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Large Valorisation on Sustainability of Steel Structures

(LVS3)

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1. FINAL SUMMARY

1.1. Background

The construction sector is a core economy in many countries, which employs about 7% of the EU work force and generates revenues of approximately € 1 000 billion in EU answering to almost 10% of GDP (FIEC). Construction means welfare, security for individuals and businesses, growth and investments for the future.

The use of the buildings and all construction related activities generate more than 30% of all CO2 (carbon dioxide) emissions (Figure 1-1), use about 30% of the produced energy and consume more than 30% of the material resources used in the society (FIEC, 2005). And so, sustainability and CO2 have moved fast towards the limelight of the construction industry. The global governmental intention is to reduce the CO2 emissions by an average 5% over the next 5 years, and some experts claim that the reduction must be 50% over 50 years in order to avoid large-scale climate changes.

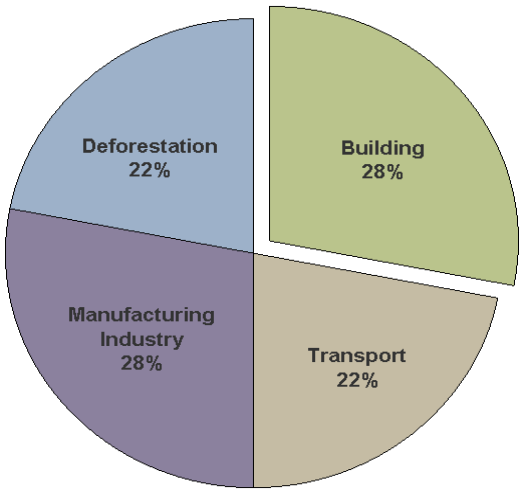

Figure 1-1 : *Estimation of global CO_2 emissions by end user.*

Sustainability includes environmental, economic and social concerns for achieving a long-lasting development of the society. Sustainability of Construction here comprises the major health and environmental aspects related to the life cycles of all types of buildings. A building's life cycle includes production, use and deconstruction, the underlying activities, material and energy flows which generate inevitable influence on the planet – good and bad.

Steel as a building material has undoubted and inherent advantages in this respect, among others, due to its mature loop of recycling. However, the quantification of the benefits is one of the key prerequisites to improve the success of steel in construction.

It has been concluded in many areas that sustainable development of the globe is dependent on the construction and real estate sector and related stake-holder's activities. On the other hand, construction and real estate sector has a great potential to make a change in the global course. The challenge requires a better general knowledge about the methodologies and technologies to promote the sustainable development. There are growing needs of novel everyday practices that cost- and time-efficiently incorporates sustainability issues in building projects.

Recycling means using the material again as input for producing new material or as an energy source. Reuse means using the demounted product in another location with or without refurbishment. Steel is unique as construction material because it can be fully recycled over and over again without any quality loss (see Figure 1-2).

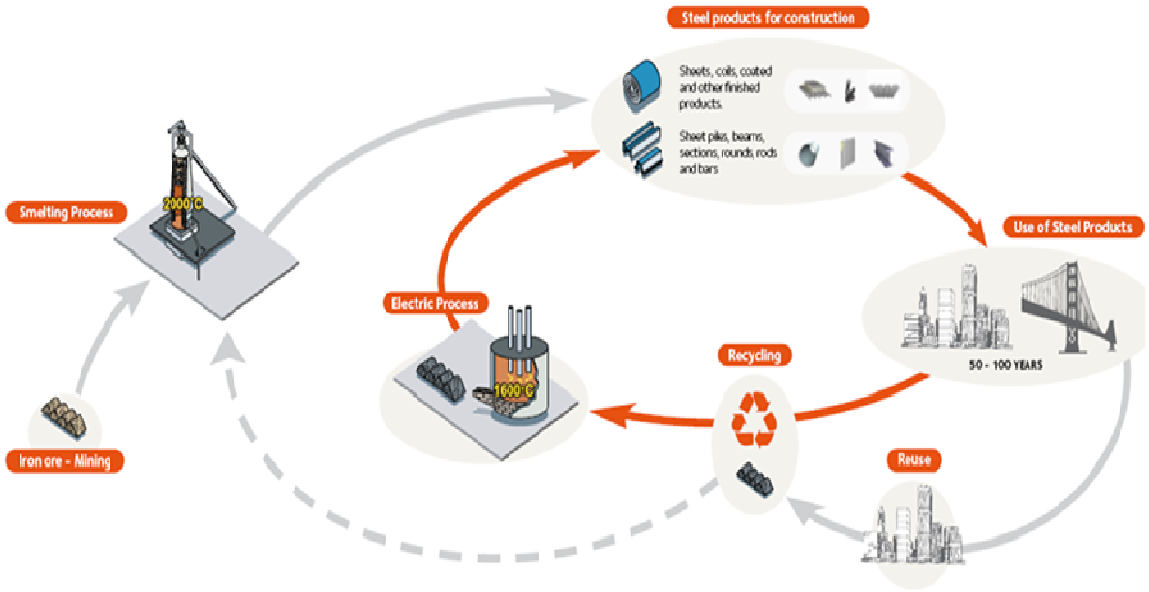

Figure 1-2 : *The steel recycling loop*

The framework and generic methods of environmental life-cycle-analysis LCA are standardised in the ISO series 14040-14044. The LCA includes three main phases that are inventory, analysis of potential effects and the interpretation (valuation) of the results. The framework of environmental analysis of products has achieved good international agreement. However, at the building level, the complexity of life cycle analysis increases and at the moment there is no detailed instruction or agreement about the methodology of a building. This means that environmental analyses have been, and can be, carried out with varying boundaries and principles of valuation.

Since 2010, the work of the Technical Committee TC350 has been implemented into a new series of European standards for the assessment of the environmental impacts of buildings (EN15643-2:2011, EN15978:2011, EN15804:2012).

These new standards involve a modular concept for life cycle analysis (see Figure 1-3), modules A to C, plus an additional module D.

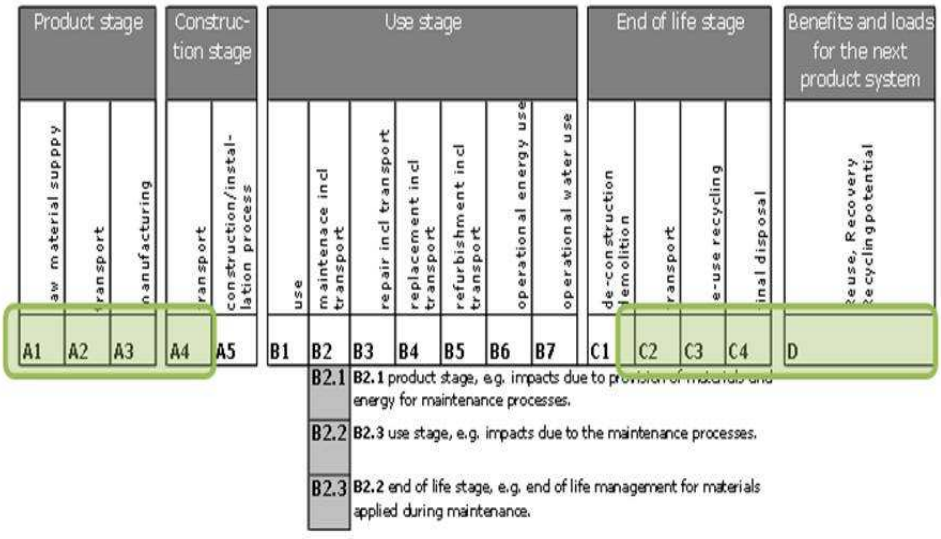

Figure 1-3 : *New standards for life cycle analysis in buildings*

Module D, which includes reuse, recovery and/or recycling potentials, is of paramount importance for composite buildings. However, according to the European standards, this module is beyond the boundary of a life cycle analysis of a building. Therefore, proper guidance is needed to help professionals performing their life cycle analysis and achieving due credits.

Diverse European research projects and different scientific publications show that at this moment the industry and the academics have good understanding of the assessment of the environmental footprint and the improvement of the thermal efficiency of steel and composite buildings. But it is not the case for the different actors of the construction market (architects, engineering offices, local authorities).

The present lack of knowledge forms a major bottleneck for massive application of novel steel solutions aiming at increasing the energy efficiency of building and decreases their general carbon footprint.

It is clear that energy efficiency in buildings will play a major role in responding to climate change and energy issues, if we are able to trigger large scale actions involving EU, all Member States and their regional and local authorities. So, having in hands what has been developed during the different past R&D project projects and the decision making platform developed in the scope of the RFCS SB-Steel project, it is time to inform design offices, architects and authorities located all over Europe and to educate them on all the possibilities and advantages of steel and composite building solutions.

1.2. Objectives

The technical objective of this project is to disseminate the knowledge acquired in the recent years about the environmental impact assessment of steel and composite buildings.

During the last decade, a lot of research projects have been funded to develop methodologies, systems and products aiming at improving the thermal efficiency as well as the global environmental footprint of steel buildings.

The new standard EN15804 intended for environmental calculation of buildings takes now into account the fact that steel is a recyclable material (Module D).

So the objective of this project is to summarise all this acquired knowledge into different documents (Background, Design guide, leaflet, User-friendly Software), to translate all these training and teaching support into the different European languages and finally to disseminate amongst Europe by the organisation of workshops.

1.3. Results

1.3.1. WP1: Realisation of documentation in English and software about the environmental assessment of steel and composite Buildings

Several documents and software have been done as result of this Workpackage. Here is a brief list of them, in the next chapter there is a more detailed description of their scope.

- *Background document*
  It contains information about Life Cycle Assessment of Buildings explanations of the methodology and algorithm used in the project, and finally the validation of the methodology

- *Design Guide*
  It contains the specifications of the new version of AMECO software and also case studies with samples of the use of the software in 4 different types of building:
  - Commercial (covering of a supermarket)
  - Offices (Office building calculated with different structural systems)
  - Industrial (industrial building calculated with different structural systems)
  - Residential (single family house)

- *Leaflet (Figure 1-4)*
  It is composed of the key messages and the most up-to-date information about the environmental assessment of steel and composite buildings

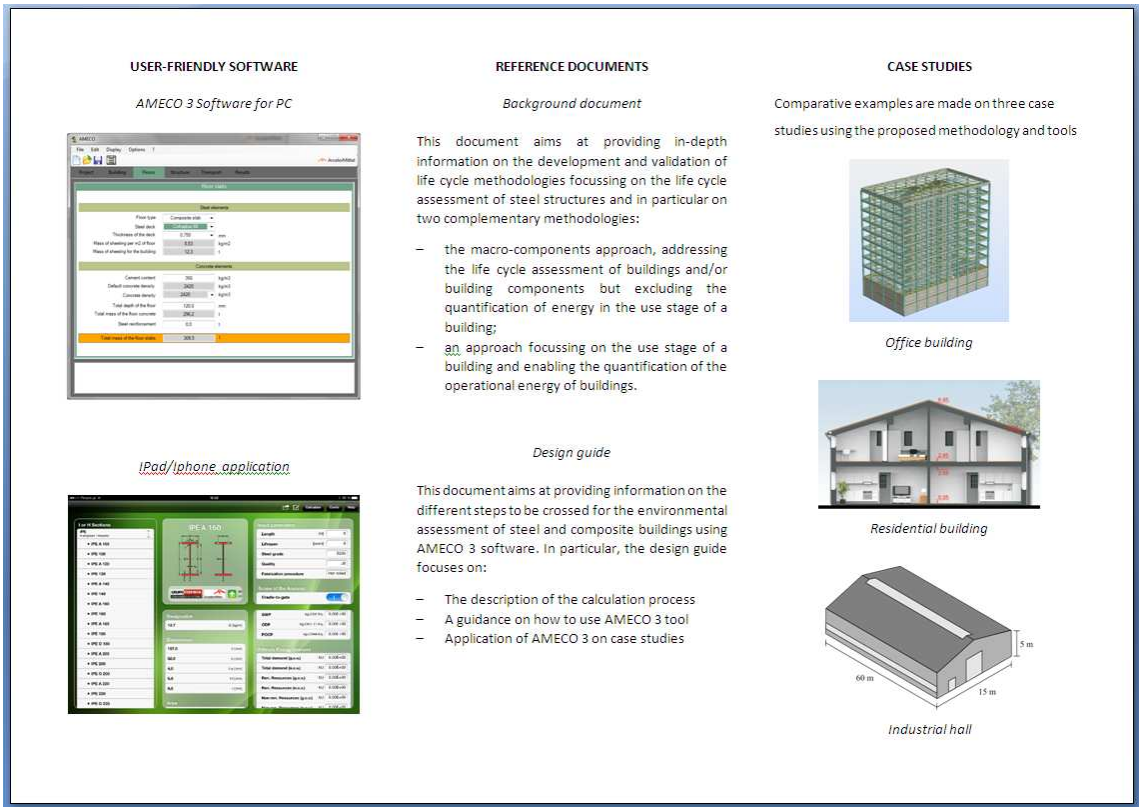

Figure 1-4 : *Sample of Leaflet document*

- *PowerPoint Presentations*
  There are 4 different topics of presentations:
  - Presentation of the background documents including the validation of the methodologies with the advanced calculation method
  - Presentation of the design guide and the leaflet
  - Presentation of the two Design Software (AMECO and Iphone/IPad)
  - Presentation of the case studies done with the software

- *AMECO software (Figure 1-5)*
  AMECO is software developed by ArcelorMittal about Life Cycle Assessment of buildings. This Software has been updated on the following different points:
  - The software has been put in line with the new EN 15804 in terms of number of impacts and distribution among the modules as defined in the standard
  - The use phase was added to the software.

- *App of simplified LCA for mobiles/tablets*
  An Android/Apple application about the LCA impacts of different steel elements (structural shape, tubes, plates....) has been carried out. This tool is not assessing the full environmental impacts of a building but gives figures for simple components (at the element level).
  This application is also adapted in order to fit with the new EN 15804 and include macro-components (assemblage of different elements).

Figure 1-5 : *Capture of AMECO software*

1.3.2. WP2: Translation of the documentation and software interface

All the documents and software, which in WP 1 has been carried out in English, has been translated into the different local languages of the partners of the project. The languages available are:

- *Spanish*
- *Czech*
- *German*
- *Italian*
- *Portuguese*
- *Swedish*
- *Hungarian*
- *Romanian*
- *Lithuanian*
- *Greek*
- *Slovenian*
- *French*
- *Dutch*
- *Polish*
- *Estonian*

1.3.3. WP3: Training for partners involved in seminars

In January 2014 in Luxembourg, after completion of the different documents in Work-Package 1, and before translations started, there was held an internal workshop in order to be ensured that all the seminars will provide the same harmonised information.
During this internal workshop, partners that have prepared the documents presented and explained the global approach as well as the Software based on the WP1 data.

