



IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS
IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS

2017-1-PT01-KA202-035955



PRESENTATION OF BIMclay project Final results

Final International Seminar of BIMclay project in Coimbra (Portugal)
14th June 2019



Co-funded by the
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of the European Union





MAIN RESULTS OF BIMclay PROJECT

PRODUCTS

The main results of the project are:

- O1. Establishment of common learning outcomes on clay placing methods, Life Cycle Assessment (LCA) and relative regulations.
- O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.
- O3. Online Resource Centre (ORC) of BIMclay.



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

O1. ESTABLISHMENT OF COMMON LEARNING OUTCOMES ON CLAY PLACING METHODS, LIFE CYCLE ANALYSIS (LCA) AND RELATIVE REGULATIONS.

O1/A1. Comparative study on the normative for placing the clay products.

O1/A2. Methods and procedures used for placing clay products.

O1/A3. Comparative study on Life Cycle Analysis (LCA) of clay products in the participant countries.

O1/A4. Report on the results of workshop in (Coimbra, Portugal).

O1/A5. Clay Placing Course Curriculum based on ecological challenges and BIM technologies.

SPANISH REGULATION REGARDING CLAY PLACING METHODS

	
REAL DECRETO 314/2006, de 17 de marzo, por el que se aprueba el Código Técnico de la Edificación.	ROYAL DECREE 314/2006, of March 17, which approves the Technical Building Code
UNE-EN 15037-3:2010+A1:2011. Productos prefabricados de hormigón. Sistemas de forjado de viga y bovedilla. Parte 3: Bovedillas de arcilla cocida.	UNE-EN 15037-3:2010+A1:2011. Precast concrete products - Beam-and-block floor systems - Part 3: Clay blocks
UNE 67041:1988. Tableros cerámicos de arcilla cocida para cubiertas. Designación y especificaciones.	UNE 67041:1988. Ceramic slabs of burned clay for covering. Designation and technical characteristics.
UNE-EN 1304:2014. Tejas y piezas auxiliares de arcilla cocida. Definiciones y especificaciones de producto.	UNE-EN 1304:2014. Clay roofing tiles and fittings - Product definitions and specifications.
UNE-EN 771-1:2011+A1:2016. Especificaciones de piezas para fábrica de albañilería. Parte 1: Piezas de arcilla cocida.	UNE-EN 771-1:2011+A1:2016. Specification for masonry units - Part 1: Clay masonry units.
UNE-EN 845-1:2014. Especificación de componentes auxiliares para fábricas de albañilería. Parte 1: Llaves, amarres, estribos y ménsulas.	UNE-EN 845-1:2014. Specification for ancillary components for masonry - Part 1: Wall ties, tension straps, hangers and brackets
UNE-EN 1344:2015. Adoquines de arcilla cocida. Especificaciones y métodos de ensayo.	UNE-EN 1344:2015. Clay pavers - Requirements and test methods.
UNE-EN 14411:2013. Baldosas cerámicas. Definiciones, clasificación, características, evaluación de la conformidad y marcado.	UNE-EN 14411:2013. Ceramic tiles - Definitions, classification, characteristics, evaluation of conformity and marking.
UNE-EN 14411:2016. Baldosas cerámicas. Definiciones, clasificación, características, evaluación y verificación de la constancia de las prestaciones, y marcado.	UNE-EN 14411:2016. Ceramic tiles - Definition, classification, characteristics, assessment and verification of constancy of performance and marking.



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

TASK IO1/A1.

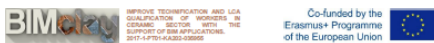


TABLE A1.1. COMPILATION ON THE PORTUGUESE NORMATIVE FOR PLACING OF CLAY PRODUCTS AND ENVIRONMENT.

PORTUGUESE REGULATION REGARDING CLAY PLACING METHODS

NP EN 15037-3:2009(A1):2013. Produtos fabricados em betão. Sistemas de pisos com vigas e laje. Parte 3. Alçobactas cerâmicas.	EN 15037-3:2010(A1):2011. Precast concrete products - Beams-and-block floor systems - Part 3. Clay blocks
NP EN 1304:2007. Telhas cerâmicas e acessórios - Definições e especificações dos produtos	EN 1304:2013. Clay roofing tiles and fittings - Product definitions and specifications.
NP EN 771-1:2011(A1):2016. Especificações para unidades de alvenaria. Parte 1. Unidades cerâmicas (flocos cerâmicos)	EN 771-1:2011(A1):2015. Specification for masonry units - Part 1. Clay masonry units.
-	EN 845-1:2013(A1):2016. Specification for ancillary components for masonry - Part 1: Wall ties, tension straps, hangers and brackets
NP EN 1344:2016. Blocos cerâmicos para pavimento. Especificações e métodos de ensaio	EN 1344:2016. Clay pavers - Requirements and test methods.
NP EN 14411:2016. Elementos e revestimentos cerâmicos. Definição, classificação, caracterização, avaliação de conformidade e marcação	EN 14411:2016. Ceramic tiles - Definitions, classification, characteristics, evaluation of conformity and marking.
-	EN 14411:2016. Ceramic tiles - Definition, classification, characteristics, assessment and verification of consistency of performance and marking.
-	EN 16578:2016. Ceramics sanitary appliances - Sustainability assessment
NP EN 12004-1:2017. Cotas para ladrilhos. Parte 1: Requisitos, avaliação e verificação da regularidade do desempenho, classificação e marcação	EN 12004-1:2017. Adhesives for ceramic tiles - Part 1: Requirements, assessment and verification of consistency of performance, classification and marking.
-	EN 12004-2:2017. Adhesives for ceramic tiles - Part 2: Test methods.
NP EN 998-1:2013. Especificação de argamassas para alvenaria. Parte 1: Argamassas para interiores interiores e exteriores	EN 13888:2009. Grout for tiles - Requirements, evaluation of conformity, classification and designation
NP EN 998-2:2017. Especificação de argamassas para alvenaria. Parte 2: Argamassas de alvenaria	EN 998-2:2016. Specification for mortar for masonry - Part 2: Mortar

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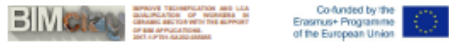


TABLE A1.1. COMPILATION ON THE SPANISH NORMATIVE FOR PLACING OF CLAY PRODUCTS AND ENVIRONMENT.

SPANISH REGULATION REGARDING CLAY PLACING METHODS

REAL DECRETO 314/2006, de 17 de marzo, por el que se aprueba el Código Técnico de la Edificación.	ROYAL DECREE 314/2006, of March 17, which approves the Technical Building Code
UNE-EN 15037-3:2010(A1):2011. Productos prefabricados de hormigón. Sistemas de forjado de vigas y bloques. Parte 3: Bloques de arcilla cocida.	UNE-EN 15037-3:2010(A1):2011. Precast concrete products - Beams-and-block floor systems - Part 3: Clay blocks
UNE 67041-1:1988. Tableros cerámicos de arcilla cocida para cubiertas. Designación y especificaciones.	UNE 67041-1:1988. Ceramic slabs of burned clay for covering. Designation and technical characteristics.
UNE-EN 1304:2014. Telhas e peças auxiliares de arcilla cocida. Definições e especificações de produtos.	UNE-EN 1304:2014. Clay roofing tiles and fittings - Product definitions and specifications.
UNE-EN 771-1:2011(A1):2016. Especificaciones de unidades cerámicas de alvenaría. Parte 1: Unidades de arcilla cocida.	UNE-EN 771-1:2011(A1):2016. Specification for masonry units - Part 1: Clay masonry units.
UNE-EN 845-1:2014. Especificación de componentes para muros y bloques de alvenaría. Parte 1: Vigas de alvenaría, tirantes y brackets.	UNE-EN 845-1:2014. Specification for ancillary components for masonry - Part 1: Wall ties, tension straps, hangers and brackets
UNE-EN 1344:2016. Requisitos y métodos de ensaio.	UNE-EN 1344:2016. Clay pavers - Requirements and test method.
UNE-EN 14411:2016. Requisitos, clasificación, características, evaluación de conformidad y verificación de la consistencia de las prestaciones y marcado.	UNE-EN 14411:2016. Ceramic tiles - Definition, classification, characteristics, evaluation of conformity and marking.
UNE-EN 14411:2016. Requisitos, clasificación, características, evaluación y verificación de la consistencia de las prestaciones y marcado.	UNE-EN 14411:2016. Ceramic tiles - Definition, classification, characteristics, assessment and verification of consistency of performance and marking.
UNE 13400:2004. Tapes cerámicos. Código de práctica para el diseño y el montaje de cubiertas con tales cerámicos.	UNE 13400:2004. Clay roofing tiles. Code of practice for the design and fixing of roofs with clay roofing tiles.

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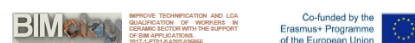


TABLE A1.1. COMPILATION ON THE GREEK NORMATIVE FOR PLACING OF CLAY PRODUCTS AND ENVIRONMENT.

GREEK REGULATION REGARDING CLAY PLACING METHODS

ΕΠΕΚ ΕΛΟΤ ΤΠ 1501-03-02-02-00-2009. Τεμάχια σκευοκάλυψης	ETEP ELOT TP 1501-03-02-02-00-2009. Clay bricks masonry
ΕΠΕΚ ΕΛΟΤ ΤΠ 1501-03-05-01-01. Επισκευαστικά στοιχεία	ETEP ELOT TP 1501-03-05-01-01. Roof covering with clay roofing tiles.
ΕΠΕΚ ΕΛΟΤ ΤΠ 1501-03-06-02-03. Στοιχεία κλιματικής προστασίας στέγης	ETEP ELOT TP 1501-03-06-02-03. Thermal insulation of clay roofing tiles
ΕΠΕΚ ΕΛΟΤ ΤΠ 1501-08-05-03-01. Υποστηρίγματα επενδύσεων κλιματισμού και ΥΤΑ από σκυρόδεμα υλικά	ETEP ELOT TP 1501-08-05-03-01. Clay barrier liners for ponds and landfills
ΕΠΕΚ ΕΛΟΤ ΤΠ 1501-03-07-02-00. Επισκευαστικά στοιχεία πλακόδεσης εσωτερικών και εξωτερικών επιφανειών	ETEP ELOT TP 1501-03-07-02-00. Ceramic tiles covering of interior and outdoor surfaces.
ΕΠΕΚ ΕΛΟΤ ΤΠ 1501-08-02-04. Στοιχεία στεγασμού κατασκευών από σκυρόδεμα με ασφαλτικές μαστίχες	ETEP ELOT TP 1501-08-02-04. Concrete structures joint sealing using asphaltic mastics
ΕΛΟΤ ΕΝ 772-1. Μέθοδος δοκιμής αντοχής σε θλίψη - Μέρος 1: Προσδιορισμός της αντοχής σε θλίψη	ELOT EN 772-1. Methods of test for masonry units - Part 1: Determination of compressive strength
ΕΛΟΤ ΕΝ 998-1. Προδιαγραφή κοινών τμημάτων τμημάτων - Μέρος 1: Κοινά στοιχεία τμημάτων	ELOT EN 998-1. Specification for mortar for masonry - Part 1: Rendering and plastering mortar
ΕΛΟΤ ΕΝ 998-2 Ε2. Προδιαγραφή κοινών τμημάτων τμημάτων - Μέρος 2: Κοινά στοιχεία τμημάτων	ELOT EN 998-2 Ε2. Specification for mortar for masonry - Part 2: Masonry mortar.
ΕΛΟΤ ΕΝ 1025-3. Προδιαγραφή κοινών τμημάτων τμημάτων - Μέρος 3: Προσδιορισμός της αντοχής σε διάτμηση	ELOT EN 1025-3. Methods of test for masonry - Part 3: Determination of internal shear strength.
ΕΛΟΤ ΕΝ 1015-11. Μέθοδος δοκιμής κοινών τμημάτων τμημάτων - Μέρος 11: Προσδιορισμός της αντοχής σε εφελκυσμό και θλίψη ορθογώνιου κοινών τμημάτων	ELOT EN 1015-11. Methods of test for mortar for masonry - Part 11: Determination of flexural and compressive strength of hardened mortar.

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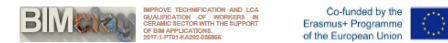


TABLE A1.1. COMPILATION ON THE EUROPEAN NORMATIVE FOR PLACING OF CLAY PRODUCTS AND ENVIRONMENT.

DIRECTIVE 2011/92/EU OF THE EUROPEAN PARLIAM AND OF THE COUNCIL OF 13 December 2011 on the assessment of the effects of certain public and private projects on the environment	DIRETTIVA 2011/92/UE DO PARLAMENTO EUROPEU E DO CONSELHO DE 13 de dezembro de 2011 relativa à avaliação dos efeitos de determinados projectos públicos e privados no ambiente	ΟΔΗΓΙΑ 2011/92/ΕΕ ΤΟΥ ΕΥΡΩΠΑΪΚΟΥ ΚΟΙΝΟΒΟΥΛΙΟΥ ΚΑΙ ΤΟΥ ΣΥΜΒΟΥΛΙΟΥ ΤΗΣ 13ης Δεκεμβρίου 2011 για την αξιολόγηση των επιπτώσεων ορισμένων έργων στο περιβάλλον	DIRECTIVA 2011/92/UE DO PARLAMENTO EUROPEU E DO CONSELHO DE 13 de dezembro de 2011 relativa à avaliação dos efeitos de determinados projectos públicos e privados no ambiente
REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAM AND OF THE COUNCIL OF 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC	REGULAMENTO (UE) N.º 305/2011 DO PARLAMENTO EUROPEU E DO CONSELHO de 9 de Março de 2011 que estabelece condições harmonizadas para a comercialização dos produtos de construção e que revoga a Directiva 89/106/CEE do Conselho	ΚΑΝΟΝΙΣΜΟΣ (ΕΕ) αριθ. 305/2011 ΤΟΥ ΕΥΡΩΠΑΪΚΟΥ ΚΟΙΝΟΒΟΥΛΙΟΥ ΚΑΙ ΤΟΥ ΣΥΜΒΟΥΛΙΟΥ ΤΗΣ 9ης Μαρτίου 2011 για την εναρμόνιση των προϋποθέσεων για την εμπορία των δομητικών προϊόντων και για την κατάργηση της οδηγίας 89/106/ΕΕΚ	REGULAMENTO (UE) N.º 305/2011 DO PARLAMENTO EUROPEU E DO CONSELHO de 9 de Março de 2011 que estabelece condições harmonizadas para a comercialização dos produtos de construção e que revoga a Directiva 89/106/CEE do Conselho
DIRECTIVE (EU) 2016/2284 OF THE EUROPEAN PARLIAM AND OF THE COUNCIL OF 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2004/108/EC	DIRETTIVA (UE) 2016/2284 DO PARLAMENTO EUROPEU E DO CONSELHO de 14 de dezembro de 2016 relativa à redução das emissões nacionais de certos poluentes atmosféricos, que altera a Directiva 2003/35/CE e revoga a Directiva 2004/108/CE	ΟΔΗΓΙΑ (ΕΕ) 2016/2284 ΤΟΥ ΕΥΡΩΠΑΪΚΟΥ ΚΟΙΝΟΒΟΥΛΙΟΥ ΚΑΙ ΤΟΥ ΣΥΜΒΟΥΛΙΟΥ ΤΗΣ 14ης Δεκεμβρίου 2016 σχετικά με τη μείωση των εθνικών εκπομπών ορισμένων ατμοσφαιρικών ρυπαντών, που τροπάζει τον οδηγό 2003/35/ΕΚ και την κατάργηση της οδηγίας 2004/108/ΕΚ	DIRETTIVA (UE) 2016/2284 DO PARLAMENTO EUROPEU E DO CONSELHO de 14 de dezembro de 2016 relativa à redução das emissões nacionais de certos poluentes atmosféricos, que altera a Directiva 2003/35/CE e revoga a Directiva 2004/108/CE
REGULATION (EU) No 245/2013 OF THE EUROPEAN PARLIAM AND OF THE COUNCIL OF 21 May 2013 on a	REGULAMENTO (UE) N.º 245/2013 DO PARLAMENTO EUROPEU E DO CONSELHO de 21 de maio de 2013 relativo à criação de um	ΚΑΝΟΝΙΣΜΟΣ (ΕΕ) αριθ. 245/2013 ΤΟΥ ΕΥΡΩΠΑΪΚΟΥ ΚΟΙΝΟΒΟΥΛΙΟΥ ΚΑΙ ΤΟΥ ΣΥΜΒΟΥΛΙΟΥ ΤΗΣ 21ης Μαΐου 2013 ο	REGULAMENTO (UE) N.º 245/2013 DO PARLAMENTO EUROPEU E DO CONSELHO de 21 de maio de 2013 relativo à criação de um

