



INNOVATIVE EDUCATIONAL INTEGRATION OF URBAN  
PLANNING BASED ON BIM-GIS TECHNOLOGIES AND  
FOCUSED ON CIRCULAR ECONOMY CHALLENGES

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TASK 02/A.1.1 REPORT ON COMPILATION ON LEGISLATION OF LCA AND ITS APPLICATION IN CONSTRUCTION SECTOR IN SPAIN

## Task 02/A1.1

# REPORT ON COMPILATION ON LEGISLATION OF LCA AND ITS APPLICATION IN CONSTRUCTION SECTOR IN SPAIN



Universitatea  
Transilvania  
din Braşov



ROMANIA  
GREEN  
BUILDING  
COUNCIL



Centro Tecnológico  
del mármol, piedra y materiales



Warsaw University  
of Technology



Consortium members: Universitatea Transilvania din Braşov (UTBV), Asociația Romania Green Building Council (RoGBC), Universidad de Sevilla (USE), Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM), Politechnika Warszawska (WUT), Datacomp sp. z o.o. (Datacomp).



## 1. Introduction

The ecolabel allows for affirming the positive environmental performance of a product. Therefore, these ecolabels are awarded to products with lower environmental impact accounting for their life cycle. There are three types: ecolabel type I, environmental self-declarations (type II) and environmental product declarations (III). The first ecolabels are voluntary schemes that affirm the least environmental impact of a product, the next, the manufacturer performs it with or without certification of a competent authority, and the latest are verified and they establish the environmental behaviour of the product.

In general, the ecolabels assess such aspects as: extraction and selection of raw material, production process (power consumption, water usage and consumption, emissions in the atmosphere and water, etc.), waste management or emission of hazardous substances.

The methodology to establish the Environmental Product Declaration (EDP) assumes the UNE-EN ISO 14025 (Labelling Type III: Environmental Product Declarations). In Spain, later appears the UNE-EN 15804 that establishes Product Category Rules (PCR), and allows for defining the common rules to perform a specific DAP for product families. In 2018, the UNE-CEN ISO/TS 14027:2018 standard was approved for the development of these PCRs.

It must be pointed out that, according to EU, from July 2013 the construction products must declare their environmental impact on the basis of the ACV (LCA), such as DAP.

The environmental product declarations are related to, amongst other documents, the following:

### Europe

- European initiative of Single Market for Green Products.
- *Resolution 2014/2208 (INI)* about the efficient use of resources: move towards the circular economy: “The European Parliament, (...) urges the Commission to propose, by the end of 2015, a main indicator and a set of sub-indicators about efficient use of resources, also in ecosystem services; it noted that the use of these harmonised indicators must be legally binding from 2018 and these must measure the consumption of resources, including the imports and exports a EU level, Member States and the industry, and consider all the life cycle of products and services, and has to be based on the ecological footprint methodology and measure of, at least, the land, water, materials and carbon use”.



- Environmental procurement. Handbook on Green Public Procurement.
- Regulation 305/2011 of Construction Products. For the evaluation of the sustainable use of the resources and environmental impact of construction work must use the environmental product declaration, when available.

## Spain

- Royal Decree 187/2011 establishing the requirements of ecological design including coverage of all energy-related product – Article 10 “Presumption of conformity and harmonised standards”: “(...) Likewise the Environmental Product Declarations (EPD) will be recognised by bodies which administer programs of these ecological labels Type III according to the standard «UNE-EN ISO 14025» provided that such Environmental Product Declaration are in compliance with the requirements of ecological design of applicable implementing measures”.
- Order VIV/1744/2008, of June 9, whereby it is regulated the General Registry of the Technical Building Code (in Spanish, Código Técnico de la Edificación - CTE) – “Article 2. Organization: 2. (...) 2. In the General Registry of the CTE will be registered, according to the provisions of the Article 4 del CTE: (...) c) In Section 3, General Certification Register, certifications shall be registered that promote the improvement of the quality of the building referred in the paragraph 4.b) of the Article 4 of the CTE the following: (...) c.3 Environmental certifications of the product life cycle analysis and other environmental assessments of building”.

## Catalonia

- Decree 21/2006 – Paragraph 6.2: At least one family of products used in the construction of the building, understanding as a family the set of products destined to the same use, will have to have a Distinctive of guarantee of environmental quality of the Government of Catalonia, Ecological Label of the European Union, AENOR Environmental label, or any other type I of ecological label, according to the UNE-EN ISO 14024/2001 or type III, in accordance with the UNE 150025/2005 IN standard.

