

ADAPTED SENIOR TRAINING PROGRAM ON BIM METHODOLOGIES FOR THE INTEGRATION OF EPD IN SUSTAINABLE CONSTRUCTION STRATEGIES 2020-1-ES01-KA204-083128



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INTRODUCTION

Having established the most appropriate teaching methodology for the target audience and the necessary materials regarding the use of BIM technologies and environmental challenges (through an exhaustive study of current environmental regulations), an Interactive Manual has been developed, integrated in the BIMEPD learning application and linked to the OER, containing links to video tutorials, visual examples and other training materials for a better understanding of the use of BIM and EPD as an environmental tool for building materials for architects.



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CONTENTS OF THE HANDBOOK

- 1. Basic concepts and BIM (Building Information Modeling) technology applied to Life Cycle Analysis (LCA).
- 2. BIM and LCA regulation.
- 3. Search and interpretation of EPD databases.
- 4. Modeling of BIM objects with development level 600 (LOD600) for the integration of environmental impact data.
- 5. Modeling of sustainable buildings (new construction and renovation) based on Life Cycle Analysis.
- 6. Environmental management and documentation of a BIM project.
- 7. Initiation and development of a project with BIM technology through a strategy of environmental impact reduction.
- 8. Methodologies for calculating environmental impact from BIM objects with LOD600 development level.
- 9. Other methodologies of environmental impact calculation from open BIM formats.
- **10. The Construction Manager: BIM Environmental Manager.**

Location of the handbook

It is uploaded in <u>https://bimepd.eu/oer/</u> and on the website and in the MOOC of the project: <u>https://class.bimepd.eu/</u>





1. Basic concepts and BIM (Building Information Modeling) technology applied to Life Cycle Analysis (LCA).

1.1. BIM METHODOLOGY

- •METHODOLOGY
- DIMENSIONS OF BIM
- •ADVANTAGES OF BIM METHODOLOGY
- BIM IMPLEMENTATION
- MOST USED BIM SOFTWARE

1.2. INTRODUCTION TO LCA

- DEFINITION
- •SCOPE OF THE LCA
- •OBJECTIVES
- •FIELDS OF APPLICATION OF THE LCA
- •LCA STAGES
- •LCA CALCULATION PHASES
- •ISO 14040 STANDARD DEFINITIONS
- •ECO-LABELING
- ENVIRONMENTAL PRODUCT DECLARATIONS (EPD)
- •LCA APPLIED TO THE BUILDING

1.3. BASIC CONCEPTS OF BIM APPLIED TO LCA

- CURRENT SITUATION
- •CHARACTERISTICS OF BIM IN ACV CALCULATION
- •EMERGING SOFTWARE LINKED TO BIM





2. BIM and LCA regulation

2.1. BIM REGULATIONS

- INTRODUCTION
- EUROPEAN SCOPE
- NATIONAL SCOPE
- UNE STANDARDS
- ISO STANDARDS

2.2. REGULALTIONS FOR ENVIRONMENTAL MANAGEMENT

- ENVIRONMENTAL MANAGEMENT SYSTEMS
- ENVIRONMENTAL AUDITING

2.3. REFERENCE STANDARS ON LIFE CYCLE ASSESSMENT

- INTRODUCTION
- LIFE CYCLE ANALYSIS (LCA)
- ENVIRONMENTAL PRODUCT DECLARATION (EPD)
- SUSTAINABILITY STANDARDS IN CONSTRUCTION





3. Search and interpretation of DAP databases

3.1. ECOLABELS

- DEFINITION OF ECO-LABEL
- CPR
- TYPE I
- TYPE II
- TYPE III. EPD

3.2. ENVIRONMENTAL PRODUCT DECLARATIONS

- KEY TO EPDS
- PROPERTIES OF THE DAP
- CHARACTERISTICS OF EPDS
- GUIDING PRINCIPLES
- USE OF DAP: STATISTICAL DATA
- APPLICATIONS
- PRODUCT FOOTPRINT
- DAP INDICATORS







4. Modeling of BIM objects with development level 600 (LOD600) for the integration of environmental impact data

4.1. LEVELS OF DEVELOPMENT

- BASIC CONCEPTS.
- BIM DIMENSIONS.
- LEVELS OF DEVELOPMENT (LOD).
- LEVELS OF INFORMATION (LOI).
- LEVELS OF DETAIL/DEFINITION (LoD).
- LEVEL OF DETAIL/MODEL DEFINITION (LOMD).
- TYPES OF LEVELS OF DEVELOPMENT.

4.2. ENVIRONMENTAL IMPACT CATEGORIES

- DEFINITION OF ENVIRONMENTAL IMPACT CATEGORIES.
- FUNCTIONAL UNIT.
- DECLARED UNIT.
- TYPES OF ENVIRONMENTAL IMPACT CATEGORIES.
- LIFE CYCLE STAGES.
- EXAMPLE OF DAP (ENVIRONMENTAL PRODUCT DECLARATION).

4.3. LOD600

- BIM OBJECT PLATFORMS.
- LOD IN BIM PLATFORMS.
- LOD600 LEVEL DEFINITION.