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

TASK IO1/A2



1. INTRODUCCIÓN

1. Antecedentes

El proyecto BIMclay nace con el propósito de producir y desarrollar materiales didácticos basados en la metodología BIM, que aborden los retos relacionados con el Análisis de Ciclo de Vida (ACV) de los productos de arcilla, para que sirvan de base formativa para profesionales del sector cerámico. Para ello, es necesario definir y recopilar los sistemas de ejecución y métodos de colocación más adecuados para productos de arcilla.

La primera tarea del proyecto BIMclay "O1. Establecimiento de resultados de aprendizaje comunes sobre métodos de colocación de arcilla, Análisis de Ciclo de Vida (ACV) y normativas" engloba una serie de tareas específicas entre las que encontramos la elaboración de este informe.

Este informe de buenas prácticas aborda el establecimiento de habilidades y competencias, así como la definición de los procesos de ejecución más sostenibles y respetuosos con el medio ambiente.

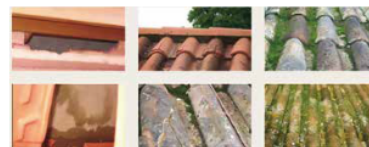
El presente informe "Proceso de colocación de teja en seco" aborda la ejecución del proceso constructivo de una cubierta por fijación en seco de tejas mixtas.

2. Definición y tipología de cubiertas según fijación de tejas

En función del tipo de fijación de las tejas, las cubiertas son clasificables en:

Cubierta tradicional, caracterizada por la utilización de mortero como medio de fijación. El principal inconveniente de esta tipología de cubiertas es que no permiten la microventilación bajo las tejas, lo que puede ocasionar condensaciones y problemas de heladicidad.

Posibles efectos adversos en cubiertas con tejas cerámicas por falta de microventilación:



Fuente: Hispalyt.



4. PROCESO DE EJECUCIÓN

1. Preparación del soporte.

El soporte de las tejas estará formado por elementos lineales que o frezcan un plano físico que sustente la ejecución en seco de la cubierta, los denominados rastreles.

Para lograr la planeidad requerida, se tendrá especial cuidado en el momento de ejecución y acabado del tablero, no admitiéndose variaciones superiores a 3 cm con respecto al plano teórico.



Fuente: Tejas Borja. Hispalyt.

2. Marcado de la posición de la lámina impermeable-transpirable.



Fuente: Tejas Borja. Hispalyt.



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

TASK IO1/A3



IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS. 2017-1-FP10-FA202-05595

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TASK O1.A3. COMPARATIVE STUDY ON LIFE CYCLE ANALYSIS (LCA) OF CLAY PRODUCTS.



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TASK O1.A3. COMPARATIVE STUDY ON LIFE CYCLE ANALYSIS (LCA) OF CLAY PRODUCTS.

TASK O1.A3.

COMPARATIVE STUDY ON LIFE CYCLE ASSESSMENT (LCA) OF CLAY PRODUCTS

INTRODUCTION

"Growing concern and environmental regulation, coupled with the increasing importance and pressure of public opinion, progressively raise the question of the energy and environmental performance of buildings, increasingly on the agenda of building construction, as well as the materials used in their construction and their Relation with the surrounding space" (CTCV, 2012).

In this tasks O1.A3, a comparative study report about the existing Life Cycle Analysis related to clay products, as well as placing these products in construction sites in the partner countries and EU has been developed.

This comparative study is focused on Environmental Product Declarations (EPD) of construction of the participant countries. Currently, there are products with its environmental declaration, i.e., a document which reports on environmental impacts, such as kilograms of CO2 equivalents generated in the manufacturing process of the products of ceramic sector. This document covers all phases through which passes a product, from extraction of the raw material with which it is manufactured until the product is completely finished.

In summary, this task will compile the EPDs of the previous materials used in the multimedia materials of the project and analyse the basic data that will be used in the interactive tool (IO3) (CO2 emissions, ecological and carbon footprint, etc.). All partners of the BIMclay project have participated in this report.

The results of this comparative study will be collected focused on its implementation in the BIMclay Multimedia Cards.

1. ENVIRONMENTAL PRODUCT DECLARATION (EPD)

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



Consortium members: Associação Portuguesa da Indústria de Cerâmicas (APICER), Centro Tecnológico da Cerâmica e do Vidro (CTCV), Associação Empresarial de Investigação Centro Tecnológico do Mármore, Pedra e Materiais (CTM), Asociación Española de Fabricantes (Aefab), Institute of Entrepreneurship Development (IED).

Consortium members: Associação Portuguesa da Indústria de Cerâmicas (APICER), Centro Tecnológico da Cerâmica e do Vidro (CTCV), Associação Empresarial de Investigação Centro Tecnológico do Mármore, Pedra e Materiais (CTM), Asociación Española de Fabricantes (Aefab), Institute of Entrepreneurship Development (IED).

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

TASK IO1/A4

BIMclay Project

IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS

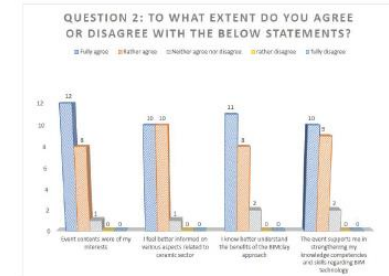
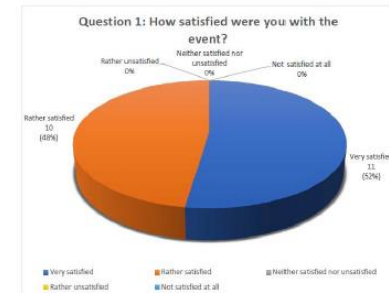
INTELLECTUAL OUTPUT 1. Task A4
 TECHNICAL CONCLUSIONS OF THE WORKSHOP IN COIMBRA,
 April 12th, 2018



4. CONCLUSIONS

The results collected through the questions reflected in the 21 questionnaires, which have been replied by attendees, are summarised below.

The answers collected for the questions are reflected in the following pictures:



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

TASK IO1/A5



TEACHING GUIDE

Task O1/A5

Clay Placing Course Curriculum based on Ecological challenges and BIM technologies



Consortium members: Associação Portuguesa de Indústria de Cerâmica (APICER), Centro Tecnológico de Cerâmica e do Vidro (CTCV), Associação Empresarial de Investigação Centro Tecnológico do Mármore, Pedra e Materiais (CTM), Associação Española de Fabricantes (Itipapay), Institute of Entrepreneurship Development (IED).



5. Contents

5.1. Contents of the course

Placement methodologies available. Generation of alternatives. Environmental legislation and sustainability in construction. Construction and sustainable development. Identification and evaluation of impacts. Life cycle analysis of ceramic products. BIM methodologies and applications in the ceramic sector.

5.2. Theory programme

BLOCK I: CONSTRUCTION AND ENVIRONMENT

UNIT 1. Introduction

- 1.1 Concepts. Introduction to sustainability. Environment.
- 1.2 Regulatory context of sustainable development and environmental quality.
- 1.3 Introduction to environmental analysis in construction.
- 1.4 Sustainability in the ceramic sector: Regulations.
- 1.5 Status of the level of implementation of sustainable construction.

BLOCK II: SUSTAINABILITY IN CONSTRUCTION WITH CERAMIC PRODUCT

UNIT 2. Life cycle analysis (LCA)

- 2.1 Definition and scope.
- 2.2 Normative frame of reference for LCA.
- 2.3 Definition and presentation of the different phases of an LCA.
- 2.4 Application to the ceramic sector.
- 2.5 LCA examples.

UNIT 3. Materials

- 3.1 Manufactured materials and raw materials.
- 3.2 European Products Directive.
- 3.3 Environmental labels and Environmental Product Declarations (EPD).

Consortium members: Associação Portuguesa de Indústria de Cerâmica (APICER), Centro Tecnológico de Cerâmica e do Vidro (CTCV), Associação Empresarial de Investigação Centro Tecnológico do Mármore, Pedra e Materiais (CTM), Associação Española de Fabricantes (Itipapay), Institute of Entrepreneurship Development (IED).



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Final International Seminar of BIMclay project in Coimbra (Portugal) – 14th June 2019

O2. BIMclay MULTIMEDIA MATERIALS. NEW INTERACTIVE BIM-LEARNING METHODS

O2. BIMclay MULTIMEDIA MATERIALS. NEW INTERACTIVE BIM-LEARNING METHODS



MULTIMEDIA FLASH CARDS

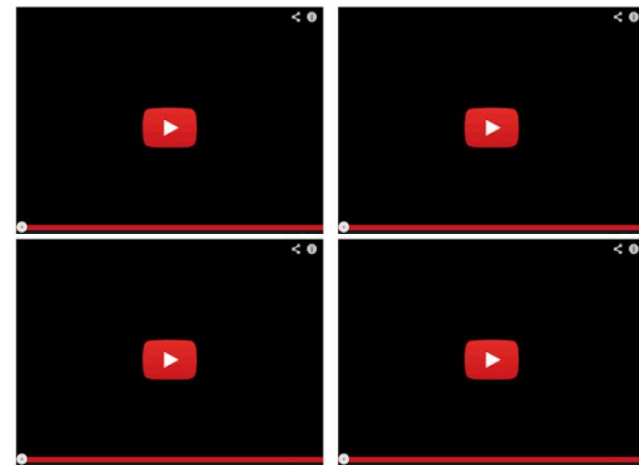
O2/A1. IT production of BIMclay Multimedia Cards.

O2/A2. Pedagogical and implementation of IT improvements of BIMclay Multimedia Cards.

O2/A3. Technical test and implementation of IT improvements of BIMclay Multimedia Cards.

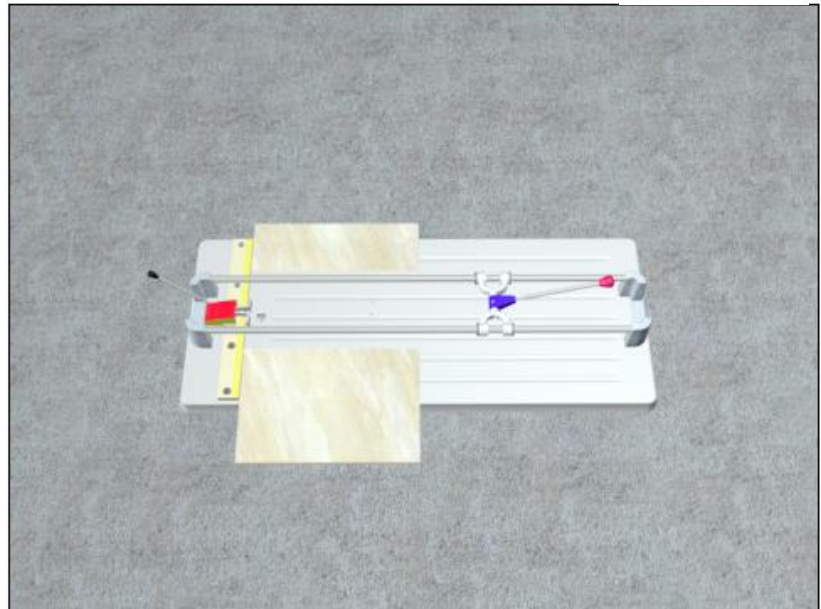
O2/A4. Report on the results International Seminar in Madrid (Spain) on new interactive methods BIM-learning applied to sector of clay products.

Graphic multimedia material on how to place the most common clay products in an ecological way.



