

Funding energy efficiency in EU housing: the role of borrower-based measures

This policy brief has been written by **Reiner Martin and Pierre Monnin**

Summary

- Europe's housing stock is a major source of greenhouse gas emissions: more than 75% of it is energy-inefficient.
- The European Commission estimates that €275 billion in additional renovation investment is needed annually to meet the EU's 2030 climate targets. For many homeowners, this necessitates access to bank credit.
- Borrower-based measures (BBMs), like limits on loan-to-value, debt-to-income and debt-service-to-income ratios, help preserve financial stability but can inadvertently restrict renovation lending.
- Empirical evidence shows that loans for energy renovations have lower default probabilities and increase property values. BBM limits that do not account for these post-renovation improvements are systematically misspecified for renovation loans.
- Slovakia, Latvia and Hungary have adjusted BBMs following a strictly risk-neutral approach, calibrating easings to remain financially equivalent to standard limits once renovation benefits are accounted for. This has made no material change to credit portfolio risk.
- Uptake of renovation loans has remained moderate. This is mainly because BBM easings only reach borrowers near existing limits and do not in themselves create a financial incentive for renovation.
- Other barriers to the growth of green loans, outside the BBM framework, can dampen the effectiveness of such measures.
- Policymakers should combine BBM easings with a broader policy package to increase the impact. Fiscal incentives, administrative simplification and public outreach are all needed to generate large-scale renovation activity.
- The European Systemic Risk Board should develop guidance and a monitoring framework to help all EU Member States implement risk-neutral BBM adjustments. This would support current and future renovation policies.
- Policymakers should regularly review the calibration of BBMs, building on the methodological templates established by early-mover countries.

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A housing renovation gap that public funding alone cannot close

Improving the energy performance of Europe's housing stock is central to the EU's climate strategy. Buildings account for approximately 40% of the EU's total energy consumption and around one-third of its energy-related greenhouse gas emissions. More than 75% of the building stock is energy-inefficient, despite meaningful progress in the area in recent years, and nearly 20% of the entire EU population live in homes that are not comfortably warm in winter, rising to more than 30% among those who are near or below the poverty line (Eurostat, 2024). The annual renovation rate of less than 1% falls far short of that needed to meet the EU's 2030 emissions targets. Given that between 85% and 95% of buildings in use today will still be standing in 2050, retrofitting existing homes is not optional: it is essential. The European Commission estimates that an additional €275 billion in renovation investment is needed each year to meet the EU's targets (European Commission, 2020). Raising that amount should involve both public funding and the mobilisation of private bank lending.

Homeowners are at the centre of this challenge. Improving the energy efficiency of buildings through renovations such as the installation of heat pumps, solar panels and insulation reduces households' energy consumption and potentially increases their use of renewable energy. Nearly 70% of EU residents own their homes and bear responsibility for renovation decisions. Around one-third of homeowners are willing to renovate but lack the necessary funds – a share that rises sharply among lower-income households. In Germany, for example, nearly 40% of homeowners cite financial constraints as the main barrier to energy upgrades, a share that reaches 70% for low-income households (Römer and Salzgeber, 2023). For most homeowners, access to bank loans is critical to enabling renovations. In contrast, public funding is probably essential for low-income households, whose limited financial resources restrict their eligibility for bank loans.

Whether a household can secure a renovation loan can depend on borrower-based measures (BBMs). These measures include loan-to-value (LTV) ratios, debt-to-income (DTI) ratios, debt-service-to-income (DSTI) ratios and loan maturity limits. Macroprudential authorities apply them to safeguard financial stability and contain unsustainable credit growth. At the end of 2023, LTV limits were in place in 72 countries and DSTI limits in 61. In the European Economic Area, 25 countries have LTV limits and 18 have DSTI limits in force (IMF iMaPP Database, 2025). BBMs have generally proven to align with financial stability objectives (Biljanovska et al., 2023) but the constraints they impose can limit the borrowing capacity of households that are willing to invest in renovation, particularly those already close to their credit limits.

This policy brief draws on new research covering Slovakia, Latvia and Hungary (Monnin et al., 2026) to examine whether BBMs can be adjusted to support renovation without compromising financial stability. We identify the complementary policies needed to ensure that such adjustments are effective at scale, both nationally and EU-wide.



