OP3.1: Increased market knowledge in the targeted RIS countries

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Executive Summary

OP3.1 'Increased market knowledge in the targeted RIS countries' aims to assist with the objective of collecting information regarding the eligibility of GEORIS products to be used in (public) construction works in RIS countries. To initiate the activity OP3.1, EXELIA prepared a mapping report for RIS participating countries, identifying domestic regulatory framework and market requirements, relevant to the commercial accommodation of the GEORIS products.

The report has identified legislative gaps that need to be addressed by partners and communicated to domestic policy and business stakeholders, to improve conditions for the commercial success of the project's products. Policy improvements need to primarily focus on the application of green criteria in public work tenders and the inclusion geopolymerised products in domestic legislation as suitable for commercial use.

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1. Increased market knowledge in the targeted RIS countries.

1.1. National registers for waste-derived products and technologies

The data analysis follows the sequence of the questionnaire, departing from the section related to findings on country specific (partners' countries) regulatory frameworks applicable to the GEORIS products.

Figure 1 shows the number of partner countries that have incorporated a register regarding waste treatment technologies and products. More specifically, Serbia (RS), Slovenia (SI), Greece (GR) and Cyprus (CY) have adopted a registry a) products that come from treated waste, and or b) approved technologies for treating waste. On the contrary, Bulgaria (BG), Romania (RO) and Poland (PL) do not have such registry. Table 2 describes one the one hand the names and websites of the respective register. At the right column the reader can find out if geopolymerized products and/or geopolymerization technology are included in the registers. Overall, none of the registers have special provisions about geopolymerized products.

Figure 1: National Register coming from treated waste and/or approved technologies for treating waste

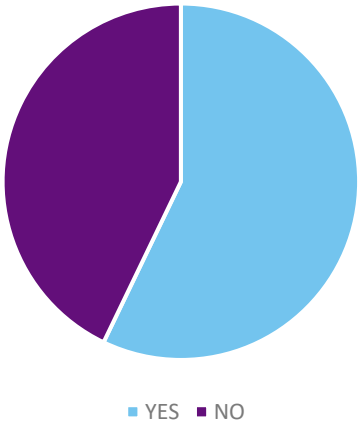

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Table 2: Details of National Registers in RIS participating countries.

Country	Name of the Register	Website	Provision for geopolymerized products/ technologies
Greece/Cyprus	Electronic waste registry	Link	NO
Serbia	Register of by-products & Register of waste that ceased to be waste	Link	NO
Slovenia	Decree on waste (77/22) -Annex 1 and Anex 5-	Link	NO

As findings indicate in table 2, there is a solid regulatory framework in most RIS participating markets, which lays the foundations for the application of the GEORIS technology products in these markets. The absence of specific provisions regarding geopolymerized products and technologies in national registries is perhaps due to the fact that geopolymerization-based production of materials is not yet commercially widespread, especially in these parts of Europe. Domestic regulations are largely adjusted to the conventional operational frameworks, although the presence of such registers is encouraging for the regulatory accommodation of newer and more sustainable products

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and technologies (such as the GEORIS). Furthermore, in countries that do not currently have registers for products that come from treated waste and approved technologies for treating waste, partners are advised to liaise with public authorities and make suggestions for the development of such registers, as it would be beneficial for the GEORIS product market adaptation. Accordingly, partners are advised to liaise with public authorities for the inclusion of geopolymerized products in the national registers.

1.2. 'End-of-Waste criteria'

The tables bellow portray the current situation in RIS participating countries, regarding implemented 'End-of-Waste' regulations. In other words, the following regulations determine which conditions need to be met for a product to cease to be waste. Table 2 gives a holistic picture of domestic regulatory frameworks, while table 3 further elaborates on country-specific provisions. Overall, **all participating countries** have implemented regulations to establish criteria for products that would otherwise be considered waste. What becomes clear from the data is that participating countries have managed to harmonize their domestic legislations with EU legal stipulations on the subject, more specifically the **Waste Framework Directive**[1]. This assumption steps from the similarities between the regulatory frameworks the countries studied. Romania and Bulgaria have adopted the Waste Framework Directive as a whole with no legal adjustments. Indicative common criteria that must be met to determine whether a product will cease to be waste across countries are:

1. The product must comply with environmental and human life safety
2. The product needs to be used without further processing other than the normal industrial
3. The product must comply with EU quality standards

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705

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4. There must be a market demand for the product

5. The product must be used for special purposes

Although differences between the RIS participating countries regarding 'End-of-Waste' criteria can be found, there are certain encouraging messages for the commercial application of the GEORIS products. First of all, a total legal homogeneity between different countries would be entirely unrealistic. Member states have their own unique legal tradition, hence a certain deviation is expected. As indicated by the data, similarities between domestic regulatory frameworks fat outweigh the differences. Therefore, GEORIS products have the advantage of meeting similar (if not identical in certain cases) criteria for their market application across the RIS participating countries. Secondly, the presence of a regulatory framework that able to constitute the GEORIS products (if conditions are met) marketable is of high importance for the project's commercial success. Considering that GEORIS products are waste by-products, the absence of such regulatory frameworks would significantly undermine the project's marketability. Lastly, in all countries except for Poland, it is central government authorities that determine which products will cease to be waste. This is a positive aspect for the GEORIS products as it prevents bureaucratic deadlocks that often emerge at local or municipal administrative levels, due to the lack of centralized approach coordination. For potential adopters who want to operate in Poland it is recommended to adapt their workplans accordingly by taking into account that communication with various regional authorities is often time-consuming, although the absence of a centralized enforcement actor is not an obstacle per se.

Table 3: 'End-of-Waste' legislation per country.

Country	Name of 'End-of-Waste' Legislation	Website	National authority deciding if recycled products meet 'End-of-Waste' criteria	Provision for products coming from recycled/treated mining waste

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Greece/Cyprus	4819/2021 FEK 129A/2021	Link	Ministry Environment & Energy	NO
Serbia	Waste management act Art. 8	Link	Ministry of environmental protection	NO
Slovenia	Environmental Protection Act Articles 28-31 Decree on Waste Article 8	Link Link	Ministry of the Environment and Spatial Planning	NO
Bulgaria	Bulgaria has transposed the WFD into national law by the Waste Management Act, promulgated in SG 53/ 13 July 2012	Link	Ministry of Environment and Water (MOEW)	NO
Romania	National Plan for waste management	Link	The National Environmental Protection Agency (ANPM)	NO
Poland	Act on Waste	Link	Provincial Authorities (Marshals)	NO

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Table 4: 'End-of-Waste' legislation provisions per country.

Country	'End-of-Waste' Legislation criteria
Greece/Cyprus	Article 6 1. Certain specified waste shall cease to be waste within the meaning of point of Article 3 when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions: 1. The substance or object is commonly used for specific purposes; 2. A market or demand exists for such a substance or object; 3. The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; 4. The use of the substance or object will not lead to overall adverse environmental or human health impacts. The criteria shall include limit values for pollutants where necessary and shall take into account any possible adverse environmental effects of the substance or object.
Serbia	Certain types of waste cease to be waste within the meaning of Article 5, paragraph 1, item 17) of this Act, if they have undergone reuse operations, including recycling, under the following conditions: 1. The substance or object is usually used for special purposes;

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	2. There is a market or demand for such substances or objects; 3. The material or object meets the technical requirements for special purposes and conditions prescribed by law and standards that apply to those products; 4. 4) The use of the substance or object will not lead to an overall harmful effect on the environment or human health.
Slovenia	Article 29 Criteria on the application of the conditions for end-of-waste status includes: 1. Permissible waste input material for the recovery operation; 2. Allowed treatment processes and techniques; 3. Quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary; 4. Requirements for management systems to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate; and a requirement for a statement of conformity; 5. Permitted uses of processed substances or objects. Decree on waste, Article 8:

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	1. The procedure for determining the criteria for ending the status of waste in each individual case.
Bulgaria	The following requirements must be met in total for a product or substance to obtain the "end-of-waste" status and be considered a by-product: 1. Further use of the object or substance is certain- the object or substance can be used directly without further processing other than normal industrial practice; 2. The object or substance is manufactured as an integral part of the production process; 3. The object or substance meets all relevant requirements, including legal requirements in terms of the product, environmental protection, human life and health, for a specific use of the object or substance, and such use will not lead to overall negative impacts on the environment, life or human health; 4. The object or substance meets the specific conditions for recognizing a given object or substance as a by-product, if they have been specified in the provisions of European Union law or in regulations issued under Art. 11 sec. 6
Romania	The following requirements must be met in total for a product or substance to obtain the "end-of-waste" status and be considered a by-product: 1. Further use of the object or substance is certain; 2. The object or substance can be used directly without further processing other than normal industrial practice;