O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

TASK IO2/A1





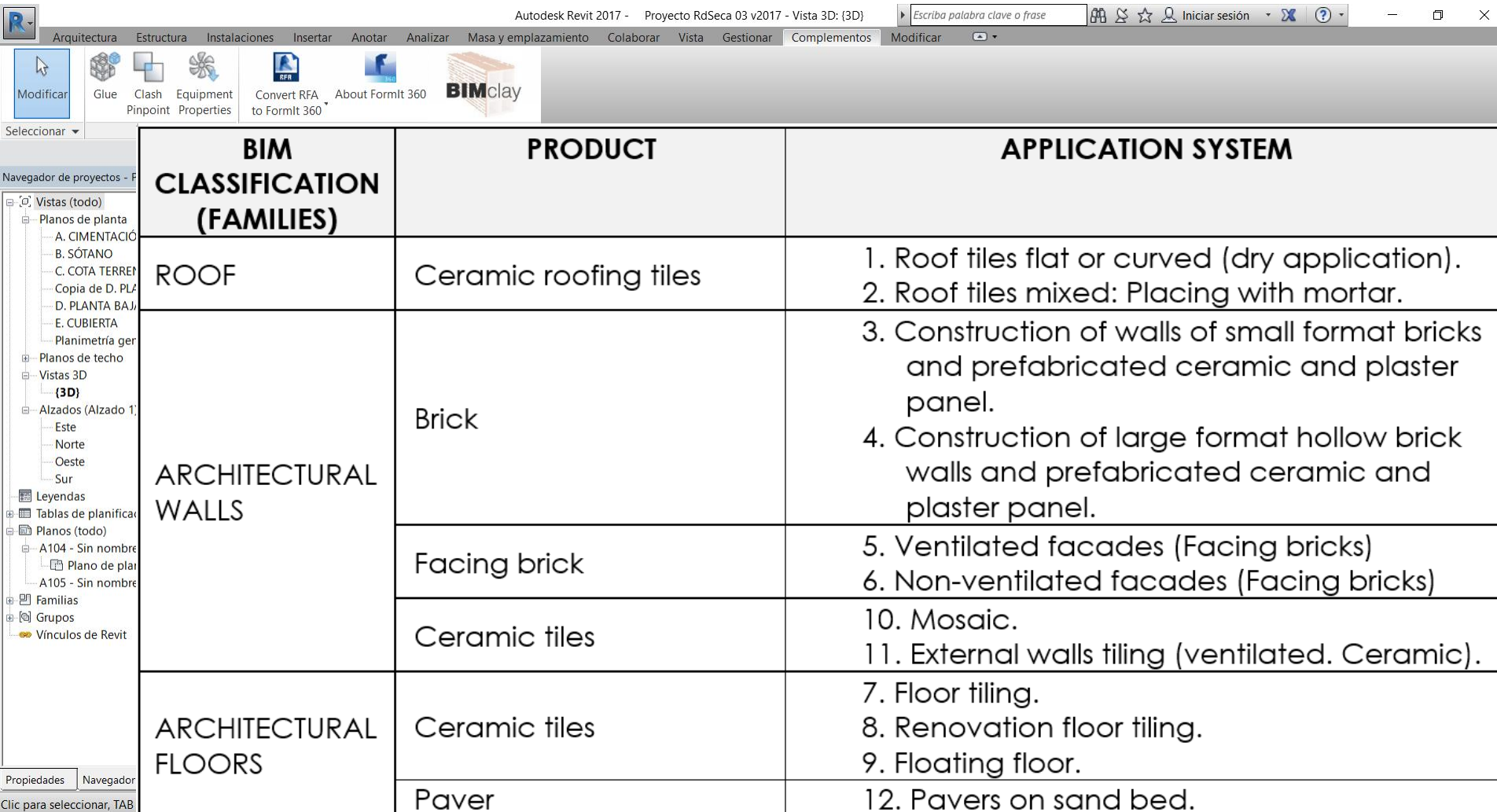
O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

TASK IO2/A1

PRODUCT	APPLICATION SYSTEM
Ceramic roofing tiles	<ol style="list-style-type: none"> 1. Roof tiles flat or curved (dry application) 2. Roof tiles mixed: Placing with mortar
Brick	<ol style="list-style-type: none"> 3. Construction of walls of small format bricks and prefabricated ceramic and plaster panel 4. Construction of large format hollow brick walls and prefabricated ceramic and plaster panel
Facing brick	<ol style="list-style-type: none"> 5. Ventilated facades 6. Non-ventilated facades
Ceramic tiles	<ol style="list-style-type: none"> 7. Floor tiling 8. Renovation floor tiling 9. Floating floor 10. Mosaic 11. External walls tiling (ventilated)
Paver	<ol style="list-style-type: none"> 12. Pavers on sand bed.

O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

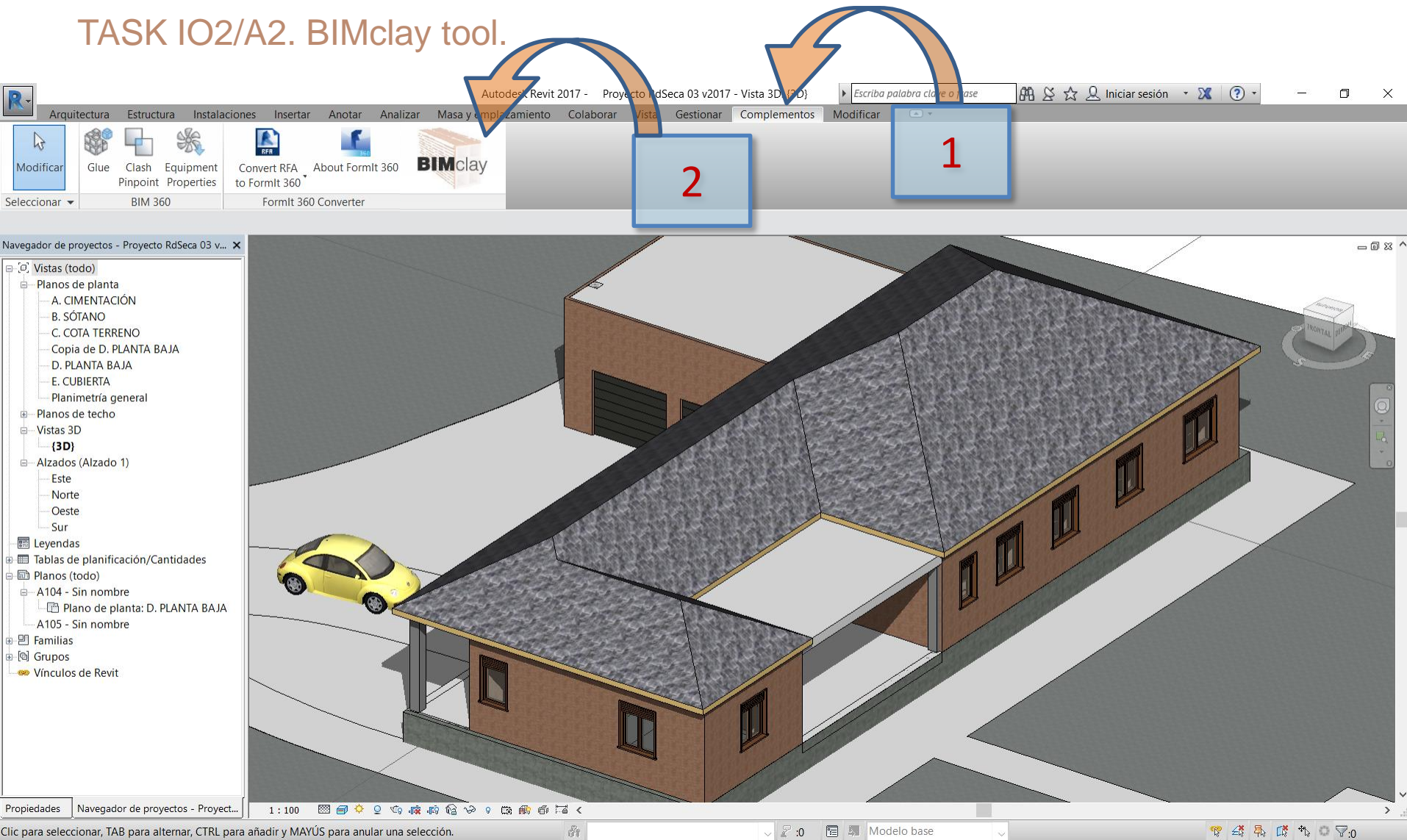
TASK IO2/A2. BIMclay tool.



BIM CLASSIFICATION (FAMILIES)	PRODUCT	APPLICATION SYSTEM
ROOF	Ceramic roofing tiles	<ol style="list-style-type: none"> 1. Roof tiles flat or curved (dry application). 2. Roof tiles mixed: Placing with mortar.
ARCHITECTURAL WALLS	Brick	<ol style="list-style-type: none"> 3. Construction of walls of small format bricks and prefabricated ceramic and plaster panel. 4. Construction of large format hollow brick walls and prefabricated ceramic and plaster panel.
	Facing brick	<ol style="list-style-type: none"> 5. Ventilated facades (Facing bricks) 6. Non-ventilated facades (Facing bricks)
	Ceramic tiles	<ol style="list-style-type: none"> 10. Mosaic. 11. External walls tiling (ventilated. Ceramic).
ARCHITECTURAL FLOORS	Ceramic tiles	<ol style="list-style-type: none"> 7. Floor tiling. 8. Renovation floor tiling. 9. Floating floor.
	Paver	<ol style="list-style-type: none"> 12. Pavers on sand bed.

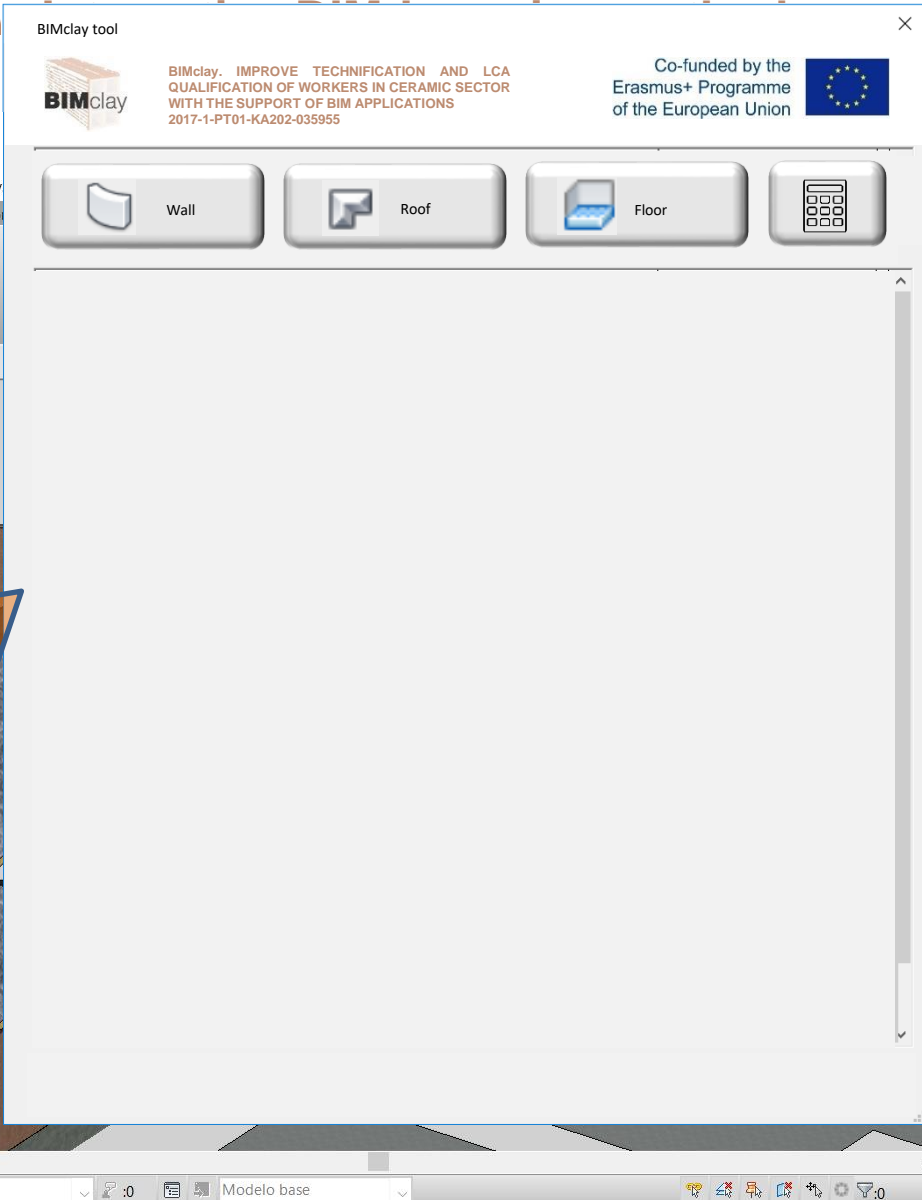
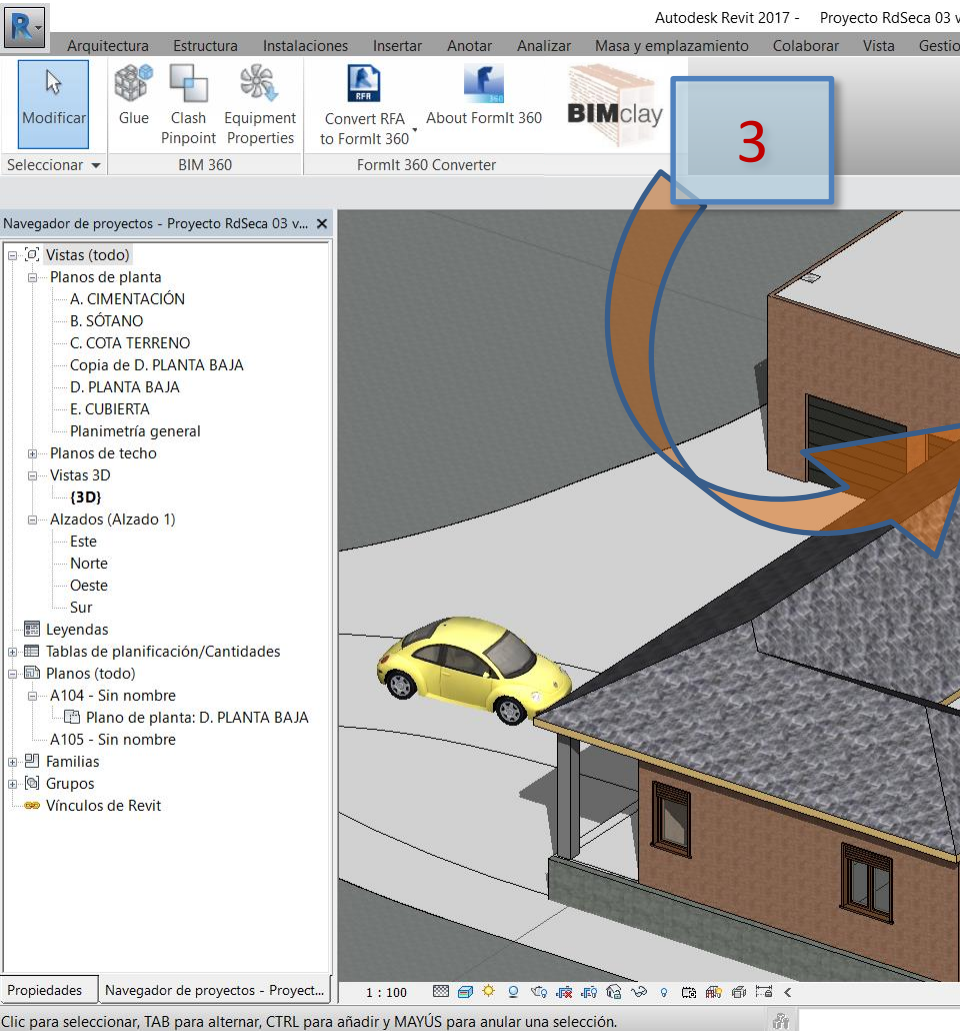
O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

TASK IO2/A2. BIMclay tool.



