

WP4 Case studies

D4.1 Case study reports

Revision: Final

Due date: 2014-09-30

Actual release date: 2015-03-30

Lead contractor: VTT



Dissemination level

PU	Public	X
RE	Restricted to a group specified by the consortium	
CO	Confidential, only for members of the consortium	

Deliverable Administration & Summary		ecobim WP4	Eco-Innovaera
No & name	D4.1 Case study reports		
Status	<Draft / Working / <u>Released</u> >	Due m21	Date 2014-09-30
Author(s)	Aapo Huovila & Carmen Antuña (VTT)		
Editor	Aapo Huovila (VTT)		
Description	<p>WP4 consisted of a set of national case studies in Finland, Germany and France led by the SMEs involved in the project. Those provided the basic project requirements and focus and allowed testing and evaluating the results. The case studies were coordinated by VTT and the general framework and scope of the case studies are presented in this report D4.1. More extensive reports of each national case study are provided in separate reports as follows: D4.1a Finnish case study, D4.1b German case studies and D4.1c French case study.</p>		
Comments			
Document workflow			
Released	VTT		Date 2015-03-30
Accepted	VTT		Date 2015-03-30

TABLE OF CONTENTS

Table of contents..... **2**

List of figures..... **3**

1. Summary of the case studies **4**

 1.1 General case study framework: aims and methods..... 4

 1.2 Finnish case study: objectives and scope 4

 1.3 German case study: objectives and scope..... 6

 1.4 French case study: objectives and scope 6

2. Individual case study reports **7**

3. Appendices..... **8**

LIST OF FIGURES

Figure 1: Case study template..... 5

1. SUMMARY OF THE CASE STUDIES

1.1 General case study framework: aims and methods

WP4 consisted of a set of national case studies in Finland, Germany and France led by the SMEs involved in the project: Arkkitehtitoimisto Tiuru & Lommi Oy (Finland), Ingenieurbüro Trinius GmbH (Germany) and LASCOS (France). The case studies were coordinated by VTT and the general framework and scope of the case studies are presented in this report D4.1. More extensive reports of each national case study are provided in separate reports as follows: D4.1a Finnish case study, D4.1b German case studies and D4.1c French case study.

Case studies form a solid basis to link development to SMEs' daily practice and therefore they had a key role in the project. Throughout the whole project their objective was first to provide the basic project requirements and focus and then through several iterations to test and evaluate the solutions developed and the results achieved in the project. The case studies were national considering locally specific features, but interactive information exchange between the partners was ensured, trying to cover the whole value chain to the extent possible in the project.

At the outset of the project a case study template was developed (see Figure 1) to define and analyse the scope of the case studies and their contributions to the different aspects of the project, particularly in terms of sustainability and eco-innovation, and to see if there were common touch points between the case studies in relation to different project objectives. The case study templates for each of the case studies are presented in the Appendix of this report. Those were filled in the beginning of the project and the scope of the case studies has been further developed and refined during the process.

1.2 Finnish case study: objectives and scope

The Finnish case study focused on an apartment building project and the sustainability assessment of two design proposals. The case study aimed at testing and evaluating how to apply in practice different methods related to BIM supported and life cycle based sustainability assessment process as explained in the deliverable 2.2 "Description of the life cycle based design/procurement process". Another objective was to test the use of ecobim indicators (described in deliverable 2.3) in such a process. In practice, the scope was limited to the evaluation of embodied carbon footprint of the case building with two BIM supported and life cycle based assessment tools: the Finnish online tool Ilmari connected to Finnish EPDs, and the French tool Elodie used through eveBIM BIM tool interface and connected to the French Inies EPD database. The case building is created with 3D CAD and IFCs are exported with correct properties. Both tools then assess the embodied carbon footprint with the help of the IFC export of the building and national EPDs. The results focus on the applicability, functionality, versatility and limitations of the two tools in the previously described sustainability assessment process. Local adaptation and upscaling issues related to the tools are addressed as well as business benefits in using these tools. The case study template filled in the beginning of the project for this case study is presented in the Appendix of this report and analyses particularly the sustainability and eco-innovation related aspects of this case study. The whole case study process, results and conclusions are described in detail in the report D4.1a Finnish case study.

ecobim
value driven life cycle based sustainable business models

Case study focus

building/neighbourhood	<input type="checkbox"/>	exploration	<input checked="" type="checkbox"/>
business/service	<input checked="" type="checkbox"/>	implementation/testing	<input type="checkbox"/>

Methodology used

Description (general + NABC scheme)

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec et dolor ut metus lobortis auctor et ut tellus. In hac habitasse platea dictumst. Ut non purus eget ipsum semper imperdiet vitae in tellus. Aliquam consequat nulla eget justo feugiat molestie commodo diam vestibulum. Mauris nec ullamcorper nisi.

