

Metropolitan
Research
Institute

COMPARATIVE ANALYSIS OF THE SUBSIDY SCHEMES SUPPORTING THE ENERGY EFFICIENT RENOVATION OF RESIDENTIAL BUILDINGS

*First report: case studies of
Bulgaria, Greece, Hungary and Romania*

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1 EXECUTIVE SUMMARY

The following study comprises the detailed comparison of the existing public subsidies to improve the energy efficiency of the residential housing stock in Bulgaria, Greece, Hungary and Romania. The country selection merits some explanation: it is precisely this choice that allows the study to explore the different trajectories super homeownership countries can follow to improve the energy efficiency of their residential building stock. A central topic in all these countries has been the multi-level governance dilemma, the responsibility (both financial and technical) that national, regional and local governments need to have in supporting private owners to finance energy efficiency interventions in their homes.

The different subsidy programmes studied here started everywhere in the early 2000s, and this length of time has allowed them various experiments with financing mechanisms, targeted building types and energy values. The timespan has also meant an increasing influence of the EU both with regard to the provision of resources and the more ambitious energy saving expectations. Thus, the country analysis and the short comparisons in the study yield interesting insights into how housing policies and political goals on the national level, as well as the multilevel government system in place create different policy trajectories and results, thereby offering unique learning opportunities for researchers and policy makers alike.

To achieve these aims the study provides a detailed overview about the four countries, closing with comparative insights at the end. To do so, for each country a detailed analysis is prepared: first the housing market and tenure structure is introduced, as it provides the main contextual background for the residential energy efficiency programmes. This is followed by a detailed examination of all the subsidy programmes available for residents since the early 2000s. As part of this, the study also pinpoints learning curves within each country, as well as existing similarities/differences among the examined countries. The country chapters are closed by an evaluation.

During the evaluation close focus was given to particular topics: social inclusion, the outcomes of the interventions, the resources used, the depth of intervention and the energy saved. Whereas the first question was relatively easy to answer, for the remaining ones it was much more difficult to find exact data, especially regarding the amount of energy saved. Nevertheless, to come as close as possible to these aims the data collection relied on two pillars: semi-structured interviews with national and local experts in each country (their list can be found at the back of the study) and a thorough desktop research, concentrating on publicly available documents and data.

To provide a good overview about the results, the current executive summary encapsulates the main findings about each country in a few paragraphs, followed by a detailed table that displays the main features of the most important subsidy schemes.

1.1 BULGARIA

According to the Odysse-Mure data residential energy efficiency improved only by 11.5% in the 20 years between 2000 and 2021. This seems comparatively little, if we look at similar data for Romania or Greece but it is close to that of Hungary. It is hard to see how or if at all the energy efficiency increase showed by Odyssee-Mure is connected to ongoing residential energy efficiency programmes in Bulgaria. We also know little about the macro level energy consumption reduction following various programme stages.

What regards the subsidy programmes themselves, over the years their content has evolved, growing in geographical scope and putting an increasingly complex task in municipal hands. Importantly, the subsidy content of the programmes has been extremely high: after years of 100% financing the current stage of the programme financed by the Recovery and Resilience Facility (RRF) contains 80% subsidy, which is still a very intensive support. There is lack of social targeting, which is in line with other housing related policies of the country. The longevity and success of the new financial setup still

remains to be seen. Moreover, the social impact of the energy efficiency programmes are hard to estimate at this stage: while there are obvious savings on a household level, due to the few buildings refurbished so far, there are no social effects on a national scale.

As indicated above, municipalities are fully entrusted with the management of the subsidy programmes. This means all the steps from collecting and submitting applications to the technical management of the refurbishments. In this institutional context the municipality becomes a vital actor, making the energy efficient intervention possible, by providing the skills that are missing on a building level. An interesting result of this set up is the particular role NGOs and other intermediate organisations play in this energy efficiency ecosystem: in selected cases they can become instrumental in finding additional funding sources for municipalities, through helping them to engage in EU-funded projects. This partnership allows municipalities both to build better networks and to be present on an international stage. However, a more negative consequence is the diminished residential responsibility and control: while residents need to approve the interventions, they don't oversee the process of refurbishment, which leaves them in an ambiguous position. Furthermore, the loss of responsibility is a possible hot bed for corruption due to the lack of transparency and accountability from the residential side.

BULGARIA				
Programme	Target group	Subsidy form	Budget	Units affected
Demonstration project for the renovation of multi-family buildings (Pilot) 2007 - 2011	36 cities, homeowners and owners' associations of multi-family buildings	grants and technical support 20% of the costs of interventions within private dwellings, 100% of the costs concerning activities relating to the common areas	The total value of renovation works amounted to BGN 11 mln (≈€5.6 mln)	50 buildings (1093 households)
Energy Renovation of Bulgarian Homes 2012 - 2015	Multi-family residential buildings in 36 biggest cities in the country. Eligibility: built before April 1999, 3 or more floors with 6 or more units, have a seismic assessment	Grant, 50% initially and after the lack of interest increased to 75% in 2013 Rest is paid by either the HOA or the owners Low-interest loans from the Housing Renovation Fund are also available	€25.5 mln budget in the Regional Development Operational Programme +€6.5 mln from the Corporate Commercial Bank	158 buildings with 2292 homes and 5730 inhabitants
National Programme for Energy Efficiency of Multi-Family Residential Buildings 2015 - 2017	Multi-family buildings that had at least 36 independent residential units, later also built before April 1999 and 3 or more floors with 6 or more units	100% funding Payments were disbursed by the Bulgarian Development Bank who was reimbursed by the state	Initial budget of €1 billion, funded by national state budget	2022 multi-family buildings received grants (147 761 apartments)
Support for the renovation of building stock 2022 - 2026	Multi-family residential buildings that are managed under the	100% and later on 80% funding in second stage Minimum amount of the supported actions is	The Bulgarian RRF allocated €879 mln For the first stage 1.1 billion BGN (≈€562 mln)	756 multi-family buildings have been approved

	Condominium Management Act and built before April 26, 1999.	50,000 BGN (≈€25,500), maximum requestable amount 7,500,000 BGN (≈€3,830,000) (and for the second stage, only 80% of these amounts)	Interest exceeded the available funds by more than 4x Second stage: 2023: 282 mln BGN (≈€144 mln)	
Subsidies for single dwellings and for multi-unit buildings not connected to gas or heat networks 2023 - 2026	Single energy production measures in dwellings of single-family and multi-family buildings	Non-refundable grants ranging between 70%-100% of the costs	Financed by the RRF and state budget (€72 mln from the RRF and additional €51 mln from the state budget)	Currently running

1.2 GREECE

According to the Odyssee-Mure database, there was a substantial increase in energy efficiency in the residential building sector in Greece following the millennium. Between 2000 and 2021, the energy efficiency of households improved by 27%. It most likely has not been the result of the otherwise rather systematic Greek subsidy scheme to improve residential energy efficiency. The subsidy system started rather late, in 2011. Since then, it has been constantly available. While experts acknowledge that the demand is always higher than the money available, relatively substantial sums have been spent on it so far. Additionally, the fact that the programme reliably appears every year creates a level of stability and predictability that allows households to plan ahead. While before 2020 the distribution was on a first come first served basis for the 'I Save' programmes, a point system was developed afterwards to make the awarding procedure more transparent. As time passed, the objectives were refined as well as the targeting became more precise. Overall, the subsidies are more advantageous for flats than for larger units.

There are two striking features of the scheme: its surprising focus on dwellings and limited options for common spaces for multi-family buildings and the nuanced targeting of poor households, where the detailed income targeting that favours lower income groups while incrementally reduces the subsidy content in case of higher income, taking into account both personal and family income levels. There is a further risk reduction for vulnerable households in the form of providing guarantees for the banks, and also social preferences are built into the evaluation system.

The programme itself is a mixed grant and loan system. It is principally a good approach, and there is an obvious intention to evade some of the shortcomings, mainly how the bank underwriting procedure affects the elderly and vulnerable groups. For different intervention types there are different price caps introduced, maximising the amount of money payable from the subsidies. The programme is quite balanced from a territorial point of view: the Regional Operative Programmes have designated budgets for each region. The size of population matters, but there are other variables as well. This is very important in Greece, as in case of population indicators only the metropolitan areas around Athens and Thessaloniki would receive the overwhelming majority of the budget. Regarding the territorial component, it is important to note that municipalities have no role at all.

GREECE				
Programme	Target group	Subsidy form	Budget	Units affected
I save 2011 2011 - 2016	Single- and multi-family buildings, single units in multi-family buildings, built before 1980, with an EPC of class D or lower Cap on maximum income Empty apartments were also eligible	Mixture of non-refundable grants and loans. Proportion of the grant was based on income The maximum amount provided per house/apartment was €15,000	Co-financed by the Greek state and ERDF funds, in cooperation with four private banks. ERDF + state budget: €396 mln	Throughout the 5-year run time of the programme, about 60,000 homes were renovated
I save 2017 2017 - 2018	Single- and multi-family buildings and individual apartments, built before 1980, with an EPC of class D or lower, and the property value criteria also remained	Same as the previous programme. Maximum budget for renovation per house/apartment increased to €25,000	€700 mln budget from the Greek state and ERDF funds	Overall, 42,228 households were awarded, 44% of them also applied for the interest free loan.
I save 2020 2020-2021	Single- and multi-family buildings and individual apartments Energy Performance Certificate lower or equal to 'C'	Funding determined based on five income categories. The base rate varied between 35% and 65%. + 10% COVID19 premium + 10% energy premium The total budget could not exceed €48,500/individual dwelling or €76,270/multi-family buildings	€900 mln, co-financed from ERDF funds, the Regional Operational Programme 2014-2020 and the 2014-2020 Operational Programme Competitiveness Entrepreneurship Innovation	The government aimed to renovate between 35.000 – 60.000 dwellings
I save 2021	Same as previous year	Five income categories. The base rate varied between 40% and 75%. For the amount not covered by the grants it is possible to get an interest subsidised loan	The source of the funds is the Greek Recovery and Resilience Fund. Total Public Expenditure: €1.138.269.150	The deadline for completing the work for the submitted applications has been extended to October 14, 2024
I save 2023	Single-family houses and apartment units Otherwise, same as previous year	Same as above	Total budget is €532 mln	Currently running
Photovoltaics system on roof programme grant 2023 - June 2024	Households, professional farmers or farmers with a special scheme for installing	Covers up to 75% of all costs with a non-refundable grant with max €16,000 for households, and 60% of	€238 mln budget, including budget for vulnerable households and professional or special status farmers	15,945 applications, examination of the requests is in progress. 5,339 applications submitted by farmers

	photovoltaic systems	all costs for farmers with max €10,000 4 categories of beneficiaries based on income		Delays in the payment of subsidies
Save / Renovate My Home - For Young People May 2023 to November 2023 Renewed for 2024	Family houses and multi-family apartments Applicants must be born between 01.01.1984 and 31.12.2005, and meet the income criteria. Main residence, not demolishable, classification C or below.	The 'Save' programme: a grant of a maximum of €22,500 (45-90% of all costs based on income). The 'Renovate' programme: the grants are a flat 30% of all costs + interest-free loan	€300 mln by the state: 'Save': €200 mln, €40 mln out of the 200 is Allocated specifically for vulnerable households 'Renovate': €100 mln	Aims to support appr. 20,000 young people

1.3 HUNGARY

According to the Odyssee-Mure profile of Hungary, energy efficiency in the residential sector has improved by 13.6% from 2000 to 2021 - 4.8% in space heating (while total energy use by households increased that time). The biggest improvement is reported from 2000 to 2005, and only a slight improvement is experienced between 2005 and 2012, when the large-scale state subsidy was available.

Hungary was a frontrunner among the new member states in providing subsidies for the energy efficient renovation of residential buildings already in 2001 - securing ⅓ of the costs by the state and ⅓ by the local municipalities. The scheme was terminated in 2009, but lasted longer due to a delayed implementation. The ensuing financial crisis hit Hungary really hard, and the scheme was never implemented again in its original form. The residential sector lost its relevance against public buildings in the 2010s, when only one significant call was made in 2015 for multi-family buildings, which provided 50% grant, and an interest free loan scheme was developed using EU funds between 2017-2022, that favoured the family house sector. This preference remained in the 2020s, when solar panel instalment was heavily subsidised (first 100, then 66%) and finally a new call was opened in July 2024 to support the energy efficient renovation of family houses.

As opposed to the countries around Hungary, the Hungarian subsidy schemes were really unpredictable; calls appeared randomly dropping from a large subsidy content to pure interest rate subsidies then back to 100% subsidies again. The most recent call of July 2024 is far the most complex, that combines loan and grant elements, differentiate the subsidy content based on income level of the household and the micro-region and requires at least 30% energy saved. Besides this current subsidy scheme the main principle behind financing the renovation of privately-owned buildings is based on the energy efficiency obligation scheme that was introduced in 2021.

Local municipalities were substantial actors in the 2000s to provide co-financing and information to the multi-family apartment owners, but their role became negligible, while the role of financial institutions increased as they provided the subsidised loans. Family house owners and homeowners' associations had to take care of the subsidy applications themselves, which has created a market around professional subsidy management.

HUNGARY				
Programme	Target group	Subsidy form	Budget	Units affected
Panel Programmes 2001 - 2009	Multi-family buildings built with industrialised technology, including the panel buildings, but not exclusively them	1/3 self financing, 1/3 state, 1/3 municipality. Grants were later complemented by a 'climate bonus': max 60% state funds if at least C energy class upgrade	The state provided nearly 90 billion HUF (≈€352 mln) over time, which was complemented by municipal resources	More than 270.000 flats were renovated, with an additional 60-70,000 projects with funds from 2009
Renovation Programme 2015 ('Warmth of home' framework) 2015	Buildings between 4-60 apartments It was extended to buildings built by traditional - and not only industrialised - technologies	Up to 50% of the costs Final subsidy was calculated based on kgs of CO2 saved. For buildings with individual heating systems, an extra 150.000 HUF (≈€484/apartment)	10 billion HUF (≈€32mln) by the government, later raised to 11.3 billion HUF (≈€37mln)	Goal: 20,000 dwellings Finally 447 projects were supported (14,000 households)
EDIOP and CCHOP 2017 - 2022	Natural persons, condominiums, and housing cooperatives. Both single- and multi-family buildings CCHOP: Central Hungary EDIOP: rest of the country.	Interest free loans 10% own-share The loans had a max 20 year duration	16.3 billion HUF (≈€40 million) was used in the Central Hungarian Region and 74 billion HUF (≈€190 million) was used in the rest of the country	4,164 families in the Central Region and 23,296 in the cohesion regions
Renovation of homes of families with children 2021 - 2022	Targeted beneficiaries were not the buildings, but the households, families raising at least one child. Renovations in general, not specifically energy efficient ones	Grant of 50% of the renovation costs up to 3 mln HUF (≈€8500) retroactively + a state supported loan, 3% interest rate	770 billion HUF (≈€2.2 billion) was spent on the programme	380,000 households benefited from it
Residential Solar Panel programme 2021 - 2022	Natural persons living in single-family homes and max 6-apartment buildings max income 4.85 mln HUF (≈€13,800) in 2020	100% non-refundable grants The amount of the grant ranged between 2.9 and 11.3 mln HUF (≈€8200 to €32000)	124 billion HUF (≈€322 mln)	Expectation: 34 920 families 36,000 were granted but due to delays, not all were completed
Solar Panel Plus Programme January 2024 - present	There is no upper income limit anymore	66% grant, but not more than 5 mln HUF (≈€12,600)	The Hungarian government added 30 billion HUF (≈€76mln) to the original 75.8 billion HUF (≈€193 mln)	32 thousand families applied. In August 2024, 20 thousand applications were approved
Home Renovation Grant 2024	Family houses built before 1990	Grant depends on the income and location and	The whole budget is 108 billion HUF (≈€280 mln)	It is planned that it will contribute to the

2024 July - present		varies between 2.5 mln to 3.5 mln HUF (≈€6,400 to €9,000) Rest: max 2.5-3.5 mln HUF, interest free loan		renovation of at least 18,000 family houses
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1.4 ROMANIA

Based on the Odyssee-Mure database, in Romania the energy efficiency in the residential sector has increased by 44% between 2000 and 2018 (space heating by 42%). The sharp drop in energy consumption/unit happened between 2000-2002, and has been steadily decreasing since then. Taking into account that only a marginal share of housing units were affected by subsidised renovations, this energy efficiency improvement must come from other sources, like the collapse of the district heating system and the rising energy prices that forced people to use individual heating systems and lower their energy consumption.

Romania experimented with a renovation subsidy system similar to the Hungarian one ($\frac{2}{3}$ subsidy), but soon many policy makers were convinced that private households are not able to finance the required own share due to the high upfront costs and as a result, the subsidy content has to be close or reaching 100%. Romania has experimented with income sensitive subsidy schemes between 2009-2015, that were less successful due to the difficulties of collecting documents on income. In the latest RRF financed call social vulnerability is taken into account by ring-fencing a certain amount for marginalised urban and rural areas.

One of the particularities of the Romanian subsidy system is that more subsidy schemes run parallel from national and European Union sources. The aim is to reach as many beneficiaries as possible. Still, the number of beneficiary households is relatively limited, which is mostly due to the combination of high subsidy content and the complex technical requirements. Another feature of the subsidy system is that besides energy efficiency, structural deficiencies of residential buildings are also on the agenda, handled by a separate subsidy scheme for the most critical buildings.

The focus of the subsidies has been the multi-family building sector in Romania, as this segment is considered to be renovated more efficiently, affecting proportionally more households. On the other hand, as homeowners' associations cannot take a joint loan in Romania, thus the subsidy can only be a grant.

Local municipalities play a decisive role in distributing and managing the national subsidies by preparing the applications for their selected building communities and implementing the renovation works in their names.

ROMANIA				
Programme	Target group	Subsidy form	Budget	Units affected
First thermal rehabilitation programme 2002	Multi-family buildings built before 1985	A grant covering $\frac{2}{3}$ of the costs, rest was financed by the owners	No significant demand for this programme, was not operating in practice	No real outputs (high technical and financial barriers)
Insulation of multi-storey residential	Multi-storey residential buildings constructed in the period of 1950-1990	34% of all costs out of the state budget, 33% from local municipalities	no data found	Until 2008, 89 multi-family buildings renovated (2551 apartments)

buildings 2006/7-2009/10		The remaining 33% covered by the HOAs		
Regional Operational Programme (ROP) 2007-2013 – Energy Efficiency Scheme 2009 - 2015	Local public authorities are the applicants, who represent the HOA beneficiaries: residential blocks built 1950-1990	10%, 20% or 30% contribution from the owners' association, depending on the families' income level	≈€238 mln from which ERDF: 478 673 160 RON (≈€108 mln), the state: 105 239 546 RON (≈€23,8 mln). Rest: paid by the local municipalities and owners	Over 41 000 apartments were rehabilitated in multi-family buildings
Continuation of the ROP in the 2014-2020 period	Residential blocks through municipalities	25% self-financing (+15% from municipalities) Units not used for residential purposes cover 100% of the costs (although municipalities can help)	Budget for the renovation of residential buildings: 2.459,56 million lei (≈€534 mln)	A couple hundred buildings in major cities
Continuation in the 2021-2027 period	Single family buildings and apartment buildings The funding will prioritise multi-family apartment buildings	95% of the costs are paid by the EU scheme, 2% is paid by the HOA and 3% is paid by the municipality	No data found	Currently running
The Recovery and Resilience Facility for residential buildings 2022 - present	Multi-family buildings and public buildings throughout the whole country	The program covers 100% of the costs for applicants up to €200/m ² for moderate and €250/m ² for deep renovation works	Marginalised areas: Total budget: €219 mln Moderate energy renovation: Total budget: €745 mln Deep energy renovation: Total budget: €83 mln	Marginalised areas: 29 submitted Moderate renovation: 451 projects Deep renovation: 121 projects (2022)
The multiannual national program on increasing the energy performance of housing blocks 2009 - present	Multi-family buildings to implement energy efficiency renovations	First 10 years: 20% homeowners, 30% local authorities, 50% state Since 2019 60% state, rest: municipality and the HOA (HOA or homeowner min. 10%)	Apr. €115 mln spent from the state budget from 2009 to 2014 Budget for 2024: 500 mln lei (≈€100 mln) commitment loans 100 mln lei (≈€20 mln) budget credits	Between 2009 and 2014, there were 2 980 blocks and 128 332 apartments funded, while 1 527 blocks and 58 669 apartments finished
Casa Verde Classic 2010-2017	Single-family houses administrative-territorial units, public institutions, non-governmental organisations	3,000 lei (≈€680) for non-pressurized solar panels; up to 6,000 lei (≈€1360), for pressurized solar panels; up to 8,000 lei (≈€1800) for heat pumps	More than 180 mln lei (≈€40 mln) financed from the state budget. 160 mln budget for administrative and public buildings and buildings of the Church	> 30,000 projects 200 projects of administrative and public buildings and buildings of the Church
Casa Verde Plus 2017 - 2019	Single-family houses administrative-territorial units, public institutions, non-governmental organisations	Financing depends on the size of the renovations Max 40,000 lei (≈€8500), max 120 lei (≈€26)/insulated m ²	no data found	1,000 applicants were chosen (from about 15,000 applications)

		public institutions/ NGOs could apply for max 500,000 lei (≈€107,000) per project, max 90% of the eligible expenses		
Casa Verde Fotovoltaice 2019 - present	Natural persons of family houses and organisations of the Church for clerical staff's living spaces	Grant of max 30.000 LEI (≈€6000) (previously 20.000 LEI)/household with at least 3000 lei (≈€600)(previously 2000 LEI) of the beneficiary's own contribution funding depends on the total costs, 90% at max.	Financed by the Ministry of Environment's Environmental Fund This year: 2 billion lei (≈€402 mln)	Budget for this year aims to allow the installation of photovoltaic panels for at least 60.000 beneficiaries
Casa Eficientă Energetic 2020 - present	Single-family homes	Up to 70,000 lei (≈€14,000) in non-refundable grants Max 60% of the costs + energy performance certification for max 2,500 lei (≈€500)	The amount allocated to the program: 130,000,000 lei (≈€26.5 mln)	Currently running

1.5 COMPARATIVE STATEMENTS

Public subsidies for the energy efficient renovation of residential buildings have been available for decades in all four countries (Bulgaria, Greece, Hungary and Romania), however their path of evolution is quite different. While Bulgaria and Romania aim to support complex energy efficient interventions (mainly in the multi-family sector) with high technical standards and extremely high subsidy rates, Greece and Hungary concentrate more on moderate investments in individual units - exclusively family houses in case of Hungary currently - and provide a combination of grant and loan with the consideration of different income levels of the households.

