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SUSTAINABLE PUBLIC PROCUREMENT – A CONTRIBUTION TO ACHIEVING LOW CARBON FOOTPRINT BUILDINGS

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Abstract

LNEG is involved in the development of a Sustainable Public Procurement model for residential buildings in Portugal under the LIFE ReNatural NZEB project and is part of action B3 of the project "Demonstration experiences of NZEB with low carbon footprint". The article intends to present the results obtained in the development of the model, for which two surveys were sent to several construction companies and material supplying companies. These surveys aimed at knowing the market's ability to comply with the sustainability criteria for low carbon footprint residential buildings. The model was defined based on the analysis of national and international good practices that were collected, the EU GPP criteria and the manual "Green Public Procurement Criteria under ENCPE 2020 for Design, Construction and Management of Office Buildings". The model is divided into five parts: selection of the design team and contractors; detailed design and performance requirements; dismantling, demolition, and site preparation works; construction of the building or major renovation works; and finalization and handover. Overall, it was found that companies in the construction sector can meet most of the selection criteria for the design team and contractors and for some of the technical specifications. It was also found that material suppliers can meet the various sustainability criteria for materials.

1. INTRODUCTION

Organizations make decisions every day about what to buy and where to buy it. A purchasing decision usually takes more into account cost and quality, but there are other factors to consider when making a procurement process. Organizations can't only focus on financial aspects, as they are expected to take responsibility for their environmental and social impacts, to interpret the needs of all their stakeholders and to transparently demonstrate their responsible behaviour, thus promoting sustainable procurement. Green Public Procurement (GPP) considers environmental criteria in the procurement processes of public organizations, while Sustainable Public Procurement (SPP) means the purchase of goods, services and works by public organizations integrating economic, environmental, and social considerations into the process at all stages of the procurement procedure and using a life cycle perspective [1]. With the objective of encouraging the adoption of a green public procurement policy and taking advantage of the experience gained from the National Green Public Procurement Strategies (2008-2010) and (ENCPE 2020) [2]. A new GPP strategy – ECO 360 [3] was very recently issued (February 2023) with a timeline for 2030. The ECO 360 [3] is to be more detailed into an action plan, which is under development, and, for that reason, we will focus further down on the instrument already developed under ENCPE 2020.

The essential purpose of ENCPE 2020 is to be a complementary instrument to environmental policies, contributing to the goal of promoting pollution reduction, reducing the consumption of natural resources and, inherently, increasing the efficiency of systems. It serves to assist public bodies in purchasing products, services and works with reduced environmental impact. The criteria are drawn up so that they can be integrated into the pieces of the pre-contractual procurement procedure if the entity concerned deems it appropriate. A crucial step before starting the purchasing procedure is to verify what the real needs are. When deciding which procedure to use and how best to include sustainability criteria, it is useful to have some knowledge of the market - for example, the availability, cost, and possible practical implications of greener alternatives.

This article was developed under the LIFE ReNatural NZEB project and is part of action B3 of the project "Demonstration experiences of NZEB with low carbon footprint". In this action, LNEG is involved in the development of a sustainable public

procurement model for residential buildings in Portugal. The LIFE ReNatural NZEB project has the main objective of testing and promoting new materials and construction solutions to achieve Near Zero Energy Buildings with low carbon footprint, using natural and recycled materials.

2. OBJECTIVES

This article intends to present the results obtained in the development of the model for Portugal, for which two surveys were sent to several construction companies and material suppliers. These surveys aimed at knowing the market's ability to comply with the sustainability criteria indicated in this model for the construction of low carbon footprint residential buildings. For building construction companies, the survey aimed to know the ability to apply sustainable procurement criteria in the construction and rehabilitation of residential buildings with near zero energy needs in Portugal. Specifically, it was intended to know if the companies were able to comply with the selection criteria of the design team and contractors, in a pre-selection procedure, the technical specifications, and how it presents the verification of the criteria that are met. For companies supplying materials and products for the construction sector, the survey asked whether the suppliers were able to meet the sustainability criteria for materials in a procedure for the supply of construction materials for a building or for major renovations, and how they demonstrate that they meet these sustainability criteria.

