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Energy poverty alleviation – a step for sustainable energy transition

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Abstract. *The paper investigates the issue of fuel poverty and its presence in the Bulgarian context. The focus of the analysis is on the potential for alleviation and – in the long term – elimination of energy poverty through the implementation of measures for energy-efficient retrofit of residential multi-story apartment housing. An effective strategy tackling this topic at the local scale is a key prerequisite for the achievement of the UN Sustainable Development Goals (SDGs) with particular relevance for SDG 7 Affordable and Clean Energy and SDG 11 Sustainable Cities and Communities. Achieving the optimal ratio of saved energy versus financial resources is the key to renovating housing at scale sustainably and efficiently. Energy poverty as a phenomenon is linked to the combined effect of three main factors - low household income, high energy costs and low energy efficiency of housing. There is a broad scientific consensus that this phenomenon has a serious negative impact on the quality of life and citizens' health and wellbeing. Furthermore, energy poverty contributes to a huge waste of energy and also affects the physical dimension of the sustainable development of the built environment. Therefore, energy poverty exacerbates deficits and discrepancies for territorial economies and communities.*
Eliminating the problem of "fuel poverty" is often considered to be impossible without the support of the affected households through subsidies. Subsidies invested in energy-efficient housing reconstruction result in immediate savings in housing heating costs, which in turn leads to a tangible reduction in the "fuel poverty" experienced by residents of reconstructed housing. Energy-efficient housing reconstruction (retrofit) is the fastest and most efficient (in terms of public resources) way to combat energy poverty. The financial resources required to enable these activities could also be obtained or complemented through financial engineering schemes with third-party involvement.

Keywords: energy poverty, social exclusion, condominiums, affordable housing, energy efficiency

JEL Codes: R11, R12, R14, R21, R23, R31, R38

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Introduction

Undoubtedly eliminating fuel (energy) poverty is deeply interrelated with the achievement of most of the United Nations' Sustainable Development Goals – primarily SDG 7, but also SDG 1,3,5,6,10, 11, 12, 13 etc. (United Nations, 2015). The most relevant SDG 7 aims to ensure access to affordable, reliable, sustainable and modern energy for all by 2030. New decentralized renewable energy (DRE) solutions are available in many places. The UN sustainable development goal SDG 7.1 aims to end fuel poverty globally by 2030. Providing energy access universally is seen as a means of ending energy poverty and has been endorsed as a normative goal that is important for sustainable development. Newer conceptualizations emphasize some critical aspects like that access is multidimensional, and that affordability, reliability and quality of energy services are critical. Recent reviews of energy access and

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fuel poverty indicators highlight the importance of alternative approaches and the challenges of applying these in different contexts (Shonali, P. et al. 2020).

Fuel poverty (the corresponding term commonly used in continental Europe is energy poverty) is a relatively new and insufficiently explored issue. Apart from its social implications, it is a significant constraint for the sustainable development of the built environment. In view of the increased global economic insecurity, accelerated by the coronavirus pandemic, it is expected that the problem will become ever more prominent and, therefore, needs adequate attention and research. This observation is particularly valid for Eastern Europe where energy poverty is a widespread and growing problem as evidenced by statistical data. Energy poverty is also present in Western and Northern European countries. The issue tends to be constrained to specific demographic groups or types of housing. It is thus principally linked to the inability to purchase 'affordable warmth/cold' among energy-poor households living in energy-inefficient homes (Boardman 2010).

Energy poverty is linked to low household income, high energy costs and energy inefficient homes, and is known to have severe impacts on the health of European citizens, including increased numbers of winter or summer deaths, detrimental effects on mental health, respiratory and circulatory problems. Existing approaches for the definition of the phenomenon are mostly based on quantitative indicators, such as the proportion of household expenditure on energy bills in relation to their income or the relation of the latter to the poverty line after subtracting the cost of energy services. Quantitative indicators are well developed in the UK and Ireland, relating to existing statistical data. A pioneering step was the establishment of a fuel poverty definition in the British research practice, thus opening the scientific debate over the matter (Boardman 1991). In the UK context, fuel poverty has been described as a situation in which a household spends more than 10 percent of its total income on heating (Bouzarovski 2018). It is, however, recognized that energy poverty knowledge in continental Europe is less developed, even if a wider range of approaches has been used (Thomson et al. 2017).

For a long time, EU-level policy research in the fuel poverty area has received scant research attention, however, the situation has been evolving rapidly in recent years. A common EU energy policy did not exist in a coherent form until 2007. Subsequently, the European Parliament welcomed the inclusion of the social dimension (Energy Roadmap 2050); considering that special attention should be given to energy poverty, that energy should be affordable for all, and calling on the Commission, Member States, and competent social bodies, to work together on tailored solutions to tackle issues such as electricity and heat poverty, with a special emphasis on low-income, vulnerable households that are most affected by higher energy prices (European Parliament, 2013a). Another major driver of energy poverty policy-making has been the EU's legislative framework on energy efficiency, incorporated in the Directive on Energy Efficiency (2012/27/EU EED 2012). This document states that national energy efficiency frameworks should ensure that vulnerable consumers have access to the benefits of energy efficiency and highlights the role of energy efficiency in reducing fuel poverty. Furthermore, Article 7 posits that within their energy efficiency targets the Member States may 'include requirements with a social aim in the saving obligations they impose, including by requiring a share of energy efficiency measures to be implemented as a priority in households affected by energy poverty or in social housing' (European Commission, 2017c). In recent years, the European Commission has taken a further step in this direction seeking to encourage policies to protect 'vulnerable consumers' in the energy sector across the EU (Pye et al. 2015).