1.3.4. WP4: Organisation of Seminars

In the second half of 2014 seminars were done all across Europe in the next locations (Figure 1-6), in their local languages, as scheduled in the proposal:

- *Miskolc (Hungary)*
- *Naples (Italy)*
- *Timisoara (Romania)*
- *Ljubljana (Slovenia)*
- *Coimbra (Portugal)*

- *Prague (Czech Republic)*
- *Vilnius (Lithuania)*
- *Liège (Belgium)*
- *Gijón (Spain)*
- *Stockholm (Sweden)*
- *Hannover (Germany)*
- *Athens (Greece)*
- *Paris (France)*
- *Breda (Netherlands)*
- *Warsaw (Poland)*
- *Tallinn (Estonia)*

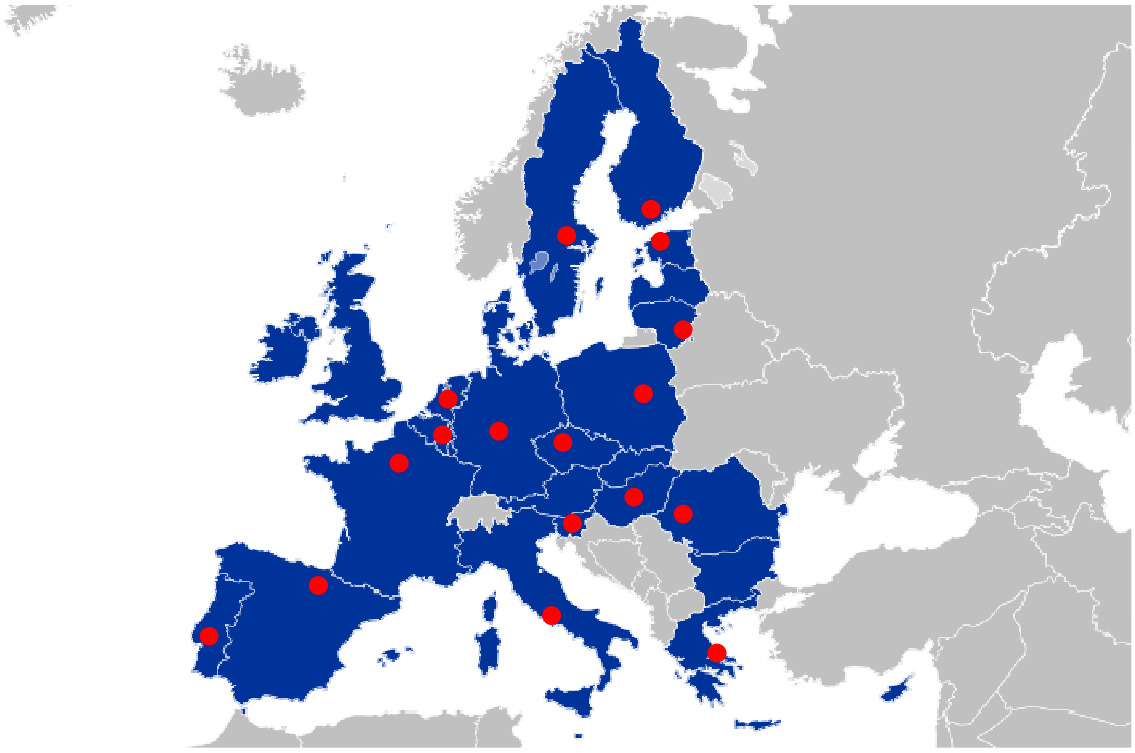

Figure 1-6 : *Location of the seminars*

In the Chapter 2 a brief description of the outcome of each seminar is described.

1.3.5. WP5: Post dissemination activities

A HTML based menu has been created to guide users through all presentations, documents and free available software that are included in all languages on it for a further dissemination.

With this information a DVD or USB stick can be easily created to new seminars, conferences, etc.

As it will be based on HTML, the content has been also put on internet in the web page http://sustainable-steel.eu/ , were it is storage the information and a brief description of the partners of the project.

1.3.6. WP6: Coordination

Three face-to-face meeting were held during the duration of the project, as expected (also several conference call meetings were realized for the coordinator and different partners):

- Kick-off Meeting in Coimbra (Portugal) in July 2013
- Intermediate meeting (with internal workshop included) in Luxembourg in January 2014
- Final meeting in Naples in September 2014

1.4. Conclusions

All the tasks, deliverables and results expected have been fully accomplished. Thanks to this project, a first step in the dissemination of the benefits of steel as sustainable material in buildings has been done.

Also the information is public in internet, in 17 different languages, so further dissemination conferences or seminars out of the scope of the project should be carried out in the coming years.

New version of software (for computers and new devices like mobiles and tablets) will also help in the spreading of the information about lifecycle benefits of steel.

Seminars were done in 16 different countries across Europe, with the participation of several stakeholders in the building construction business, showing interest in the topics of lifecycle, energy efficiency and sustainability.

2. SCIENTIFIC AND TECHNICAL DESCRIPTION OF THE RESULTS

2.1. WP1: Realisation of documentation in English and software about the environmental assessment of steel and composite Buildings

WP Leader: *UC (Other partners: AM, CTICM, AC&CS and ULG)*

2.1.1. Objectives

- Preparation of the design guide
- Preparation of the background documentation
- Preparation of a 6 faces leaflet summarising the key messages relating to the environmental impact of steel and composite structures
- Adaptation of the AMECO software
- Adaptation of the Iphone and Ipad simplified calculation Software
- Preparation of the PowerPoint presentations

2.1.2. Description of activities and discussion

- Preparation of the design guide (Figure 2-1)
  The design guide main purpose is to show the main characteristics of AMECO software form their technical point of view, with the specifications of the calculations, a user guide and finally 3 different case studies in different typologies and scenarios.

  It contains:
  - Introduction and aim
  - Computer code and environment
  - General features of AMECO software
    - Environmental impacts
    - Installation
    - Languages
    - Units
  - Technical description
    - Definition of a project
    - Building structure
    - Building envelope
    - Building occupancy
    - Building systems (heating/cooling…)
    - Constants and specific parameters
    - Calculation of the environmental performance of the structure
    - Environmental impact of the building
    - Software output: Results
      - Use phase
    - User guide
  - Case studies
    - Office Building (With different structural systems – Paris (France))
    - Residential Building (single family house in Romania)
    - Industrial hall (industrial building calculated with different structural systems – Paris (France))
  - Annexes (Data bases)

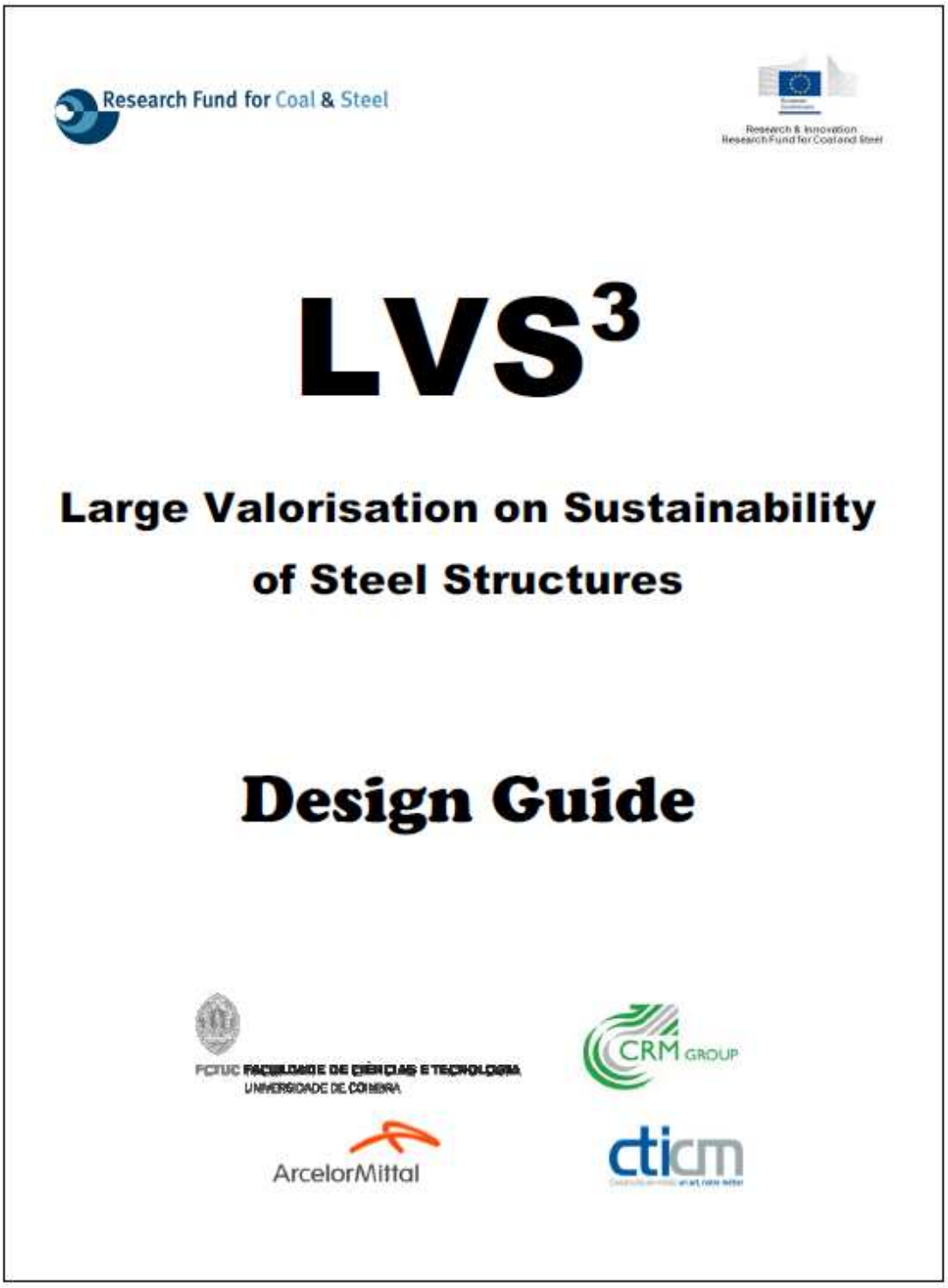

Figure 2-1 : *Cover page of the Design Guide*

The complete Design guide can be found in http://sustainable-steel.eu/

- Preparation of the background documentation (Figure 2-2)
  The Background main purpose is to give explanations of the methodology and algorithm used in the project about Life Cycle Assessment of Buildings, and finally the validation of the methodology.

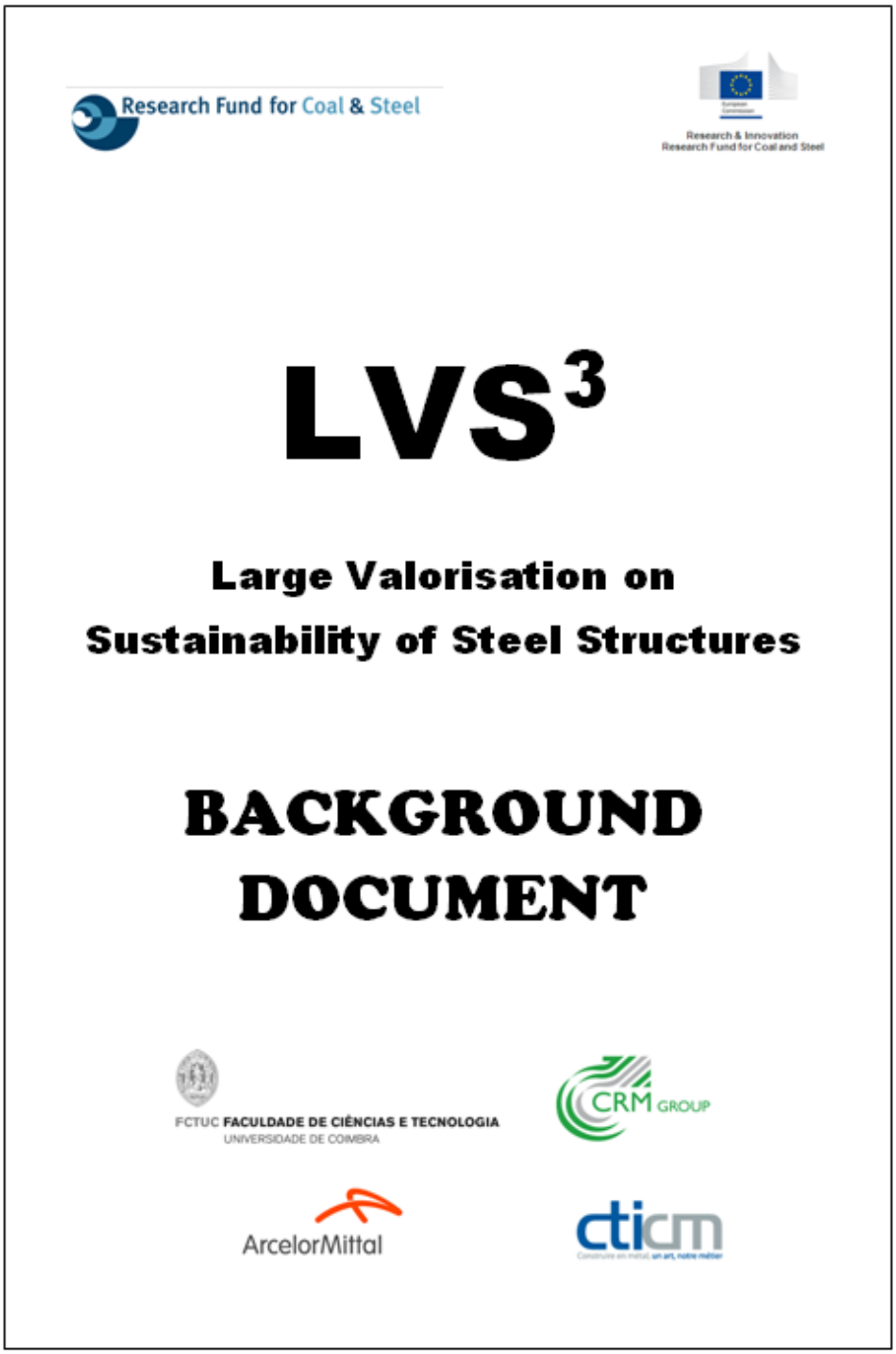

Figure 2-2 : *Cover page of the Background Document*

It contains:

- Introduction
- Lifecycle assessment of Buildings
  - Methodology
  - Environmental indicators
- Simplified methodologies for Building assessment
  - Macro-components
  - Algorithm for energy quantification (use phase)
- Validation of adopted methodologies
- Appendix: Database of macro-components

The complete Background Document can be found in http://sustainable-steel.eu/

- Preparation of a 6 faces leaflet summarising the key messages relating to the environmental impact of steel and composite structures (Figure 2-3)
  This task has been developing simultaneously with the realization of the design guide. It is composed of the key messages and the most up-to-date information about the environmental assessment of steel and composite buildings.

