.

Addressing this performance gap requires a coordinated approach. Strengthening post-renovation monitoring and verification, enhancing technical capacity, improving regulatory enforcement, and providing stable, performance-linked financial support are all necessary steps. In parallel, developing comprehensive building energy data and integrating long-term lifecycle considerations into project planning can help ensure that renovations deliver measurable, lasting energy savings and contribute effectively to national and European climate objectives.

Poland

In Poland, underperforming renovations of public buildings result from a combination of planning, technical, regulatory and financial factors. These issues occur across all phases of the renovation cycle and significantly contribute to the energy performance gap.

One of the most frequently observed problems concerns the energy audits. Although energy audits are formally required in many public support programmes, they are often treated as administrative formalities without deep analysis. This results in energy models that rely on theoretical assumptions rather than real-world occupancy schedules and building-specific data. As a result, assumptions about energy consumption, user behaviour, or peak demand can be inaccurate, and the selected technical solutions may perform well on paper but not in everyday operation.

Furthermore, the lack of established priorities at the planning stage contributes to poor decision-making, such as choosing visible solutions instead of those that address the greatest energy losses, which can lead to oversizing of the heat source and to lower energy savings than expected. In many cases, the renovation scope is defined by available funding rather than by a long-term optimisation strategy for the building.

Another important factor is the limited technical expertise and non-compliance with project design documentation during the execution phase. Capacity constraints at the municipal level, particularly in smaller local authorities, may further limit effective oversight of renovation works. In Poland, public procurement procedures often prioritise the lowest price, which can result in the engagement of contractors with insufficient experience in energy-efficient renovations. Construction errors, deviations from design specifications, or the use of lower-quality materials can significantly reduce the effectiveness of implemented measures. These risks are further amplified by inadequate on-site supervision and limited enforcement of technical and regulatory requirements during construction works. In addition, contractual arrangements rarely include performance-based elements linking payments to the achievement of declared energy savings, which weakens accountability for actual results.

The reason for underperforming renovation, which occurs during the use of a building, is a lack of awareness among users and building managers. The operational phase is often underestimated in terms of its impact on long-term energy performance. A significant number of public buildings in Poland lacks installed energy consumption monitoring systems, making it impossible for administrators to detect inefficiencies or optimise management. Additionally, the lack of awareness among building users regarding their impact on energy consumption (e.g., lighting habits) places a burden on the system that was not anticipated at the design stage. Post-renovation evaluation of actual energy performance is not yet a standard practice in most municipalities, which limits opportunities to identify performance gaps and implement corrective measures.

Regulatory and policy-related barriers constitute another structural cause of underperforming renovations in Poland. National support programmes for the renovation of public buildings tend not to be very ambitious in terms of the energy savings required, which does not encourage a more holistic approach or ensure that contractors feel responsible for poorly designed renovations. Many of them focus on partial renovations or individual measures, rather than promoting deep and comprehensive energy upgrades in line with the EU's long-term climate and energy goals. Monitoring and measurement activities are also not always sufficiently financed within public support schemes, despite their importance for ensuring durability of results and compliance with evolving EU requirements, including those under the EPBD.

Finally, the discrepancy between available financial instruments and actual investment needs at the local level significantly constrains renovation outcomes. Municipalities frequently adjust the scope of renovations to available funding instead of actual needs, which may result in technically inconsistent solutions, such as installing a new heat source in a poorly insulated building. This short-term financial approach often limits the application of lifecycle cost optimisation and discourages comprehensive, staged renovation planning aligned with long-term strategic objectives. (The Association of Municipalities Polish Network "Energie Cités", 2024)

4. Addressing Underperformance in Key Phases of the Renovation Process in CEE

4.1. Financing mechanisms to support high performing building renovations

Recent report published by European Commission (EC) on public spending for energy efficiency required to achieve co2 emission reduction, primary and final energy consumption targets for 2030, estimates that investment needs amount to EUR 242 billion annually for 2021-2030 period (EC, 2026). The report recognises that regulatory measures alone will not be sufficient to cover these financial needs, highlighting the importance to mobilise both public and private funding and subsequently, and of de-risking energy efficiency for investors, with the aim to attract private capital into a sector that has so far relied predominantly on public funding schemes.