## 2. Types

The organisms that emit EPD with repercussion in Spain are:

- EPD System: an international organization based in Sweden. It performs EPD and PCR for all types of products. EPDs are fully accessible and it can be seen if they have been made for a particular company in a country. Although there are EPDs for construction products, it is not specific to these types of products.

Web: <http://www.environdec.com/es/>

- EPD Aenor (Global EPD): Based in Spain. It performs EPD and PCR, mainly, for now, for construction products. En la actualidad dispone de un número elevado de DAP en vigor, y en continuo crecimiento. Complete EPDs are available in pdf format. Agreements with the EPD system have also been signed for Aenor's EPDs to be internationalized. The Technical Building Code (CTE) is the policy and regulatory framework that establishes the requirements that buildings in Spain must meet. The CTE has a General Registry regulated by Order VIV/1774/2008 and created to increase the transparency and public control of the instruments that facilitate the implementation of the CTE. Within this register is the General Register of Environmental Certifications of the life cycle analysis in which the first EPDs were registered in September 2015 for long steel and cement products sectors verified by AENOR within its GlobalEPD. In Spain, there are currently two Program Managers:

- GlobalEPD Program of the Spanish Association for Standardization and Certification (AENOR). Applicable to all industrial sectors but especially active in the construction sector. It has General Instructions complying with ISO 14025 and specific requirements for the construction sector based on EN 15804. It has issued PCR and EPD in the steel, ceramic, cement and plaster sectors, and is working in others such as mortars, bricks and tiles or furniture. It forms part of the approved European Association ECO Platform Programs and has issued Declarations of its brand.
- EPDc Program of the Sustainable Construction Agenda. Applicable to construction and centred in Catalonia.

In Spain, the tasks of elaboration of technical standards are carried out in AEN/CTN 150/SC 3 "Ecological Labelling and LCA" horizontally and in the AEN/CTN 198 "Sustainability in construction".

Web: <https://www.en.aenor.com/certificacion/certificacion-de-producto/declaraciones-ambientales-de-producto/declaraciones-globalepd-en-vigor>



- EPD construction: developed by ITEC and COAAT of Barcelona. Specific for construction. All EPDs are accessible in EPD format. They have also developed an EPD comparator for construction product specifiers.  
Web: [http://www.csostenible.net/index.php/es/sistema\\_dapc](http://www.csostenible.net/index.php/es/sistema_dapc)

Apart from these bodies, there are other associations or entities that issue or evaluate environmental parameters related to the LCA. They are as follows:

- GBC Spain: although GBC is not a EPD certifying body, it has established procedures for EPDs to be easily integrated into the environmental certification tools of the agencies (GREEN BUILDING COUNCIL, LEED and BREEAM. Specific field of construction.  
Web: <http://materiales.gbce.es/declaracion-ambiental-de-productos/>
- OPENDAP: open system, where environmental assessments of constructive solutions of the CTE are established. Held by the Torroja Institute and collaborating with the ARCO<sub>2</sub> team, at present there are no open EPDs available, only the available information is the CO<sub>2</sub> emissions emitted by the materials in the analysed phases. Specific scope of construction.  
Web: <http://www.opendap.es/>
- PRODUCT ENVIRONMENTAL FOOTPRINT: developed by the EU, aims to be a reference portal for European EPDs, in a similar way to ecolabel (type I labelling). Currently, no EPDs has been developed, but those that are made will be available in open. General scope, not specific to construction. On the other hand, the European Commission has included within the Single Market initiative for green products a proposal for a product environmental footprint (PEF). This methodology seeks to establish a series of rules for calculating and communicating environmental information and would be in line with the criteria of International Standard ISO 14025, framework for EPDs. A number of pilot projects are currently being developed for the development of PCRs for these products. From the construction point of view, there are normative for the following products: pipes, thermal insulation, metal sheets, paints, and photovoltaic panels.  
Web: [http://ec.europa.eu/environment/eussd/smgp/ef\\_pilots.htm#pef](http://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm#pef).

- **SUSTAINABLE LIFE:** Environmental footprint obtained through the PEF seal. The environmental footprint presents a global vision of the impact on the environment of a product or organization; while the carbon footprint focuses on climate change by quantifying greenhouse gas (GHG) emissions. On the other hand, the water footprint analyses and quantifies the use of water using different methodologies; While the ecological footprint is a concept developed long ago by the Global Footprint Network to indicate the surface of air, land and water ecologically productive necessary to produce resources consumed by a population or group and to assimilate their residues. The study of the environmental footprint includes and calculates the carbon footprint according to ISO 14067 or ISO 14064 and the calculation of the water footprint according to ISO 14046 of the product or organization analysed. The analysis carried out by the Foundation Sustainable Life has exclusively covered companies, so it doesn't evaluate products for now.