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“More than 75% of the EU's building stock is energy-inefficient.”

The risk-neutral case for adjusting BBMs

There need not be a trade-off between renovation finance and financial stability. Renovation work changes (and generally improves) the financial fundamentals underpinning both households' repayment capacity and the quality of the collateral securing the loan. This provides a basis for easing BBMs without increasing credit risk.

For a homeowner, the financial case for a renovation loan rests on four benefit channels: savings on energy bills; reduced uncertainty about future energy costs; an expected increase in the property's market value; and, in some jurisdictions, tax benefits and grants linked to renovation (Monnin et al., 2026). As the empirical evidence in various jurisdictions shows, each of these channels directly strengthens repayment capacity and improves the quality of collateral for banks. On the default side, people living in energy-efficient homes have a lower probability of default than those in energy-inefficient properties (Billio et al., 2022; Guin and Korhonen, 2020). Green-labelled residential mortgage-backed securities in the EU have delinquency rates around 47% lower than their non-green counterparts (Billio et al., 2025). On the collateral side, the evidence is equally clear: energy renovations materially increase property values. Studies across the EU find that deep energy retrofits attract a market price premium of around 13–14% compared with pre-retrofit conditions. In Hungary, one of our focus countries, homes with a good energy rating command a premium of roughly 15–20% compared with average-rated properties (Gholamzadehmira et al., 2025; Ertl et al., 2021).

Given these twin effects of improved repayment capacity and strengthened collateral, BBM limits calibrated without accounting for post-renovation property values and energy savings are systematically misspecified for renovation loans. They treat a renovated property as being as financially risky as an unrenovated one, despite the evidence to the contrary. A carefully designed BBM easing that incorporates these verified benefits will not loosen financial stability standards: it will correct a misspecification and recalibrate limits to reflect a genuine change in risk profile.

How a risk-neutral approach translates into numbers

As illustrative data from Slovakia show, energy cost savings can justify an easing of DSTI limits (Monnin et al., 2026). For instance, in a household comprising two adults and two children with a total net monthly income of €2,330 (roughly the average in Slovakia), the income figure that enters the DSTI calculation is €1,615 after deducting the statutory subsistence minimum. We assume that the total cost of renovating their property is €42,000. Financed by a loan with an eight-year maturity at a 9% interest rate, this results in a monthly debt service payment of €615. Before the renovation, the household's annual energy bill was €4,600. After the renovation, annual savings reach €2,577, or €215 per month.

“A carefully designed borrower-based measure will not loosen financial stability standards.”

The key question concerns how these savings should be reflected in the DSTI calculation. Table 1 shows three scenarios for this. In the baseline scenario, savings are ignored and the DSTI stands at 38%. In the first adjustment, the monthly savings are treated as additional income (raising the relevant income from €1,615 to €1,830), which lowers the DSTI to 34%. In the second adjustment, the savings are netted against the monthly debt service payment (reducing it from €615 to €400), lowering the DSTI to 25%.

Table 1. Debt-service-to-income ratios in different approaches to energy-savings accounting

Scenario	Income	Debt service	DSTI ratio
Savings not accounted for	€1,615	€615	38%
Savings accrued to income	€1,830	€615	34%
Savings accrued to debt service	€1,615	€400	25%

Source: Monnin et al. (2026), based on data from Slovakia.

Both adjustments are risk-neutral: in each case, the bank’s actual credit risk is the same as that for a standard loan at the unadjusted DSTI limit, because the household’s post-renovation financial position has been strengthened by an amount equal to the energy savings. The differences between the scenarios reflect a judgement about how households will use the savings: if they are expected to spend the equivalent amount on general consumption, accruing them to income is more appropriate; if they are expected to spend it on debt repayment, netting them from debt service is justified. A conservative regulator that accrued savings to income would raise the DSTI limit by 4 percentage points; one that netted them against debt service could justify raising it by 13 percentage points. In practice, the correct answer lies somewhere in between and should be calibrated with a safety margin.

