EDUCATIONAL PLATFORM FOCUSED ON ADVANCED STRATEGIES OF REINSTATEMENT OF BUILDING MATERIALS IN THE INDUSTRIAL VALUE CHAIN TO PROMOTE THE TRANSITION TO THE CIRCULAR ECONOMY THROUGH THE USE OF BIM LEARNING TECHNOLOGIES

2019-1-ES01-KA203-065962

Presentation of CircularBIM Erasmus+ project

Centro Tecnológico
del mármol, piedra y materiales

Co-funded by the
Erasmus+ Programme
of the European Union

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GENERAL INFORMATION OF THE PROJECT

Project title: Educational platform focused on advanced strategies of reinstatement of building materials in the industrial value chain to promote the transition to the Circular Economy through the use of BIM learning technologies

Coordinator: Universidad de Sevilla

Call: Erasmus+ 2019. Strategic Partnerships for Higher Education (KA203)

Key Action: Cooperation for innovation and the exchange of good practices

Reference: 2019-1-ES01-KA203-065962

Start date: 01-09-2019
End date: 31-08-2022

Funding by: European Union

Co-funded by the
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CircularBIM

CONSORTIUM

P01. Universidad de Sevilla (USE) - SPAIN www.us.es

P02. Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM) - SPAIN www.ctmarmol.es

P03. CYPE SOFT SL (CYPE) - SPAIN www.cype.com

P04. Universitatea Transilvania din Brasov (UNITBv) - ROMANIA www.unitbv.ro

P05. Asociatia Romania Green Building Council (RoGBC) - ROMANIA www.rogbc.org

P06. Centro Tecnologico da Ceramica e do Vidro (CTCV) - PORTUGAL www.ctcv.pt

P07. Universidade do Minho (UMinho) - PORTUGAL www.uminho.pt

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SUMMARY

The raw materials present on the planet are a finite, limited and, in many cases, non-renewable resources, which is why the current consumption model is destroying many of these resources. For this reason, investment in research is necessary and, in this way, **new production models** should be promoted, if possible, based on the **revaluation and reuse of industrial waste**, encouraging the study and search for new markets for these recovered resources, considered as waste.

In this way, industries are encouraged to **adapt to the Circular Economy model** with the **environmental**, **social and economic** advantages so necessary for our planet.

Waste management plays a crucial role in the Circular Economy. The way waste is managed can lead to high recycling rates and the **return of valuable materials to the economy**, or on the contrary, to an inefficient system in which most recyclable waste ends up in landfills or is incinerated, with potentially damaging effects on the environment and significant economic losses. Understanding that the **waste** generated during a **production process** is one of the fundamental keys to **initiating the transition process to the Circular Economy**.

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OBJECTIVES

To contribute to overcome the situation described above, the main objectives of CircularBIM project are:

- Increasing the awareness about the Circular Economy in construction sector.
- Teaching to reduce waste generation of construction materials.
- Reduce waste from the construction sector by reincorporating it into the value chain.
- Provide information on the possibility of revaluation of each element.
- Free access to a free software for the consultation and use of the techniques or methods of reuse of building materials, also in BIM format.
- Involve professionals and students in new technologies such as BIM applications.

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RESULTS

The main results of the project are:

O1. Establishment of common learning outcomes on placing methods based on Circular Economy criteria, Life Cycle Assessment (LCA) and relative regulations.

O2. New interactive BIM-learning methods for Circular Economy.

O3. CircularBIM OPEN EDUCATIONAL RESOURCE (OER).

INTELLECTUAL OUTPUTS

O1: Establishment of common learning ou economy criteria, Life Cycle Assessment

O1/A1. Comparative study on the normative for placing constructive elements with concepts of Circular Economy.