3. METHODOLOGY

The performance of the referred model for Portugal, for residential buildings, was based on the analysis of national and international good practices, the EU GPP criteria, and the manual "Green Public Procurement Criteria under ENCPE 2020 for Design, Construction and Management of Office Buildings", which was published in August 2020 (APA, 2020) [4]. This model has been defined through a checklist of criteria/ideas for constructing low carbon footprint and circular buildings. The checklist is divided into five parts: selection of the design team and contractors; detailed design and performance requirements; dismantling, demolition, and site preparation works; construction of the building or major renovation works; and, completion and handover, with examples of technical specifications and contract performance clauses presented for each [4] [5]. To use the checklist, each company must first identify the procurement needs and the objectives to be achieved in the pre-selection process of the team and/or the building to be constructed, looking for the ideas/criteria to put into the tender documents, to achieve the desired end, while keeping in mind that each project has its own specificities.

Criteria for low carbon and circular buildings:

1) Selection of the design team and contractors - Selection criteria

2) Detailed design and performance requirements

Technical specifications criteria: Minimum energy performance; Lighting control systems; Building Energy Management System; Use low or zero carbon energy sources in the vicinity of the building; Mobility and infrastructure plan; Waste storage inside the building or on its perimeter; Water-saving installations; Thermal comfort conditions; Daylighting and glare control; Ventilation and air quality; Incorporation of recycled material in concrete and masonry; and CO2 and aggregate transport performance requirements.

3) Dismantling, demolition and site preparation works

Technical specifications criteria: Pre-demolition (deconstruction) audit plan and demolition (deconstruction) waste management.

4) Building construction or major renovation

Technical specifications criteria: Hiring local suppliers; Selection of materials; Construction and Demolition Waste Prevention and Management Plan (CDWMP) must be in place before work commences on site; Identification of materials that can easily be removed in a future deconstruction (design for deconstruction); Constructive solutions; Reduction of water consumption; Reduction of energy consumption; Internal and external communication of the benefits obtained; Estimated costs of operation, maintenance, and deconstruction of the new building; Installation and commissioning of the building's energy systems.

5) Completion and handover

Technical specifications criteria: Quality of the surroundings of the completed building.

Contract performance clause criteria: Quality of the completed building structure.

Based on these criteria the two surveys were carried out and sent to 146 construction companies and 101 material supply companies. The survey for suppliers also covered other companies because the Portuguese Association of Building Material

Traders, disseminated the questionnaire to its member companies. It was also disseminated to 40 more companies and suppliers by the project partner, ITeCons. In addition to sending emails (directly and indirectly), 28 construction companies were contacted by phone. As for the suppliers covered by this survey, 17 of them were contacted by phone. The results will be presented in the next chapter, divided between construction companies and material supplying companies, considering the questions presented in the survey.

4. RESULTS

4.1. CONSTRUCTION COMPANIES

From the total number of companies that were covered, six responses were obtained, equivalent to a percentage of 4.1%. Although this percentage was low, after several attempts at contact, it was nevertheless considered worthwhile to analyse it in an attempt to show the market trend. Most of the questions in the questionnaire were multiple choice, consisting of a total of six questions. After receiving the answers, the data were gathered, presenting the results in subchapter 4.1.1.

4.1.1. RESULTS

The following are the results obtained per question:

Question 1: What is the category of the company?

The first question helped to understand the size of each company. Of the construction companies that responded, half are micro companies, i.e., with less than 10 employees, and the other half are small companies, i.e., with less than 50 employees, both categories with the same percentage of 50%, figure 1.

