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PROBLEMS OF REMEDIATION IN BULGARIA. CONSTRUCTION PRACTICE AND POLITICAL COMMITMENT TO THE EU REGULATIONS

This article examines the term "remediation" in a historical and political context. A definition of the term "renovation of buildings" is also presented. This definition is derived from the technological process of inspection itself, which is divided into two sub-stages: a technical inspection and an inspection for an energy efficiency. From practical standpoint, the process of renovating buildings must follow the development of the technologies and standards, on the one hand, and the decisions given on political, law and administrative levels, on the other hand.

The main problems to the buildings remediation in Bulgaria by 2020 are indicated and described. These problems, being addressed as standard characteristics, can be used for comparison to the remediation performed in other countries. The article lists the main processes carried out for the remediation of buildings in Bulgaria in the period 2000–2020. Besides, the main problems are outlined that make the situation with further progress unclear and the implementation of EU policies problematic (although Bulgaria had committed to these).

Keywords: renovation of buildings, remediation in Bulgaria, EU policies, ownership, panel buildings, technical inspection.

The term „санирание“ (“sanirane” – remediation). The name "sanirane" etymologically comes from the Latin word *sānus*, which means "healthy". The term "sanirane" is used mostly in Bulgarian language, less often in Russian language. In Russian the term „реновация жилищного фонда“ ("renovatija zhilishtnovo fonda") is used, but in Bulgarian – "renovation of buildings" is rarely used. In English – "renovation of buildings"; in German – Renovierung von Gebäuden; in Spanish – la renovación de edificios; in French – la rénovation des bâtiments, in Italian – ristrutturazione degli edifici etc..

Expressed in technical terms, "remediation" means the reconstruction of buildings and facilities, which can, on the one hand – achieve the reliability of their construction under operational and climatic effects (storms, earthquakes, etc.), and on the other hand – achieve a certain comfort under operating conditions (e.g. thermal insulation, sound insulation, engineering systems). Thus remediation can be defined as a general concept that includes: reconstruction and modernization. Reconstruction and modernization are different concepts. The reconstruction of a building is related to changes in its load-bearing structure, aimed at making it habitable, according to

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the regulations in force at the time of reconstruction. Modernization includes a set of measures to increase the consumer qualities, amenities and comfort of living in a building, which does not affect its load-bearing structure. During the modernization the volume-planning decision of the building is often changed, its heating system is replaced, the building is thermally insulated, an air-conditioning system is built, etc. The measures carried out during the modernization are related to overcoming the inevitable moral depreciation over time. [1, p. 2-3]. Reconstruction and modernization have as analogues the terms "technical inspection" and "energy inspection". Although the installations are also subject to technical inspection, more often it concerns the construction and reconstruction of the building. It is a bad practice for buildings, especially panel buildings, to be subjected only to a partial technical inspection, arguing that no changes are made to the load-bearing structure.

For example, in the Bulgarian remediation practice the certification of the buildings (which precedes the construction and repair works) is not a complete inspection with the following argument: according to BDS EN 1998-3 the minimum number of open dowels must be 20 % upon a full inspection of the building. Complete inspection is required only when the loads increase, i.e. when upgrading or changing the load-bearing structure. When renovating the building, the loads do not increase and when no changes in the structure are found, it is not necessary to open the horizontal dowel joints to establish the quality of the welds, the corrosion of the vertical joints and the quality of the monolithic concrete. The "no load increase" finding is usually followed by a reference to "a special research" of the Civil Engineering Research Institute from 1998 on the condition of the large-panel residential buildings, according to which in case of poor performance of the joints, lack of anti-corrosion coating and operation in high humidity the maximum corrosion rate is about 0.001 mm / year, which for 100 years of operation leads to a reduction of the cross section of the reinforcing bars by 8.5 % (for N16) and up to 10 % (for N26), which proves that the dowel connections have the required operational durability. [2, p. 18]. However, the research in the few complete technical inspections in Bulgaria for the last 20 years shows that there are joints not filled entirely with concrete, presence of poorly compressed and desorted concrete, etc. [3, p. 15] The predominant part of these defects is due to non-compliance with the technology of execution, in which the consistency of the applied concrete mixture and the time for application after preparation of the mixture are essential. [4, p. 3].

The conclusions outlined for the remediation practice in Bulgaria are as follows:

- Full technical inspections are not performed and despite the World Bank report [5, p. 27] on seismic hazard and the presence of irrelevant and insufficient data from technical inspections, the practice is to carry out remediation with reference to obsolete research from 1998. (Since 1998 until 2020 22 years have passed, which is half the lifespan of a panel building that is about 50 years¹)

– In order to catch up with the EU requirements for progress in terms of energy efficiency and to report some percentage of remediated buildings (for which an increase in energy class by at least one degree has been demonstrated after the remediation), construction and repair works are carried out, which concern the energy rehabilitation and modernization of the building, but the need for reconstruction is skipped [6, p. 5].

