

1.3.3. CARBON FOOTPRINT STUDY IN ROMANIA CONSTRUCTION

OERCO2
ONLINE EDUCATIONAL RESOURCE FOR INNOVATIVE STUDY OF CONSTRUCTION
MATERIALS LIFE CYCLE

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ROMANIA
GREEN
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1. Introduction

The concern for the ecological and carbon footprint in Romania's buildings started to be considered mostly by architects just recently and in most cases during the green building certification processes. Therefore, during the concept stage, a sustainability planning ensures that processes run efficiently, construction sites are safe and low embodied energy materials are used. The concern is low mainly because architects, design engineers and planners are not responsible for the increasing the number of constructions and urbanized areas, but they are responsible for the energy inefficiency of many of them, and the global impact that these items have on environment.

From the materials used for construction and planning to the consumption of the resources required for these operations and to the ability to facilitate responsible behaviour among employees, each element plays an very important role in the impact that building has on the environment. The application of sustainable development principles to building construction aims to reduce resource consumption, waste production and environmental impact while warranting the high quality and utility of built-up areas.

In a green building certification process integrated design is in most of the cases mandatory and all those involved in building projects (architects, engineers, investors) establish a set of priorities addressing built objects, priorities that include objectives related to[5]:

- energy efficiency, a good selection of building materials such that environmental impact is minimized;
- avoid using construction materials that contain toxic constituents,
- reduce waste generation during construction and operation of the buildings;
- ensure longevity and flexibility of construction;
- avoid deforestation or destruction of the natural landscape. [6]

Ramona Cetatian (2015) [1] , speaker at the conference “Environmentally friendly between dream and reality”, gave a presentation that supports and argues that among the building products used for interior design it is necessarily to persist organic and natural materials in order to improve our living conditions.

In Romania constructions cause a big ecological footprint, as it consumes large quantities of non-renewable natural resources and energy, and is responsible for substantial carbon dioxide (CO₂) emissions. Architects, design engineers, investors were all encouraged to take better account of the low-emission character and energy efficiency of building materials over the whole of their life cycle, and to promote the use of ecologically sustainable, renewable and low-emission materials such as wood in construction. The author recommended materials such as:



- structural strength: wood (binds carbon as it grows, so that it is a carbon-neutral material), stone, straw, reed, soil, clay, mud bricks, some metals;
- roof cover: sieve, shingle, reeds, straw, slate tile, roofing tile;
- interior finishing: stone, limestone, marble, limestone, gypsum, gravel, glass, some metals, paints from natural pigments based on natural solvents, wood;
- interior design: wood, stone, clay, ceramic, some metals, paper, cardboard, reeds, bamboo, woven of natural fibers (wool, linen, silk).

In the study presented by Ramona Cetatian among the materials used to realized and decorate a building it is strongly recommend ecological cork floor. Cork is a natural material made from the bark of the cork oak. To obtain these natural material cork oaks are not cut, but only periodically peeled bark. Therefore we can say that cork is probably the cleanest and renewable source for decorating walls and floors. Cork is considered a renewable source because is harvested cork oak bark only, and if it is done by professionals, bark is restored and can be harvested regularly (9-10 years). The use of cork products basically support the work of farmers and protects the cork oak in its natural habitat. Protecting cork oak forests is very important for the thousands of species in the ecosystem and also keeping these forests we help prevent field erosion.

In Maria Simion et al.(2013) [2] paper, are presented studies about the Ecological Footprint (EF), as a new indicator and methodology in environmental sustainability assessment was used to calculate where and how the humans induce impacts on the environment, in particular due to the generation of C&DW. Ecological footprint makes a relationship between two factors - the amount of land required to dispose per capita generated waste. The study proposes the calculation of EF to develop a sustainable C&DW integrated waste management in European countries, considering the methodologies developed for solid waste management. For the development of the proposed analysis, four C&DW management scenarios were proposed based on the actual situation of C&DW in 2009, in Iasi, Romania and Bologna, Italy. The evaluation is based on Life Cycle Assessment (LCA) methodology, assisted by SimaPro software that calculates the EF using indicators like CO₂, land use and nuclear footprints. The research showed that the EF could be used as an indicator able to evaluate the sustainability of C&DW integrated management systems in various countries and locations.