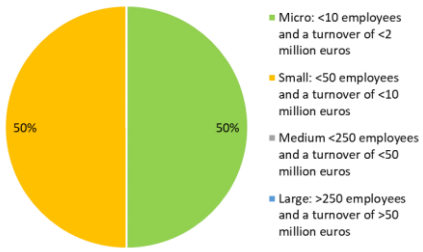

Figure 1. Size of the construction companies.

Question 2: City where the company is located.

The following map, figure 2, shows the location of all the construction companies that responded to the survey. As can be seen these companies are in the coastal area of Portugal.

Figure 2. Map of the distribution of construction companies in Portugal.

Question 3: Definition of Sustainable Public Procurement (SPP). This question, given its importance, was divided into two questions 3.1 and 3.2.

Question 3.1: Does the company consider Sustainable Public Procurement (SPP) an official and recognized component of its procurement?

The definition of SPP was provided in the survey itself and companies were asked whether they considered SPP an official and recognized component of their procurement. From the responses received and represented in figure 3, only 33% of companies consider SPP as an important component of their procurement.

Question 3.2: Does the company have formal Sustainable Public Procurement policies?

As can be seen in figure 4, although, according to the previous answer, one third of the companies consider an official and recognized component in their procurement, only 17% of the companies answered that they have a formal SPP policy, which implies that the vast majority, 83%, do not have formal Sustainable Public Procurement policies.

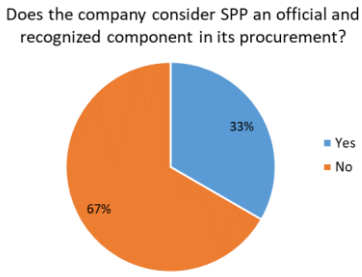

Figure 3. Whether the company considers SPP an official and recognized component in its procurement.

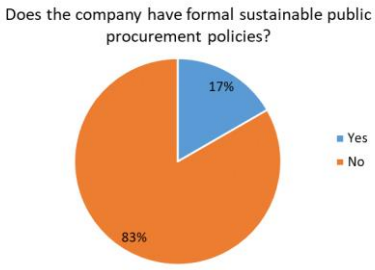

Figure 4. Whether the company has formal Sustainable Public Procurement policies.

Question 4: In the tender documents, with regard to the requirements demanded by the contracting authority in a pre-selection procedure, is your company able to meet these candidate selection criteria?

In this question, each construction company was asked whether it is able to meet the selection criteria for candidates for the design team and contractors, with regard to the requirements demanded by the contracting authority in a pre-selection procedure. These requirements are usually found in the tender document, since it is the document that establish the technical, legal, and administrative guidelines concerning the aspects of the execution of the work, as well as the obligations assigned to each party involved in that project. In the evaluation of the answers, it was considered that the company was able to comply with the criteria, as long as the values of the topics had a percentage equal to or higher than 50%. In figure 5, it can be seen that of the sustainability criteria indicated, the companies are able to comply with the following (values equal to or greater than 50%): Possess a functional and relevant quality system for the execution of construction tasks; Being able to present technical solutions that meet several technical measures and that they have the technical capacity to implement the necessary measures; Possess skills for the acquisition and installation of construction materials with low environmental impact; Have the technical ability to apply the necessary measures, to execute the project, in order to ensure environmental protection and safety; The project manager, architects, engineers, and consultants have relevant skills and experience in the field of sustainable construction; Seek to hire contractor(s) and/or company(ies) that have relevant experience and skills in the execution of construction contracts, in which an improvement in environmental performance is required, within the scope of sustainable construction. On the contrary, it was verified that companies are not able to comply with the following criterion (less than 50%): the company having recent experience for the execution of sustainable construction contracts, during the last three years, at least.