The highest shares of populations who live in fuel poverty are concentrated in the part of the EU consisting of post-socialist states of ECE (also referred to as the EU-10), especially Bulgaria. In such countries, the share of the population reporting inadequately heated homes is typically around 20.0

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percent, while the value of the composite fuel poverty indicator is 44.5 percent. This is against EU-wide averages of 12.8 and 31.7 percent, respectively. Also scoring high against the same criteria are the eight EU countries that border the Mediterranean Sea, where 16.6 per cent of the population has reported being 'unable to keep their home adequately warm', with the composite fuel poverty indicator reaching 43.58 percent (Bouzarovski 2018). The energy situation in a large part of Europe today is bleak: 57 million people cannot keep their homes adequately warm during the winter; 104 million people cannot keep their homes comfortable enough during summer; 87 million live in poor quality dwellings; and 52 million people face delays in paying their energy bills (EU Energy Poverty Observatory). One of the objectives of the EU strategy is to reduce the number of energy-poor citizens by at least 20 million (Eurostat). To this end, urgent coordinated policy interventions are necessary to adequately support energy-poor citizens and facilitate their social integration ultimately aiming to eradicate energy poverty altogether.

The vulnerability of citizens in Central and Eastern European countries, such as Bulgaria, Croatia, Estonia, Greece, Hungary and Latvia can be attributed to the legacy of the centrally planned economy in these countries. Relevant examples include the typically poor thermal insulation of the housing stock, the historically low energy prices and the predominance of an unsustainable energy supply mix (Robić, S. et al. 2018). In Croatia, there is no definition of a vulnerable consumer, nor are there methods for defining and monitoring energy poverty; however, there is public policy in place, which concerns (in part) vulnerable consumers. Croatia has a very inefficient building stock from the 70s and 80s, when energy prices were highly regulated. There is also a problem of non-efficient post-90s-conflict (fast rebuilt) building stock. More than a quarter of the households in Croatia face problems paying energy bills, and this number is increasing. 9.9% of households are not sufficiently heated. Some community energy projects have been implemented, but there are no state incentives, whilst energy cooperatives face many legal barriers (EU Energy Poverty Observatory). In Hungary, the funding priority is social inclusion with the latest target from 2020 being to reduce the rate of people at risk of poverty to 15%. The expected result is to achieve up to 45% energy savings in reconstructed apartment buildings by 2023 (Lakatos 2015). A few aspects of the Hungarian energy, social and climate policies have been identified as having a positive economic impact on energy-poor households - e.g. residential energy efficiency programs, direct support measures and more recently reductions in utility prices mandated by the government (Dénes and Orsolya 2012).

In Greece, there is neither a clear definition of energy poverty (although a definition was expected to be introduced by the end of 2019), nor specific indicators for monitoring the phenomenon. Almost 6 out of 10 households are unable to adequately meet their energy needs (Papada and Kaliampakos 2016), while according to a national survey on fuel poverty that was conducted in 2018-2019, 90% of households stated that the costs for energy services in comparison with their monthly/annual income are high to very high. During the same survey, 75% of the participants stated that they spend more than 11% of their income to cover the costs of energy services. Most national social policies, which are indirectly related to addressing energy poverty, are in the form of subsidies such as the 'social electricity tariff' (Corovessi et al. 2017).

In Estonia, it is estimated that over half of the building stock does not achieve summer comfort; 80% of the housing stock is built during the 1960-1990 period; two-thirds of the housing stock are apartment dwellings; 40-60% of household energy costs are associated with heating whilst 70% of households' heating is sourced from district heating (EU Energy Poverty Observatory). According to the Central Statistical Bureau (CSB) survey, 22% of Latvia's population was considered to be at risk of

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poverty in 2016. Latvia has one of the highest energy expenditures to income ratio (14.5%). This high percentage remains at the same level and is not expected to decline in the near future. As in other EU countries, buildings in Latvia are the largest energy consumers; 37% of the final energy consumption is attributed to households, 85% of the consumed energy is used for heating and hot water. Households in Latvia consume twice as much energy as the average household in Europe to achieve the same comfort level. There is still no formal definition of energy poverty in the country (currently in the process to be included in legislation). Energy cooperatives have not been formed to date (EU Energy Poverty Observatory).