The screenshot displays the Autodesk Revit 2017 interface. The ribbon at the top includes the BIMclay logo. Two blue boxes, labeled '1' and '2', are connected by curved arrows. Box '1' points to the BIMclay logo in the ribbon, and box '2' points to the BIMclay logo in the project browser. The project browser on the left shows a tree view of the project structure, including 'Vistas (todo)', 'Planos de planta', 'Planos de techo', 'Vistas 3D', 'Alzados (Alzado 1)', 'Legendas', 'Tablas de planificación/Cantidades', 'Planos (todo)', 'Familias', 'Grupos', and 'Vínculos de Revit'. The main view shows a 3D model of a building with a yellow car parked in front. The status bar at the bottom indicates '1 : 100' and 'Modelo base'.

O2. BIMclay Multimedia Materials. New TASK IO2/A2. BIMclay tool.



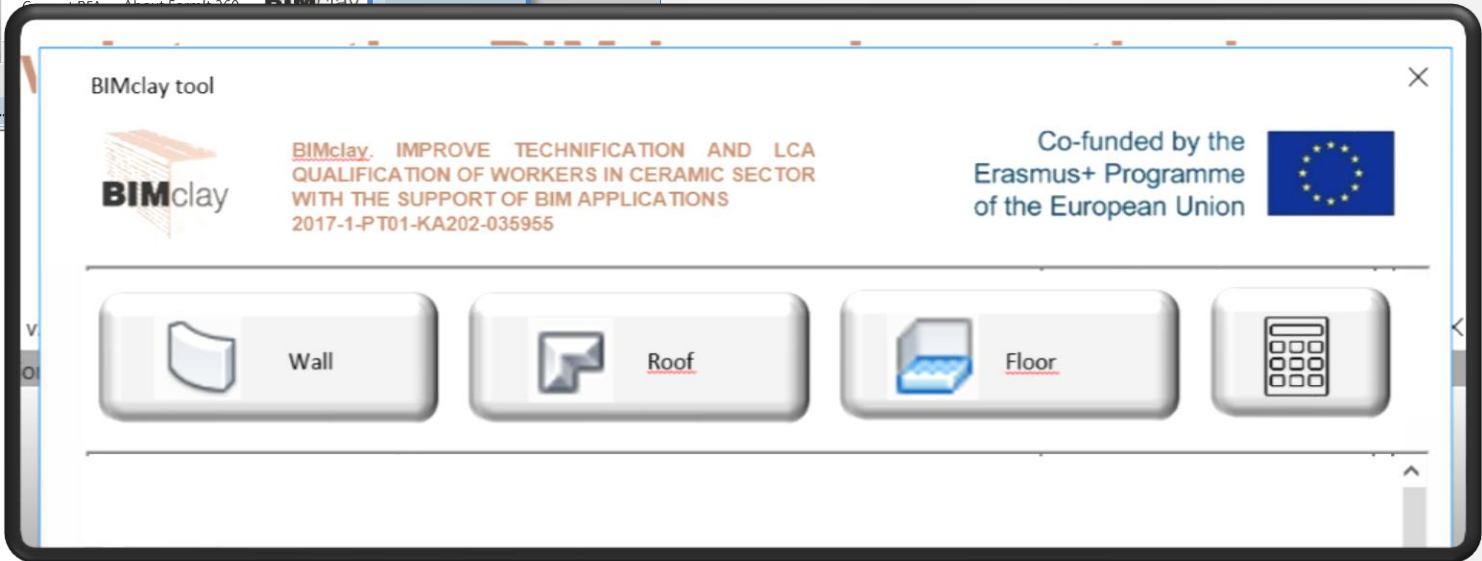
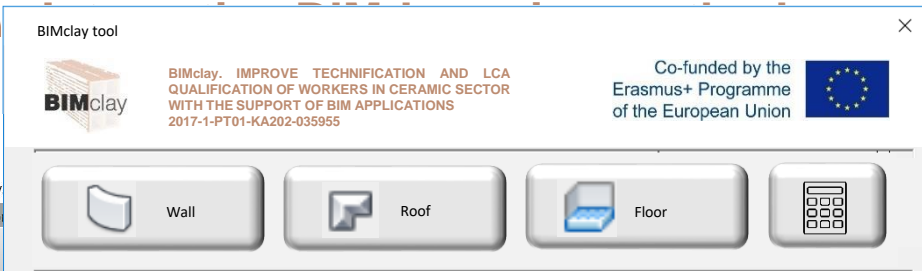
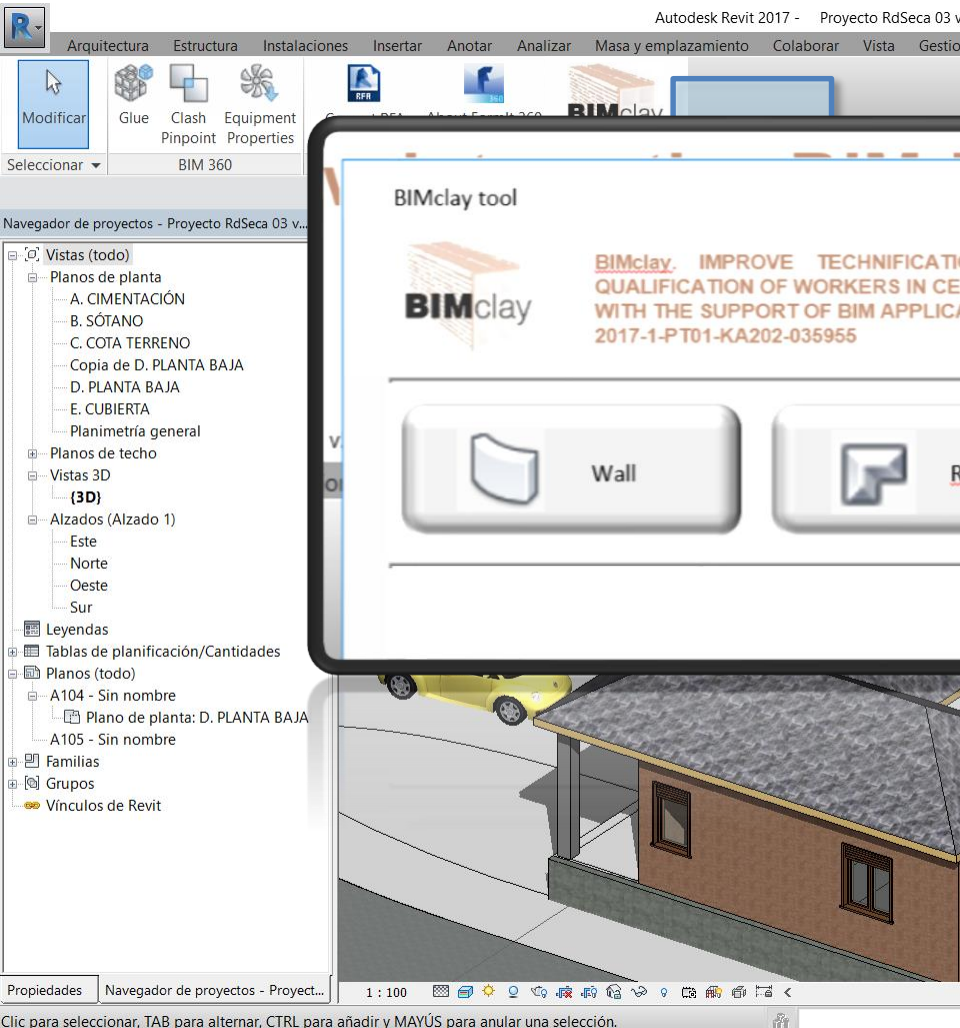


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O2. BIMclay Multimedia Materials. New TASK IO2/A2. BIMclay tool.





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O2. BIMclay Multimedia Materials. New

TASK IO2/A2. BIMclay tool.

Autodesk Revit 2017 - Proyecto RdSeca 03 v

4

BIMclay tool

BIMclay

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Wall Roof Floor

Vistas (todo)

- Planos de planta
 - A. CIMENTACIÓN
 - B. SÓTANO
 - C. COTA TERRENO
 - Copia de D. PLANTA BAJA
 - D. PLANTA BAJA
 - E. CUBIERTA
 - Planimetría general
- Planos de techo
- Vistas 3D
 - (3D)
- Alzados (Alzado 1)
 - Este
 - Norte
 - Oeste
 - Sur
- Legendas
- Tablas de planificación/Cantidades
- Planos (todo)
 - A104 - Sin nombre
 - Plano de planta: D. PLANTA BAJA
 - A105 - Sin nombre
- Familias
- Grupos
- Vínculos de Revit

1 : 100

Modelo base



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O2. BIMclay Multimedia Materials. New

TASK IO2/A2. BIMclay tool.

Autodesk Revit 2017 - Proyecto RdSeca 03 v

4

BIMclay tool

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Wall Roof Floor

- Construction of walls of small format bricks and prefabricated ceramic and plaster panel.
- Construction of large format hollow brick walls and prefabricated ceramic and plaster panel
- Ventilated facades (Facing brick)
- Non-ventilated facades (Facing brick)
- Mosaic.
- External walls tiling (Ventilated. Ceramic).

Navegador de proyectos - Proyecto RdSeca 03 v...

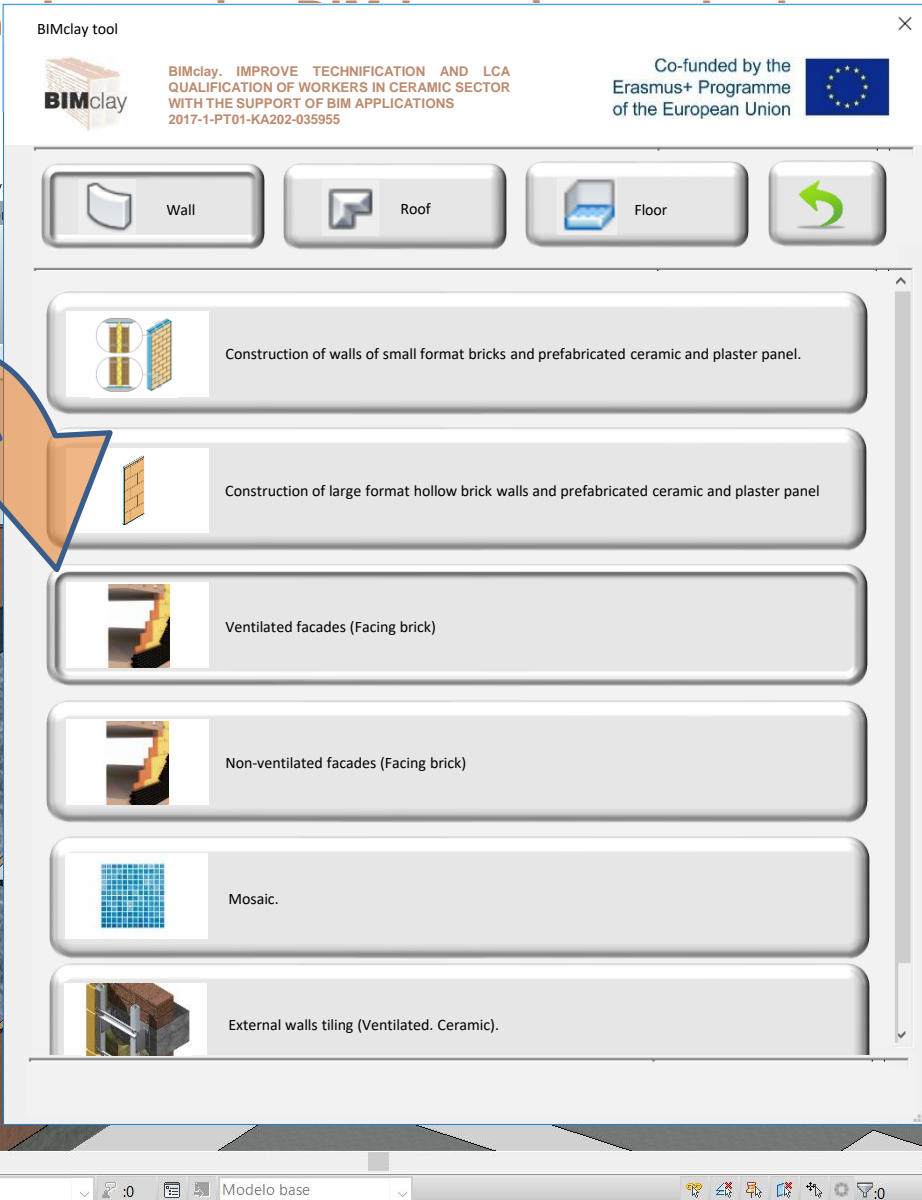
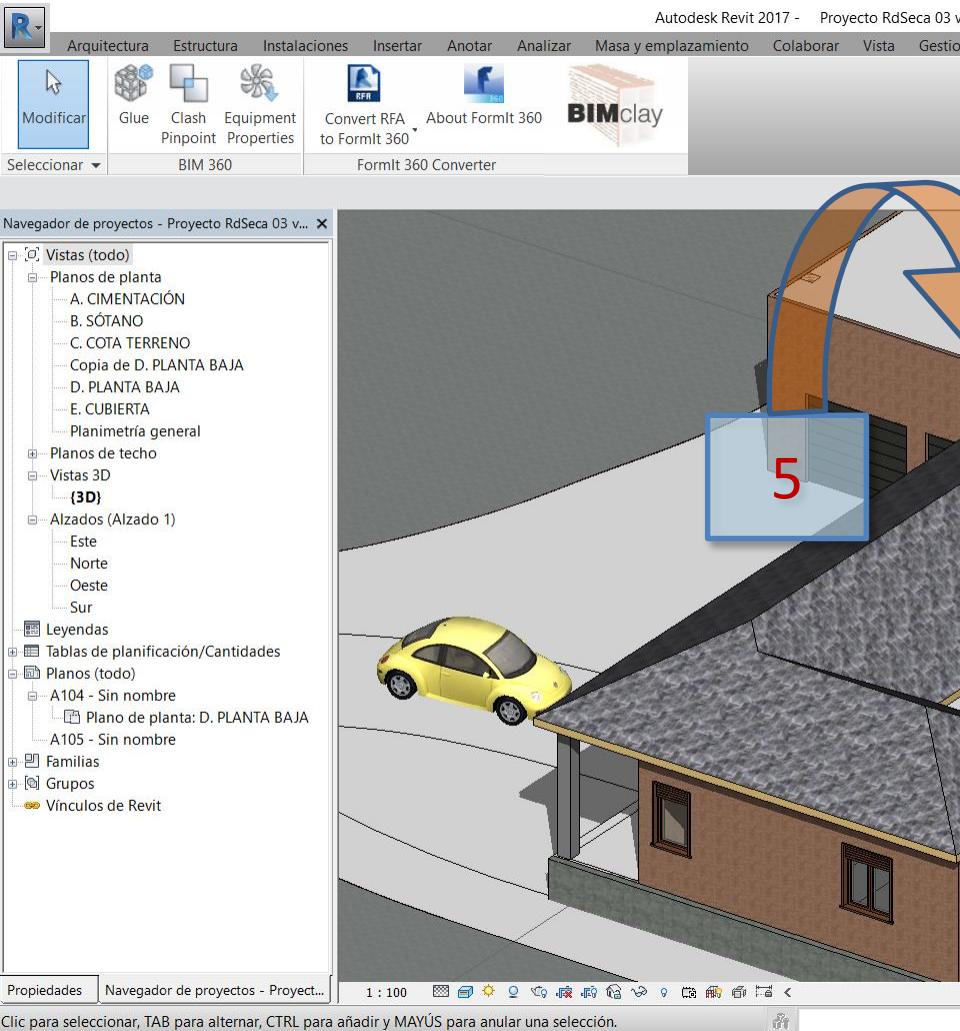
- Vistas (todo)
- Planos de planta
 - A. CIMENTACIÓN
 - B. SÓTANO
 - C. COTA TERRENO
 - Copia de D. PLANTA BAJA
 - D. PLANTA BAJA
 - E. CUBIERTA
 - Planimetría general
- Planos de techo
- Vistas 3D
 - (3D)
- Alzados (Alzado 1)
 - Este
 - Norte
 - Oeste
 - Sur
- Legendas
- Tablas de planificación/Cantidades
- Planos (todo)
 - A104 - Sin nombre
 - Plano de planta: D. PLANTA BAJA
 - A105 - Sin nombre
- Familias
- Grupos
- Vínculos de Revit