As detailed in Chapter 3, the energy performance gap is a persistent challenge of building renovation projects. At scale, it undermines the achievement of energy savings and emissions reduction targets, while at the individual building level it results in higher-than-expected energy consumption and reduced cost-effectiveness of investments. This represents an inherent risk for renovation financing. To date, public funding programmes have only partially addressed this issue: financial support is typically linked to ex-ante performance indicators based on calculated projection, with limited to no mechanisms for verifying operational energy performance. As monitoring and verification of operational performance being underfunded or excluded from eligible costs, detection of energy performance gaps and implementation of corrective actions are limited.

As for private funds for energy renovations of public buildings, energy performance gap represents a significant barrier to attracting private funding. Uncertainty regarding whether projected savings will materialise represent a risk for private investments. Risk represents a factor or event that threatens the successful completion of a project in terms of time, cost, or quality. In building renovations, such risks may stem from technical factors that could negatively affect the quality and performance of the building.

A range of financial instruments have emerged in the past years, to support public building renovations, with the dual aim of mobilising private investment and de-risking by delivering energy savings. Energy performance contracting (EnPC) has developed precisely in response to this problem. Under this model, an ESCO designs and implements the renovation and commits to achieving a defined level of savings. The investment is usually financed by the ESCO or through third-party financing arranged by it. The public authority repays the investment from the verified reduction in energy bills over a defined contract period (Moles-Grueso, 2023). If the guaranteed savings are not achieved, the ESCO compensates the difference. Monitoring and verification are therefore embedded in the contract design. This model shifts part of the performance risk away from the public authority and ties remuneration to measured outcomes.

Reliable measurement of energy use before and after renovation is central to any repayment structure linked to savings. EU guidance on financial instruments explicitly recognises that project preparation, monitoring and technical support require funding (Garcia, 2021).

BRRs and BRPs are instruments which aim to support a staged approach to renovation, offering an alternative to single-stage deep renovation. A staged deep renovation represents a sequence of renovation measures implemented over a period. While staged renovation is not always the most technically optimal solution, and may, if poorly managed, in fact increase the risk of energy performance gaps, these tools provide a framework to mitigate such risks. By clarifying what the final performance level should be and how intermediate steps contribute to it, renovation roadmaps reduce the risk of fragmented or lock-in measures (Sriraj Gokarakonda, 2024). BRRs and BRPs can support the monitoring of energy performance after each stage, allowing progress towards higher performance standards to be tracked over time. When integrated into renovation financing schemes, these instruments help with reducing upfront financial pressure in single stage deep renovations, enabling a broader rollout of renovation projects; while maintaining a clear long-term trajectory; supporting performance tracking; reducing uncertainty and financial risks associated with underperformance.

Financing frameworks that aim to support high-performing renovation should treat monitoring and verification as an integral component of public building renovations, recognising these activities as essential costs eligible for funding. BRRs or BRPs should be used to guide staged implementation toward the nZEB standard and provide a clear route for verification and monitoring, so that underperformance is detected early and addressed properly. Without these adjustments, funding schemes risk delivering formal compliance without securing performance in use, leaving public budgets to absorb the cost of uncertainty and discouraging private investment from entering the market.

Financing measures to tackle underperformance:

- Designing financing programmes to support the achievement of the highest performance standards, including integration of monitoring post-renovation into eligible costs.
- Using BRRs/BRPs to spread investment over multiple budget cycles.
- Where possible, link funding to verified energy savings, through schemes such as ESCO.
- Combine public grants with loans, or other private funding schemes (e.g. donations)

4.2. Addressing energy performance gap in the renovation planning process

Reducing the energy performance gap starts well before procurement and construction. Regional evidence shows that underperformance is strongly linked to weaknesses in planning: insufficient data, limited ability to prioritise, renovation packages designed for funding eligibility rather than long-term targets, and weak feedback loops from measured performance.

A planning approach that reliably delivers expected savings needs two foundations: (i) structured building data and energy management, and (ii) a renovation planning framework that connects targets, financing and sequencing.

4.2.1 Building data, energy management and portfolio-based planning

Effective renovation planning begins with understanding the building stock as a portfolio rather than as a collection of isolated projects. Across the CEE region, a recurring weakness is the absence of structured, reliable and comparable building-level data. Without this foundation, municipalities tend to select projects reactively, often driven by funding calls rather than strategically, based on energy performance, cost efficiency and long-term decarbonisation priorities.

