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ПОДГОТОВКА И ПРОВЕЖДАНЕ НА УСТОЙЧИВИ ОБЩЕСТВЕНИ ПОРЪЧКИ ЗА СТРОИТЕЛСТВО НА СГРАДИ В БЪЛГАРИЯ

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PREPARATION AND CONDUCTING OF SUSTAINABLE PUBLIC PROCUREMENT FOR CONSTRUCTION OF BUILDINGS IN BULGARIA

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Abstract:
The selection of public procurement contractors in the field of construction is in the focus of economic and civil interest both in Bulgaria and around the world. The spending of significant financial resources for the construction of buildings and technical infrastructure requires the Contracting Authorities to prepare and apply clear rules and procedures for selection of companies executing construction projects. In the construction sector, public procurement has a significant impact, resulting in increase of the environmental performance of the industry. "The sustainable use of natural resources" considers the durability of constructions and the use of environmentally friendly raw materials, the possibility of recycling of constructions, materials and their parts left after demolition. In this regard, sustainable public procurement introduces environmental considerations in the design, contracting, and monitoring of construction

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projects. The application of environmental / sustainable criteria in tendering procedures should become a mandatory requirement for all public authorities.
This report analyzes the need to implement sustainable public procurement for construction of buildings in Bulgaria. It outlines the limitations for Contracting Authorities and Contractors for conducting and participating in procedures aimed at realizing environmentally sustainable construction projects.

Keywords:
Sustainable design and construction, sustainable public procurement, Aassessment of sustainable construction, Building information modeling (BIM)

1. INTRODUCTION

In 1987, the UN World Commission on Environment and Development's report "Our Future" gave the first definition of sustainable development - which "meets the needs of the present without compromising the ability of future generations to meet their own needs".

The UN 2030 Agenda, adopted by world leaders in 2015, represents the new global framework for sustainable development and sets goals, which are balanced between the three dimensions of sustainable development: economic, social and environmental.

The definition of sustainable public procurement, according to the European Commission, is as follows: "Sustainable Public Procurement (SPP) is a process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development - economic, social and environmental - when procuring goods, services or works at all stages of the project" http://ec.europa.eu/environment/gpp/versus_en.htm [1].

A short definition, applicable to the Bulgarian Public Procurement Act, is: Public procurement for the selection of contractors for the sustainable design and construction of buildings.

When the subject of sustainability is discussed, it is often the impact on our planet that is highlighted, but sustainability includes much more than that. A sustainable project is better than a “green” one because sustainability considers a greater array of impacts than just those that influence the natural environment [2].

Sustainability has been a major issue in the Architecture, Engineering and Construction (AEC) industry since the energy crisis and the emerging concerns related to climate change [2].

In sustainable construction, economic thinking, which is based only on the idea of initial costs is being abandoned. Alongside the initial costs (construction costs), consideration is also given to the resources required to operate, maintain and repair or change the use of a building during its operational period. In the first place, design decisions are brought out, which are economically justified long-term investments, while at the same time competition during construction is preserved [3].

Buildings in the European Union account for 40% of the energy use and 36% of the carbon emissions produced. To achieve the Commission's proposed target (September 2020) of reducing emissions by at least 55% by 2030, the European Union must reduce greenhouse gas emissions from buildings by 60%, energy use - by 14% and heating and cooling energy consumption - by 18%.

A significant part of every nation's capital is invested in public and residential buildings. The financial resources for building construction and maintenance are commensurate with public and private resources for infrastructure and manufacturing.

In line with EU objectives and in accordance with the Long-term National Strategy to Support the Renovation of the National Building Stock of Residential and Non-residential Buildings by 2050, Bulgaria has made commitments to increase the energy efficiency of

residential and administrative buildings, and to achieve a minimum of 30% primary energy savings for renovated buildings.

In the period 2016-2021, BGN 2 billion from the national budget have been used for the renovation of approx. 2000 buildings for which energy savings have not been reported to date. There is no assessment of the effectiveness of the state funds spent or the market studies carried out were negative.

At present, only 4.2% of the multi-family residential buildings, 11% of the total area for residential buildings, 9.6% of the total area for non-residential buildings, 1.7% of the area of administrative buildings and only 2.1% of the buildings of cultural infrastructure, have been renovated. Only 7% of the area of occupied residential buildings (built after 2010 and the renovated ones) is in accordance with the modern requirements for energy efficiency (according to an analysis of the residential stock, published at: https://www.mrrb.bg/bg/pregled-i-analiz-na-nacionalniya-jilisten-sgraden-fond-v-republika-bulgariya/)[4].

The needs for renovation of residential and non-residential buildings are significant and far exceed what has been achieved so far.