Bulgaria faces the most significant challenges within the EU-28 on energy poverty, with 47% of the total population being unable to maintain adequate thermal comfort in their home (EU Energy Poverty Observatory). On average, Bulgarian households spend approximately 14% of their income on water and energy bills. The average annual household expenditures for electricity, heating and water have increased by 36% between 2008 and 2013 (Kisyov 2014). The national policy instruments for combating energy poverty are implemented at the local level by municipalities and mainly focused on subsidies to support heating costs. Existing state energy costs assistance programs target people who cannot afford to maintain adequate thermal comfort and do not directly address fuel poverty. Energy costs support policies are currently entirely based on income support for vulnerable households. No link is made to related housing conditions and type of heating systems. There is currently no national legal definition of fuel poverty in Bulgaria (EU Energy Poverty Observatory).

1. Fuel poverty vs energy efficiency of mass apartment housing in Eastern Europe

Existing approaches to defining energy poverty at the European level are still not well coordinated. Common policies to tackle energy poverty are not yet established (Bouzarovski 2018). Potential policies to alleviate energy poverty could be seen in three directions: raising the level of household income; subsidizing heating costs and subsidizing housing retrofit. While the income level and energy costs policies are dependent on a large number of variables and could be considered as long-term interventions, reducing fuel poverty through the implementation of energy efficiency measures in mass housing can bring fast and efficient results if adequate measures are put in place.

Large Scale Apartment Housing. Because of the process of forced urbanization during the rule of communist governments in Eastern Europe, about half of the existing housing stock in these countries was constructed between 1960 and 1990 of the twentieth century (Economidou 2011). The new construction of dwellings took place in cities which were experiencing fast rates of urbanization leading to rapid enlargement caused by the mass migration from rural areas. New housing developments consisted predominantly of prefabricated large-scale multifamily housing apartment blocks built rapidly with little or no consideration of energy efficiency. Generally, the residential blocks of flats were divided into several types, according to the time of their construction. Some differences between the residential blocks can be found in accordance with the implemented building systems. Among them, the prefabricated panel apartment blocks deserve special attention due to their large share in the overall housing stock (BPIE 2016).

Generally, in all Eastern European countries large scale apartment housing from the period of communist rule have extremely low energy efficiency. For example, the building envelope of residential buildings have real heat transfer coefficients over three times higher than the norms for new building construction introduced after the political changes in 1989. In the vast majority of residential buildings,

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the basements and attic levels are without thermal insulation. The extremely poor thermal insulation of the building envelope has become a primary reason for permanent heat losses. There were some largely insignificant changes in the energy efficiency building regulations concerning large scale industrialised housing construction in Eastern Europe. The legislation dealing with the thermal resistance requirements of buildings improved slightly over the years, taking into account the existing conditions for energy supply. For example, for prefabricated panel apartment blocks, the assumption has been that buildings will be operated in conditions of guaranteed district heating (which is subsidized everywhere at that time in the conditions of a centrally planned economy). In general, for ideological reasons within the socialist economic system the energy prices were kept far below the market levels everywhere as a result of the application of heavy subsidies. As a result, subsidized energy prices, combined with the relatively low energy prices on the international markets until the end of the seventies of the 20th century, have cumulatively contributed to the low-level thermal insulation of residential buildings in most Eastern European countries. The global increase in energy prices that occurred later was reflected to some extent in regulations and housing design decisions. This led to some improvement in the thermal resistance of large-panel residential buildings. (Georgiev 2017).

Condominium ownership. During the time of the centrally planned economy (1947-1989), the planning, development and construction of new housing in Eastern Europe was almost entirely implemented by the state within the framework of the five-year "socio-economic development plans" and consisted of multistorey apartment buildings. A limited and distorted private sector activity existed in the so-called "individual" and "cooperative"(collective) housing construction. This share of housing supply was not only minor, compared to the state housing development, but it also suffered from unequal access to financing, subsidies and building materials supply. According to the prevailing doctrine of the centrally planned economy in this period, all parameters of new dwellings - quantitative, qualitative, financial, etc., were also determined in a centralized way through housing planning in the framework of the five-year development plans (Georgiev 2017). Almost all new housing construction in Eastern Europe during the period of the centrally planned economy consisted of large-scale apartment residential buildings. The majority of these buildings operated as public rentals, while there was a small part that was owner-occupied in the form of condominiums.

A key feature of the apartment housing stock in Eastern Europe after 1989 is the prevalence of private homeownership. After 1989 the transition to a market economy in Eastern Europe forced the privatization of existing public rental apartment housing. The level of homeownership thus increased up to 90% which is far beyond the average figure of 65% for Western Europe (United Nations, 2013). In most cases, housing privatization was carried out over the course of several years by simply selling the apartments in high-rise multi-storey buildings to sitting tenants converting their status from renters to apartment owners. The quick mass privatization of high-rise apartment buildings left many Eastern European countries without an adequate regulatory framework for the management and maintenance of these newly formed condominiums, as pointed out by various researchers (Lujanen 2010; Tsenkova 2005; Georgiev 2017). In addition, new homeowners had limited resources to manage and maintain their newly acquired dwellings. As a result, following the transfer of ownership, the housing stock in many countries in the region has started ageing prematurely and deteriorating, a process which is exacerbated by the low quality of construction works and used materials and lack of funds and proper maintenance. Due to the above-mentioned reasons, combined with the inherited low construction

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quality and lack of management from the socialist period, high-rise apartment blocks in Eastern Europe are in general extremely energy inefficient and need urgent renovation (United Nations, 2013).