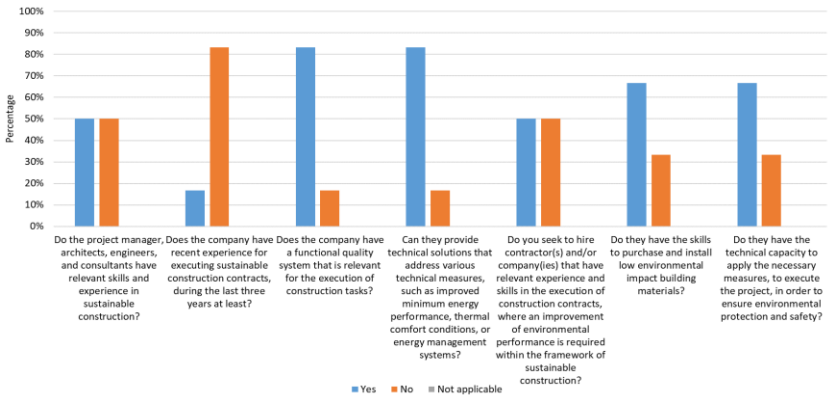

Figure 5. Candidate selection criteria, by percentage.

Question 5: In what way does the company manage to present the verification of the sustainability criteria that are fulfilled?

The purpose of this question was to find out how the company presents the verification of compliance with the sustainability criteria, which it indicated earlier, in question 4, for the selection of candidates. Observing figure 6, the forms of verification that the companies present (values equal to or greater than 50%) are the following: Through resumes of the team members that will work on the construction project; With documentation of the company's experience in relevant projects, considering the team members that will work on the project; Through third-party audits. In first place is the submission of the resumes of the team members (83%). It is noteworthy that forms of verification such as documentation of their experience in relevant projects and through third party audits, are equalled as the second highest form of verification, both with percentages of 50%. Companies present as forms of verification in a lower percentage (less than 50%): Documentation related to relevant contracts from the last three years; Collection of monitoring data.

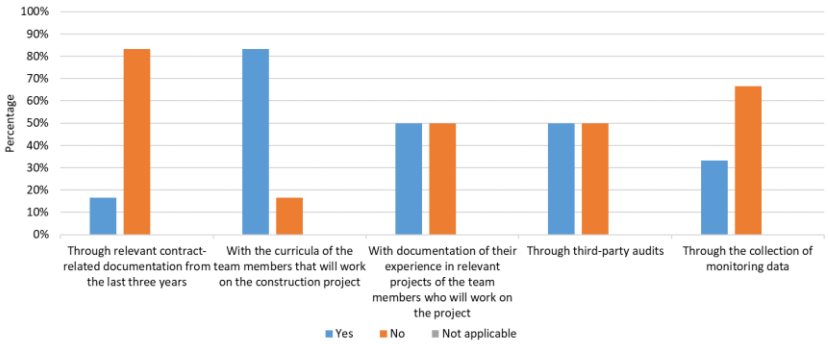

Figure 6. Ways of verifying the criteria that are met, by percentage.

Question 6: In the tender documents, concerning the construction of buildings and major reconstruction works, regarding the technical specifications that the bids must meet and the evaluation criteria against which the bids can be evaluated, are they able to meet the following requirements?

Various technical specifications were presented in this question. In the evaluation of this question, it was considered that the construction companies have the ability to comply with the technical specifications, as long as the values of the topics had a percentage equal to or greater than 50%. Besides that, the technical specifications were distributed by three charts (figure 7 to figure 9), and each of the technical specifications can present one or more topics, so that a company can comply with one topic and not comply with the others, for example. Thus, and according to figures 7, 8 and 9, the companies have the ability to meet the following technical specifications (values equal to or greater than 50%): Minimum energy performance (figure 7); Waste storage inside the building or on its perimeter (figure 7); Daylighting control and enchainment (figure 8); Ventilation and air quality (figure 8); Pre-demolition (deconstruction) and demolition (deconstruction) waste management audit plan (figure 9). On the other hand, according to figures 7, 8 e 9, the technical specifications that companies can't manage to fulfil (less than 50%), are as follows: Energy management systems (figure 7); Low or zero carbon energy sources in the vicinity of the building (figure 7); Water-saving facilities (figure 7); Thermal comfort conditions (figure 7); CO2 and aggregate transport performance requirements (figure 7); Mobility and infrastructure plan (Figure 8); Control daylighting and glare (Figure 8); Incorporation of recycled material in concrete and masonry (Figure 8); Pre-demolition (deconstruction) audit plan and demolition (deconstruction) waste management (figure 9).

