Progress and Challenges of the NRRP Low Carbon Economy Reforms in the Residential Building Sector in Bulgaria

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Abstract: The article analyses the progress and challenges encountered in implementing low-carbon economy reforms within the building sector, as mandated by the National Resilience and Recovery Plan as a component of the instruments supporting the EU Green Deal. It highlights the role of the building sector in the broader policy framework for economic decarbonization, delves into the formulation of the reforms and identifies key issues within them, while also addressing the challenges faced in their execution. In conclusion, the article asserts that the anticipated outcomes of the reforms fall short of expectations, warranting a reassessment, redesign, or additional corrections for their effective application.

Key Words: Environmental Sustainability, Housing, Government Policy

JEL Classification: K32, Q56, Q58, 018

1 Introduction[1]

The introduction of emission trading scheme 2 (ETS2) (EC, 2021a) and the building sector decarbonization in particular will play an important role and have a key impact on achieving the goals of the Green Deal (Held et al., 2022; Matthes and Graichen, 2022; EC, 2021b, 2021c). In 2020, the EU initiated the "Renovation Wave" strategy (EC, 2020), aiming to enhance the sustainability of building stocks, create jobs, boost the post-pandemic economy, and alleviate energy poverty. The strategy involves targeted actions, reinforced energy efficiency directives, and financial facilitation. The initiative aims to alleviate the financial burdens associated with upfront costs for energy-efficient refurbishment. Additionally, it seeks to increase awareness, improve capacity, and set up one-stop shops to streamline the process of undertaking high-quality renovation projects for homeowners and small to medium enterprises.

Renovation activities are envisioned to combat energy poverty and improve housing access. However, current spending on energy-efficient buildings is eclipsed by conventional construction investment. The slow pace of energy-focused renovations affects less than 1% of the building stock annually (EC, 2021d), and the lack of funds and working co-financing mechanism is a notable challenge in Bulgaria in particular (LTRS 2030). To expedite progress and justify upfront costs, a necessary reform to introduce a co-financing mechanism was proposed in the National Resilience and Recovery Plan (NRRP, 2021).

The primary challenge addressed in this research is the decarbonization of Bulgaria's building sector, identified as one of the five key reforms for a low-carbon economy in the NRRP. Despite contributing only 8% to the carbon emissions in the country, the building sector faces a substantial task due to the low rate of building renovation and limited adoption of rooftop renewable energy sources (RES) (LTRS 2030). The reform focuses on establishing a financing mechanism for energy efficiency and renewable projects through energy bills, with specific attention to protecting vulnerable households. Challenges include the need for amendments to multiple laws (Territorial Planning Law, Condominium Law, Energy Law, and Renewable Energy Law), administrative reforms for capacity-building in various regions, and the creation of co-financing models and energy

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communities. The reform is tied to significant investments, which however represents only a fraction (1.5%) of the total inhabited multifamily buildings in Bulgaria. The broader challenge lies in achieving widespread decarbonization, considering the limited impact of previous national programs and the absence of statistical data on renewable energy adoption in individual houses. The success of the reform hinges on overcoming legislative, financial, and implementation hurdles to transition towards a more sustainable and low-carbon building sector.