The concept of a condominium – a multistorey residential building with joint ownership of common areas and separate individual dwellings – apartments, owned by different residents, exists in all European countries (Lujanen 2010). This property appeared in different ways in different parts of Europe. In Western Europe, but also in Eastern Europe (until World War II) condominiums emerged through the united efforts of private investors who jointly developed and inhabited apartment buildings. In post-WWII Eastern Europe, most of the new apartment buildings were built and owned by the state and dwellings were used as a rental. They were privatized on a large scale in the period 1990-2000, along with the imposition of certain conditions by the state for collective management and collection of running costs for these buildings. The privatization process took place in parallel with the introduction of requirements for the establishment of collective representative bodies at the housing block-level – homeowners' associations (HOA). During the communist rule after 1944 the state in Bulgaria, as well as in other centrally planned totalitarian countries in Eastern Europe, seized the role of the main developer and in order to meet the policy of forced urbanization undertook massive construction of multi-storey residential buildings in the so-called "housing complexes". However, unlike other Eastern European countries and the former Soviet Union, the ownership of newly built apartments in Bulgaria was transferred immediately after their completion to their residents without providing the necessary legal provisions for adequate maintenance of the condominiums. Such "primary" privatization of newly build apartment housing was quite peculiar for an Eastern European country at that time and implied further heavy problems with the maintenance and management of Bulgarian condominiums later on.

2. Renovation of mass housing to combat energy poverty – Bulgarian pilot cases

Due to the prevailing share of homeownership, reducing fuel poverty through the implementation of energy efficiency measures in multistory apartment buildings is largely dependent on the decisions of apartment owners and the existing legislative framework that defines their rights and obligations in the context of condominium buildings. Efficient legal regulations need to be in place in order to ensure that energy-efficient retrofit of residential buildings can be successfully undertaken. Depending on the level of development in the condominium legal framework, different achievement levels are observed in renovation activities across Eastern European countries.

Despite the complicated legal and economic environment, some innovative pilot projects have been implemented in Eastern Europe revealing the potential of improving the energy efficiency of housing as a tool to alleviate fuel poverty. International organizations have often played an important role in funding and realizing projects for the improvement of the energy performance of apartment buildings. In recent years housing refurbishment projects have increased in scale. The creation of a legal, financial and organizational framework to improve the energy performance of the housing stock in these countries was speeded up by more stringent EU energy efficiency legislation. All countries in Eastern Europe have already transposed the EU Directive on energy efficiency in their national legislation (Energy Performance of Buildings Directive). The sharp increase in prices of fossil fuels, primarily imported from Russia, and the related increase in the importance of the fuel poverty issue is another strong incentive for national governments to increase their involvement in securing legal and financial support for the improvement of housing energy efficiency. The main obstacles to large-scale

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energy-efficient retrofit activities for condominium housing can be outlined as follows (Lujanen 2010; BPIE 2011; Georgiev 2017):

- Lack of legislation for adequate management of condominium housing
- Lack of energy-saving incentives and financial tools for the renovation of condominium housing
- Nonexistent legal enforcement rules in the condominium residential sector
- Underdeveloped social rental housing sector able to accommodate insolvent apartment owners from condominium buildings.

A recent World Bank report outlines specific obstacles to energy-efficient housing retrofit in Bulgaria, such as "weak HOAs and an inability to take collective decisions on building refurbishment, high transaction costs and lack of delivery mechanisms for thermal refurbishment, lack of financial resources by homeowners to undertake energy efficiency investments, skepticism about EE savings, which are difficult to quantify when access to reliable data is poor (The World Bank (2018).

In spite of the overall problematic status of the condominium housing management and energy-efficient retrofit in Eastern Europe and in Bulgaria in particular, there are examples of innovative approaches that are enabling breakthroughs and could be outlined as best practice cases.

2.1 Zaharna Fabrika Pilot Condominium Renovation Project

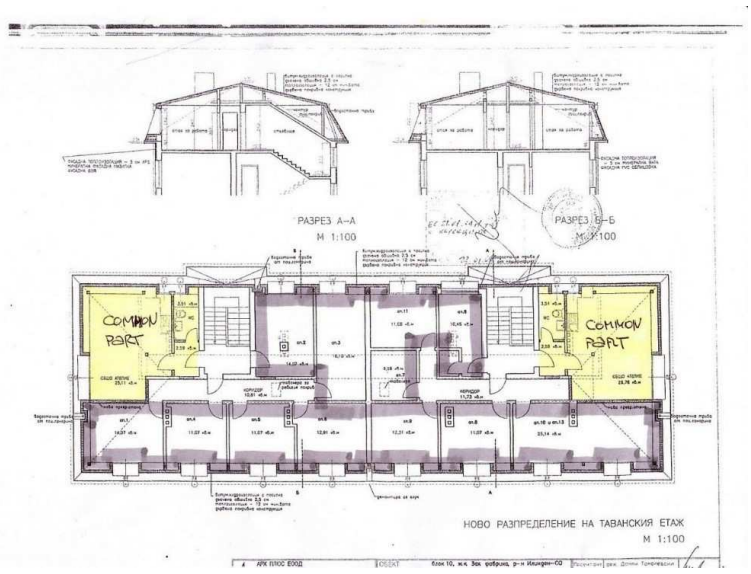

Fig. 1 Project for the reconstruction of the under-roof space of the pilot building. Source: G. Georgiev – private archive

