EcoShopping - Energy efficient & Cost competitive retrofitting solutions for Shopping buildings

Co-funded by the European Commission within the 7th Framework Programme.
Grant Agreement no: 609180.
2013-09-01…2017-08-31 (48 months).

Deliverable D1.2 First year annual report

Revision 0
Preparation date..... 2014-07-15
Due date 2014-08-31
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Dissemination level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Deliverable administration					
No & name	**Deliverable D1.2 First year annual report**				
Status	Draft / Working / Released	**Due**	2014-08-31	**Date**	2014-08-19
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Description of the related task and the deliverable in the DoW	Task 1.2: Project administration and control Task Leader: ENR (7) Partners Involved: SOL(4) T1.2 comprises a set of sub-tasks: 1) Strategic management - The Project Management Board (PMB) will be the highest level of management in the project and it will be chaired by the Chairman of the PMB. The PMB takes decisions regarding the project strategies and resolves conflicts within the project. The CPMB will strongly support the PC in the management & reporting of the project, acting both as a unique body called Consortium Management. The Project Management Board includes the following activities • Define the strategy for conducting the project according to the terms of the contract; • Monitor the progress of the project, identify corrective actions when necessary and authorise appropriate amendments to the work plan in order to meet the overall objectives; • Review the policy and strategy for dissemination and publicity of the project; • Assess the impact of any changes to the contract suggested by the European Commission and respond accordingly; • Resolve any conflict, technical, managerial or financial that may appear amongst the project partners; • Ensuring the proper definition of the exploitation of the project results; • Oversee and review the administration arrangements of the Project Coordinator; and • Agree on the management of the knowledge generated during the project. 2) Operative management – The sub-tasks are: • the first point of contact and communication with the EU Institutions, • the monitoring of the project progress according to the work-plan, time table, deliverables and deadlines established in the contract, • budget controlling, • risk management, • knowledge management. The scientific coordination of the project is not included in this WP. This WP only covers financial and administrative management/coordination activities. In accordance with article II.16 of the grant agreement, the efforts and costs related to the scientific coordination of the project are not included in this WP and will not be reported as management, but as RTD activities. The Deliverable is D1.2 First year annual report.

Planned resources PM	ENR	SOL	Total
	5	2	7
Comments			

V	Date	Authors	Description
0	2014-07-07	SOL jm	Index and structure
0.1	2014-08-01	ENR kh	First Draft
0.2	2014-08-08	SOL xh	Review of the first draft
0.3	2014-08-19	ENR eg	Draft to reviewers: AIT: Sergio Leal SYM: Sergio Garcia Carabías BRE: Ed Suttie
0.4	2014-08-26	ENR eg	Checked and released to the Coordinator for internal QA
1	2014-08-31	ENR eg	QA and submission to the EC.

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1. PUBLISHABLE EXECUTIVE SUMMARY

This report reviews the progress of the EcoShopping project from Month1 (September, 2013) to Month 12 (August, 2014). It gives a summary about the objectives for the respective period and in relation to that it identifies the achievements.

It gives an overview of the Project Management activities, the status of the project, project planning, occurred problems and their solutions, project meetings, milestones, deliverables and possible deviations from what had been planned previously.

In the part 4 and 5 the use of resources are explained in detail and the financial statements are given by each Beneficiary.

2. CORE OF THE REPORT FOR THE PERIOD

2.1 Project objectives for the period

The objectives for the period in question [M1 – M12] are embodied in the milestones list attached below. We have satisfactorily completed all the milestones planned in DoW.

Table 1: List of Milestones for the period (M1 – M12)

Milestone number	Milestone name	WPs involved	Lead Beneficiary	Delivery date Annex I	Achieved
MS1	Pre-Retrofit Building Assessment Report (Demo characteristic and Simulation Model)	WP1	LAG	M12	YES
MS7	System requirements, specifications and architecture	WP5	AIT	M9	YES

Management Milestones: Our major goal for the first twelve months was the establishment of the governance structure, the communication flow method, and to set up the public web page. The governance structure defined the roles and the responsibilities for the different committees and the project decision rules. It is formed by; the General assembly as a whole, the steering committee and the project management board. The communication method selected was the Teamwork PM software which is accessible from the webpage, capable to ease the exchange of information between the project members. Complementary, this document: 1st Year Annual Report reviews the work performed since the beginning of the project.

Technical Milestones: This year, five research Work Packages were started; WP2, WP3, WP4, WP5 and WP6.

The objective of Work Package 2 was to identify the European building codes, standards and requirements, to give an explanation about the European commercial building stock and retrofitting methodology and to study the viability and feasibility of the identified retrofitting technologies. After that, we aimed to investigate the requirements of Shopping Centre Owners, in special consideration to the Demonstration building IKVA Shopping Centre in the city of Sopron, Hungary and to develop a guide to identify the Owner's requirements and a comprehensive methodology for planning and maintaining a sustainable portfolio of Shopping Centres. The next step was the pre-retrofit assessment of the Demonstration building, the identification of the baseline of the IKVA to be used for energy savings calculations and investigation of the retrofitting options in multiple scenarios using a dynamic building simulation model in order to give the best retrofitting solution also considering aspects of the LEED methodology.

In Work Package 3 we investigate the different insulation solutions that are available or currently developed and introduced to the market from different aspects and we have created a database of these materials and solutions. The best-fit materials have been chosen for lab testing. The solution which will be identified the most promising and effective will be chosen for demonstration considering various aspects. Next to the insulation solutions, self-cleaning materials have been also studied and their usefulness in shopping centres are evaluated.

The other aim of this Work Package was to investigate energy-efficient lighting solutions for shopping centres and to identify their energy savings potential. Also we aimed to review the

rules and regulations of indoor lighting systems, provide an overview of the actual status of the lighting in the demonstration building and provide alternatives for the remodelling of these systems.

The objective of Work Package 4 was to provide system layout design with detailed technical specifications. It aimed to evaluate the HVAC system specifications to optimize the dimensioning and the best configuration distribution of the updated energy system (renewable energy system -photovoltaic or wind turbine-, DC heat pump and radiant heating/cooling system), to locate system inefficiencies and to evaluate the distribution energy systems to evaluate the existing local thermal comfort.

Moreover, the available technologies for energy-efficient improvements were identified taking into account the potential implementation areas in order to study and decide the optimal solution and the most suitable distribution configuration to decrease the energy consumption.

For this purpose, the dimensioning of the Renewable Energy (RE) powered heat pump and the evaluation of different installing and distributing models of the capillary tube system are needed.

The objective of Work Package 5 was to define the system requirements, specification and architecture of the Intelligent Automation Unit (IAU) Platform together with a low cost novel monitoring system which is a combination of distributed fixed sensor network and an autonomous Mobile Robot. The integration of the Mobile Robot, which collects environment data and offers service to visitors, not only brings an improved user oriented monitoring, but also enhances the building security with the integrated acoustic event detection system. Together with the collected data from the fixed sensor network, an instant representation of the building status is provided to the IAU, which then evaluates multiple scenarios, selecting the best strategy that fulfils the predefined energy saving goals with the minimum cost/impact. A Thermal Dynamics Modelling, calibrated with monitoring data, will be used in the optimization process performed by the IAU. The system performs a optimization calculation and executes the corresponding control, the result is that, the system will exploit the renewable energy and the inertia of the building which serves as a large thermal storage as much as possible, reduce the cost by load shifting, switch on the heating or cooling system more accurately in terms of time and temperature within an acceptable range (e.g. before the commercial building open, the HVAC starts up to adjust the comfort, when the tariff is lower, the system may also start heating or cooling). The partial load behaviour of the HVAC existing equipment will be investigated in detail and integrated to the IAU. The dependence of the HVAC equipment on variables as outdoor temperature will be monitored and taken as additional data.

The objective of Work Package 6 was to begin the preparation of an Operation and Maintenance plan that will detect degradation of physical and energy system performance, in addition to anticipating future failures and projecting the remaining life of physical and energy system in acceptable operating state before faults or unacceptable degradation of performance occur. For this purpose a detail operation and maintenance plan is being carried out.

The information of the existing systems (mainly focused on HVAC) and the new technologies to be implemented is being collected since we are writing the Operation & Maintenance procedures (protocols) explaining how to operate on a day-to-day basis to ensure safety and compliance of the indoor air quality, eliminate unnecessary energy consumption and lay down requirements to achieve/maintain high energy performance.

Other Milestones (Dissemination): During the year, we have defined our Dissemination Plan, which will be periodically updated during the whole project life. The Dissemination

Plan provides a comprehensive framework for the diffusion of the project concept, ideas and results. It gives a clear understanding of the target groups and the actions needed to approach them. At the same time, we created the website which will be used for the external dissemination of the knowledge developed in the project.