Need
Approach
Benefit
Competition

Sustainability

environmental	0%
economic	0%
social	0%
cultural	0%

Eco-innovation

new ict	0%
new process	0%
new service	0%
revenue model/other	0%

new business model	0%
---------------------------	-----------

[Graphic annex \(click here\)](#)

Figure 1: Case study template.

1.3 German case study: objectives and scope

The objective of the German case study was to compare three different methods and tools for life cycle assessment of buildings. The case study discusses the processes, strengths and obstacles related to the different applications. The three different methods and tools are characterised as follows:

1. An internally developed Excel spreadsheet based LCA tool,
2. An externally provided DGNB-specific LCA online tool, and
3. A BIM-based generation of a building bill of quantities with Autodesk Revit.

In the comparison of the tools, the following key differences are addressed: transparency of the data and calculations, difficulty to use and understand, expertise needed, required manual workload, source and validity of the used database, calculation method and conformity with standards and certification schemes. The main results compare the advantages and disadvantages of the analyzed methods and tools. Fields for further development and new business opportunities are also analyzed. The case study template filled in the beginning of the project for this case study is presented in the Appendix of this report and analyses particularly the sustainability and eco-innovation related aspects of this case study. The whole case study process, results and conclusions are described in detail in the report D4.1b German case studies.

1.4 French case study: objectives and scope

The objective of the French case study was to test the ICT solutions jointly developed by the French partners during ecobim project (and presented in WP3 deliverables) in the Ajaccio Hospital extension project. Based on the earlier expertise and tools (CSTB's BIM checker and IFC viewer module "eveBIM", and LASCOM's PLM platform "LASCOM AEC"), the French partners CSTB and LASCOM developed in WP3 a new tool called "Lascom AEC-BIM Edition" combining the two earlier solutions, and used for BIM-based collaborative work between stakeholders for an ecobim compliant building design and sustainability assessment. The new product helped the French partners to win a big contract for the extension project of Ajaccio hospital using the developed new solution. Being the first implementation in a real project, it was used as the French case study to test the developed solution. In the case study the combined BIM and PLM approach establishes the collaborative work between different actors of a design and build process for a sustainable hospital extension. The collaboration platform involves all the design and construction actors like architects, structural engineers, energy engineers, environmental impact engineers and constructors but also the owner and his assistants under supervision of a BIM manager. The benefit of the process comes from a better coordination and mutual understanding between the actors, since BIM offers a far better representation of the building enriched by the different technical properties required by the different analysis tools (environmental, energy, economic...). The case study template filled in the beginning of the project for this case study is presented in the Appendix of this report and analyses particularly the sustainability and eco-innovation related aspects of this case study. The whole case study is described in the deliverable D4.1c French case study (consisting of PowerPoint presentations and a video presentation and demonstrations).

2. INDIVIDUAL CASE STUDY REPORTS

D4.1a Finnish case study. Lommi, J., Huovila, A. & Antuña, C. (2015). 16 pages.

D4.1b German case studies. Trinius, W., Li, D. & Modlmayer, K. (2015). 30 pages.

D4.1c French case study. Pinot, L., Lebègue, E., & Rolland, E. (2015). Published as a combination of PowerPoint slides and a video presentation and demonstrations.

3. APPENDICES

Case study templates

Finnish case study

building/neighbourhood	<input type="checkbox"/>	exploration	<input checked="" type="checkbox"/>
business/service	<input checked="" type="checkbox"/>	implementation/testing	<input type="checkbox"/>

Methodology used

Building design analysis from an *ecobim* point of view.

Description (general + NABC scheme)

The aim is to develop *ecobim* tools which provide possibilities for evaluating different approaches and solutions for different stages of the building process. The tools gather information from the BIM and through numerically valued indicators ecologically based values can be explored and results compared. This will result in a sustainable value driven building process, and for the architect in a business opportunity to provide multiple choices for the client. The **need** for a solution as explained is evident, but the simplicity of the outcome is a challenge. Our **approach** is to provide the basis within the BIM and to open the evaluation process for new innovative solutions, new ICT business models. This also creates a need for new business models to provide necessary data for calculation. The **benefit** of the process comes from the pre-evaluation, thus giving the whole building process guidelines for achieving the desired results. Our **competitors** are the existing sustainability programs as LEED, BREEAM.

Sustainability

environmental	40%
economic	30%
social	20%
cultural	10%

Eco-innovation

new ict	40%
new process	20%
new service	30%
revenue model/other	10%

new business model	30%
---------------------------	------------

[Graphic annex \(click here\)](#)

German case study

building	<input type="checkbox"/>	exploration	<input checked="" type="checkbox"/>
business/service	<input checked="" type="checkbox"/>	implementation/testing	<input checked="" type="checkbox"/>

Methodology used

Application of internal Excel-based LCA calculation tool, online-software for DGNB-specific LCA calculation, and BIM-based generation of building bill of quantities.