This is the second extremely bad practice, which is a consequence of the fact that the concept of "remediation" is both a term related to construction work and a term that refers to a certain type of policy. And when the requirements for the implementation of a certain policy have to be caught up, actions are taken that are irrelevant to the technical process, which is a significant problem when it comes to construction.

Thus, the renovation, which includes reconstruction and modernization as a general feature, is practically subdivided into: *energy remediation* on the one hand, which provides for specific energy expertise or energy inspection, and *thermal insulation* of the building, which also requires specific expertise [7, p. 22-23]. This splitting of the concept is based on the practice, as the very concept of "remediation" entered the world construction practice in the last decade of the twentieth century to reflect the specific complex of construction works that were performed in order to modernize large-panel residential buildings. A typical remediation of a residential building includes a complete inspection of the building condition, partial reconstruction of the connections between the prefabricated elements, repair or replacement of the roof waterproofing, repair or replacement of water supply and sewerage systems, complete rehabilitation of the facades, increasing the energy efficiency of the building by increasing the heat protection capacity of the enclosing structures, replacement of the heating system, construction of air conditioning and (or) ventilation systems. Also, during the remediation, all other elements of the building are repaired, for which the inspection had revealed that due to their technical depreciation they are not able to fully perform their functional purpose [8, p. 28].

As noted, the concept of "remediation" is not only related to a certain type of current practice, but also to a certain type of policy in the recent years. This is valid in the perspective of Bulgaria as EU member state. Therefore, when analyzing the concept of "remediation" when it concerns the EU member states, the following must be taken into account: a) *the European policy factor*, b) *the funding factor* c) local specifics, such as the issue of *ownership* [9, p. 2-3]. The reason for pointing out these factors is that as a member state Bulgaria should implement the EU policies in the field of Energy efficiency, and should harmonize its national legislation. These policies indicate certain good practices. At the same time, however, as the poorest country in the EU and as the country with the weakest economy in the Community, Bulgaria cannot directly apply foreign experience – the reasons are economic and social and they are seen in two groups of problems that are specific:

These are problems related a) the ownership and the human factor and b) the physical and technical characteristics of the buildings [10, p. 51].

In terms of property and the human factor. A specific problem in the remediation of multi-family residential buildings in Bulgaria is the problem with ownership:

– *The private ownership* of the apartments and the co-ownership of the common parts of the building: roof, facades, stairwells, lifts, as well as common installations is a major factor influencing the choice of remediation approach, especially since the most common defects indicated in the technological inspection, are precisely the common parts for which the least care is taken in maintenance [11, p. 42]. In Bulgaria, according to statistics, 92.5 % of the housing is privately owned and only 7.5 % is state or municipal property. However, the land on which the blocks are built belongs to the municipality. This creates certain difficulties in financing the buildings remediation and when following the examples of Germany, France, Belgium, etc., it should be borne in mind that there the situation with ownership, and therefore with the responsibility for the loans taken differs [12, p. 8].

Another problem related to the specifics of ownership concerning remediation projects and energy efficiency in multi-family residential buildings is related to uninhabited apartments in habitable buildings. A large percentage of unoccupied housing in a building (respectively a small number of owners) makes the investment inefficient in terms of energy efficiency and inefficacious in terms of financing, regardless of the financing source [13, p. 19].

– *The heterogeneous composition of the owners in terms of social status, solvency and age* suggests a likelihood of disagreement regarding the scope of the remediation, as well as regarding the technical solutions. It is likely that a large part of the residents are not in solidarity with the necessary technical solutions, because for retirees the investment project that would provide long-term energy savings and a better quality of life has one meaning, but for young families who are now entering in possession of housing (very often with a credit that shall be repaid for 20-25 years) has another meaning. This is also important in terms of credits granting. Age has a significant impact on the very construction and repair process. It should be borne in mind that the desire to evacuate during the construction process is not always a consequence of personal choice only.

In terms of the physical and technical circumstances several additional groups of problems should be mentioned:

– *Complicated plastic image.* Unlike the pragmatic formal solutions of the industrially produced multi-floor buildings in the Central European countries, the architectural image of some of the large-panel residential buildings in Bulgaria is deliberately complicated. The variations in the number of floors of the separate sections, forming a "block", lead to complication and price increase of the details at the party walls [14, p. 5]. This makes the task of creating more complicated.