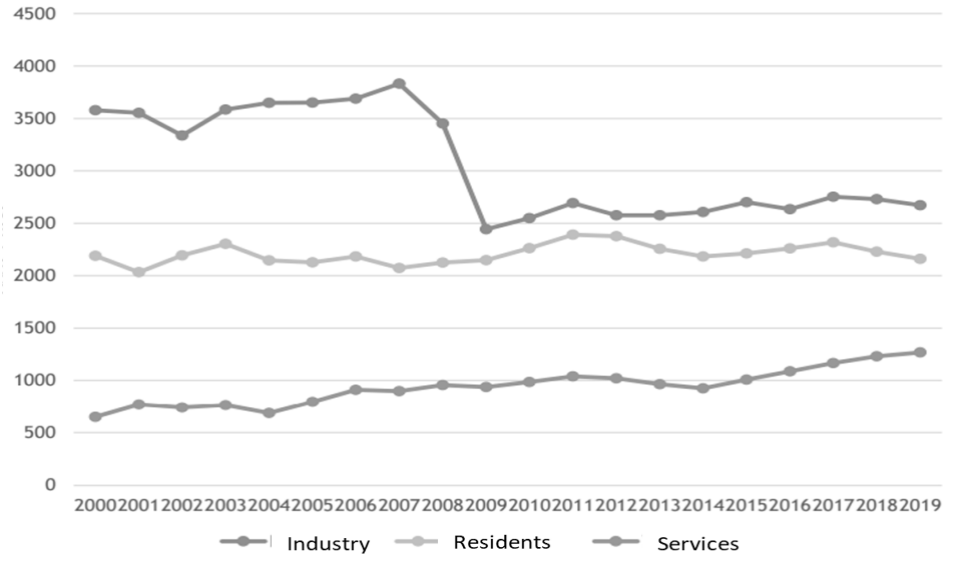
2 Role of the Building Sector in the Decarbonization Process

Buildings contribute to 33% of the current worldwide CO_2 emissions, encompassing both operational emissions and the embodied emissions of materials (IEA, 2021). The buildings sector bears a substantial emissions burden (UNEP, 2022), directly and indirectly contributing to approximately one-third of global CO2 emissions (IEA, 2022). In 2021, fossil fuel use in buildings constituted around 8% of global energy-related emissions, while 19% resulted from the generation of electricity and heat for buildings. Additionally, 6% of emissions were attributed to the embodied emissions from building materials like cement, steel, and aluminum. Beyond CO_2, fugitive emissions from fluorinated greenhouse gases, particularly hydrofluorocarbons (HFCs), representing about 80% of such emissions, accounted for 8% of the buildings sector emissions in 2020 (Downey et al., 2021; Hu et al., 2020).

Addressing energy consumption in buildings is crucial due to their substantial contribution to final energy use in numerous countries. In Bulgaria, heating alone constitutes 36% of the total final energy use and a significant share within the residential sector (Ministry of Energy, 2020; Peneva, 2022). The sector alone consumes over 6100 GWh per year from fossil fuels and 2003 GWh from renewable fuels as of 2019, according to the report.

Given this considerable energy consumption and the relatively uniform nature of the private household sector, particularly when compared to other economic sectors such as industry or services, there are promising opportunities for the effective implementation of energy-saving measures, with a specific focus on room heating.

Figure 1: Final Energy Consumption by Sector in Bulgaria, ktoe



Source: Ministry of Energy of Bulgaria, National Statistical Institute.

In Bulgaria's NRRP, the decarbonization of the building sector constitutes one of the five reforms for a low-carbon economy. The other four reforms include creating a National Decarbonization Fund, stimulating electricity production from RES, developing a National Road Map for hydrogen technologies, establishing a Commission for energy transition and developing a Road Map for climate neutrality.

Despite the building sector contributing only 8% to Bulgaria's carbon emissions, its decarbonization presents a significant challenge due to low building renovation rates and limited deployment of rooftop RES. The reform focuses on establishing a financing mechanism for energy efficiency and renewable projects through

energy bills. Within this reform, measures to protect vulnerable households include adopting an official definition for energy-poor households and promoting energy efficiency and renewable energy projects through energy bills. These initiatives involve amendments to the Territorial Planning Law, Condominium Law, Energy Law, and Renewable Energy Law. Administrative reforms encompass building capacity for one-stop-shops in 28 regions, creating co-financing models, and developing energy communities.

The building sector decarbonization reform is closely tied to investments in two measures: a 1.3 billion Euro program for energy efficiency in multifamily buildings and a 123 million Euro program for financing single measures for renewable energy in single-family and multi-family buildings. These programs include sub-measures for constructing solar systems for domestic hot water supply (with households receiving no more than BGN 1,960.83) and photovoltaic systems up to 10KW. The maximum grant for an individual household is planned to be up to 70% of the system's value, but not exceeding BGN 15,000.