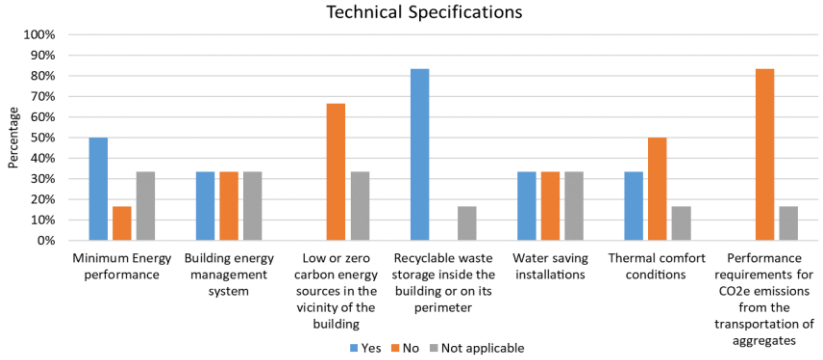

Figure 7. Technical specifications, by percentage.

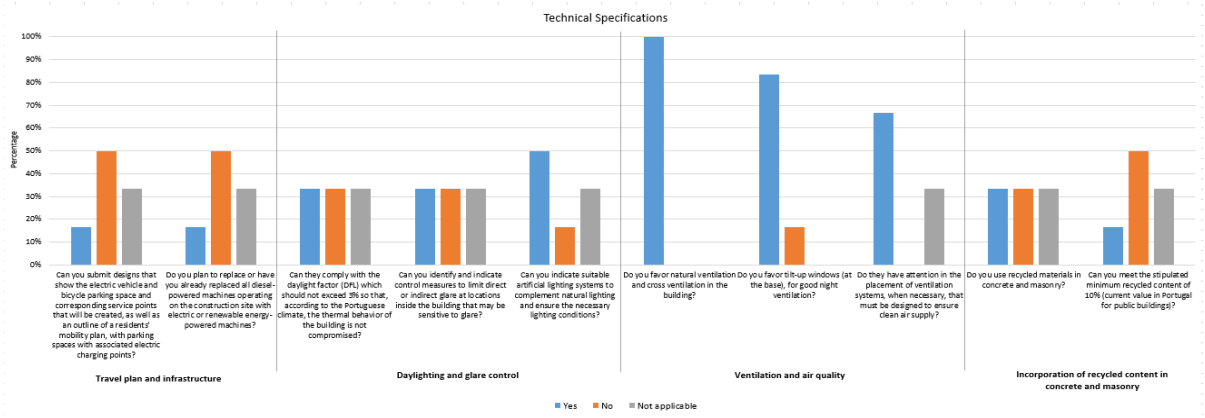

Figure 8. Continuation of technical specifications, by percentage - Mobility and infrastructure plan; Control of daylighting and glare; Ventilation and air quality; Incorporation of recycled material in concrete and masonry.