A robust planning process therefore requires the establishment of a structured building information base, ideally embedded within a municipal energy management system. Such a system should enable authorities to systematically collect, store and analyse information about their building stock in a consistent manner over time.

At minimum, this information base should allow municipalities to understand how each building performs energetically; how much it costs to operate; how its technical systems function; what renovation measures have already been implemented; and what constraints or opportunities shape future interventions. This typically includes core physical characteristics of the building (size, age, function), envelope and system configuration, energy consumption data over time, operational patterns, and past investment history. Equally important is the capacity to track comfort-related issues and maintenance backlogs, as these factors often influence renovation decisions as much as energy performance.

The value of such a system lies not merely in data storage but in analysis. When municipalities are able to compare buildings on a consistent basis identifying high-consumption outliers, detecting abnormal seasonal patterns, or assessing cost intensity they can move from ad hoc project preparation to structured prioritisation. Portfolio-level analysis supports the creation of renovation pipelines, bundling of projects, and sequencing of investments based on objective criteria rather than short-term funding availability.

Systematic data collection also improves performance accountability. When baseline consumption is clearly established and documented, projected savings become more transparent and verifiable. This reduces the risk that underperformance remains undetected and strengthens the feedback loop between planning and implementation.

In short, reducing the energy performance gap begins with governance capacity. A municipality that understands its building stock in quantitative and operational terms is better positioned to design ambitious renovation programmes, allocate resources efficiently and ensure that projects contribute to a coherent long-term objective rather than to isolated short-term upgrades.

4.2.2 From building data to renovation plans

Once a municipality has established a structured understanding of its building stock, the next step is to translate data into a coherent renovation plan. This plan should not be conceived as a collection of projects prepared for upcoming funding calls, but as a long-term investment and decarbonisation strategy for the public building portfolio.

A robust renovation plan defines a clear long-term objective for the building stock, aligned with national and European climate and energy targets. It establishes prioritisation criteria based on energy consumption, operational costs, functional importance and renovation readiness. Most importantly, it links technical ambition with financial planning. Without this integration, renovation programmes risk oscillating between overambitious targets without funding and funded projects without sufficient performance depth.

The financial framework is therefore not an external annex to the renovation plan but an integral part of it. Municipalities should assess their expected investment capacity over multiple years, identify potential funding sources (grants, loans, performance-based contracts, national programmes), and define how these resources can support either comprehensive deep renovation or staged renovation pathways. Financial realism and technical ambition must evolve together.

Where financial capacity allows, deep renovation implemented in a single step is generally the most reliable approach to achieving expected energy performance. Comprehensive interventions reduce interface risks between measures, optimise system sizing and avoid repeated mobilisation costs. They also minimise the probability of lock-in effects, where partial improvements constrain or complicate future upgrades.

However, financial or institutional constraints often make staged renovation unavoidable. In such cases, the renovation plan must clearly define the long-term endpoint and sequence measures accordingly. Step-by-step renovation should not mean incremental optimisation without direction; it should represent a structured pathway toward a predefined performance target. Each phase must be compatible with the final objective and should avoid solutions that would later require costly correction or replacement.

The integration of financial planning into renovation strategy also enhances risk management. By explicitly linking investment phasing, expected savings and future regulatory developments, municipalities can reduce uncertainty and improve decision-making transparency. This is particularly important in a context where performance gaps frequently arise from ambition being reduced during project preparation to match available funding.

In essence, the renovation plan functions as a bridge between data and implementation. It ensures that individual projects contribute to a coherent long-term transformation of the building stock, rather than responding to short-term funding windows. When technical objectives, financial capacity and sequencing logic are aligned within a single strategic framework, the likelihood of underperformance decreases significantly.

4.2.3 Avoiding lock-in and enabling staged renovation

Energy audits are the technical foundation of renovation planning. Yet in many cases across the CEE region, audits are prepared primarily to satisfy funding eligibility requirements rather than to optimise long-term building performance. When audits are treated as procedural documents, the energy performance gap is often embedded before procurement even begins.