Andreea Lorena Radu et al. (2013) [3] In her paper presents a methodology to develop a model for calculating the carbon footprint for grant funded projects. This approach is consistent with the objective assumed by our country to reduce GHG emissions by 20% until 2020. The proposed model could be integrated in the programmatic documentation in the next financing programming period 2014-2020, in order to be mandatory prepared by grant applicants. The complexity level is reduced, but subsequently and according to the level of familiarity of users in apluing it, the model can be updated and further developed.

Lucian-Ionel Cioca et al. (2012) [5], present a study about the impact of carbon footprinting in

Romania for different types of activities. The paper talks about carbon footprint became an important term for surprisingly many people in the last years. It is very important that people learn what effects may have carbon foot printing on their lives and how it's produced. In Romania the carbon (CO₂) emissions are the consequences of burning of fossil fuels and manufacturing of cement, and the value of CO₂ emissions in 2008 was 94,660 (kt).

Romania is the second smallest among and the most polluting countries in the world, according to a new study, aimed at carbon dioxide emissions into the atmosphere, in the period 1990-2009. Our country released into the air 78.5 million tons of CO₂, placing thus ranked 19th in the top 20 most polluting nations in the world, according to The Economist. Whole industrial sector, except the energy sector, with the constructions sector produce only 18% of CO₂ emissions in the EU, while residential emissions amounts to 11%, according to Eurostat.

In Romania all elements making up the carbon footprint are:

- non road transport 9.8%
- fuel combustions for other uses 12.2%
- road transport 15.9%
- manufacturing and construction 18.2%
- electricity and Heating 43.9%

By 2050, the amount of CO₂ emitted by the energy sector must be reduced to 93-99% compared to 1990, and the industry generated up to 87%. The amount of CO₂ related to housing and construction field should reduce it by to 91%, and issued by the transport sector to 67%.

In 2007, Romania had CO₂ emissions less than 110 million tons, with 35.3% under 1990 levels. In 1990, the amount of CO₂ emitted into the atmosphere of Romania represented 3.93% of total emissions of the 27 countries that today are part of the European Union. **Today**, Romania is responsible for only 2.65% of carbon dioxide pollution in the EU.

In addition, Marica et al. (2008) [7] publication is important, because it analyse the protection of natural mineral resources that depends directly on their reasonable use and management. Environment management is essential in understanding the complex actions between the present earth surface and the control of production in the extractive field. All branches of extractive activities and competitiveness on the global market are closely connected with the application of coherent and unitary programs for the protection of natural resources and the environment by economic agents. As in other European countries, Romania has adopted standards, laws, norms or settlements concerning not only the quality of products but also an integrated system of quality and environment management. Research carried out between 2003 and 2005 in the MENER program—having governmental financial funds—attempted to unify and introduce the concept of environmental management for the exploitation of clays for the ceramic industry, minimization of the impact of physical environment, human or social productive



activities, achievement of systematic and thorough studies regarding the effect on the exploitation habitat or contribution for the achievement of strategies of specified domains, for a short and a long term.

The analysis and monitoring works, and the specific assessments and expert assessments (geological, geodesic, technical—economic and production) carried out as part of the study demonstrate the possibility of efficient implementation of a unitary quality, production and environment management system.

2. Conclusions

An ecological building is designed to reduce the overall impact of the built-up environment on human health and the natural environment, through:

- The efficient use of energy, water and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and harm to the environment.

However, remains a great deal of effort to make in promoting eco-construction and renovation. Today the majority of people recognise the expression Green Building (Ecological Building) and most consider it with a positive connotation. Among those who perceive eco-construction under a positive light, many are ignorant of the specific nature of such practices. The often ignore what distinguishes them from conventional construction methods, how they are integrated into residential construction and what the selection of ecological options implies for companies and acquirers.

For optimum operation, ecological methods and technologies must be integrated into a coherent design. The expectations of today's owners and occupants in terms of maintenance, operation and comfort are very high, which results in corresponding technological and energy costs. An important vector for promoting ecological construction is construction regulations.

3. References

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