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Fig. 2 The pilot building under renovation.(Source: Georgi Georgiev – private archive)

By the time the project kicked off (2003), condominium buildings in Bulgaria (60% of owner-occupied housing) suffered severely from low energy efficiency and the lack of adequate management and maintenance, leading to high energy bills, progressive deterioration of the stock, and great reduction of its market value. Most of the apartment owners were not only unable to secure the funds needed to cover the building management and repair costs but some of them could not even pay their heating bills. Homeowners' associations did not exist in legal terms, making any attempts to maintain and refurbish existing condominium buildings extremely difficult, because all apartment owners had to agree and be able to afford the renovation. By 2003 no single action was taken in Bulgaria to tackle the issue of the deteriorating condominium housing stock seven at the level of pilot activity (Georgiev 2017).

The project initiator was the Bulgarian Housing Association (an NGO, developing housing-related projects in Bulgaria since 1995), supported by Dutch housing associations De Nieuwe Unie from Rotterdam and Woondrecht from Dordrecht. They found that the management and maintenance of residential condominium buildings in Bulgaria suffer from a chronic lack of adequate legal and organizational form. As it is well known, the problem of maintaining communal areas such as staircases, roofs, facades, engineering installations, is extremely acute and leads to the increasing degradation and decapitalization of buildings and surrounding areas. Defects in the amortised infrastructure also contribute to the compromising of the structure of the buildings, the risk of fire, etc. As a result of the preliminary study, the project partners concluded that the Dutch model of multi-storey apartment building management by owners' associations could be a good starting point for finding a solution in the Bulgarian conditions. The project aimed to improve the living comfort, physical condition, energy efficiency, management and maintenance of existing condominium buildings in Bulgaria by testing a pilot activity (Block 10 in Zaharna Fabrika), where an efficient organizational and financial model for the reconstruction and subsequent management through a newly established homeowners' union was applied. The renovation of the apartment building increased the standard of living, reduced energy costs and facilitated the future maintenance of the property. A logical outcome was also the increase in the market price of the renovated building (European Environmental Bureau 2011).

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The building's roof, basement, windows and external brick walls of block 10 were in a poor condition. The building, dating back to 1947 comprised 13 flats, all of them privately owned. The specific financing model was devised on the basis of the survey data and engagement with the owners of Block 10. A project with a financial and technical part for the implementation of the reconstruction was developed. It was assumed to perform complete thermal insulation of the external walls of the building and reconstruction of the attic space by an upgrade and thermal insulation of the roof structure. Two shared-owned ateliers were allocated in the upgraded under-roof area. They were targeted for rentals, in order to cover a part of the loan repayment (Georgiev 2017).

Zaharna Fabrika Pilot project consisted of energy-efficient housing renovation by use of a soft loan, offered by Dutch International Guarantees for Housing (DIGH), followed by energy auditing and building certification. This pilot project was the first in Bulgaria example of a purposefully conducted operation to test all the interconnected stages that address the problem of reconstruction of the existing condominium building by establishing a homeowners' association to carry out the renovation and subsequent management of the building. One of the key benefits of the realisation of the project was a 50% reduction in heating costs, allowing the money saved on energy bills to be used for the renovation loan repayment. The building received an energy efficiency certificate class A according to the current standard (European Environmental Bureau 2011). Zaharna Fabrika pilot project proved that it is possible to renovate a condominium building with almost no subsidies, covering the entire retrofit costs by a soft loan with a "bottom-up" driven project, supported by an experienced expert team, working closely on site with the apartment owners. "There is huge potential for this project to be replicated" (Beuermann et al. 2008).

A key moment for the successful implementation of the renovation project of the pilot building - bl.10, was the establishment of effective interaction between project consultants and homeowners. The willingness to cooperate and the pro-active involvement of the apartment owners was the decisive precondition for achieving the end result, namely better housing, cheaper maintenance of the building without additional financial burden for the homeowners (Beuermann et al. 2008). As a unique case for Bulgaria, this project was published in a large number of Bulgarian and international presentations, publications, seminars, etc. It was also disseminated and analysed in relevant housing research projects of the European Commission - Inofin, Rosh, Reshape, Share etc., in the related documents of Dutch International Guarantees for Housing (DIGH) etc.(Sofia Energy Center 2006-2007), (Lary et al. 2008).

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Fig. 3 View of the reconstructed pilot building. Source: G. Georgiev – private archive

СЕРТИФИКАТ

за енергийните характеристики на сграда

Номер 063EEK001 | Категория A | Валиден до: 2016 г.

