

EUROPEAN UNION PRINCIPLES ON CONSTRUCTION PRODUCTS AND THEIR IMPLEMENTATION IN ROMANIA

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Received: 10.01.2025 / Accepted: 19.02.2025 / Revised: 27.03.2025 / Available online: 31.05.2025

DOI: [10.2478/jaes-2025-0016](https://doi.org/10.2478/jaes-2025-0016)

KEY WORDS: economic efficiency, sustainable materials, specific execution standards, environmental strategies, natural resources

ABSTRACT:

The construction industry is an essential sector that significantly influences economic efficiency, sustainability and environmental impact; in the production process it generates gas emissions, consumes natural resources and greatly affects ecosystems. These disruptive elements have become priorities for each country, being regulated by EU legislation and national legislation. Each EU member state has adopted specific rules, but in accordance with the objectives established at European level by implementing new technologies, using sustainable, ecological, innovative construction materials and applying strategies to reduce the impact on the environment. This is precisely what we want to mention in our paper. The literature used is quite extensive in the field and we tried to use everything that is new in the field.

1. INTRODUCTION

The responsibility for environmental conservation is a collective one; the evolution of society continues to depend on how we address climate change and respond to future challenges. In the construction industry, from energy consumption, natural resources and noise pollution to fire resistance and water scarcity, all are elements that, if made more efficient, contribute to a sustainable and durable society. The adoption of new structural systems has paved the way for contemporary construction without constraints. New, environmentally friendly materials are sought; it is very important to be aware of the impact of construction on the ecosystem. In the design process, it is necessary to assume ecological responsibility by applying new, innovative technologies and practices (Dimitriu, Popescu, 2021).

"The built environment is more than buildings. It is the framework for human activity, including buildings (residential and non-residential), public spaces, parks, landscaped areas, monuments, streets, parks, road and municipal infrastructure and any other infrastructure necessary for general needs. [...] The built environment has an impact on the natural environment and climate change, representing an essential factor for the quality of life" (ARDLD, 2024).

EU directives for the construction industry are being harmonised and updated continuously. Relevant directives include:

* Directive 2009/125/EC, establishing a framework for the setting of ecodesign requirements for products with an environmental impact.

* Directive 2010/31/EU on the energy performance of buildings, designed to improve the energy performance of buildings across the European Union.

* Directive 2012/27/EU on energy efficiency, which aims to stimulate more efficient use of energy in all economic sectors.

* Directive 2012/31/EU (EPBD) on the obligation for all new buildings to be built according to the nZEB standard. This standard requires all new buildings to be built with low energy consumption, using efficient technologies, innovative and environmentally friendly construction materials.

* Directive 2018/844/EU on the energy efficiency of buildings, which focuses on the implementation of measures to renovate existing buildings, increase energy performance and reduce energy consumption.

* European Agreement of 2022 on imports of construction materials from outside the EU, which refers to materials in the sectors: cement, aluminum, iron, steel. It is about countering the risk of carbon emissions and the number of EU-ETS certificates.

* EU Regulation 2024/3110/EU on construction materials and their marketing. The regulation updates existing rules and strengthens the supervision of this market and consumer

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protection. The national legislation of the EU member states has been harmonized and adopted the European Union guidelines in this area. The Council of the European Union adopted the Construction Products Regulation (CPR) in November 2024. It harmonises EU marketing rules, free movement on the EU technology market, reduces red tape and promotes the circular economy.

The CPR sets rules for the placing on the market of construction products so that they last longer, can be repaired more easily and can be recycled at the end of their life cycle. This EU regulation enables the development of common European standards. "The construction ecosystem represents almost 5.5% of EU GDP and provides jobs for around 25 million citizens in over 5 million companies. 430,000 companies are part of the EU construction products industry, with a turnover of €700 billion, mostly small and medium-sized enterprises. [...] Buildings are responsible for around 50% of the extraction and consumption of resources and for over 30% of the EU's total annual waste. Buildings are responsible for 40% of the EU's energy consumption and 36% of energy-related greenhouse gas emissions" (Council of Europe, June 2023).

2. CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

Climate change is a global challenge that requires decisive action at international, regional, national and local levels.

The EU adopted the European Green Deal in 2019 (European Council, 2019). It is the strategy to address the climate crisis after the European Parliament declared a climate emergency in 2028. The aim is to make the European economy more competitive, more efficient in the context of sustainable development (Enulescu, 2004). This is a central element of the European Union's policies, which are based on economic growth, advanced social progress, balanced territorial organization, with strong regional centers. The cities of the future must be cohesive, attractive, ecological, healthy and economically powerful.