Figure 2-3 : *Cover page of the Leaflet*

It contains:

- Cover
- General information about the project
- Consortium
- Software
- Documentation
- Case studies

The complete Leaflet can be found in http://sustainable-steel.eu/

- Adaptation of the AMECO software
  The purpose of AMECO software is to assess the life cycle of composite structures of buildings or bridges, evaluating the environmental footprint, in particular the associated energy consumption and greenhouse gas emissions.
  Ameco 3 is an extension of Ameco (version 2), which proposes to take into account the use phase of the building. It allows the estimation of energy needs for a variety of the building systems (heating, cooling…). Their calculation is based on several international norms such as ISO-13370, ISO-13789 and ISO-13790 as well as on European norm (EN 15316). The extension of the use phase is only available for buildings.
  In the next Figures 2-4 and 2-5 there are screen captures of the new software:

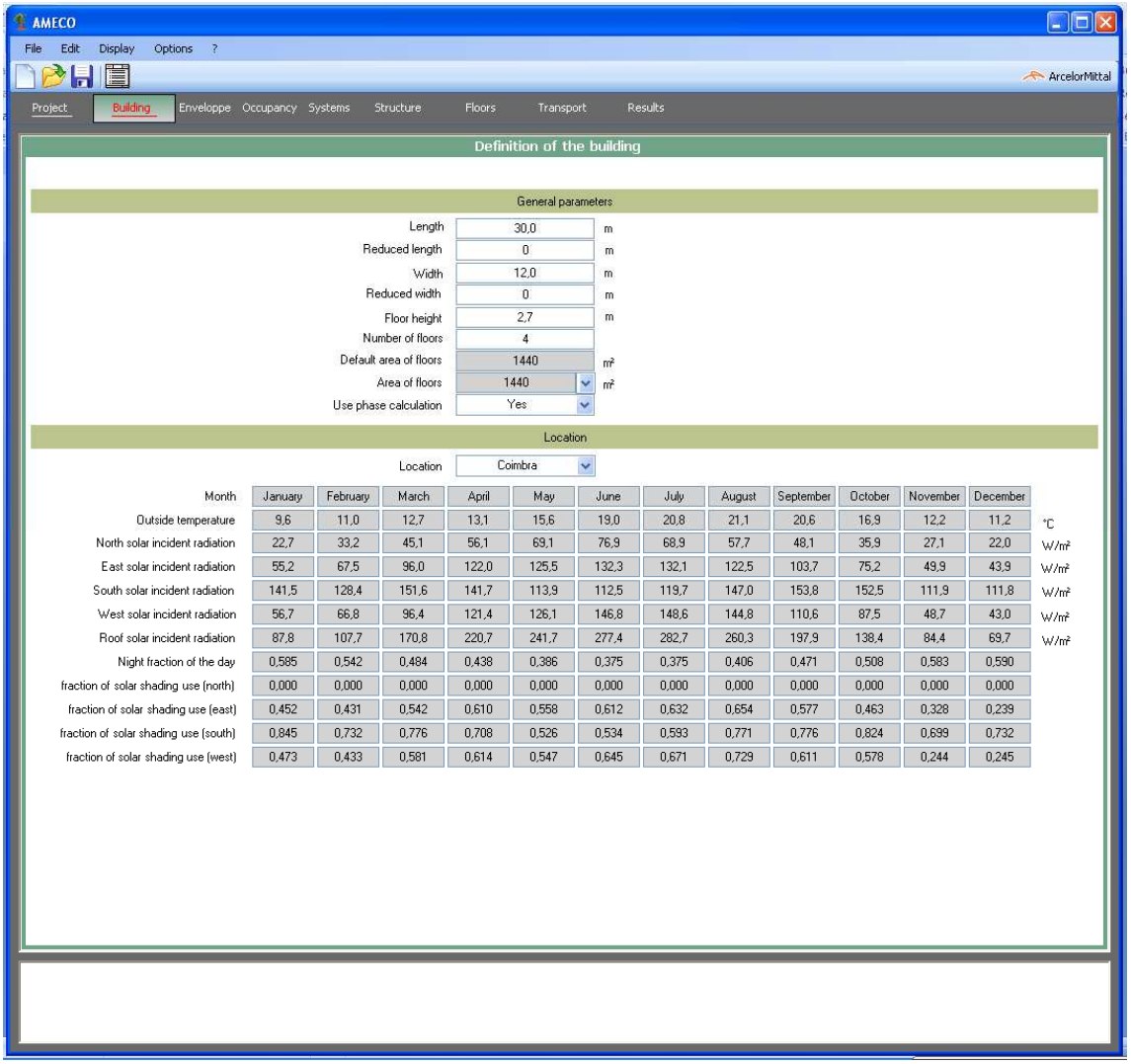

Figure 2-4 : *AMECO software interface. Data*

AMECO can be downloaded in http://sustainable-steel.eu/ and also in ArcelorMittal web in http://sections.arcelormittal.com/download-center/design-software/sustainability.html.

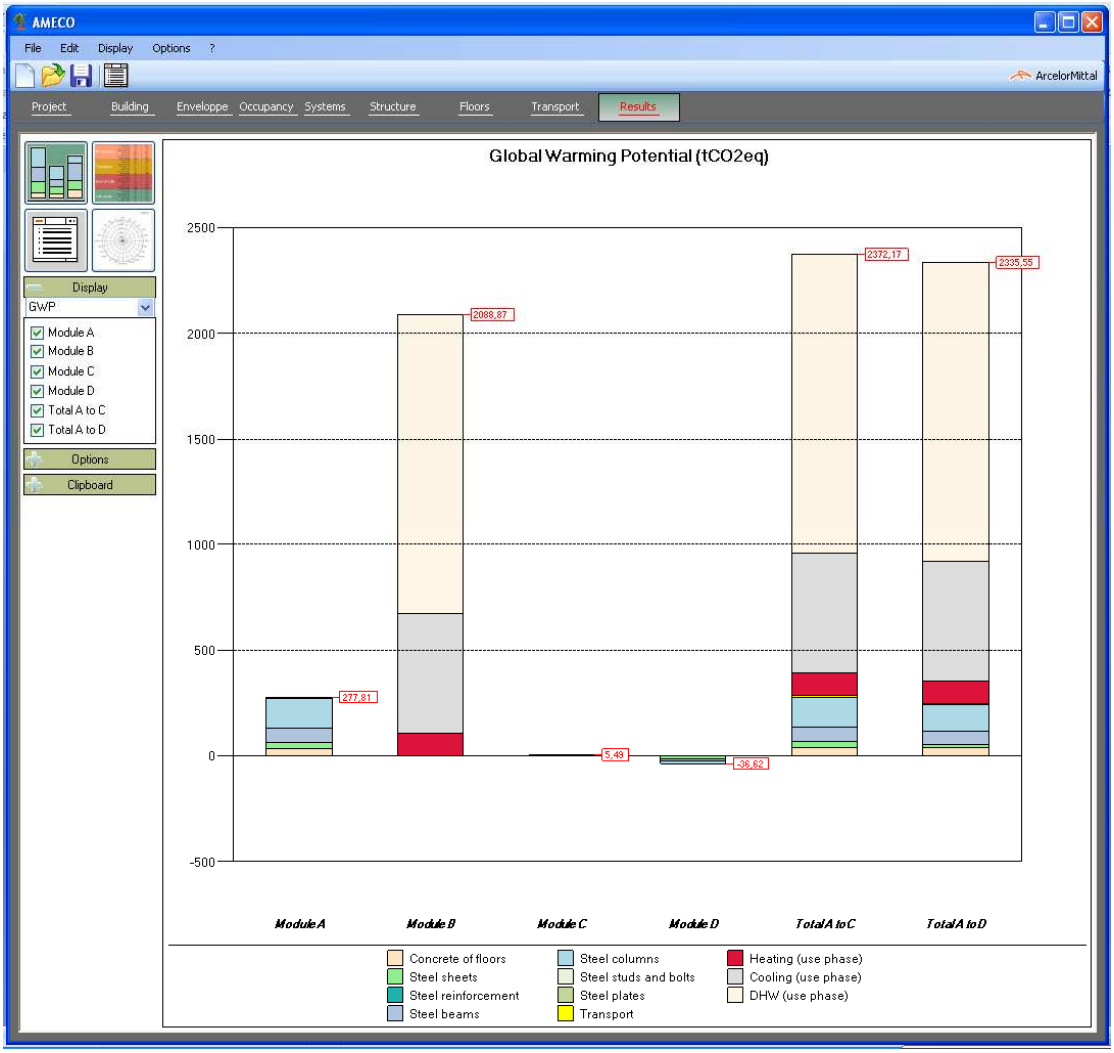

Figure 2-5 : *AMECO software interface. Results*

- Adaptation of the Iphone and Ipad simplified calculation Software (Figures 2-6, 7 and 8) BUILDINGS LCA is a simplified tool that let mobile/tablet users in Android/Apple devices to have an easy-friendly lifecycle calculation.
  Based in macro-components and steel sections catalogue, it let the user to choose between Material or Building calculations of lifecycle.

Figure 2-6 : *App icon in Appstore/GooglePlay*

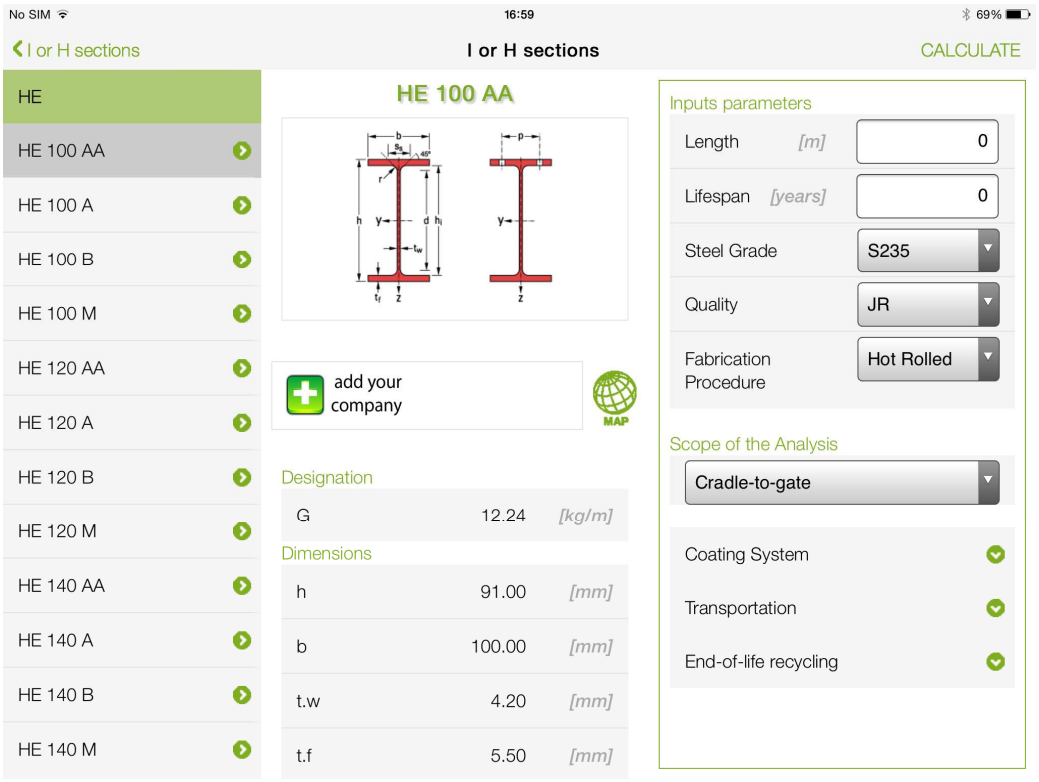

Figure 2-7 : *App software. Database*

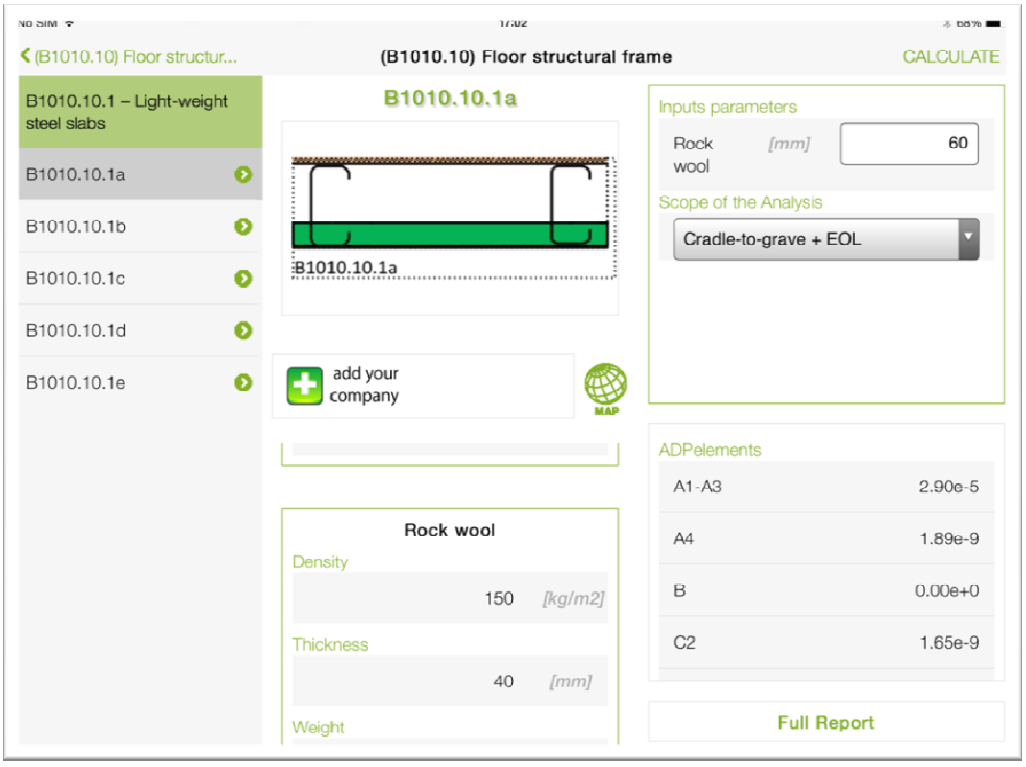

Figure 2-8 : *App software. Calculations*

The validation of the approach was based on the comparison with advanced analyses performed by the use of commercial software GaBi 6.

Buildings LCA is available in http://sustainable-steel.eu/ and also for mobiles and tablets in Appstore/ GooglePlay

- Preparation of the PowerPoint presentations
  These presentations were created to show in the different workshops of dissemination of the project the results of the documentation and software mentioned before. It has been divided in 4 different topics:

  - Presentation of the background documents including the validation of the methodologies with the advanced calculation method
    For a better comprehension of this topic, the presentation has been split in two: LCA Methodology and Use Phase.

    - LCA Methodology (Figure 2-9) contains:
      - Basic notions
        - ✓ Sustainable development
        - ✓ Life cycle assessment
      - Environmental assessment of buildings
        - ✓ Scales of assessment
        - ✓ Environmental product declaration
        - ✓ CEN TC350: Context, main concepts
        - ✓ Focus on module D
      - Environmental assessment of steel
        - ✓ Cycle of steel
        - ✓ Benefits of recycling

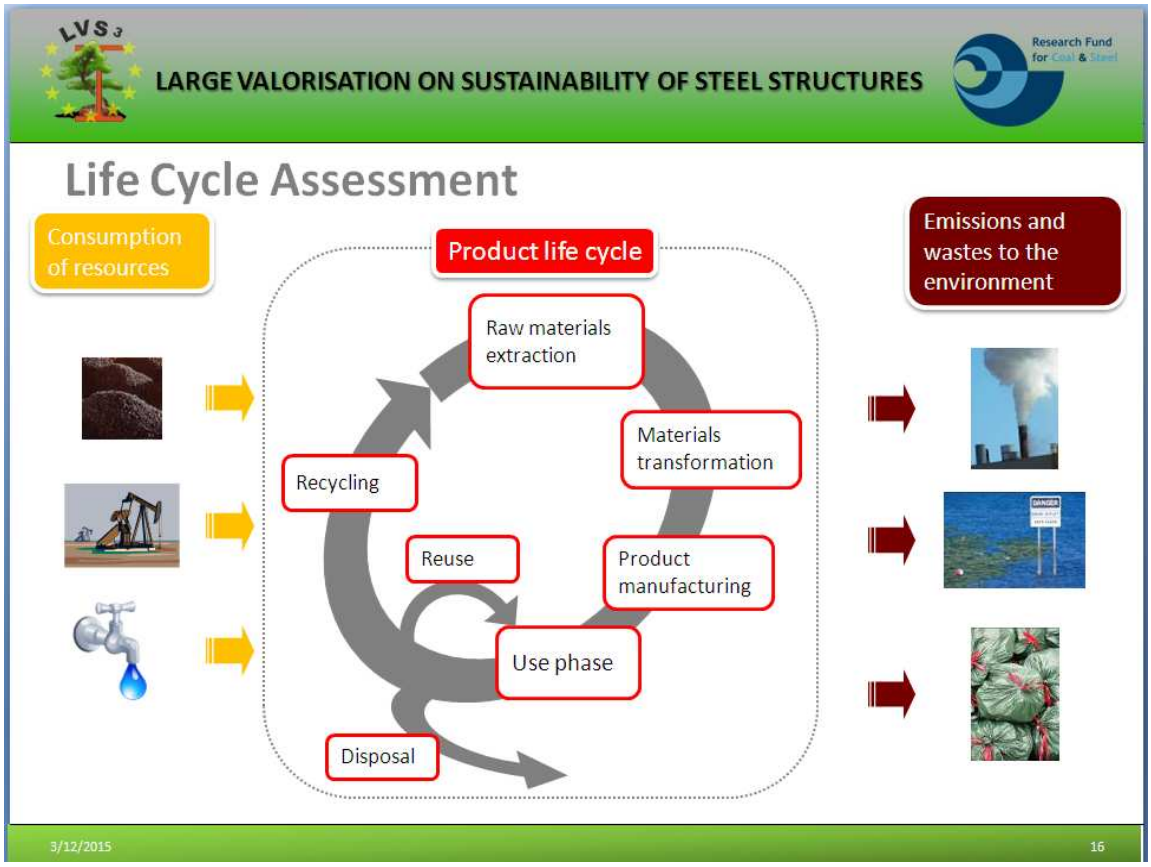

Figure 2-9 : *LCA Methodology Presentation*

- Use Phase (Figure 2-10) contains:
  - Operational energy quantification
    - ✓ Introduction
    - ✓ Building location and climate
    - ✓ Energy need calculation method
    - ✓ Algorithm for energy quantification (use phase)
  - Calibration and validation of algorithm
    - ✓ Reference compartment (EN 15265:2007)
    - ✓ Reference apartment (adapted from EN 15265:2007)
    - ✓ Residential building case study
  - Final remarks