Propiedades Navegador de proyectos - Proyect... 1 : 100

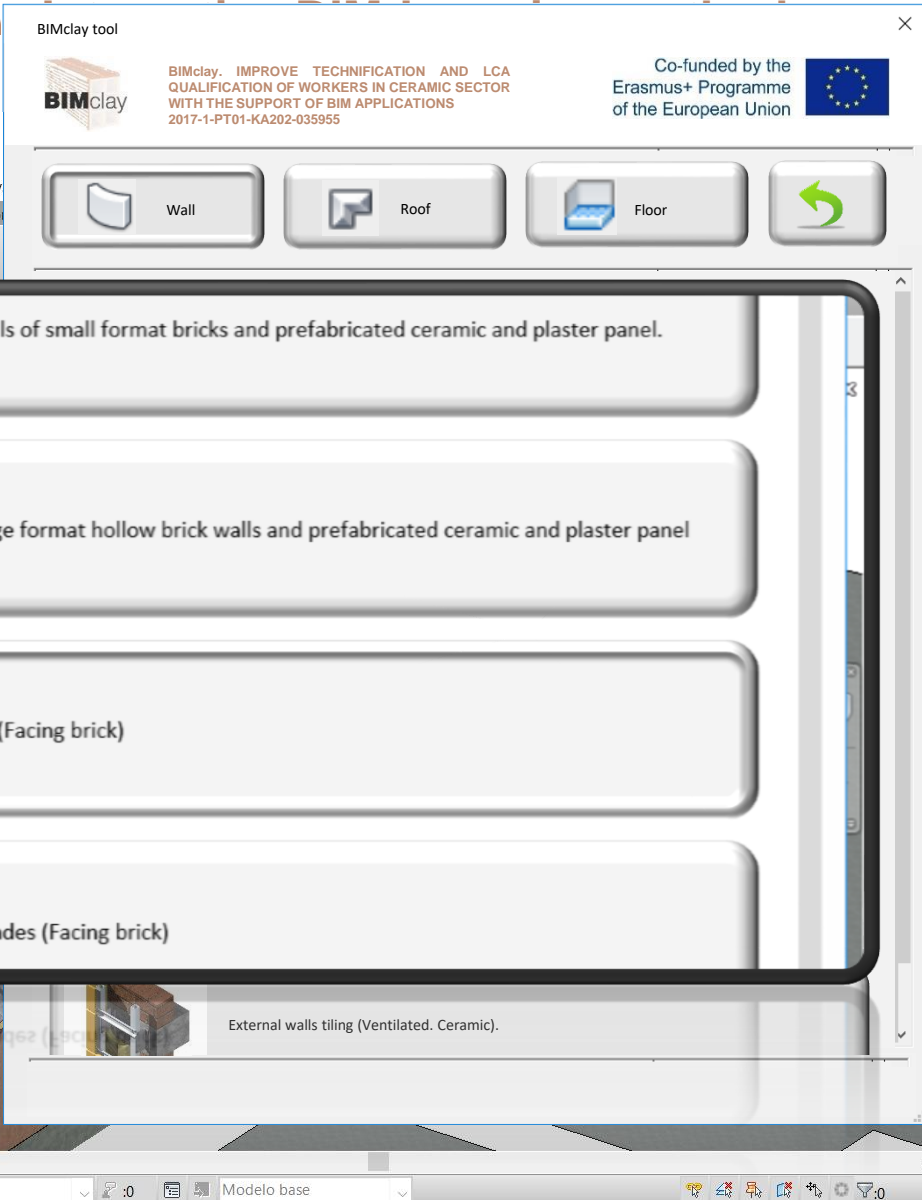
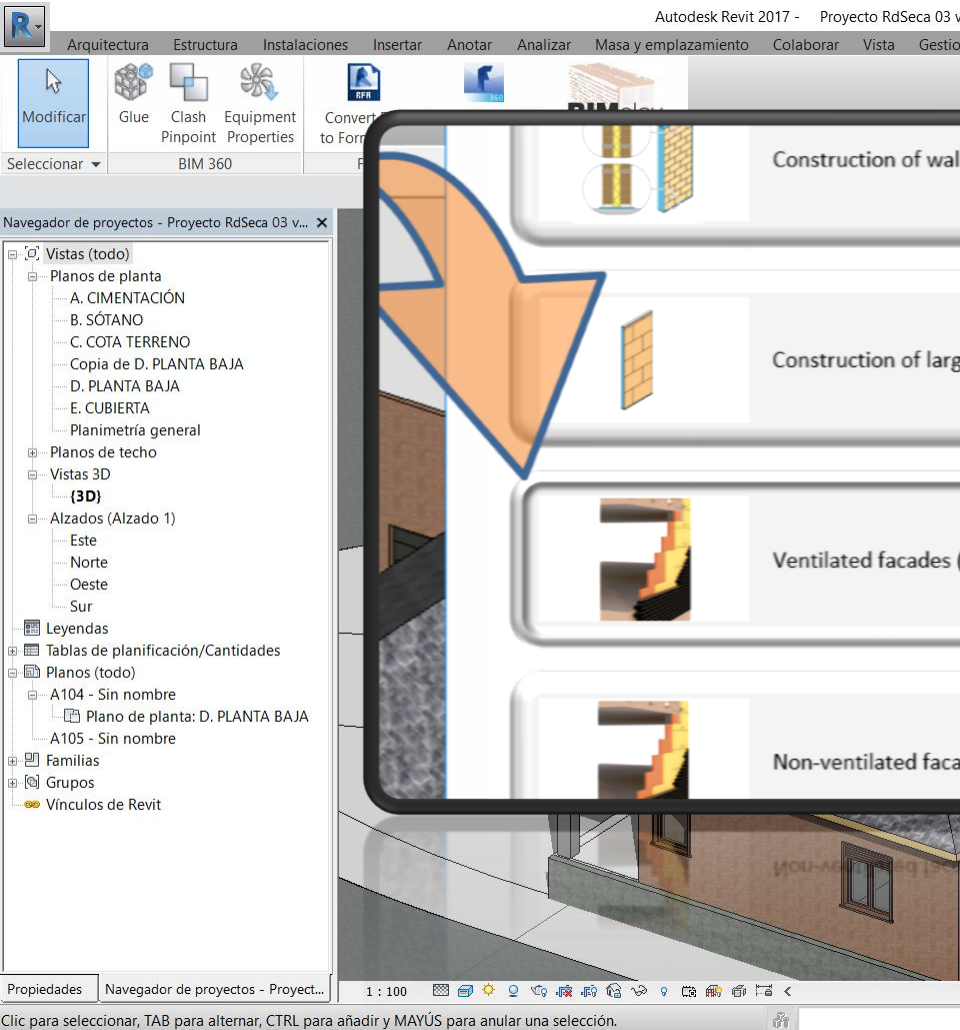
Clic para seleccionar, TAB para alternar, CTRL para añadir y MAYÚS para anular una selección.

Modelo base

O2. BIMclay Multimedia Materials. New TASK IO2/A2. BIMclay tool.



O2. BIMclay Multimedia Materials. New TASK IO2/A2. BIMclay tool.