ROMANIAN REGULATION REGARDING TO PLACING CONSTRUCTIVE ELEMENTS WITH CONCEPTS OF CIRCULAR ECONOMY

	
Legea nr. 6/1991 pentru aderarea Romaniei la Conventia de la Basel privind controlul transportului peste frontiere al deseurilor periculoase și al eliminarii acestora	Law no. 6/1991 for Romania's accession to the Basel Convention on the control of transport across borders of hazardous waste and their disposal
Legea nr. 50/1991 privind autorizarea executării lucrărilor de construcţii	Law no. 50/1991 authorizing the execution of construction works and some measures for housing, as amended and supplemented
Legea nr. 24/1994 pentru ratificarea Convenţiei-cadru a Naţiunilor Unite asupra schimbărilor climatice, semnată la Rio de Janeiro la 5 iunie 1992	Law no. 24/1994 for ratifying the UN Framework Convention on Climate Change (UNFCCC), adopted at the Summit held in Rio de Janeiro in 1992 ("The Earth Summit")
Hotărârea nr. 273/1994 privind aprobarea Regulamentului de recepţie a lucrărilor de construcţii şi instalaţii aferente acestora	Government Decision no. 273/1994 regarding the approval of the regulation governing the handover of construction works and associated equipment
Hotărârea nr. 925/1995 pentru aprobarea Regulamentului de verificare şi expertizare tehnică de calitate a proiectelor, a execuţiei lucrărilor şi a construcţiilor	Decision no. 925/1995 for approving the Regulation on the examination and technical quality expertise of the projects, of the works and constructions execution
Legea nr. 10/1995 privind calitatea în construcţii	Law no. 10/1995 Regarding the Quality in Construction
Ordonanta nr. 82/2000 privind autorizarea operatorilor economici care desfăşoară activităţi de reparaţii, de reglare, de modificări constructive, de reconstrucţie a vehiculelor rutiere, precum şi de dezmembrare a vehiculelor scoase din uz, cu modificările şi completările ulterioare	OG no. 82/2000 regarding the authorization of the economic operators carrying out repair, adjustment, constructive modifications, reconstruction of road vehicles, as well as dismantling of end-of-life vehicles, as subsequently amended and supplemented.
Legea 350/2001 privind amenajarea teritoriului urbanismul	Law no. 350/2001 regarding urban planning together with various other general and local regulations and plans
Hotărârea nr. 856/2002 privind evidenţa gestiunii deşeurilor şi pentru aprobarea listei cuprinzând deşeurile, inclusiv deşeurile periculoase	Government Decision no. 856/2002 on waste management which approves waste categories
Ordinul nr. 863/2002 privind aprobarea ghidurilor metodologice aplicabile etapelor procedurii-cadru de evaluare a impactului asupra mediului	Order no. 863/2002 on the approval of the methodological guidelines applicable procedural steps assessment framework Environmental Impact
Ordinul nr. 864/2002 pentru aprobarea Procedurii de evaluare a impactului asupra mediului în context trans-frontieră şi de participare a publicului la luarea deciziei în cazul proiectelor cu impact trans-frontieră	Order no. 864/2002 approving the Procedure for Environmental Impact Assessment in a Trans-boundary Context and public participation in decision-making for projects with trans-boundary impact

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INTELLECTUAL OUTPUTS

O1: Establishment of common learning outcomes on placing methods based on circular economy criteria, Life Cycle Assessment (LCA) and relative regulations

O1/A1. Sustainable construction methods and procedures used for Circular Economy concepts.

2. Methodology

➢ Constructive solutions

14FVL00002	m²	VENTILATED FACADE WITH WOOD PANELING OUTER CLADDING

Main sheet of ventilated brickwork facade. Insulation of walls with conglomerate cork plates placed on flat surfaces.
Interior wall cladding with wooden panels for self-supporting wall covering, placed on wooden profiles.
Exterior coating of natural wood composite panels for exteriors, consisting of a high-density bakelite body, covered with natural wood veneer superficially treated with synthetic resins that provide greater durability. Due to their high resistance they do not require the usual maintenance of other outdoor woods. Materials with more than 8% of raw material of recycled origin and ecolabel III.
Measure the executed surface.

Code	Q	u	Description	Prece	Cost (€)	CF ($tCO_2eq.$)	EE (MJ/h)	CDW (t/m^3)
TO02100	2.72	h	OFFICIAL 1ST	19.85	52.99	---	---	---
TA00200	2.52	h	SPECIALIST ASSISTANT	19.04	47.98	---	---	---
TP00100	0.50	h	SPECIAL PEON	18.90	9.45	---	---	---
MW00300	0.26	h	LIFTING PLATFORM	7.50	1.94	0.0108	177.3	---
06LHM00005	1.00	m²	BRICK MASONRY	29.64	29.64	0.0717	832.4	264.26
10LWW90202	1.00	m²	CORK PANELS INSULATION	14.44	14.44	-0.0040	354.1	6.71
10LWW90300	1.00	m²	COATING. WOODEN PANELS	19.51	19.51	0.0388	967.2	15.22
RA00200	1.01	m²	OUTER COATING. WOODEN	83.97	83.97	0.0250	684.8	13.08
WW00400	2.00	u	SMALL MATERIAL	0.30	0.60	0.0003	5.3	0.00
				Total	**262.36**	**0.1427**	**3021.2**	**299.26**

Tabla 4 Sustainable Ventilated Facade Price Example (S02)

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INTELLECTUAL OUTPUTS

O1: Establishment of common learning outcomes c
economy criteria, Life Cycle Assessment (LCA) and

O1/A4. CircularBIM Course Curriculum based on ecological challenges and BIM technologies.