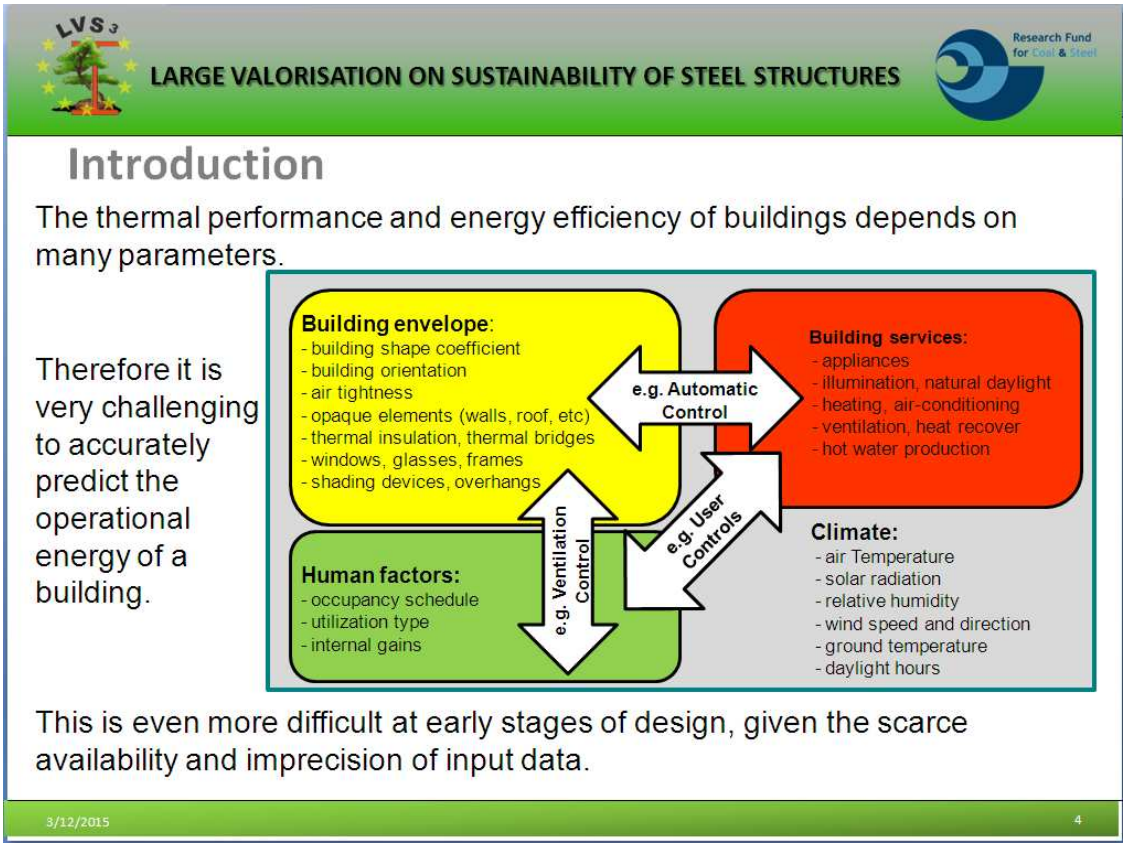

Figure 2-10 : *Use Phase Presentation*

- o Presentation of the design guide and the leaflet (Figure 2-11)
  It contains:
  - Introduction
  - General features of AMECO software
  - Definition of a project
  - Calculation process
  - Software output
  - Use guide
  - Case studies brief description

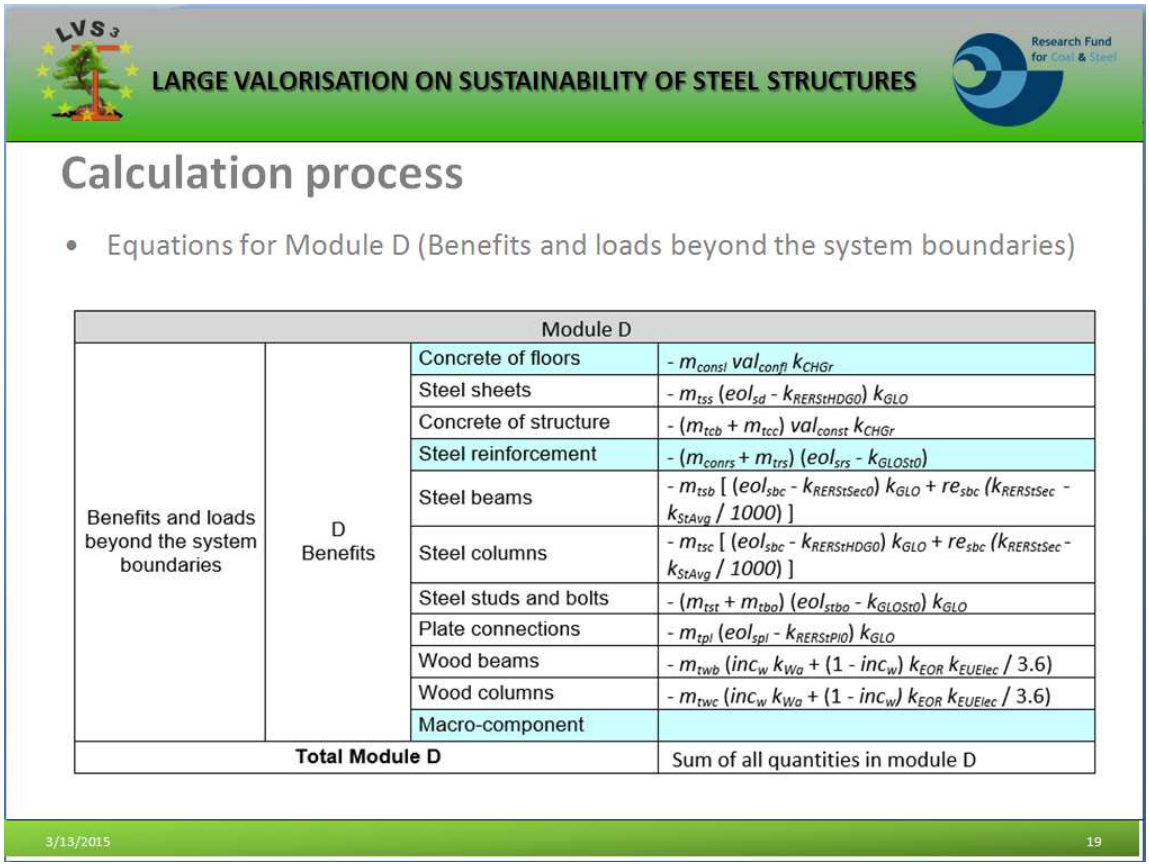

Figure 2-11 : *Design Guide Presentation*

- Presentation of the two Design Software
  For a better comprehension, this topic has been divided in the 2 different programs realized during the project.

  - AMECO software (Figure 2-12)
    It contains:
    - General presentation
      - ✓ Introduction
      - ✓ Modules
      - ✓ Organisation
    - Definition of a building
      - ✓ Typologies
      - ✓ Location
      - ✓ Facades
      - ✓ Base floor
      - ✓ Occupancy
      - ✓ Systems
      - ✓ Structure
      - ✓ Floors
      - ✓ Transport
    - Results
      - ✓ Impacts
      - ✓ Graphical outputs
      - ✓ Tables
      - ✓ Report
      - ✓ Parameters

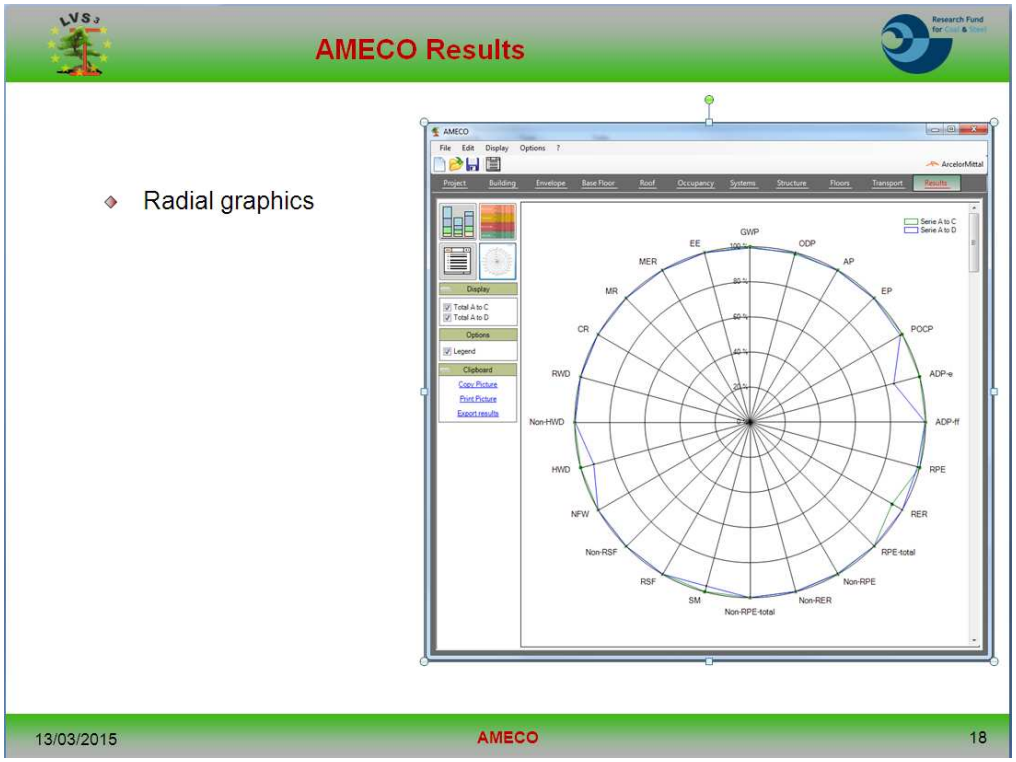

Figure 2-12 : *AMECO software Presentation*

- Mobile/Tablet App (Figure 5-13)

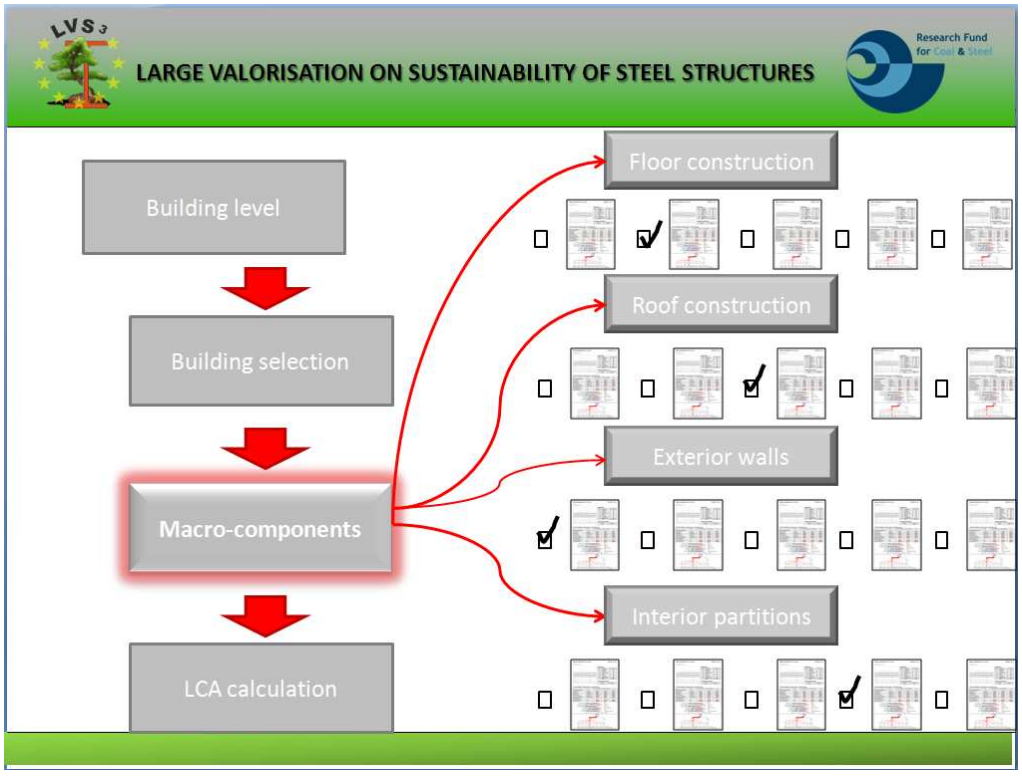

Figure 2-13 : *App software Presentation*

It contains:

- Macro-components approach
- Algorithm for life cycle assessment based in macro-components
- Mobile/tablet App guide
  - ✓ Material level
    - Steel elements
    - Macro-components
  - ✓ Building level
    - Building selection (type/shape)
    - Macro-components (floor/roof/exterior/interior)
    - LCA calculation & report
- Final remarks

o Presentation of the case studies made with the different Software
There are 3 different case studies presented, with the data description of the sample and their results:

- Office Building (Figure 2-14)