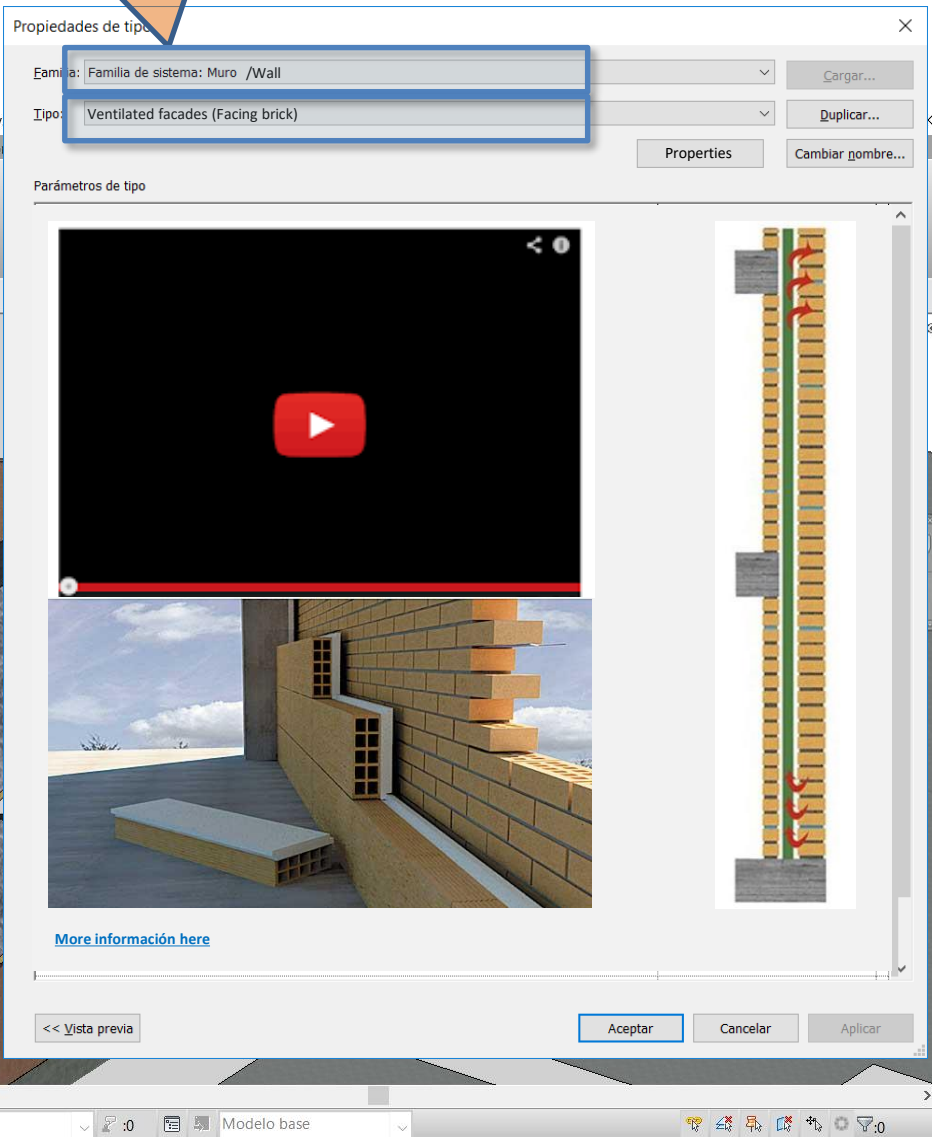
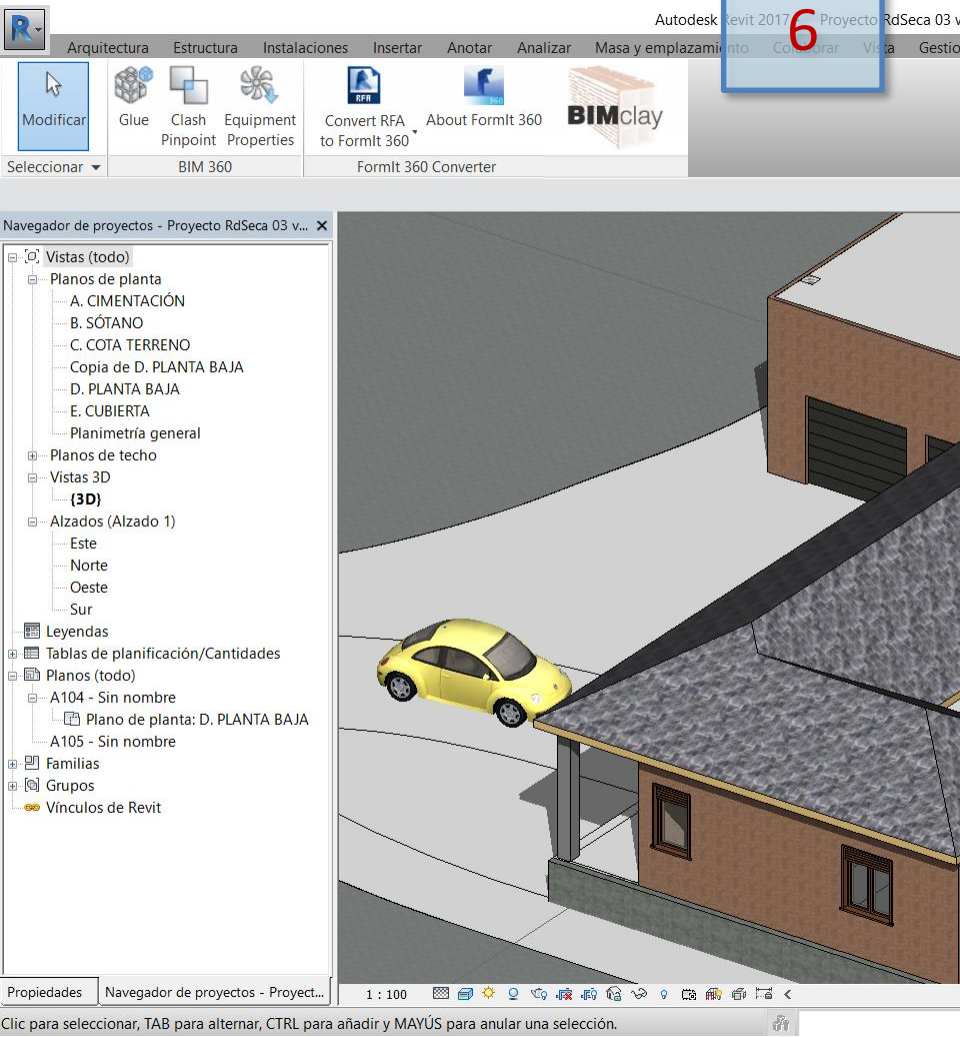
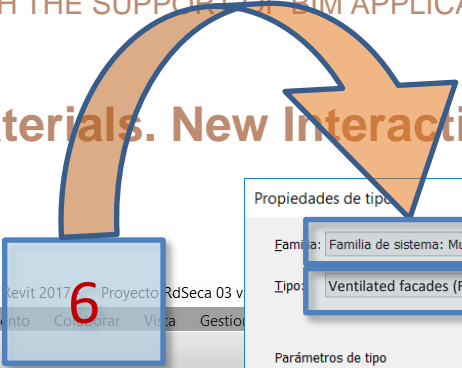
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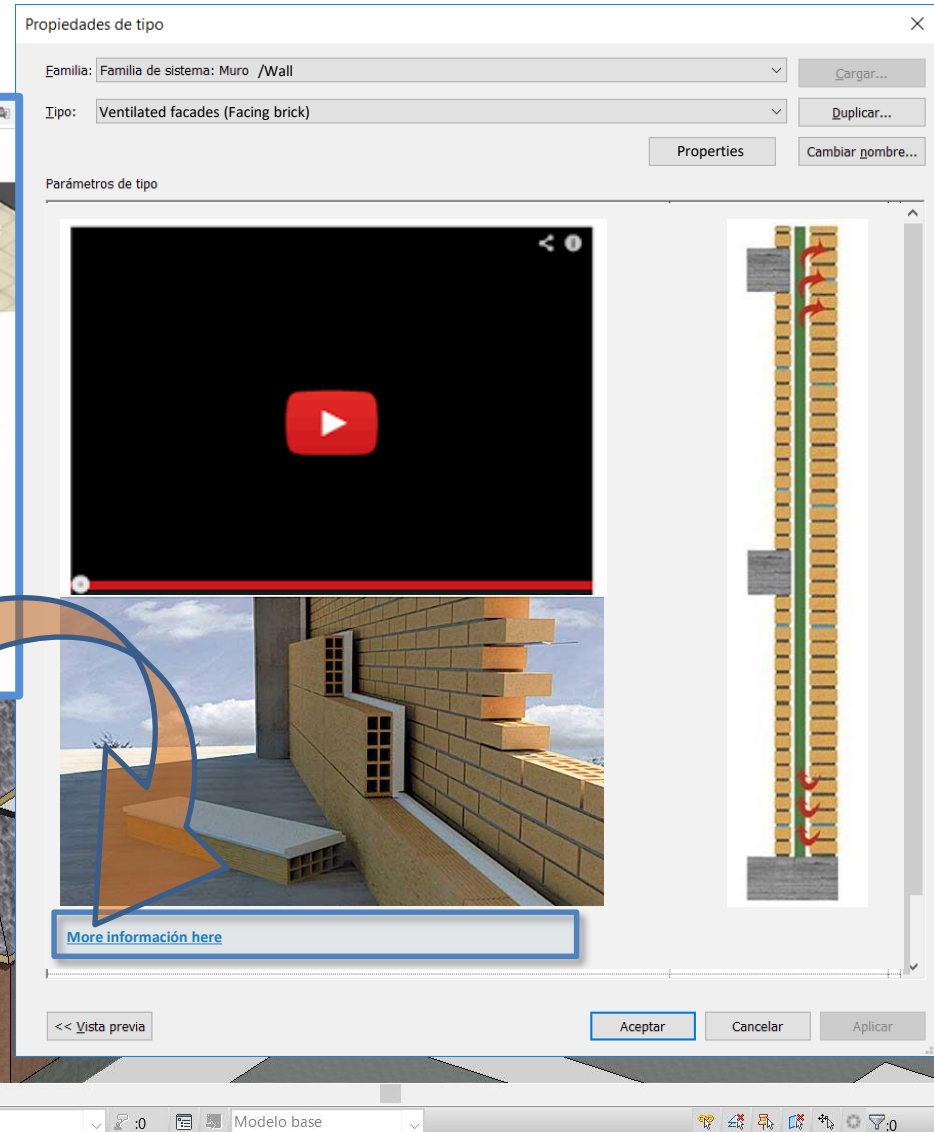
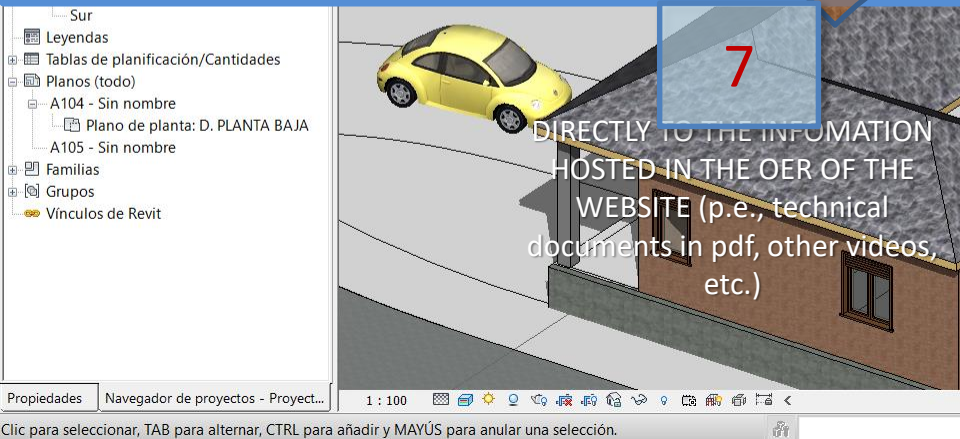
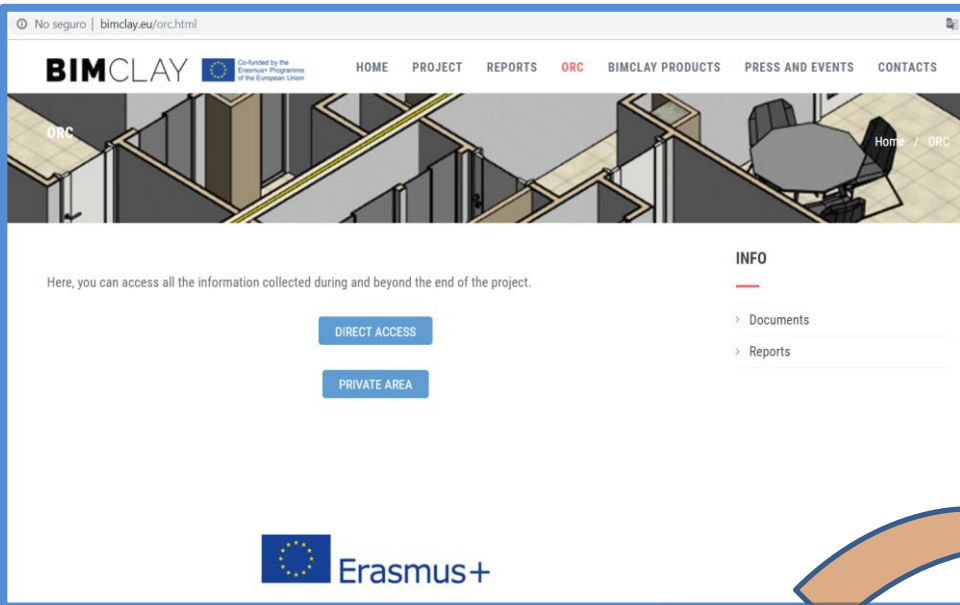
O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

TASK IO2/A2. BIMclay tool.



O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

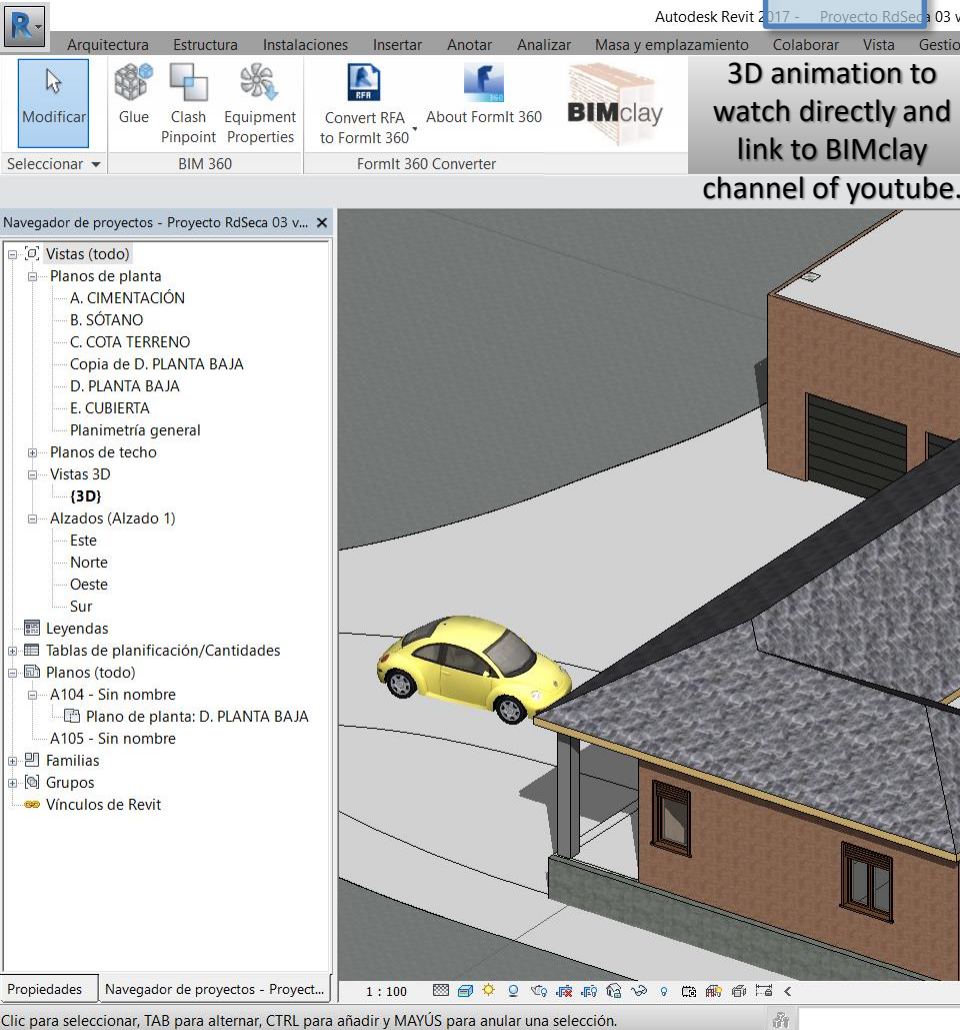
TASK IO2/A2. BIMclay tool.



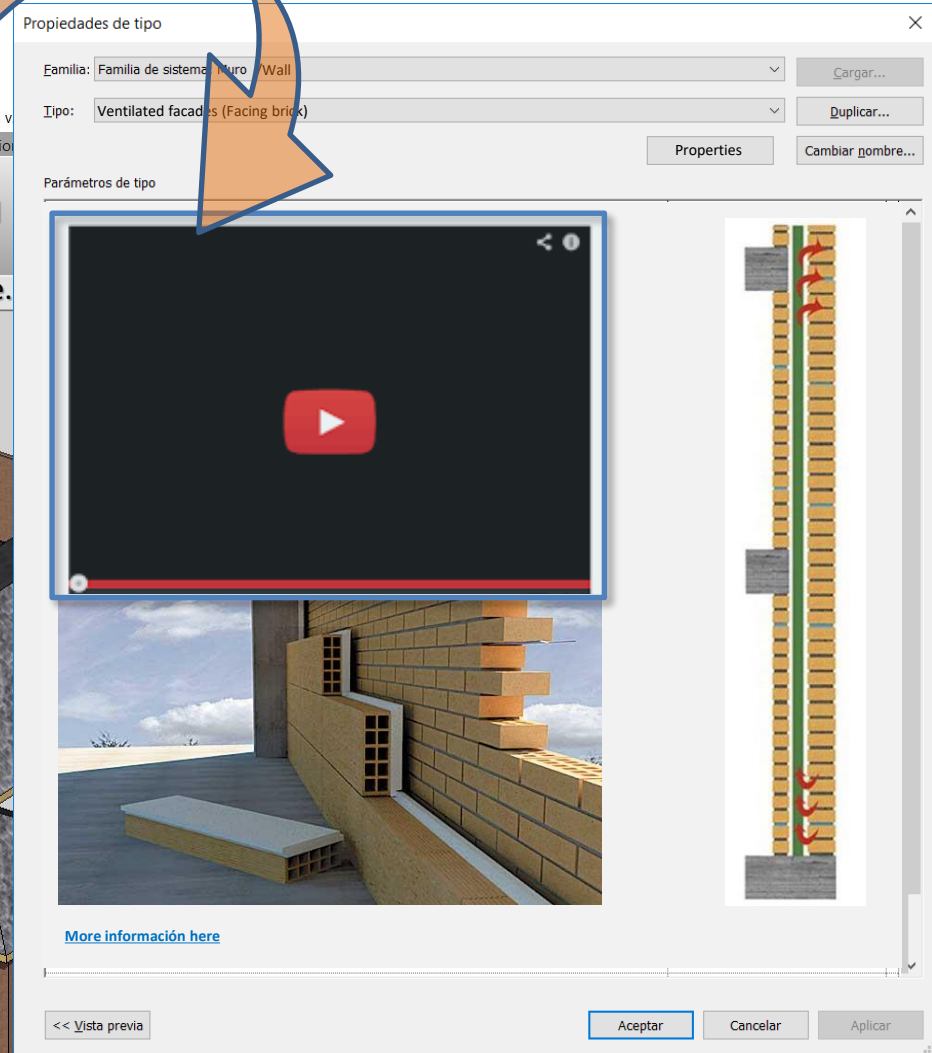
O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

TASK IO2/A2. BIMclay tool.