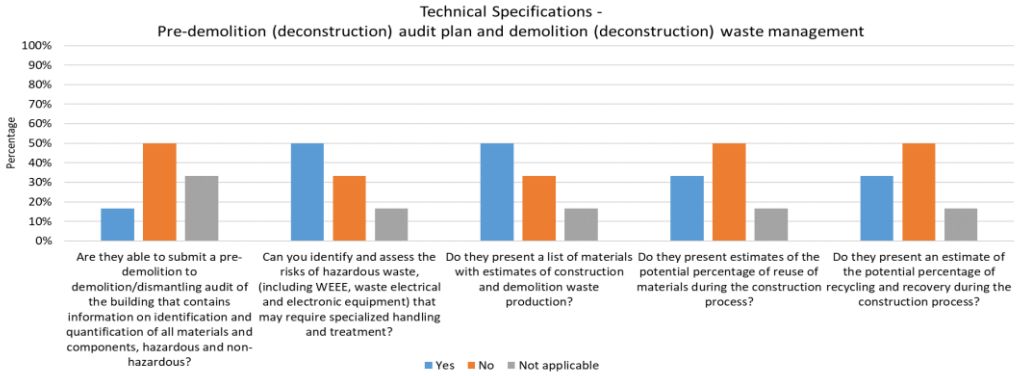

Figure 9. Continuation of technical specifications, by percentage - Pre-demolition (deconstruction) audit plan and demolition (deconstruction) waste management.

4.2. SUPPLIER COMPANIES

Of the material suppliers that were covered by the survey, 18 responses resulted, equivalent to a percentage of 17.6%. Also in this case, although the percentage of answers was higher, it was considered to be worth analyzing in an attempt to show the market trend. Most of the questions in the questionnaire were multiple choice, consisting of a total of five questions. After receiving the answers, the data were gathered, presenting the results in subchapter 4.2.1.

4.2.1. RESULTS

The following are the results obtained per question:

Question 1: What is the category of the company?

The first question helped to understand the size of each one. Of the suppliers who responded, the majority were small companies, i.e., with fewer than 50 employees, and micro-companies, i.e., with fewer than 10 employees, with each category having an identical percentage of 39%. These two categories correspond to 78% of the total suppliers who responded, figure 10.

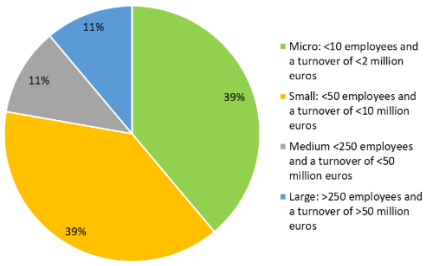

Figure 10. Size of the supplying companies.

Question 2: City where the company is located.

In the following map, figure 11, is the location of all the material supply companies that responded to the survey. As can be seen, most of these companies are in the central and northern coastal area of Portugal. It should be noted that there were no responses from any supplier in the south of the country.

Figure 11. Map of suppliers' distribution in Portugal.

Question 3: Definition of Sustainable Public Procurement (SPP). This question, given its importance, was divided into two questions 3.1 and 3.2.

Question 3.1: Does the company consider Sustainable Public Procurement (SPP) an official and recognized component of its procurement?

The definition of SPP was provided in the survey itself and suppliers were asked if they considered SPP an official and recognized component of their procurement. From the responses received and represented in figure 12, 61% of suppliers consider SPP as an important component of their procurement.

Question 3.2: Does the company have formal policies for Sustainable Public Procurement?

As can be seen in figure 13, although most companies consider an official and recognized component in their procurement, only 33% of suppliers responded that they have a formal SPP policy, implying that the majority, 67%, do not have formal Sustainable Public Procurement policies.

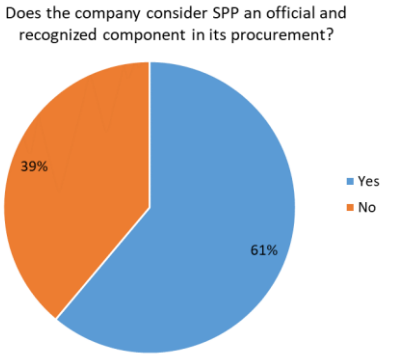

Figure 13. Whether the company considers SPP an official and recognized component in its procurement.