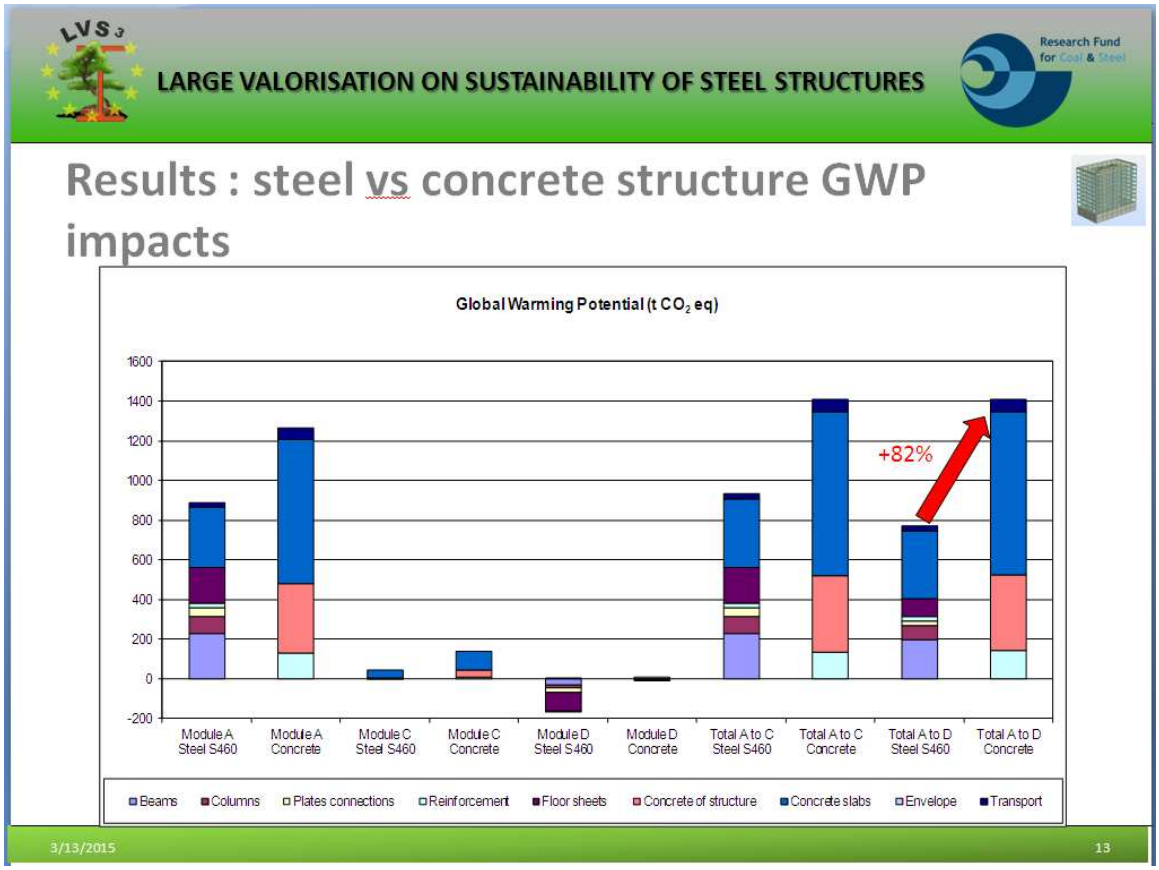

Figure 2-14 : *Office Building Case Study Presentation*

- Residential Building (Figure 2-15)

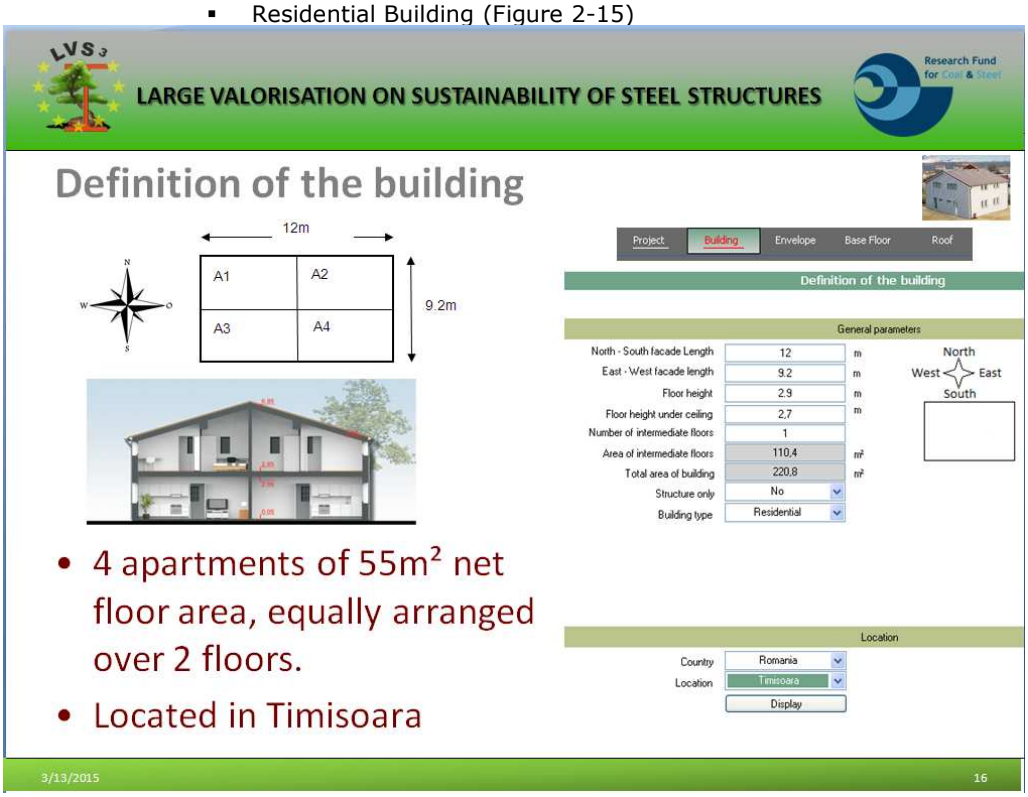

Figure 2-15 : *Residential Building Case Study Presentation*

- Industrial Hall (Figure 2-16)

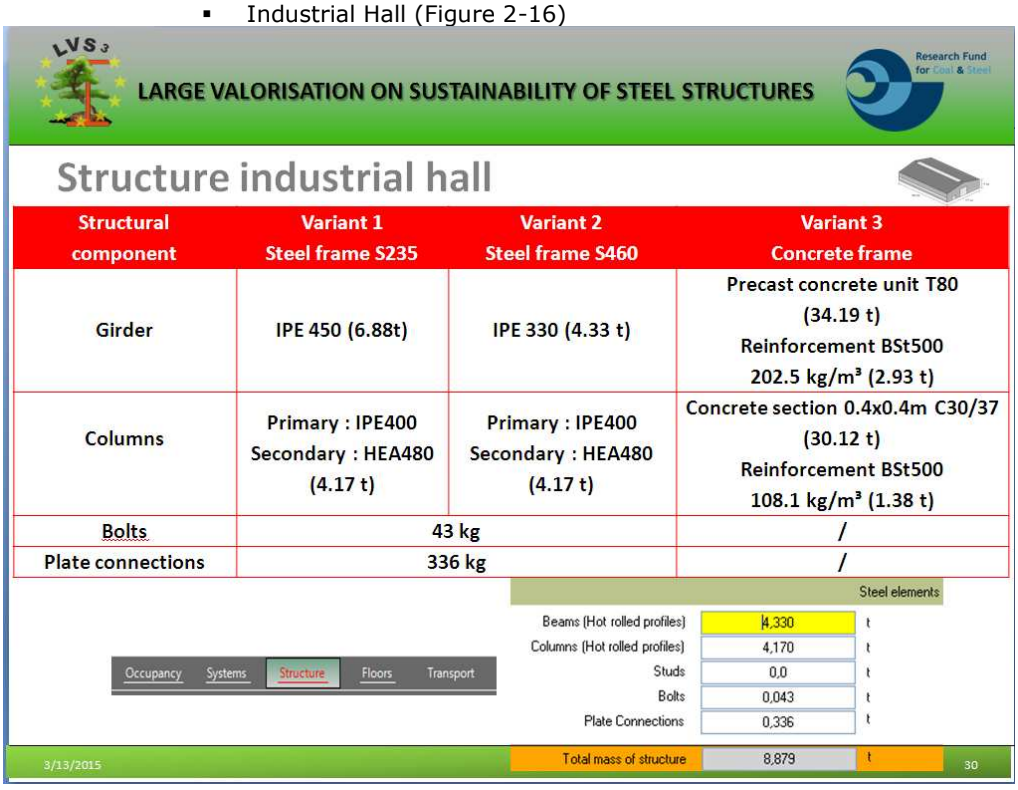

Figure 2-16 : *Industrial House Case Study Presentation*

The complete presentations can be found in http://sustainable-steel.eu/

2.1.3. Conclusions

Documents and software realized during the project reaffirm the benefits of steel as a sustainable material for buildings and construction.
In order to have simplifications of the calculations of the lifecycle assessment, a macro-components approach has been used. It was developed in previous RFCS project SB_Steel (2014), Sustainable Building Project in Steel (RFSR-CT-2010-00027) and in this LVS3 RFCS project, the database has been taking into account in the methodology, and software AMECO and App lifecycle calculator.
Also a big step for LCA calculations is the introduction of the use phase in software AMECO. That will let the final user to have a more clear vision of the lifecycle of the projected building, considering that use phase is one of the most important due to the long lifespan of buildings (At least 50 years).
The software also let compare different steel solutions, and the benefits of High Added Value steel (high strength steel), redundant not only in less weight of the structure but additional benefits in sustainability impacts as it show in the different case studies.
Finally, the work also shows the importance of Module D and recycling in general to valuate even more the use of steel as sustainable material in structures and envelopes of buildings. Steel, which is 100& and infinitely recyclable without lost any property, is considering Module D (now optional in the standards) the most suitable material of choice.

2.1.4. Exploitation and impact of the research results

The documents and software are free to use for any stakeholder, so dissemination of the results further the scope of the project is expected.

AMECO software upgrade version is already integrated in the design software of ArcelorMittal, free downloadable in http://sections.arcelormittal.com/download-center/design-software.html.

BUILDING LCA will be a tool exploited (also free) by ECCS (European Convention for Constructional Steelwork) and can be downloaded in Appstore (for Apple devices) and in Google Play (for Android devices).

All the documents are available in the web page of the project (http://sustainable-steel.eu/), free to download.

2.2. WP2: Translation of the documentation and software interface.

WP Leader: AC&CS (Other partners: All)

2.2.1. Objectives

The different versions of the documents (background document, the design guide, leaflet and the PowerPoint presentations), prepared in the frame of WP1, are translated in the different languages of the partners.
Moreover, the Software Interfaces are also translated in the different languages of the partners. In consequence, it will be possible to present them in the mother tongue to all the seminar participants (WP4).

2.2.2. Description of activities and discussion

- Translation of the background document, the design guide, leaflet and the power point presentations
- Translation of the software interface

All the work has been translated to the different partners languages:

- Spanish
- Czech

- German
- Italian
- Portuguese
- Swedish
- Hungarian
- Romanian
- Lithuanian
- Greek
- Slovenian
- French
- Dutch
- Polish
- Estonian

2.2.3. Conclusions

The documents and software are ready to use by the local partners' stakeholders in their local languages

2.2.4. Exploitation and impact of the research results

For a better exploitation and dissemination of the results, the translations of documents and software are available for free in http://sustainable-steel.eu/

2.3. WP3: Training for partners involved in seminars

WP Leader: CTICM (Other partners: All)

2.3.1. Objectives

The partners, that have realised the different documents and Software, acquired a deep knowledge about what is needed to be disseminated. The other partners of this project have all been chosen as experts in their countries, as far as sustainability assessment of steel and composite construction is concerned. However, their level of understanding of this topic might differ. Therefore, in order to provide high quality, professional and consistent seminars across Europe a special training for the project's partners have been organised.
The task of this WP is the organisation of an internal Workshop during which partners that have prepared the documents, present and explain the global approach as well as the Software based on the WP1 data. In this way, it is ensured that all the seminars provide the same harmonised information. This should happen before the partners start with the translations in order to avoid any misunderstandings.
In order to avoid additional travel cost, the length of one of the co-ordination meetings was extended to two days and the second day was used for the training.

2.3.2. Description of activities and discussion

- Preparation of the internal Workshop
- Participation of all partners

During the intermediate coordination meeting of the project, done in January 2014 in Luxembourg, an internal workshop was held the second day as expected, with the presentation of the different documents and software in English to the rest of the partners and solving of the doubts before starting the translations.

2.3.3. Conclusions

The internal workshops let the rest of the partners not involved in the WP1 to have an accurate idea of the work done before the start of their translations.

2.3.4. Exploitation and impact of the research results

To avoid mistakes in further works (translations and seminars)

2.4. WP4: Organisation of seminars

WP Leader: University of Liege (Other partners: All)

2.4.1. Objectives

The main task of this project is the organisation of seminars in each of the participating countries. Each partner is responsible for the organisation of the seminar in his country. Before the event, invitations have been prepared and distributed to the targeted people. The audience consisted of designers, architects, developers, future steel users such as students and professors. Last but not least the decision makers and authorities were invited. Contacts have been taken with Steel promotion organism in order to ensure that steel contractors and steel distributors were invited to the seminars. The full day seminar was organized in a central place in order to target a high attendance. During the seminar, printed documents as well as USB Keys that contain all data have been distributed.

2.4.2. Description of activities and discussion

No seminars had been organised in Luxembourg. Instead, one seminar was organised in the French speaking part of Belgium for Belgium and Luxembourg. And one seminar was organised in Netherlands for Dutch speaking audience from the Netherlands and Belgium.
See Table 2-1 for the list of locations and main data.

Country	***Partner***	***Date and location***	***number of participant***
France	*CTICM*	*6th of November 2014 in Paris*	*80*
Netherlands	*BOUWMS*	*27th of November 2014 in Breda*	*50*
Germany	*BFSEV*	*22nd and 29th of September 2014 in Bremen and* Kaiserslautern	*61*
Spain	*CLAI & TECNALIA*	*12th of November 2014 in Gijón*	*70*
Estonia	*TUTAL*	*11th of December 2014 in Tallinn*	*68*
Czech Rep.	*CTU*	*16th of September 2014 in Prague*	*109*
Italy	*UNAP*	*16th of December 2014 in Naples*	*58*
Portugal	*UC*	*12th of December 2014 in Coimbra*	*31*
Lithuania	*TUVIL*	*17th of December 2014 in Vilnius*	*93*
Sweden	*STALBYG*	*2nd of December 2014 in Stockholm*	*25*
Hungary	*UMISK*	*20th of November 2014 in Budapest*	*50*
Romania	*TUTI*	*5th of December 2014 in Timisoara*	*83*

Greece	*NTUA*	*14th of November 2014 in Athens*	*35*
Slovenia	*ULJUBL*	*9th of December 2014 in Ljubljana*	*56*
Belgium	*ULGG*	*10th of December 2014 in Liège*	*50*
Poland	*ITBW*	*28th of November 2014 in Warswaw*	*75*
		Total	***994***

Table 2-1 : *Organisation of the seminars*

2.4.2.1 France seminar

Figure 2-17 : *Paris seminar flyer*

In order to disseminate the results of LVS3 research project, CTICM has arranged a workshop in Paris. This workshop was held on 6th November 2014, at the "Maison des Travaux Publics" located in the center of Paris. Invitations have been sent out by mail to about 3000 people from steel construction industry. This invitation was also printed in the CMI journal, which is published at around 10 000 copies (paper and numerical).
About 80 people attended the workshop. One third was students in sustainable construction. The two others thirds belonged to steel construction companies, engineering offices or architecture firms.
The seminar lasted all day long: the morning was devoted to the general principles of sustainability and life cycle assessment. The afternoon was the actual LVS3 workshop (see Figure 2-17), where the results of the project were explained and detailed.

Each participant has received the two printed guides of LVS3 project (Background document and Design Guide, both printed in French, after the translation by the Belgian partners). Each package also contains an USB stick, with the guides in pdf format and the installation package for software AMECO 3. No fee was required to attend the meeting.

In the Figure 2-18 there is a picture of the Paris workshop.

Figure 2-18 : *Paris seminar*

2.4.2.2 Netherlands seminar

The seminar was organised together with the Technical Committee 1 (Sustainability) from Bouwen met Staal to attract more people and give the seminar extra status. This worked out well and the seminar was attended by more than 50 people, taking in consideration that it was the second seminar from Bouwen met Staal on sustainability in 2014.