The anticipated impact of this investment package involves renovating approximately 1200 buildings and installing RES equipment in nearly 10,000 households. This corresponds to around 1.5% of the total 66,000 inhabited multifamily buildings in Bulgaria, with less than 4% having been completely renovated through national programs (less than 2500 buildings) (LTRS 2030). In comparison, Bulgaria has 1.5 million individual houses, but there is no available statistical data on how many have installed RES equipment. Notably, this marks the government's first program of this nature.

3 Challenges of the Reform

3.1 Challenges related to the basic situation in Bulgaria

The challenges facing building sector decarbonization in Bulgaria extend beyond policy design and are intricately linked to the country's fundamental situation. Economic constraints play a pivotal role, as limited financial resources and competing budgetary priorities may impede the allocation of sufficient funds for large-scale sustainable projects. Socioeconomic disparities within the population also pose a challenge, hindering widespread participation in energy-efficient measures due to financial constraints and a lack of awareness and education about sustainable practices.

Inadequate infrastructure, especially in older buildings, constitutes a significant obstacle to implementing energy-efficient technologies. Retrofitting existing structures to meet modern sustainability standards demands substantial investment and may encounter logistical challenges. Bulgaria's reliance on traditional energy sources, such as coal, further complicates the transition to renewable alternatives. Existing infrastructure and economic dependencies on traditional energy sectors could slow down the adoption of greener technologies.

A general lack of public awareness and understanding about the benefits of decarbonization and sustainable building practices can hinder the success of initiatives. Without an informed public, there may be resistance or insufficient demand for energy-efficient solutions. Regulatory and administrative hurdles, including bureaucratic processes and legal complexities, present additional challenges, emphasizing the need for streamlined procedures to facilitate effective implementation.

Insufficient technological integration in the building sector is another concern, potentially limiting the adoption of advanced energy-efficient solutions. The lack of access to and familiarity with cutting-edge technologies may restrict the scalability and impact of decarbonization efforts. Cultural and behavioral factors, such as traditional preferences in construction and reluctance to change, also influence the willingness of individuals and businesses to adopt new, sustainable practices in building design and energy use.

Addressing these fundamental challenges requires a comprehensive approach that combines policy adjustments with broader efforts to enhance public awareness, invest in infrastructure, and overcome economic and cultural barriers to sustainable development.

3.2 Challenges related to the NRRP's design

The initial conceptualization of the building sector decarbonization reform and investment, while holding promise, has encountered a series of challenges as of October 2023. One primary issue stems from the lack of synchronization between the investment and the reforms, leading to delays in the reformative processes. This disjointed timing has compelled the initiation of the investment before the completion of corresponding reforms. Originally structured with the intent of offering 100% grants, subsequent phases were forced to commence with

reduced 80% grants, requiring households to co-finance with their own capital. This unintentionally excluded energy-poor households, contradicting the inclusive principles advocated by the Green Deal. While the initial phases generated considerable interest, the second phase, initiated in June 2023, lacked enthusiasm due to the lingering incomplete reforms. The absence of finalized reforms also hampers households' access to low or zero-interest credits, undermining the intended support for energy-poor households.

Another significant challenge arises from the lack of integration with other reforms, notably the absence of the decarbonization fund. This absence hinders the provision of specific support for vulnerable households, leaving 2000 buildings without approved 100% grant funding. The lack of a comprehensive communication campaign has left many stakeholders unaware of the cessation of 100% grants, resulting in reduced active participation in co-financing phases. The absence of an efficient co-financing mechanism raises concerns about the potential for Bulgaria's decarbonization process to become costly, slow, and less effective.