5.2. Theory programme

BLOCK I: CONSTRUCTION SECTOR AND CIRCULAR ECONOMY REGULATIONS

UNIT 1. Introduction

1.1 Concepts. Sustainability. Environment.

1.2 Regulatory context of sustainable development and environmental quality.

1.3 Circular Economy in construction: Regulations.

1.4 Status of the level of implementation of sustainable construction.

BLOCK II: SUSTAINABILITY OF MATERIAL RESOURCES

UNIT 2. Circular Economy for construction sector

2.1 Definition and scope.

2.2 Normative frame of reference for Circular Economy

2.3 Principles of Circular Economy for Building Design

2.4 Circular Economy principles by target groups

UNIT 3. Sustainability of building materials

3.1 General characteristics

3.2 Models and tools for assessing the level of environmental impact of construction materials and products

UNIT 4. Environmental indicators

4.1 Comparison of materials, practical methodology

4.2 Circular Economy in construction sector

BLOCK III: SUSTAINABLE CONSTRUCTION PROCESSES AND SOLUTIONS

UNIT 5. Comparative study of construction processes and procedures

5.1 Structures and foundations

5.2 Covers and enclosures

5.3 Installations

5.4 Coatings

5.5 Comparison of solutions

BLOCK IV. CONSTRUCTION AND DEMOLITION WASTE (CDW)