A performance-oriented audit should function as a decision-making instrument. Its purpose is not only to confirm compliance with regulatory thresholds but to explore technically and economically viable pathways toward higher efficiency levels. This requires analysing more than a single renovation package. At minimum, audits should compare alternative intervention scenarios, including a cost-optimal package and a higher-ambition option aligned with long-term decarbonisation objectives. Presenting scenarios transparently enables decision-makers to understand the trade-offs between investment cost, operational savings and long-term value.

Life-cycle cost considerations are central to this approach. Focusing exclusively on upfront investment often leads to under-dimensioned or suboptimal solutions that generate higher operational costs over time. A robust audit therefore evaluates total cost of ownership, taking into account energy savings, maintenance requirements and system durability. This broader perspective supports more rational investment decisions and reduces the likelihood that renovations fall short of expected performance.

Equally important is the technical integration of measures. Envelope improvements influence heating and cooling loads; ventilation solutions affect comfort and system sizing; control strategies determine actual energy consumption. Audits should therefore assess interaction effects between measures rather than treating interventions as isolated components. Without such integration, projected savings may prove unrealistic once systems are installed and operated in real conditions.

Finally, performance assumptions must be explicit. Baseline energy use, operational schedules, comfort parameters and climate assumptions should be clearly documented. This transparency is essential not only for accurate projections but also for subsequent verification. When assumptions remain implicit, deviations between predicted and actual performance are difficult to interpret and rarely lead to corrective action.

In this sense, a well-executed energy audit reduces uncertainty. It clarifies ambition levels, quantifies expected results and provides a technically coherent foundation for procurement and implementation. By shifting audits from eligibility-driven exercises to optimisation-driven analyses, municipalities can significantly reduce the structural risk of underperformance in public building renovation.

4.2.4 Building Renovation Passports, staged renovation and alignment with Minimum Energy Performance Standards

Where deep renovation cannot be implemented in a single step, structured step-by-step renovation becomes necessary. However, without a clearly defined long-term objective and sequencing logic, staged renovation risks reinforcing the energy performance gap rather than reducing it. Partial interventions undertaken without reference to a final performance target often create lock-in effects, where early measures constrain or complicate subsequent upgrades.

BRPs provide a governance tool to manage this risk. A renovation passport translates the findings of the energy audit into a long-term, structured pathway for the building. It defines the current performance status, identifies a final target consistent with long-term decarbonisation objectives, and sequences renovation measures over time in a technically coherent manner.

In the context of public buildings, a passport should make explicit how each renovation phase contributes to the final objective. It should clarify expected performance after each step, identify investment needs, indicate the appropriate timing of measures in relation to component lifetimes, and define how results will be monitored. This structured approach ensures that interim measures do not undermine future ambition and that each investment is compatible with the long-term trajectory.

Renovation passports are particularly relevant in situations where financial or institutional constraints prevent immediate deep renovation. Instead of allowing such constraints to result in minimum-compliance upgrades, passports maintain strategic direction. They reduce uncertainty, improve investment planning, and support transparent communication between technical staff, financial departments and political decision-makers.

The relevance of renovation passports is further strengthened by the introduction of MEPS for non-residential buildings under the recast Energy Performance of Buildings Directive (EU) 2024/1275. Member States are required to establish regulatory pathways ensuring that the worst-performing non-residential buildings improve their performance over time. In this evolving regulatory environment, municipalities will need instruments that allow them to anticipate compliance obligations rather than react to them.

Renovation passports can serve precisely this function. By mapping a building's trajectory toward higher performance classes, they provide a practical planning tool for progressive compliance with MEPS requirements. They allow public authorities to prioritise buildings at highest regulatory risk, align investment planning with future standards, and avoid repeated interventions that still fail to meet required thresholds.

Importantly, the Directive foresees the establishment of renovation passport schemes by Member States, typically on a voluntary basis. Even where voluntary, such schemes can become powerful enabling instruments for public authorities seeking to combine staged renovation, performance optimisation and regulatory preparedness within a single framework. In this context, the OUR-CEE project has developed example renovation roadmaps and methodological guidance to illustrate how such step-by-step pathways can be structured in practice. These materials, available at https://our-cee.eu/, demonstrate how staged renovation can be aligned with long-term performance targets while reducing the risk of lock-in effects and underperformance.