Three countries, one shared principle and two distinct approaches to calibration

Macroprudential authorities in Slovakia, Latvia and Hungary have implemented targeted BBM easings for renovation loans. A defining feature of all three schemes is their strict adherence to the risk-neutral principle: in each case, the central bank explicitly designed the easing so that adjusted limits remain financially equivalent to the original ones once renovation benefits are fully accounted for. All three authorities treat BBM reform as an opportunity to support environmental objectives, but their decisions are grounded in quantitative assessments of renovation-related risk reduction. To ensure that the loans generated by the BBM easings contribute to environmental objectives and do not lead to a general loosening of credit, all three authorities tie eligibility for these easings to verified improvements in energy performance.

The schemes differ, however, in a significant and instructive way. Slovakia and Latvia calibrate their easings from the bottom up,

“Slovakia, Latvia and Hungary have implemented targeted borrower-based measure adjustments.”



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estimating renovation benefits at the household level and deriving permissible limit adjustments from those estimates. Hungary has taken a top-down approach based on whether the estimated aggregate volume of new lending the easing would generate could pose a material systemic risk. Both approaches are consistent with the risk-neutral principle but make different estimates and require different analytical capabilities.

Slovakia and Latvia: bottom-up calibration from household energy savings

Both Slovakia and Latvia have based their BBM adjustments on estimates of the energy cost savings that renovation can generate for a representative household, directly translating those savings into a permissible increase in borrowing limits. The underlying logic is risk-neutral: because the household's post-renovation financial position is stronger than its pre-renovation position by the amount it has saved on energy bills, allowing it to borrow that amount leaves the bank's credit risk unchanged.

The National Bank of Slovakia estimated the potential monthly energy bill savings for a typical household undergoing renovation, before incorporating them into the permissible DSTI calculation. This raised the maximum permissible monthly instalment by €50 for qualifying renovation loans. Loan maturity limits were also extended from eight to ten years, reflecting long-term cash-flow benefits. Eligibility for the eased limits was conditional on enrolment in a public subsidy programme linked to the EU Recovery and Resilience Facility, a conditionality that simultaneously reduced bank risk exposure and ensured that the easing directed credit towards verified, high-quality renovation projects rather than simply relaxing the limits on any renovation claim.

Latvia's Latvijas Banka followed a similar logic, but with distinctive features that reflected Latvia's macroeconomic context. Monthly heating cost savings were estimated using two simulation methods. The resulting 5-percentage-point DSTI increase was calibrated conservatively. This meant incorporating a safety margin to account for the risk that actual savings could fall short of estimates, and for the financial vulnerability of Latvia's median-income households, whose income levels are comparatively low and whose financial buffers are thin. The DTI ratio was also relaxed from 6 to 8 to prevent the DSTI easing from being neutralised by a simultaneously binding DTI constraint in a lower-rate environment, with the new threshold calibrated against historical mortgage rates since 2004 to reflect the full interest rate cycle.

The common thread between these calibrations is that both tie the permitted easing directly and precisely to the measured risk reduction from renovation and explicitly incorporate safety margins to maintain risk neutrality even in adverse scenarios.

Hungary: top-down calibration from aggregate systemic impact

Hungary's Magyar Nemzeti Bank (MNB) approached calibration from a different angle. Rather than estimating renovation benefits at the household level, it calculated how much additional credit the easing would generate across the banking system, and whether that volume

"The Slovakian, Latvian and Hungarian calibrations are based on a risk-neutrality principle."



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of new lending could pose a material risk to financial stability. The MNB constructed an upper-bound estimate of potential loan volume growth by inflating the observed loan volume near the LTV limit, adjusting for occasionally binding DSTI constraints, and estimating the share of loans collateralised by highly energy-efficient housing that is currently above the standard ceiling. The bank concluded that even with conservative assumptions, the additional credit generated would be small relative to total mortgage lending, making it insufficient to materially affect aggregate credit growth or real estate prices.

On this basis, Hungary has implemented larger absolute adjustments than Slovakia and Latvia: LTV was raised from 80% to 90% for mortgages and leases in Hungarian forint (HUF), and DSTI was raised from 50% to 60% for eligible loans. These are significant easings in absolute terms, but they are grounded in an assessment that their aggregate impact on system-wide stability would be contained.

The contrast between the two approaches is instructive for policymakers elsewhere in the EU. Slovakia’s and Latvia’s household-savings method links the easing precisely to the quantified risk reduction and is more directly grounded in loan-level risk neutrality, but requires granular-level household data. Hungary’s aggregate approach is more tractable where such data are limited. Therefore, the two are complementary in that they provide micro-level precision and a systemic safeguard. In combination, they provide a methodological template that other jurisdictions can adopt and adapt.