UNIT 6. Construction and demolition waste

6.1 General aspects of CDW

6.2 Regulatory context of CDW

6.3 Demolition and hazardous waste

6.4 CDW treatment

BLOCK V. CIRCULAR ECONOMY APPLIED TO BIM TECHNOLOGIES

UNIT 7. BIM technologies

7.1 BIM definitions

7.2 Technical regulations related to BIM technologies

7.3 The use of BIM in the Sustainable Building Design

7.4 BIM and environmental challenges and its application in the construction sector

BLOCK VI: NEW CONSTRUCTION PROCESSES WITH CIRCULAR ECONOMY PRINCIPLES

UNIT 8. CircularBIM Tool

8.1 Analysis of a practical case study.

8.2 Use of CircularBIM Tool

8.3 Application of the practical case to the CircularBIM Tool

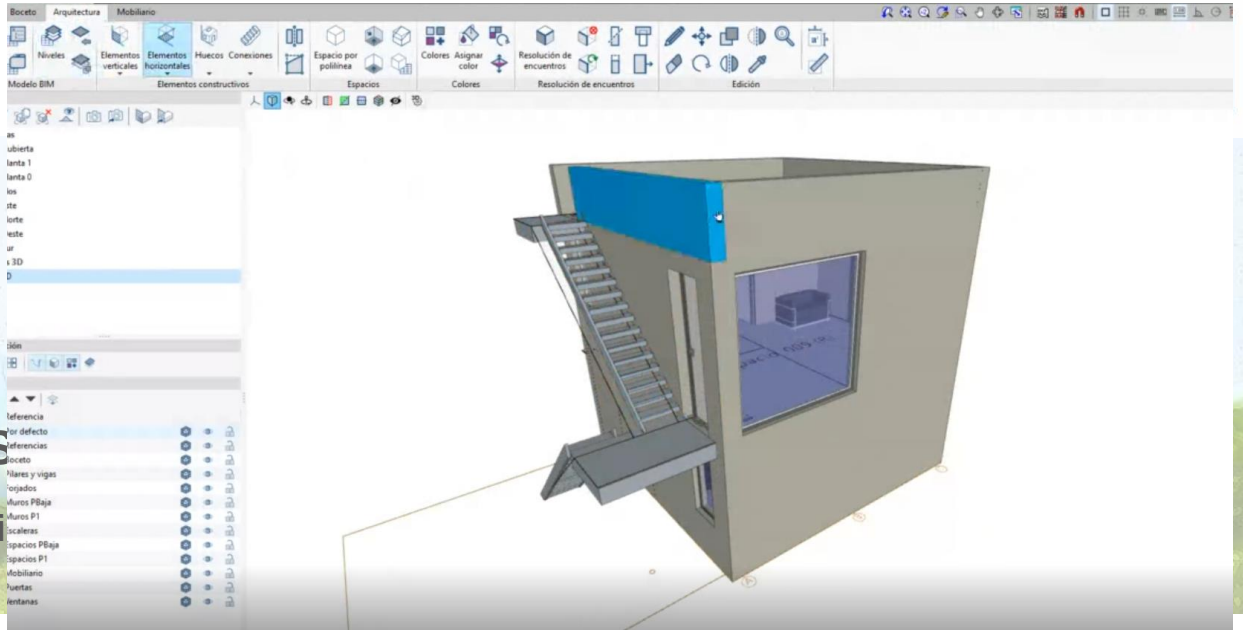
8.4 Analysis and study of results

8.5 Constructive alternatives to reduce the environmental impact

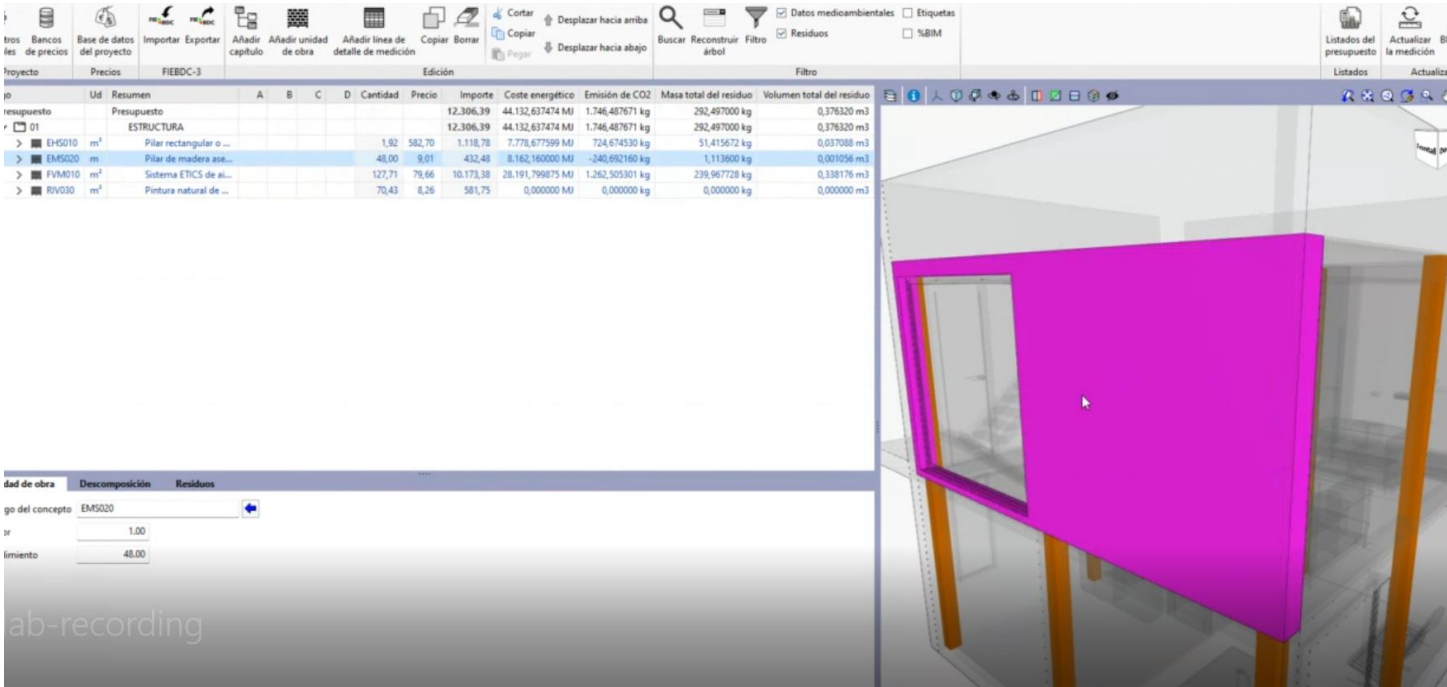
8.6 Comparative study of the different constructive solutions

INTELLECTUAL OUTPUTS

O2: New interactive BIM-learni



O2/A2. Interactive CircularBIM Tool.