In the National Recovery and Resilience Plan of the Republic of Bulgaria (NRRP), a total amount of BGN 2 billion has been earmarked for sustainable energy renovation of residential and public buildings. It is expected that by 2026, around 2,000 buildings to be also energy-renovated.

The greatest interest among the projects included in the NRRP of the Republic of Bulgaria has been shown to the projects for energy efficiency in the buildings. The application guidelines are currently being developed by the experts of the Ministry of Regional Development.

In 2023-2024 is expected the launch of procedures under the Public Procurement Law, as a result of which the contractors of sustainable energy renovation of the buildings will be selected.

Therefore, the Contracting Authorities must prepare and conduct such public procedures that create real competition and transparency between contractors for sustainable design and construction of buildings.

2. METHODS OF ASSESSMENT OF SUSTAINABLE CONSTRUCTION IN THE EUROPEAN UNION

The EU standards, which define the commonly used methods for assessing the sustainability of construction works, are as follows:

Table 1. Commonly used EU standards

Bulgarian State Standard (BSS) EN ISO 14044	Environmental management — Life cycle assessment — Requirements and guidelines (LCA)
ISO 15686-5	Buildings and constructed assets — Service life planning — Part 5: Life-cycle costing (LCC)
BSS EN 15978	Sustainability of construction works - Methodology for the assessment of performance of buildings - Part 1: Environmental Performance

BSS EN ISO 14044 - Environmental management — Life cycle assessment — Requirements and guidelines (LCA)

ISO 14044 specifies requirements and provides guidelines for life cycle assessment (LCA). The concept of LCA as a method for assessing the environmental impact of products throughout their life cycle has been widely adopted in building construction, and its focus has long been on carbon emissions, energy and other environmental impacts.

LCA is a tool, which can be used to analyze the environmental impacts of different building designs and specifications. LCA can be specified in the procurement criteria as a means of quantifying improvements in the environmental impacts of buildings.

ISO 15686-5 - Buildings and constructed assets — Service life planning — Part 5: Life-cycle costing (LCC)

LCC is a valuable technique, which is used for predicting and assessing the cost performance of constructed assets, in which all costs arising from owning, operating and maintaining a building over a certain study period or building life cycle are considered to be potentially important. The functions of LCC are for decisions in option appraisal, informing design decisions; and importantly providing an enriched cash flow forecast for the client over an extended period.

Figure 1 illustrates the hierarchical breakdown structure for whole life-cycle costing (WLCC) in the ISO 15686 – 5. WLCC includes a broader economic matrix, encompassing not only construction costs and LCC but also “non-construction costs” such as site purchase; letting or selling agent fees; procurement costs and the cost of finance.

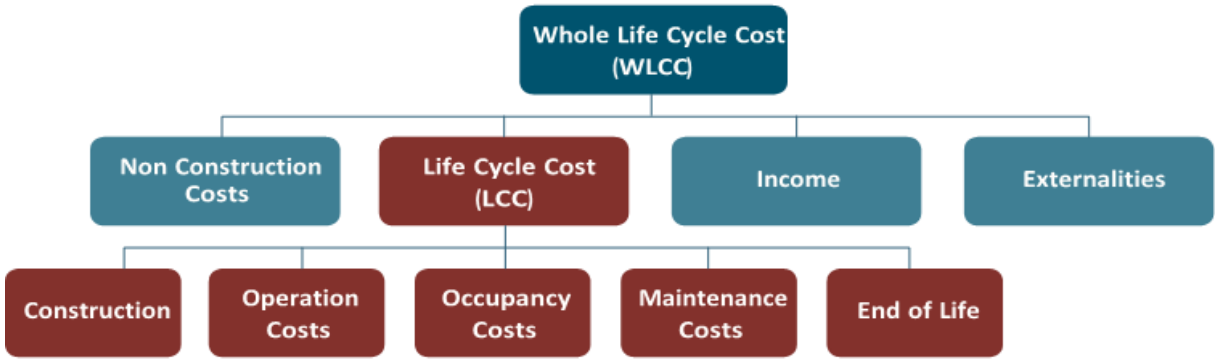

Figure 1. Hierarchical breakdown structure for WLCC in the ISO 15686 – 5

Figure 1 also illustrates that WLCC includes ‘income’ from the built asset and any defined ‘external’ costs. The ISO 15686-5 describes external costs as ‘externalities’, which are costs not necessarily reflected in the transaction between provider and consumer, giving examples such as business staffing, productivity and user costs. Another externality which is very relevant today, is the wider impact on the environment which could possibly be assessed through a Life Cycle Analysis (LCA) and Green Building Ratings. Externalities could also be expanded to take account of the social impact on the built asset [5].