By integrating renovation passports into the planning architecture alongside data systems, portfolio-level renovation plans and performance-oriented energy audits municipalities can significantly reduce the structural causes of underperformance. Step-by-step renovation, when guided by a clear final objective and aligned with emerging MEPS obligations, becomes not a compromise but a controlled pathway toward long-term building decarbonisation.

Planning measures to tackle underperformance:

- Create and maintain a consistent database of building characteristics, energy use, system performance, and past interventions.
- Prioritise renovations using criteria such as high energy use, high operating costs.
- Develop renovation plans at the local level with clear goals for transforming the public building stock into a highly efficient building stock.
- Use BRRs or roadmaps to structure interventions and achieve incremental performance targets; ensure that measures are compatible and do not create a lock-in effect.
- Ensure alignment between technical, financial, and administrative actors throughout the planning phase.

4.3. Implementation and delivery of high performing building renovations

The successful implementation and delivery of high-performance building renovations require a holistic approach addressing both technical and organizational factors that commonly contribute to the energy performance gap. Achieving the expected energy performance depends on careful coordination across the entire renovation process—from planning and design to execution and post-occupancy evaluation. Underperformance often arises from challenges in data collection, project management, technical capacity, financial frameworks, and monitoring practices.

A critical factor influencing renovation success is the **procurement** strategy. Contracts should clearly define performance requirements, energy targets, quality standards, and post-renovation monitoring obligations. The separation of roles in conventional procurement often contributes to mismatches between design intent, construction quality, and operational performance, which are key drivers of the energy performance gap. One of the primary advantages of the design–build approach is the early integration of energy performance objectives into both design and construction decisions. Because the same team is accountable for delivering the renovated building, energy targets defined during the design phase are more likely to be translated accurately into construction practices. This reduces the risk of value engineering, construction shortcuts, or misinterpretation of specifications that can undermine the intended energy performance. Furthermore, the design–build model strengthens accountability for outcomes, which is particularly relevant for energy renovations. When responsibility for performance is shared or unclear, as in traditional procurement, underperformance is difficult to attribute and correct. In contrast, design–build enables contractual mechanisms—such as performance guarantees or energy targets—to be embedded directly into the project delivery process, incentivizing the project team to prioritise long-term operational performance rather than only capital cost and construction speed.

During implementation, robust **on-site supervision and quality control** mechanisms are essential. Insufficient oversight often leads to deviations from the design specifications, resulting in reduced energy performance. Standardised protocols for quality control, training programmes for construction teams, and clear documentation of materials and workmanship are effective methods to maintain high standards. Technical measures should be implemented holistically. For example, improving the building envelope without optimizing HVAC systems can result in limited energy savings. Therefore, a systems-level perspective is necessary, integrating all aspects of the building's energy performance.

Capacity building and institutional support. The human and organisational dimension is equally important. Training programmes for municipal staff, facility managers, designers, and contractors strengthen technical expertise, project management skills, and understanding of high-performance standards. Targeted workshops, technical guidance materials, best practice examples and knowledge exchange are effective methods for building institutional capacity.

Project implementation measures to address underperformance:

- Use performance-oriented procurement strategies that integrate energy performance targets, quality standards, and monitoring obligations.
- Strengthen on-site supervision and control to ensure compliance with design specifications.
- Ensure high-quality execution from the procurement stage, by establishing conditions for contractors to ensure workforce is properly trained in energy efficient construction methods.
- Expanding the skills, knowledge, expertise, and capacity municipal staff to deliver public building renovations at the highest energy performance standards.

4.4. Performance monitoring during the building's use

Monitoring is a key element in ensuring that renovated buildings achieve and maintain their expected energy performance under real operating conditions. It involves collecting data on the implementation of actions and their results to assess whether implementation is proceeding according to plan and whether it is approaching the achievement of the objectives set as declared energy savings. Monitoring should thus identify energy performance gaps, detect its causes, enable targeted corrective actions, collect data and enable continuous improvement throughout the building's life cycle. Without systematic monitoring, it is difficult to determine whether underperformance results from technical deficiencies, operational issues or unrealistic design assumptions. (BPIE, 2026)

These functions are supported by BEMS, which enable real-time monitoring, analysis, and optimisation of building energy use through digital control and data management. At a more basic level, energy bills also provide a means of tracking operational performance of buildings, although they offer less granular and less information on where deficiencies exist and corrective measures are necessary.