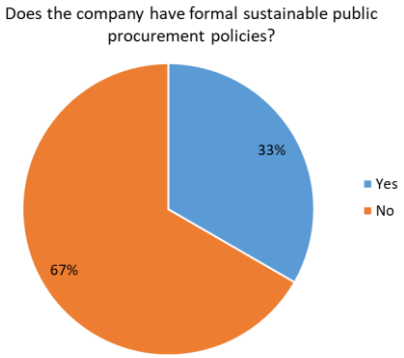

Figure 12. Whether the company has formal Sustainable Public Procurement policies.

Question 4: When supplying building materials requested by customers for the construction of a building or for major renovation works is the company able to comply with the following sustainability criteria for the materials?

The role of suppliers of products and materials for the construction sector is of great relevance, so it is important that they take into consideration sustainability factors for the materials they sell. Thus, when supplying building materials required by customers for the construction of a building or for major renovation works, it was important to know whether the supplier company can comply with certain sustainability criteria for materials. These sustainability criteria refer to the use of certified materials, local materials/components, materials with low environmental impact, non-toxic materials, recycled materials, renewable materials, natural insulation materials, long-lasting and able to be reused and recycled, use of legal wood, materials with high useful life or the use of water-based paints and varnishes to avoid VOCs and other carcinogens. It was considered that the company was able to comply with the criteria if the topic values had a percentage equal to or higher than 50%. In figure 14 of the sustainability criteria indicated, suppliers can manage to fulfil with (values equal to or greater than 50%): Certification of materials; Use of local materials/components; Use of materials with low environmental impact; Use of non-toxic materials; Use of renewable materials; Use of materials with high useful life; Use of water-based paints and varnishes, to avoid VOC's and other carcinogens. It should be noted that the highest response found was for materials with a high useful life (with 72%), followed by certified materials and non-toxic materials (also with 67%). It is also observed in figure 14 that suppliers are less able to comply with (values below 50%): Use of recycled materials; Use of natural, long-lasting insulation materials that can be reused and recycled; Use of legal wood. However, in this last criterion, legal wood, i.e., wood from sustainably managed forests, most suppliers answered not applicable, as they are not wood suppliers, but for those who answered they are more able to comply with the legal wood requirement, than those who are not.

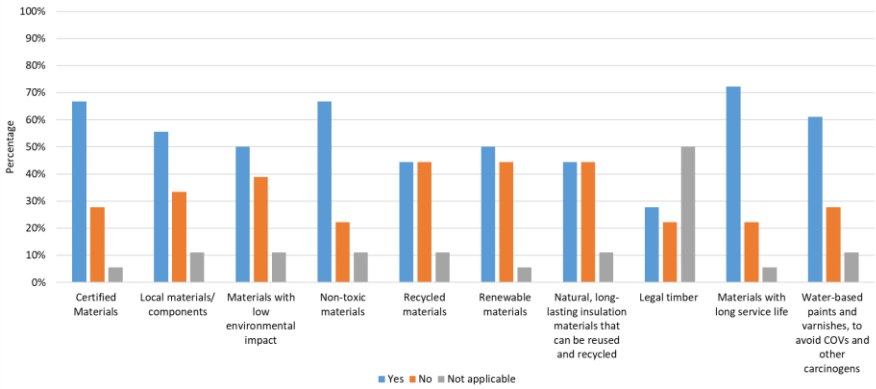

Figure 14. Sustainability criteria of materials, by percentage.

Question 5: For all the previous questions that answered yes, please indicate how they demonstrate to contractors that they comply with sustainability criteria for materials?

Of those who answered yes in the previous question, they were asked to indicate how they demonstrate to contractors that they comply with the stated sustainability criteria for materials. Because for this question there was more than one response to each topic, the total number of responses for each topic was higher. Figure 15 shows that the most used form of demonstration in all types of materials is through data sheets or similar documentation. This document presents the specifications of a raw material or product, and is used to describe the characteristics, uses and other relevant information about the material in question. Another form of demonstration used are environmental product declarations (EPD) and the European ecolabel.