Description

The aim is to compare different approaches available to conduct an LCA of a building. For that comparison, a spreadsheet approach and an online software are analyzed with regards to functionality as well as options for result generation and interpretation. Besides the workload, required expertise, difficulties, transparency and repeatability, strengths and weaknesses are presented and discussed, including:

- Structure of the set-up
- Communication of input data from the planning team
- Link to environmental database
- Result generation
- Interpretation options
- Adaptability to different contexts of application
- Use as consultancy tool
- Updating and relating to changes in database, assessment procedures etc.

The third case study applies a BIM-based generation of the building bill of quantities, conducted with the sample architecture project in Revit 2014, used here to test the quantity takeoff function and to apply the result as input in the above described spreadsheet - as an alternative to the fully integrated BIM LCA (Finnish case-study).

Sustainability

environmental	100%
economic	– %
social	–%
cultural	–%

Eco-innovation

new ict	20%
new process	40%
new service	20%
revenue model/other	20%

new business model	30%
---------------------------	------------

French case study

building/neighbourhood	<input checked="" type="checkbox"/>	exploration	<input type="checkbox"/>
business/service	<input checked="" type="checkbox"/>	implementation/testing	<input checked="" type="checkbox"/>

Methodology used

Collaborative work between stakeholders for an ecobim compliant building design.

Description (general + NABC scheme)

The aim is to experiment the combined BIM and PLM approach for establishing the collaborative work between different actors of a design and build process for a sustainable hospital extension project in Ajaccio.

Different actors are owner (and his assistants), architects, structural engineers, energy engineers, environmental impact engineers and constructors under supervision of a BIM manager

The benefit of the process comes from a better coordination and better mutual understanding between the actors, since the BIM offers a far better representation of the building enriched by the different technical properties required by the different analysis tools (environmental, energy, economic...).

Sustainability

environmental	25%
economic	25%
social	25%
cultural	25%

Eco-innovation

new ict	25%
new process	25%
new service	25%
revenue model/other	25%

new business model	30%
---------------------------	------------

[graphic annex \(click here\)](#)

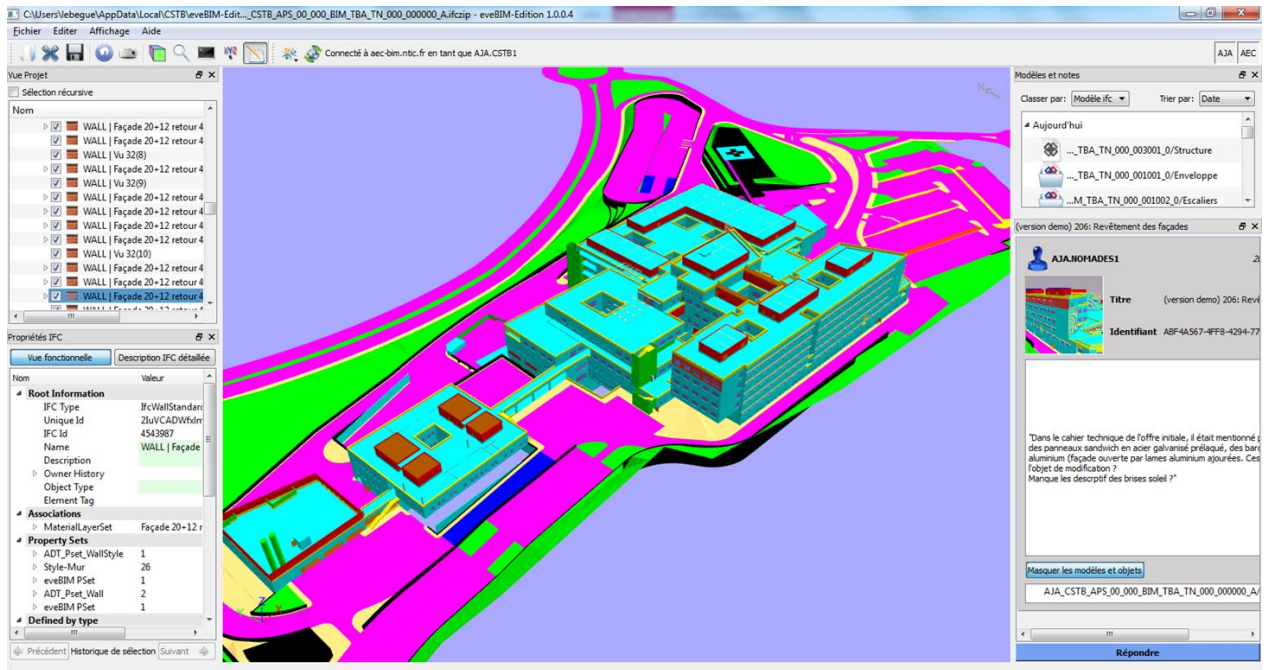


Figure: New Ajaccio Hospital, Corsica, France (attached to the French case study template).