“Calibration methods are complementary: one provides micro-level precision; the other a systemic safeguard.”

Table 2. Risk-neutral borrower-based measure easings in Slovakia, Latvia and Hungary

Country and year of introduction	Instruments eased	Calibration approach	Key conditionality
Slovakia (2023)	DSTI: instalment ceiling +€50/month; maturity extended to 10 years	Bottom-up: household energy savings are estimated and incorporated into permissible DSTI	Enrolment in the EU Recovery and Resilience Facility subsidy programme is required
Latvia (2024)	DSTI: +5 percentage points; DTI raised from 6 to 8	Bottom-up: heating savings estimated via dual simulation; safety margin applied; DTI recalibrated on historical rate cycle	Loans must finance verified energy efficiency improvements
Hungary (2025)	LTV: 80% to 90% for HUF mortgages; DSTI raised from 50% to 60%	Top-down: upper-bound estimate of loan volume growth; aggregate impact assessed as limited	Financed property meets energy efficiency standards defined in the regulation; fixed-rate or short-maturity requirement for DSTI easing

Source: Monnin et al. (2026).

What banks tell us: financially sound, modestly impactful

Our survey of 17 major banks across Slovakia, Latvia and Hungary covered approximately 58–87% of the assets of the banking sector in each country (see Monnin et al., 2026, for a description of the survey methodology and sample). The results are consistent across all three countries despite differences in their approaches to calibration. This points to the two headline conclusions below.

The risk-neutral approach is working: no material change in credit risk

The financial stability objective appears to have been met in all three countries. The great majority of banks reported that the adjustments had not materially altered the risk profiles of their loan portfolios. Most banks assess that the probability of default and loss given default for eligible loans is similar to those for standard loans; three banks reported moderately lower risk for green loans, and only two reported a moderate increase in risk. This finding is consistent across both the bottom-up schemes of Slovakia and Latvia and Hungary's top-down scheme. Accordingly, both approaches to calibration have preserved lending-book risk profiles, in line with the strictly risk-neutral design of all three authorities.

Modest uptake and the structural insufficiency of BBM easings alone

The impact on loan volumes is less pronounced. Half of the banks surveyed reported no significant change in demand for eligible loans following the easings; the other half observed some increase but attributed only a marginal role to the BBM adjustment itself. Just three banks reported that the measures enabled households that had previously been unable to enter the credit market to do so.

Two structural obstacles explain this limited impact. First, the easing affects only a narrow subset of borrowers: those who are already near an existing BBM limit, own property suitable for renovation and are willing to invest. Second, a BBM easing does not provide a financial incentive to renovate. It increases the amount a household can borrow once a renovation project is already economically attractive, but does not alter the underlying cost-benefit calculation. Public subsidies, tax credits and guarantees are necessary to make renovation more economically attractive for households.

When asked about barriers to the growth of green loans, banks consistently pointed to factors outside the BBM framework: the absence of stable government support and subsidies; high upfront costs; insufficient supply of viable projects; unattractive loan pricing; and limited consumer awareness. For BBM reform to be as efficient as possible, the renovation finance ecosystem would need to address such barriers in parallel.

“Targeted easings have preserved lending-book risk profiles.”

Policy recommendations

Our analysis points to three sets of recommendations for macroprudential authorities, prudential supervisors, fiscal policymakers and the European Commission.

Embed BBM easings in a comprehensive policy package

The principal policy lesson is that BBM adjustments work best as one component of an integrated renovation finance framework rather than as a standalone measure. To maximise its effectiveness, a well-calibrated easing should be embedded within a broader policy package that supports renovations.

In this context, policymakers should consider that:

- **Fiscal tools are the most direct lever.** Public subsidies, tax credits and guarantees improve the household cost-benefit balance for renovation and are the primary drivers that banks identify for future growth in the green loan market. Where subsidies are in place, BBMs can be calibrated to reflect the reduced credit risk they provide.
- **Administrative simplification can unlock latent demand.** Simplified definitions of eligible projects, unified EU taxonomy compliance tools, online access to energy performance certificate registers and sector-specific documentation templates all would materially reduce origination costs for banks and improve uptake.
- **Public outreach is a prerequisite for demand.** Banks engage in only limited marketing of renovation loan products. Public authorities could complement these efforts by providing households with simple tools to assess the financial viability of renovation and by publicising the availability of lending and subsidy products.