The audience consists of different parts of the chain in the building industry, architects (18%), steel contractors (5%), structural engineers (32), education (5%), suppliers (25%) and others (20%).

The lectures from the LVS3 project were received well by the public (see Figure 2-19 for the programme). The lecture on methodology and the design guide gave the audience a good insight in the theory behind the software and Ipad and Iphone applications.

13.45	Receptionwith coffee and tea	
14.15	Welcomebychairman	Bart van Leeuwen (Movaresandchairman BmS-TC1), chairman
14.30	LCA-methodologyandenergy forusephase	Jan-Pieter den Hollander (Bouwen met Staal)
15.20	Design Guide	Ralph Hamerlinck (Bouwen met Staal)
15.40	Discussion	Chaired by Bart van Leeuwen
15.55	Coffee break	
16.25	Software (Ameco3)	Ralph Hamerlinck (Bouwen met Staal)
16.45	AppsforiPadandiPhoneandcase studies	Jan-Pieter den Hollander (Bouwen met Staal)
17.35	Discussion	Chaired by Bart van Leeuwen
17.45	Dinner	
18.45	CouplingBIM and BREEAM	Thijs Huijsmans (Royal HaskoningDHV)
19.05	Sustainable steel bridges	Bauke Hoekstra Bonnema (Tata Steel)
19.25	Sustainability: tomeasure is toknow	Elise van Westenbrugge-Bilardie (IMd Raadgevende Ingenieurs)
19.45	Discussion	Chaired by Bart van Leeuwen
20.00	Drinks	
20.45	End	

Figure 2-19 : *Breda seminar programme*

In the lecture on AMECO, the software was also demonstrated live for the public. Most of the public was willing to try and test the software. Some people asked to send them the software in advance. There was some critic on the case studies, more specific on the comparison of steel and concrete. Advisors thought the case studies were somewhat biased.

At the end of the seminar, everybody took with them both reports from the project and the map with all the prints of the lectures.

For more information, there is information in the web:
http://www.bouwenmetstaal.nl/evenementen/seminar-duurzaamheid-van-staalconstructies/

2.4.2.3 Germany seminar

The workshops were hosted under our workshop-series "iforum" – this is an established name for Bauforumstahl workshops and guarantees a large number of notifications. We did two smaller Workshops in Bremen and Kaiserslautern to cover different geographical areas and reach more people than in one big Workshop.

At the end of the workshop were delivered:

- 90 Leaflet
- 90 Background document - "Hintergrundbericht"
- 90 Design Guide – "Anwendungsleitfaden"

In the Figures 2-20 and 2-21 there are pictures of the flyer and the workshop

Figure 2-20 : *Germany seminar programmes*

Figure 2-21 : *Germany seminar workshop*

2.4.2.4 Spain seminar (Flyer Figure 2-22)

Figure 2-22 : *Spain seminar flyer*

The workshop in Spain was held in University of Oviedo, in Gijón, with the participation of speakers (Figure 2-23) from University, technological centres and industry.
An USB was given to all attendees with the software and documents in Spanish. Up to 70 stakeholders form university and companies attended the lectures, in an all-day seminar with general presentations about steel and sustainability in the morning and more focused in LVS3 project in the afternoon.

Figure 2-23 : *Spain seminar speakers*

2.4.2.5 Estonia seminar

The event was organised by Institute of Structural Design of Tallinn University of Technology. Estonian Association of Civil Engineers was involved to arrange promotion and advertisement. In order to make up a full day seminar of steel structures, the LVS3 program was merged with topics of quality assurance of steel structures (see Figure 2-24). The seminar took place on December 11, 2014 in Tallinn at the campus of Tallinn University of Technology.

The participants showed a great interest in the topic of sustainability evaluation of buildings with steel elements, which was a new topic for the majority of participants. Up-to-date knowledge of sustainability and life cycle analysis is very important to increase the competitiveness of steel in the local construction market, where concrete is the preferred material in several sectors and timber has the reputation of being the most sustainable material.

USB key with project documents and software were distributed to the participants. Background Document and Design Guide have been translated and made available in printed form. The participants were also informed about the post-dissemination activities in internet.

In the Figure 2-25 there is a picture of the event.

LVS3 (Large Valorisation on Sustainability of Steel Structures) projekti eesmärgiks on tutvustada ja levitada uuemaid teadmisis teras- ja komposiitkonstruktsioonidega hoonete ja sildade elutsükli analüüsi ja keskkonnamõjude hindamise meetoditest ja nende rakendustest.

„TERASKONSTRUKTSIOONIDE KVALITEET JA JÄTKUSUUTLIKKUS“

seminar toimub 11. detsembril 2014.a.
Tallinna Tehnikaülikoolis,
Ehitajate tee 5, ruum VI-201

Osalemine tasuta, vajalik eelregistreerimine

Registreerunud osavõtjatele:

- Projektis LVS3 loodud eestikeelne tarkvara teraskonstruktsioonide elutsü analüüsiks, arvutusjuhised
- Eesti Ehitusinseneride Liidu täienduskoolitustunnistuse

Registreerimise tähtaeg: **08.12.14**
Registreerida saab e-posti teel: kyllu@ttu.ee
Lisainformatsioon: tel. 6202410

AJAKAVA

9.30-10.30 **Projekteerija, tellija, valmistaja – mida peab teadma teraskonstruktsioonide CE-märgise tagamiseks?**
Andres Laansoo, *TTÜ*

10.30-11.30 **Teraskonstruktsioonide tule- ja korrosioonikaitse projektides**
Jüri Murel, *Patem*

11.30-12.00 Kohvipaus

12.00-12.45 **LVS3 tutvustus. Elutsükli analüüsi metoodika, Arvutusjuhised**
Ivar Talvik, *TTÜ ehitiste projekteerimise instituut*

12.45-13.30 **Kasutusfaasi energiatarbe mõju hoone keskkonnamõjudele (LVS3)**
Simo Ilomets, *TTÜ ehitiste projekteerimise instituut*

13.30-14.00 Kohvipaus

14.00-15.00 **AMECO3 ja IPad tarkvara hoone elutsükli analüüsiks. Näited**
Ivar Talvik, Aldur Parts *TTÜ ehitiste projekteerimise instituut*

15.00-15.30 **Diskussioon**

1918 TALLINNA TEHNIKAÜLIKOOL TALLINN UNIVERSITY OF TECHNOLOGY

RFS2-CT-2013-00016

Figure 2-24 : *Estonian seminar flyer*

Figure 2-25 : *Estonian seminar workshop*

2.4.2.6 Czech Republic seminar

It was held in Prague University in September 2014 with a great participation (up to 100 attendees). In the next Figures it can be seen the flyer (Figure 2-26), the poster (Figure 2-27) and the workshop in action (Figure 2-28)

Seminář
Novinky
v ocelových a dřevěných konstrukcích
se zaměřením na udržitelnost výstavby

Úterý 16. září 2014 v posluchárně C 215

PROGRAM

13.00 - 14.00	Prezentace účastníků	
14.00 – 14.05	Zahájení	prof. Kohoutková
14.05 – 14.25	K normalizaci ocelových a ocelobetonových konstrukcí po 2015	prof. Studnička
14.25 – 14.45	K normalizaci dřevěných konstrukcí po roce 2015	doc. Kuklík
14.50 – 15.20	Přestávka	
15.20 – 15.40	Požadavky na ocelové konstrukce a trvale udržitelný rozvoj	prof. Wald
15.40 – 16.00	Kritéria pro vyhodnocení efektivnosti ocelových konstrukcí po dobu jejich životnosti	Ing. Netušil
16.00 – 16.30	Aplikace softwaru AMECO pro multikriteriální porovnání konstrukčních systémů budov a mostů	Bc. Hána
16.30 – 17.00	Přestávka	
17.00 – 17.20	K návrhu nosníků s náběhem	Ing. Jandera
17.20 – 17.40	Tepelně izolační styčník s čelní deskou	Ing. Sokol
17.40 - 18.00	Zhodnocení konstrukčního řešení vybraných ocelových mostních konstrukcí z hlediska LCA	doc. Ryjáček
18:00 – 18:20	Návrh spřažení příhradových ocelobetonových mostů	prof. Macháček
18.20 – 19.00	Diskuze a závěr	

Seminář přináší poslední poznatky z navrhování nosných stavebních ocelových a dřevěných konstrukcí se zahrnutím aspektů trvale udržitelného rozvoje, jehož uvážení se stává nedílnou součástí návrhu pozemních staveb i mostů. Součástí semináře jsou materiály evropského projektu LVS3+, který se zaměřil na shrnutí poznatků o možnostech, modelech, programech a datech udržitelného rozvoje ocelových konstrukcí. Účastníci semináře obdrží Příručku pro přípravu studií udržitelného rozvoje při navrhování ocelových konstrukcí a informace o dostupných programových vybaveních.

Figure 2-26 : *Czech seminar flyer*

Figure 2-27 : *Czech seminar poster*

Figure 2-28 : *Czech seminar workshop*

2.4.2.7 Italy seminar

The LVS3 Workshop, organized by the Department of Structures (DiST) of the University of Naples "Federico II", was held on 16th December 2014 at the Department of Architecture (DiARC) of the University "Federico II"

In particular, the main topics are summarized in the following agenda:

- "*La sostenibilità applicata alla progettazione strutturale*" presented by Prof. Raffaele Landolfo
- "*La valutazione ambientale del ciclo di vita per la progettazione di edifici sostenibili*" presented by Prof. Sergio Russo Ermolli
- "*Il software AMECO3*" presented by Ph.D. Ing. Lucrezia Cascini
- "*Applicazioni di AMECO per iPhone e iPad*" presented by Ph.D. Arch. Caterina Antonia Dattilo
- "*Casi studio: esempi di LCA per edifici per uffici, residenze, capannoni industriali*" presented by Arch. Elvira Romano

The workshop deals an integrated approach for sustainable structural design, focusing on the concept of Life Cycle Thinking and on the results of the actual research activity to reach a competitive sustainable construction field. In particular the importance of considering benefits of steel structures, both in structural and environmental terms in the sustainable construction sector has been emphasized in accordance to LVS3 project goals (Figure 2-29).

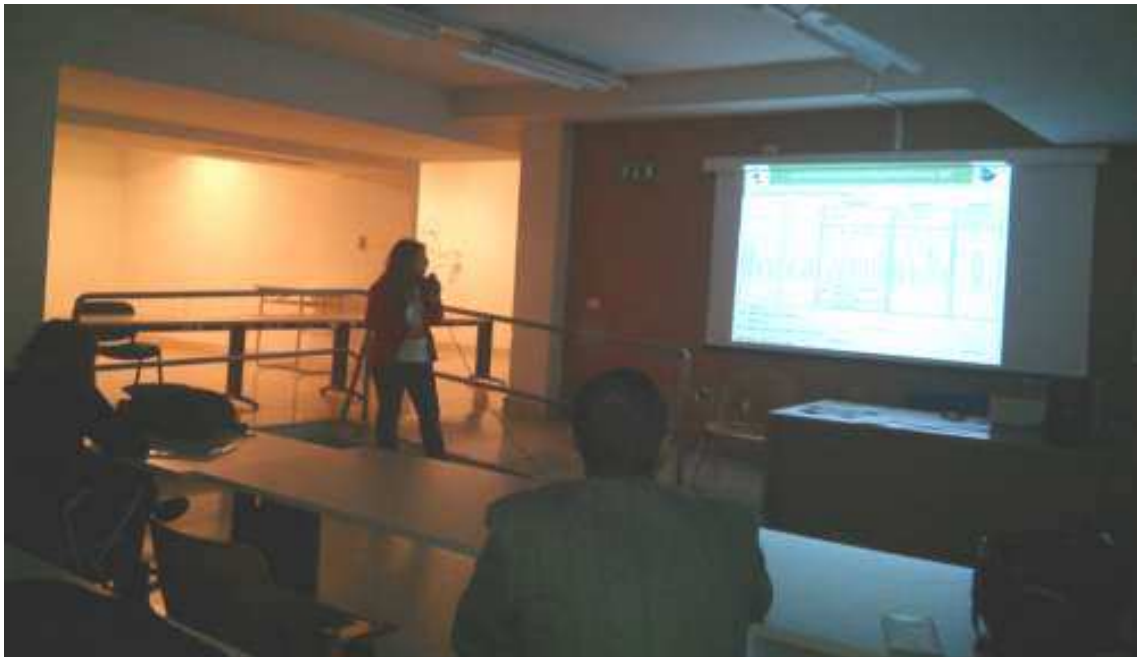

Figure 2-29 : *Italy seminar workshop*

Participants received two printed documents in Italian language: Background Document and Design Guide as well as USB stick containing all data, so users can be easily guided during the application of tools and methods acquired during the seminar to carry out LCA analysis for several typologies of buildings or bridges (Figure 2-30).

Figure 2-30 : *Italy seminar dissemination products*

All participants were very grateful for the distributed material and they showed a huge interest in LVS3 project, following with great attention and active participation all the presentations proposed.

2.4.2.8 Portugal seminar

The workshop of LVS3 in Portugal took place on the 12th December 2014, in the Department of Civil Engineering in the University of Coimbra (Figure 2-31).

Figure 2-31 : *Portugal seminar workshop*

For the advertisement of the workshop a poster was made (as illustrated in Figure 2-32), which was disseminated among the mailing list of CMM (Associação Construção Metálica e Mista), and the mailing list of the Department of Civil Engineering of University of Coimbra.

Figure 2-32 : *Portugal seminar poster*

2.4.2.9 Lithuania seminar

- The LVS3 Workshop was organised due to programme declared in the Final Propose and the Programme of LVS3 Workshop
- *Date*: December 17th, 2014;
- *Place*: Saulėtekio al. 11, Vilnius, VGTU SRA03 main lecture hall of the Auditorium Building (Figure 2-33);

- *Agenda*:
  9^{30} – registration of participants;
  10^{00} – opening of the Workshop*;*
  10^{15}-11^{45} – the first session
    1st part – LVS3 Background LCA Methodology;
    2nd part – LVS3 Background Use phase;
  11^{45}-12^{15} – Coffee break;
  12^{15}-13^{45} - the second session
    3rd part – LVS3 AMECO Presentations;
    4th part – LVS3 Macro components Ipad Iphone;
  13^{45}-14^{15} – Coffee break;
  14^{15}-15^{45} – the third session
    5th part – LVS3 Case studies;
    6th part – LVS3 Design guide;
  16^{00} Close of the Workshop and the final dinner.

Figure 2-33 : *Lithuania seminar workshop*

- *Documentation/USB.* All documentation, foreseen by the LVS3 project for Workshop held in VGTU, Vilnius, Lithuania, was prepared in Lithuanian It included:
  - Two books "Background Document" („Pagrindžiamasis dokumentas") and "Design Guide" („Projektavimo vadovas");
  - The set of Power Point Presentations of 6 lectures for Workshop: LVS3 Background LCA Methodology, (46 slides), LVS3 AMECO Presentations, (20 slides), LVS3 Background Use phase, (25 slides), LVS3 Design guide, (30 slides), LVS3 Macro components Ipad Iphone, (26 slides), and LVS3 Case studies (38 slides);
  - The LVS3 Leaflet;
  - The AMECO3 Software;
  - The final propose to take part in the LVS3 Workshop;
  - The Programme of the LVS3 Workshop;
  - The LVS3 posters and arrows for direction participants to the Workshop lecture room;
  - The certificate for participants of the Workshop attesting them about heard out a course of LVS3 lectures.

The USB keys were filled with all prepared for the LVS3 Workshop documents each: two books; set of Power Point Presentations for 6 lectures; LVS3 Leaflet, the final propose, the Programme of LVS3 Workshop, the copy of the AMECO3 Software. The books and Power point presentations were divided into the three sessions, as they were presented in the programme of the LVS3 Workshop.