Web: <http://www.vidasostenible.org/sellos-de-huella/>

- **ECO-Platform:** The main European Program Managers have formed the ECO-Platform Association, for the EPDs in the construction sector. This Association seeks to harmonize criteria to facilitate the free circulation of products in Europe, avoiding technical barriers based on environmental criteria. All EPDs recognised by this Association must comply with the European Standard EN 15804 and carry a double logo: that of the Program Manager in which the verification is carried out and that of the ECO-Platform.

Eco Platform applies a peer auditing system to approve EPD Verification Program Administrators, from which it publishes a list of Programs that can use the ECO Platform Mark. The first Programs to be approved in this Association (in 2014) were the Spanish GlobalEPD of AENOR, the Swedish International EPD AB, the German IBU and the Austrian Bau-EPD. The first EPDs of this Association were delivered on 16 October 2014 in Brussels. In parallel, several Program Administrators are establishing bilateral mutual recognition agreements, such as the International EPD AB, IBU and AENOR GlobalEPD.

Web: <http://www.eco-platform.org/>

- **LEVELS:** Developed as a common EU framework of core indicators for the sustainability of office and residential buildings, Level(s) provides a set of indicators and common metrics for measuring the performance of buildings along their life cycle. As well as environmental performance, which is the main focus, it also enables other important related performance aspects to be

assessed using indicators and tools for health and comfort, life cycle cost and potential future risks to performance. It is structured as follows:

- 1. Macro-objectives: An overarching set of six macro-objectives for the Level(s) framework that contribute to EU and Member State policy objectives in areas such as energy, material use and waste, water and indoor air quality.
- 2. Core Indicators: A set of 9 common indicators for measuring the performance of buildings which contribute to achieving each macro-objective.
- 3. Life cycle tools: A set of 4 scenario tools and 1 data collection tool, together with a simplified Life Cycle Assessment (LCA) methodology, that are designed to support a more holistic analysis of the performance of buildings based on whole life cycle thinking.
- 4. Value and risk rating: A checklist and rating system provides information on the potential positive contribution to a property valuation and the underlying reliability of performance assessments made using the Level(s) framework.

In addition, the Level(s) framework aims to promote life cycle thinking. It guides users from an initial focus on individual aspects of building performance towards a more holistic perspective, with the aim of wider European use of Life Cycle Assessment (LCA) and Life Cycle Cost Assessment (LCCA).

Web: <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/levels-common-eu-framework-core-sustainability-indicators-office-and-residential-buildings-0>



### 3. Comparative analysis

Based on previous work by the University of Seville (González-Vallejo et al, 2014; Martínez-Rocamora et al, 2016), it can be asserted that the construction materials that control, in the case of Spain, the environmental impacts in the construction process are: concrete, steel, ceramic, aluminium, polystyrene and PVC. These materials account for about 80% of these impacts, including CO<sub>2</sub> emissions. We will choose material from this group and whose EPDs are from some of the companies mentioned above.

In summary, the companies active in Spain that issue and certify EPD are: EPD system (verified by TECNALIA), EPD AENOR (own verified) and DAP construction (ITEC verifier). Between these three companies we will be around 100 EPD made and currently in force in Spain. We will now compare the main features of these certifications:

	Organism	Available	Validity	Product	Regulation applied	Phases assessed	Verifier
Product of waterproofing sheet of PVC DANOPOL	EPD system	YES (PDF)	18/05/2020	PVC	15804/14025	Cradle-gate	TECNALIA
External thermal insulation system	EPD AENOR	YES (PDF)	04/04/2022	Insulation	15804/14025	Cradle-grave	AENOR
CEMENT CEM II	EPD AENOR	YES (PDF)	30/09/2019	Cement	15804/14025	Cradle-gate	AENOR
Porcelain stoneware - Colorker	EPD construction	YES (PDF)	18/07/2021	Ceramic tile products	14025/21930	Cradle-grave	ITEC





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2. Guía sobre declaración ambiental de producto y cálculo de huella de carbono. 2014. Foundation of the Energy of the Community of Madrid.
3. UNE-EN ISO 14025:2010. Environmental labels and declarations. Type III environmental declarations. Principles and procedures.
4. UNE-EN 15804. Sustainability in construction. Environmental Declarations of product. Basic rules of construction product categories.
5. UNE-ISO 21930:2010. Sustainability in building construction. Environmental declaration of construction products.