– *Layerings*. As a result of uncontrolled individual interventions on the buildings various elements are "layered", such as: thermal insulation; glazing, extension masonry, partitioning, grilles at loggias; outdoor units of air conditioners; satellite dishes; fencing the spaces above the entrance visors. On the one hand, the "layers", which are considered as defects in many development projects and in many cases are defects, but on the other hand these repairs are financed by private homeowners, who can hardly be convinced that it is necessary to reinvest funds in remediation.

Defects related to the buildings functionality, which are often found in large-panel residential buildings are: insufficient thermal insulation, impaired sound insulation from shock and air noise, leaks in bathrooms due to defects in water supply and sewerage systems and lack of waterproofing, free movement of parasites and insects upwards the building, increased noise activity from the lift system and shock noise, insufficient security of the front doors against burglary and theft, leaks from the entrance visors, etc.

In view of these circumstances, the following conclusions can be drawn:

Defects in panel construction in Bulgaria are on the one hand due to some low technical indicators of the building elements and on the other hand due to the lack of adequate maintenance during the operational period. Adequate maintenance is a repeatedly mentioned factor for the building aging and should be taken into account both in technical inspections and in creating a successful organizational and management model, which includes a special part for future maintenance of remediated buildings (legally regulated, but also regulated e.g. as a relationship between the private owner and the municipality, which can be part of a sustainable credit granting), as maintenance is a major factor determining aging. Also, when developing standard projects, as well as when developing a specific remediation project, the principles of sustainable architecture should be taken into account. According to these principles, opportunities should be created for upgrading the renovated building with "extras" and / or "innovations".

Further in-depth inspection and analysis of the condition of the structural elements and the dowel joints between them is necessary.

Moral aging. In addition to the physical aging is the moral aging of all technical systems and solutions used in panel construction. The individual building elements as well as the installation systems are also obsolete.

Moral aging mainly concerns on the one hand the functionality of the building, but this is also related to the operational suitability and physical life of panel buildings. Moral obsolescence refers to the elements and materials used in construction and influenced by the maintenance or non-maintenance of the building, but it also refers to the contemporary norms and standards that define housing policies. For example, in the initial years of design and production of all large-panel construction systems it was accepted that the buildings will be operated in conditions of provided central heating, which was subsidized by the state. This also applies to water supply

and electrification. Over time, the regulations governing the thermal requirements of buildings have changed several times, taking into account the existing conditions for the supply of energy sources. The low prices of energy sources until the end of the 70's had their impact on the thermal qualities of the buildings and respectively on the designed heating installations and the heating bodies in them. The ensuing energy crisis has a significant impact on both design decisions and regulations. This process can be observed with similar effect at the moment when Bulgaria is a member of the EU and should comply with the macro framework for energy efficiency, as previously – in the construction of panel buildings Bulgaria has taken into account the agreements framework between the socialist countries regarding the supply of resources.

The changes in the large-panel housing construction related to the energy crisis and the change of the political system were reflected in: changes of the facade panels, increasing the thickness of the thermal insulation layer in three-layer panels, reducing or removing thermal bridges, improving the composition of concrete for single-layer panels; obligatory laying of a thermal insulation layer in the floor constructions above the basements; improving the thermal insulation above the ceiling slabs and transition from low to high under-roof space [15, p. 3]. However, in view of the present and the requirements that are formulated in the current political and economic situation, these decisions are ineffective.

Extremely little has been done in Bulgaria regarding the remediation of buildings. The actual start was in 2007 with the UNDP pilot project "Demonstration renovation of multifamily residential buildings", which is a joint initiative of the Ministry of Regional Development and Public Works and the UN Development Program and is actually the first step in implementing the Renovation Program for Residential Buildings in Bulgaria, adopted in 2005. Under this project, 50 residential buildings have been remediated where 100 % of the costs for the expertise were covered by the project, and for the repair works: 20 % of the costs were borne by UNDP and 80 % – by the residents.

In 2007 the program "Energy renovation of Bulgarian homes" was launched under the operational program "Regional Development" of the EU with a deadline the end of 2013. [16, p. 34]. Under this program, 299 buildings were renovated, the programme covering 75 % of the costs and the residents paying the remaining 25 %. Within the National Program for Energy Efficiency of Multifamily Residential Buildings, which is the largest initiative, contracts have been concluded for remediation of 2022 buildings, and by 2020 – 1854 buildings were put into operation. The implementation of this program began in 2015 with a financial resource of BGN 1 billion, for which an option for provision of additional funds was foreseen. The program receives funding through operational program "Growing Regions 2014-2020" and it is the only program that grants free energy efficiency measures to multifamily residential buildings. However, what has been done under this program should not

be considered a success, because with this project neither the long-term issue of financing was resolved, nor a working model was found for continuation. It is also economically disputable whether the BGN 2 billion spent on renovating 1,854 buildings is justified.