2.2 Work progress and achievements during the period

WP2. Continuous Assessment and Standardization *WP Leader: SOL*

WP2	Continuous Assessment and Standardization	Leader	YEAR 1											
			1	2	3	4	5	6	7	8	9	10	11	12
Task 2.1	Buildings Code, EPBD analysis and standardization	BRE												
Task 2.2	Buildings characterization and Retrofitting Methodology Design	IZNAB												
Task 2.3	User needs, services and scenarios	LAG												
Task 2.4	Pre-Retrofit Building Assessment	LAG												
Task 2.5	Post-Retrofit Building Assessment	IZNAB												
Task 2.6	Gap between theoretical and experimental performance	IZNAB												
Task 2.7	Life Cycle Analysis (LCA) oriented sustainable re-design of existing buildings	BRE												
Task 2.8	Industrial viability of new technologies and replication potential analysis	SOL												

Task 2.1 Buildings Code, EPBD analysis and standardization

Task Leader	BRE
Contributors	ANC
Schedule	01.09.2013 – 31.08.2017
Deliverables	D2.1 Assessment of national building codes, EPBD implementation and standards identified. (BRE/M6) D2.2 Accomplishment and Recommendations of Standardization (BRE/M48)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task analysed how the building codes for non-domestic buildings of the different European countries take into account energy efficiency, RES and in particular, the energy efficiency improvements of envelopes, lighting and HVAC systems of existing buildings.

A comparison and analyse has been made of the national building codes from the 10 European countries within the project, with specific reference to the Energy Performance Building Directive implementation, in order to evaluate the possible relevance of refurbishment technologies as a means of energy saving and energy consumption reduction,

and in general, the contribution of energy related objectives. This has been supplemented by data from project partners to make the work as comprehensive as possible while still being practical to implement. The primary sources of information include the Concerted Action (CA) EPBD, the Buildings Performance Institute Europe and previous pan European projects as well as national codes. Related standards such as, grid connection, electrical and mechanical equipment were identified and included as part of the critique. In all cases the analysis identified key variations and overall trends in the approaches taken by different counties.

With the assistance of ANC, BRE will set up information material regarding the proposed new procedures and methods, discussions with experts from standardisation and regulatory bodies and presentation of proposed procedures at international conferences and expert meetings. Actions will be limited to group discussions and activities, e.g. presentations on a group scale to attendees at conferences and expert meetings. The work will monitor significant changes during the 48 month project duration to existing regulations and codes (D2.1) and contribute to D2.2.

✓ **Significant results**

D2.1 Assessment of national building codes, EPBD implementation and standards identified. This 160 page report reviews the implementation of EPBD in the 10 partner countries of the project. It has been delivered January 2014.

Keynote paper ECOSHOPPING: ENERGY EFFICIENT & COST COMPETITIVE RETROFITTING SOLUTIONS FOR RETAIL BUILDINGS by Lewry and Suttie presented at the 6th “Romanian Conference on Energy Performance of Buildings” (RCEPB-VI) 5 – 6 June 2014, Bucharest, ROMANIA. It has been delivered June 2014.

Abstract submitted for 5th CIBSE best practice symposium "Simple buildings, better buildings? Delivering performance through engineered solutions" 16th - 17th April 2015, London, UK ECOSHOPPING: ENERGY EFFICIENT & COST COMPETITIVE RETROFITTING SOLUTIONS FOR RETAIL BUILDINGS – A REVIEW OF BEST PRACTICE by Lewry and Suttie.

Task 2.2 Buildings characterization and Retrofitting Methodology Design

Task Leader	IZNAB
Contributors	RED, LAG, ANC
Schedule	01.09.2013 – 28.02.2014
Deliverables	D2.3 Identification of European existing peri-urban commercial buildings stock and retrofitting methodology (LAG/M6)
Status	Finished
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task reviewed the European existing commercial building stock and defined a retrofitting methodology, based on a multi-criteria analysis and the task also identified indoor and outdoor comfort indicators, and building energy performance levels.

A commercial building retrofitting process is presented, which is divided into five steps: Project Setup & Pre-retrofit Survey, Energy Auditing and performance Assessment, Identification of Retrofit Options, Site Implementation and Validation & Verification. The Economic analysis methods (which are used to evaluate the economic viability of building retrofit measures) and Risk assessment of buildings retrofits are evaluated in order to make a comparison between the capital investment and the benefits that can be achieved due to implementation of the retrofit measures.

Some basic measures that can be implemented in the commercial buildings are introduced. These measures include passive and active technologies, including lighting (daylight and management of solar loads), envelope (thermal performance of external walls), HVAC systems, airtightness and retrofitting of windows.

In the section 5, the European commercial building stock is assessed, focusing on some characteristics: Existing stock by age bands, Envelope performance (Transmittance and Air tightness values), HVAC system types of the existing commercial buildings (Central, Packaged and Individual AC) and their energy consumption values. In most cases, detail information is studied in different European countries so as to give a clear idea of the energy situation of wholesale and retail trade buildings in each country. Additionally, in order to raise the awareness of energy efficiency, the energy consumption in commercial buildings is also compared to the data of other non-residential buildings.

- ✓ **Significant results**

The most important conclusion of the Deliverable that has been prepared at the end of this Task is the design of a systemic retrofitting methodology based on a multi-criteria analysis, which identifies the key points during the preparation, design, construction and use phases of the project.

This study analyses the Buildings retrofitting methodology.. In addition to the retrofitting methodology, several retrofitting measures that could be implemented in shopping centres are analysed. These measures include lighting, envelopes, HVAC systems, windows, and airtightness.

In order to check the benefits of retrofitting measures, several economic analysis methods are explained, which are tools to evaluate how the reduction in the energy consumption (and electrical invoices) justifies economically the capital investment of specific retrofitting measures.

The report gives a clear idea of the existing commercial building stock in the European countries and identifies some characteristics with regard to the Energy performance, efficiency and consumption. The several parameters that are analysed in each country for commercial buildings show how the European regulations (and a greener conscious of all the citizens) have achieved a better energy performance of envelopes (transmittance and Air tightness values) and how the energy consumption has decreased remarkably for the last years.

These categories are divided into different European countries so as to give an interesting comparison of the energy situation of wholesale and retail trade buildings between different European countries. These commercial building values are also compared to the data of other non-residential buildings to notice how important is to accelerate the implementation of energy conservation measures and to improve the existing non-residential buildings, not only the commercial ones, but also decrease the energy consumption in offices, hospitals, hotels, restaurants and educational buildings.

In the analysis of the European commercial building stock (in which it is also considered the age and their localization), the most important and deployed HVAC plants are greatly analysed, since this aspect is very important in the whole building energy performance.

This study will have influence in the R&D work packages and also in Demonstration work package (WP7) because it provides a systemic retrofitting methodology for shopping centres taking into consideration several retrofitting options, including passive and active technologies.

Task 2.3 User needs, services and scenarios

Task Leader	LAG
Contributors	SYM, AIT
Schedule	01.09.2013 – 31.05.2014
Deliverables	D2.4 Owner's requirements and usage scenarios (LAG/M9)
Status	Finished
Deviations from the DoW	None
Risks notice/probable	The comfort questionnaire survey in the pilot building was made during winter period, and possible differences would be experienced in some comfort results during a questionnaire made in the summer period.

✓ **Summary**

The aims of Task 2.3 are to define the owner's requirements on the retrofitting scope, to describe the technological and building energy regulations, to give a method how the end user needs can be gathered and evaluated, and by using this method to make a survey at the demo building. In addition, the Deliverable 2.4 that has been made as the result of this task, describes the retrofitting technologies and the integration of them in the EcoShopping project, and presents the use cases and the scenarios. The main target of the use cases is to describe the requirements, functionalities and applications for the EcoShopping information modelling and related EcoShopping tool development purposes.

In D2.4 report the relevant technological, building energy, operational and maintenance requirements were presented. Two questionnaires were made in order to survey the owner, and the end user requirements: the Owner questionnaire and the Comfort questionnaire. On one hand the owner's requirements can be gathered by using the Owner questionnaire, which focuses on the following topics:

- Approach and regulations: owner's intention on retrofitting, usage of renewable energy sources (RES), national regulations on RES, etc.
- Indoor requirements: specification of indoor comfort parameters as temperature, air quality, noise level, quality of lighting, etc.
- Technical orientation and policies: owner's demand for the heating, domestic hot water, cooling and ventilation systems; energy cost saving; rating the energy and maintenance cost, etc.
- Operation and maintenance: energy consumption and maintenance costs of the building, maintenance costs of HVAC and lighting systems, operation of the building, etc.
- Lease: services are included in tenants' contract, market position, etc.
- Future: regulations and new standards, future market positioning, etc.

On the other hand, the opinion of the end users about the current indoor comfort parameters can be assessed by using the Comfort questionnaire. The results of the comfort questionnaire

evaluation were presented, which should be taken into account in the design process of the retrofitting project. In the pilot building, the measures should be implemented to improve comfort sensation of employees and visitors regarding the operative temperature, the ventilation, and the lighting.

The retrofitting system specifications and the integration with other subsystems, such as 1) Envelope solutions, 2) Daylighting systems and 3) HVAC equipment are defined.

Eight use cases have been defined in the report, which support the scenario description and testability of the established solutions. The purpose is to reduce the consumption of energy without losing comfort for users and providing, at the same time, higher security, automatic and reliable information services to workers and facilitate the system maintenance tasks.