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	3. The object or substance is manufactured as an integral part of the production process- the object or substance meets all relevant requirements, including legal requirements in terms of the product, environmental protection, human life and health, for a specific use of the object or substance, and such use will not lead to overall negative impacts on the environment, life or human health; 4. The object or substance meets the specific conditions for recognizing a given object or substance as a by-product, if they have been specified in the provisions of European Union law or in regulations issued under Art. 11 sec. 6.
Poland	1. The following requirements must be met in total for a product or substance to obtain the "end-of-waste" status and be considered a by-product: further use of the object or substance is certain; 2. The object or substance can be used directly without further processing other than normal industrial practice the object or substance is manufactured as an integral part of the production process; 3. The object or substance meets all relevant requirements, including legal requirements in terms of the product, environmental protection, human life and health, for a specific use of the object or substance, and such use will not lead to overall negative impacts on the environment, life or human health; 4. The object or substance meets the specific conditions for recognizing a given object or substance as a by-product, if they have been specified in the provisions of European Union law or in regulations issued under Art. 11 sec. 6.

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1.3. Safety and environmental requirements for construction products

This section outlines safety and environmental requirements for construction materials in the RIS participating countries. The goal is to identify whether the GEORIS products will be compatible with domestic legislation on sustainability and safety. Overall, as indicated by the data, the GEORIS technology products are in line with the safety and sustainability regulations set by the target countries. Legal frameworks across the RIS participating countries in the categories described above exhibit significant convergence, as all countries had to harmonize with EU legislation in that regard. More importantly, product-specific qualities, such as fire safety and sustainable use of natural resources among others which are characteristic attributes of the GEORIS products against market competition, are explicitly highlighted across the legal frameworks of the participating countries. Legally speaking therefore, GEORIS products have a competitive advantage against conventional technology products, as they are not required to make any adaptations to comply with domestic legislations.

The following 2 summarize the most important legislation of the studied countries about safety and sustainability requirements for construction products. First of all, all countries analysed in this paper have specific provisions about construction product safety and sustainability. Secondly, all countries implement the same criteria, which are to be found in table 6. All countries except for Slovenia and Serbia follow the stipulations of EU 305/2011 Regulation. Slovenia and Serbia have incorporated the same criteria in line with the same EU regulation as the rest of the countries.

Table 5: Legislation on minimum safety and sustainability requirements for construction products.

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Country	Name of Legislation	Website
Serbia	Regulations for building construction	Link
Slovenia	Construction Products Act (ZGPro-1) (in connection with the REGULATION (EU) No 305/2011)	Link
Greece/Cyprus	(EU) 305/2011	Link
Bulgaria	(EU) No 305/2011	Link
Romania	(EU) No 305/2011	Link
Poland	(EU) No 305/2011	Link

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Table 6: Minimum safety and sustainability requirements for products used in construction works in RIS participating countries.

Country	Safety and sustainability requirements
All countries	1. Mechanical resistance and stability 2. Safety in case of fire 3. Hygiene, health and the environment 4. Safety and accessibility in use 5. Protection against noise 6. Energy economy and heat retention 7. Sustainable use of natural resources.

Tables 7 and 8 outline the legal state of affairs in RIS participating countries regarding minimum technical provisions for pavement blocks and/or fire- resistant tiles. All countries have relevant legislation, which is a positive aspect for the GEORIS products, as it will allow for project partners to proceed with the necessary adaptations before launching to the target markets. However, due to the lack of sufficient data it is not possible to delve deeper into the specifics of the technical requirements across countries. Such details would require the devotion of significant time in additional desk research, which is not per se a problem, as well as financial resources that far exceed the deliverable's designated costs.

Table 7: Technical provisions for pavement blocks and fire-resistant tiles for non-combustible products that can be used in the construction of buildings.