Expand BBM easings to all EU Member States

The schemes implemented in Slovakia, Latvia and Hungary draw on a significant body of analytical and policy work that should not remain confined to the three countries. Risk-neutral BBM easings that are calibrated to renovation benefits could play a valuable role in any part of the EU where households face BBM constraints and financing gaps for renovation.

The European Systemic Risk Board (ESRB) is well placed to lead this effort by:

- **Encouraging national macroprudential authorities to implement similar schemes.** In addition to the countries in this study, authorities in Portugal, France, the Netherlands and Estonia have also taken measures to adjust BBMs for renovation work (Banco de Portugal, 2025). Other European macroprudential authorities can draw on these experiences to implement effective risk-neutral BBM adjustment schemes that support the renovation policies that are already in place or are being introduced in their jurisdictions.



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“Borrower-based measure adjustments work best within an integrated renovation finance framework.”

- **Developing guidance on risk-neutral BBM easings for renovation loans, by drawing on the frameworks established in Slovakia, Latvia, Hungary and other European countries.** Such guidance should set out the analytical requirements for a risk-neutral adjustment that covers household energy savings, property value uplift and the role of public subsidies, and should offer a variety of approaches suited to different national data environments. The guidance should also establish a monitoring and peer-learning framework to track design, calibration and outcomes across Member States, thereby accelerating EU-wide learning and the dissemination of best practice. A first step for the ESRB could be to establish a Task Force on BBMs and Energy Retrofits, with the objectives of gathering more EU-wide evidence and of assessing complementarities and incongruities with other macroprudential measures.

“Borrower-based measure reform cannot support housing renovation on the scale Europe needs by itself.”

Regularly review the calibration of BBMs as the evidence accumulates

The calibration of BBMs has been deliberately conservative so far, due to the novelty of the approach. Our survey evidence confirms that eligible loans remain marginal in bank portfolios and are not generating material credit risk. This leaves scope for further easing that poses no threat to mandates on financial stability, provided that the outcomes of this approach are monitored carefully. Macroprudential authorities in Slovakia, Latvia, Hungary and other European countries could progressively extend eligibility, raise limit adjustments or broaden the scope of qualifying renovation works, while sharing updated calibration data with other Member States that are considering similar reforms.

In the context of renovation, a conservative approach to calibration is warranted because retrofit outcomes often underdeliver relative to engineering estimates (Lenain, 2026). Realised savings are reduced by behavioural responses and performance gaps, with the evidence suggesting that savings can be 20–40% lower than predicted, even when measures are correctly installed (see, for example, Giraudet, 2025).

Conclusion

The experiences of Slovakia, Latvia and Hungary demonstrate that macroprudential authorities can adjust BBM frameworks to support housing renovation without compromising financial stability. The defining feature of all three schemes, and the source of their prudential legitimacy, is their strict adherence to the risk-neutral principle: explicitly ensuring that eased limits remain financially equivalent to standard ones once the benefits of renovation have been accounted for. Bank surveys confirm that this discipline has been effective, as they show no deterioration of credit risk profiles.

The complementarity of the calibration methodologies used in Slovakia and Latvia (a bottom-up household-savings approach) and in Hungary (a top-down aggregate assessment) provides a methodological template for other jurisdictions. Expanding these approaches to the rest of the EU is the logical next step, with the ESRB well placed to lead through guidance, monitoring and peer review. Yet BBM reform cannot support housing renovation on the scale Europe needs by itself. Combining it with fiscal support, administrative simplification and public outreach is necessary to achieve this objective.

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Authors' declaration

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Declaration of the use of AI

The authors used Claude Opus 4.6 to produce a summary of the empirical findings in the working paper that they co-authored and that underpins this policy brief (Monnin et al., 2026). The tool was used only to provide a first draft of the sections presenting these results, based on prompts describing the sequence of argument chosen by the authors. It was not used to write the final policy recommendations, nor in subsequent stages of the drafting and review process. All outputs were reviewed and, where necessary, corrected by the authors, who remain fully responsible for the content of the publication.

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