Monitoring goes beyond checking renovation results; it is also relevant in terms of the EPBD directive and broader EU climate and energy governance frameworks. According to the EPBD, the obligation for reporting progress in achieving the directive's objectives rests with the Member States, which submit the required data to the EC. At the same time, an effective monitoring system depends on the consistent and comparable collection of data across different administrative levels. In this context, local authorities, as owners and managers of public buildings, serve as providers of building data used in national monitoring systems, thereby linking building-level performance with national reporting obligations.

Monitoring relies on tools such as updated EPCs to compare building energy performance, the SRI which defines building’s capability to use smart-building technologies, BBRPs to track whether renovated buildings meet energy, safety, and IEQ standards. By systematically verifying this information, compliance monitoring ensures obligations are met and supports reporting progress under national renovation strategies (Litiu, 2025). **Compliance monitoring** focuses on demonstrating conformity with regulatory requirements. In contrast **optimisation monitoring** is concerned with how the building performs in daily operation. Monitoring for optimisation aims to support better building performance over time. It focuses on identifying inefficiencies in system operation, detecting abnormal energy use patterns, and supporting corrective actions.

Building performance tracking strategies may vary in scope and complexity, depending on institutional capacity, technical infrastructure, and available financial resources. Basic monitoring tools include regular analysis of energy bills, benchmarking against historical data or similar buildings, and the use of existing building automation systems to observe system operation. These methods already allow for the identification of major deviations and trends at relatively low cost.

Advanced monitoring builds on smart meters, sub-metering of key systems and energy information systems that provide higher-resolution data. This enables detailed analysis of load profiles, identification of specific sources of inefficiency, and more precise diagnostics of heating, ventilation, cooling, and lighting systems. As a further step, fault detection and diagnostics (FDD) tools extend advanced monitoring by automatically identifying system faults based on operational data and, in some cases, supporting the determination of their root causes. (Friedman, et al., 2011).

Post-renovation monitoring should operate within a clearly defined, multi-level responsibility structure. Municipalities, as building owners, are ultimately accountable for ensuring monitoring is carried out, while day-to-day operational activities such as energy tracking, performance analysis, and system optimization can be assigned to facility or energy managers. Additionally, local authorities provide data to national systems, helping to meet EPBD reporting requirements and support overall policy oversight. Building performance monitoring should be carried out in a structured approach to ensure both compliance with renovation objectives and continuous improvement in performance. It is recommended to develop monitoring plan, specifying indicators and key performance indicators (KPIs), data collection methods, responsibilities and reporting procedures. (BPIE, 2026) Effective performance monitoring during building operation requires the definition of appropriate KPIs that reflect both project objectives and external requirements, including energy consumption levels, emissions reductions and indoor comfort parameters where relevant. KPIs should allow verification of renovation outcomes and identification of performance gaps during the use phase. (Angelakoglou, et al., 2023)

In this regard, implementing ISO 50001 can provide a suitable framework for such monitoring activities. As an international energy management standard based on the Plan-Do-Check-Act (PDCA) cycle, ISO 50001 supports consistent monitoring, analysis and optimisation of energy consumption. It enables public authorities and municipalities to verify the results of renovations, identify performance gaps and ensure the sustainability of energy savings over time, ensuring that monitoring becomes an ongoing part of building management, not just a one-off exercise.

Monitoring measures to tackle underperformance:

- Ensure systematic tracking of energy performance to verify whether expected savings are achieved under operating conditions, using BEMS where available, or energy bills as a more basic monitoring tool.
- Ensure consistent data collection at the municipal level, to support both local management and renovation plans for public buildings, and national reporting.
- Establish monitoring frameworks, specifying KPIs such as energy consumption, CO_2 emissions, and IEQ.
- Leverage existing frameworks and tools, EPCs, SRI, BRP/BRR, to support tracking and compliance.