The provision of subsidies is crucial in all four countries as the market conditions do not encourage investments (e.g. price caps on energy), legislations behind homeowners' associations are poor - except for Hungary - and market actors have little interest in the residential sector as long as higher gains can be achieved in other sectors.

The information included shows that the need to engage with poor or with specifically energy poor households generated different policy answers among the selected countries. While Greece introduced a relatively easy to control income-sensitive support scheme, Romania and Bulgaria opted for a very different path, reaching a 100% subsidy rate at various points of their policy development cycle. While Bulgaria is trying to go down to 80% now, Romania has just seen it necessary to cover the entire cost of energy efficiency interventions for participating households. Despite the differences in timing, in both cases the subsidy intensity eliminates largely the financial barriers vulnerable households face to engage in energy efficiency investments. Finally, Hungary is an outlier in this aspect: here the lack of structured policy development has led to haphazard subsidy schemes, with no income considerations at all with the exception of the last program, introduced in 2024.

Overall, it is hard to say how efficient the various programmes have been. The picture that emerges shows an increase in expectations everywhere, a growing role of renewable energy, and the introduction of a stricter monitoring and indicator system to get funding. This change is indivisible from the role of EU, from its growing expectations through the Fit for 55 package. Importantly, the number of buildings reached through these national subsidy schemes seems very little compared to

the entire housing stock, and as a result most likely has had little direct impact on the extent the residential energy efficiency has improved over the last decades. Nevertheless, the example set cannot be underestimated: like the example of Cluj Napoca in Romania shows, better-income residents often don't wait, but engage in energy efficiency investments on their own.

The current public subsidies have very high and not sustainable subsidy content, thus the crucial question is if and how these intensive grant components can be switched to less intensive and loan based solutions. This is especially true in case the European Union (the main source of public funding in these countries) will not provide non-repayable sources in the future, while the targets to reduce energy consumption of residential buildings are strictly set (e.g. 16% primary energy reduction by 2030), and also obligations are formulated with regard to the concentration on the worst performing buildings. One possible solutions could be to introduce more income sensitive schemes, which are already well established in Greece, have been experimented with in Hungary but failed in Romania and never considered in Bulgaria. The other aspect to reconsider is the technical content of the interventions, where by introducing a staged renovation scheme (using renovation roadmaps) and providing a predictable and long term subsidy framework, the upfront costs could be reduced.

As all four countries rely heavily on the European funds (however Hungary has for the time being difficulties in accessing them), the reconceptualisation of how public resources for energy efficiency in the dominantly privately owned residential sector should be designed is also a task of the European Union and all the Member States.

2 INTRODUCTION

The current study is the first milestone in the research to evaluate the existing subsidy instruments to increase the energy of the residential housing stock in Bulgaria, Greece, Hungary and Romania.

The choice of countries offers interesting insights into the successes and challenges of residential energy efficiency subsidy systems. Importantly, the countries are diverse, and have gone through very different trajectories in the last 30 years. While Hungary was considered a forerunner of market development and political changes until the early 2000s, much of its position has eroded after. Romania and Bulgaria have been through a different path, reducing corruption and gaining significant economic impetus as a follow up of their EU accession in 2007. Greece for its part is only emerging from a decade-long economic decline.

What unites the countries is that they have a predominantly privately owned housing stock, in which the renovation has to be implemented and financed by the owners themselves. The energy efficiency programmes started in the 2000s, but has been in operation with substantial changes. The countries have been experimenting with various subsidy systems, have been targeting different building types, inhabitants and intervention types - all with different results.

The current study sets out to accomplish four different goals:

- It aims to create a systematic overview of the different schemes in all four countries, going back to the beginning of 2000s and exploring the continuities and ruptures. It also includes single family buildings in the overview, as this has been a much neglected aspect of similar explorations.
- It seeks to provide an evaluation of the policies including aspects on social inclusion, the efficacy of the programmes and their impacts.
- It also wants to give insights into the operation of subsidy schemes on local level through selected inspiring cases. Importantly however, these practices are definitely not perfect, they rather demonstrate the type of activities local governments can do to support participations in energy efficiency schemes. They also showcase their limitations.
- Finally, it also creates a short comparative analysis at the end, to highlight strengths and shortcomings of the individual subsidy systems.

The paper provides an introductory analysis of the national housing systems for each country involved in the research. Of varying length, these serve to contextualise the findings, and are based on the authors' conviction that the framework conditions provided by the housing system thoroughly influence the way a subsidy system works. Although Romania, Bulgaria and Hungary are post-socialist countries alike with a massive privatised housing stock, their building management system differs substantially, creating very different national and municipal strategies to reach and encourage residents. Similarly, the issue of housing vacancy, which is present everywhere exerts significantly more influence in Bulgaria and Romania than in the other two countries. In the former cases, it threatens a buildings' ability to engage in an energy efficiency interventions even with 80-100% national subsidies. For Greece, the local dynamics have also influenced profoundly the structure of the subsidy scheme, supporting interventions on a household level on the building envelope that are regarded as detrimental and prohibited in the other three countries.

For every country these housing profiles are followed by a detailed overview of the subsidy programmes and their evaluations. Four case studies are also included – one for Bulgaria, one for Hungary and two for Romania – to highlight local considerations, successes and failures in managing the subsidy programmes. The last chapter, the conclusion, uses the assembled materials to outline an idealtypical subsidy programme then points out the shortcomings of the current programmes in the four examined countries.

The work is based on extensive desk research, interviews with local experts in all four countries – for their list see the references – and reinterpreting results of previous research projects of Metropolitan Research Institute. These most importantly include the Horizon project ComAct, the LIFE project ComActivate, consultancy activities for FEANTSA focusing on the possible adverse effects of the Green Deal policies on housing affordability, the ESPON financed research project House4All and previous consultancy works for the Habitat for Humanity International.

3 EVALUATION OF THE FOUR SUBSIDY SYSTEMS

3.1 BULGARIA

3.1.1 COUNTRY PROFILE

According to the 2021 census done by the National Statistical Institute, the population of the country is 6.5 million. 73.6 percent of the population lives in urban areas and 26.4 percent has a rural residence. The natural increase is -9.6, meaning a steady decrease in population. The decrease is exacerbated in rural regions where the rate is -16.4 compared to urban regions where it is -7.2 (NSI, 2021).

This drastic population decrease results in shrinking urban areas and an increasing vacancy rate in buildings all over the country (Simeonova and Milkova, 2020). The loss of population is relatively even everywhere. In the last quarter of the century Bulgaria experienced a dramatic demographic loss, whereby the accession to the EU only accelerated the processes through massive outbound migration. There are around 4.2 million dwellings in the country, and about 30% of them are regarded empty (NSI, 2021). The situation is different in the capital Sofia, the economic and administrative centre of the country. Its population decreased between 2011 and 2021, but recent trends show it stabilising. However, it has a staggering vacancy rate, estimated to be 30% in 2023 (Balkaninsight, 2023). Many dwellings are bought as an investment, including by people living outside Sofia, and very often are not rented (or are rented illegally). This vacancy rate - as it will be explained later - is of seminal importance, since it presents a major hurdle to operating condominiums both administratively and financially. As a result, it directly influences the uptake of energy efficiency measures on the residential side, and impact 46,5% of the population, who lives in flats in multi-family buildings (EU-SILC).

Another characteristic of the housing situation is that approximately 85% of the population lives in owner-occupied dwellings, and the remaining 15% are in the rental sector. The share of municipally owned housing is below 1% and is not expected to grow since despite a few newly built social units, the sale of the existing stock to sitting tenants can be observed as well. Importantly Bulgaria - as emphasised by Habitat Bulgaria - does not have an up-to-date housing strategy (Habitat for Humanity Bulgaria, 2023).

Given these conditions, the issue of condominium management is of primary importance for maintenance and energy efficiency improvement of the housing stock in Bulgaria. Condominium management is regulated by the Condominium Ownership Management Act, which has been in force since 2009. It is a highly problematic law that has been amended several times. While condominiums are governed by the General Assembly, these assemblies do not include the entire building, but only a staircase. As a result, in case of energy efficiency applications, specific regulations enter into force that require the establishment of a new legal entity for this special purpose, comprising the entire building.

One positive development is that recent changes¹ in the Condominium law made the decision making process significantly easier. Among others, homeowners' associations (HOAs) now can have a joint bank account, and the threshold for the validity of a general assembly decision was lowered to 50%+1 vote. Thus, to apply for a renovation subsidy the creation of a new association requires only 50%+1% unlike the two-thirds majority required before.

Nevertheless, major bottlenecks remain: 99% of the owners need to agree to provide access to their dwellings for carrying out subsidised building renovation activities. Additionally, the new legal entity, established for the sole purpose of applying for the energy efficient building renovation, does not have the right for its own bank account. Finally, the professional management of the condominiums is still

¹ Condominium ownership management act, amend. and suppl. SG. 82/29 Sep 2023

a rarity. The recent legal changes have brought improvements here as well, and there is much talk about future changes, when building management will be regulated better and a unified information system will be created by the Ministry of Regional Development and Public Works. The latter will combine the registry of professional condominium managers and the registry of condominium ownership (Geróházi, Szemző, Somogyi, 2023).

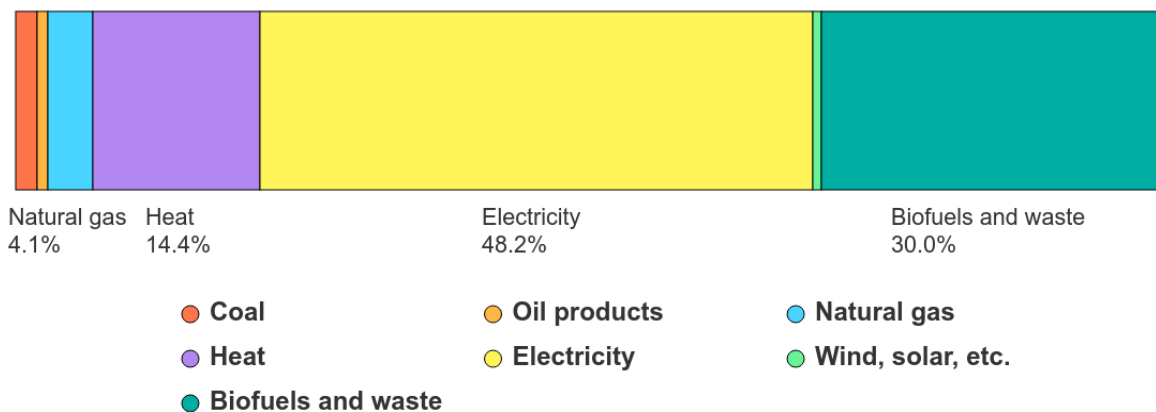
Interventions into the Bulgarian housing sector are badly needed, since the stock is relatively old and most importantly has not been maintained well. From an energy efficiency point of view, as summarised by the Long Term National Strategy to Support the Renovation of the National Building Stock, 34% of the occupied residential buildings in Bulgaria - amounting to 18% of the total useful floor area of residential buildings - were constructed before any kind of energy efficiency requirements were introduced. The latter were introduced for the first time in 1960. In the ensuing period - until 1989 - 52% of the currently occupied residential buildings were constructed, making up 60% of the useful floor area. During this time most of the panel and reinforced concrete buildings were constructed (Long Term Renovation Strategy of Bulgaria).

Interestingly, as established by the above mentioned Strategy (p.33), the link between the age of a building and its energy consumption is not direct. This discrepancy can be caused by diverse things, including a disregarding of existing statutory requirements during the construction period and the diverse, and non-systematic individual measures carried out by the residents themselves.

Currently, the energy consumption of the Bulgarian housing sector is estimated to be twice as much as it would ideally be. The housing sector in Bulgaria accounts for 25% of all energy consumption, with about 70% of this consumption going for space and water heating (Kulevska and Markovski, 2020). Electricity takes predominance in the final energy consumption of housing, followed by biofuels at the second place.

FIGURE 1. SOURCE OF ENERGY AT HOUSEHOLDS IN BULGARIA

Residential total final consumption by source, Bulgaria, 2022



Source: International Energy Agency, <https://origin.iea.org/countries/bulgaria/efficiency-demand#how-does-the-residential-sector-in-bulgaria-use-energy>

Heating in particular shows a bit different picture. The final energy consumption of households for heating before 2020 showed an overwhelming importance of wood and coal (52.6% of households used wood and coal for heating), where 38.5% used electricity, 2.4% used natural gas, and 6.4% used natural gas through the district heating system (Komitov, Rasheva, and Binev, 2019). This seems to be changing as well: local experts estimate that wood and coal are steadily replaced by electricity. Importantly, the energy mix varies significantly between urban and rural areas. Electricity is the

primary source of heating for a high share of urban households, but firewood and central/district heating are also important. In the rural areas, wood and coal have prominence.

Not surprisingly in this context, energy poverty affects Bulgarian households harshly. The energy poverty rate is one of the highest in Bulgaria within the EU. According to EU-SILC data summarised by the ESPN Flash Report from 2022, in 2020, as high as 27.5% of households in Bulgaria could not keep their homes adequately warm. Moreover, 22.2% have reported to have arrears in paying their utility bills. Approximately 24% of the population lived below the poverty line, and about a quarter of a million of them received heating subsidies.

While there was no official energy poverty definition at the time of the ESPN report, a few years later, in 2023 the Bulgarian government approved a set of indicators to determine energy poverty. They have also adopted an energy poverty definition, which is as it follows: “A household is energy poor, if the average monthly income of the household minus their monthly energy expenditure is below the officially recognised poverty line”².

PICTURE 1. TYPICAL PREFABRICATED BUILDING IN BURGAS (BY ÉVA GERŐHÁZI)



3.1.2 DESCRIPTION OF THE SUBSIDY SCHEMES

The task ahead of Bulgaria is enormous. A recent EU report from 2023, using data from Bulgaria’s Long Term Renovation Strategy summarised that:

“At present, Bulgaria needs to renovate almost 19 million m² of residential space by 2030 in order to meet the targets set in the long-term renovation strategy for the renewal of the national building stock of over 111 million m² by 2050. This would lead to emission reductions of 1065 kilotons of CO₂ by 2030 and 6220 kilotons by 2050.” (Citizen-led renovation, Bulgaria, 2023)

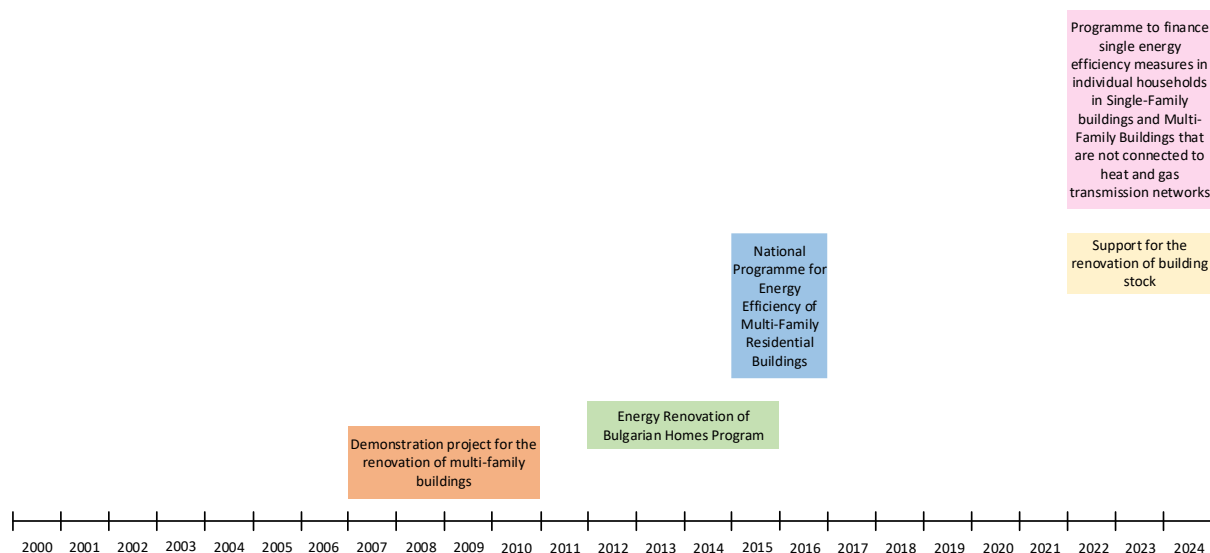
This is all the more daunting, as Bulgaria was relatively late in starting to subsidise energy efficient refurbishment of multi-unit buildings. As it will be spelt out in detail in the pages below:

² Law on Amendments and Supplements to the Law on Energy, Decree No. 199 of 2023)

1. The first Bulgarian overarching energy efficiency subsidy scheme was established in 2007 to pilot a possible framework for later programmes. It only included 36 cities, and despite the 100% grant only 50 buildings received support to renovate.
2. After the pilot programme, the first nationwide programme was established with the funds from the 2007-2013 Regional Operational Programme. The funding intensity was initially 50%, but after and after the lack of interest increased to 75%. The programme's shortcomings also included the bad central management. In the following National Programme for Energy Efficiency of Multi-Family Residential Buildings these shortcomings were addressed: the new programme provided municipal level implementation and 100% funding.
3. Currently the Recovery and Resilience Facility finances two programmes: one for larger scale energy efficiency projects, providing initially 100% and later on 80% funding for beneficiaries. The other programme that supports single interventions such as installation of solar panels for households in both single- and multi-family buildings.

In the following, the overview of the above mentioned programmes will be detailed, further highlighting their main goals and operational mechanisms.

FIGURE 2. TIMELINE OF SUBSIDY SCHEMES IN BULGARIA



3.1.2.1 DEMONSTRATION PROJECT FOR THE RENOVATION OF MULTI-FAMILY BUILDINGS

The demonstration project for the renovation of multi-family buildings was a pilot project for establishing a framework for the energy efficiency renovation of multi-family buildings. It started in 2007 and ran until 2011. This programme was part of the 2007-2013 Regional Development Operational Programme and was coordinated by the Ministry of Regional Development of Public Works (MRDPW) and UN Development Programme (UNDP).

The programme targeted homeowners and owners' associations of multi-family buildings with the purpose of facilitating renovations. There were technical support and grants available for the buildings. It supported roof waterproofing, external thermal insulation, replacement of doors and windows, modernisation of the water and sewage systems, and technical renovation of damaged parts of the buildings. It also covered technical inspection and assistance. The programme covered 20% of

the costs interventions within private dwellings, and 100% of the costs concerning activities relating to the common areas. The range of interventions were manifold, and they included the correction of structural deficiencies (bourgas-news.com, 2008).

The programme was only a test, for establishing a framework to use for later larger scale programmes, thus the effectiveness of the programme was deliberately small-scale. It was never foreseen to establish it as a nationwide programme. As a result only 50 buildings with a total of 1093 households were awarded grants and support. Additionally, it was also claimed that it had a goal to prevent social exclusion through the renovations and grant allocation, promote green solutions and energy efficiency and support voluntary associations of citizens and good governance (MRDPW, 2007). Nevertheless, given the small amount of interventions, the latter seem a bit far fetched.

3.1.2.2 ENERGY RENOVATION OF BULGARIAN HOMES PROGRAMME

This is the programme that was created from the aforementioned pilot testing programme. It ran from 2012-2015 and was also financed by the 2007-2013 Regional Development Operational Programme. There was a 25.5 million EUR budget allocated for the programme in the OP and an extra 6.5 million EUR committed by the Corporate Commercial Bank. It was also coordinated by the Ministry of Regional Development of Public Works in collaboration with the UN Development Programme (ECSO, 2018).

The programme initially covered 50% of the renovation costs in the form of non-refundable grants, however due to the lack of interest from homeowners in 2013 the MRDPW increased the grants to 75% of all costs. The remaining amounts were to be paid by either the HOA or the owners themselves, and they had an opportunity to take out low-interest loans from the Housing Renovation Fund that was set up as part of this initiative. The latter was not without complications: the bank that was supposed to supply loans went bankrupt at the time, which additionally detracted users.

The methodology of the programme largely built on the previous demonstration project, but, the scale was extended. Now, the programme targeted the 36 biggest cities³ in the country. The programme aimed to support large-scale energy efficiency improvements in multi-family residential buildings, covering a range of energy saving measures: replacement of doors and windows, thermal insulation of the building envelope, repair and replacement of the internal heating/cooling/ventilation system, electrical renovation. In addition, the installation of renewable energy solutions, such as solar thermal systems or biomass heating was available, also to increase the quality of living conditions for the people within the buildings. Although there were no biding expectations, there were hopes that the energy consumption in the buildings could be halved.