8

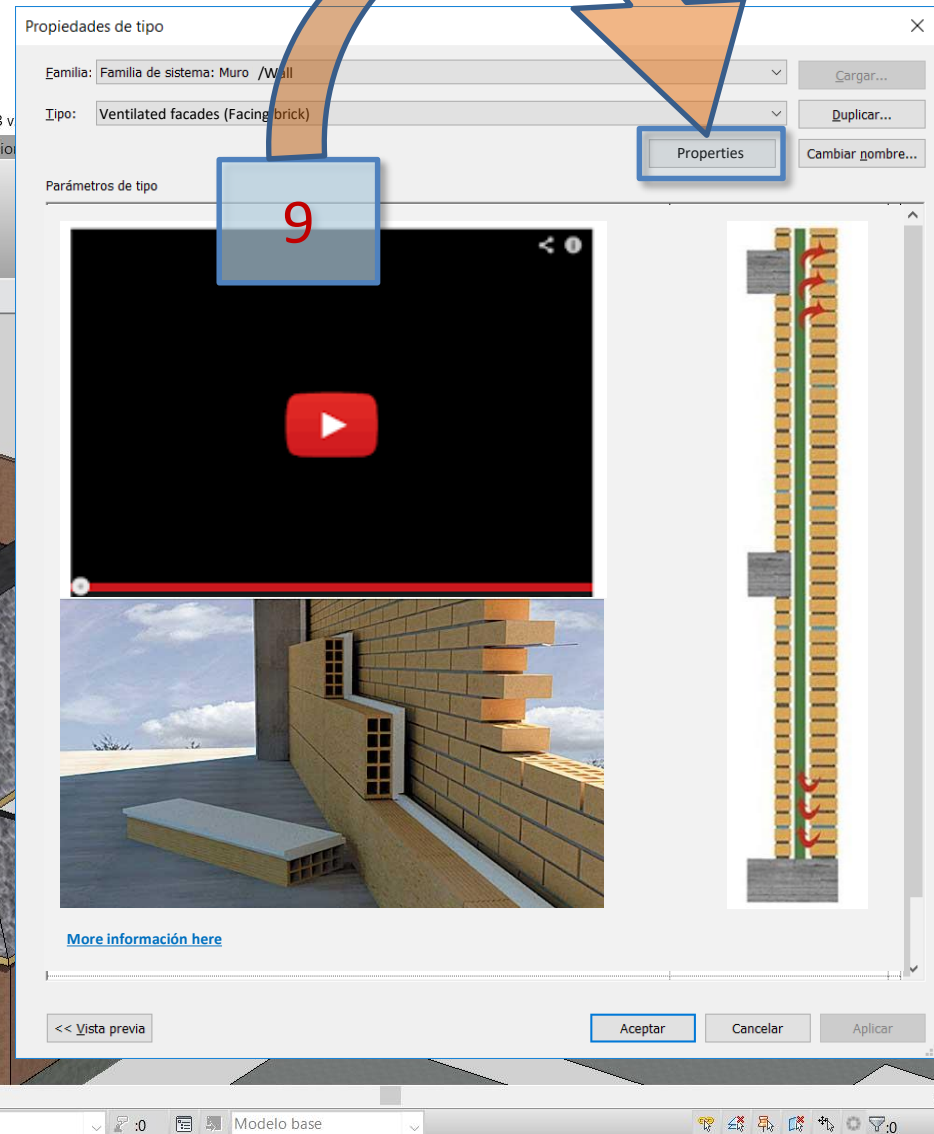
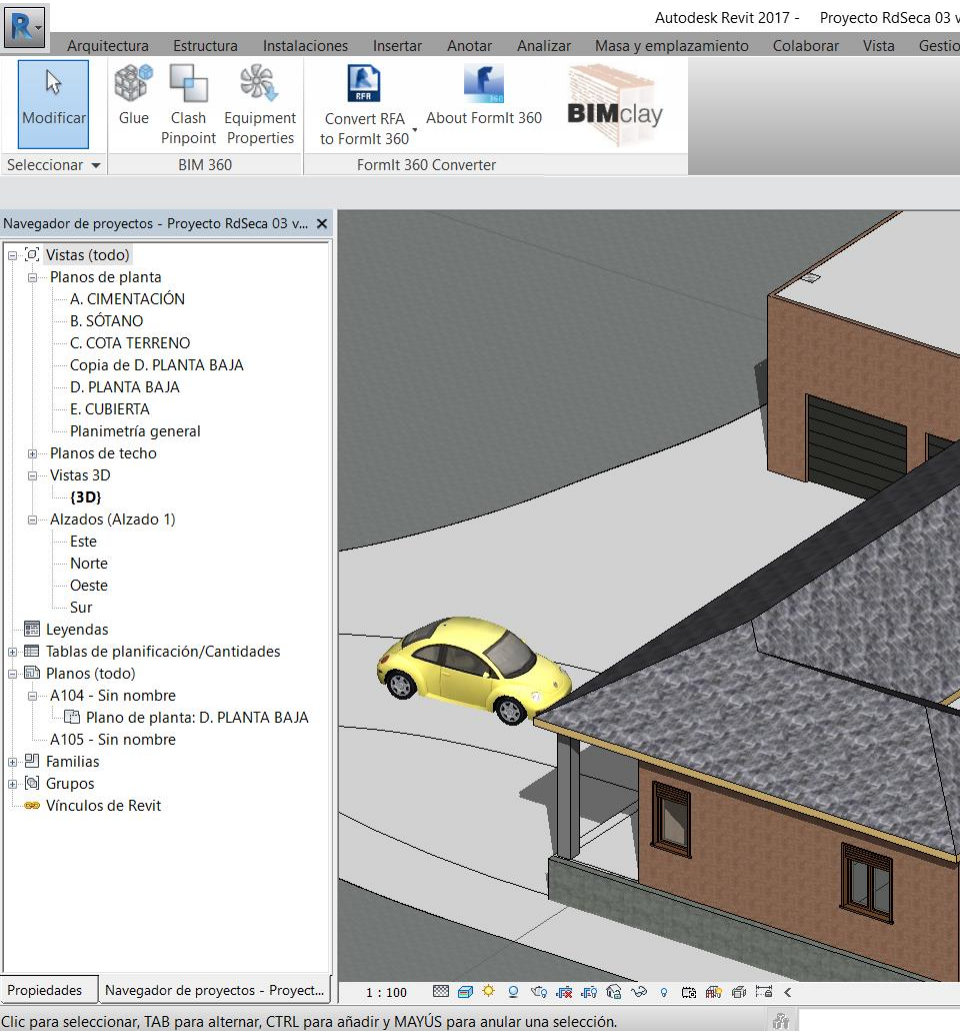


3D animation to
watch directly and
link to BIMclay
channel of youtube.



O2. BIMclay Multimedia Materials. New Interactive BIM-Learning methods.

TASK IO2/A2. BIMclay tool.



O2. BIM
TASK

Alternative BIM-Learning methods.

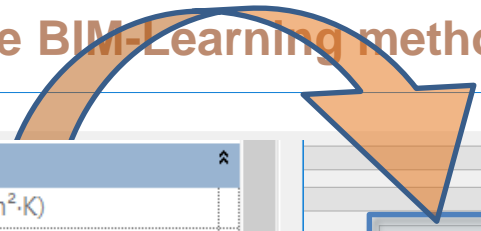
Propiedades de tipo

Familia: Familia de sistema: Muro / Wall Cargar...

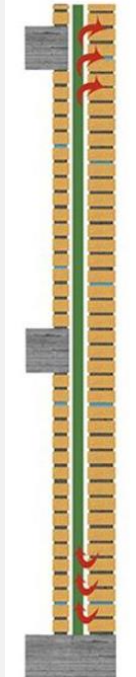
Tipo: Ventilated facades (Facing brick) Duplicar...

Cambiar nombre...

Propiedades analíticas	
Coeficiente de transferencia de calor (U)	0.8333 W/(m ² ·K)
Resistencia térmica (R)	1.2000 (m ² ·K)/W
Masa térmica	0.00 kJ/K
Absortancia	0.700000
Aspereza	3
IMPACTO AMBIENTAL DE ELEMENTOS DE ARCILLA COCIDA Y CERÁMICA	
GWP Potencial de calentamiento global (Fase A to Fase D)	NUMBER kg CO2 eq
ODP Potencial de agotamiento de la capa de ozono estratosférico (Fase A to Fase D)	NUMBER kg CFC-11 eq
AP Potencial de acidificación del suelo y de los recursos de agua (Fase A to Fase D)	NUMBER kg SO2 eq
EP Potencial de eutrofización (Fase A to Fase D)	NUMBER kg (PO4)3- eq
POCP Potencial de formación de ozono troposférico (Fase A to Fase D)	NUMBER kg etileno eq
ADPE Potencial de agotamiento (...) recursos no fósiles (elementos) (Fase A to Fase D)	NUMBER kg Sb eq
ADPF Potencial de agotamiento (...) recursos fósiles (combustibles fósiles) (F.A to F.D)	NUMBER MJ
Datos de identidad	
Imagen de tipo	
Nota clave	CODE
Modelo	
Fabricante	
Comentarios de tipo	
URL	www.bimclay.eu/EXAMPLE



Properties



Acceptar Cancelar Aplicar

<< Vista previa

Acceptar Cancelar Aplicar



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02. BIM
TASK

Alternative BIM-Learning methods.

10

Propiedades de tipo

Familia: Familia de sistema: Muro / Wall

Tipo: Ventilated facades (Facing brick)

Cargar... Duplicar... Cambiar nombre...

Propiedades analíticas	
Coeficiente de transferencia de calor (U)	0.8333 W/(m ² ·K)
Resistencia térmica (R)	1.2000 (m ² ·K)/W
Masa térmica	0.00 kJ/K
Absortancia	0.700000
Aspereza	3
IMPACTO AMBIENTAL DE ELEMENTOS DE ARCILLA COCIDA Y CERÁMICA	
GWP Potencial de calentamiento global (Fase A to Fase D)	NUMBER kg CO2 eq
ODP Potencial de agotamiento de la capa de ozono estratosférico (Fase A to Fase D)	NUMBER kg CFC-11 eq
AP Potencial de acidificación del suelo y de los recursos de agua (Fase A to Fase D)	NUMBER kg SO2 eq
EP Potencial de eutrofización (Fase A to Fase D)	NUMBER kg (PO4)3- eq
POCP Potencial de formación de ozono troposférico (Fase A to Fase D)	NUMBER kg etileno eq
ADPE Potencial de agotamiento (...) recursos no fósiles (elementos) (Fase A to Fase D)	NUMBER kg Sb eq
ADPF Potencial de agotamiento (...) recursos fósiles (combustibles fósiles) (F.A to F.D)	NUMBER MJ
Datos de identidad	
Imagen de tipo	
Nota clave	CODE
Modelo	
Fabricante	
Comentarios de tipo	
URL	www.bimclay.eu/EXAMPLE

Acceptar Cancelar Aplicar

<< Vista previa

Acceptar Cancelar Aplicar



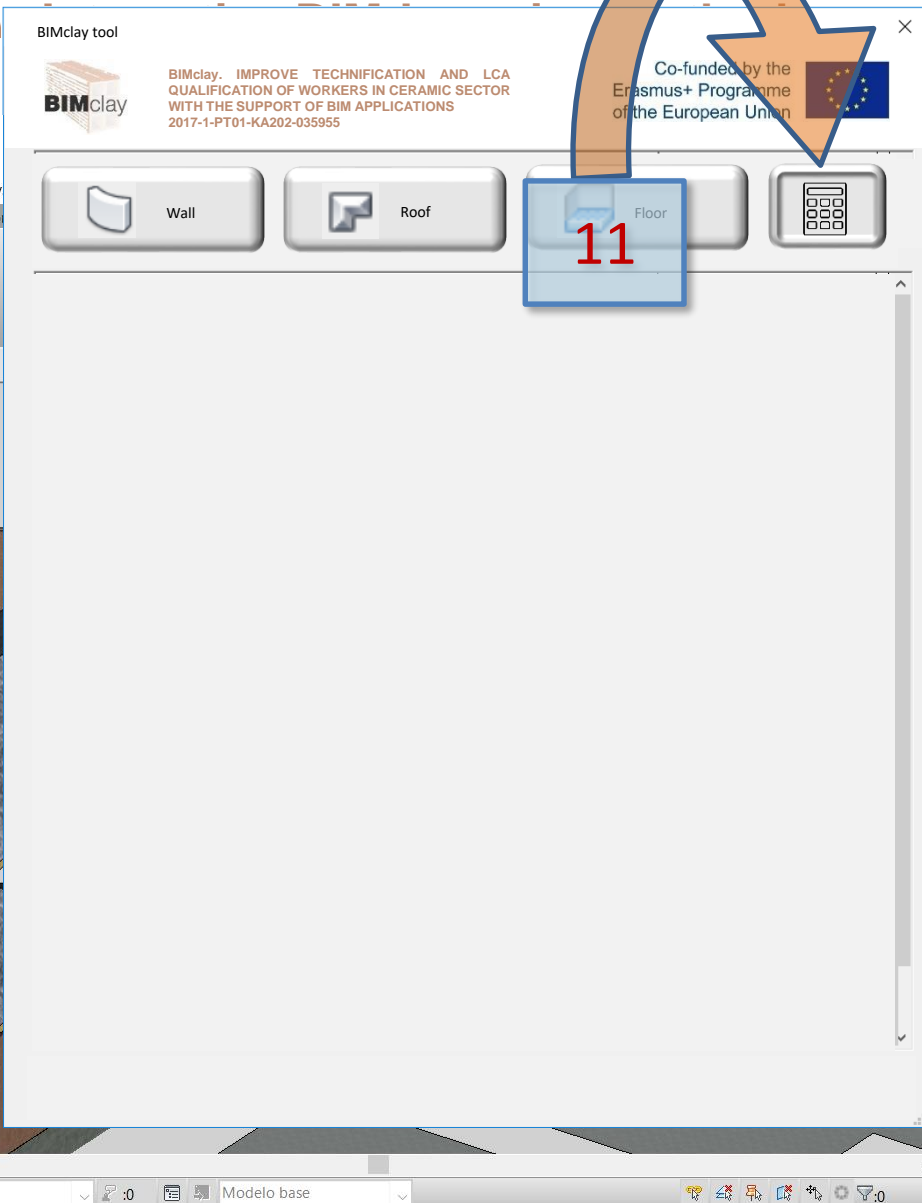
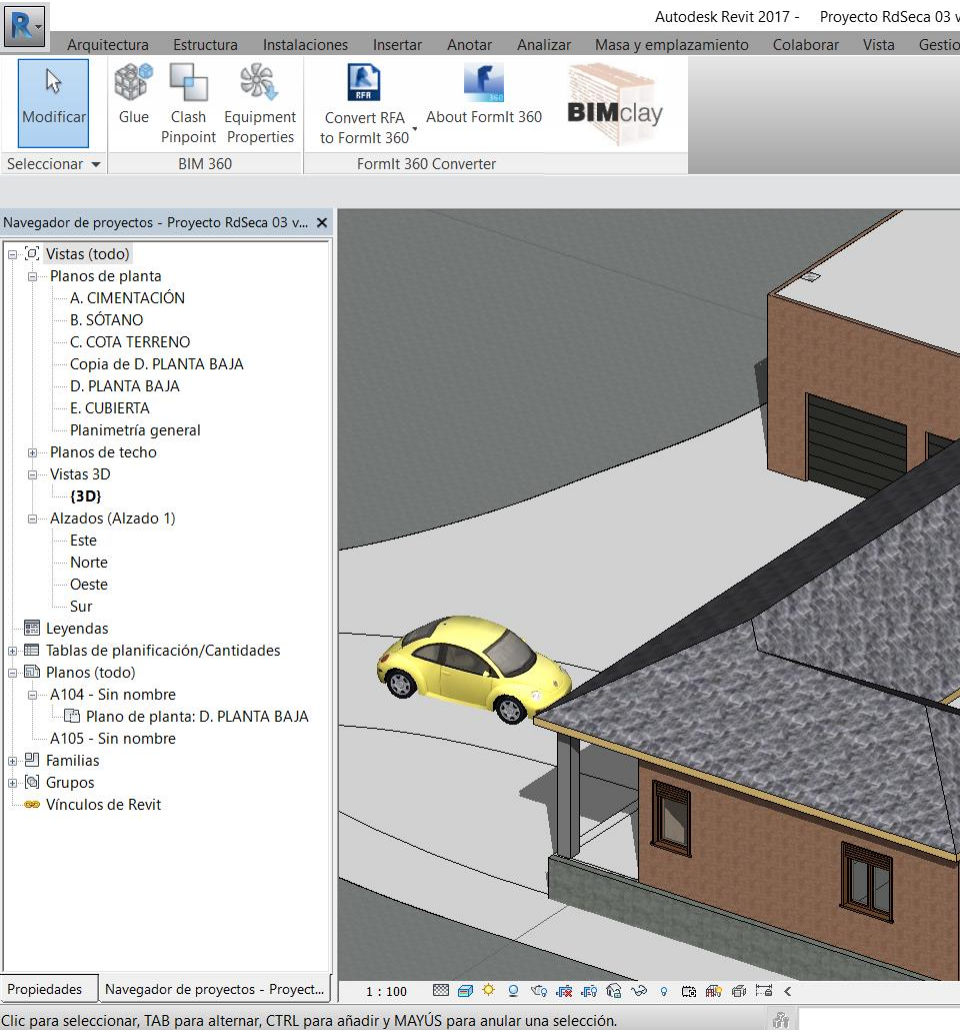