Сграда	Жилищен блок №10	
Адрес	София, ж.к. Захарна Фабрика	
Тип на конструкцията	Средна	
Година на построяване	1 946 г.	
Застроена площ	240,5	m^2
Отоплявана площ	1 214	m^2
Отоплявам обем	3 152	m^3

Годишен разход на енергия

ДЕЙСТВИТЕЛЕН	ЕТАЛОНЕН
138.9 kWh/m²	148.1 kWh/m²

Издаден на 06.06.2006 г. | Издаден от ЕнЕфект –Консулт ЕООД | Рег.номер 00063 | Подпис/печат

Fig. 4 Energy efficiency certificate of the reconstructed pilot residential building.

Source: Georgi Georgiev – private archive

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Due to the comparable nature of problems around the renovation of owner-occupied apartment housing, the above-mentioned pilot approach (best practice case) could be replicated in other Eastern European countries, provided that several prerequisites are in place:

- limited scale developments;
- relatively identical income level tenants, avoiding "fuel poverty enclaves";
- bottom-up approach involving experienced local consultants
- availability of suitable financial support mechanisms

This paper argues that a large-scale energy retrofit projects for condominiums in Eastern Europe as well as in other countries would only be feasible after at least a partial restructuring of the residents' tenure status – from poor owners to renters (Georgiev, 2017).

2.2 Residential Energy Efficiency Credit Facility (REECL) – Bulgaria

The REECL facility was designed to provide Bulgarian homeowners with an opportunity to gain the benefits of energy efficiency retrofit of their dwellings through a combination of a loan and an incentive grant. The scheme was implemented via local participating banks. EBRD provided the loan financing and the subsidy supplement was granted by the International Decommissioning Support Fund ("Kozlodui Fund"), set up in the year 2000 with contributions from the European Commission, EU member countries, and Switzerland. Homeowners were entitled to receive incentive grants starting from EUR350 to EUR2000 and above depending on the different levels of building renovation and the number of participants in a condominium building. It involved various homeowners regardless of the type of housing. Initially, the weak point of the REECL Program was that it was targeted at individual apartment owners thus not creating incentives for building-based energy efficiency activities. At the later stages of the project, it was modified allowing homeowners to receive an increased subsidy (up to 30%) of the loan amount for renovation activities at the scale of the entire condominium building. Only a relatively small amount of saving measures were initially eligible for loans and grants but gradually the program evolved to encompass more activities. Currently, the following energy efficiency installations are eligible to be covered by the facility:

- Energy Efficient Windows
- Insulation of Walls, Roofs, and Floors
- Gas Boilers with or without associated controls, space heating and hot water storage systems
- Biomass Room Heaters, Stoves and Boiler Systems with or without associated controls, space heating and hot water storage systems
- Solar Thermal Systems with or without associated space heating and hot water storage systems
- Cooling and Heating Heat Pump Systems
- Lifts
- Balanced ventilation
- Central Heating
- Photovoltaics in Buildings

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Eligibility Criteria for Homeowners

The applicants should be Bulgarian residents and should own the dwelling to be refurbished under REECL. No double subsidy is allowed for the renovation measures. Applicants are subject to credit approval in line with the participating bank's credit process. Financing is available only for the renovation of existing housing

Eligibility for Participating Banks – subject to the usual EBRD due diligence

Eligibility of Investments is determined by technological compliance, caps for incentive payments per technology and per project and compliance with national regulations. Repayment of projects realised before the application date is not allowed.

The REECL program is the biggest and the oldest successful large-scale actively operating energy efficiency scheme for Bulgaria. It was launched in 2005 and is currently still in operation. The first two stages of the REECL Facility were implemented until 2010. During the first two REECL stages, the REECL Program has committed nearly 30000 energy efficiency home improvement projects, financed through personal loans totaling more than EUR 43,5 mln. and incentive grants amounting to EUR 7,7 mln. The REECL financed projects during these stages have saved a total estimated electricity equivalent of 214 421 MWh per year and have reduced CO2 emissions in the range of 307 387 tonnes per year (Residential Energy Efficiency Credit Line).

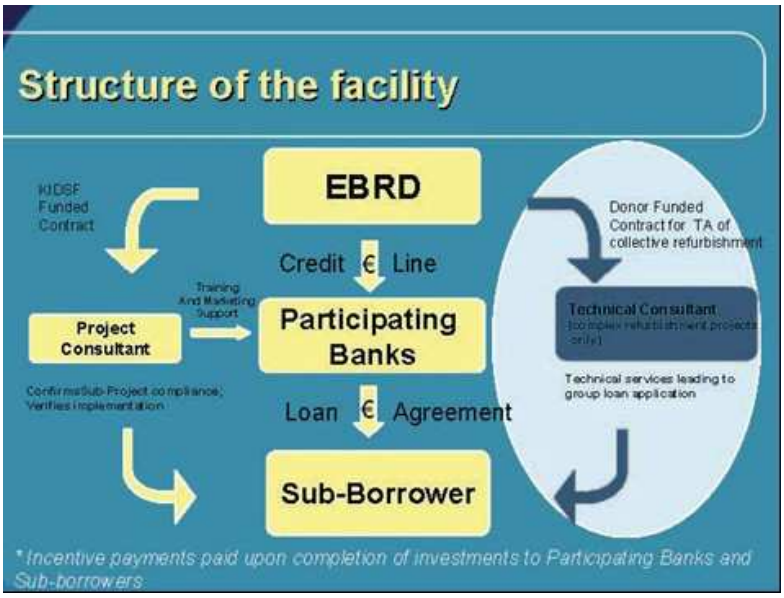

Fig. 5 REECL Scheme, Source: http://reecl.org

Conclusion

This paper asserts that the eradication of the problem of "fuel poverty" is impossible without the support of the affected households through subsidies of different kind. "In situations where the owners are unable to pay for rising energy costs and the required major renovations, other parallel measures