In order for a building to be eligible for the programme, it had to meet the following criteria: 1) have 6 or more residential units and 3 or more floors 2) built before April 1999, 3) have a seismic assessment.

As the programme started very late in the 2007-2013 programming period, it had a relatively short running time, and the programme failed to reach the expected results. Initially the programme aimed to renovate at least 180 buildings with at least 6100 homes, thus improving 13,500 people's lives and saving 21,500 MWh/year in energy use. The main problems that arose were connected to the centralised approach and the insufficient financial support.

³ Blagoevgrad, Burgas, Varna, Veliko Tarnovo, Velingrad, Vidin, Vratsa, Gabrovo, Gotse Delchev, Dobrich, Dupnitsa, Kazanluk, Karlovo, Kardzhali, Kyustendil, Lom, Montana, Pazardjik, Panagyurishte, Pernik, Petrich, Pleven, Plovdiv, Razgrad, Rousse, Svishetov, Si-Lystra, Sliven, Smolyan, Sofia, Stara Zagora, Targovishte, Haskovo, Shumen and Yambol;

The programme reached 158 buildings with 2292 homes and 5730 inhabitants. While the first result is somewhat close (88%) to the target, the other two are far below the expected results. Importantly, an additional 137 buildings were also approved for renovation, however they were transferred under the Energy Efficiency National Programme for the implementation of the construction works.

Stakeholders argued that the programme failed because it was too centralised and some were convinced that the self-financing part – even at 75% grants – was too high. However, regarding the latter point, others feel that with a better communication the program could have been successful. As a result of the failures, the next programme offered 100% grants – with a much larger budget and with municipal coordination. The management of the programme was transferred from ministerial to municipal level, to address the centralisation issue. Based on the feedback from the beneficiaries, in the following programmes more effort was put into information campaigns and a more precise establishment of the criteria for applications (ECSSO, 2018). However, regarding the point about communications, others disagree if it was really carried out.

3.1.2.3 NATIONAL PROGRAMME FOR ENERGY EFFICIENCY OF MULTI-FAMILY RESIDENTIAL BUILDINGS

The National Programme for Energy Efficiency of Multi-Family Residential Buildings (NPEEMFRB) programme was the continuation of the Energy Renovation of Bulgarian Homes Programme, and it ran from 2015. It had an initial budget of 1 billion EUR and lasted for 2 years until 2017. This programme was funded by national state budget. The payments were disbursed by the Bulgarian Development Bank who was reimbursed by the state. The programme provided 100% grants for the eligible buildings for energy efficiency renovations. It largely addressed the shortcomings of the previous programmes, namely: the intensity of the funding was increased to 100% thus the self-financing was not a problem and a barrier to homeowners anymore. The application had to be completed by HOAs, with at least 95% of the owners agreeing. Additionally, while the programme was still coordinated by the Ministry of Regional Development and Public Works the programme's implementation was now managed by the local municipalities, thus making the process more direct and less centralised. This programme was largely successful – by the end of the first year more than 6800 buildings registered. The programme allocated almost all of the available funds, in total 2022 multi-family buildings received grants - a total of 147 761 apartments (World Bank, 2018).

The programme supported the following activities: (MRDPW, 2015)

- Repair and structural reconstruction of damaged parts of the building determined by the required technical audit.
- Renovation of common areas of multi-family residential buildings (roof, facade, staircase, etc.)
- Implementation of energy efficiency measures prescribed as required for the building in the energy efficiency audit.
- Concomitant construction and assembly works related to the implementation of energy efficiency measures and the relevant rehabilitation of common areas of the building as a result of the implemented measures with energy saving effect. The attendant construction and assembly works are related only with the restoration of the initial state, broken as a consequence of the renovation of the common areas and the change of joinery in the separate site.

The technical and eligibility aspects of the programme were largely similar to the previous programme, however the scope was now extended to nation-wide. The building eligibility was a bit modified initially: those multi-family buildings were eligible, that had at least 36 independent residential units. However, in 2016 the previous programme's criteria were brought back (built before April 1999 and the 3 or more floors with 6 or more units.)

According to official reviews, the programme was deemed successful, the overall satisfaction was very high. The new elements such as the 100% financing, the municipal project management were

perceived as good practices, however a human resource issue arose in municipalities, who had very limited resources to provide sufficient technical support and supervision. This led to problems with the implementation of the project (Energy and Extractives Global Practice Group Europe and Central Asia Region, 2018). However, many national experts express concern about the ineffectiveness of a 100% subsidy, as well as its detrimental effects on corruption and the responsibility households are willing to take for their buildings.

3.1.2.4 SUPPORT FOR THE RENOVATION OF BUILDING STOCK

This programme started in 2022 is part of the Recovery and Resilience Facility plans and is coordinated by the Ministry of Regional Development and Public Works. It is planned to run until 2026. The programme was published as Component 4, investment 1 of the Bulgarian Recovery and Resilience Plan. The Bulgarian RRF allocated 879 million EUR to the energy efficiency renovations of public and residential buildings (European Commission, 2022).

The aim of the programme is the energy efficient and sustainable renovation of multi-family residential buildings that are managed under the Condominium Management Act (CMA) and built before April 26, 1999. All the regions and cities of the country are eligible.

The first stage of the programme started in December 2022, and overall, 756 multi-family buildings have been approved for the programme for a total of 1.1 billion BGN. *The interest in the programme is much larger, however, the total applicants exceeded the available funds by over 4 times.*

Those who applied in the first stage of the programme received a 100% non-refundable grant for the costs of the renovation. In April 2023 the second stage of the programme was opened – although with a much smaller budget – 282 million BGN. Those who applied in the first stage but were too late could apply in this stage, but this time the available grants only covered for 80% of the renovation costs. The programme did not provide any loan schemes or subsidies for the remaining 20% - the HOAs had to self-finance that part from their own sources. The deadline of Stage II was early 2024.

The minimum amount of the supported actions is 50,000 BGN (app. 25.500 EUR), and the maximum amount a building can request is 7,500,000 BGN (app. 3.830.000 EUR) - and from April 2023 on, only 80% of these amounts.

The programme supported the following actions:

- External renovation of the building envelope: replacement of joinery (doors, windows, showcases, shading), and external thermal insulation (walls, roofs, floors, etc.)
- Microclimate maintenance systems repair of the common spaces of the building
- Modernisation and replacement of the heating, cooling, and ventilation systems of the building with more energy efficient solutions
- Upgrading the building's electrical system
- Energy efficiency lighting solutions

In addition, the grants covered the energy audit and certification, and the project management of the renovations (Bulgarian RRF, 2022). The main expected results from the programme is to achieve primary energy savings of 30% for each site, and to raise both single- and multi-family residential buildings' energy consumption from classes E, F, and G to at least B (Housing Europe, 2022).

3.1.2.5 SUBSIDIES FOR SINGLE DWELLINGS

Similarly to other countries in the region, the focus of the Bulgarian subsidy schemes has been solely on multi-family buildings. As it was confirmed during the expert interviews, while there is talk about the need to focus on single-family homes as well, so far not much has been achieved. Importantly,

they view this as a pragmatic and political decision at the same time: through its volume it is cheaper to achieve through multi-family buildings goals of the NERCP.

Previously, the only programme available was through the short-lived EBDR pilot scheme in 2005 that also supported single-family homes in its second stage. (It had two stages). The 60 million EUR project focused on extending credit lines to participating commercial banks, and through this lending increasing residential energy efficiency. The credit also included a 20% grant part. While theoretically in the project it was possible to refurbish whole buildings, most recipients went for single measures.

Now a slight change in attitude is apparent in Bulgaria, coming through the programme to finance single energy efficiency measures in individual households in single-family and multi-family buildings that are not connected to heat and gas transmission networks. While it might not be apparent from the title, it is designed in a way that it is targeted for single-family buildings. The programme runs between 2023 and 2026.

It aims to increase the use of renewable energy in household final consumption. It provides grant funding for the supply and installation of solar installations for domestic hot water and photovoltaic systems, which may also include systems for storing the electricity produced. In order for a project to receive funding, it must relate to a dwelling where the applicant has a permanent address. The total investment is BGN 240 million - BGN 140 million the Recovery and Sustainability Facility and BGN 100 million national and private co-financing. BGN 80 million was allocated in the first stage of implementation. As part of the programme the supply and installation of solar installations for domestic hot water supply can be fully financed, but with no more than BGN 1960.83. Photovoltaic systems with a capacity of up to 10 kWp are financed up to 70% but not more than BGN 15 thousand.

Also focusing on single-family homes, but with a very different approach and of course scale is the pilot project Izgrei (Rise and Shine). Supported by various politicians, NGOs and initiatives from home and abroad – among others REScoop.eu, a Brussels-based European federation of citizen energy cooperatives by the Greenpeace – the energy community located in the village of Belozem is the first of its kind in Bulgaria, relying on solar panels on single-family homes. Still operating in a partial legal vacuum, the energy community wants to supply clean energy, also selling it to authorities. Its membership is open to anyone in the area who wants to invest. It aims to tackle very local problems in this way: high share of energy poverty, frequent power outages that also shut down electric well pumps, cutting off access to water. While this is a very small initiative, at least it focuses on single-family homes and as such could be replicated by others in the future.

3.1.3 EVALUATION

The energy efficiency programmes have had little impact on the residential building sector so far, which is no surprise considering the number of buildings involved. According to the Odysse-Mure data there was a massive change regarding the energy efficiency of industry, but everything else lags behind. Their residential energy efficiency improved only by 11.5% in the 20 years between 2000 and 2021.

All that said, according to the Long Term renovation Strategy of Bulgaria, prior to the interventions 40.5% of the buildings belonged to energy efficiency class E, 35.3% to class F and 16.1% to class G. The minimum requirements was to reach level C, while a small portion (8,4%) went for level B. This is estimated to help saving 40% of the energy and reducing the heating costs by 1/3, calculating with an apartment size of 65 m² (p.69).

It is hard to measure how people feel about the energy efficiency interventions. According to a survey commissioned by the Ministry of Regional Development in 2017 the majority of respondents felt a sizeable decrease in their utility bills, and an increasing living comfort as a result of the interventions.

Living comfort had improved in 95% of the housing units as measured by the change in average indoor temperature during the winter, reaching 3 to 5 degrees (Long Term Renovation Strategy of Bulgaria). The reliability of a single survey is of course questionable, and does not necessarily mean that energy investments always go hand in hand with increased residential satisfaction.

What is clear that over the years the content of the subsidy programmes have changed, increasingly focusing on specific interventions about energy efficiency. This is the clearest in case of the RRF, where a significant part of structural intervention possibilities that were there in the 2007 pilot are not present. This is in line with the RRF's aims, which - approved by the Commission in 2022 - directs 59% of the total amount to various investments and measures in support of climate goals. From a residential renovation perspective this does not only include support for renovation, but generally targeted reforms to facilitate such investments.

Nevertheless, structural interventions remain important for the residents, and it increasingly becomes the prerequisite for taking on the energy efficiency subsidies. As it was summarised by the Long Term National Strategy to Support the Renovation of the National Building Stock

"The experience Bulgaria has gained so far in the renovation of residential buildings with a view to upgrading their energy efficiency demonstrates that renovation packages have to include measures to improve both energy efficiency and the technical parameters of buildings due to their poor technical condition and in order to bring them in line with currently applicable statutory requirements. The implementation of these additional measures has resulted in greater interest in energy efficiency projects/programmes, even when co-financing is required." P. 61.

As for the social impact of the programmes: it is hard to say at this stage. While there are obvious savings on a household level, due to the few number of building, there are no social effects on a national scale. However, so far there is lack of social targeting, which is in line with other housing related policies of the country. As the World Bank has shown already in 2017 (Hamilton, 2017) – thus prior to the pandemic, the ensuing inflation and the energy crisis – there is a lack of public assistance for the poor and marginalised in the housing sector coupled with a huge housing affordability crisis. So, despite a surplus of over 900,000 apartments in the country, over 40% of households live in overcrowded conditions, with the housing vacancy rate being 30% at the national level. Bulgaria loses approximately 20-30 thousand people a year. But the owners, who leave are unwilling to invest into these apartments, and they are not managed by anyone. (Sofia is an exception, where a few companies manage these apartments on the rental market.) (Hamilton, 2017 and interview with local stakeholders)

These framework conditions make the increasing of renovation rate particularly hard, although it is evident that it is very slow. They also inhibit decreasing the very high subsidy content, although that makes the programme very costly even with the reduced rate of 80%. More market-friendly solutions should be considered, but this runs the risk of both political and residential opposition. It remains to be seen how the 80% subsidy rate will be received, although the first signs are encouraging. The negligence of single family homes is also problematic, since the current national programme does not support insulation and any structural works, thereby reducing the energy saving opportunities for the significant share of the population, which is also hard hit by energy poverty and the generally bad state of power supply systems in Bulgaria. (Such small pilot projects, as the energy community Izgrei are also insufficient.)

Whether and how interventions should be more territorially focused, is also an important question to consider. While vacancies create a problem about the uptake of energy efficiency subsidies everywhere, it is important to see where the population migrates. More importantly, the problems can be quite different depending on the rural or urban character of a region, necessitating different measures. However, before any of these considerations, the role of the municipalities should possibly be reassessed. Their very central role in the process of subsidy management results in the fact that that any territorial concentration will put an unequal responsibility on certain local governments.

As it was shown in the programme descriptions, municipalities are entrusted with the technical management of the subsidy programmes. In this institutional context the municipality becomes a vital actor, making the energy efficient intervention possible, by providing the skills that are missing on a building level. Thus, running the programmes on a local level means that they not only cooperate very closely with the housing associations, but are involved in the application process - preparing and submitting the forms - in the implementation phase - running a public procurement process and selecting the companies to carry out the interventions - and finally in the monitoring phase itself (Geróházi - Szemző, 2023). The necessity of these complex tasks partially resides in the fact that the management of multi-apartment buildings is still viewed as a great difficulty, where only a fraction of the buildings pay external companies, many choose to elect representatives from the owners, who do the management free of charge. There are many cases when a building has no representative at all.

It was already indicated that the latest changes meant that decision-making mechanisms were simplified, lowering significantly the threshold for the validity of a general assembly and for a binding agreement (Geróházi-Szemző, 2023). Consequently, part of the municipalities' activity is ensuring that housing associations operate, that residents come and decide together and refurbish the *entire building*. The latter is essential, as previously people were allowed to refurbish only parts of the building. Now municipalities enforce the restriction and the need to get a permit for facade renovation.

An interesting result of this set up is the particular role NGOs and other intermediate organisations play in this energy efficiency ecosystem: they are instrumental in finding funding sources for municipalities and often write the applications themselves. This partnership allows municipalities both to build better networks and to be present on an international stage.

However, a more negative consequence is the lack of control: residents do not oversee the process, once the decision is taken, they have little influence over the interventions. As a result, such a setup is a possible hot bed for corruption due to the lack of transparency and accountability from residential side.

One interesting case, showing the complexity of tasks handled by local municipalities in the Bulgarian context is the city of Burgas.

The case of Burgas

Burgas is the fourth largest city in Bulgaria, and an important touristic and economic centre by the Black Sea, with a port. It has a population of 203,000 inhabitants, with another 277,922 residents living in its surrounding metropolitan area.

Part of the population is severely affected by energy poverty. As shown in a small local survey focusing on a few blocks in the city of Burgas, 30% of the population reported that they were not able to keep their homes adequately warm and 25% reported that they struggled to keep their homes adequately cold. These figures are considered extremely high in the EU context (Geróházi, Szemző and Somogyi, 2023).

Its municipality has been actively participating in various EU-funded and national projects, and energy efficiency has been one of its major concerns. Using various national funds, since 2007 they have provided funds not only for residential buildings but for schools, kindergartens and cultural institutions. As it was emphasised by one of its employees, there is not a single programmes in this branch that they have applied to and that they have not won.

Energy efficiency is clearly a political priority in Burgas, where the mayor has been the same since 2007. Not surprisingly, according to the same employee the city has the most renovated residential buildings in Bulgaria.

That means in the 1st national programme almost half of the national financing went to Burgas.

In the 2nd one another 30 buildings were approved, but already much more were interested to join. For the last programming period only 14 were submitted. In this case, unlike before, 20% co-financing is expected from the buildings.

The management of the project is no small task for a municipality, especially that the Bulgarian system – as it was spelt out above - puts all the responsibilities into municipal hands. As a result, Burgas has a dedicated unit which is specialised in managing the projects, writing the applications, collecting all the necessary documentation and ensuring interest in participation from a residential side. To reach the residents and raise interest, campaigns were carried out city-wide. The text from the local newspaper in 2008 highlighted the need for owners to take responsibility:

“If you are uncomfortable living in an uneconomical, uncomfortable and perhaps not entirely safe block of flats. If you share the belief that the owner is responsible for their home and, together with their neighbours, for the upkeep of the communal home (the building as a whole), you would like to see it renovated, but you don't have enough resources and find it difficult to get all your neighbours to agree on your own.”

But it also offered help, including technical assistance for:

1. Technical and energy audit of the building;
2. A complete renovation project of the building;
3. Organisation and carrying out of tenders for suppliers and contractors;
4. Control of the implementation of the works to achieve good quality and the required standards;
5. Preparation of a technical passport for the building and the possibility of energy certification.

The municipality set up an administrative structure to support residents. During the first national programme each district in the city – which are smaller administrative units that do not have an independent assembly or a mayor – 1 or 2 employees supported the citizens, they helped to correct the documents which was then submitted by the municipality. This task was taken over by the central Energy Office during the second programme, which has functioned as a one-stop-shop ever since. The Energy Office was established as part of a Horizon project (ComAct), which provided financing for it. During the second programme municipal employees (approximately 20) went to buildings and explained all the requirements to the residents. In this process they had held more than 100 meetings.

Regarding residents, at the beginning everyone was happy, since almost every building which had submitted an application was approved. During the 2nd national programme one of the obligations was to have an energy audit and a technical inspection of the building, with an approximate cost of 2-3000 EUR. The Burgas municipality covered this cost instead of the residents. They covered 250 buildings, and submitted all to the national level, but only 30 buildings were approved. It was known in advance that there was limited financing for the different cities. Nevertheless, the residents were really disappointed.

The process with the construction management is particularly difficult: municipalities do not have enough employees, and it is hard to find competent people. From the municipal side "investment controllers" are overseeing the constructions.

Finally, so far no social consequences – either negative or positive – of the refurbishments can be observed.

While it was a forerunner, by now Burgas is not alone in its activities in Bulgaria. Municipalities are encouraged by the state to set up one-stop-shops and try to engage people. Thus, besides Burgas, we find one-stop-shops in Plovdiv, Asenovgrad, Sofia, Gabrovo, Ruse and Stara Zagora. Importantly, smaller municipalities without resources for a one stop shop can form associations, like the Association of Rhodope Municipalities, which consists of over 10 members.

The role of EU projects is also seminal in the creation of one-stop-shops that in their case also focus on managing the projects from the beginning to the end. The projects also support municipalities both financially and with guidance in setting up their energy offices/one-stop-shops (ComActivate D2.1). Since the long-term financing of these one-stop-shops is not clear, their sustainability is often questionable. In the meantime, they allow municipalities to reach out and manage their work in a more systematic manner, and to do more in awareness raising and training than otherwise.

3.2 GREECE

3.2.1 COUNTRY PROFILE

In Greece the latest national census was carried out in 2021, when the population of the country was 10,482,487. In the 2011 census the population was 10,816,286 living in 4,134,540 households. The population of the country has been steadily decreasing for over a decade now – it decreased 3.1% between 2011 and 2021. The average size of a Greek household is 2.6 persons (Hellenic Statistical Authority, 2024). There are many reasons behind this decline, but intensive outmigration as well the decade-long recession were conducive to this. The latter most likely by contributing to the declining fertility rates.

According to the EU-SILC survey, 43% of the population lives in cities, 30% in suburbs and towns, and 27% in rural areas in 2023. 40% of the Greek households live in single-family buildings and 60% in multi-family buildings with flats being the more common in cities and suburbs/towns and single family houses being more common in rural areas (EU-SILC, 2023). Turning these numbers to the share of units we see from the Census of 2011, that 44.7% of the dwellings are in multi-family buildings (HSA, 2024b).

According to the 2021 census the owner occupation rate is 73% which is slightly (by 3 percentage points) above the EU average, however data shows that since 2005 owner occupation has been in a steady decline, having declined over 11 percentage points. Furthermore, in the major urban hubs of Athens and Thessaloniki, owner occupation is even lower due to the high rate of private rental flats, hovering around 60-65% in 2021 (HSA, 2024a). On the other hand, it is important to note, that according to the Census of 2011, only 64.7% of the dwellings were occupied while 35.3% were vacant, mainly for seasonal and secondary use (HSA, 2024b).

This big jump is the result of the harsh effect the financial crisis had on Greece. In 2010 almost every third household had financial troubles meeting obligations such as rent, mortgage or utility bills. In 2015 the situation even worsened affecting almost half of all households in the country. For comparison, the EU average was around 11% during this time. The biggest negative jump in owner occupation happened between 2005 and 2010 when it went down from 84% to 77%. According to the Hellenic Statistical Authority almost 70% of young people between 18-34 lived with their parents in 2019.

Based on 2021 data it is estimated by the HSA that households spend around 36% of their income on housing related expenses (rent/mortgage, utility bills). This is the highest among EU members. It is also significant to note that despite over 55% of all households are one and two person households, the average room per person in all households is around 1.3, putting Greece in the bottom of the EU, just above Romania and Poland (HSA, 2024a).