Thirdly, the successful implementation of reforms necessitates effective multisectoral coordination, encompassing housing, energy, and social policies. Despite assigning leading ministries for each reform, poor coordination has resulted in incomplete or paper-based reforms. Notably, the financing of energy efficiency measures through bills remains unimplemented, and the establishment of one-stop-shops has been significantly delayed. The mechanism designed to protect vulnerable households lacks essential details, including the competent governmental body and fund names. Furthermore, the second phase of the building renovation program lacked a proper communication campaign, raising concerns about the overall risks associated with the reform's implementation. Addressing these multifaceted challenges requires a comprehensive and integrated approach that goes beyond mere legislative adjustments, encompassing streamlined communication strategies and enhanced coordination mechanisms.

4 Conclusions and Recommendations

Conclusions

Despite the positive momentum in reforms and successful investment outcomes, concerns about the long-term sustainability of the decarbonization process have arisen. Following the financial support provided by the NRRP, there is a crucial need for the establishment of enduring, constant funds, and co-financing mechanisms. Unfortunately, both Bulgaria and Romania experienced the highest share of food and energy expenditures in households' disposable income in 2021, accounting for 75% of the total income. This financial constraint leaves little room for long-term investments across a significant portion of the population. The impending liberalization of the electricity market is poised to further diminish households' capacity to undertake enduring measures for low energy consumption.

Simultaneously, the foreseen commencement of the social climate fund in 2026 is anticipated to face sustainability challenges. Bulgaria, having the lowest energy consumption covered by the emission trading scheme in the building sector (ETS 2), implies that, in the absence of European funds, national financing mechanisms will encounter limitations. The revenue from emissions fees collection and private capital investment is expected to be constrained.

In light of these challenges, there is an imperative to reconsider and reshape the reforms and investments associated with building sector decarbonization, particularly in low-income countries. Drawing lessons from the encountered challenges, it is essential to devise effective and appropriate solutions promptly to address the pressing issues at hand.

Recommendations

Addressing the challenges identified in ensuring the long-term sustainability of the building sector decarbonization process requires a thoughtful redesign of policies. Here are several suggestions:

1. Financial Accessibility:

To address financial accessibility concerns, the redesign should focus on income-adaptive financing mechanisms. Introduce tiered subsidies or income-based interest rates to accommodate varying income levels, ensuring that even households with limited financial capacity can participate in and benefit from the decarbonization initiatives. Additionally, establish targeted social support programs tailored to assist vulnerable households, recognizing the high percentage of income dedicated to food and energy expenditures. These

programs can include direct financial assistance, tax incentives, or subsidies specifically designed for low-income families.

2. Long-Term Affordability and Public Awareness:

To ensure the long-term affordability of energy-efficient measures, the policy redesign should include measures such as negotiating favorable agreements with suppliers, incentivizing energy-efficient appliance purchases, and exploring innovative financing models to reduce upfront costs for consumers. Simultaneously, launch comprehensive public awareness campaigns to inform households about changes in grant structures, co-financing requirements, and the impending liberalization of the electricity market. Clear communication is essential to encourage active participation and informed decision-making among the populace.

3. Integration and Emission Trading Scheme (ETS):

It is necessary to promote integration by aligning building sector decarbonization initiatives with existing social programs to streamline efforts and resources. Coordinating with ongoing initiatives can enhance efficiency, reduce redundancy, and maximize the impact of limited funds. Reevaluate the building sector's role in the emission trading scheme to align with the country's energy consumption realities. Adjustments may be needed to enhance the effectiveness of the ETS in promoting sustainable practices within the building sector.

4. Private Sector Engagement and Policy Flexibility:

It is essential to encourage private sector engagement by exploring partnerships with financial institutions, businesses, and investors. Creating incentives for private capital investment can diversify funding sources, reducing dependence on emissions fees and public funds. Design policies with built-in flexibility to adapt to evolving economic conditions and unforeseen challenges. Regular reviews and adjustments can help ensure that policies remain effective and responsive to changing circumstances, contributing to the overall success and sustainability of the building sector decarbonization efforts.

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