In 2018, the EU issues the most important and up-to-date directive, which changes the direction of development of Community energy efficiency policies. This is Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31 / EU on the energy performance of buildings and Directive 2012/27 / EU on energy efficiency [17, p. 2-12]. Five crucial prerequisites shall be outlined before its analysis can be presented:

1. Directive (EU) 2018/844 changes the direction of development of remediation policies in the EU and sets new goals for the period 2020-2050. It should be considered the most important document that defines energy efficiency policies in the Union and that changes and incorporates the previous ones.

2. By 2020 Member States are required to harmonize their national legislation with Directive (EU) 2018/844.

3. Practices that can be called "good practices" in the field of remediation shall comply with the requirements of Directive (EU) 2018/844. Such practices are described in: Commission Recommendation (EU) 2019/786 of 8 May 2019 on building renovation [18, p. 2-30].

4. By 2020 policies concerning building remediation practices cannot be considered legitimate, if the conditions set out in Directive (EU) 2018/844 are not adopted and met.

5. With a view to the adoption of Directive (EU) 2018/844, all energy efficiency policies should take into account the changes set out in this Directive. In particular, actions taken to improve energy efficiency cannot be distinguished as individual projects or individual practices from the general strategy to be established in the light of the provisions of the Directive. In particular, energy efficiency surveys cannot be distinguished from technological inspections, and they shall follow the technological inspections – both as a practice and as a policy.

By May 2020 Bulgaria has not yet adopted amendments to the Energy Efficiency Act to bring national legislation in line with Directive (EU) 2018/844.

2. After this law is voted and the changes are adopted, Bulgaria is obliged in the shortest possible time (by the end of 2020) to implement at least 5 important points defined in an Ordinance, namely:

Member States are obliged to:

a) establish a detailed strategy aimed at achieving a highly efficient and decarbonised building stock by 2050;

b) define a roadmap with measures and measurable indicators for the progress of specific indicative milestones for 2030, 2040 and 2050;

c) hold a public consultation on their strategy before submitting it to the Commission and to determine the procedure for further consultations;

d) facilitate the access to mechanisms through smart financing in order to help investment mobilization;

e) present their strategy as part of their final integrated national energy and climate plan.

By 2020 the organizational and management model in Bulgaria is based on technical inspections, which are irrelevant by 2020, due to obsolescence [19, p. 10-20]. The very process of rehabilitation 2015-2020 was implemented (with problems both in the structure and in the organization) spontaneously, looking for a functional minimum in order to meet the requirements of the EU and only thanks to free granting. In the strategic documents from 2020 no solution has been found on how to continue this process. The main problems for successful mass remediation are: 97 % of the homes in Bulgaria are privately owned; 30 % of Bulgarians live on incomes below the poverty line [20, p. 58]; there is a huge credit indebtedness and insolvency of the population and distrust in financial institutions; 75 % consent of the homeowners in one multi-family residential building is required in order to conclude a contract for remediation of the whole building; in the implemented remediation processes a high percentage of corruption and cartelism was proved, which leads to a high percentage of public political distrust.

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ПРОБЛЕМЫ С РЕАБИЛИТАЦИЕЙ В БОЛГАРИИ. СТРОИТЕЛЬНАЯ ПРАКТИКА И ПОЛИТИЧЕСКАЯ ПРИВЕРЖЕННОСТЬ К ПРАВИЛАМ ЕС

В статье рассматривается термин «реабилитация» в историческом и политическом контексте. Приведено также определение термина «реновация зданий». Это определение вытекает из самого технологического процесса инспектирования, который делится на два подэтапа: технический осмотр и осмотр на предмет энергоэффективности. С практической точки зрения процесс реконструкции зданий должен сопровождаться развитием технологий и стандартов, с одной стороны, и решениями, принимаемыми на политическом, правовом и административном уровнях, с другой стороны.

Обозначены и описаны основные проблемы, связанные с восстановлением зданий в Болгарии к 2020 г. Эти проблемы, рассматриваемые как стандартные характеристики, могут быть использованы для сравнения с восстановительными работами, проводимыми в других странах. В статье перечислены основные процессы, осуществленные для восстановления зданий в Болгарии в период 2000–2020 гг. Также намечаются основные проблемы, которые делают ситуацию с продолжением этого процесса неясной и проблематичной реализацию политики ЕС (хотя Болгария взяла на себя обязательства по этому вопросу).

Ключевые слова: *реновация зданий, рекультивация в Болгарии, политика ЕС, собственность, панельные здания, технический осмотр.*

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