According to the 'Action Plan for Combatting Energy Poverty' (ΕΦΗΜΕΡΙΔΑ ΤΗΣ ΚΥΒΕΡΝΗΣΕΩΣ, 2021) energy poor households are "those households with an annual energy cost lower than 80% of the annual cost that covers the minimum required energy consumption, and at the same time with a net annual income lower than 60% of the respective equivalent median income based on the number of people in each household, according to the equivalence scale of the OECD". Energy poverty is tackled by means of various income supports. One of the main ones is the Social Domestic Tariff, which was introduced in 2011 to protect low income households and other vulnerable population groups that include persons with disabilities, long-term unemployed and parents with three vulnerable children. Other means include the provision of free electricity up to a certain extent as well as rent subsidies and heating oil allowance. Much attention has been paid to the mountain regions, the transforming coal regions and the metropolitan centres of Thessaloniki and Athens. Regarding the latter, it is assumed that the wide spread private rental sector houses many energy poor households.

A decade ago almost every household in Greece (98.9%) had a form of individual space heating, mainly based on diesel oil or electricity. 12% uses wood or natural gas. (HAS, 2013)

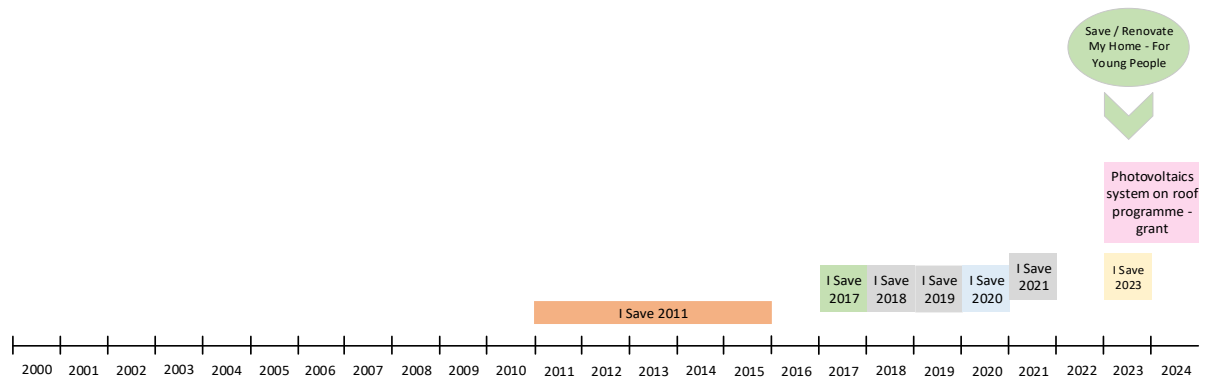
In 2023 about 88% of the population indicated that they have not made any energy efficiency renovation in the last 5 years on their homes. Out of the 12% who did, most renovation focused on the replacement of the heating system for a more efficient one (HSA, 2024b). Nevertheless, the Odyssee-Mure survey shows a striking decrease of end user energy consumption in buildings, which is partially due to the investments into energy efficiency, and partially to the steep economic decline the country went through and its inevitable social consequences. Over the period 2000 to 2021, the energy efficiency of final consumers among households improved by 27%. Similarly, the energy consumption of space heating per m² with climatic correction decreased by 30% between 2000 and 2021. Importantly, the use of electricity has quadrupled in the same period, because of the increased use of electric appliances, lighting, water heating and air-conditioning (Odyssee-Mure, 2024). Hydro power and lignite are important sources of electricity production, as well as wind turbines and solar panels. The latter has a very short return period due to the climatic conditions. For the provision of energy the Greek specificities are the many islands, that due to the structure of tourism need varying amount of energy in different seasons.

According to a report done by the Greek National Bank in 2023, the average age of the housing stock in Greece is just above 40 years old – increasing from 34 in 2011 - however the effective deterioration of the stock was much higher due to the relatively low investments in renovations over the years by the households due to the severe economic crisis. Between 2011 and 2023, the housing stock showed a net 120,000 unit decrease, having been built 130,000 units, while 250,000 units were dropped from the tradable housing stock. However, investments in the housing stock are on the rise recently (National Bank of Greece, 2023).

3.2.2 DESCRIPTION OF THE SUBSIDY SCHEMES

Greece has had a yearly recurring national programme for energy efficiency renovation of residential buildings since 2011. The 'I save' programme has been renewed almost every year with largely the same details, but over time the details got more and more refined to fit the current guidelines and trends. The Greek legislative environment allows patchwork renovations meaning individual apartments can carry out different renovation processes in the same building without affecting the rest of the apartments. The programmes mostly focus on single family homes - whether that is a single apartment in a multi-family building or a standalone detached house - however there are some, although limited opportunities for multi-family buildings to apply as a block as well. The 'I Save' programmes were mostly financed from ERDF funds through various Operational Programmes. In recent years some new programmes appeared as well, one focusing on providing support for young people to improve their living conditions, and one for the installation of solar panels in order to contribute to the green transition pillar of the Recovery and Resilience Facility's directions.

FIGURE 3. TIMELINE OF SUBSIDY SCHEMES IN GREECE



3.2.2.1 I SAVE 2011

The Eksikonomisi kat ikon was the first large scale energy efficiency renovation programme in Greece. This programme aiming to motivate homeowners to improve their homes’ energy efficiency started in 2011 and was renewed almost every year for a new programme with largely the same details. The main objective of the programme was to improve the energy performance of the homes in Greece, to save money and energy and to increase the property values. It had a special aspect that was aimed at low-income families who would otherwise be unable to afford the renovations from private funds. The programme consisted of a mixture of non-refundable grants and loans. The loans ran from four to six years and were interest free until 2015.

The targeted buildings were both single- and multi-family buildings, and single units in multi-family buildings as well. The programme set out three criteria the homes had to meet: 1) they were situated in a region with a property value below or equal to 1750 EUR/m² (shortly after the start of the programme this was changed to 2100 EUR/m² to increase the eligible buildings’ number) ; 2) the construction permit of the building were issued before 1980; 3) the Energy Performance Certificate was a class D or lower. In the multi-family buildings at least 50% of the owners had to approve in order to apply for the funds, and the nature of the renovation had to be decided upfront with the application. As the programme had a cap on the maximum income, not every owner was eligible, those in the multi-family buildings who fell out of the scope of the programme had to participate from their private funds. The programme mainly aimed for apartments and houses that were currently inhabited, however empty apartments were also eligible if they had been in use in the previous three years. If homeowners applied not as a building but as a private apartment, the funds could only be used for actions inside the individual flat.

All interventions had to be preceded by a thorough energy inspection carried out by inspectors certified by the Ministry of Energy.

The programme was co-financed by the Greek state and ERDF funds, in cooperation with four private banks. The programme provided a mix of non-refundable grants and loans to the eligible applicants, the proportion of the grant was based on income. The lower the applicant’s income was, the bigger proportion they received in grant. Throughout the majority of the programme the loans were interest-free, however for those who applied after the end of 2015, interest-free loans were no longer available. The maximum amount provided per house/apartment was 15,000 EUR.

In terms of the intensity of the funding, it was divided into three categories based on income. The categories defined the percentage of the non-refundable grants and the loans of the applicants.

Personal annual income	Family annual income	Funding intensity
< 22,000 EUR	< 40,000 EUR	30% grant + 70% loan
22,000 EUR < income < 40,000 EUR	40,000 EUR < income < 60,000 EUR	15% grant + 85% loan
40,000 EUR < income < 60,000 EUR	60,000 EUR < income < 75,000 EUR	100% loan

Initially the programme was not successful enough so they changed the categories as follows:

Personal annual income	Family annual income	Funding intensity
< 12,000 EUR	< 20,000 EUR	70% grant + 30% loan
12,000 EUR < income < 40,000 EUR	20,000 EUR < income < 60,000 EUR	35% grant + 65% loan
40,000 EUR < income < 60,000 EUR	60,000 EUR < income < 75,000 EUR	15% grant + 85% loan

The programme was moderately successful. After addressing the shortcomings of the too high category boundaries of the initial programme, the number of applicants went up, throughout the 5-year run time of the programme, about 60,000 homes were renovated.

The programme did not specifically target energy poor families, however it managed to create a framework, where people living in energy poverty were well-targeted by the programme due to targeting the low property value regions and the low EPC ratings.

However some problems still arose: most of the buildings falling into the scope of the programme were owned by older people, and despite the loans given out being a subsidised, interest-free loan, the private banks treated the applicants like any other loan applicant, and banks usually do not approve loans for people over 70, thus a lot of applicants were rejected by the banks despite being eligible for the programme based on the homes they lived in (Geróházi & Szemző, 2015).

3.2.2.2 I SAVE 2017

The new programme was largely the same as in the previous years, the actions supported were broadened and the funding categories were reworked.

The 2017 programme aimed for at least a 40% reduction in energy use for buildings that fell into the income categories 1 and 2, and 70% energy use reduction for the rest of the categories. However, these values were set based on a reference building. In reality, the savings were around 15-20% (Geróházi & Szemző, 2015).

The target groups remained the same: single- and multi-family buildings and individual apartments, built before 1980, with an EPC of class D or lower, and the property value criteria also remained. The new programme supported the installation of thermal insulation on the building envelope, including the entrance and the roof, the replacement and modernisation of doors and windows, installation of external shading, and upgrade of the space heating and domestic hot water system by replacing boilers, the distribution system, and also the installation of solar thermal collectors and upgrade of the heat control system. For individual apartment applicants, the inner insulation change was also included.

The programme had a 700,000,000 EUR budget from the Greek state and ERDF funds. The managing authority was the Ministry of Environment and Energy, but this time – to solve the problem with the loan applications – the only financial partner was the Hellenic Development Bank’s Fund for Entrepreneurship and Development.

The programme this time outlined seven categories based on income. The maximum amount of funding was increased to 25,000 EUR/household, which consisted of non-refundable grants and interest-free loans. This time the loans remained interest-free regardless of the time of the application. The newly defined categories were the following:

Category	Personal annual income	Family annual income	Funding intensity
Cat. 1	PAI ≤ 10.000 €	≤ 20.000 €	60%-70% grant (+5% per children)
Cat. 2	10.000 € < PAI ≤ 15.000 €	20.000 € < FAI ≤ 25.000 €	50%-70% grant (+5% per children)
Cat. 3	15.000 € < PAI ≤ 20.000 €	25.000 € < FAI ≤ 30.000 €	40%-70% grant (+5% per children)
Cat. 4	20.000 € < PAI ≤ 25.000 €	30.000 € < FAI ≤ 35.000 €	35%-70% grant (+5% per children)
Cat. 5	25.000 € < PAI ≤ 30.000 €	35.000 € < FAI ≤ 40.000 €	30%-50% grant (+5% per children)
Cat. 6	30.000 € < PAI ≤ 35.000 €	40.000 € < FAI ≤ 45.000 €	25%-50% grant (+5% per children)
Cat. 7	35.000 € < PAI ≤ 40.000 €	45.000 € < FAI ≤ 50.000 €	0% grant, only loans

The amount not covered by the grants could be taken out as an interest-free loan. The exact percentage of the grants were decided by the funding allocator (The Development Bank) based on the applicants’ social situation. The energy inspection part remained the same, and it was made part of the application. The energy inspector after inspection filled out the electronic application on behalf of the building to make it easier for the owners.

Overall, 42,228 households were awarded, 44% of them also applied for the interest free loan. Most applicants were from category 1-2, so the programme succeeded in targeting lower income families (REELIH, 2019).

3.2.2.3 I SAVE 2020

The 2020 iteration of the ‘I Save’ programme had a budget of 900 million EUR and was co-financed from ERDF funds, the Regional Operational Programme 2014-2020 and the 2014-2020 Operational Programme Competitiveness Entrepreneurship Innovation. The main goals were to reduce the energy needs of residential buildings and decrease the pollutant emissions, while saving costs for citizens and improving the living conditions through an integrated approach of energy saving interventions. The following interventions were supported by the programme: Replacement of doors and windows, installation and upgrading of thermal insulation, upgrading and modernising the heating/cooling system, transition to renewable energy, installation of solar panels, smart home features and upgrade of the electrical features of the common areas (lighting, elevator).

Three target groups were defined in the programme: owners of individual apartments, single-family houses and whole multi-family buildings. Owners in multi-family buildings could apply individually for the funding, and patchwork renovations were allowed to execute. There were two categories in the multi-family applicants: Type A, which included the apartments in the building as well, and Type B which only included the common areas of the building.

The total budget of the interventions could not exceed 48,500 EUR/individual dwelling or 76,270 EUR/multi-family buildings. For the individual applicants there were five income categories defined, which determined the intensity of the funding. The categories were the following:

Category	Individual Income (€)	Family Income (€)	Base Rate	COVID-19 premium	Energy premium	Maximum Rate of Use
1	≤ 10,000	≤ 20,000	65%	10%	10%	85%
2	> 10,000 – 20,000	> 20,000 – 30,000	55%	10%	10%	75%
3	> 20,000 – 30,000	> 30,000 – 40,000	50%	10%	10%	70%
4	> 30,000 – 50,000	> 40,000 – 70,000	45%	10%	10%	65%
5	> 50,000 – 90,000	> 70,000 – 120,000	35%	10%	10%	55%

For multi-family buildings the basic grant rate was 60%, which was complemented by a 10% Covid-19 premium, and in the case of Type A applicants, an extra 10% energy premium. Moreover, both individual applicants and multi-family buildings situated in designated lignite areas were given an extra 10% to further incentivise transition from the use of coal. Thus, people living in the designated lignite areas could reach up to 95% of funding in grants and MFBs up to 90%. The remaining of the costs were covered by the beneficiaries.

The beneficiaries of the grants had to satisfy the minimum requirements of the ‘Energy Performance of Buildings Regulation’ as well as the additional requirements prescribed by the programme. For individual applicants and single family homes, the energy category had to be upgraded by at least three categories. The same regulations had to be satisfied by Type A MFBs as well. In the case of Type B MFBs there was no energy target, as it only covered common areas of the building, and only upgrade of the lighting, terrace, central heating and cooling plant and the elevator could have been included, the insulation of the building envelope was not allowed. Envelop may not be included (Εξοικονομω - Αυτονομω, 2020). As the results of energy savings were not satisfactory, currently only Type A programmes are running, thus the participation of individual apartments is compulsory.

3.2.2.4 I SAVE 2023

The 2023 iteration of the programme held largely the same characteristics as the previous ones. While the programme’s name is 2023 it has been running since 2020, updated in 2021 and then in 2023. The source of the funds is the Greek Recovery and Resilience Fund. The programme supports the

replacement and modernisation of doors and windows, the thermal insulation of walls, roofs and floors, upgrading the heating and cooling systems, installation of renewable energy sources for water heating, and other energy saving interventions, such as the installation of a ‘smart home system’.

Those who wish to apply for the programme cannot take part in any other simultaneously running energy efficiency subsidy programmes. The income categories and the subsidy rates were reworked again to match the current economic situation.

	Personal Income (€)	Family Income (€)	Home ownership by the applicant (grant)	Free Concession to another Person / Rental (grant)
1	≤5,000	≤10,000	75%	65%
2	>5,000 - 10,000	>10,000 - 20,000	70%	60%
3	>10,000 - 20,000	>20,000 - 30,000	55%	45%
4	>20,000 - 30,000	>30,000 - 40,000	45%	40%
5	>30,000	>40,000	40%	40%

For the amount not covered by the grants it is possible for beneficiaries to get an interest subsidised loan. In order for a household to be eligible for the programme, the dwelling must be their main residence, or a long term rental property (short term rental properties are automatically disqualified), and it has to have an Energy Performance Certificate in a category lower or equal to ‘C’. The planned renovations have to improve the dwelling’s EPC by at least three categories and ensure at least 30% primary energy saving.

For the evaluation of the applications, a weighting system was put in place. The most important factor is the planned energy saved, which accounts for 50% weighting, followed by the income factor with 14%. Applicants who are single parents, disabled, have many children or live in older buildings can receive extra points (Εξοικονομώ 2023, 2021).

3.2.2.5 PHOTOVOLTAICS SYSTEM ON ROOF PROGRAMME GRANT

The programme started in 2023 and runs until June 2024, or until the funds are all exhausted. This programme is part of the Greek Recovery and Resilience Fund’s first pillar (Green Transition). It is a programme that targets individual households and farmers with a subsidy to install photovoltaic systems with a storage system for self-consumption with the application of energy offsetting.

The programme covers up to 75% of all associated costs for the households with a non-refundable grant with the maximum amount of 16,000 EUR for households, and 60% of all costs for farmers with a maximum amount of 10,000 EUR. The programme has 238 million EUR budget that is divided into four categories:

1. 45 million EUR is reserved for vulnerable households and 10% for people with disabilities, single parents and multi-child families;
2. 100 million EUR is for households with individual income ≤ 20,000 EUR or family income ≤ 40,000 EUR;

3. 63 million EUR is for household with individual income > 20,000 EUR or family income > 40,000 EUR;
4. 30 million EUR exclusively for professional farmers or special status farmers.

The programme is managed by the Hellenic Electricity Distribution Network Operator and is only available for households and farmers who are in contract with the Hellenic Electricity Distribution Network Operator – which is the national publicly owned energy distributor (Φωτοβολταϊκά στη στέγη, 2023). The programme runs on a ‘first come first served’ basis.

3.2.2.6 SAVE / RENOVATE MY HOME - FOR YOUNG PEOPLE

The programme ran from May 2023 to November 2023. It was part of the Greek government’s wider social housing programme called ‘My Home!’. This programme had 300 million EUR budget provided by the state. The programme aims to support approximately 20,000 young people between the ages of 18 and 39 to renovate their homes and upgrade its energy efficiency status.

The programme consists of two parts: ‘Save’ and ‘Renovate’. ‘Save’ has 2/3 of the whole budget (200 million EUR), and is the first part of the programme’s implementation. 40 million EUR out of the 200 is allocated specifically for vulnerable households. The ‘Save’ programme covers interventions aiming at energy saving, such as replacing doors and windows, thermal insulation of the homes, modernising heating and cooling systems, upgrading the domestic hot water supply systems, and converting the house into a smarthome. The second ‘Renovate’ programme follows the ‘Save’ part, as in order to apply for the ‘Renovate’ programme the applicant had to be a beneficiary of the ‘Save’ programme. ‘Renovate’ has a 100 million EUR budget, and it supports a wider range of general renovations such as the renovation of the bathroom and kitchen areas, replacement of entrance door, electrical and plumbing renovations, and floors.

The whole programme aims to decrease energy consumption by at least 30% and upgrade homes by at least three energy classes based on the EPC ranking relative to the pre-intervention ranking. In order to be eligible to participate in the programme the applicants must be born between 01.01.1984 and 31.12.2005, have a tangible right to residence (full ownership/usufruct/bare ownership – of at least 50%), and meet the income criteria. For homes to be eligible for inclusion in the programme, they have to be used as a main residence, must not have been deemed demolishable and have to have a classification C or below based on the Energy Performance Certificate ranking.

The income criteria is a personal income up to 30,000 EUR and a family income of up to 50,000 EUR, in order to have the right to participate in the programme "Save", and up to 20,000 euros for their inclusion in "Renovate". Another criterion for inclusion in the programme is that applicants are NOT to be beneficiaries of the Eksikonomisi kat ikon II programme.

The programme provided non-refundable grants to the beneficiaries. The ‘Save’ programme provided a grant of a maximum of 22,500 EUR to beneficiaries that covered 45-90% of all costs based on income. The rest of the costs could be covered by an interest-free loan. For the ‘Renovate’ programme, the grants are a flat 30% of all costs regardless of income which could be complemented with a 7,000 EUR interest-free loan.

The subsidy is based on income categories that go as follows:

Category	Personal income (per annum)	Family income (per annum)	Subsidy rate ‘save’	Subsidy rate ‘renovate’
Cat. 1	<5,000	<10,000	75% (+15% for multiple children)	30%
Cat. 2	5,000 – 10,000	10,000 – 20,000	70% (+15% for multiple children)	30%

Cat. 3	10,000 – 20,000	20,000 – 30,000	55% (+15% for multiple children)	30%
Cat. 4	20,000 – 30,000	30,000 – 50,000	45% (+15% for multiple children)	30%

(Εξοικονομώ – Ανακαινίζω για νέους, 2023)

3.2.3 EVALUATION

The Greek subsidy scheme, while it started relatively late, has been constantly available since its introduction in 2011. While experts acknowledge that the demand is always higher than the money available, relatively substantial sums have been spent on it so far. Additionally, the fact that the programme reliably appears every year creates a level of stability and predictability that allow households to plan ahead. This leads to increasing interest from the residents. While before 2020 the distribution was on a first come first served basis for the ‘I Save’ programme, a point system was developed afterwards to make the awarding procedure more transparent.

Another advantage of the schemes has been their constant evolution. As time has passed, the objectives were refined as well as the targeting became more precise. There are two striking features that set the Greek subsidy programme apart from those in other countries examined in the current study: its surprising focus on dwellings and limited options for common spaces for multi-family buildings, and the nuanced targeting of poor households.

Regarding the first one, the concept of dwelling focused interventions in multi-family buildings is conceptually different from the approaches applied in most other EU countries. Thus, the subsidy content is aimed at interventions in dwellings, and subsidy for the common parts was only available before 2020. Then there was a separate application to intervene in common spaces, including lighting, roof terrace, installing central heating-cooling plant and upgrading elevators. But common spaces could only be renovated if enough apartments participated from one building. However, even then the maximum amount available was limited and the support did not include insulation at all. Insulation – both within and outside of the dwelling – has been the responsibility of individual households, as well as the change of the windows. This setup often easily resulted in a patchwork structure of the facades. There lies an interesting point to consider: while in the entire CEE region the partial insulation of the façade is out of question, the Greek case seems to suggest that under specific circumstances – not considering the negative aesthetic effects – it can be considered. On the other hand, we have to acknowledge the special situation of Greek multi-family buildings: they practically do not have district or centralised heating systems, thus it is not possible to implement common interventions, and the technical objections against patchwork style insulation might be less serious as heat-bridges are hardly dangerous under Mediterranean climate.