2.4.2.10 Sweden seminar

The seminar (Figure 2–34) focused on rising environmental demands from the European Commission through the CPR and ANNEX I (Sustainable use of natural resources), standardization in CEN/TC350, national environmental schemes and dissemination findings in the LVS^3 project.

Figure 2-34 : *Sweden seminar poster*

The participants (Figure 2-35) represented material producers (both steel and concrete), contractors, architects, consultants, universities, administrations, and associations for steel and concrete.

The Design guide and Background document was handed out during the seminar, those two documents are also available on the SBI webpage http://sbi.se/om-stal/hallbarhetsbedomning-av-stalkonstruktioner#material together with the software AMECO v3.01

Sara Elfving from The National Board of Housing, Building and Planning – Boverket opened the seminar with information on environmental demands from the European Commission through the CPR and ANNEX I (Sustainable use of natural resources).

IVL Swedish Environmental Research Institute was represented by Martin Erlandsson who gave a scientific background to the environmental research conducted at IVL. He also presented the Anavitor concept, how to perform LCA calculations from existing environmental information.

The standardization work performed in CEN/TC350 (Sustainability of construction works) and the Swedish mirror committee, TK 209, was presented by the TK 209 chairman RutgerGyllenram. He gave an overview of the ongoing work in the committees in Europe.

Then we were given a practical example on how to produce an EPD (Environmental Product Declaration) for Structural steel work from Jonas Olsson, quality- and environmental manager in the company EuroProfil. The EuroProfil EPD is the first EPD accepted in the ECO Platform.

The concluding presentation on the LVS3 project was performed by Wylliam Husson with main focus on practical use of the software AMECO v3.01. The result of the case study on an office building was a good example on advantages with AMECO.

Figure 2-35 : *Sweden seminar workshop*

2.4.2.11 Hungary seminar

The University of Miskolc the Hungarian Steel Structure Association, and the Hungarian Welding Society organized a workshop on "The role of steel in the sustainable development" in November 20, 2014 on Thursday, at the Budapest University of Technology and Economics, Department of Bridges and Structures (1111 Budapest University of Technology and Economics, Műegyetem rakpart 3-9, KMF. 85 lecture room) – Figure 2-36.

Figure 2-36 : *Hungary seminar workshop*

The program started with the lectures related to LVS3, Large valorisation and sustainability of steel structures. We have spoken about Design guide, Background LCA methodology, Case studies, AMECO software and mobile applications. One printed copy of the Design guide and the Background document has been distributed among participants and the PowerPoint presentations on DVD.

There were other lecturers, related to this subject, from companies (Ostorházi Ltd, Weinberg'93 Ltd.) showing the applicability and their experiences.
There were also two lectures from other universities about the economic aspects and design comparisons.

During discussion there were several questions to the lecturers. The participants emphasized, that the combined theoretical and industrial approach gave them a lot of help. They looked satisfied.

2.4.2.12 Romania seminar

Program (Figure 2-37):

10^{00} – 10^{20}	***Opening session*** Prof.Dr.Ing. Viorel Ungureanu
10^{10} – 10^{50}	***Why steel buildings can be considered „Sustenabile"? – Invited lecture*** Prof.Dr.Ing. Dan Dubină, MC of Romanian Academy
10^{50} – 11^{30}	***Informații generale: Metodologia LCA / Background information: LCA methodology*** Prof. Dr. Ing. Daniel Grecea
11^{30} – 12^{00}	***Document cadru: Faza de utilizare – Energiaoperaţională / Backgrounddocument: Use phase - Operational energy*** Prof. Dr. Ing. Viorel Ungureanu
12^{00} – 12^{30}	Coffee break
12^{30} – 13^{00}	***Ghid de proiectare / Design guide*** Conf. Dr.Ing. Adrian Ciutina
13^{00} – 13^{50}	***ProgramulAmeco3 / Ameco software*** Conf. Dr.Ing. Adrian Ciutina
13^{50} – 14^{30}	***Macro-componenteșiaplicațiiIPHONE / IPAD / Macro-components and iPhone and iPad Applications*** Prof.Dr.Ing. Viorel Ungureanu
14^{30} – 15^{30}	Lunch
15^{30} – 16^{30}	***Studii de caz / Case studies*** Prof.Dr.Ing. Viorel Ungureanu
16^{30} – 16^{50}	***Discuțiilibere / Free discussions***
16^{50} – 17^{00}	***Closing session*** ***Prof.Dr.Ing. Viorel Ungureanu***
17^{00} – 17^{30}	Coffee break

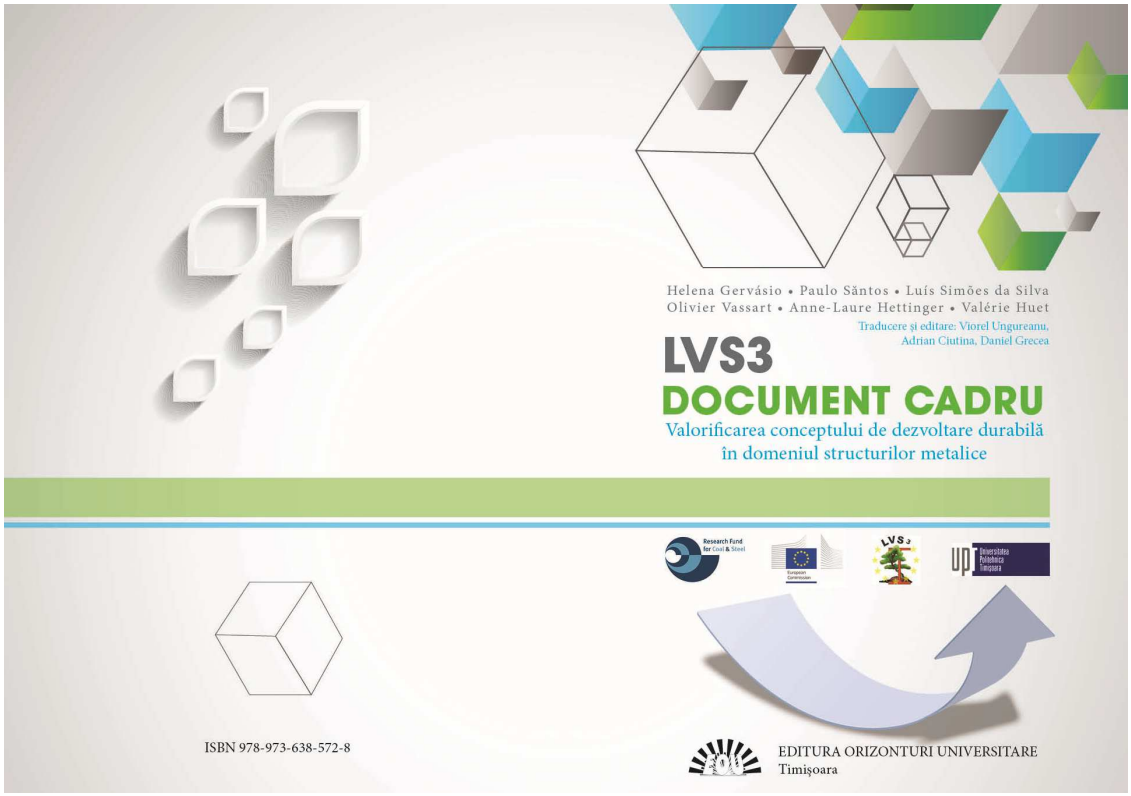

Figure 2-37 : *Romania seminar dissemination documents*

The audience consists of designers, architects, developers, students and professors from Timisoara, Cluj-Napoca, Arad, Lugojand Deva. During the seminar, printed documents as well as USB Keys that contain all data were distributed. A number of 83 participants attended the seminar.

A number of 200 Background document and 200 Design guides have been printed, accompanied by 200 USB Keys.

2.4.2.13 Greece seminar

A combination of undergraduate, post-graduate students, post-doc researchers, experts, civil engineers, mechanical engineers and consultants in the construction sector attended the seminar (Figures 2-38 y 39).

LVS3
LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES

Workshop
Friday, 14 November 2014
Venue: Multimedia Auditorium in Central Library of NTUA
Zografou Campus

Agenda

14:00 – 14:15	Welcome
14:15 – 14:40	The Project "LVS3 - Large Valorisation on Sustainability of Steel Structures" and perspectives **M.Founti, NTUA Mechanical Eng. Professor, Greek LVS3 Partner**
14:40 – 15:00	Steel Structures in Greece **Ch.Gantes, NTUA Civil Eng. Professor, guest speaker**
15:00 – 15:15	LCA for steel structures **D.Giannopoulos**
15:15 – 15:30	Coffee Break
15:30 – 16:00	AMECO3 Software (version for PC, Smartphones & Tablets) **M.Stamatiadou**
16:00 – 16:30	Case Studies **M.Stamatiadou**
16:30 – 17:00	Round Table - Closure

Figure 2-38 : *Sweden seminar poster*

USB sticks with the Software, Background Document, Design Guide and the leaflet of the Project were delivered to the audience.

Comments:

- Positive comments for the free version of the software (USB sticks). Most participants agreed that it is very handy the fact that there is an application for smartphones or tablets.
- Active discussion on the benefits of including MODULE D in the AMECO3 software.
- It would be nice to introduce more materials (conventional ones such as bricks, plasterboards, etc.) in order to be able to compare the various construction scenarios to steel structures.
- Case studies with bridges would be nice

Figure 2-39 : *Greece seminar workshop*

2.4.2.14 Slovenia seminar

The seminar in Slovenia was organized by the University of Ljubljana and the Faculty of Civil and Geodetic Engineering The seminar, held at the Faculty of Civil and Geodetic Engineering, lasted one day and took place on the 9th of December 2014 in the afternoon from 15:00 to 19:00. All documents and Power Point presentations were translated in the Slovenian language.

Each participant received a paper copy of LVS3 publication in the Slovenian language as well as a DVD medium with the LVS3 software and the electronic version of the publication.

The subject of the seminar was background information on the methodology for life cycle analysis and presentation of the design guide, presented by Primož Može, as well as presentation of AMECO software and presentation of case studies, presented by Franc Sinur. The participants were very enthusiastic about the seminar topic and the seminar was concluded by a productive discussion.

The audience consisted of approximately 35 experts from design offices and also 21 students from the master study of structural engineering at the Faculty of Civil and Geodetic Engineering, University of Ljubljana. The seminar was free of charge for all participants (Figure 2-40).

Figure 2-40 : *Slovenia seminar workshop*

2.4.2.15 Belgium seminar

The workshop in Liège was organised on the 10th of December 2014 at the University of Liège and 50 participants attended the workshop.

The invitation to the seminar was sent to more than 1300 professionals of the construction sector in Belgium, but also in Luxembourg and in the north of France.

At the beginning of the workshop, a USB key including the following documents was distributed to each participant:

- The design guide in French and in English
- The background document in French and in English
- The leaflet
- The presentations of the workshop (in French)
- The setup file for the AMECO 3 software

Also, to allow the participants to take notes during the presentations, a notepad and a pen were also distributed.

In the Figure 2-41 there is the invitation to the seminar and in the Figure 5-42 a picture of the workshop held in Liege.

Le Département ArGEnCo de l'Université de Liège, en collaboration avec ArcelorMittal, le CTICM et le CRM Group, a le plaisir de vous inviter au séminaire intitulé

La durabilité des structures en acier

dans le cadre du projet de valorisation LVS3 financé par le fond de recherche du charbon et de l'acier (RFCS) de la Commission Européenne.

L'objectif de ce séminaire est de vous présenter les développements récents permettant l'estimation de l'impact environnemental des bâtiments en acier et mixtes acier-béton au travers de cas d'étude et l'utilisation d'outils interactifs qui vous seront fournis gratuitement.

Date et lieu de l'évènement : mercredi 10 décembre 2014, de 13h15 à 17h00
Institut de Mathématiques (B37), Auditoire 01, Sart-Tilman, 4000 Liège (cf. plan d'accès ci-après)

Organisation du séminaire :

- 13h15 – 13h30 : Accueil des participants
- 13h30 – 14h15 : L'analyse de cycle de vie – principes généraux
  Oratrice : Sigrid Reiter, Université de Liège
- 14h15 – 14h45 : Etude de la phase d'utilisation des bâtiments
  Oratrice : Valérie Huet, AC&CS, CRM Group
- 14h45 – 15h15 : Présentation du guide de conception
  Orateur : Olivier Vassart, ArcelorMittal
- 15h15 – 15h30 : Pause café
- 15h30 – 16h00 : Le logiciel AMECO3 pour PC
  Orateur : Christophe Thauvoye, CTICM
- 16h00 – 16h45 : Présentation de cas d'étude
  Oratrice : Françoise Labory, ArcelorMittal
- 16h45 – 17h00 : Question–Réponse

Organisateurs : J.-F. Demonceau et. J.-P. Jaspart
(jfdemonceau@ulg.ac.be et jean-pierre.jaspart@ulg.ac.be)

Pour des questions organisationnelles, **l'inscription au séminaire est obligatoire mais gratuite**. Vous trouverez le formulaire d'inscription ci-après. Ce formulaire est à envoyer par e-mail à Jean-François Demonceau (jfdemonceau@ulg.ac.be). Réponse souhaitée avant le 30 novembre 2014.

Figure 2-41 : *Belgium seminar invitation*

Figure 2-42 : *Belgium seminar workshop*

2.4.2.16 Poland seminar

Figure 2-43 : *Poland seminar invitation*

A free workshop on the LVS3 project was organized on the 28th of November 2014, in close cooperation with Warsaw Technical University presenting: Project Background, Methodology, Caste-Studies, Ameco3 software and iPAD LVS3 with case studies.

Moderator - Ph.D. of meeting dr eng. Robert Gerylo, (President of the Insulation Product KT in PKN) opened the workshop and welcomed all attendees. The moderator presented the horizontal standards for sustainability of buildings and informed on basics of LVS^3 project.

Profile of the attendance (See Figure 2-43 for invitation) were: Scientists, representatives of construction companies, civil engineers, building energy auditors, power & energy companies, engineering companies, energy agency, students. The workshop was attended by guests from several cities of Poland.

Agenda of the meetings was:

10:00 – 11:00 Registration
First session
11:00 – 13:00 Background, LVS3 Methodology, Ameco
13:00 – 13:45 Lunch
Second Session
13:45 – 15:15 Software and caste studies
15:15 – 16:00 Discussion

Figure 2-44 : *Poland seminar workshop*

Michał Piasecki from ITB presented Background- Sustainable Construction: harmonization process for requirements and assessment methods. In the presentation it was showed the main assumptions of CEN TC 350 for integrated building performance. MP explained also the aim of LVS3. MP reviewed the LCA methods for building assessment and compared them. The main conclusions from the presentation were: there are undergoing intensive processes of harmonization of sustainable construction in Poland, Europe and worldwide; language and requirements of sustainable construction normatively should be expressed by quantitative indicators; harmonization requires the use of the same assessment methods in the same way; LVS3 is a response to market participants of the need for harmonization.
After that, Dominik Bekierski presented LVS3 methodology and Ameco.
In second session, D. Bekierski presented 3 case-studies done in Ameco (Figure 2-44).
Dr M. Piasecki presented mobile application.

At the end of the workshop, there was a discussion and closing remarks. Materials from the workshop were distributed into the attendees (Figure 2-45).

Figure 2-45 : *Poland seminar documentation*

2.4.3. Conclusions

The workshops have been a great opportunity to help to disseminate the results (both documentations and software topics) of the project to all stakeholders in the construction life cycle. The conferences and meetings also let to know doubts and comments of the final users about the work done and will be taking into account for further experiences of dissemination in the future.
The fact that the seminars were done in the local language of the location was also an advantage for an easy develop of the workshop and the spread of the knowledge.