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O2. BIMclay Multimedia Materials. New TASK IO2/A2. BIMclay tool.





BIMclay tool



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2017-1-PT01-KA202-035955

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 Wall

 Roof

 Floor



BIM OBJECTS USED IN THE PROJECT*

FAMILY	NAME	L* m	H* m	M* kg	**Factor de conversión a m2	m2 IN THE PROJECT	GWP kg CO2 eq	ODP kg CO2 eq	AP kg CO2 eq	EP kg CO2 eq	POCP kg CO2 eq	ADPE kg CO2 eq	ADPF kg CO2 eq	MF kg
Wall	Ventilated facades (Facing brick). A-D Phases													
	Facing brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
	Brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
Floor	Ceramic tiles. A-D Phases (Another EXAMPLE)													
	Ceramic tiles	***	***	***	***	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
	TOTAL A-D Phases						Σ GWP	Σ ODP	Σ AP	Σ EP	Σ POCP	Σ ADPE	Σ ADPF	Σ MFR

*L: dimensión de la longitud de la pieza en metros; H: dimensión de altura de la pieza en metros; M: masa de la pieza en kg.

**Factor de conversión:

Ladrillos y bloques cerámicos para revestir: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_006_ESP.pdf


Ladrillos cerámicos cara vista: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_004_ESP.pdf

...otros enlaces de EPDs...

** It is not necessary for the calculation

***Estimation for 50 years


EXPORT DATA IN EXCEL OR PDF





BIMclay. IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS. 2017-1-PT01-KA202-035955


12


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 Wall

 Roof

 Floor



BIM OBJECTS USED IN THE PROJECT*

FAMILY	NAME	L* m	H* m	M* kg	**Factor de conversión a m2	m2 IN THE PROJECT	GWP kg CO2 eq	ODP kg CO2 eq	AP kg CO2 eq	EP kg CO2 eq	POCP kg CO2 eq	ADPE kg CO2 eq	ADPF kg CO2 eq	MF kg
Wall	Ventilated facades (Facing brick). A-D Phases													
	Facing brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
	Brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
Floor	Ceramic tiles. A-D Phases (Another EXAMPLE)													
	Ceramic tiles	***	***	***	***	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
	TOTAL A-D Phases						Σ GWP	Σ ODP	Σ AP	Σ EP	Σ POCP	Σ ADPE	Σ ADPF	Σ MFR

*L: dimensión de la longitud de la pieza en metros; H: dimensión de altura de la pieza en metros; M: masa de la pieza en kg.
 **Factor de conversión:
 Ladrillos y bloques cerámicos para revestir: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_006_ESP.pdf
 Ladrillos cerámicos cara vista: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_004_ESP.pdf
 ...otros enlaces de EPDs...

** It is not necessary for the calculation
 ***Estimation for 50 years

EXPORT DATA IN EXCEL OR PDF

BIMclay tool



BIMclay. IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS. 2017-1-PT01-KA202-035955

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BIM OBJECTS USED IN THE PROJECT*

FAMILY	NAME	L* m	H* m	M* kg	**Factor de conversión a m2	m2 IN THE PROJECT	GWP kg CO2 eq	ODP kg CO2 eq	AP kg CO
Wall	Ventilated facades (Facing brick). A-D Phases								
	Facing brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2
	Brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2
Floor	Ceramic tiles. A-D Phases (Another EXAMPLE)								
	Ceramic tiles	***	***	***	***	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2
TOTAL. A-D Phases							Σ GWP	Σ ODP	Σ AP

*L: dimensión de la longitud de la pieza en metros; H: dimensión de altura de la pieza en metros; M: masa de la pieza en kg.

**Factor de conversión:

Ladrillos y bloques cerámicos para revestir: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_006_ESP.pdf

Ladrillos cerámicos cara vista: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_004_ESP.pdf

...otros enlaces de EPDs...

** It is not necessary for the calculation

***Estimation for 50 years

EXPORT DATA IN EXCEL OR PDF



BIMclay tool

BIMclay. IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS
2017-1-PT01-KA202-035955

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

Wall

Roof

Floor

BIM OBJECTS USED IN THE PROJECT*

FAMILY	NAME	L* m	H* m	M* kg	**Factor de conversión a m2	m2 IN THE PROJECT	GWP kg CO2 eq	ODP kg CO2 eq	AP kg CO2 eq	EP kg CO2 eq	POCP kg CO2 eq	ADPE kg CO2 eq	ADPF kg CO2 eq	MFR kg
Wall	Ventilated facades (Facing brick). A-D Phases													
	Facing brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
	Brick	m	m	kg	Resultado de la formula**	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
Floor	Ceramic tiles. A-D Phases (Another EXAMPLE)													
	Ceramic tiles	***	***	***	***	m2 drawn in the project	m2xGWP/m2	m2xODP/m2	m2xAP/m2	m2xEP/m2	m2xPOCP/m2	m2xADPE/m2	m2xADPF/m2	m2xMFR
	TOTAL A-D Phases						Σ GWP	Σ ODP	Σ AP	Σ EP	Σ POCP	Σ ADPE	Σ ADPF	Σ MFR

*L: dimensión de la longitud de la pieza en metros; H: dimensión de altura de la pieza en metros; M: masa de la pieza en kg.
**Factor de conversión:
Ladrillos y bloques cerámicos para revestir: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_006_ESP.pdf
Ladrillos cerámicos cara vista: https://www.aenor.com/Producto_DAP_pdf/GlobalEPD_008_004_ESP.pdf
...otros enlaces de EPDs...

** It is not necessary for the calculation
***Estimation for 50 years

EXPORT DATA IN EXCEL OR PDF

Propiedades | Navegador de proyectos - Proyect... | 1 : 100 | Modelo base



IMPROVE TECHNIFICATION AND LCA QUALIFICATION OF WORKERS
IN CERAMIC SECTOR WITH THE SUPPORT OF BIM APPLICATIONS

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Final International Seminar of BIMclay project in Coimbra (Portugal) – 14th June 2019

03. Online Resource Centre (ORC) of BIMclay

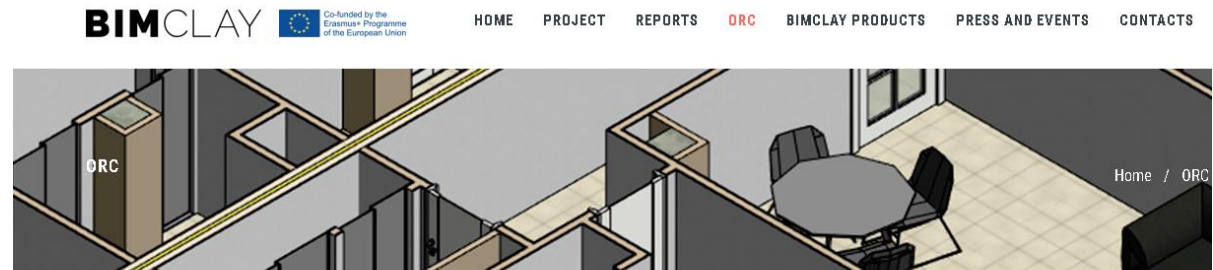


03. ONLINE RESOURCE CENTRE

03/A1. IT production of Online Resource Centre.

03/A2. Pilot BIMclay course implementation: environment test and technical improvements.

03/A3. Report on the results International Seminar BIMclay (Coimbra, Portugal).



Here, you can access all the information collected during and beyond the end of the project.

DIRECT ACCESS

PRIVATE AREA

INFO

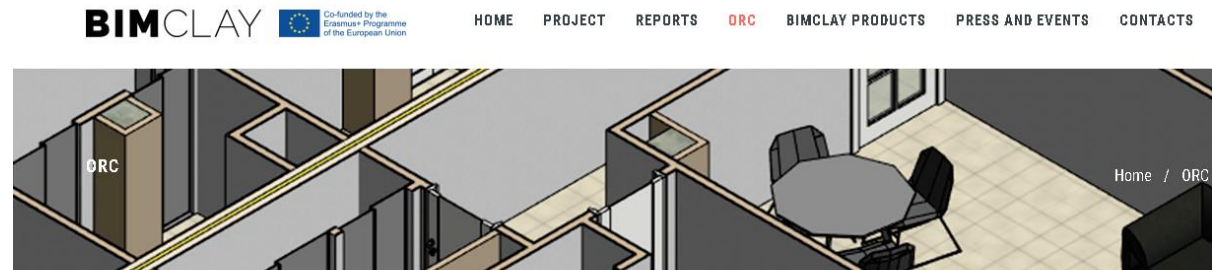
- > Documents
- > Reports

O3. ONLINE RESOURCE CENTRE

O3/A1. IT production of Online Resource Centre.

O3/A2. Pilot BIMclay course implementation: environment test and technical improvements.

O3/A3. Report on the results International Seminar BIMclay (Coimbra, Portugal).



Here, you can access all the information collected during and beyond the end of the project.

DIRECT ACCESS

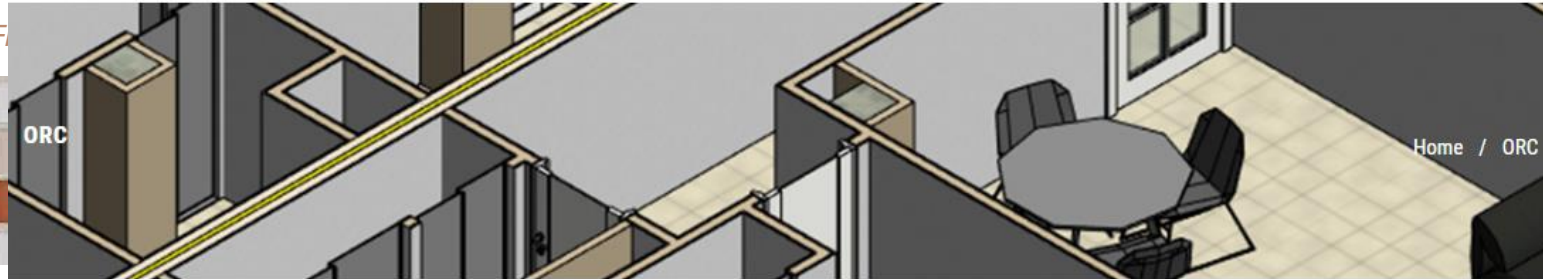
PRIVATE AREA

INFO

- > Documents
- > Reports



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03. Online Res

TASK IO3/A1

REGULATIONS


INFO

Name and description:  Report 1.1.1. Compilation on the European normative for placing of clay products and environment.

Upload by: CTM

Language available:    

Date: 2018/12/03


Name and description:  Report 1.1.1. Compilation on the Portuguese normative for placing of clay products and environment.

Upload by: CTCV

Language available:  

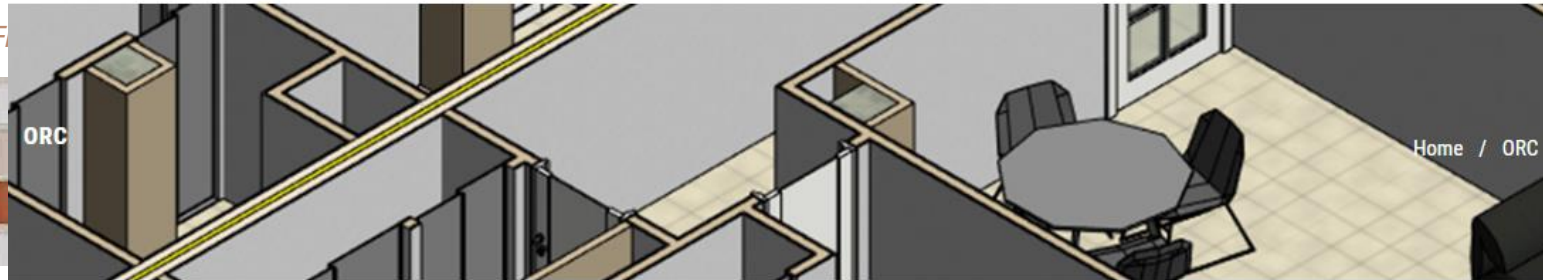
Date: 2018/12/03

- > Regulations
- > Technical Documents
- > Environment
- > BIM
- > Dissemination

Name and description:  Report 1.1.1. Compilation on the Spanish normative for placing of clay products and environment.



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03. Online Res

TASK IO3/A1

REGULATIONS

INFO


Name and description:  Report 1.1.1. Compilation on the European normative for placing of clay products and environment.

Upload by: CTM

Language available:    

Date: 2018/12/03


- > Regulations
- > Technical Documents
- > Environment
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Thank you for your attention!

See you soon in
www.bimclay.eu !!!

David.caparros@ctmarmol.es