5. Modeling of sustainable buildings (new construction and renovation) based on Life Cycle Analysis

5.1. ENVIRONMENTAL CERTIFICATION OF BUILDINGS

• CONCEPT OF SUSTAINABLE BUILDING

HISTORICAL EVOLUTION

• METHODOLOGIES, TOOLS AND EVALUATION SYSTEMS

5.2. REFERENCE SYSTEMS FOR ENVIRONMENTAL CERTIFICATION

EUROPEAN SYSTEMS:

BREEAM

- HQE
- Ithaca Protocol
- Green
- INTERNATIONAL SYSTEMS:
- LEED
- SBTool
- Casbee

5.3. SOFTWARES FOR LCA CALCULATION

- INTRODUCTION
- SimaPro
- Eco-it
- Air.e LCA
- OpenLCA
- GaBi
- TEAM
- UMBERTO
- ONE CLICK LCA
- REGIS
- eBalance
- EIME
- iPoint
- LifeCycle Tracker
- Aveny

5.4. BIMSOFTWARE FOR SUSTAINABLE BUILDING MODELING

- PROFESSIONAL BIM and LCA SOFTWARE
- COCON-BIM
- ONE CLICK LCA with BIM
- TALLY
- CYPE module IA-ACV
- CYPE AND CSTB: ElodieBIM





6. Environmental management and documentation of a BIM project.

6.1. CIRCULAR ECONOMY IN CONSTRUCTION

- •DEFINITION OF CIRCULAR ECONOMY
- •IMPORTANCE OF THE CIRCULAR ECONOMY
- EVOLUTION IN THE CONSTRUCTION SECTOR
- DEVELOPMENT OF THE CIRCULAR ECONOMY IN CONSTRUCTION
- •THE ROLE OF STAKEHOLDERS
- •CHALLENGES AND BARRIERS

6.2. ENVIRONMENTAL MANAGEMENT

- INTRODUCTION
- •PHASES OF IMPLEMENTATION
- •GOOD PRACTICES OF THE ACTORS INVOLVED IN THE PROCESS
- •WASTE MANAGEMENT PLAN

6.3. BIM DOCUMENT MANAGEMENT

- BASIC CONCEPTS
- •BIM DOCUMENT MANAGEMENT STANDARDS
- •THE BIM PROCESS
- •DESCRIPTION OF THE BIM PROCESS
- •AGENTS INVOLVED IN THE BIM WORKFLOW
- •THE COLLABORATIVE ENVIRONMENT
- BIM EXECUTION PLAN
- •INFORMATION MANAGEMENT DURING THE DEVELOPMENT PHASE







7. Initiation and development of a project with BIM technology through a strategy of environmental impact reduction.

7.1. ECO-EFFICIENT APPLICATION

- INITIAL APPROACH
- OBJECTIVES TO BE DEVELOPED FOR THE ECO-EFFICIENT APPLICATION
- SCALES OF ACTION
- OBTAINING ENVIRONMENTAL INFORMATION
- CALCULATION ANALYSIS OF EACH STAGE
- DATA INTEGRATION IN BIM OBJECTS

7.2. CONNECTIVITY MODEL

- LOD700
- BIM AND GIS

7.3. WORKFLOW MODEL

- THEORETICAL WORKFLOW FOR THE IMPLEMENTATION OF ECO-EFFICIENT STRATEGIES
- IMPLEMENTATION WORKFLOW FOR DIGITAL CITY CONSTRUCTION





8. Methodologies for calculating environmental impact from BIM objects with LOD600 development level

8.1. CALCULATION METHODOLOGIES WITH SOFTWARE

• Explanation of the calculation methodologies (FROM DATABASE OR FROM THE DATABASE INTEGRATED IN LOD600)

8.2. BIMclay

- PROJECT DEFINITION
- OBJECTIVES
- CONSORTIUM AND IMPACT
- INTELLECTUAL PRODUCTS
- BIMclay RESULTS

8.3. BIMstone

- PROJECT DEFINITION
- OBJECTIVES
- CONSORTIUM AND IMPACT
- INTELLECTUAL PRODUCTS
- BIMstone PLUG-IN





9. Other methodologies of environmental impact calculation from open BIM formats

9.1. BIMhealthy.

- PROJECT DEFINITION
- OBJECTIVES
- CONSORTIUM AND IMPACT
- INTELLECTUAL PRODUCTS
- BIMhealthy PLUGIN

9.2. UrbanBIM

- PROJECT DEFINITION
- OBJECTIVES
- CONSORTIUM AND IMPACT
- INTELLECTUAL PRODUCTS
- URBANBIM PLUGIN

9.3. CircularBIM

- PROJECT DEFINITION
- OBJECTIVES
- CONSORTIUM AND IMPACT
- INTELLECTUAL PRODUCTS
- PLUGIN CircularBIM





10. The Construction Manager: BIM Environmental Manager

10.1. THE ENVIRONMENTAL BIM MANAGER

- BIM PROCESS SPECIFICATIONS
- BIM ROLES AND RESPONSIBILITIES
- DISCIPLINE BIM COORDINATORS
- BIM CONTRACT EXECUTION COLLABORATIVE ENVIRONMENT

10.2. REGULATION OF CDW IN CONSTRUCTION WORKS

- ENVIRONMENTAL IMPACT IN CONSTRUCTION
- MANAGEMENT PLANNING
- DEFINITION CDW
- ORIGIN CDW
- SITUATION IN EUROPE
- SITUATION IN SPAIN
- REGULATIONS APPLICABLE TO THE WASTE MANAGEMENT OF CONSTRUCTION AND DEMOLITION WASTE

10.3. CDW MANAGEMENT PLANNING

- WASTE MANAGEMENT STUDIES
- WASTE MANAGEMENT PLAN
- WASTE BUDGETS
- INSTRUMENTS FOR ADAPTATION TO THE MODEL