The narrative description of each use case and the description of the use case related actors were given. The selection of relevant use cases for the development of the EcoShopping information model is based on the need of the EcoShopping demonstrations related tools, such as Envelope and daylight technologies, HVAC and RES integration, Intelligent Automation Unit, Operation and Maintenance, Monitoring and end user collaboration.

D2.4 report was made by Lagross Ltd. (LAG), with the contribution of Austrian Institute of Technology GmbH (AIT), and Systemas y Montajes Electricos SL (SYM). LAG was responsible for surveying the owner's requirement, including technological and building energy requirements, and LAG made the end user needs assessment, and a survey on indoor environmental comfort parameters in the demo building. SYM described the operation and maintenance requirements, the retrofitting technologies and the integration of these technologies. The use cases of the EcoShopping system was provided by AIT, with a contribution of SYM and LAG. BRE, RED, Yasar, FHG and SOL have reviewed the document and their valuable comments have been integrated to the report. As the main contact to the Shopping Centre Owner, ENR and Task 7.1 were closely involved.

- ✓ **Significant results**

The main technological, building energy, operational and maintenance requirements were described. In order to survey the owner and the end user requirements, the so called Owner questionnaire and Comfort questionnaire, and a Guide was made. The owner's demand on HVAC and lighting systems, predicted energy cost saving, maintenance, etc. can be gathered using the Owner questionnaire. Based on the comfort questionnaire the opinion of the end-users about the current indoor comfort can be evaluated, and also can be found out what parameters should be improved in order to achieve a better indoor environment.

D2.4 also contributes to the assessment of the current status of a commercial building, by developing an overview of the insulation solutions, daylighting technologies, HVAC system of the projects demonstrator. Use cases have been defined, which support the scenario description and testability of the established solutions.

Task 2.4 Pre-Retrofit Building Assessment

Task Leader	LAG
Contributors	ENR, IZNAB, AIT
Schedule	01.09.2013 – 31.08.2014
Deliverables	D2.5 Pre-Retrofit Building Assessment (Demo characteristic and Simulation Model). (LAG/M12)
Status	Under process, will be finished on time.

Deviations from the DoW	We have been used the LEED V4 instead of the 2009 LEED NC that was determined in the DoW. LEED V4 is the latest version of the LEED. LEED 2009 outdated this summer.
Risks notice/probable	We needed some results of the lighting & daylighting systems and radiant ceiling system, but both of them will be simulated only in the later period of the research (after M12) so some input based on informed estimation.

✓ **Summary**

This summary is made on 30th July 2014, therefore making of D2.5 report is in progress, but will be finished on time according to the DoW.

In order to evaluate the pre-retrofit status of the pilot building a detailed inspection on the spot was carried out. This inspection included the survey of the building structures, identification of the energy consumption systems, such as heating, ventilation, air conditioning, domestic hot water and lighting systems. The survey provided data about the control and the set-points of the existing equipment. Having these data gave the possibility to evaluate the actual, i.e. the pre-retrofit status of the building.

The whole building energy model was made in EnergyPlus by AIT with the help of LAG, based on the survey of the building. The pilot building IKVA shopping centre is located in Hungary, therefore the building energy performance in the pre-retrofit status are calculated also according to the national building energy requirements, besides the EnergyPlus calculation.

The focus of the work was definitely on the energy optimization; however other aspects from LEED methodology were also taken into account in order to make holistic approach of the retrofitting.

✓ **Significant results**

A building energy model was made in EnergyPlus, which gave the possibility to investigate different optimisation scenarios to determine the energy performance of the whole building.

The proposed retrofitting solutions of the pilot building were defined and simulated with the EnergyPlus building energy model. The investment cost and the energy cost saving were also analysed in order to select the energy efficient and cost competitive retrofitting solution.

The main result of the task is summarized in D2.5 Pre-Retrofit Building Assessment. This contains the LEED V4 evaluation of the proposed retrofitting scenario.

Task 2.6 Life Cycle Analysis (LCA) oriented sustainable re-design of existing buildings

Task Leader	**BRE**
Contributors	SOL, ANC
Schedule	01.09.2013 – 31.08.2017
Deliverables	D2.8 LCA report. (BRE/M48)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task focuses on the sustainable re-design of the existing building and the technologies for retrofitting as deployed in the case study shopping centre IKVA, Sopron, Hungary. The analysis will require each of the refurbishment options to be set so that the embodied impacts can be calculated by BRE using its LCA methodology. This will include initial embodied impacts, reasonable maintenance and end of life disposal. An existing LCA database will be used coupled with gathering additional data required to fill in gaps in the existing dataset, SOL and ANC will assist BRE to collect the additional data to build up the adapted LCA database.

Calculation of the embodied impacts will include; Raw materials extraction, Manufacturing, Fabrication, Assembly, Transportation and Recycling. This data will then be combined with the information provided by Tasks 2.3, 2.4 and 2.5 so that a complete LCA picture can be built up. Deep Retrofit options will be considered including separation of embodied impacts and operational impacts. The result of these calculations will show which options are likely to produce the lowest overall impacts for the complete life cycle. The possibility to add options for analysis will be kept open until the completion of task 7.1, after which the analysis will be finalised.

Optional analysis will be carried out on the operational impacts to look at the effect of various future energy provision scenarios. This might include different amounts of nuclear power, wind, PV present in national electricity provision.

✓ **Significant results**

Environmental impact data discussions have started with technology providers.

Task 2.7 Industrial viability of new technologies and replication potential analysis

Task Leader	SOL
Contributors	IZNAB, FHG, ISA, NOVA, CNR, YASAR, NTUST, LAG, SYM, ANC
Schedule	01.09.2013 – 31.08.2017
Deliverables	D2.9 Viability and feasibility report of retrofitting Technologies. (SOL/M6) D2.10 Replication potential analysis report (SOL/M48)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task is divided into two parts. In the first part (six first months of the project) it was studied the viability and feasibility of retrofitting technologies (some of them to be implemented in IKVA shopping centre). The second part is longer (from the 7th month to the end of the project) and currently under study: the replicability of the chosen technologies in each R&D WP.

During the first 6 months, it was evaluated the industrial viability of different technologies for a retrofitting project in commercial buildings, carrying out a deeper analysis for selected technologies which are possibly to be implemented in the demo building located in Sopron (Hungary). This review and analysis was collected in the deliverable 2.9.

This Deliverable is also an assessment of the new and emerging retrofit solutions and HVAC technologies and it is conducted through the identification of their strengths, weaknesses, opportunities and threats (SWOT). The assessment was based on the information collected from previous studies and scientific publications and it was divided into five sections: 1) Envelope materials; 2) Lighting and Daylighting technologies; 3) HVAC and Renewable Energies; 4) Building Management Systems; and 5) Maintenance procedures.

For technologies that are in development process within the R&D Work Packages (WP3, WP4, WP5 and WP6) a deep study and analysis was performed regarding the main characteristics, energy savings potential, cost-benefit and Return On Investment (ROI). Moreover, the chosen options were compared with further alternatives in order to study their technical and economical viability, ideas about how the demo site could be improved are assessed and provided in each research field to the EcoShopping R&D partners.

- ✓ **Significant results**

In this task, we have evaluated and compared different technologies and solutions that can be implemented in a retrofitting project of a shopping centre. Although not all the studied alternatives are available on the market or they are not suitable enough for all kind of shopping centres (different circumstance need to be taken into account, for example, the surroundings and climates), the assessment and study of these alternatives, including the new and emerging retrofit solutions could help designers and building owner in their decision process, offering them a database or guideline, with detailed analysis in strengths, weaknesses, opportunities and threats of the potential solutions and some technical data.

As a predeep research activity, this study enables our partners to review the risk and weak points of each technology and solution, allows us to have a holistic view by trying to integrate different solutions as a whole. Nevertheless, this study will serve as a database of backup alternatives when any serious problems rise with the listed solutions in any WPs, such as the unsolvable technical difficulties, unexpected cost and unavailability of any component etc., the whole consortium then may replace immediately by turning into this listed alternatives for further investigation avoiding unnecessary time lost and cost.

After this study, we have realised that, in some cases, the technologies to be researched and implemented may not be the best option (technically, environmentally and/or economically), but the building as a whole cannot be split up ignoring the links between its subsystems, instead, a systemic vision is fundamental when designing a solution for a building. The integration of different technologies by maximizing the advantage of different technologies and solutions is crucial.

WP3. Envelope and Day lighting technologies WP Leader: CNR

WP3	Envelope and Day lighting technologies	Leader	YEAR 1											
			1	2	3	4	5	6	7	8	9	10	11	12
Task 3.1	Specification of Insulation and daylighting requirements	CNR												
Task 3.2	Effective insulation solution (wall and window)	CNR												
Task 3.3	Daylighting system	NTUST												
Task 3.4	Optimisation and evaluation of Insulation	CNR												

Task 3.5	Optimisation and evaluation of Daylighting system	RED												

Task 3.1 Specification of Insulation and daylighting requirements

Task Leader	CNR
Contributors	RED, NTUST, IZNAB, ANC
Schedule	01.12.2013 – 31.05.2014
Deliverables	D3.1 Specification of selected types of insulation solution based on the created database of the different conventional and most innovative insulation technology and self-cleaning materials. (CNR/M9) D3.2 Day lighting requirements (RED/M9)
Status	Finished
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

Task 3.1 addressed different activities concerning insulating materials for walls/roofs and windows, self-cleaning products and lighting technologies.