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such as subsidies are needed" (Lujanen 2010). Subsidies invested in energy-efficient housing retrofit result in efficient and immediate savings in housing heating costs, which in turn reduces or eliminates the "energy poverty" phenomenon for residents of reconstructed housing. Energy-efficient housing reconstruction (retrofit) is the fastest and most efficient (in terms of public resources used) way to combat energy poverty. However, there is a limiting effect on the requirement for a larger one-off public financial resource. Such resources could also be obtained or complemented through financial engineering schemes with third-party involvement.

Using subsidies for fighting energy poverty through improvement of the mass apartment housing is an efficient and socially acceptable approach. Such an approach is associated with a higher initial level of investment, as well as the need for capacity building to assess, design, and implement energy-efficient housing reconstruction activities. However, in the long run, investing in energy efficiency measures in housing has no alternative in terms of the efficiency of the subsidies used (both socially and financially).

Assistance for preparing and implementing the renovation process is necessary for the successful renovation of the housing stock on a larger scale, as homeowners' associations and their umbrella bodies usually do not have the proper competence for undertaking efficient renovations (Georgiev 2017). It is important to point out that technical assistance should enable and empower private market actors in the housing sector rather than strengthen the monopoly of publicly owned companies. It is worth concentrating on initial pilot condominium energy retrofit projects geographically (i.e. concentrate loans and subsidies used) because of the anticipated substantial economy of scale which can serve as a layout for a larger neighborhood.

The analysis of the approaches in energy retrofit activities concerning condominium buildings in various Eastern Europe countries shows a broad scope of solutions but nevertheless, several priorities can be distilled in terms of finance and governance innovations: interventions with a shorter payback period should be subsidized first. It implies no high upfront costs from homeowners and HOA, while societies can prepare for larger-scale initiatives (with the need institutional and legislative frameworks provided by the State).

Although common in Eastern European condominium apartment buildings, the fuel poverty problem is even more important because "the challenges are geographically wider and affect the management of apartment blocks in most parts of the world, including large-scale developments in many fast-growing metropolitan regions" (Lujanen, 2010).

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References

[1] Beuermann, C., Bunse, M. (2008). "Energy/emission saving policies in urban areas – sustainable cities: Best practices", DG Internal Policies - European Parliament. <https://www.europarl.europa.eu/RegData/etudes/etudes/join/2008/404906/IPOL-JOIN_ET(2008)404906_EN.pdf> accessed 1 August 2020.

[2] Boardman, B. (2010). "Fixing Fuel Poverty: Challenges and Solutions", Routledge, DOI:10.4324/9781849774482.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 11, Issue 1, 2022

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[3] Boardman, B. (1991) "Fuel poverty: from cold homes to affordable warmth", Belhaven Press (now Wiley). 267pp. ISBN 1 85293 139 6.

[4] Bouzarovski, S. (2018). "Energy Poverty: (Dis)Assembling Europe's Infrastructural Divide", Palgrave Macmillan, Springer, Cham, Switzerland.

[5] Bouzarovski, S. Tiradoherrero, S., Petrova, S., Andürge-vorsatz, D. (2016). "Unpacking the spaces and politics of energy poverty: Path-dependencies, deprivation and fuel switching in post-communist Hungary", Local Environment. The International Journal of Justice and Sustainability, Volume 21, Issue 9 https://doi.org/10.1080/13549839.2015.1075480

[6] Buildings Performance Institute Europe (2016). "Accelerating the Renovation of the Bulgarian Building Stock" <https://bpie.eu/wp-content/uploads/2016/05/Accelerating-the-renovation-of-the-Bulgarian-building-stock_EN.pdf > accessed 18 May 2020.

[7] Buildings Performance Institute Europe (2011). "Europe's buildings under the microscope. A country-by-country review of the energy performance of buildings" <https://www.bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf > accessed 1 August 2020.

[8] Corovessi, A., Touloupaki, E., Chrysogelos, N., and Metaxa, K. (2017). "Energy poverty in Greece: Social innovation recommendations to tackle the phenomenon", INZEB.

[9] DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (2012). <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:315:0001:0056:en:PDF > accessed 1 August 2020.

[10] Dénes, F. and Orsolya, F. (2012). "Poverty or fuel poverty? Defining fuel poverty in Europe and Hungary" ENERGIAKLUB.

[11] Economidou, M. et al. (2011). "Europe's buildings under the microscope – A country-by-country review of the energy performance of buildings", BPIE – Buildings Performance Institute Europe. <https:// bpie.eu/publication/europes-buildings-under-the-microscope > accessed 1 August 2021.

[12] Energy performance of buildings directive <https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en > accessed 11 August 2021.