The second feature is its detailed income targeting that favours lower income groups while incrementally reduces the subsidy content in case of higher income, taking into account both personal and family income levels. There is a further risk reduction for vulnerable households in the form of providing guarantees for the banks, and also social preferences are built in the evaluation system. Experts suggests that the system, connected to the national tax register, is reliable, and there is little room for income fraud. Additionally, although with lower intensity, an income sensitive subsidy system is available for rental apartments as well. This duality reflects that the subsidy system flexibly adapted to the post-financial crises issues of the Greek society: the decreasing owner occupation in the housing sector necessitated the focus on private rental apartments. The success of the targeting could serve as an example for post-socialist countries, who are wary of introducing such a system.

The programme itself is a mixed grant and loan system. It is principally a good approach, and there is an obvious intention to evade some of the shortcomings, mainly how the bank’s underwriting process affects the elderly and the vulnerable groups. Since 2020 a risk guarantee scheme, which was mentioned above, was introduced to prevent their exclusion from the process. However, there seems

to be a big issue with the structure of the commercial banks' involvement in the process. Whereas originally four banks provided the loans, by now it is only one that is active in the field. Although the reasons behind are unclear, this suggests a substantial market distortion.

For different intervention types there are different price caps introduced, maximising the amount of money payable from the subsidies. While it is theoretically a very good idea, and also useful to control prices, they need to be set very wisely. Some of the caps for certain measures are low, some are OK and some are surprisingly generous. Once the cap is overstepped, the own share of the recipient increases. Despite all the precautions, it seems that to recover the losses from too low price caps constructors often issue false invoices. Moreover, there is a very low price cap for energy audit, which is a prerequisite for applications. Instead of 250-300 EUR which is officially accepted, in reality it can be around 500-1000 EUR. The difference needs to be paid by the applicant, which is a barrier for many households.

Another payment related problem regards the reimbursement of construction companies, which at the beginning happened 2 or 3 years later than when they finished the job. As a result, prices went up since the companies tried to recover the losses. Recently the system was changed and now they receive a 70% deposit.

The programme is quite balanced from a territorial point of view: the Regional Operative Programmes have designated budgets for each region. The size of population matters, but there are other variables as well. This is very important in Greece, as in case of population indicators only the metropolitan areas around Athens and Thessaloniki would receive the overwhelming majority of the budget. But the current setup means that there were special provision for the coal transition areas which had more grants than other regions.

Regarding the territorial component, it is important to note that municipalities have no role at all. Quite contrary to the cases of Romania and Bulgaria they do not get involved in the process of interventions at all, to the extent that they practically do not know what happens to private buildings in their area. There are also no one-stop-shops involved in the programme, despite the assumption that homeowners need advice even when refurbishing on their own. This strikingly different organisational structure of the energy efficiency subsidies supports the notion that once multi-family buildings are not targeted in common interventions, the level of complication decreases to such an extent that individualised approaches become viable. While vacancy is a huge issue in Greece as well - among others owners are discouraged to rent out the empty apartments due to very high taxes - it does not have the detrimental effects on building renewal like in Bulgaria, precisely because the focus of subsidies is on individual dwellings and not on multi-family buildings. (Of course, additional regulatory differences also play a role, creating a very differently functioning housing market in Greece than in Bulgaria.)

Overall, statistics suggest that the subsidies are more advantages for flats than for single family buildings. In case of a fully detached single-family house, more money is needed to intervene, but the price caps favour flats. Moreover, there are less incentives for households in rural areas, who typically burn wood to heat. Nevertheless, they can also profit from the solar panel support. The latter was also strengthened by the fact that there has been no prioritising in the photovoltaic programme of those who have already taken part in the other schemes and had a few interventions carried out. Thus, it became a programme of its own, operating on the first come first served basis.

3.3 HUNGARY

3.3.1 COUNTRY PROFILE

Hungary has a population of 9.6 million people, out of which 70% lives in cities – including 1.7 million people in Budapest. The population of the country is steadily decreasing with the natural reproduction rate being around -5.6 in 2023. This rate is relatively stable with a slight increase throughout the last decade. The aging index also shows a steady increase throughout the years being at 141.5 in 2023 (KSH, 2023).

Regarding the country's housing stock, an increasing trend can be seen in the number of dwellings, reaching 4 586 000 by 2023. In 2022 about 2.4% of the whole dwelling stock was municipally owned, the rest was privately owned, and the rate is ever decreasing. While the rate of owner occupation is very high, the respective population living in owner-occupied housing is 90%, while the remaining 10% are tenants, as was mentioned, 2.4% in municipal housing and 7.6% in private rental dwellings. Although this tenure structure has been favoured by most governments and their housing policies since the changing of the system in 1989/90, in recent years an even further push for homeownership can be seen by the government. Not only ownership is heavily favoured by the current policy environment, but it is also specifically the ownership of single-family homes that has been preferred by the government (KSH, 2023).

In 2011, 62% of the housing units were in single-family homes (buildings with 1-3 apartments), and 38% of the flats were in multi-family homes (buildings over 3 apartments) in Hungary. This division is substantially different in cities, e.g. in Budapest 20% of the apartments are in single-family homes while 80% in multi-family buildings (Census 2011).

In 2020, 34% of all primary energy went to residential buildings. 71% of all energy used in residential buildings was used for heating. Regarding heating, 52% of the energy used for heating came from natural gas, 22% from renewable sources (mostly firewood), electricity was used in 18% of the cases and district heating is responsible for 8% of the energy use in the residential heating sector (Tóth, et al., 2023).

It is estimated that over 75% of single-family houses fall into the I-G energy categories, which paints a rather sad picture of the current state of the stock (Bene et al., 2023). The average primary energy consumption per m² is 215 kWh/year with regard to residential units (ComAct d3.2, 2022). In 2021, 33% of the single-family houses were fully insulated, while this ratio is even worse for multi-family buildings. Prefabricated buildings (panel buildings) show a 44% full-insulation rate, however smaller multi-family buildings are only at 26%, and larger multi-family buildings perform even worse – as low as 16% of the buildings are fully insulated.

There is no specific national energy poverty definition in use in Hungary, the operational definition is under conceptualisation at the Ministry of Energy. On the other hand, there were several efforts to measure the scale of the problem. E.g. Energiaklub - an NGO - applies the following term: *“A household is considered to live in fuel poverty if its members are unable to keep their home adequately warm, or when the cost of adequate heating constitutes an unreasonable burden for the household.”* According to the Energiaklub, 10-21% of the households – or somewhere between 380 000 – 800 000 households – live in energy poverty. Three quarters of the energy poor households live in single-family homes, mainly in rural areas and villages (energiaklub.hu). In case we apply some common indicators used in the European Union, we can see, that Hungary has an average position compared to the other EU member states, e.g. having 8.7% of the population not being able to warm up their homes, or 7.3% is declared to have arrears in paying utility bills - EU SILC 2023.

Energy poverty is relatively moderate (except for the extreme cases in rural areas) partially due to the capped prices of electricity and gas since 2013. This cap was partially released in August 2022. From that date the price cap remained up to a certain consumption level (2,520 kWh/year; 1,729 m³/year), while above that the price became about seven times more in the case of natural gas and about two

times more in the case of electricity. District heating is completely exempt from the modification in capping. Mostly the family houses are affected by the change of the capping of prices, while apartments in multi-family buildings hardly experienced any effects. On the other hand, the renovation of family houses is much less complicated from an organisational point of view, as one (or few) households have to make a decision based on their needs and means. In case of multi-family buildings the decision is taken by the community of owners who may have very different financial situation and technical preferences.

Condominiums and cooperatives are existing entities from the beginning of the XX. century in Hungary, that is why their legal background is stable. The most recent regulation is from 2023 (Act CXXXIII of 2003 on Condominiums). The act states that the condominium manager is responsible for the main management and maintenance of the building, and for convening the assembly of the owners at least once a year. Each building has to establish their Organisational and Operational Rules at their first assembly, which sets out the exact responsibilities of the condominium manager, the assembly of the homeowners, and the modes and requirements for joint decision making. The required ratio of homeowners voting “yes” for renovations is set out in the OOR of the condominium (Act CXXXIII of 2003 on Condominiums), but in general 50%+1 of the ownership share being present in a General Assembly is enough. Despite well-known difficulties, the last 30 years have brought the stabilisation and professionalisation of the housing management system. Importantly, from an energy efficiency point of view - unlike in Bulgaria and Romania - it is the entire condominium that belongs to one housing association, and not one staircase, which means that the organisational unit is equal to the technical unit of intervention.

PICTURE 2. PHOTO OF A PANEL BUILDING IN BÉKÁSMEGYER, BUDAPEST (BY ÉVA GERŐHÁZI)



3.3.2 DESCRIPTION OF THE SUBSIDY SCHEMES

There were several smaller and bigger programmes supporting residential energy efficiency in Hungary in the last two decades. Hungary was one of the first countries to start with energy efficiency investment programmes. In this study we concentrate on the larger scale building renovation programmes leaving out smaller scale interventions (e.g. the ones targeting the upgrade of district

heating systems inside the buildings - ÖKO programme - or grants for smaller buildings below 12 units in 2011).

The first programme supporting the energy efficient renovations of multi-family buildings started in 2001 in Hungary. It targeted multi-family buildings built with industrialised technology, including the panel buildings, but not exclusively them. This programme required 1/3 self financing, and the rest was covered by the state and the municipality.

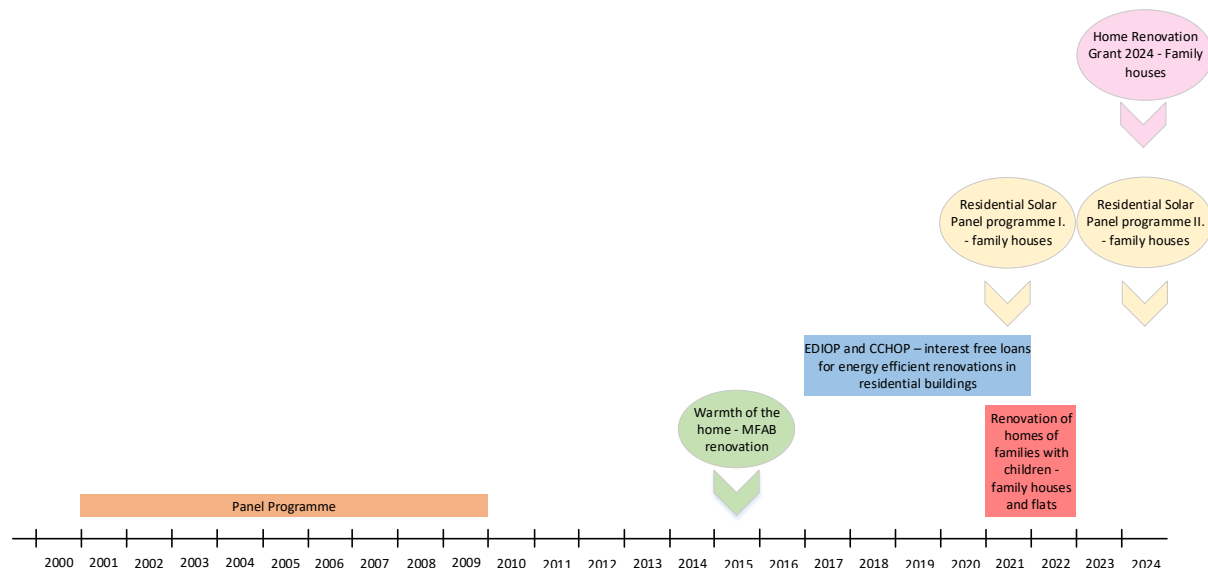
The programme lasted until 2009. The next bigger renovation programme started in 2015, as part of a general energy efficiency renovation programme called 'Warmth of the Home'. This programme covered up to 50% of the costs, however the final subsidy was calculated based on the kgs of CO2 saved.

After a significant break, in the 2014-2020 EU programming period, another programme started that targeted both single- and multi-family buildings. It was financed by the Economic Development and Innovation Operational Programme and the Competitive Central Hungary Operational Programme in Budapest and Pest county, and it provided interest free loans for beneficiaries to renovate their homes and make them more energy efficient. This programme required 10% own-share.

In 2021, as part of the Recovery and Resilience Facility, a programme for installing residential solar panels on single-family homes' roofs was started. The programme provided 100% non-refundable grants for beneficiaries and appeared again in 2024 in the form a 66% subsidy.

In 2024 a new programme has just started (1 of July) for energy efficiency renovation of single family homes as part of the REPowerEU agenda. It is planned to provide a mixture of grants and loans.

FIGURE 4. TIMELINE OF SUBSIDY SCHEMES IN HUNGARY



3.3.2.1 PANEL PROGRAMMES - PROGRAMME FOR THE ENERGY MODERNISATION OF MULTI-FAMILY BUILDINGS BUILT WITH INDUSTRIAL TECHNOLOGY

The programme's idea was born in 2000 and the programme officially started in 2001. The aim was to improve the conditions of the old housing blocs built with industrial technology from the 1960s on. The programme ran until 2006 in its first iteration and was later revamped in 2008. The programme supported the renovation and insulation of the building envelope, replacement and modernisation of the doors and windows, modernisation of the water- and space heating systems, the ventilation systems and the electrical systems in the common areas such as lifts and lighting. The building engineering processes only could take place after the building properly underwent the insulation or

was previously done from private sourcing. The 2008 call was the first to contain the use of renewable energy sources – from that on, the applicants could use the funds for the installation of solar panels, biomass, and heat pumps. From 2009 on, the programme contained a multi-layered support system for deep renovations.

The financing was 1/3 from the state budget which was complemented by another 1/3 from the municipalities. The remaining was paid by the owners and the buildings' budget. In addition, the at least 1/3 own share of the communities was frequently financed by a loan, that contained interest rate subsidies⁴ coupled with the Bausparkasse (Lakáskassza) scheme, which in reality resulted in additional interest free loans. While the financial contribution of local municipalities was compulsory in the first years, it changed over time, and the building communities could apply directly for funding to the state.

Besides providing 1/3 of the costs, the municipalities had an intermediary role till 2008: they collected, pre-selected and submitted the applications to the state authorities in those cases where they co-financed the projects. Many of the municipalities went far beyond these responsibilities and in addition informed and encouraged the communities.

The technical terms and conditions changed a lot throughout the programme. In 2001 the applicants only had to submit a form detailing the energy expenditure and usage of the building before the renovation and the expected change, however there was no need for official auditing or proof of the calculations. From 2003 on, detailed calculations had to be included in the application. The methodology of the calculations, however, was not specified. From 2004, the regulations became stricter, the application guidebook detailed all the necessary data and calculations that had to be provided as well as the necessary certifications of materials. This was also the first iteration of the programme where the applicants were ranked based on the expected savings. In 2005-2006 the programme became even more strict with the necessary provision of data becoming even more specific. Up until this point there was no sanctioning if the results of the renovation differed from the data specified in the application. As there were no requirements on complex interventions, it was quite usual that the same building applied for the subsidy multiple times.

The 2008 revamping of the programme contained an element where the energy provider had to validate the data provided by the buildings and a monitoring element was also introduced. From 2009 on, the initial calculations and planning had to be done by a certified professional. The 2009 call was part of the government's Green Investment System. It was complemented by a 'climate bonus' where beneficiaries could achieve a maximum of 60% state funds instead of the 1/3 if they achieved an at least C energy class upgrade. This was to motivate complex deep renovations.

The Panel Programme stopped in 2009 (however payments were made from that source years after that) due to the financial crisis.

Throughout the programme's run from 2001 to 2009 more than 270.000 flats were renovated, and the funds of 2009 used up to 2011 resulted in additional 60-70,000 projects (however, we have to be careful as buildings applying multiple times could be calculated multiple times as well). The state provided nearly 90 billion HUF over time, which was complemented by municipal resources (Geróházi et. al 2011).

⁴ Since 1988, the state has provided an interest rate subsidy for the renovation of common parts of condominiums and cooperatives in case the community accumulates enough funds in its reserves. At the time of the Panel Programme (and currently as well) the subsidy is 70% of the interest rate in the first 5 years, and 35% in the second 5 years. From 2004-2005 the commercial banks developed new products to combine the Bausparkasse programmes with the interest rate subsidies to reach a nearly interest free loan. The main attribute of the invention was to ease the collateral system: pledging the account of the condominium or cooperative was generally enough to take a joint loan. It was a real novelty as previously individual liens were applied to private apartments.

The government in 2005 calculated that the renovation costs are about 1.200.000 HUF/apartment, making all 1/3 financing part 400.000 HUF. As the self-financing was considered too much of a financial burden for the owners, the government introduced the Panel Plusz loan programme where the owners could take out a 15 year loan with 5-6% interest. This programme did not work, however, as owners could find better loan deals on the market at the time (Magyar Energiahatékonysági Intézet, 2020).

3.3.2.2 RENOVATION PROGRAMME 2015 – ('WARMTH OF HOME' FRAMEWORK)

The Panel Programme was set to be renewed in 2013, however it never started. Instead, on 30 April 2015 a general multi-family residential energy efficiency renovation scheme was launched under the name 'Otthon Melege' ('Warmth of home') that was targeted for buildings between 4-60 apartments. It was extended to buildings built by traditional - and not only industrialised - technologies.

The government set 10 billion HUF (appr. 31.8 million EUR) aside for the programme and promised a 50% subsidy intensity in funding (finally the subsidy was raised to 11.3 billion HUF). The programme supported the insulation of the building envelope, modernisation of doors and windows and replacement of the heating system with a more energy efficient one and the installation of renewable energy sources for water heating. The goal of the programme was to improve the energy classification: if the building previously was below category 'C', it had to reach 'C' with the renovations, if the building had a previous classification of 'C' or above, it had to improve at least 2 categories. The payment of the state grants was done in two installments. 95% was paid upfront and 5% was paid afterwards, if the numbers on the energy saved checks the boxes previously expected.

The intensity of the financing was 50% max, however there was a finer scheme in place to determine the grants. The scheme provided funding based on the saved CO2 kg/year.

- 750 HUF/kg for replacement of doors and windows and insulation of the envelope.
- 950 HUF/kg for installation of renewable energy sources
- 450 HUF/kg for any other action not in the above two categories.

For buildings with individual heating systems, an extra 150.000 HUF/apartment was given for the modernisation of the heating system. However the maximum amount of the non-refundable grants was 50% of all costs. It was also specified in the call, that the buildings had to undertake a complex renovation as this was determined by the government as the most energy efficient and saved the most (which means that the renovation had to reach the energy criteria set in the TNM decree of 7/2006).

The grants could be used to pay for energy audit, certification, planning, permits, and insulation of the envelope, replacement of doors and windows, modernisation of building engineering systems, heating systems, installation of renewable sources (Nemzeti Fejlesztési Minisztérium, 2015, Magyar Energiahatékonysági Intézet, 2020). The goal was to implement renovation of buildings accommodating about 20,000 dwellings. Finally 447 projects were supported, which accommodate about 14,000 households.

The call was very popular, its resources were used up in some days, which presupposes that those buildings were able to apply which prepared all the documentation in advance.

The case of Ajka

Ajka is a mid-size city in Western Hungary with 26,000 inhabitants. $\frac{2}{3}$ of its housing stock consists of multi-family buildings mostly built by industrialised technology.

Ajka is a great example that shows both the political support a municipality can lend to an existing national programme locally, and the barriers such a municipality faces should it want to continue supporting rehabilitation without national subsidies.

The municipality of Ajka played an active role in supporting the renovation of the multi-family buildings since the launch of the Panel Programme in 2001. It provided $\frac{1}{3}$ of the renovation costs even at those times, when it was not compulsory and the homeowners' associations had the possibility to apply for funding directly to the state. Between 2003 and 2009 the municipality spent 677.7 million HUF to support the multi-family buildings, which affected 133 multi-family buildings out of the 231 buildings that are located in the town. The municipality also provided co-funding in the 2015 call (Warmth of Homes), when the municipal contribution was not at all requested. In addition, the municipality has run separate programmes to support buildings built by traditional (not industrialised) technology and also run a programme to finance non-energy related interventions. It also launched a large-scale renovation subsidy call in 2019 and also in 2024 from its own funds.

All together renovations with a total budget of 6.1 billion HUF were implemented in the town between 2003-2024, out of which the municipality provided 2.37 billion HUF. 87% of the multi-family buildings underwent either energy efficient or structural renovations.

The success of the municipality is based on a strong political commitment of the mayor for decades. This approach has advantages and disadvantages. The residents of Ajka could rely on the support of the municipality in a predictable way, and consequently for today nearly all multi-family buildings are renovated up to a certain extent. The price is paid by the municipality, which had to take substantial loans and made a preference towards multi-family buildings against e.g. public buildings. The municipality also defined its own preference regarding the technical content of the renovations: In case of co-financing the state subsidies the technical standards were set by the state. In the case of local schemes however the main goal was to make visual improvements of the buildings to improve the urban landscape, that is why painting of facades without insulation were implemented as well, and the energy efficient interventions were allowed to be realised on a lower standard.