A state of the art of the commercial insulating materials was the basis for the selection of the most promising ones. The criteria of the choice were mainly related to the optimal costs/performance ratio, as well as pros and cons of each product. A review on the past and on-going European projects was also performed to identify the main research trends concerning insulating products for walls/roofs and windows.

To achieve both depolluting and self-cleaning effects in indoor environments, self-cleaning coatings can be used to cover the insulating panels. Therefore, a research on commercial doped titanium photo catalyst products was carried out in order to select the most proper ones to be used both as benchmark and as basis for further developments within EcoShopping project.

Concerning lighting technologies, an overview of the actual systems (both daylighting and electric lighting) used in shopping centres was fulfilled; control strategies and systems, quality and comfort considerations were also covered.

Besides, the different standards and codes associated to insulation, indoor lighting systems, comfort, health and energy saving targets at national and European level were identified.

✓ **Significant results**

The selection of the insulating materials was performed considering as major parameters thermal conductivity, cost and thickness to save inner space. The most suitable insulating solutions selected for the characterization of their physical properties in laboratory are Expanded Polystyrene (EPS), Aerogel and Thermoset.

Commercial self-cleaning products for indoor application were also selected. Degussa P25 is used as benchmark and it will be analysed in laboratory, next to the other selected products and to the new developed titanium photo catalyst, in order to compare their performance.

The actual situation of lighting within the demo site was described in terms of building configuration and lighting system composition. The different area's and options for the

building remodelling were outlined taking into account low, medium and high budget solutions that will be developed in the subsequent task within this work package.

Finally, four different structured databases were created to organize the collected information about insulating materials, self-cleaning coatings, lighting technologies, standards and codes. These databases were published on the project website. They are accessible by the consortium of the EcoShopping project both for consultation and implementation, and by anyone outside the project who is interested in finding information and being updated on the current insulating solutions available in the market, including the most innovative ones.

Task 3.2 Effective insulation solution (wall and window)

Task Leader	CNR
Contributors	RED
Schedule	01.6.2014 – 31.05.2015
Deliverables	D3.3 Evaluation and identification and of the most efficient insulation materials to be installed in field (CNR/M21)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

Task 3.2 started in June 2014 and will last until May 2015. The aim is to analyse the selected insulating materials and self-cleaning products in laboratory in order to find the best solutions to be used for the installation in the case study.

In particular, innovative and conventional materials will be physically characterized both separately and in combination with each other. Measurements such as thermal conductivity, vapour resistance, moisture sorption and so on will be performed.

The new doped titania photo catalyst will be chemically characterized and its self-cleaning and depollution capacity will be evaluated. In particular, the modification of the band gap to extend the photocatalytic activity under visible radiation and to reduce the dependence on the presence of UV light will be assessed in comparison to actual commercial products.

✓ **Significant results**

Up to date, the manufacturers of the insulating materials have been identified. The work is still in progress in relation to the planning of the laboratory tests for the physical characterization of the products and to the identification of the possible composition to be tested. Also the costs for the construction of a mini demo to perform the analyses are under evaluation. The analyses will include the measurement of the thermal conductivity by Guarded Hot Plate, the specific heat by differential scanning calorimeter (DSC), the thermal diffusivity and effusivity in dynamic thermal conditions; the hydrophobic response to liquid water and the vapour resistance of the materials will be evaluated as well.

Concerning self-cleaning products, the laboratory tests on reference TiO2 (Degussa P25), commercial products and the new developed photo catalyst are in progress. They have been characterized by means of X-Ray Diffraction, IR, UV-Vis, TGA, FEG-SEM and EDS measurements to identify their composition in terms of active components and eventually binders and additives for commercial ones. Contact angle measurements are also planned. The formulation of the coating including the new synthesized photocatalytic compounds is

currently under examination. In the meantime, first photocatalytic tests to assess their performance are in progress both under UV (254 nm) and Xenon lamps. Thanks to D3.2 results, the most interesting lightings technologies will also be investigated to assess the self-cleaning properties of the commercial and novel coatings under those lighting exposure.

Task 3.3 Day lighting systems

Task Leader	NTUST
Contributors	RED
Schedule	01.6.2014 – 31.05.2015
Deliverables	D3.4 Design of day lighting system (NTUST/M21)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

We made several significant improvements to the NLIS (Natural Lighting Illumination System), including a new version of Light Collection Sub-System), and a new design of Light Transmission Sub-System. In addition, we add intelligent control mechanism to the Light Emission Sub-System (based upon ZigBee wireless scheme), which enables better light distribution depending on various applications of NLIS. In the demonstration site we newly built at NTUST, we use an indoor plant gardening as a application example.

We also implemented a new analysis-design-fabrication standard procedure for our NLIS research: by adopt a newly bought 3D printer (OBJECT from Stratasys), we are able to fast fabricate new design of NLIS components, no need to send for out-souring mock-up, and perform measurement of them instantly, which saves design-verification cycle time.

We intend to further modularise the overall NLIS system, to facilitate easier installation. Currently, the NLIS is composed of multiple modules, each LightModule is composed of multiple LightBricks, and each LightBricks are made up of multiple SunLegos. The SunLego is the smallest and the most fundamental unit of the whole NLIS system.

To proceed with the NLIS development, we will be focusing on the sub-system integration, to improve the overall system performance.

✓ **Significant results**

- Innovative design of each sub-systems (collection, transmission and emission) contributes overall NLIS system performance.
- Intelligent output control mechanism allows better indoor sunlight applications.
- By adapting 3D printing technology, we speed up NLIS analysis-design-verification procedure.
- Using modularised system design, improve overall system performance and for easier implementation.
- Based on the above progress, we publish scores of journal and conference papers, which promotes the utilization and proliferate of NLIS.

WP4. HVAC and RES integration WP Leader: SYM

WP4	HVAC and RES Integration	Leader	YEAR 1										
			1	2	3	4	5	6	7	8	9	10	11	12
Task 4.1	Specification of HVAC system	SYM												
Task 4.2	Capillary Tube Technology for cooling and heating	GCD												
Task 4.3	RE powered DC heat pump Integration	YASAR												
Task 4.4	Integration and evaluation	SYM												

Task 4.1 Specification of HVAC system

Task Leader	SYM
Contributors	SOL, IZNAB, YASAR
Schedule	01.12.2013 – 31.05.2014
Deliverables	D4.1 Layout of system hydraulics, technical specification of main components and operation scheme (SYM/M9)
Status	Finished
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task has served to evaluate the HVAC system specifications to optimize the dimensioning and the best configuration distribution of the updated energy system (renewable energy system -photovoltaic or wind turbine-, DC heat pump and radiant heating/cooling system).

The systems inefficiencies in IKVA shopping centre have been analysed with the collected demand profiles, evaluating the distribution energy systems and doing the calculation of the Predicted Mean Vote (PMV) and Predicted Percentage Dissatisfied (PPD) indices to evaluate the existing local thermal comfort (which is also compared with the results of the customers/employees survey in Task 2.3).

Moreover, the available technologies for energy-efficient improvements were identified taking into account the potential implementation areas in order to study and decide the optimal solution and the most suitable distribution configuration to decrease as much as possible the energy consumption. For this purpose, the dimensioning of the Renewable Energy (RE) powered heat pump is analysed and different installing and distributing models of the capillary tube system are evaluated.

✓ **Significant results**

The most common inefficiencies of HVAC systems in commercial buildings have been analysed in order to provide a kind of database of these operational problems and how they can be solved. With the same purpose, the approach was focused on the existing HVAC system in IKVA shopping centre.

In this task has been analytically explained the differences between the survey results regarding indoor thermal comfort and calculated PMV and PPD indices. In the survey that was made in Task 2.3, there were obtained two kinds of answers depending on who answered

the questions: customers or employees. The metabolic and clothing insulation rates justified the differences between these two types of answers.

After analysing the HVAC inefficiencies and connecting their consequences to the indoor thermal comfort, a useful study of the available technologies in the market to improve energetically these HVAC systems was performed. To that end, a list of technology options that could potentially reduce the energy consumption (with regard to the HVAC field) in commercial buildings is shown and afterwards, fourteen solutions were deeper analysed.

Moreover, the dimensioning and distribution of the RE powered heat pump and the capillary tube system was studied within this task. Firstly, with regard to the renewable energies, two possibilities were evaluated: 1) Solar photovoltaic system, and 2) A Combination of Solar photovoltaic and Micro wind turbine system. This second alternative is more interesting and would take advantage of the two sources (sun and wind) during the whole year. The problem for this choice is that IKVA is within a historic environment and a Municipality and National park authorizations are needed for installing this renewable energy system.