5. Checklist for Implementing High-performing Renovations

5.1. Logic and functionality

This section aims to provide local authorities with a tool to plan activities and evaluate how ongoing and future public building renovations align with what qualifies a high-performing renovation, long term. This checklist can be used for the ongoing renovation projects and early-stage evaluation of any project against recommendations on achieving high-performing renovation in public buildings, along the key priority areas: financing, planning, execution, monitoring. The intention is not to create a pass/fail mechanism, but to help identify potential weaknesses and areas that may require additional attention. Overall, the checklist should act as a governance, self-assessment and risk-awareness tool.

For each question, municipalities should indicate whether the condition is fully met, partially met, or not in place. A higher number of “No” or “Partial” responses may indicate areas where the project is more exposed to underperformance and where corrective actions should be considered.

The results should support decision-making, improve project preparation and strengthen monitoring and accountability. The checklist may also serve as a basis for internal discussion within municipalities, as well as dialogue with managing authorities, financial institutions and technical experts.

5.2. OUR-CEE Checklist

AREA	QUESTION	Yes	Partial	No
FINANCING	Is the public building selected for renovation in alignment with the municipality’s renovation strategy?			
	Are energy savings defined in financing programmes in absolute terms (kWh/year) and not only as percentages?			
	Does the funding scheme support deep or staged renovation (e.g. through BRRs or BRPs)?			
	Are monitoring and data collection costs eligible within the financing scheme, or planned to be allocated from other sources (e.g. local budget, loans)?			
	Are performance-related risks considered in financial planning?			
	Is your municipality financially equipped to absorb potential cost overruns without compromising project scope or quality?			
PLANNING	Is there a clear long-term renovation objective for the public building portfolio?			
	Are prioritisation criteria, at the local level, in place for selecting public buildings for renovation considering energy performance, operational costs, functional importance?			
	If staged renovations are applied, are BRRs/BRPs in place to guide the implementation?			

	Do the BRRs/BRPs and energy audits clearly address interactions between measures (e.g. building envelope, HVAC, lighting, renewables)			
	Do the BRRs/BRPs provide clear guidance for monitoring and verification after each renovation stage?			
PROJECT IMPLEMENTATION AND EXECUTION	Are technical specifications clearly reflected in procurement documentation?			
	Does the procurement procedure consider quality and experience criteria beyond lowest price?			
	Are performance requirements, energy targets, and quality standards clearly defined in the contract?			
	Are contractual mechanisms in place to incentivise meeting energy performance targets (e.g., performance guarantees)?			
	Is there adequate on-site supervision and quality control protocols during project execution?			
	Are deviations from design or technical specifications documented and corrected?			
	Are commissioning and functional testing conducted for all the equipment?			
	Are facility managers trained to operate installed systems?			
	Are monitoring and verification (M&V) systems installed and operational before the building enters service?			
MONITORING AND VERIFICATION	Is there a defined monitoring plan for the renovated building?			
	Are clear KPIs established for post-renovation performance?			
	Are energy consumption data collected regularly and analysed?			
	Is building performance reviewed periodically (e.g. annually)?			
	Is responsibility for monitoring assigned to a specific person or unit within the local authority?			
	Are monitoring results used to improve future renovation projects?			
	Are corrective actions defined and implemented in case of underperformance?			

5.3. Interpreting the results

The checklist should be used as a starting point for identifying gaps and prioritising improvements.

If most responses are marked as *Yes*, the project is generally well aligned with the principles of high-performing renovation. The focus should then be on maintaining implementation quality and ensuring effective monitoring and verification.

If several responses are marked as *Partial*, this may indicate weaknesses in project preparation or delivery. It is recommended to revisit the relevant stages of the renovation process, particularly planning (Section 4.2) and implementation (Section 4.3).

If multiple responses are marked as *No*, especially in highlighted questions, the project is at risk of underperformance. Corrective actions should be considered before proceeding, including strengthening project scope, procurement practices and monitoring frameworks (Section 4.4).

In all cases, particular attention should be given to highlighted questions, as they represent the most critical conditions for reducing the energy performance gap.

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OUR-CEE

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Written as part of the OUR-CEE Project
(Overcoming Underperforming Renovations in Central and Eastern Europe)

Supported by:

Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

European
Climate Initiative
EUKI

on the basis of a decision
by the German Bundestag

Implemented by:

EPG

EnEffect

Regional Energy Agency North

POLSKA SIEĆ Energie Cités