Country	Name of Legislation	Website

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Serbia	SRPS EN 13501:2010 Fire classification of construction products and building elements - Part 1	Link
Slovenia	1. Technical guidelines TSG-1-001: 2019 – Fire safety in buildings 2. Response of construction materials on fire - classification on SIST EN 13501-1	Link
Greece/Cyprus	1. EN 1339_2003: Concrete paving flags & 1338:2003 2. EAD 350142-00-1106: Fire protective board, slab and mat products and kits Paragraph 2.2	Link
Bulgaria	Spatial Planning Act	Link
Romania	1. Law no. 50/1991 regarding the authorization of construction works, with its associated Procedural NormsLaw no. 10/1995 regarding construction quality 2. Law no. 350/2001 regarding urban planning together with various other general and local regulations and plans 3. Government Decision no. 343/2017 regarding the amendment of Government Decision no. 273/1994 for the approval of the regulation regarding	1. Link 2. Link 3. Link

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	the reception of construction works and the corresponding installation	
Poland	Catalogue of Typical Flexible and Semi-rigid Pavements	Link

Table 8 summarizes all country specific legislations o the handling of residual materials coming from construction products. According to findings, all countries have adopted measures to regulate the handling of construction product residual materials. 3 countries, namely Romania, Poland and Bulgaria, have implemented the Construction Products Regulation (EU) No 305/2011. GEORIS technology adopters need to take into account the relevant legislation on the handling of residual material for construction materials in each RIS participating country before proceeding with the application of the GEORIS products. The residual material legislation can be seen as homogenous, given that it is identical in 3 participating countries. Overall, little deviation among the studied countries is expected, since they all operate within the overarching EU regulatory framework. However, due to the reasons explained earlier it is not possible to have a detailed overview of the country-specific criteria about residual waste handling. Table 9 lastly, presents complementary provisions related to safety and sustainability related to construction products. 3 of the studied countries have implemented such measures, while 2 of those that have are line with the Construction Products Regulation (EU) No 305/2011.

Table 8: Legislation for the handling of residual material of construction products

Country	Name of Legislation	Website

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Serbia	Waste Management Act, Article 52 (Management of waste with PCB), Article 53 (POPs), Article 54 (asbestos) - waste should be managed separately, reports to the ministry/agencies	Link
Slovenia	34/08 and 44/22 – ZVO-2)	Link
Greece/Cyprus	For pavement blocks, EN 1338 Table ZA.1 — Required characteristics Emission of asbestos no content permitted. For fire protective boards: Paragraph 2.2.1.4 Content, emission and/or release of dangerous substances	Link
Romania Bulgaria Poland	Construction Products (REGULATION (EU) No 305/2011)	Link

Table 9: Complementary legal provisions related to health, durability and sustainability of construction products

Country	Name of Legislation	Website
Poland	1. Act of 27 April 2001 Environmental Protection Law 2. Waste Act (amendment of 2021)	1. Link 2. Link 3. Link

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	3. Water law Act of 2017, lay down principles for environmental protection and the conditions for the use of resources.	
Slovenia	REGULATION (EU) No 305/2011 Annex I: Basic requirements for construction works	Link
Serbia	1. Draft Law on Construction Products 2. REGULATION (EU) No 305/2011 Annex I: Basic requirements for construction works	1. Link 2. Link

1.4. Green criteria in public tenders

The aim of this section is to outline what kind of standards are applied by RIS participating countries concerning Green Public Procurement (GPP) in the construction sector. Figure 10 exhibits that most countries (71% or 5 out of 7) don't apply such criteria in the construction sector. Currently only **Poland** and **Slovenia** make use of GPP criteria in the construction sector. Slovenia implemented the relevant legislation in 2017 and entered it into force in 2018. Article 4 par. 13 summarize specific to the construction sector criteria for the Slovenian case. Poland has implemented the National Action Plan on Sustainable Procurement (2013-2016), however GPP has not been effective implemented. Data shows that a number of barriers, such as lack of mandatory application, absence of operational application knowledge by construction workers as well as increased financial cost, permit its successful implementation. Table 11 summarizes conditions for GPP criteria application in the construction sector across the studied countries. Even though Poland has relevant legislation, due to the reasons described above public tenders **never/almost never** apply such criteria. Accordingly, in the absence of a coherent regulatory framework Greece, Cyprus, Serbia, Romania and Bulgaria, public tenders do not apply GPP standards in construction works. The only exception is Slovenia, where public tenders **often** apply GPP