For the installation of the capillary tube mat, different configurations of this radiant system are explained depending on the typology of the ceiling in IKVA (there are 5 different ceiling constructions). This matter was not concluded before the end of this task because it had to be discussed further with the entire consortium since it did not only affect to the HVAC system, but also to WP3 (lighting and envelope) and WP5 (IAU).

Task 4.2 Capillary Tube Technology for cooling and heating

Task Leader	GCD
Contributors	SYM, ANC
Schedule	01.6.2014 – 28.02.2015
Deliverables	D4.2 Radiant ceiling system report: technical description, engineering design and requirements. (GCD/M18)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

GCD's first phase of the D4.2 is in progress; according to the work package are a lot of inputs from other work packages required. By going through the already completed deliverables many of the required inputs were defined, but there are also important information missing, like e.g.:

- Consumption profile by LAG as result of EnergyPlus calculation, the results of the building simulation were not submitted yet, so far the results of the EnergyPlus calculation will be assumed regarding the heating and cooling load, although the capillary tube mats could not be integrated in the building model at the present
- Temperature requirement by the owner is unknown, the recommendation of operative temperatures of D2.4 will be assumed, but if they accord to the owner's requirement is an open-end question
- Location of the renewable energy system not defined yet, but GCD is under discussion with SYM

- According the layout of the capillary tube system, definition of build-in lights and ventilation outlets in the ceiling are not defined - the numbers, size and position of these components have an effect to the capillary tube system, which may not be underrated
- Build-in lights, ventilation outlets and similar constructions in the ceiling reduce the available space for the capillary tube system and have to be considered
- SYM provided in D4.1 two different system layouts, 5 possible ceiling constructions and 3 scenarios of retrofitting the IKVA shopping centre regarding the areas of the shopping centre. In combination with D2.3 and the different heating and cooling sources (HP for cooling and heating + existing gas boiler) there will be many different possibilities for implementing the heating and cooling system

GCD is figuring out which combinations will be most suitable for the retrofitting of IKVA shopping centre in cooperation with SYM.

Task 4.3 RE powered DC heat pump Integration

Task Leader	YASAR
Contributors	IZNAB, SYM, ANC
Schedule	01.6.2014 – 31.8.2015
Deliverables	D4.3 Design of the RE powered DC heat pump system (YASAR/M18) D4.4 Prototype of air-water RE powered DC heat pump (YASAR/M24)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

In the **Task 4.3. Renewable Energy Powered Heat Pump Integration** will be realized by YASAR UNIV. is the leader of this task. This task has started on June 1st, 2014 Partners involved in this task are YASAR, IZNAB, SYM, ANC.

Already started:

- YASAR has started the preliminary design of a small medium renewable energy powered DC Heat Pump with variable speed compressor to the existing HVAC&R system.
- YASAR has started identifying relevant energy, exergy and exergoeconomic metrics for performance analysis.
- YASAR discussed the basics of the HP control system with a potential vendor VIESSMANN, and will provide a detailed control strategy which guarantees the DC HP work smoothly with the RE system.

Starting soon:

- SYM and YASAR will realize simulations for system dimensioning and system optimization, taking the inertia of the building as one of the inputs.
- YASAR and ANC will analyze the optional renewable energy system, such as PV and wind turbine, and selected according to the energy availability, system requirement and building structure.
- SYM will consider architectural aspects and aesthetical issues during the engineering design and integration.

✓ **Significant results**

To start prepare deliverable an email has been sent to the partners. On the other hand, to be able to complete the Task 4.3, we will need some outputs from Tasks 4.1 and 4.2 since we need radiant ceiling system details to define the HP operating conditions.

In April 2014, YASAR had a meeting together with the representatives of VIESSMANN to discuss about the HP system to be installed. We went through the data on the system sent to us by ENR.

Preliminary design study focused on cooling only case for a 1000 m2 area. A HP system with both heating and cooling capacity for the entire shopping mall floor area will be considered. Given these modifications in the scope of the HP system, we will have another meeting with VIESSMANN to discuss alternative solutions.

WP5. Intelligent Automation Unit WP Leader: NOVA

WP5	Intelligent Automation Unit	Leader	YEAR 1											
			1	2	3	4	5	6	7	8	9	10	11	12
Task 5.1	System requirements, specifications and architecture	AIT												
Task 5.2	Design of fixed sensor network	ISA												
Task 5.3	Data processing and management	FHG												
Task 5.4	Mobile Robot integration	FHG												
Task 5.5	Building modeling and Weather model integration	AIT												
Task 5.6	Optimizer & Control Unit (Control Strategy and action development)	NOVA												
Task 5.7	Web service platform development (UI) and evaluation	NOVA												

Task 5.1 System requirements, specifications and architecture

Task Leader	AIT
Contributors	ISA, FHG, NOVA, SOL, ANC, IZNAB
Schedule	01.12.2013 – 31.05.2014
Deliverables	D5.1 System requirements, specifications and architecture (AIT/M9)
Status	Finished
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This document aims to define the system requirements, specification and architecture of the Intelligent Automation Unit (IAU) Platform together with a low cost novel monitoring system which is a combination of distributed fixed sensor network and an autonomous Mobile Robot. The integration of the Mobile Robot, which collects environment data and offers service to visitors, not only brings an improved user oriented monitoring, but also enhances the building security with the integrated acoustic event detection system. Together with the collected data from the fixed sensor network, an instant representation of the building status is provided to the IAU, which then evaluates multiple scenarios, selecting the best strategy that fulfils the

predefined energy saving goals with the minimum cost/impact. A Thermal Dynamics Modelling, calibrated with monitoring data, will be used in the optimization process performed by the IAU. The system performs a optimization calculation and executes the corresponding control, the result is that, the system will exploit the renewable energy and the inertia of the building which serves as a large thermal storage as much as possible, reduce the cost by load shifting, switch on the heating or cooling system more accurately in terms of time and temperature within an acceptable range (e.g. before the commercial building open, the HVAC starts up to adjust the comfort, when the tariff is lower, the system may also start heating or cooling). The partial load behaviour of the HVAC existing equipment will be investigated in detail and integrated to the IAU. The dependence of the HVAC equipment on variables as outdoor temperature will be monitored and taken as additional data.

As target group are the system developers foreseen. These documents support their implementation and development work by defining the system requirements, specification and architecture.

✓ **Significant results**

The main results presented in this report are the description of the system requirements, system specification and system architecture for EcoShopping IAU system.

- Description of the EcoShopping IAU system including the fixed sensor network, the mobile sensor network and the control system;
- Listing of the standards which should be considered when developing the EcoShopping IAU system;
- Description of the EcoShopping relevant communication between building and IAU;
- Description of the communication between the (fixed and mobile) sensor networks and the control system;
- Description of the system architecture to be adopted when considering IAU systems;

Task 5.2 Design of fixed sensor network

Task Leader	ISA
Contributors	FHG, NOVA, AIT
Schedule	01.6.2014 – 30.11.2014
Deliverables	D5.2 Design of fixed sensor network (ISA/M15)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

Design of fixed sensor network (Task 5.2.) is included in the WP5 that aims to develop an Intelligent Automation Unit (IAU) Platform together with a low cost novel monitoring system which is a combination of distributed fixed sensor network and an autonomous Mobile Robot.

The fixed sensor network infrastructure will be able to collect data in each zone of the building according to the Task 5.1. The infrastructure will be based on ICT for monitoring and metering energy consumption, indoor and outdoor environment parameters in order to verify the final performance of the building retrofitting.

The monitoring solution is oriented on the evaluation of site indoor and outdoor environment parameters measurement, such as: thermal comfort, relative humidity and air quality, together

with energy consumption. The intelligent system will improve the energy consumption and energy efficiency while maintaining or improving the comfort levels and the indoor environmental quality,

- ✓ **Significant results**

After the development done in *Task 5.1 System requirements, specifications and architecture*, the *Task 5.2 Design of fixed sensor network* (Figure 1) will be started to be developed.

The fixed sensor network infrastructure will be composed by: 10 Temperature& Humidity sensors; 6 CO2 meters; 11 electricity meters; 33 Current Transformers; 3 Heat consumption meters; 3 indoor light irradiance sensors; 7 gateways radio MBUS; 3 Hubs (gateways) Modbus TCP and one weather station.