BSS EN 15978 - Sustainability of construction works - Methodology for the assessment of performance of buildings - Part 1: Environmental Performance

The standard specifies the calculation method based on life cycle assessment (LCA), data obtained from environmental declarations (EPD) and other quantitative environmental information to assess the environmental performance of a building.

According to the EN 15978 standard (CEN, 2011), which is the most widely accepted by the industry and academia, the life cycle stages of a building are: A. the embodied stage, including the production stage (A1-A3) and construction stage (A4-A5); B. the use stage; and C.

the end-of-life stage. In addition to these base system boundaries, the benefits and loads beyond the system boundary (D) are also taken into account (see Fig. 2)[6].

Life cycle of buildings															Supplement
Production			Construction		Use							End-of-life				Beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
raw materials supply	transport	manufacturing	transport	construction	use	maintenance	repair	replacement	refurbishment	operational energy	operational water use	deconstruction/demolition	transport	waste processing	disposal	Reuse/recycling

Figure 2. The life cycle stages of buildings (EN 15978)

The standards related to the assessment of the sustainability of buildings are very informative publications, but they are theoretical, with few practical examples.

In 2016, the European Commission has published guidelines for the provision of criteria aimed at facilitating public authorities in the purchase of products, services and works with reduced environmental impact.

- Commission staff working document for EU GPP Criteria for Office Building Design, Construction and Management
- Technical background report and final criteria for Green Public Procurement Criteria for Office Building Design, Construction and Management

The guidelines of the European Commission provide a wide range of criteria in terms of input materials and more, but they are too general. A practical method for calculation building sustainability indicators is lacking.

3. INDICATORS FOR EVALUATION OF PROPOSALS, ACCORDING TO THE BULGARIAN PUBLIC PROCUREMENT ACT

The Law on Public Procurement (PPA) in Bulgaria is synchronized with the European Directive 2014/24/EU on public procurement.

In this paper we shall not discuss the criteria for selection of the contractors, which aim to determine their economic and financial capacity and technical capabilities and/or qualifications. After the Contracting Authority has verified that they are financially stable, they possess the necessary equipment and have the necessary knowledge, skills and experience, the procedure continues with the evaluation of the technical proposal.

In accordance with the EU directives, Contracting Authorities are required to use the method of selecting the most economically advantageous offer. According to this method, the Contracting Authorities shall apply one of the following criteria: (1) the lowest price, (2) cost level while accounting the cost effectiveness, including the costs for the whole life cycle; (3) optimal correlation quality/price, which shall be evaluated on the basis of the price or the level of costs, as well as of indicators, including quality, ecological and/or social aspects, related to the subject of the public procurement.

According to the annual report of the Public Procurement Agency for 2021 in 65% of the procedures in Bulgaria, the evaluation criterion 'lowest price' was used, and the average for the EU is 55% [7].

Currently, there are no official statistics on the use of the second criterion ‘cost level while accounting the cost effectiveness, including the costs for the whole life cycle’. Regarding the preferences of economic operators (Contractors), studies show that the criterion "optimal quality/price ratio" is most valuable to them.

When applying the "optimal quality-price ratio" criterion, the Contracting Authority, before opening the price offers, evaluates the technical proposal of the participants for the design and construction of the building (technical evaluation). The final evaluation of the participants' offers is obtained after summing up the technical and financial assessment (the price offered by the participant), and before that, the two assessments are adjusted by a coefficient. The coefficient gives a "weight" to each of the two assessments (e.g. 60% for technical assessment and 40% for financial).

Therefore, the evaluation of the technical proposal of the participants can significantly influence the final ranking of the applicants.

Contractors of public procurement in Bulgaria are convinced that their technical proposals (for design and construction) are evaluated subjectively and non-transparently by the Contracting Authority. There is almost no company, which expects a transparent and objective evaluation of their offer. Unfortunately, they have a reason to think so.

The technical proposals of the participants are usually evaluated according to the following indicators:

- Work programme for implementation of design/construction
- Methodology and technology of the planned activities
- Quality control
- Risk management, and other vaguely defined indicators and requirements

The assessment is carried out on the basis of the expert opinion of the members of the Evaluation Committee and aims to assess the quality of implementation of each specific proposal.

Often, the same technical proposal, with the same evaluation indicators, is evaluated totally differently by other experts. The assessment depends on the level of expertise and personal qualities of the members of the Evaluation Committee.

The lack of an objective, transparently formed criterion for evaluating the offers of participants in public procurement for design and construction leads to:

- demotivation of the applicants for the preparation of a competitive proposal and respective quality implementation of the construction site
- prerequisites for corruption in the administration, responsible for the preparation and conduct of public procurement
- significantly increasing the value of the construction site and decreasing the quality of its implementation.