[13] European Commission (2020). "Financing the green transition: The European Green Deal Investment Plan and Just Transition Mechanism". <https://ec.europa.eu/commission/presscorner/detail/en/ip_20_17> accessed 11 May 2020.

[14] European Commission, Directorate General for Internal Policies (2015). "How to end Energy Poverty? Scrutiny of Current EU and Member States Instruments". https://www.europarl.europa.eu/RegData/etudes/STUD/2015/563472/IPOL_STU(2015)563472_EN.pdf > accessed 12 May 2020.

[15] European Environmental Bureau (2011). "Saving Energy in Europe: 15 Good Practice Case Studies", pp.33-39. <https://nanopdf.com/download/saving-energy-in-europe-15-good-practice-case-studies_pdf > accessed 10 August 2020.

[16] European Union (2012). "Energy Roadmap 2050". doi:10.2833/10759 <https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf> accessed 18 August 2021.

[17] EU Energy Poverty Observatory. <https://www.energypoverty.eu > accessed 10 August 2020.

[18] Georgiev, G. (2017). "Housing policy in Bulgaria – Recent history, current projects and future trends", Lap Lambert Academic Publishing, Riga. [Online] ISBN-10: 3330330406.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
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URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[19] Gerőházi, E. and Szemző, H. (2015). „Analysis of Subsidy Schemes Aiming to Support Energy Efficient Renovation of Multi-family Buildings in Selected Countries of Central and Eastern Europe“, Metropolitan Research Institute.

[20] Housing Europe (2015). "The State of Housing in the EU 2015: A Housing Europe Review." <https://www.housingeurope.eu/resource-468/the-state-of-housing-in-the-eu-2015 > accessed 10 August 2020.

[21] Kisyov, P. (2014) "Peport on National Situation in the Field of Fuel Poverty – Bulgaria", project "Reduce Energy Consumption and Change Habits" (REACH), co-funded by the Intelligent Energy Europe Program of the European Union. <http://reach-energy.eu/wordpress/wp-content/uploads/2014/12/D2.2-EAP_EN.pdf/> accessed 15 July 2020.

[22] Lakatos, E. (2015). Structural funds and housing in 2014-2020. HOUSING EUROPE. <https://www.housingeurope.eu/resource-557/structural-funds-housing-in-2014-2020> accessed 10 October 2020.

[23] Lary, A., Mollov, B. (2008) "Mid-term Evaluation Report of the UNDP-GEF project Building the Local Capacity for Promoting Energy Efficiency in Private and Public Buildings (EE Project Bulgaria)", pp. 3-17 <https://erc.undp.org/evaluation/evaluations/detail/3766 > accessed 10 August 2020.

[24] Lujanen, M. (2010). "Legal challenges in ensuring regular maintenance and repairs of owner-occupied apartment blocks", International Journal of Law in the Built Environment, Vol. 2 No. 2, pp.178-197. doi.org/10.1108/17561451011058807.

[25] Papada L., Kaliampakos D. (2016). "Measuring energy poverty in Greece", Energy Policy, 94:157-165. [4]https://doi.org/10.1016/j.enpol.2016.04.004.

[26] Pilot project in district Zaharna Fabrica, Sofia - Eco - building Club (2006).

<https://www.yumpu.com/en/document/view/33135112/pilot-project-in-district-zaharna-fabrica-sofia-eco-building-club> accessed 10 October 2020.

[27] Pue, S. et al. (2015). "Energy poverty and vulnerable consumers in the energy sector across the EU: analysis of policies and measures".
<https://www.researchgate.net/publication/282358589_Energy_poverty_and_vulnerable_consumers_in_the_energy_sector_across_the_EU_analysis_of_policies_and_measures > accessed 10 October 2020

[28] Residential Energy Efficiency Credit Line (REECL) <http://reecl.org/en/ > accessed 10 October 2020.

[29] Robić, S. et al., (2018). "Energy poverty in the Western Balkans: Adjusting policy responses to socio-economic drivers. Energy Poverty and Vulnerability: A Global Perspective", London: Routledge, pp. 202-217.

[30] Shonali, P., Narasimha, R. (2020). "Advancing energy poverty measurement for SDG7", Prog. Energy 2 043001 <https://iopscience.iop.org/article/10.1088/2516-1083/ac0512/pdf > accessed 19 August 2021.

[31] Sofia Energy Center (2007). "EI-Education guidebook on energy intelligent retrofitting", pp. 7-17. <http://www.sec.bg/userfiles/file/EI-Education/Guidebook%20EN%201.pdf> accessed 10 August 2021.

[32] Sofia Energy Center (2006). "Best Practice Examples", p.17. <http://www.sec.bg/userfiles/file/EI-Education/Guidebook%20EN%203.pdf> accessed 10 August 2021.

[33] The World Bank (2018). "Bulgaria - National Program for Energy Efficiency in Residential Buildings: Program Design Report for the Second Phase: Bulgaria National Residential Energy Efficiency Program Phase 2 Design Report" <http://documents.worldbank.org/curated/en/329851534930802672/Bulgaria-National-Residential-Energy-Efficiency-Program-Phase-2-Design-Report> accessed 10 June 2020.