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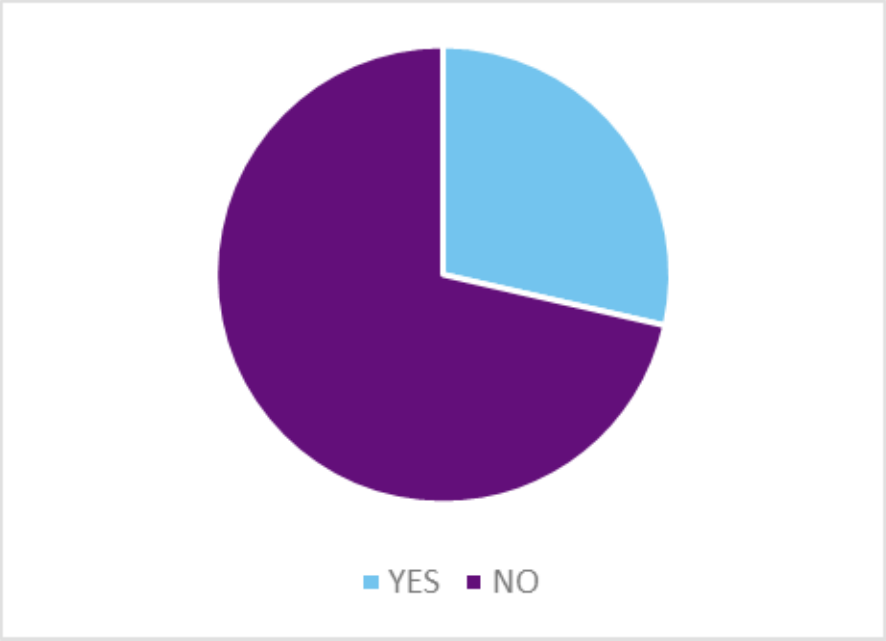
criteria in the construction sector. Slovenia specifically applies GPP standards in construction works closely related to the GEORIS products, such as pedestrian area arrangements, building renovation according to environmental standards and reconstruction of roads with environmental friendly standards. Overall, the absence of GPP criteria in construction works across the countries of interest for the GEORIS project is not necessarily problematic. It would certainly be more encouraging for the commercial success of the products if public tenders enforced such criteria, as construction operators would have to unavoidably make use of sustainable construction materials (such as the projects'). This aspect of course is not an obstacle for the wide-scale market application of the GEORIS products, as except for their sustainable characteristics, the project products exhibit additional qualities, such as durability and increased fire resistance that constitute it superior to the competition.

Figure 10: countries with GPP in the construction sector



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Country	Frequency of green criteria enforced by public tenders	Criteria applicable to the GEORIS products
Slovenia	Often	1. Energy renovation of the object considering environmental aspect 2. Reconstruction of the road with environmental aspects (GPP) 3. Arrangement of surfaces for pedestrians and cyclists (OP European Cohesion policy, Priority investment 4.4)
All other countries	Never	Not applicable

Table 11: GPP criteria provisions

The last sub-section of the questionnaires is concerned with the identification of the most common standards and processes used in public tenders to demonstrate whether construction products are sustainable or not in the RIS participating countries. The table below summarizes the most important quality standard schemes implemented by the countries studied in this paper. According to the data, all countries make use of ISO standards, including ISO 9001, 14025 and 20400. In general ISO standards are recommended by the EU for assessing material quality and sustainability criteria. For Bulgaria it is not entirely clear which ISO standards are implemented, although on the relevant authority (BDS), it is stated that such criteria are applied in construction products. Furthermore, Poland, Greece, Bulgaria, Romania and Cyprus have incorporated additional quality assessment processes, namely Life-Cycle Assessment (LCA). Slovenia has the most

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concrete quality standard regulatory framework. Except for ISO 14025, Slovenia applies complementary measures, as stipulated in the Public Procurement Regulation. More specifically, products need to comply with environmental concerns regarding water and energy efficiency. In addition, specifically for the GEORIS products article 6 stipulates that for the awarding of public contracts, operators need to consider the **reuse of secondary raw materials and products**, as well as prevention and reduction of waste generation from **construction products.** To sum up, it is important for potential GEORIS technology adopters to make sure they comply with the respective quality assurance criteria in each country. It would be safe to assume that given the sustainable and eco-friendly traits of the GEORIS products, the presence of quality and sustainability assurance standards will not be a problem for their commercial application in any of the RIS participating countries.