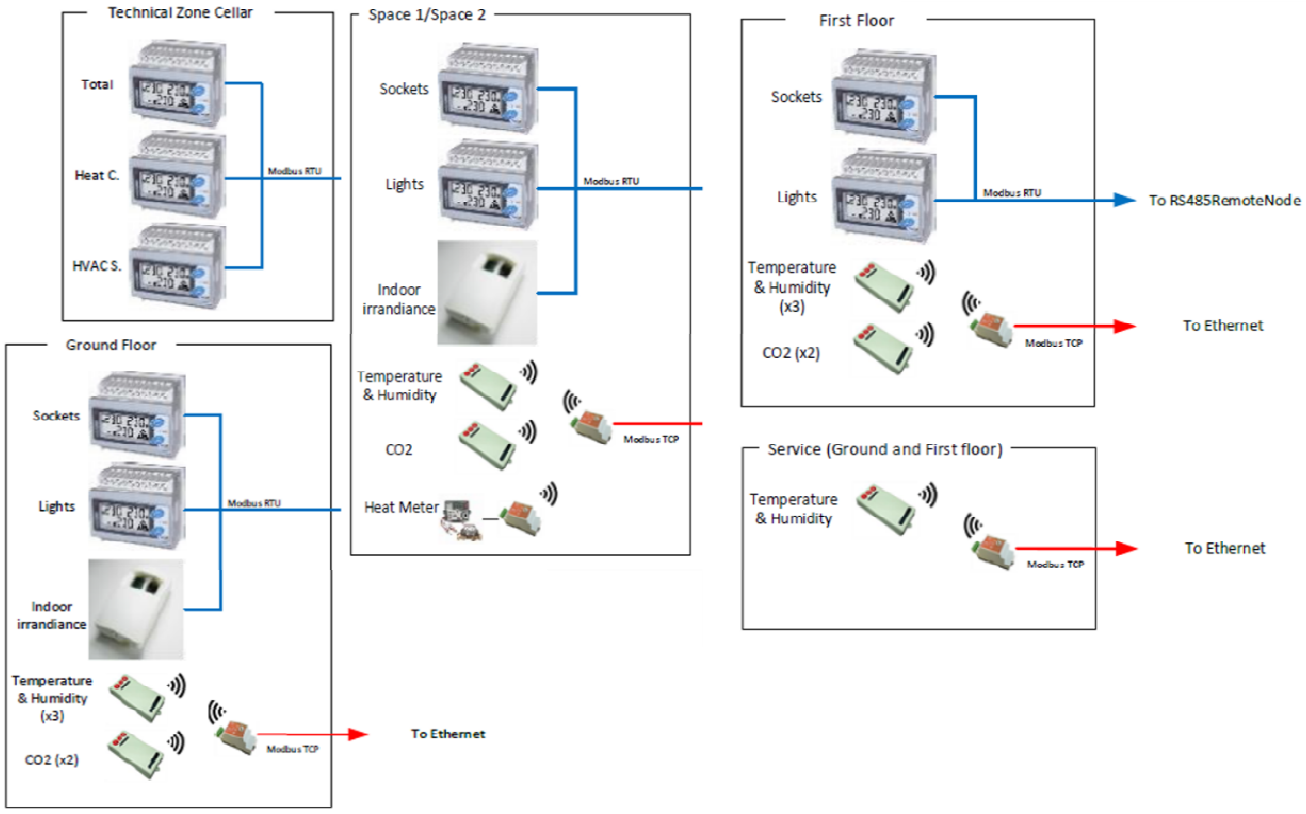

Figure 1. Fixed Sensor Network Design

Task 5.3 Data processing and management

Task Leader	FHG
Contributors	ISA, NOVA, AIT
Schedule	01.6.2014 – 31.8.2015
Deliverables	D5.3 Acoustic and Environmental Data Processing implementation. (FHG/M15) D5.4 Environmental Data processing implementation (ISA/M15) D5.5 Interface between acoustic/environmental processing units and Optimizer & Control Unit (OCU) (FHG/M24)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	Delayed due to undefined purchasing procedure

✓ **Summary**

Subtask 1. Acoustic and Environmental Data Processing

The general acoustic fixed sensor system architecture is designed and discussed to fit to multiple external conditions. We are working on a prototype of the acoustic sensor with integrated AD-converter taking into account specific EcoShopping adjustment, i.e. hardware dimensions need to be feasible for wall mounting. The acoustic sensor unit contains a Field-programmable gate array (FPGA) board for potential signal-processing on the sensor unit itself. Acoustic event detection and necessary acoustic pre- and post- processing will take place on the central acoustic processing unit which is directly connected to the fixed acoustic sensor network. The software for the acoustic processing unit is not yet adapted to the specific EcoShopping Hardware, due to the hardware purchasing delay. No data gathering has been performed up to now, since there is no hardware available

Subtask 2. Environmental Data processing

Environmental data interface definition is finished by ISA. Preliminary planning presumes the data storing to be handled by the Optimizer Control Unit (OCU). Current planning also assumes, OCU will handle environmental data processing and metadata combination.

Subtask 3: Interface between acoustic/environmental processing units and Optimizer & Control Unit

Fixed sensor network interface definition is done, dealing with sensor data transport towards the acoustic processing unit. Environmental data interface definition is also done. The metadata interface from the acoustic processing unit to the OCU will be implemented accordingly to the Environmental data interface definition.

✓ **Significant results**

General fixed sensor network design is finished. Fixed Acoustic Sensor Network and Mobile Robot Platform will have a backup interface connection, beside the interface between acoustic/environmental units and OCU. Acoustic processing unit only stores temporarily input data and subsequent metadata transport from the acoustic processing unit towards the OCU will be performed accordingly to the environmental data interface definition.

Task 5.4 Mobile Robot integration

Task Leader	FHG
Contributors	ISA, NOVA
Schedule	01.6.2014 – 31.8.2015
Deliverables	D5.6 Mobile Robot integration (FHG/M24)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	Delayed due to undefined purchasing procedure

✓ **Summary**

The fixed sensor network is supplemented by a Mobile Robot system, based on the MetraLabs SCITOS G5 platform (http://metralabs.com). The basic G5 Robot module already includes an industrial PC with Wi-Fi (IEEE 802.11a/b/g), and it conforms to the European CE-guidelines for the public indoor sector and is approved by the German Technical Inspection Agency (TÜV). According to the requirements at hand, it will be extended with optional components and equipped with custom-build modules. The additional human-machine interface module comprises a movable robotic head with eyes that are able to wink, and a touch-screen display.

The Mobile Robot unit runs on differential high torque gear-motors, enabling driving speeds up to 1,4 m/s, or rotations up to 200 °/s. Equipped with acoustic sensors and pre-processing capabilities, the Robot acts as a mobile sensor module within the fixed sensor network, thus adding a dynamic component. Such a mobile module can improve the sensor network reliability by putting sensors right where they're needed. The Robot may compensate for weak-points within the fixed network, thus the fixed sensor network can be implemented with fewer sensors, while the Robot substitutes missing sensors on demand. Just like the fixed sensors, the Robot features microphones that are used to record acoustic data. Similar to the network's processing unit, the Robot will processed the acquired data and estimate the occupancy level at the Robot's current location. Via Wi-Fi, the occupancy level data will be transmitted for interpretation.

This task includes deliverable D5.6, which is scheduled for M24.

✓ **Significant results**

A selection on sensor modules for the Mobile Robot platform has been made. The Robot will be equipped with acoustic sensors by FHG and iPoint temperature, humidity and CO2 sensors by ISA. To accommodate the power requirements of these sensor modules, needed customizations of the baseline Scitos G5 Robot platform have been established.

Using a preliminary Robot dummy, microphone placement on the Mobile Robot platform has been evaluated. Feasibility of microphone array layouts and wiring have been discussed and a sketch of a preferred layout has been made. Hence required customizations of the Robot's casing have been established.

This task has just started and the purchasing procedure for required hardware components is still on going. Integration of these components will start as soon as they become available.

Task 5.5 Building modelling and Weather model integration

Task Leader	AIT
Contributors	SOL, IZNAB
Schedule	01.6.2014 – 31.5.2016
Deliverables	D5.7 Building modelling and Weather model integration (AIT/M33)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

In order to have a much more precise prediction and control, models of the building and weather forecast data will be needed within the building management system. As modelling a building in state-of-the-art building simulation software, e.g. TRNSYS or EnergyPlus, is still a resource intensive task, especially with respect to manpower, this process has to be sped up in order to keep the enhanced building management system at a competitive price. The whole building model will therefore be reduced to a model based on a simplified geometry of the building, as well as its physical parameters, and will ensure proper forecasts of the potential for thermal load shifting using the building mass. Although its exact quantitative behaviour may differ from the actual building at first, due to its more convenient mathematical representation will be able to be modified during building operation to be able to increase the accuracy and accommodate for changes in the building behaviour. Finally, those reduced models will be validated by building experts and its dynamic response compared to simulations, using for example TRNSYS or EnergyPlus.

For the weather predictions, numerical weather prediction models, such as COSMO, will be collected and analysed, and compared with weather prediction services available, to get the best cost-benefit with respect to performance within the system.

✓ **Significant results**

Not available at this stage. Task is currently on process.

Task 5.6 Optimizer & Control Unit (Control Strategy and action development)

Task Leader	NOVA
Contributors	ISA, FHG, AIT
Schedule	01.6.2014 – 31.5.2016
Deliverables	D5.8 Control Strategy and action development (NOVA/M33)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	Integrating different systems into single control system

✓ **Summary**

The scheduled work on deliverable *D5.8 Control Strategy and action development* started in the Q4 of the first project year. By now, work effort was directed into specifying general control system architecture and optimizer unit (some of this work is included in deliverable *D5.1 System requirements specifications and architecture*).