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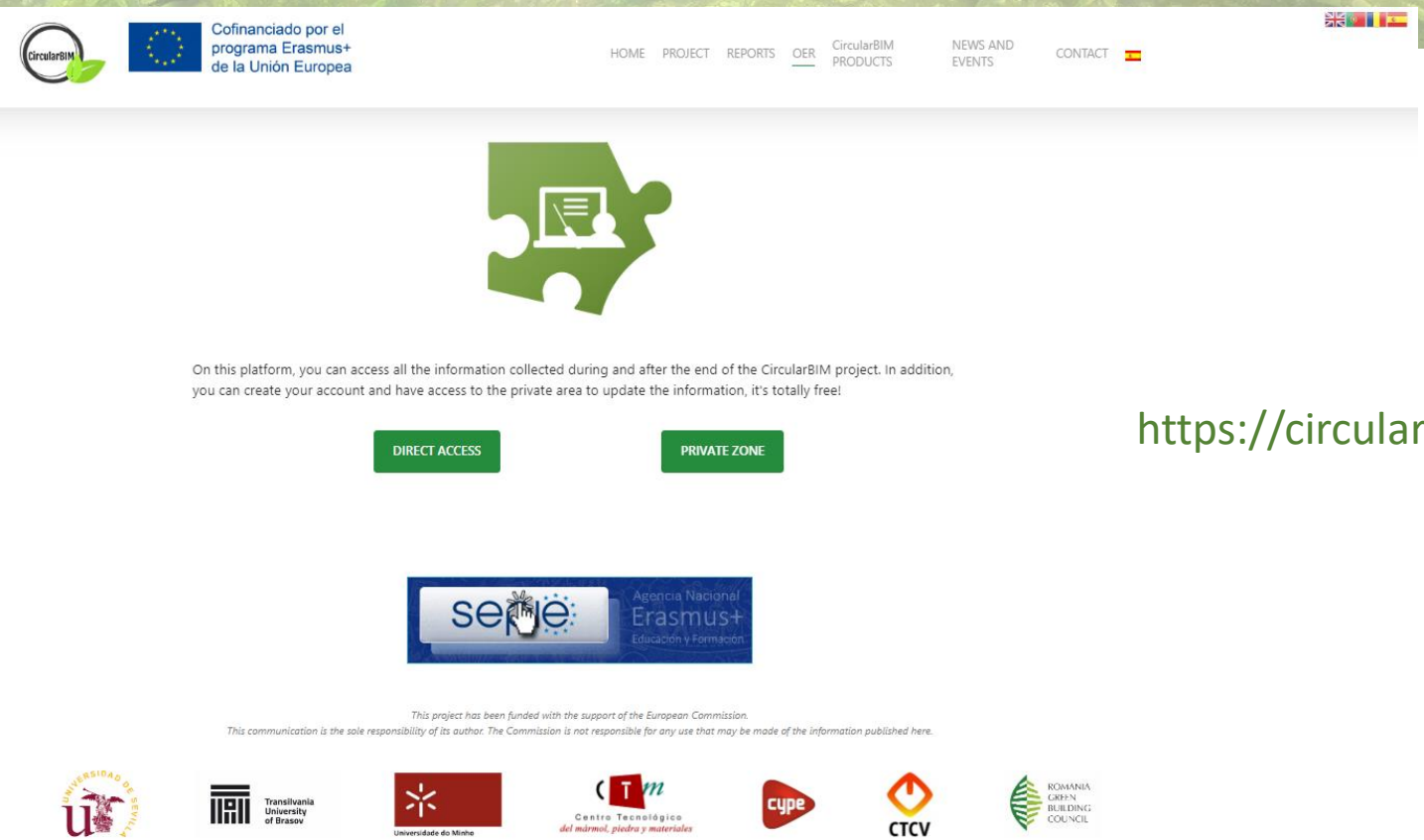
INTELLECTUAL OUTPUTS

O3: CircularBIM Open Educational Resource (OER)



https://circularbim.eu/es/oer/

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INTELLECTUAL OUTPUTS

O3: CircularBIM Open Educational Resource (OER)

Cofinanciado por el
programa Erasmus+
de la Unión Europea

Report on the compilation of Portuguese regulations for the placement of construction elements with Circular Economy concepts			
1.3. Romanian regulations	UNITBV		May 2020
Report on the compilation of Romanian regulations for the placement of construction elements with Circular Economy concepts			
1.4. European regulations	CTM		May 2020
Report on the compilation of European regulations for the placement of construction elements with Circular Economy concepts			

This project has been funded with the support of the European Commission.
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https://circularbim.eu/es/oer/

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