3.3.2.3 EDIOP AND CCHOP – INTEREST FREE LOANS FOR ENERGY EFFICIENCY RENOVATION OF RESIDENTIAL BUILDINGS

Both the Economic Development and Innovation Operational Programme and the Competitive Central Hungary Operational Programme contained a similar programme for the energy efficiency renovation of residential buildings. The CCHOP provided a scheme for Central Hungary – namely Budapest and its surrounding Pest county -, while the EDIOP provided a scheme for the rest of the country. These operational programmes were part of the 2014-2020 programming period of the EU. The programmes provided an interest free loan to support energy efficiency renovations and the installation and implementation of renewable energy sources. The subsidy content of the interest free loan was calculated as 48.84% in the course of a 20 years duration.

The CCHOP originally allocated 14.696 billion HUF (approx. 47 million EUR) and the EDIOP allocated 78.19 billion HUF (approx. 250 million EUR). The target group of the programmes were natural persons, condominiums, and housing cooperatives. There was a maximum share of the financial

framework defined that could be used for multi-family buildings, this share was 50% of the resources in the case of EDIOP while 25% in CCHOP.

The actions supported by the programme were the insulation of the building envelope, the modernisation of doors and windows, shading of the building (only if other actions also executed), modernisation of heating systems and ventilation systems, replacement of lighting systems (only if other actions also executed), installation of solar panel systems and heat pumps. In addition the funds could be used to support the planning and preliminary actions of the renovation. A maximum of 8.5% of the whole amount could be used for project preparation, management, and the technical inspection.

In the case of the CCHOP the loan could be between 500.000 HUF and 10.000.000 HUF for natural persons and 500.000 and 7.000.000 HUF per flats for condominiums. In the case of the EDIOP the amount for natural persons was the same, and for condominiums and cooperatives the amount was between 250.000 HUF and 7.000.000 HUF per flat.

At least 10% of the total costs had to be covered by self-financing both in the case of natural person beneficiaries and condominiums and cooperatives. The loans had a maximum 20 year run time. The provision of the loan was coordinated by the Hungarian Development Bank (MFB) but the loans were directly provided by so called 'MFB points', which were commercial banks that were selected in a public procurement process. The clients had to approach these commercial banks, that followed the underwriting process designed by the Hungarian Development Bank.

The application process run from April 2017 to December June 2022 in case of CCCHP and till December 2022 in case of EDIOP. The projects had to be completed by the end of 2023.

Based on the evaluation of the programme (Trenecon, 2023) 13 billion HUF (approx. 34 million EUR) was used in the Central Hungarian Region and 115 billion HUF (approx 300 million EUR) was used in the rest of the country, affecting 4,014 families in the Central Region and 23,026 in the cohesion regions. The programme had a slow start, but after the processes were cleared and the the clients got know about the possibility, it became popular, which is reflected in the increase of the final budget in the cohesion regions. Based on that the average size of interventions were around 4 million HUF (approx. 10,000 EUR) and were concentrating on installation of solar systems, insulation, modernisation of heating systems and heat pump systems. We know from interviews and background studies, that the vast majority of the funds were used for installing solar panels to family houses, and only very few condominiums or cooperative buildings benefitted from this opportunity - only about 60 in the convergence regions (HUGBC, 2023).

3.3.2.4 RENOVATION OF HOMES OF FAMILIES WITH CHILDREN

This programme was an addendum for the 2015 'Warmth of the Home' programme. It did not specifically target energy efficiency renovations but had a rather wide scope of actions supporting any kind of renovation starting from general renovation and small-scale interventions, however it was partly utilised to undertake energy efficiency renovation projects. The actions supported were the following: insulation of the home, modernisation of heating, new gas boiler installation, roof renovation, replacement of doors and windows, installation of solar panels, carpentry, kitchen and bathroom renovation, construction of stairs and gallery. As the lists reflects: interventions might have been made inside apartments and family houses but not in the common parts of multi-family buildings as the targeted beneficiaries were not the buildings, but the households.

The project targeted families raising at least one child⁵, and provided a grant of 50% of the renovation costs up to 3 million HUF (approx. 8,500 EUR) retroactively. As the grant is paid after the renovation is completed, the state also introduced a state supported loan - 3% interest rate - to help the households to pre-finance the interventions. The programme started in January 2021 and run till December 2022. Only renovation measures starting after the 1st of January, 2021 were eligible for the programme. The grants could be used for material costs and labour costs as well in a 50-50% distribution. The reimbursements were paid by the Hungarian State Treasury and the programme was coordinated by the Minister without Portfolio for Families.

770 billion HUF (approx. 2.2 billion EUR) was spent on the programme, and about 380,000 households benefited from it. Thus this programme was far the largest renovation scheme in the last decades. However, since the programme's scope was not strictly energy efficiency, no criteria was set about the potential energy saving or energy rating improvement as a result of the renovations. (Portfolio, 2023)

3.3.2.5 RESIDENTIAL SOLAR PANEL PROGRAMME

The programme started in 2021 and provided 100% non-refundable grant for beneficiaries for installing solar panels. The programme was planned to be part of the Recovery and Resilience Facility - however the vast majority of the sources of RRF are still not provided to Hungary, so practically this programme was state funded.

The programme supported two actions: The installation of solar panels on rooftops to cover the building's own consumption; and the installation of solar panels on rooftops coupled with the electrification of heating system with heat pump, installation of electricity storage and replacement of doors and windows.

The beneficiaries were natural persons living in single-family homes with ownership of the dwelling with a maximum taxable annual income per head of 4.85 million HUF in the 2020 year (which was around the average income of that time). Applicants could receive extra points in the evaluation system if they had kids, and if the building was in specific disadvantaged regions.

The amount of the grant ranged between 2.9 and 11.3 million HUF. (max 2.9 million in the case of the first action and max 11.3 million in the case of the complex second action).

The grants could not be used for payments for already existing systems or expanding an already existing system. The maximum capacity of the installed solar panels was 5 kWp in order to avoid the overproduction of solar energy to the grid (napelem.palyazat.gov.hu, 2021).

Initially the project was expected to provide grants for 34 920 families with 11 600 of them receiving the higher support for complex renovations. According to the data from May 2024, this goal was more or less achieved, as nearly 36,000 households was granted with a subsidy amount of 124 billion HUF (appr. 322 million EUR). However only one third of the amount was already paid to the beneficiaries, and 65% of the grantees got at least the pre-payment. (HVG, 2024)

Besides the delays in payment another relevant critique formulated by experts was about the combination of solar panels and electrification of the heating system, which - even if the change of doors and windows were subsidised as well - resulted in unsustainable heating systems by heat pumps

⁵ The child-raised element in the programme ranged from the 12th week of pregnancy to 25 years-old as long as the residency of the child in question is the same as the parents. If the child has any disability, there is no maximum age limit for the programme. If parents raise their kid(s) separately, the grant is also divided among them.

due to the lack of insulation of the buildings. As heat pumps do not provide proper heating in cold winters in case the building envelope is not sufficient.

Due to the delays in payment not all the contracted installations were completed. Still, from January 2024 a new subsidy system started (Solar Panel Plus Programme), which provides 66% grant, but not more than 5 million HUF (12,600 EUR) for the installation of solar panels and batteries. As the grids are not in a proper condition to be fed by individual solar panels, the goal was to install self-sustainable systems that do not need the grid as their 'battery', thus it was obligatory to install individual batteries for all supported households. Even though the installation of solar panels is not as favourable financially as it was before January 2024, as due to the new gross accounting of solar energy the flow of energy between the household and the energy provider is accounted every month and not annually as before, the interest for this grant is quite substantial, reaching about 32,000 applications by September 2023.

3.3.2.6 HOME RENOVATION GRANT 2024

Acknowledging the fact that family houses in general have worse energy parameters than multi-family buildings the government currently launches a subsidy scheme to implement energy efficient renovations in family houses.

The programme started on the 1 of July 2024, as part of the REPowerEU pillar of the Recovery and Resilience Facility. The whole budget of the programme is 108 billion HUF (approx. 280 million EUR), and it is planned that it will contribute to the renovation of at least 18,000 family houses built before 1990. The programme is a mix of a non-refundable grant and a subsidised loan. The amount of the grant depends on the income and location of the beneficiaries. The lower the income the higher the non-refundable grant is, and beneficiaries living in more disadvantaged settlements can also receive higher grants. The grant's amount varies between 2.5 million HUF to 3.5 million HUF (6,400 EUR to 9,000 EUR) based on these indicators. The rest, up to 2.5-3.5 million HUF, is covered by an interest free loan instrument that serves as the basic funding of the programme and can be taken out from the selected commercial banks, and have a 12 years duration. The grant acts like a bonus: the whole amount (6 million HUF) has to be taken as a loan, and the grant part is paid in case the energy audit shows that the minimum amount of energy is saved. (This minimum requirement is 30%.) At least 1 million HUF as a down-payment is requested, and of course the beneficiary has to cover the extra costs, if the investment goes over 7 million HUF (approx. 18,000 EUR).

The share between the grant and the loan depends primarily on the location of the house. Whole Hungary is divided into 3 categories that influence the amount a beneficiary can receive in grant: the first category is where the average income is below 75% of the national average, the second is where it is between 75% and 110%, and the third category is where it is above 110%. The maximum grant's amount is 3.5-3-2.5 million respectively. Inside these areas, that beneficiary can receive the highest amount of grant in case the head of the household and his/her partner's average income is below 399.840 HUF/month and the least share if it is above 742.560 HUF/month (the average gross income in Hungary in May 2024 was 658,400 HUF/month, while the median income was 491,900 HUF/month).

The criteria for the dwelling participating in the programme are that it had to be built before 1990, serves as the residence of the beneficiary at least since July 1st 2024, it is listed as a single-family residential building and there is no registered economic activity at the address.

The renovations have to be preceded and followed by an energy audit to determine the energy saved. The minimum target of the primer energy saved is 30%. If at least 40% energy is saved, the beneficiary can receive an extra 5% in grants.

The programme covers four types of activities: 1) external insulation of the building envelope, 2) replacement of doors and windows, 3) modernisation of the heating system, and 4) modernisation of

the water heating system. Maximum 5% of the costs - so 350 000 HUF can be used for the planning and authorisation of the plans.

The application window opened on the 1 of July 2024 and planned to close at the end 2025. The loan contracts have to be signed until April 2026, and the renovations have to be completed in 2 years after the signing of the contract. The programme is evaluated on a first come first serve basis (otthonfelujitasi-tamogatas.hu, 2024). Approaching the end of 2025 about 10.000 energy audits were implemented, which is substantially less than expected. This slow take up might be explained by the complexity of the programme (e.g. audits, list of eligible construction materials to choose from, income documentation) which requires new skills from the final beneficiaries but also from the commercial banks. It is expected that from the beginning of 2026 there will be procedural changes to make it a bit less complicated and easy to handle.

3.3.3 EVALUATION

Hungary was the frontrunner of renovation schemes in Central and Eastern Europe since public subsidies for energy efficient interventions of residential buildings have been available for more than 20 years. However they have been neither predictable regarding their financial scope and method nor their technical requirements (e.g. installation of solar panels was subsidised by interest free loans, then by 100% grants). Furthermore, this meant randomly upcoming new streams of subsidies and years without any accessible state support. This uncertainty has had a perverse impact on the market. As a result, 1) for property owners postponing their investments has become a rational strategy, waiting for a new subsidy to come. This waiting period is further supported by the heavily subsidised energy prices, limiting household incentives to engage in/speed up renovation; 2) when the subsidy came the construction prices became irrationally high as all actors tried to increase their margins.

Looking through the main subsidy schemes one by one, the main conclusions are:

- The Panel Programme had a slow start but as some commercial banks developed special products to co-finance the own shares, and the municipalities were able to raise awareness among the homeowners' associations, it became very popular. Energy poverty was not considered at all that time (between 2001-2009), but as the own share was quite low (by coupling different state subsidies) and partial interventions were also allowed, the programme was quite accessible even by poor households. Not primarily the income level of individual households but the capability of homeowners' associations was the decisive factor to be able to take part in the renovation process. The programme also showcased the importance of local municipalities: not the settlements with wealthier inhabitants were successful, but the ones where the municipality devoted a lot of money for co-financing and informed and organised the communities. The funds for the subsidy scheme were not enough after it became popular. This is demonstrated by the short call in 2015, when the budget was used up in a few days. From a technical point of view the requirements became stricter and more complex. In 2015 the buildings had to have energy audits as part of the application and as a result of the interventions had to meet the complex energy standards set in a government decree (7/2006 TNM decree).
- The interest free renovation loan from EU sources was a success as well, but the vast majority was used to insert solar panels onto family houses and the interest free loan on a 20 year term combined with the possibility of annual balance of payment with the electricity providers resulted in a financially very beneficial project for family house owners. This very advantageous situation can question the necessity of public subsidies for solar panels. However, the new monthly billing procedure yet again alters the situation.

- The 100% subsidy for solar panels was also a public gift, taking into account that the solar panel projects had a return of 5-10 years at that time. On the other hand this was the first project with a visible social focus, by providing subsidies only to those families with an income below a certain threshold (close to the national average). One of the components of the subsidy scheme included not only the installation of solar panels, but also the electrification of the heating system by heat pumps and the replacement of doors and windows. This concept could have been a major step towards reducing energy poverty. However, technicians argued that installing a heat pump system without primarily decreasing the energy need by insulating the facades is a trap and results in serious lock-in effects. While the subsidy system was also very popular, it had to be financed solely from national funds due to the unavailability of the Recovery and Resilience Fund. As a result, it had problems with the transfer of subsidies. Most of the payment is still pending, causing serious cash-flow problems for solar panel installers some of which went bankrupt consequently.
- The predicted new subsidy, starting on the 1 of July 2024, concentrates on family houses and excludes multi-family buildings. It is also sensitive to household income level, thus theoretically could be a supporting tool for poorer families. However, the fact that families had to be credible for the whole investment amount (as the subsidy comes as the investment is completed), and the real estate must provide proper collateral for the loan, may create a barrier for many low income families in remote areas. Nevertheless, it may bring in benefits for even lower-middle class households. Technicalities might also raise some questions, as in case of facade insulation 'major renovation' is implemented, which require a low energy consumption to be reached (between 150-110 kWh/nm/y), which may increase costs well over the 'optimal' 7 million HUF, requiring much more down-payment from the families.

Overall we can see that in the first period energy efficiency interventions concentrated on prefabricated multi-family buildings, which was the case in the Central-European region, considering the panel housing estates as a post-socialist heritage, where most of the people live. In Hungary, also the scale effect was considered to be an advantage for the big buildings, which could have been renovated with very similar technologies. Nevertheless, it is important to emphasise that the technical requirements of the time were relatively low: many buildings ended up with 5-8 cm insulations. Additionally, no complexity was required, it was acceptable to do only one intervention. The system opened up gradually towards buildings built by traditional technologies in 2015, reaching family houses, which became much more central from 2017 and currently are the sole beneficiaries. There is no clear explanation for this change. The Long Term Renovation Strategy of Hungary (2021) and the technical surveys behind have shown that family houses in general have much worse energy efficiency conditions than that of multi-family buildings and many of them can be renovated in a cost-efficient way. The other explanation might be quite political: the current right-wing political system favours the rural areas against the urban centres, where the majority of the family houses are located.

Regarding the role of homeowners' associations (HOAs), we can say that they have always been treated as partners in the Hungarian system. (This is rather different from the Romanian and Bulgarian approach.) Even though the municipalities played a key role in the early years of the Panel Programme as co-financers and pre-selectors, but even in these cases the HOAs had to apply for the funding and implement the renovation process. It was never considered to take away the responsibility from HOAs. As a result, market-friendly solutions were applied, where often either the construction companies or specific tendering companies worked on the application for a fee. Similarly, soon after the launch of the Panel Programme a few commercial banks offered new products for multi-family buildings with much better collateral conditions than before (forgetting about individual loans and liens). This new loan product was the booster of the Panel Programme, calling the attention of the role of commercial banks as complementers of grant programmes.

In the course of interview processes of the last decades MRI collected some major observations of the programme implementers with regard to the difficulties they faced:

- The complexity of applications in the state run programmes was hard to follow by HOAs. Local municipal subsidy schemes had much simpler requirements. On the other hand state schemes had higher technical standards and had to meet EU related administrative requirements as well.
- The technical requirements may increase the access barriers: in case major renovation is implemented (that affects at least 25% of the facade) then the renovated building has to meet the energy parameters set in government decrees. (According to the latest one the building has to reach the standard between 150 and 110 kWh/m²/y). Property managers reported that they were retained to start insulating the facade as it would have required substantial interventions in the heating system to reach the obligatory level, which would have increased the costs unrealistically. Thus even the insulation did not happen. While for some buildings (like most of the prefabricated ones) this shift can be reached by the insulation of the envelope, other buildings built by traditional technologies, or even most of the family houses can not meet the requirements without complex and expensive interventions. In the former state subsidy systems these requirements were not thoroughly checked (except the one of 2015), but the conditions in the new family house subsidy scheme require audits before and after the interventions, through which this requirement will be enforced. The question is how it affects the less affluent family house owners.
- Commercial banks have a diverse position in the renovation market as a result of the subsidy schemes. While grants were used, the ones that required the provision of own shares, the commercial banks competed in developing new financial products. In case the subsidy comes in the form of interest free loans, those banks have the privilege, that are selected by the state (through public procurement), and the others lose part of their residential market potential.

3.4 ROMANIA

3.4.1 COUNTRY PROFILE

According to the National Institute of Statistics, Romania's population was 19 million in 2023. 52% of the population lives in an urban area, and 48% of the population lives in rural areas. The population is declining at a rate of -0,38% per year. While the urbanisation is not considered either high or growing in Romania, it can be observed that the urban population's decline is a little slower, around -0,2% per year (NIS, 2023).

Romania had about 8.3 million housing units in 2021, with 95% of them being owner-occupied. About 65% of the housing stock is single-family housing, and 35% are in multi-family buildings. In cities, however, around 80% of the units are in multi-family buildings whereas in rural regions 98% of the units are single-family buildings (Eurostat, 2023).

The rate of private ownership is also very high in Romania, in 2021 only 2,6% of the population lived in municipal housing, about 3% in rental units, while 95% was owner-occupied. About 40% of the Romanian housing stock is overcrowded, which shows an improving trend in recent years, however it is still well over double of the EU average (Eurostat, 2023).

Majority of the Romanian housing stock is outdated – over 85% being built before 1990, and due to the lack of proper maintenance, their condition only worsened over time. In a 2022 EU wide survey (EU-SILC), 10% of the households reported having leaking roofs, damp walls, floors or foundations, or rot in window frames or floors. Lacking access to public utilities is also quite a big problem in Romania. The lack of access to basic public utilities is by far the highest in the EU with 21% of all residential dwellings (the second being Bulgaria with 7%). And access is also not guaranteed with newer constructions; data shows that about 63% of houses built in rural regions between 1994 and 2018 had no sewage access at their completion (this ratio was 16% in urban areas) (Eurostat, 2023). About 7%

of the Romanian housing stock does not have connection to the electric grid and in rural regions ~80% of households rely totally on wood for heating. In a survey of 2019 43.4% of respondents said they heat their homes during winter by the use of wood, coal, or natural gas stoves, 35.7% have their own natural gas boiler, 13.5% benefit from district heating (at block or neighbourhood level), and only 1.8% use an electric heating system. The remaining indicated 'other sources'. Those who currently use wood, coal or gas are the keenest on changing their heating system (NIS, 2023). It is important to note that the already developed district heating system has seriously collapsed in main cities. Many of the housing units disconnected and turned to individual gas boilers. That is why maintaining the district heating systems technically and financially remains a major challenge in bigger cities.

Law 226/2021 regarding the establishment of social protection measures for vulnerable energy consumers (Sept.2021) includes a new definition of energy poverty as "the impossibility of the vulnerable energy consumer to cover its minimum energy needs". According to the most common indicators used in the EU, energy poverty affects about 28% of the Romanian population, meaning about 5 million people cannot adequately heat their homes in wintertime (10%), or have difficulties with paying energy bills (7%). Preference for vulnerable consumers is reflected in energy price setting. In the course of the energy crises of 2022-2023, a price ceiling scheme for electricity and natural gas was introduced (April 2022 – March 2023) extended with small changes for stimulating consumers to save energy (September 2022 – August 2023): the final price charged by electricity suppliers was limited to a) max. 0,68 lei/kWh (approx. 0.14 EUR /kWh) for domestic customers whose average monthly consumption was less than 100 kWh during 2021; b) max. 0.80 lei/kWh (about 0.16 EUR /kWh) for customers whose average consumption was between 100-300 kWh per month in 2021 (from September 2022, the price ceiling was limited to monthly consumption up to 255 kWh). For natural gas, the price charged by gas suppliers was max. 6 cents/kWh for domestic consumers. Extension of capped prices for vulnerable customers until 2025 (September 2022 – March 2025) remained. (SocialWatt, 2023)

While the renovation of single-family houses is a decision of the households themselves, the renovation of multi-family buildings require coordinated decisions of the community. That is why the operation of HOAs is crucial to understand. In Romania condominiums are managed through the homeowner's association, which is an autonomous non-profit legal entity that is regulated by laws. It can impose obligations on all owners and enforce those obligations. For the renovation decision, $\frac{2}{3}$ majority of the owners, being present at the General Assembly, is needed - previously it was 100%. In Romania the homeowner's associations cover only one staircase, that is why it is possible that while there are renovation measures implemented in one staircase, the one next to it may remain non-renovated. It is also visible in Romanian cities that insulation frequently happens in a patchwork style: some flats are insulated while others are not. This habit was very frequent 10-15 years ago, while it is already forbidden by law (according to some interviewees, this patchwork type of intervention is still possible but not in case of state subsidy schemes.) In smaller cities the management of the HOAs are mostly implemented by the owners themselves, while in bigger cities the management is contracted out to specialised companies.