- Control system will use information from the sensor network to control HVAC (heating, ventilation and air conditioning) systems.
- Building model along with the Weather predicting model will use information stored in EcoShopping database and as a result provide output data.
- Output data from models will be used by the Optimizer to suggest the best strategy for minimum impact and minimum cost.

✓ **Significant results**

As the work on deliverable *D5.8 Control Strategy and action development* only just started we do not have significant results yet.

We are expecting to gain significant traction with our results as the rest of the systems that need to be controlled become defined.

WP6. Operation and Maintenance WP Leader: ANC

WP6	Operation and Maintenance	Leader	YEAR 1											
			1	2	3	4	5	6	7	8	9	10	11	12
Task 6.1	O&P Plan	ANC												
Task 6.2	Alarm system requirements and specifications	ANC												
Task 6.3	Diagnostic analysis algorithm design	NOVA												
Task 6.4	Web service integration and Intelligent alarm generation	NOVA												

Task 6.1 O&P Plan

Task Leader	ANC
Contributors	SYM, SOL, NTUST, RED, YASAR, IZNAB
Schedule	01.12.2013 – 31.11.2014
Deliverables	D6.1 O&P Plan, alarm system requirements and specifications for HVAC (ANC/M15)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task aims to prepare an Operation and Maintenance plan that will detect degradation of physical and energy system performance, in addition to anticipating future failures and projecting the remaining life of physical and energy system in acceptable operating state before faults or unacceptable degradation of performance occur. For this purpose a detail operation and maintenance plan is being carried out.

The information of the existing systems (mainly focused on HVAC) and the new technologies to be implemented is being collected since we are writing the Operation & Maintenance procedures (protocols) explaining how to operate on a day-to-day basis to ensure safety and

compliance of the indoor air quality, eliminate unnecessary energy consumption and lay down requirements to achieve/maintain high energy performance.

✓ **Significant results**

Although the task is not finished, there is already a preliminary guidance of the operation and maintenance plan. It also contains recognized standards of this type of information.

Task 6.2 Alarm system requirements and specifications

Task Leader	ANC
Contributors	AIT, ISA, FHG, SYM
Schedule	01.12.2013 – 31.11.2014
Deliverables	D6.1 O&P Plan, alarm system requirements and specifications for HVAC (ANC/M15)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task has two main objectives: Firstly, the system requirements and functional aspects are being identified and clearly defined for the implementation within the timeframe and scope of the EcoShopping project. Secondly, system specification in which equipment, faults, methods and techniques that can be introduce to the O&M framework will be defined. Functional requirements and performance baselines (including existing comfort and system conditions, baseline energy consumption) will also be described.

✓ **Significant results**

This task is not finished yet and we are completing both main objectives (system requirements and specifications) following the next work-plan: documentation, identification, definition and description of all the operational aspects of the equipment (HVAC, lighting, IAU, self-cleaning products) in IKVA.

WP7. Demonstration WP Leader: ENR

WP7	Demonstration	Leader	YEAR 1											
			1	2	3	4	5	6	7	8	9	10	11	12
Task 7.1	Retrofitting specification	ENR												
Task 7.2	Retrofitting of the demo site	ENR												
Task 7.3	Monitoring and evaluation	SYM												

Task 7.1 Retrofitting specification

Task Leader	ENR
Contributors	IZNAB, SOL, SYM, GCD, NOVA, RED, YASAR, ANC
Schedule	01.3.2014 – 31.8.2014
Deliverables	D7.1 Engineering process and constructive analysis report (ENR/M12)
Status	Finished
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

Core work that had been carried out within this task:

1. Desk analysis

This resulted that we had the original 1979 construction plans of the Demonstration building IKVA Shopping Centre in Sopron city and the mandatory surveillance reports of the building. Since the erection of the building, there were indoor changes that had not been documented, as well the replacement the old boilers and some other changes in the HVAC system.

2. Surveys

Multiply surveys in Sopron had been carried out. Geometry, dimensions, doors and windows dimensions and placement, other building structures dimensioning, materials, coatings, status, photo documentation, in special consideration of condition, functional and occupancy status, equipments and their status and condition of building structures had been evaluated.

Regarding building services systems dimensions, net, facilities, breakthroughs, connections, air tapping/ejection point, system materials, and status had been evaluated.

3. Plans

Basic architectural and building services plans and documentation incl. technical description had been prepared and a 3D structure model.

4. Demonstration concept

Technological content depends strongly on the use cases and scenarios, which are evaluated in the WP2. A close cooperation had been maintained with this WP. Multiple scenarios are being considered, depending on market positioning of the building. We need to choose one part of the building as a basic case in order to ensure the goals of the demonstration. We have defined the area where the retro-fitting technologies will be demonstrated in this sense. Two smaller, currently unoccupied rooms are available for test. Due to their contained surface and volume there would be more flexibility to make the modifications.

6. Owner cooperation and Owner work-plan

Owner's decision and development of the local market strongly influence the engineering design of the retrofitting and technological content and complexity.

7. Local authorities' consultation

8. Workshop, Demonstration building December 3rd 2013

A workshop had been held in December 2013 in site to build up knowledge about DEMO site of Participants, which resulted technological reports applied to the demonstration building. With strong cooperation of Task 2.3 the Owner forum formed the cooperation methods

between the Owner of the demonstration building and EcoShopping consortium. A work-plan had been prepared for the Owner.

9. Discovered difficulties:

The ventilation system is turn on/off manually. There is no schedule for ventilation. The facility manager decides when and how long to turn the ventilation system. At the moment this is done only during summer, about one hour a day in the morning period. There is no heating module in the ventilation system. Ventilation system and windows replacement are not covered within the scope of EcoShopping, but they are the weakest elements of the shopping centre in relation to energy-efficiency.

Next to that, the electricity network of the building is in a very bad condition and outdated. It is not planned and traced with plans. A whole reconstruction of this system is needed, independently from EcoShopping demonstration. The condition of the cables and other accessories e.g. distribution boxes also causes huge energy losses.

✓ **Significant results**

The result is this task is summarized in the D7.1 Engineering process and constructive analysis report.

Main achievements are:

- Establishment of the cooperation between the Owner and the EcoShopping Project Management in relation to content, mechanism and structure.
- Preliminary content and interests' collation between the Owner of the building and the DEMO Project Coordinator, which results the recording of the conditions of the realization of the project. Establishment of the legal and organizational conditions of the project.
- Creating a database about the building and the diagnosis of its technological and energy-efficiency related condition.
- Facilitating information needs about the building, supporting the work with the technology implementation design.
- We have explored the barriers and restrictions that are the results of the unique characteristic of the demonstration building and began the fine-tuning of EcoShopping solution considering these aspects.
- With the cooperation of Task 2.3 we have identified the user needs. The results of the research in relation to this can be used as a basis for planning the retrofitting of other Shopping Centres. We have negotiated the testing of these results in Shopping Centres with the cooperation of Hungarian Association of Shopping Centres.

WP8. Dissemination and training activities WP Leader: IZNAB

WP8	Dissemination and training activities	Leader	YEAR 1											
			1	2	3	4	5	6	7	8	9	10	11	12
Task 8.1	Dissemination plan, Information, Communication and Training Activities	IZNAB												
Task 8.2	Evaluation of end-user acceptance and public satisfaction	ENR												
Task 8.3	Benchmarking and business model	IZNAB												
Task 8.4	Exit strategy	ENR												

Task 8.1 Dissemination plan, Information, Communication and Training Activities

Task Leader	IZNAB
Contributors	IZNAB, SOL, SYM, GCD, NOVA, RED, YASAR, ANC
Schedule	01.9.2013 – 31.8.2017
Deliverables	D8.1 The Plan for the Use and Dissemination of Foreground (PUDF) (IZNAB/M6) D8.2 Information, collaboration & disseminations plans. Web-site publication and database update (IZNAB/M48)
Status	On progress
Deviations from the DoW	None
Risks notice/probable	None

✓ **Summary**

This task contains activities that are essential for and/or contribute to the dissemination of the project results as well as raise awareness on the topics of the project. The Deliverable 8.1 lists publications (scientific journals) that are targeted for the disseminating and explains briefly their scope. Also conferences/seminars, events and relevant fairs are listed. Out of these, events with special interest have been selected and additional information on these events was provided. An important part of the activities focus on the dissemination via media. This includes the creation and maintenance of the project website, publication in print media as well as press conferences. The draft of project website is in place since end of September 2013 and can be found under http://ecoshopping-project.eu/. It provides rough basic project information (e.g. project number, project title, call identifier, funding scheme and contact data for Coordinator) and is being regularly updated with news and events information. In the middle of February 2014, the final version of the project website has been submitted, with all relevant information about "EcoShopping" project, such as: abstract of the project, description of the work packages, partners organization profile and experience, related events, download section of public reports, external links to relevant websites (EU projects, Technological platforms, Engineering associations, etc.) and news about activities of the "EcoShopping" partners. Additionally the statistics on the visitors of the website will be recorded to get information on the use by the target group.