In the spirit of sustainable development, the European Commission has developed the "Urban Agenda for the EU", where the consolidation and restoration of European cities is a "foundation of democracy". In Romania, the construction sector is one with significant contributions to the country's GDP. Thus, according to data from the National Institute of Statistics and the Ministry of Finance, in 2020 it represented 9% of GDP, in 2021 7.1%, in 2022 5.0% and in 2023 4.6%; in 2024, in the first 3 semesters of the year, the increase was 3.6-4% compared to 2023.

The decrease in the volume of construction work in the period 2020-2024 is due to the COVID-19 health crisis, inflation, the economic crisis, but also the war on the borders of Romania (Palangean, 2023). In a stage marked by rapid industrialization and environmental degradation, protecting resources has become a key point for industries, beneficiaries and political factors. Sustainable construction materials are renewable, recyclable and environmentally friendly resources. Implementing the concept of sustainable construction also includes recycling materials. This results in savings, increases efficiency, and provides long-term benefits. Alexandru Gologan (2024), in the article "The circular economy stops at the construction waste barrier. Regulations in the field must be updated" from 15.10.2024 on www.digi24.ro, says that the circular economy is a production and consumption model that is based on:

- reducing the volume of natural resources used,
- extending the life cycle of products,
- reducing waste production,
- reusing, repairing, recycling materials.

The Competition Council (CC) recommends updating the regulations in the construction field for the transition to the circular economy (Competition Council Press Office, 2024). The study conducted by the CC in Romania found that the level of the circular economy is 1.3% compared to the 11.5% average of the European Union.

According to the same study, a large amount of hazardous waste is generated in construction activity; they are disposed of through storage because there are no technological regulations and application rules for the reuse of recycled materials in new constructions (Cimpoi, 2024). Large construction companies have taken up the idea of a circular economy to protect the environment, building sustainable works, saving natural resources that regenerate much more slowly than the pace at which they are exploited. Up to 50% of global greenhouse gas emissions result from the production and consumption of construction materials. Currently, the linear economy, that is: take, produce, throw away, is still the majority in Romania; resources are becoming scarcer, and the exploitation of lots is becoming more intense. The Strabag company, for example, which also has large works in Romania, presented the first measures taken to align with the circular economy, for sustainable development and environmental protection in the areas of water, air, and soil. In the company's activity, 4 principles were studied (Figure 1):

1. Increasing the efficiency of products and materials: A design is considered that uses materials, such as: hybrid constructions made of steel, wood and lightweight materials, which reduces the amount of concrete, but also the use of modular constructions with a high degree of prefabrication that reduces the volume of waste, as well as construction execution times.
2. Extending the use of products: It is the principle of using buildings for as long as possible through renovation, modernization and reconditioning. Increasing the energy efficiency of built buildings is an important component of efficiency and sustainable development.
3. Construction material cycles: This concept provides for the processing of materials after use (instead of being thrown away), and their reuse in other constructions, such as: recycling asphalt, concrete rubble as filling material. The processing of these residual construction materials and their processing to obtain new, high-quality materials is being studied. The Strabag company uses new technologies to recycle concrete or asphalt on site; thus new recycled materials are obtained that can be used.
4. Construction and replacement of recyclable materials: The concept foresees the use of structural elements from demolished buildings: elevator shafts, stairs which are generally prefabricated.

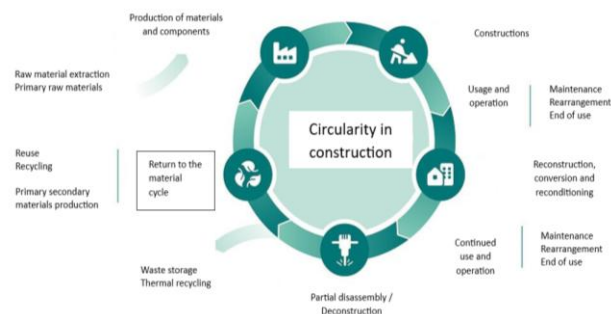


Figure 1. Circular construction (<https://work-on-progress.strabag.com/ro/materiale-si-economie-circulara/constructie-circulara>)

Promoting and respecting quality standards in construction are essential for the safety and sustainability of construction. The construction market is an important element in the country's

economic growth. "The shortage of skilled workers and migration to Western countries require training and retraining programs for young people" (Feodorov, 2024). The transition to a green economy, reducing carbon emissions, using environmentally friendly materials increase production costs. These, together with geopolitical conflicts, the COVID-19 pandemic, inflation and disruption of global supply systems, represent critical points in the construction activity. European legislation regarding zero-emission buildings, the reuse and recycling of materials to protect the environment, represent challenges to aligning with EU policies for sustainable development.