PICTURE 3. PHOTO ON A TYPICAL BUILDING IN FERENTARI HOUSING ESTATE IN BUCHAREST (BY ANDRÁS EKÉS)

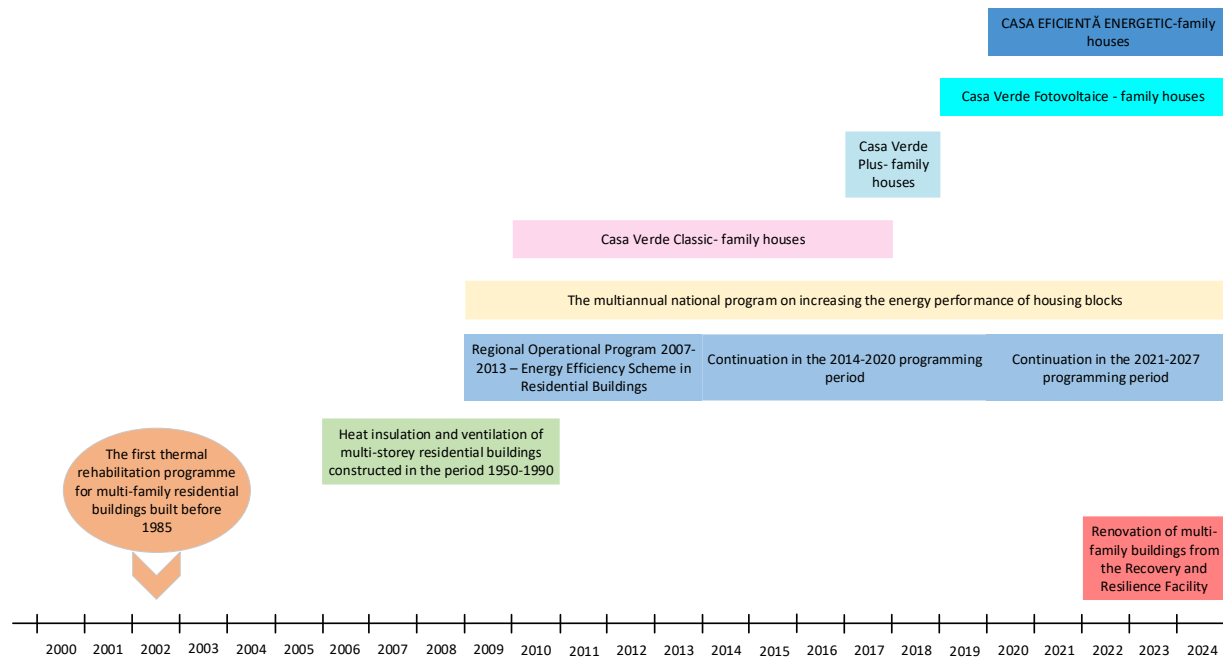


3.4.2 DESCRIPTION OF THE SUBSIDY SCHEMES

The Romanian government first started dealing with energy efficiency building renovations in 2002 when the first thermal rehabilitation programme was created. It targeted multi-family buildings built before 1985. However, due to the unfavourable conditions (too low subsidy content), the programme was not a big success. Learnt from the lessons of this programme, in 2006 the first Energy Action Plan with a renovation programme was created. The required own share however still remained too high in this programme, so the expected results were not met. From 2009 on, the government adapted a dual programme strategy, which up until now allows two types of concurrent programmes running, one financed dominantly from EU sources distributed through the Regional Operation Programmes (ROPs)/Recovery and Resilience Facility, and one continuous programme financed from the state budget. These programmes also target primarily the common parts of multi-family buildings, and try to overcome the barriers of the first programmes. Currently the self-financed shares are very small, most of the costs are covered by state/EU grants or by municipal support. The EIB also provides loans to municipalities to help them finance the renovations done within their territory. It is interesting to note, that even the most experienced experts consider that the first subsidy schemes started around 2010 with the ROPs and the national funding scheme, and there is very little memory about the pilot programmes of the 2000s.

Romania also has several programmes targeting single-family homes. The Casa Verde (basic, plus, photovoltaice) and Casa Eficientă Energetic programmes provided support for several interventions regarding the improvement of energy efficiency of single-family homes, however most of the actions have a very limited budget and are used primarily for the installation of solar panels.

FIGURE 5. TIMELINE OF SUBSIDY SCHEMES IN ROMANIA



3.4.2.1 THE FIRST THERMAL REHABILITATION PROGRAMME FOR MULTI-FAMILY RESIDENTIAL BUILDINGS BUILT BEFORE 1985

In 2002, a thermal rehabilitation programme for multi-family residential buildings was launched by the Ministry of Regional Development and Tourism. The programme was the first ever thermal rehabilitation programme in Romania, financed from state funds, and it targeted multi-family buildings built before 1985. The programme provided a grant covering 2/3 of the costs of the renovation process, the rest was financed by the owners themselves. The programme required complex interventions - the beneficiaries had to insulate the building envelope as well as it required the renovation and modernisation of the heating system in case of district or central heated buildings. Due to the excessive requirements and the requirement of financing 1/3 of the interventions by the owners, the demand for the grants were very low. It had no real outputs, because the potential beneficiaries were discouraged by the high technical and financial barriers. (Geróházi & Szemző, 2015). On the other hand this programme was the first to put the renovation of privately owned buildings into the political agenda, so despite its low outputs, it had an impact through changing the political climate.

3.4.2.2 INSULATION OF MULTI-STOREY RESIDENTIAL BUILDINGS CONSTRUCTED IN THE PERIOD OF 1950-1990

After years of hesitation and thinking, the 2002 programme was revamped and thus, the first National Energy Efficiency Action Plan was born in 2006-2007. The main role of this plan was to create and strengthen the legislative and institutional framework in conformity with the EU regulations. The programme's timeframe was 2006/7-2009/10. It included 13 measures divided among the industrial-residential-transportation sectors. It was coordinated by the Ministry for Development, Public Works and Housing.

The 5th measure of the programme was the "Heat insulation and ventilation of multi-storey residential buildings" constructed in the period of 1950-1990. It supported the exterior heat insulation of the

building facade and roof, change of the windows and insulation of the heating pipes. The goal was to save at least 25% energy compared to the pre-renovation numbers.

The programme initially provided 34% of all costs out of the state budget, and 33% from funds that were allocated to local municipalities to disperse. The remaining 33% had to be covered by the HOAs.

Until 2008, a total of 89 multi-family buildings were renovated using this scheme, which accounted for 2551 apartments. Thus the programme's success was still very limited, the 33% self-financing coupled with the complexity of interventions prevented a lot of HOAs from participating in the programme.

3.4.2.3 REGIONAL OPERATIONAL PROGRAMME 2007-2013 – ENERGY EFFICIENCY SCHEME IN RESIDENTIAL BUILDINGS

The programme started in 2009 and ran until the end of the 2007-2013 programming period – so approximately till 2015. The first priority axis of the programme was to “Support for sustainable development of urban growth poles”, which included elements regarding the rehabilitation of the urban infrastructure, improving services, including social services. The overall objective of the programme was to improve the energy efficiency of residential buildings in Romania in accordance with the EU 2020 Strategy. The programme supported all general energy efficiency measures in the common parts of the buildings – insulation, modernisation of joinery, changing windows, upgrading heating systems in case of district heating, etc.

The scheme targeted HOAs and municipalities. The most successful setup was when they jointly applied, because if the municipality did it on their own, the owners did not know the exact details of the renovations, and if the HOAs did it on their own, they did not have the financial means to finance the programme. The intensity of the funding was dependent on social factors. The EU funds and the state budget covered 60% of all costs, while the remaining 40% was divided between the HOAs and the local governments. Initially the whole 40% was charged onto the HOAs, however this turned out to be a serious bottleneck, so local authorities had to step in and contribute to the financing of the programme. This financing contained social elements.

- 10% contribution was required from the owners' association, provided that more than 50% of the families - owners in the building - had an average monthly net income per family member below 150 Euro;
- 20% contribution was required from the owners' association, if more than 50% of the families had an average net monthly income per family member of less than 350 Euro but more than 150 Euro;
- 30% contribution was required from the owners' association, if more than 50% of the families had an average net monthly income per family member of less than 500 Euro but more than 350 Euro.

The programme was more successful than the pilot ones and over 41 000 apartments were rehabilitated in multi-family buildings (Regional Operational Programme 2007-2013, 2007).

3.4.2.4 CONTINUATION OF THE ROP IN THE 2014-2020 PERIOD

In the 2014-2020 programming period, the scheme was largely the same as in the previous one, fixing the issues and bottlenecks.

The subsidy intensity of the programme changed. The managing authority decided that they do not differentiate between owners of the apartments, as it created a lot of administrative burden to obtain income statements from each owner, so they eliminated the social aspect, and decided on 25% self-financing for everyone. (With the addition of 15% from the local municipality). The units that are not

used for residential purposes have to cover 100% of the costs. (However, some municipalities may still try to help the non-residential owners, e.g. in Sfântu Gheorghe the municipality provides 80% of the 60% state share in order to avoid that the economic owners hinder the renovation process.)

The criteria also got a bit stricter. The programme was less successful due to the funding distribution between EU/state money and self-financing/municipal financing. The implementation just finished (end of 2023) and only a couple hundred buildings managed to utilise the scheme even in major cities (Regional Operational Programme 2014-2020, 2014).

The beneficiaries of the actions were not the HOAs, but the municipalities, which automatically necessitates the active participation of local authorities.

3.4.2.5 CONTINUATION IN THE 2021-2027 PERIOD

In this programme, the financing was completely rehailed. The new financing intensity is much more favourable for the home owners. 95% of the costs are paid by the EU scheme, while the remaining 5% is divided up between the HOAs and the municipalities. 2% is paid by the HOA and 3% is paid by the municipality.

The programme includes a mandatory element of improving thermal insulation of the building envelope, and the insulation of roofs, replacement of doors and windows, modernising ventilation and air conditioning systems (including passive cooling systems), and installing small-scale renewable energy sources for domestic heating and hot water. The selected buildings cannot get financing for stand-alone actions, only integrated energy efficiency renovation processes that include the modernisation of ventilation systems and instalment of renewable energy sources. As part of the integrated renovations, up to 15% of the project funds can be spent on instalment of intelligent energy consumption monitoring systems and other specific objectives, such as: green roofs and facades, modernisation of elevators, replacement of electrical circuits, equipping buildings with intelligent lighting.

The funding will prioritise multi-family apartment buildings (MFABs) where the interventions directly address energy poverty and 40% energy savings will be achieved after the renovations and MFABs where 60% energy savings can be achieved within economically reasonable financial constraints.

The calls were published in 2023 and the application process is managed by the municipalities on behalf of the buildings. Those buildings who already benefited from the RRF's energy efficiency renovation funds will not be accepted to this programme. (Regional Operational Programme 2021-2027, 2021).

The budget for the renovation of buildings is divided between regions, and inside the regions there are allocations for the smaller and bigger cities (this structure was the same in all ROPs over the previous periods). With this the unequal use of funds due to different financial capacities of municipalities could somehow be equalised. On the other hand in case some regions did not use its quote on time, the funds were reallocated to regions with a higher absorption capacity.

3.4.2.6 THE RECOVERY AND RESILIENCE FACILITY FOR RESIDENTIAL BUILDINGS

Component 5 of the Recovery and Resilience Facility is the Renovation Wave. The Renovation Wave initiative builds on the national long-term building renovation strategy, other aspects of the Directive on Energy Performance of Buildings, and building-related aspects of each EU country's national energy and climate plans (NECPs). It aims to deliver energy efficient interventions to both the public and private sectors, namely tackling energy poverty and worst performing buildings; renovation of public buildings; and decarbonisation of heating and cooling.

Investment 1. of the programme covers the establishment of a renovation wave fund to finance works to improve the energy efficiency of the existing building stock. The investment specifically focuses on multi-family buildings and public buildings throughout the whole of Romania. Alongside with the energy saving interventions it also specifies the improvement of seismic resilience and accessibility of the buildings.

The programme on a national level is coordinated by the Ministry of Development, Public Works and Administration, who publishes the calls for proposals for local public authorities, who are responsible for the local coordination and the application. The local authorities had to apply for the calls in 2022, representing their HOAs' requests.

The project covers the following actions: thermal insulation of the building envelope and roof, replacement and modernisation of doors and windows, modernisation of the lighting system in the common areas, modernisation of the heating systems (although replacement of individual gas boilers were not supported as not being part of the common property). It also supported the installation of photovoltaic systems on the roofs to cover the energy consumption of the common areas.

Different calls were published at the same time: one for both EE renovation and seismic resilience improvements dedicated to areas with high seismic risk or communities that are located in marginalised urban and rural areas (delineated by a national map or the Integrated Local Development Strategies); one for moderate or deep renovation of multi-family buildings in general, and one for all local administrative units to cover moderate (90% of the budget) and deep energy renovations (10% of the budget). If, after the three calls there are any funds left, a separate call will be made available for all local authorities for EE renovations and will be distributed on a first come first serve basis.

All calls specified that as a result a minimum reduction of energy consumption for heating by at least 50 % have to be achieved compared to the annual energy consumption for heating prior to the renovation. In the third call 10% of the budget had to be spent on renovations achieving at least 60% energy saved (deep renovations)

The programme covers 100% of the costs for applicants up to 200 EUR/m² for moderate and 250 EUR/m² for deep renovation works. Total budget for the renovation of multi-family buildings in marginalised areas was 219 million EUR. In 2022, 29 submitted projects amounting around 100 million EURI have been registered. The total budget for moderate energy renovation for multi-family buildings in general was 745 million EUR and 83 million EUR for deep energy renovation. In 2022, 451 projects amounting to around 733.5 million EUR have been submitted for moderate renovation, and 121 projects amounting around 635 million EUR have been submitted for deep renovation. All the projects have to be completed by the end of 2026, as this is the final deadline for the use of RRF.

3.4.2.7 THE MULTIANNUAL NATIONAL PROGRAMME ON INCREASING THE ENERGY PERFORMANCE OF HOUSING BLOCKS

This programme started in 2009, with the goal of supporting multi-family buildings to implement energy efficiency renovations. The programme has been running since 2009, but several amendments were added to keep it up to date.

It supports thermal rehabilitation of the building envelope, modernisation of the heating and cooling systems and the thermal agent distribution, the hot water system, the joinery, and the electric system as well as the installation of renewable energy sources. The target group is either HOAs or municipally owned housing buildings, and since 2022 single family residential buildings. However, it is important to note that only those are eligible where the main function is housing, and no economic activity is registered. Since 2019 the technical requirements are much stricter regarding the renovations. Only those buildings can apply for funding that reach at least level 3 with regarding to their static state

(static levels are rated from 1-4, typical panel buildings are on level 3). There are separate subsidy forms for buildings with low static parameters.

The interventions are subsidised from the state budget, however since the 2022 amendment, EU structural and cohesion funds can be utilised in the scope of the programme as well, instead of the state budget part of the financing. In the first 10 years of the programme the costs were divided into three parts: 20% was paid by the homeowners, 30 percent by the local authorities, and 50% by the national government. Since 2019 60% is covered by the national budget and the rest is shared between the municipality and the HOA, but the distribution is up for the local government's decision. The law prescribes that at least 10% have to be paid from the HOA's/homeowners' budget, however.

The programme's success is heavily dependent on the municipality's financial situation. Richer cities such as Bucharest or Cluj are much more likely to be able to afford the municipality's part of the financing, while smaller cities can only afford a few buildings' renovation at once (Ministry of Regional Development and Public Administration, 2009). But still in the case of richer cities, it seems, that the local quotas are strict, and even in bigger cities only some buildings can be financed annually due to the shortage of national resources.

The case of Cluj-Napoca

Cluj-Napoca is located in Transilvania, being the seat of Cluj county with roughly 280,000 inhabitants. Cluj is the second biggest city in Romania (after the capital) with a significant economic power. Due to its economic boom there is a slight gentrification process throughout the city and the affordability of housing is constantly worsening. The net income is about 1,000 EUR net, which is far exceeding the Romanian average.

77% of the residents live in multi-family buildings, which are mostly disconnected already from the district heating system, remaining about 15% of the housing stock in service.

Cluj-Napoca is considered one of the most successful cities in implementing energy efficient interventions in the residential sector. This evaluation refers both to the activities of the municipality in supporting the HOAs but also the activities of HOAs to implement renovations themselves from their own funds. According to the observation of the World Bank experts, about half of the multi-family building stock is already renovated, a vast majority of which from purely the funds of the owners, as there was no hope to get state/EU funding due to the low amounts dedicated to the city. On the other hand the quality of the renovations, that were implemented purely from the residents' funds, are rather questionable. Without state support and state standards, and without implementing energy audits and contracting proper technicians, the interventions rather belong to 'beautification' or reach low energy standards.

The city was active in assisting the HOAs to take part in the state renovation programmes. They provided the needed municipal contribution, pre-select the applicants and applied for funding to central government bodies. The city has an energy office with 5 people, who deal with residential but also non-residential buildings. About 150-200 buildings were renovated in the city from state/EU funds (only about 10 in the last 5 years) and about 100 are in the pipeline for the most recent ROP and RRF calls. This is a great progress, however the city has about 4-5,000 multi-family buildings, so it is visible that even with this high effort, the pace of renovation is very low.

The local legislations also favour the lower energy consumption of buildings: companies (but also residential buildings) can get a 50% local tax reduction in case they are certified as green buildings.

Cluj-Napoca is part of the 100 Climate Neutral Cities, that is why it was among the firsts to adopt a NetZeroCity Action Plan which emphasises the importance of accelerating the renovation measures in the residential sector that takes up about 43% of the greenhouse gas emission in the city.

The case of Sfântu Gheorghe

Sfântu Gheorghe is the capital city of Covasna County, located in the region of Transylvania, Romania. Known for its rich cultural heritage, it is a significant centre for the Hungarian community in Romania, with a unique mix of Romanian and Hungarian influences.

There is a strong commitment - on behalf of the local administration, including the City Council - to maintain a sustainable smart development of the urban area, meaning that all the urban development projects are based on the city's Integrated Urban Development Strategy, Urban Mobility Plan, Sustainable Energy Action Plan and The Energy Efficiency Improvement Program.

Among other types of investments, the Municipality pays special attention to the use of state/EU funds for the renovation of multifamily buildings. The Energy Department deals with the national calls, while the EU and Tendering Department organizes the application for the EU financed subsidy schemes. In each case, when it is necessary, the Municipality provides the needed co-financing. In the process of project management, each investment completes the whole project circle for the multi-family buildings, from the technical documentation until implementing, settlement and monitoring.

With regard to the national calls (multi-annual programme), in 2023 the Municipality of Sfântu Gheorghe submitted several applications for financing. First, the Municipality mapped all the blocks of flats in the city (about 1000 buildings) and informed the HOAs about the possibility of participating in the national tender. Those that indicated their interest (last year 200 out of the 1000) were prioritized based on the potential energy savings and the size of the building (the bigger the more preferred). In the same year, the Municipality has defined 15 eligible multifamily buildings to participate, but only 6 of them could provide the needed documents. The funding contracts for these investments will depend on the limit of the national funds provided by the government. However, the Municipality plans to resubmit all the applications in the course of the following years, besides national funding any available EU and other foreign funds will be approached.

With regard to the EU funding (Structural funds), the Municipality participated at the ROP of 2014-2020, the ROP of 2021-2027 and the call of the Recovery and Resilience Facility. In the case of the ROP of 2021-2027 the Municipality aims to involve 4 other multifamily buildings. It is expected that there will be a significant over demand for the funds on regional level and the system will operate with the 'first come, first served' methodology - such as was the case in ROP 2014-2020.

The municipality also submitted in 2022 for the calls of the RRF (NextGenerationEU funds), 40 applications out of which 10 were public buildings, and the others multi-family buildings. All the applications were successful, and funding contracts have been signed.

3.4.2.8 CASA VERDE CLASSIC

This programme ran from 2010-2017. It was a programme targeting natural persons to do renovations and upgrades on their own single-family homes.

The programme itself was rather successful – even though the subsidies were not particularly high. Throughout its course the programme financed over 30,000 projects nationwide, from more than 180,000,000 lei.

It supported the purchase and installation of new heating systems utilising renewable energy. Beneficiaries could receive 3,000 lei for the installation of non-pressurised solar panels; up to 6,000

lei, for the installation of pressurised solar panels; up to 8,000 lei, for the installation of heat pumps, excluding air-to-air heat pumps.

The grants were paid retroactively after show of receipts and inspection of the work done by an authority. The programme was managed by the Administration of the Environmental Fund, and was financed from the state budget.

The programme also contained a dedicated part for legal persons, where the same actions were supported for administrative and public buildings and buildings of the Church. It had a slightly lower, 160,000,000 budget, but the grants were higher. A total of 200 projects were financed from this (The Environment Fund Administration, 2010).

3.4.2.9 CASA VERDE PLUS

After the success of the first programme, the government reintroduced the second iteration of the Casa Verde programme in 2017.

This time the scope of the programme was modified, it now focused on insulation of external walls, and internal insulation of the roof in single-family houses. Independent buildings with a usable area of less than 50 square meters were not eligible.

A guide was published by the administration of the Environmental Fund specifying the eligible insulation materials. The insulation for the exterior in the case of the facade and interior in the case of the roof, must have a thickness of at least 15 cm.

The financing intensity of the project depends on the size of the renovations. Each beneficiary can receive up to 40,000 lei, but not more than 120 lei/insulated square meter. Applying for this programme also meant for the beneficiaries that they couldn't apply for any other government funds regarding the renovation project. The costs that exceeded the 40,000 lei (or the grants based on the insulated m²) were taken by the owner, as well as the use of materials not included in the initial guide.