Table 12: Product Quality and sustainability Standards/Processes

Country	Quality standards used in public tenders to demonstrate product sustainability
Serbia	1. ISO 20400:2018- Sustainable procurement 2. SRPS EN 15804:2020 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
Slovenia	1. ISO 14025 2. EN15804 and A2 standard

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Greece/Cyprus	1. ISO 9001 2. Environmental Product Declaration 3. LCA
Bulgaria	ISO standards
Romania	ISO/FDIS 13590:2022
Poland	1. ISO 9001 2. LCAs enforced by the Polish Committee of Standardization (KPN)

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2. Summary of main findings

2.1. National registers for waste-derived products and technologies

- 57% (4 out of 7) of the countries have a national register coming from treated waste and/or approved technologies for treating waste.
- None of the countries have specific provisions for geopolymerized products and/or technologies.
- Partners are advised to reach out to relevant public authorities for: a) the creation of such registers in countries that do not currently have; b) in countries where registers exist relevant authorities it is preferable if geopolymerized products are also included.

2.2. 'End-of-Waste criteria'

- 100% of the RIS participating countries have implemented 'End-of-Waste' criteria.
- All countries have harmonized their domestic legislation with the EU Waste Framework Directive and share similar (often identical) 'End-of-Waste' criteria, signalling a legislative homogeneity, which is encouraging for the GEORIS commercialization process as it would require less (if none) product adaptations.
- Most common criteria between participant countries are:
  6. The product must comply with environmental and human life safety
  7. The product needs to be used without further processing other than the normal industrial
  8. The product must comply with EU quality standards
  9. There must be a market demand for the product

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10. The product must be used for special purposes

- In every country except for Poland, it is **central government authorities** that enforce 'End-of-Waste' criteria. In Poland these criteria are enforced by local authorities.

2.3. Safety and environmental requirements for construction products

- **100%** of the RIS participating countries have legislation on minimum safety and sustainability requirements for construction products
- **All countries** adhere to the same requirements, as they are harmonized with the EU 305/2011 Regulation.
  The safety and sustainability requirements common in every participating country are:

  1. Mechanical resistance and stability
  2. Safety in case of fire
  3. Hygiene, health and the environment
  4. Safety and accessibility in use
  5. Protection against noise
  6. Energy economy and heat retention
  7. Sustainable use of natural resources
- Due to lack of sufficient data, the precise stipulations per country regarding the handling of residual material from construction products, as well as the exact technical specifications for pavement blocks and fire-resistant tiles for non-combustible products that can be used in construction works are not entirely clear. What has become evident according to the data is that all countries have adopted relevant legislation for the regulation of the above-mentioned subjects.

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2.4. Green criteria in public tenders

- In **71%** of the participating countries (5 out of 7) public tenders do not incorporate GPP criteria in construction works
- In Slovenia public tenders in construction works often apply GPP criteria, in constructions relevant to the GEORIS products.
- The absence of GPP criteria could mean steeper competition with conventional technology products.
- Nevertheless, the absence of strict GPP criteria in most countries, means less product adaptations.
- **All countries** implement quality and sustainability standards/processes in the construction sector.
- Various **ISO standards** are the most common practice, while in some cases there are also LCA criteria.

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3. Conclusion

OP3.1 'Increased market knowledge in the targeted RIS countries' contributes to partners' market awareness of RIS participating countries, by identifying legislative advantages and gaps in domestic legislation. Research outcomes are to be consulted by partners to effectively engage in communication with policy and business stakeholders for the improvement of the GEORIS products commercial success. Actions need to focus on imposing obligations to green public tenders for the adoption of green criteria (and overall sustainable construction materials, such as the GEORIS) in public works. In addition, domestic legal frameworks must be transposed to include geopolymerised products.

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