Romania has benefited from European funds for large infrastructure projects, which practically represent a component of the country's integration into transport networks, trade and economic development as a whole. In construction, recycled materials can be largely reintroduced into the production cycle (Saint-Gobain, 2024) (Figure 2).

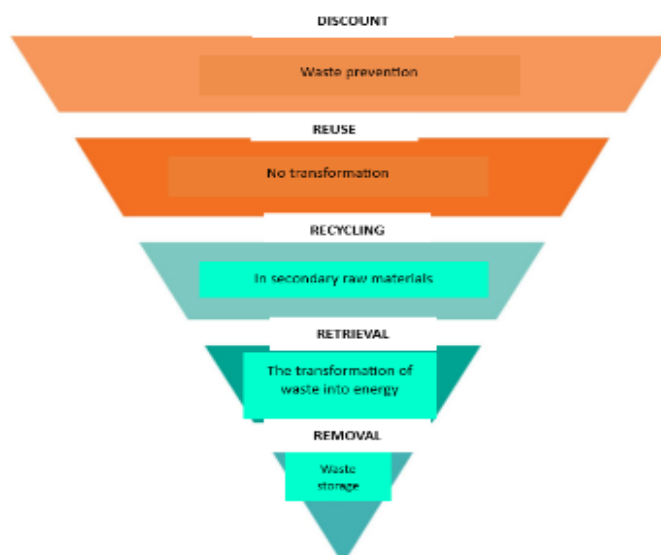


Figure 2. Reintroduced of the waste into the production cycle (<https://www.saint-gobain.ro/diminuarea-consumului-de-resurse-non-regenerabile>)

Newly constructed buildings must use resources efficiently to increase their lifespan, new technologies, modern approaches in design and execution. Demolition waste is generally inert waste, less reused. Every year, the Earth's share of natural resources, related to a calendar year, is used up much faster than December 31. Natural resources related to future generations are used up.

Through the circular economy with its three components: reduce-reuse-recirculate, it is proposed to make the use of resources more efficient and reduce the impact on the environment. A sustainable product is one that has a reduced impact on the environment and human health and to protect the planet.

The Law on the Construction Industry and Waste Management in Romania is an update of the legislation in accordance with the European Union directives. According to the analysis carried out by Valentin Stamate, Senior Public Policy Analyst - Energy & Environment, the law could aim to:

- 70% recycling for non-hazardous construction waste with increased reuse of concrete, wood, metals,
- selective demolition and separation of materials, and hazardous ones such as asbestos to be managed appropriately,
- mandatory development of waste management plans before the start of design,
- strict reporting and tracking systems for waste transport and processing,
- adoption of environmentally sustainable practices and less dependent on landfills.

The law complies with the European Green Deal, achieving the transition to a circular economy by reducing dependence on new raw materials. The construction sector is one of the eight sectors with the greatest potential for a circular economy.

3. CONCLUSIONS

The construction sector is a strategic one for the European Union, as well as for Romania. Economic development is dependent on infrastructure and buildings. According to Eurostat data, the construction sector is the largest employer in the EU, with the largest economic activity in Europe, operating on the levels: civil engineering, rehabilitation-maintenance, new residential buildings, non-residential buildings. The EU objectives related to sustainable development in the construction sector and which implicitly apply to Romania are:

- improving quality in construction,
- improving regulations in the field,
- strengthening research activity,
- sustainable growth by promoting efficient ecological and sustainable processes.

Sustainable constructions are structures designed to be economically and ecologically neutral; they generate long-term savings. Renewable energy resources and proprietary technologies aim to reduce greenhouse gas emissions.

BREEAM (Building Research Establishment Environmental Assessment Method) certificates assess the impact of buildings on the environment. "Green" construction projects promote sustainability, encourage the production and use of renewable energy. It is important to educate citizens on the reduction of material waste, waste and the use of recyclable construction materials. The durability and longevity of products reduces the need for frequent intervention and the impact on the environment. The conservation of natural resources is a basic criterion in the construction industry; it is not an option, but a responsibility towards the environment and an opportunity to stimulate research into using innovative and less polluting technologies. Romania, as a member state of the European Union, has adopted laws, norms and regulations specific to the construction industry, in accordance with European objectives in this field. These include the use of innovative and sustainable construction materials, the implementation of energy efficiency technologies and the application of strategies to reduce environmental impact.