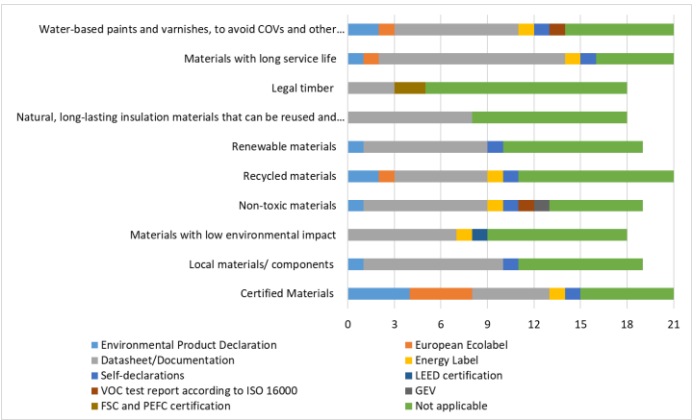

Figure 15. Ways to demonstrate compliance with sustainability criteria for materials by number of responses.

For legal wood, it was found that in addition to the technical data sheet, some suppliers use FSC (Forest Stewardship Council) and PEFC (Program for the Endorsement of Forest Certification) certification, which are certification systems for sustainable forest

management. Both represent the normative references in the field of forest certification most used worldwide. Another form of demonstration, in this case, for non-toxic materials and water-based paints and varnishes, is the VOC test report according to ISO 16000. In figure 15, it can also be seen that the amount of "not applicable" answers, reaches almost half, or more than that, in the case of legal wood and natural insulation materials, long lasting and able to be reused and recycled, since they are not suppliers of these materials.

5. CONCLUSIONS

In terms of geographical location of both construction companies and material suppliers, it was found that companies located in the coastal area of northern and central Portugal were the ones that responded to the surveys. In relation to SPP, it was observed that few companies consider SPP an official and recognized component in their procurement, and even fewer companies have a formal policy. It was also found that most construction companies can comply with the criteria for selecting candidates for the design and contracting team, with the highest response corresponding to two criteria: to have a functional and relevant quality system for the execution of construction tasks and to present technical solutions that meet various technical measures, with 83% each. It was also important to know the forms of verification that companies can present. In most cases, verification is done through resumes of the team members who will work on the construction project. It can also be done through documentation of the team members' experience in relevant projects and through third-party audits. Regarding technical specifications, companies can comply with minimum energy performance, waste storage within the building or its perimeter, and ventilation and air quality, for some topics regarding daylighting control and glare, and pre-demolition (deconstruction) audit plan and demolition (deconstruction) waste management.

Regarding suppliers, after an analysis of the answers obtained in the questionnaires, it appears that, when it comes to SPP, most suppliers consider it to be an official and recognized component in their purchases, but when it comes to its application, this is no longer the case, noting that the vast majority do not have a formal policy of SPP. In relation to the supply of materials it is observed that most suppliers can meet the criteria, with the highest response found for materials with high useful life, 72%, followed by certified materials and non-toxic materials (also with 67%). However, when it comes to recycled materials and natural, long-lasting insulation materials that can be reused and recycled, companies still need to work harder, because these are sustainability criteria that they are not able to meet. When it comes to demonstrating to the contractor, the most used form was the technical sheet/similar documentation of the product supplied. This was followed by the environmental product declaration (EPD), as well as the European ecolabel.

Although not many responses were received for construction companies, which denotes that this issue is not yet a concern for most of these companies, it can be said in general that companies in the construction sector can meet most of the selection criteria for the design team and contractors and for some of the technical specifications. As for the supplier companies, there was a greater number of responses, so in general it can be concluded that suppliers already have a greater ability to meet criteria related to the sustainability of the materials they supply.

Acknowledgements

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