There was a problem with the programme, as a lot of the materials included in the guide were more expensive than originally planned, thus owners could easily run out of the 40,000 lei threshold.

This programme also had a dedicated part for legal entities; administrative-territorial units, public institutions, non-governmental organisations. They could apply for up to a maximum of 500,000 lei per project, related to eligible expenses, but maximum up to 90% of the eligible expenses of the project (The Environment Fund Administration, 2017).

As some of the interviewees emphasised, the programme was a complete failure considering that about 1,000 applicants were chosen (from about 15,000 applications), but even after two years of successful application the Fund did not start the implementation. The successful applicants did not get a response for these two years.

3.4.2.10 CASA VERDE FOTOVOLTAICE

While the Casa Verde Plus did not have the solar panel part, the Casa Verde classic had. Just after a two year hiatus, the government and the administration of the Environmental Fund reopened a new programme for supporting solar panel installation. The Casa Verde Fotovoltaice is a programme that finances the installation of solar panels. Started in 2019 (still running) it is a programme financed by the Ministry of Environment's Environmental Fund. It consists of a grant of max 30.000 lei/household with at least 3000 lei of the beneficiary's own contribution. So the intensity of the funding depends on the total costs of the operation, however it is 90% at max.

The eligible applicants are natural persons and organisations of the Church for clerical staff's living spaces (The Environment Fund Administration, 2019).

3.4.2.11 CASA EFICIENTĂ ENERGETIC

This is the newest programme targeting single-family homes. It started in 2020 with the aim of increasing energy efficiency and the use of renewable energy sources in single family houses up to 3 stories. The eligible beneficiaries are natural persons.

It offers up to 70,000 lei in non-refundable grants to the applicants, but the overall subsidies cannot exceed 60% of the total costs of the renovation.

The renovations covered by the programme are: thermal rehabilitation of the building envelope (replacement of joinery, insulation of external elements such as walls, terraces, and insulation of the ground floor and roof); and the modernisation of the heating system using renewables (boilers and heat pumps, solar panels, natural gas systems); modernisation of the lighting and shading systems.

The grants also cover the obligatory energy performance certification up to 2,500 lei (The Environment Fund Administration, 2020).

3.4.3 EVALUATION

Romanian interviewees emphasised that despite the fact that residential buildings are responsible for 50% of the primary energy used in urban areas, while the share of public buildings is negligible (about 5%), public funds rather went to public buildings and residential ones received limited amounts.

As the description of the subsidy schemes showed, there are parallelities in the system: renovations financed from European funds and national funds, subsidies that cover privately owned and publicly owned buildings. According to the interviewees this is not made on purpose, rather each financing actor had the goal to implement energy efficiency measures, and no actor had the proper amounts, thus smaller amounts had to be added up. Taking also into account that there are serious difficulties in paying the awarded funds to the final beneficiaries (mainly in case of national funds), the parallel sources secure some kind of continuity to the construction sector. In addition, in the negotiations with the European Union it was obvious that energy efficiency somehow must be supported from EU funds (in case of regional operational programmes and the Recovery and Resilience Facility). On the other hand certain ministries were also keen on continuing on the national programmes. This resulted in parallel and somewhat different systems which created complications for the final beneficiaries. (Currently a simplification and standardisation procedure is going on.)

The subsidy content was constantly growing from 66% to 100%. The reason behind it was twofold:

- The socially sensitive system that required a different share of down-payment from HOAs with different financial capacities of households was considered too complicated and was simplified with a standardised own share requirement.
- This standardised own share was reduced to 2% and then to 0% as the technical standards increased (reaching 50-60% energy saved and the installation of renewables), and the technical audits became much more thorough, which made the interventions very costly (it is estimated to be over 500 EUR/m²). It was a political consideration to state that if there is no possibility to distinguish between the households based on their financial possibilities then the system has to be adjusted to the poorest.

Even though the subsidy content constantly increased reaching 100%, it was still not possible to cover the difference between the prices of application and implementation and the difference between the maximum subsidy amount/m² and the real costs. Consequently the owners (or the municipalities) always had to contribute with some extra payment.

As seen from the subsidy content, Romania has chosen to support more in depth renovation in fewer buildings with a high subsidy intensity. As a result, according to the evaluation of the Technical University in Cluj-Napoca, about 5% of the multi-family building blocks were renovated in Romania. Bucharest has the highest rate as it relies on additional EIB funds and the municipality is very active in the renovation process, and Cluj-Napoca has also results over the average, but still, with this pace it seems impossible to reach the 16% savings by 2030 and the carbon neutral housing stock by 2050.

The results were achieved mostly among the multi-family buildings, as even if subsidy programmes for family houses are available since 2010, the resources devoted to those are limited. Multi-family buildings were rather in the focus as it was considered to be more efficient (to reach more people with one grant). In addition, the funds rather had an urban focus, in which areas family house owners considered too rich to be publicly supported. In areas where family house owners are much more marginalised there are problems with the legalisation of housing which again impedes the application of investments.

Even if marginalised residents and energy poor households were mentioned as social targets only recently, we can observe that the subsidy schemes became more and more affordable as the subsidy content increased up to 100%. Under these conditions less the investment cost itself, rather the decision making and sometimes the pre-financing capacity of the homeowners' associations which is a decisive factor for participation.

The decision making capacity is an extremely important factor, and the management of HOAs 'failed' in this regard. The decision about the compulsory involvement of municipalities in the application and implementation process rooted from the consideration that HOAs can not make decisions and implement renovation processes themselves. The Romanian interviewees had a unanimous opinion that HOAs can not be left alone and the strong involvement of municipalities is essential. On the other hand municipalities have difficulties in carrying this financial and capacity burden to serve many communities and that is why self implementation of renovations is the only way for those who left out of this assistance but it results in lower technical standards.

Under these circumstances the market actors contribute to the renovation process on a lower efficiency level. E.g. no special products for condominiums are developed by commercial banks, as the grant level is too high, the operation of HOAs is considered insatiable by the banks which impedes them to develop proper joint collaterals, while individual loans are fenced by the National Bank's cap on household debts. The capacity of the construction sector is also limited and the internal production of construction materials in Romania is also weak. That is why the resources of ROPs and RRF allocated in 2023, 2024 may not be increased as the construction sector would not be able to complete a higher amount of projects in the coming years.

According to the expectations the European Union may not provide non-repayable grants after the 2021-2027 period, rather loans with favourable conditions. The switch from the current 95-100% grant system to completely loan products seems to be a challenge taking into account the experiences of the last decades in which HOAs were unable to take joint loans, owners were not able to co-finance properly and the cost of interventions became sky-rocketing due to the increasing technical standards.

4 CONCLUSIONS

Subsidies for the energy efficient renovation of the residential stock have been available in all four countries - Bulgaria, Greece, Hungary and Romania - for decades. However, despite the magnitude of the problem and the obvious political intentions both on the EU and national level (with the exception of Hungary), so far little has been achieved. It is not only public money that is missing from the system, but both residential support and programme management could be increased, programme structures both redeveloped and streamlined.

Due to strong national specificities, it would not be feasible to create a programme structure that would fit all four countries. Nevertheless, an idealtypical programme structure can be outlined which would be characterised by the following attributes:

1. Rely on the market and let stakeholders operate efficiently: According to estimations, the amount of investment needed to reach the EU 2050 goals can be financed from public sources only up to 30%. The remaining 70% must be provided by private actors. In order to incentivise them the environment has to be market friendly: 1) energy prices should reflect real costs, 2) the legal framework of homeowners' associations should secure that they can make decisions with a majority, that arrears can be collected, and HOAs can enter into contractual relations with financial institutions and contractors, 3) and financial institutions should be able to follow their underwriting processes (Climate Strategy & Partners, 2023).
2. Set the subsidy content to reflect the gap that the market does not finance: energy efficient investments have a return to the owners through the decrease of energy costs and the increase of the property value. While often these are hard to realise – e.g. due to strongly subsidised energy prices and many owners, who are not planning to move/sell. Through market based mechanisms these benefits should be covered (e.g. by long term loans). The public sector has to step in however to cover the costs that are over these benefits (let's call them green benefits for the environment) and provide favourable conditions to finance the value increase part in case the property is not in transaction.
3. Be sensitive to issues of poverty and energy poverty: Public policies in the field of energy efficiency have a double aim: to reduce energy consumption and to assist those who have the most difficulties to secure proper energy comfort (energy poor). These two directions can divert as the first one points to the lower hanging fruits of the market, while the second requires substantial public intervention. However, it is possible to couple these two aims by prioritising the worst performing buildings and/or installing specific income targeted elements to mainstream energy efficiency subsidy schemes.
4. Ensure long term predictability: appearing and disappearing subsidies create uncertainties in the market and provide an incentive to all actors to benefit from the single opportunities as much as possible. Property owners tend to postpone their renovation actions till the subsidy comes, while construction companies tend to overprice their services knowing that the demand suddenly rises. However, in case a subsidy scheme is stable and predictable, demand is dispersed more evenly, and all actors have the time to plan, prepare and accumulate funds accordingly.
5. Set the technical targets realistically: the goals to save energy and install renewables are set in European directives. However, they would require deep renovations, and phasing out the use of fossil fuels in a relatively short time span. The question is if these goals can be reached in one step or can rather be implemented in a series of steps following a renovation roadmap. Taking into account that deep renovations mostly never pays off, and the market is not ready to provide financing, we would recommend implementing the renovations in consecutive steps, following the 'structural interventions first, energy efficiency next and energy source last, but not least' principle (Gerőházi, Szemző and Somogyi, 2023).

6. Monitor but not overcomplicate: Experience shows that in case technical targets are not properly set and monitored, then energy efficient solutions tend to be suboptimal. On the other hand, complicated state subsidy schemes discourage owners from using subsidies. There is a need to define administrative tasks, which are manageable by the final beneficiaries. Parallel to it is essential to set up a secondary system to assist the applicants (inside or outside of the municipalities).
7. Provide assistance to make the system work: even in case of competitive market conditions and carefully planned public schemes not all the potential beneficiaries can get use of the systems. In line with the guidance of the European Union, setting up one-stop-shops and services to assist the homeowners' associations and single homeowners is essential, such as the education of all the other stakeholders, like financial institutions on how to approach HOAs, or auditing companies on how to work out renovation roadmaps.

Subsidy systems in the four reviewed countries differ quite substantially from this ideal type due to political, market and administrative reasons. In the following we will highlight the major deviations from the model, most importantly with the aim to provide directions for these countries to follow.

Rely on the market and let stakeholders operate efficiently

In none of the four countries are the legal framework or the market mechanisms appropriate to boost the renovation from private resources. The three major deficiencies are related to the energy prices and energy communities and the legal framework of homeowner associations' operation.

The energy prices are capped or publicly influenced in all four countries, which provides limited incentives for the energy efficient renovations and it prolongs the pay-off period. Under these circumstances either the subsidies, the green attitude of owners or efforts to increase the value and comfort level of buildings remain the incentives. These incentives are strong in many cases, but as we could see from the Hungarian and Romanian local examples, if purely these incentives remain and no public requirement or fund is available to define the technical standards of renovation, then sub-optimal solutions are implemented which result in lock-in effects on the long run. (See as example the renovation of HOAs in Cluj-Napoca purely from the funds of the owners.)

Difficulties with the legislations with regard to energy communities is also an impediment that hinders multi-family buildings to install solar panels since such an investment is only worth if individual electricity bill can be covered besides common energy costs. Even if subsidy schemes contain incentives for installing solar panels, it has serious legal bottlenecks with regard to multi-family buildings in Bulgaria, Hungary and Romania. Private family house owners have also limited incentives to install solar panels already, as due to European legislation, gross accounting of solar energy is obligatory to introduce in member states, which makes the financial balance of solar panels much less profitable. (On the other hand, it is reasonable to apply gross accounting, considering that the grid is not able to serve as a large battery for free.)

40-50% of the housing stock in the four countries are in multi-family condominiums or cooperatives, in which private owners have to cooperate in order to plan and implement renovation actions. Legislations with regard to the operation of HOAs was properly set in Hungary, while has improved recently in Bulgaria and Romania. Still, except for Hungary, commercial banks reject to develop joint loan products for HOAs, as they are afraid of not having proper collaterals and payment disciplines. A particular difficulty in Bulgaria is posed by the fact that the building level associations created for the purpose of energy efficiency subsidies cannot take loans. Where we see an improvement is the legislation on collective decision making: 50-66% majority is enough for a renovation decision in all countries. This however does not change the fact that the background processes, like collection of funds and handling arrears are still major issues.

Set the subsidy content to reflect the gap that market does not finance

The rate of subsidies in the four countries is not based on a proper gap analysis, rather on other considerations, that are often of very political nature. And the involvement of commercial banks is often not seamless, despite the fact that cooperation between market and public actors and the complementarity of schemes becomes crucial in case the EU decides to provide only repayable loans for energy efficiency purposes and rejects grant schemes from the end of the decade.

This very politicised environment in Bulgaria came to light, when the decrease of subsidy content from 100 to 80% created a vehement debate, possibly threatening with going back to the 100% in the future. Importantly, in Bulgaria the former 100% subsidy content excluded completely market actors, and the reduction of subsidy to 80% - if it stays - still did not encourage the development of loan products.

In Romania the 95-100% subsidy is defined to reach complex interventions in a multi-family environment targeting the financial capacity of the lower-middle class (however the cap on eligible costs/m² reduces the subsidy intensity in reality). Meanwhile, efforts to include commercial banks into the financing scheme have failed.

In Hungary cooperating with the market actors is a more developed mechanism, however it is not relevant in case of multi-family buildings as there is no subsidy for them currently, but for family houses the combination of grant and loan products and the involvement of commercial banks is a forward looking approach.

In Greece the focus is on family houses, in which the combination of grant and loan elements is also a foundation, and commercial banks have well developed products for the renovation market, however not for multi-family buildings.

The cooperation between market and public actors and the complementarity of schemes becomes crucial in case the EU decides to provide only repayable loans for energy efficiency purposes and rejects grant schemes from the end of the decade.

Another aspect that may be a factor behind setting the public subsidy level is the demographic situation in these countries. From these countries outmigration to other member states of the EU is very common, Bulgaria and Romania suffering the most. Consequently there is a very high vacancy rate in the housing stock, which, mainly in the case of multi-family buildings, makes it difficult to involve all the owners into the co-financing schemes. Close to 100% subsidies may have a reason to avoid asking for the own-share of owners, who do not manage their properties after leaving the country.

Be sensitive to issues of poverty and energy poverty

Defining energy poverty and finding appropriate indicators to find the affected households is increasingly important as the pressure grows in the EU to create just transition pathways. The EPBD recast clearly signals a change of attitude as making national energy poverty definitions compulsory – and creating a broad one on the EU level. Member states have obligations to identify and give a preference to social groups when implementing subsidised renewable energy and energy efficiency interventions.

Not all of the four countries came up with a definition on energy poverty so far. Hungary is the only one still lacking an official definition, while recently in Romania - rather generic definition - and in Bulgaria and Greece - more specific definition - was developed. These terms however are not yet applied when creating the subsidy schemes. This is not to say that there are no income sensitive programmes: they have been applied in Greece for many years, and the most recent Hungarian family house renovation programme also provides higher subsidies for lower income families. Furthermore,

in Romania there are dedicated funds for deprived urban and rural areas. What is more important that the high subsidy rate in Bulgaria and Romania also serves as a tool against income poverty.

Additionally, the efficiency of income based subsidies in countries of high rate of remittances and grey economy needs to be questioned. This is probably very strongly depends on the local circumstances. While Romania experimented with income-based subsidies in the 2014-2020 Regional Operational Programme, it found such a process overly complicated and thus rejected it, in Greece, thanks to the central tax register, it is considered a feasible scheme.

Ensure long term predictability

Subsidy schemes from Central-Europe (e.g. Slovakia, Czechia, Poland) proved that long term and predictable systems help the beneficiaries and market stakeholders to adapt to the schemes in an efficient way. Predictability reduces construction prices and improves the quality of technical planning and implementation.

In the four countries in observation Hungary is the one with the highest uncertainties, in which different subsidy rates and subsidy forms appear and disappear from time to time. This is a wrong signal to the market leading to high transaction costs and prolonged investments from the household side. In the other three countries, the schemes are much more reliable; however their budget, subsidy content and conditions are also changing. What is important to acknowledge, that the construction market is not flexible enough to follow all these changes. There is a lack of labour force in all four countries, as it is the case in most European countries, even in those ones with high immigration. Thus, persistent financing schemes (similar subsidy content, similar regulations about pre-payment, about the technical standards) is crucial to build up long-term capacities and invest into the necessary education.

Financial institutions also need to have long-term signals as developing new financial products needs time. Commercial banks have less interest in case of revolving funds, as these repayable subsidies are generally implemented by one dedicated or some selected banks. In case the subsidy is a grant, a wide range of financial institutions may have an interest to secure the co-financing share.

Set the technical targets realistically and modify the “energy efficiency first” principle

Technical requirements in the subsidy schemes became more and more complex in all four countries. This trend is understandable taking into account that reaching the climate goals requires substantial efforts in reducing energy consumption of the buildings. On the other hand, this complexity increased the costs of interventions drastically. That is why Bulgaria and Romania have chosen to support fewer households in implementing substantial renovations with 80-100% subsidy. The most recent Hungarian subsidy scheme is not as complex and requires only 30% energy saved, but here the internal legislations require also that in case at least 25% of the facade is renovated, then major renovation has to be implemented which necessitates serious additional interventions and result in much more than 30% savings. In Greece the usual requirement is to improve the energy performance of the housing units by three grades, mainly through the change of doors and windows and the upgrade of the heating system. Insulation of multi-apartment buildings is not preferred, rather in case of family houses.

Technical experts proved that complex interventions (co called ‘cost optimal ones’) are the most efficient financially and technically on the long run, but these interventions are also very costly and would require the interventions in the individual heating systems, which are either not supported (like in Romania or Bulgaria) or increase the costs significantly. The other strategy, which is not spelled out in these countries, would be to concentrate on the proper insulation of the building envelope and the change of the windows - following the ‘energy efficiency first’ principle - in a large number of buildings, as proper insulation would not result in lock-in effects. (The insulations that were accomplished in the

previous rounds of subsidy schemes in all four countries became outdated by today, causing a lock-in effect for the next decades that is why an insulation standard that meets the 2050 goals must be applied.) The interventions in the heating systems may come in a second round, after the insulation is complete, and thus the shift from fossil fuels can be properly implemented.

The other aspect which is also somehow ignored is the importance of the renovation of structural elements of buildings. Energy efficiency is not the first task to accomplish in owners' minds as the buildings have such premature problems like damp walls, leaking roofs and broken or outdated pipes. Some of the subsidy schemes take it into account (like in Romania, where only buildings meeting certain structural requirements can apply for energy efficient funding, and there are subsidy schemes for structural deficiencies, mainly to mitigate earthquake risks; in Bulgaria and Hungary also statements on proper statics are required). Energy efficient interventions may not be feasible to implement in the whole housing stock in case preliminary structural interventions are not supported either by the state or local municipalities.

Monitor but not overcomplicate

Most of the interviewees mentioned the complicated administrative requirements of the state run subsidy schemes, which became even more complex with the precise auditing of energy saved. It was a common problem in all countries as the managing authorities wanted to meet the hypothetical requirements of the European Commission and also wanted to secure transparent financial and technical processes. Everyone argues for simplification, but it seems that none has the knowledge on how to do that. Under these circumstances property owners themselves are hardly able to make the application themselves, which creates a need for market based assistance (used in Hungary and in Greece) or the assistance of the municipality, who took over the whole process in Romania or in Bulgaria.

Provide assistance to make the system work

In order to help the property owners and communities initiate and implement the renovation process assistance is needed. In case a proper network of assistance is created, the final beneficiaries would rather be empowered to make the needed decisions, fill in the application sheets and implement the interventions. According to the latest recast of the Energy Performance of Buildings Directive, it is obligatory to set up at least one one-stop-shop per 80,000 inhabitants. There are already seeds of such activities in all four countries. They are rather project based and have a small number of clients due to the lack of substantial subsidies in Hungary. They are rather widespread in the framework of local municipalities in Bulgaria and Romania, where municipalities play a crucial role in energy efficient investments anyhow. However, such a setup also has its dangers: corruption remains an issue in these cases, as well as the lack of active involvement from the residents, resulting in lower quality and more expensive interventions.

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Bulgaria

- Ivaylo Trendafilov, Chief expert, Strategic Development Directorate, Burgas Municipality
- Dragomir Tzanev, Executive Director at EnEffect center for energy efficiency
- Mincho Benov, National Director of Habitat Bulgaria
- Ivanka Pandelieva-Dimova, project manager, Sofia Energy Centre

Greece

- Alice Corovessi, managing director and Eleftheria Touloupaki, senior expert, INZEB
- Aristotle Tympas, Professor, National and Kapodistrian University of Athens

Hungary

- Antal Venczel, urban development department, Ajka municipality
- Experts of the Hungarian Development Bank, EU business development and support department

Romania

- Marcel Ionescu-Heroiu, urban development specialist, World Bank
- Noémi Fogas, head of Energy Development Department and Csilla Mike, consultant Tendering and EU department, Sfântu Gheorghe municipality
- Norbert Immanuel Petrovici, Department of Sociology, Babes Bolyai university
- Mihai Moia, executive director of the Association for Promoting Energy Efficiency in Buildings - REONEFF
- Andrei Cecla, Timea Farkas and Levente Czumbil, Technical University of Cluj Napoca
- Ovidiu Cimpean, state secretary, Ministry of Investments and European Projects