2.4.4. Exploitation and impact of the research results

Thanks to the seminars, the results of the project were disseminating in 16 different European countries to stakeholders. The presentations and documentation is available in all the local languages in the project web http://sustainable-steel.eu/

2.5. WP5: Post dissemination activities

WP Leader: BFS

2.5.1. Objectives

After the seminars, all data should be prepared for a further dissemination. A DVD or USB stick will be created with a HTML based menu that guide users through all presentations, documents and free available software that are included in all languages on it. As it will be based on HTML, the content can easily be put on internet. A web page will be also available

2.5.2. Description of activities and discussion

An HTML frame has been done in order to let their use as web page and also to make easily ar DVD or USB with all the information of the project.

The web address is http://sustainable-steel.eu/

The design is simple in order to facilitate the user the search of information in their local language. Also information about the partners of the project is available.

In the next Figures there are captures of the web as samples.

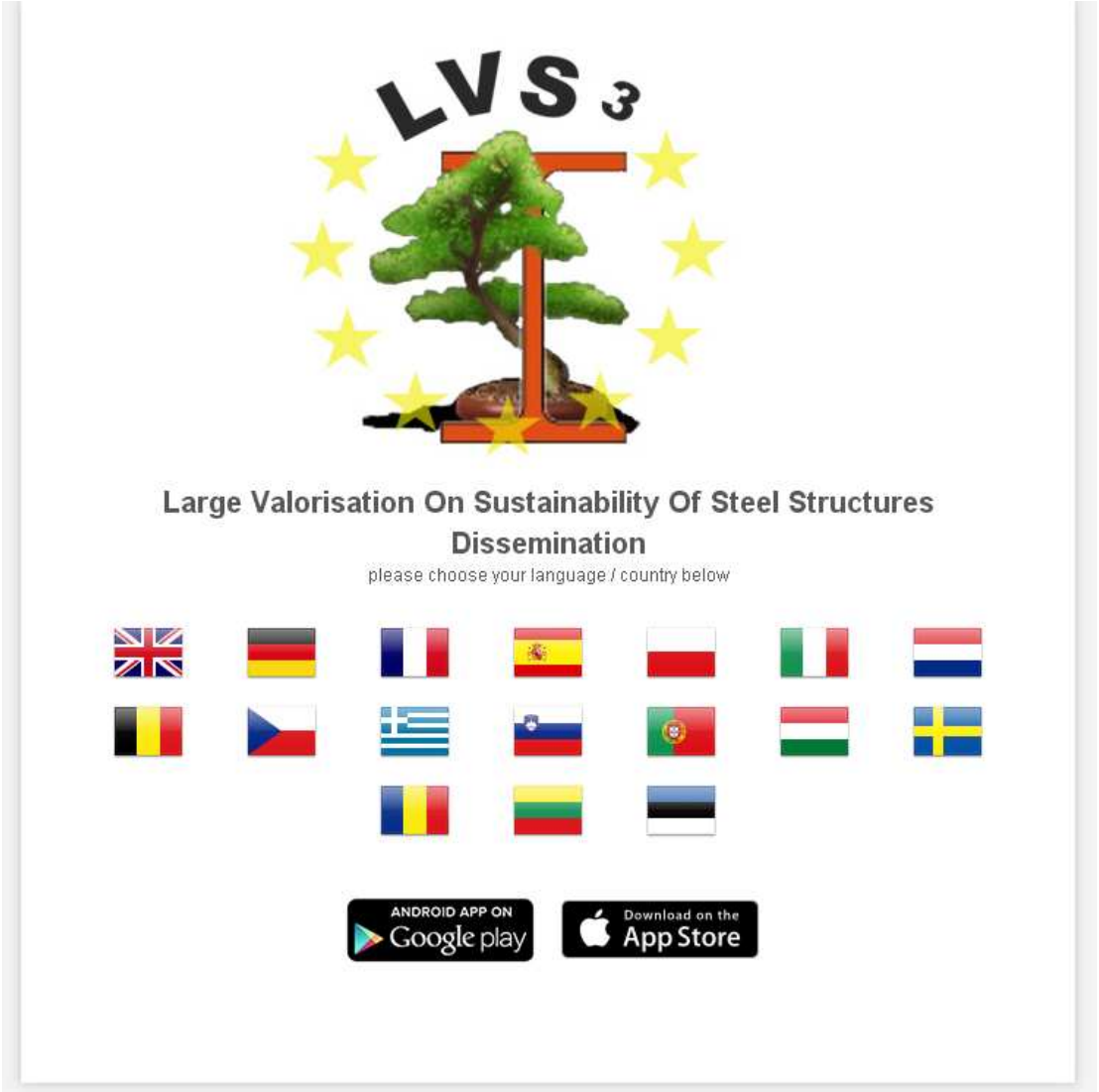

Figure 2-46 : *Web page. Home*

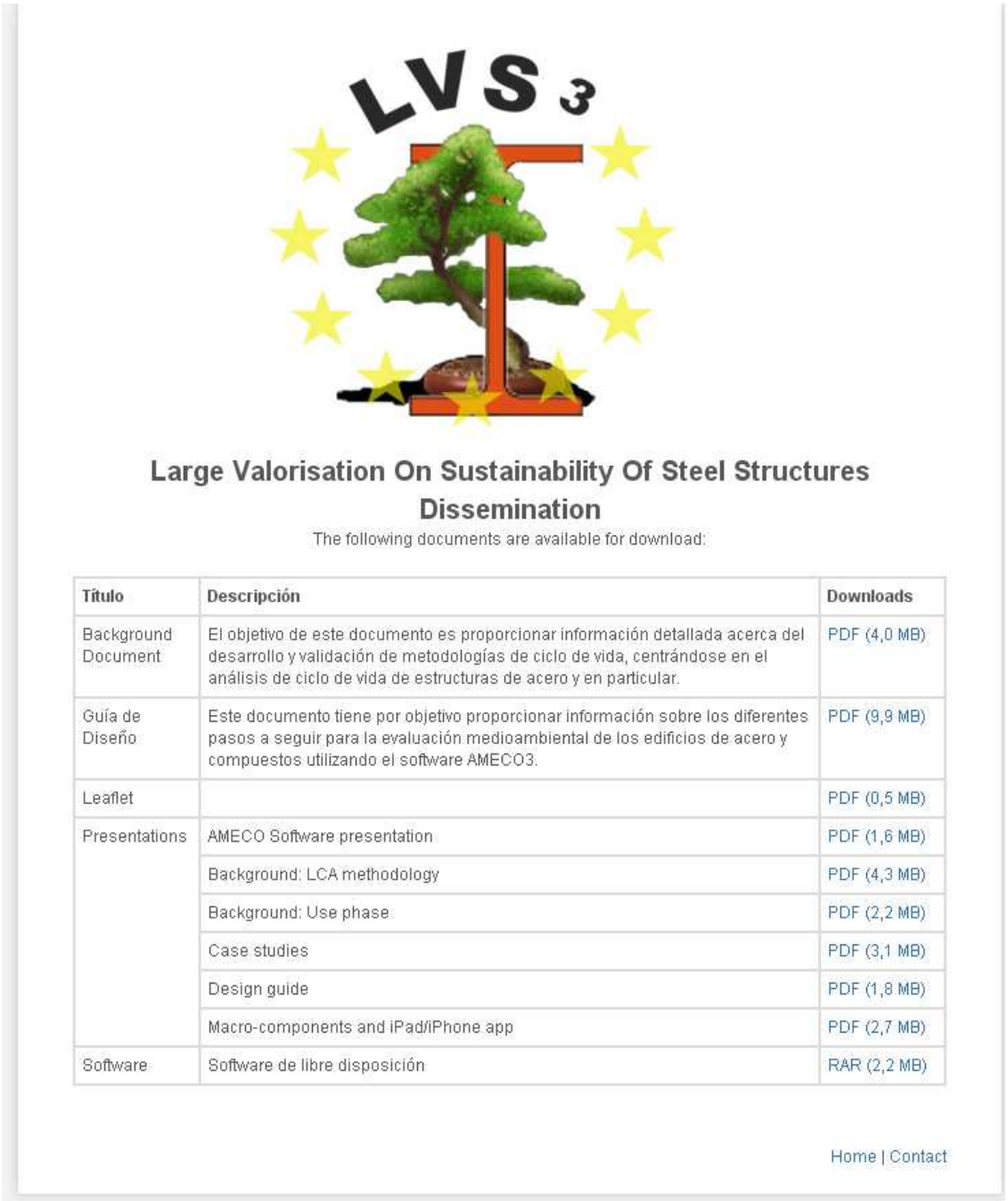

Figure 2-47 : *Web page. Documentation*

Large Valorisation On Sustainability Of Steel Structures
Organisations & Contacts

Organisation	Address	Contact
bauforumstahl Deutscher Stahlbau. Gut beraten.	**bauforumstahl e.V.** Sohnstraße 65 40237 Düsseldorf Germany www.bauforumstahl.de	M.Sc. Raban Siebers Tel.: +49 211.6707.560 Fax: +49 211.6707.829 E-Mail: raban.siebers@bauforumstahl.de
ArcelorMittal	**ArcelorMittal** Research and Development 66, rue de Luxembourg L-4009 Esch/Alzette Luxembourg www.arcelormittal.com	Prof. Olivier Vassart Tel.: +352 5313 2175 Fax: +352 5313 2199 E-Mail: olivier.vassart@arcelormittal.com
	University of Ljubljana Faculty of Civil and Geodetic Engineering Jamova cesta 2 SI-1000 Ljubljana Slovenia www.fgg.uni-lj.si	Assist. Prof. Primož Može Tel.: +386 1 47 68 625 E-Mail: primoz.moze@fgg.uni-lj.si
	Czech Technical University in Prague Department of Steel and Timber Structures Thakurova 7 CZ 166 29 Praha Czech Republic www.ocel-drevo.fsv.cvut.cz/odk/en/	Frantisek Wald Tel.: +420 224 354 757 Fax: +3420 233 337 466 E-Mail: wald@fsv.cvut.cz
	National technical University of	Prof. Maria Founti

Figure 2-48 : *Web page. Partner information*

2.5.3. Conclusions

Web page and/or DVD/USB are ready to be used for any stakeholder interested in the results of the project.

2.5.4. Exploitation and impact of the research results

Web page will let an easy dissemination of the information. Several partners will report about web page in their newsletters or mailings to all their contacts.

USB/DVD will be useful in next conferences and workshops regarding sustainability with steel in buildings.

2.6. WP6: Coordination

WP Leader: ArcelorMittal

2.6.1. Objectives

The purpose is the co-ordination of all tasks in order that the targets as well as the fixed deadlines are reached.

2.6.2. Description of activities and discussion

- Organization of coordination meetings:
  - Kick off meeting in Coimbra (July 2013)
  - Intermediate meeting + internal workshop in Luxembourg (January 2014)
  - Final meeting in Naples (September 2014)
- Control of deadlines and deliverables
- Regular meetings (conference call) with tasks leaders in order to control the development of the work
- Assistance to partners to financial issues
- Yearly report to EU commission
- Final documentation
  - Draft report
  - Publishable report
  - Financial audits

2.6.3. Conclusions

Work has been done to ensure the success of the project

2.6.4. Exploitation and impact of the research results

Meetings in Coimbra and Naples were held during international symposium (2013 ECCS meeting in Coimbra, Eurosteel 2014 in Naples) so many partners presented articles regarding sustainability of steel structures in buildings during the events.

3. LIST OF FIGURES

4. LIST OF TABLES

5. LIST OF ACRONYMS AND ABBREVIATIONS

AC&CS:	Advanced Coatings & Construction Solutions
AM:	ArcelorMittal
BOUMS:	Bouwen met Staal
CEN:	European Committee for Standardization
CLAI:	Club Asturiano de la Innovacion
CTICM:	Centre Technique Industriel de la Construction Metallique
CTU:	University of Prague
DVD:	Digital Video Disc
EPD:	Environmental Product Declaration
EU:	European Union
FIEC:	European Construction Industry Federation
GDP:	Gross Domestic Product
HTML:	Hypertext Markup Language
ITBW:	Technical University of Budowlanej
LCA:	Life Cycle Assessment
LVS^3:	Large Valorisation on Sustainability of Steel Structures
NTUA:	University of Athens
RFCS:	Research Fund for Coal and Steel
R&D:	Research & Development
STALBYG:	Stalbyggnadinstitutet Stiftelser
TC:	Technical Committee
TUTI:	University of Timisoara
TUVIL:	University of Vilnius
ULG:	University of Liege
ULJUBL:	University of Ljubljana
UNAP:	University of Naples
USB:	Universal Serial Bus
WP:	Work package

6. LIST OF REFERENCES

ISO 14040 (2006) Environmental management - Life cycle assessment -- Principles and framework, ISO - International Organization for Standardization.

ISO 14044 (2006) Environmental management -- Life cycle assessment -- Requirements and guidelines, ISO - International Organization for Standardization. ISO - International Organization for Standardization.

EN 15193 (2007) Thermal performance of buildings - Energy requirements for lighting, CEN – European Committee for Standardization.

EN 15265 (2007) Energy performance of buildings - Calculation of energy needs for space heating and cooling using dynamic methods - General criteria and validation procedures. CEN - European Committee for Standardization.

EN 15643-1 (2010) Sustainability of construction works — Sustainability assessment of buildings — Part 1: General framework. European Committee for Standardization.

EN 15978 (2011) Sustainability of Construction Works — Assessment of environmental performance of buildings — Calculation method. European Committee for Standardization.

EN 15804 (2012) Sustainability of Construction Works — Environmental product declarations – Core rules for the product category of construction products. European Committee for Standardization.

EN ISO 13786 (2007) Thermal performance of building components - Dynamic thermal characteristics - Calculation methods, CEN – European Committee for Standardization.

ISO 13370 (2007) Thermal performance of buildings - Heat transfer via the ground - Calculation methods, ISO - International Organization for Standardization.

ISO 13789 (2007) Thermal performance of buildings - Transmission and ventilation heat transfer coefficients - Calculation method, ISO - International Organization for Standardization.

ISO 13790 (2008) Energy performance of buildings - Calculation of energy use for space heating and cooling, CEN – European committee for Standardization.

7. APPENDICES

7.1. Background document

In English

7.2. Design guide

In English.

7.3. Leaflet

In English.

7.4. Power Point Presentations

In English.

All the documents are available in CIRCABC website of the European Commission.

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KI-NA-27-91-EN-N

The technical objective of this project was to disseminate the knowledge acquired in the recent years about the environmental impact assessment of steel and composite buildings. During the last decade, a lot of research projects have been funded to develop methodologies, systems and products aiming at improving the thermal efficiency as well as the global environmental footprint of steel buildings. The new standard EN15804 intended for environmental calculation of buildings takes now into account the fact that steel is a recyclable material (Module D).

The project was divided in 4 steps:

- Realisation of documentation and software about sustainability of steel structures
- Translation of the documentation and software interface.
- Training for partners involved in seminars.
- Organisation of the Seminars in the different European countries.

There is also a dissemination package which consists in different documents and software which are available on the website http://sustainable-steel.eu/ :

- Design guide.
- Background document.
- Software AMECO which is also available on www.arcelormittal.com/sections.
- App version (mobiles/tablets) of LCA calculations, available also in App Store (Apple) and Google Play (Android)
- Leaflet
- PowerPoint presentations.
- All the documents translated into nearly all the European languages.

Seminars were also organised by the different partners in 16 different countries in their local language.

Publications Office

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