References

Biroul de presă al Consiliului Concurenței, oct.2024. Studiu al Consiliului Concurenței (CC): *Reglementările din construcții trebuie actualizate pentru a facilita reciclarea deșeurilor* (Competition Council Press Office, Oct. 2024: Competition Council (CC) Study: Construction regulations need to be updated to facilitate waste recycling).

Bursa construcțiilor, iunie 2024. „Work on progress”: STRABAG redefinește viitorul industriei de construcții (Construction Exchange, June 2024, "Work on progress": STRABAG redefines the future of the construction industry); <https://www.construcțiibursa.ro/work-on-progress-strabag-redefineste-viitorul-industriei-de-construcții--4643137>.

www.juridice.ro: „Consiliul UE a adoptat Regulamentul UE privind produsele pentru construcții” (The EU Council adopted the EU Construction Products Regulation), 5.nov.2024.

Conciliul Europei, 30 iunie 2023. „Consiliul își adoptă poziția cu privire la Regulamentul privind produsele pentru construcții” (Council adopts its position on the Construction Products Regulation).

Ministerul Afacerilor Externe, martie 2021. „Tranziția verde/Pactul Ecologic European” (Ministry of Foreign Affairs, March 2021, "Green Transition/European Green Deal").

Ministerul Mediului, dec.2022. „Planul de acțiune privind economia circulară pentru România” (Ministry of Environment, Dec. 2022, "Circular Economy Action Plan for Romania").

ARDLD, sept.2024. „Soluții sustenabile pentru mediul construit” (ARDLD, Sept. 2024, "Sustainable Solutions for the Built Environment").

Valentin Feodorov/ARACO, 14.11.2024. „Soluții și inovații pentru dezvoltarea sustenabilă a industriei construcțiilor în România. Provocări și perspective”, A XXVI-a ediție a conferinței de cercetare în construcții, economia construcțiilor, arhitectură, urbanism și dezvoltare teritorială *Mediul construit românesc - provocări, răspunsuri și soluții*, București, 14 noiembrie 2024 (Solutions and innovations for the sustainable development of the construction industry in Romania. Challenges and perspectives - The 26th edition of the research conference in construction, construction economics, architecture, urbanism and territorial development *The Romanian built environment - challenges, answers and solutions*); <https://araco.org/solutii-si-inovatii-pentru-dezvoltarea-sustenabila-a-industriei-construcțiilor-in-romania-provocari-si-perspective/>.

Saint Gobain Romania, 2024. „Diminuarea consumului de resurse non-regenerabile” (Reducing the consumption of non-renewable resources); <https://www.saint-gobain.ro/diminuarea-consumului-de-resurse-non-regenerabile>.

Teodora Cimpoi, 6 sept.2024. „Noua lege privind deșeurile din construcții: ce înseamnă pentru România” (The new law on construction waste: what it means for Romania); <https://energymagazine.ro/noua-lege-privind-deșeurile-din-construcții-ce-inseamna-pentru-romania/>.

Dimitriu R., Popescu M., 2021. *Tehnologii inovative în construcții. Eficiența energetică și sustenabilitatea în România*, Editura Universității de Arhitectură și Urbanism „Ion Mincu”, București (Innovative technologies in construction. Energy efficiency and sustainability in Romania, Publishing House of the "Ion Mincu" University of Architecture and Urbanism, Bucharest).

Dan Palangean, 20.nov.2023. Dezvoltarea sustenabilă, o problemă pentru România. *Revista Piața Financiară* (Sustainable development, a problem for Romania. *Financial Market Journal*); <https://www.piatafinanciara.ro/dezvoltarea-sustenabila-o-mare-problema-pentru-romania/>.

Consiliul Europei, 2019. Pactul verde european (Council of Europe, 2019. European Green Deal); <https://www.consilium.europa.eu/ro/policies/green-deal/>.

Cristina Enulescu, 2004. Competitivitatea sectorului european al construcțiilor. INCD URBAN-INCERC, Sucursala București (The competitiveness of the European construction sector. INCD URBAN-INCERC, Bucharest Branch); <https://uac.incd.ro/Art/v2n2a14.pdf>.

www.digi24.ro, Alexandru Gologan, 15.10.2024. „Economia circulară se oprește în bariera deșeurilor din construcții. Reglementările pe domeniu trebuie actualizate” (Circular economy stops at the construction waste barrier. Regulations in the field need to be updated); <https://www.digi24.ro/digieconomic/macro/economia-circulara-se-opreste-in-bariera-deșeurilor-din-construcții-reglementările-pe-domeniu-trebuie-actualizate-33241>.