According to Article 71, para. 2 of the Public Procurement Act, when Contracting Authorities provide for an assessment of whole life cycle costs, they indicate in the public procurement documentation the data to be submitted by the participants and the method of assessment.

A significant obstacle to non-application of this criterion is the lack of a life cycle calculation method regulated in national and European legislation.

A list of common methods for applying the life cycle assessment criterion is included in Annex XIII to Directive 2014/24/EU, but currently only provides one common method for certain types of road vehicles.

Therefore, there is a need to develop a numerical criterion to evaluate contractors' proposals in terms of sustainable building development performances.

4. SUSTAINABILITY AND BIM

Building Information Modeling (BIM) gives possibility to be developed a numerical criterion to evaluate performances of sustainable building development

BIM is regarded as a helpful tool, which can considerably reduce the time and effort required to manage data of buildings. It is defined as a set of interrelating policies, processes, and technologies, which generate a systematic approach to manage critical information for a building’s design and project data in digital format throughout its life cycle. BIM software can hold graphic information as well as material properties about the elements, which comprise a building. These characteristics of BIM provide it with great potential for managing complex and uncertain LCA and LCC data. BIM-based LCA has been used in the assessment of greenhouse gases and other environmental impacts. Some studies have also contributed to BIM based LCC, BIM-LCC data standards and 5D BIM. Recent studies increasingly focus on the application of BIM-based LCC for sustainable buildings. However, despite an ample amount of published work about the integration of LCA and LCC using BIM, no thorough review of this has yet been conducted [6].

This year was launched the new Master's programme at the Universities of Architecture, Construction and Geodesy with subject "Management and optimization of construction investment projects through BIM". BIM technologies are also being introduced in state and local administration. Over the next 4 years, hardware and software will be provided to experts from the municipal, regional and state administrations in 28 regional administrations, 6 large municipalities and 3 ministries with funds under the National Recovery and Resilience Plan. Employees will be trained to apply BIM to manage upcoming large public construction contracts.

With this technological provision to the Contracting Authorities for the management of sustainable public procurement, the need to change the method of evaluation of tender offers is urgently needed.

5. BARRIERS TO THE IMPLEMENTATION OF THE SPPCB IN BULGARIA

A significant obstacle is the lack of personnel of the Contracting Authorities to prepare and conduct public procurement for the construction of buildings in which the life cycle of the design is assessed through BIM. If the sustainable procurement requirement is included to perform an LCA/LCC of a building design, the technical expertise in preparing the terms of reference and technical specifications as well as the team conducting the public procurement, become very important. This is because applicants will have to follow predetermined rules and guidelines to ensure they are comparable. Additionally, LCA and LCC reports submitted as part of offers will need to be critically reviewed by an expert evaluator. Knowledge in BIM additionally complicates the preparation and conduct of such public procurement procedure.

Investors and contractors are also not motivated to implement sustainable construction. The high initial investments have still unproven or long-term returns.

We should also add the fact that the practical application of the integration of LCA and LCC using BIM has still not been sufficiently explored, despite the large amount of published papers.

The financial institutions choose to grant credits to safe investment projects with an average return on investment, while investments in sustainable buildings are considered as high

risk and uncertain. Such projects are perceived by commercial banks as more complex and requiring expert knowledge and costs for their implementation.

6. CONCLUSIONS

The awarding of sustainable public contracts for the design and construction of buildings can be a powerful tool to stimulate the construction industry in the Republic of Bulgaria to implement practices to reduce greenhouse gas emissions.

Studies and research are needed on a method for evaluating the technical proposals, in quantifiable terms, of participants in public procurement in terms of sustainable building development performance. The application of an objective quantifiable assessment will motivate design and construction companies for technological development and personnel qualification.

Long-term training of local and state government officials is needed for the application of BIM technologies in the assessment and management of sustainable buildings. The financial resource for training and software equipment is provided by the government.

In order to ensure transparency in the selection of SPPCB contractors and predictability in the subsequent implementation of the design and construction, it is necessary to develop unified forms, as part of the documentation for participation in the sustainable public procurement, which include at least:

- terms of reference for the design of sustainable buildings/elements
- technical specifications
- numerically based method for evaluating technical of proposals for design/construction/engineering
- contract conditions for the implementation of the SPPCB with included conditions for subsequent monitoring of the building sustainable performance

The forms of the documents will be tailored to the functional characteristics of the building, the design phase, the type and scope of the construction and other requirements arising from the standards in the field of sustainable construction and the characteristics of BIM.

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