Furthermore, synergies and collaborations will be established exploiting project partners networks of contacts and their active presence in initiatives/communities. A logo has been designed to help to identify the project. It will be used in the project website and on all project reports and other documents. The dissemination plan also includes a part on the evaluation of dissemination activities. This should monitor and evaluate the progress of performed activities. At the time being this part includes the information on measures set, and will be updated in the next reporting periods with actual information on the dissemination of each partner.

✓ **Significant results**

The dissemination plan describes the aimed way of implementation of dissemination measures. It should act as a schedule and provide a big picture of the project's impact. Basis for the planning is the project proposal document as well as existing plans and involvement of partners in networks and projects. To reach the relevant target groups, dissemination channels with appropriate measures were defined. The measures include participations to conferences

and fairs, submission of papers to scientific journals and articles to magazines, setup of the project website, involvement in expert forums, organisation of workshops and dissemination in expert networks and research projects.

2.3 Project Management during the period

2.3.1 Consortium management tasks and achievements

ENERGOSYS coordinates the project. ENERGOSYS established the governance structure for the correct project management. This structure contains the roles and the responsibilities of each committee and organization, and sets the decision rules.

The governance structure is formed by: the General Assembly, Steering committee and the Project Management Board:

- The General Assembly is the high level management body in which all the participants are represented. It is led by ENERGOSYS
- The Project Management Board is formed by:
    - The Steering committee, in charge of the project supervision, is only formed by the Work Package Leaders, and it is chaired by ENERGOSYS.
    - The Project coordinator is responsible for the day by day management and the only person authorized to commit and negotiate with the EU.

The PMB is chaired by Solintel that will strongly support the PC in the management and the reporting of the project. The Chairman of the PMB and the PC will work in close cooperation and will act as a unique body called Consortium Management.

- *Work package leaders:* They are responsible for managing the tasks grouped in the WP. The WP leader must report to the Executive Management team, ensuring the fulfilment of its duties from the scientific point of view.
- *Task leader:* This responsibility is assigned to a specific partner, who will be in charge of the task execution and the reporting to the WP leader.

The **General Assembly** shall take the following decisions:

- Content, finances and intellectual property rights
    - Proposals for changes to Annex I of the EC-GA to be agreed by the European Commission
    - Changes to the Consortium Plan (including the Consortium Budget)
- Evolution of the Consortium
    - Entry of a new Party to the Consortium and approval of the settlement on the conditions of the accession of such a new Party
    - Withdrawal of a Party from the Consortium and the approval of the settlement on the conditions of the withdrawal
    - Declaration of a Party to be a Defaulting Party
    - Remedies to be performed by a Defaulting Party
    - Termination of a Defaulting Party's participation in the Consortium and measures relating thereto
    - Proposal to the European Commission for a change of the Coordinator
    - Proposal to the European Commission for suspension of all or part of the Project
    - Proposal to the European Commission for termination of the Project and the Consortium Agreement

The **Project Management Board** will, in particular:

- Define the strategy for conducting the project according to the terms of the contract;
- Monitor the progress of the project, identify corrective actions when necessary and authorise appropriate amendments to the work plan in order to meet the overall objectives;
- Review the policy and strategy for dissemination and publicity of the project;
- Assess the impact of any changes to the contract suggested by the European Commission and respond accordingly;
- Resolve any conflict, technical, managerial or financial that may appear amongst the project partners;
- Ensuring the proper definition of the exploitation of the project results;
- Oversee and review the administration arrangements of the Project Coordinator; and
- Agree on the management of the knowledge generated during the project.

The functions and responsibilities of the **Project Coordinator** are described below:

- Coordination of the overall contractual, financial and administrative aspects, including the reporting of the project's financial and budgetary status to the PMB and the European Commission;
- Collection, assessment and submission of the cost statements for the project to the European Commission with the support of the Chairman of the PMB;
- Obtaining audit certificates from the contractors, and financial security details when requested and applicable;
- Coordinating communication between the project and the European Commission with the support of the Chairman of the PMB;
- Organising project reviews by the EC and ensuring that corrective actions – if any – are implemented;
- Performing inter-work package co-ordination by providing advice to the Work package Leaders by using appropriate electronics means (web, e-mail, and phone conference) with the support of the Chairman of the PMB;
- Monitoring compliance by the Parties with their obligations and stimulating their involvement in the project activities;
- Issuing progress reports as specified in WP1 with the support of the Chairman of the PMB;
- Meetings will, whenever possible, be synchronised with project events, such as conferences and/or workshops, in order to minimise travel costs.

In order to guarantee the quality assurance of the project the **Chairman of the PM**B will support the PC in the following activities:

- Evaluates and approves project progress (periodic and final reports);
- Evaluation and approval of project progress (periodic and final reports);
- Approves cost statements;
- Ensure respect for ethical and legal issues and attention to gender issues;
- Develop an accurate risk and contingency plan;
- Controls and reviews technical progress and financial resources.

The responsibilities of the **Work Package leaders** will include:

- Organisation of the work package activities;
- Promotion of the consensus from WP members on the actual activities' plan;
- Coordination of, and contribution to, the reporting activities, by issuing a proposed Table of Contents (TOC) to the WP members, highlighting the different responsibilities (consistent with the Description of Work) and by incorporating members' suggestions as appropriate;

- Identification of possible critical or conflict areas; and
- Contribute to the updating of the risk assessment table (relate to table further in the proposal).

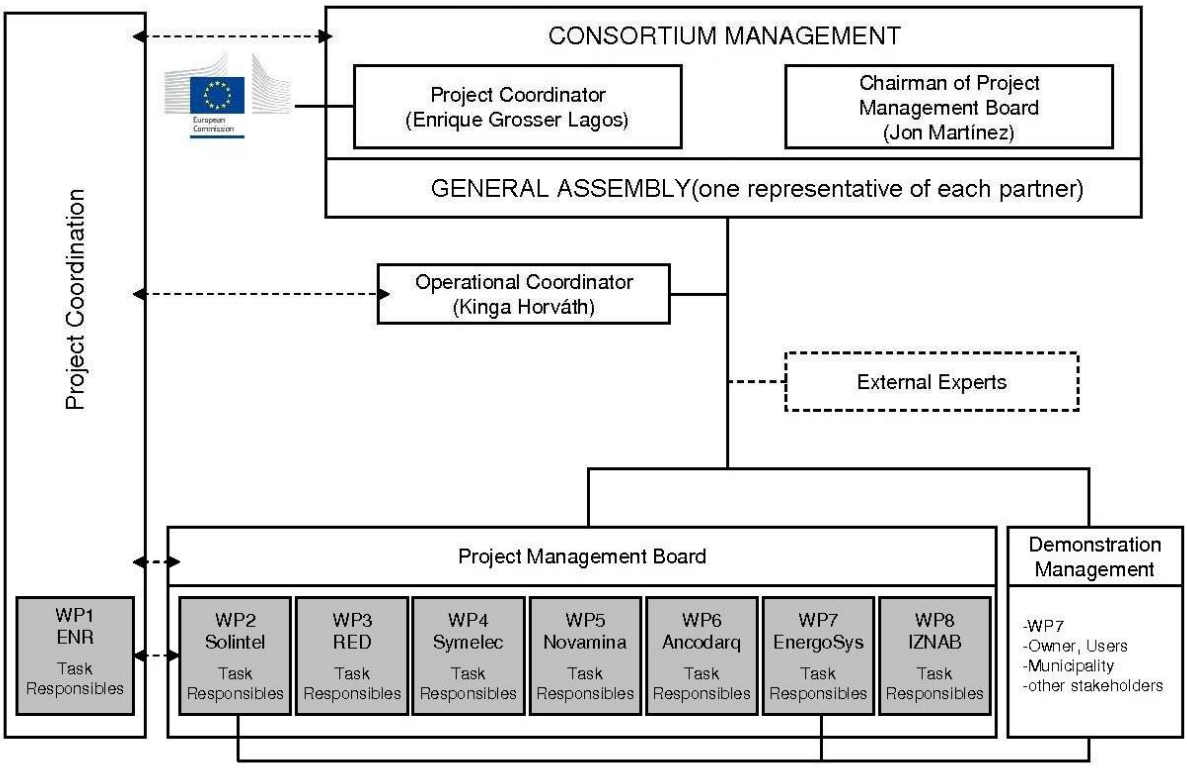

Figure 2. Governance structure and management

2.3.2 Problems that have occurred and how they were solved or envisaged solutions

Table 2. Identified risks and contingency plan

Identified risk	Contingency Plan
Delays in the first deliverables Because of last minute changes in deliverables and holiday season the first deliverables that were due at the end of November, 2013 and December, 2013 were delayed.	**Reviewers schedule** We have set up a comprehensive review plan for all the deliverables, incl. name of the reviewers and deadlines for different work phases. This plan had been approved by the consortium members personally during the second Consortium Meeting. It is requires to submit 3 working versions of each deliverable before the final deadline. Reviewers can plan their resources also better.

2.3.3 List of project meetings, dates and venues

Table 3. List of project meetings, dates and venues

MEETING	DATE	VENUE	ASSISTANTS	ISSUE
Kick-off Meeting	16.09.2013 – 17.09.2013	Budapest (Hungary)	ALL	Launch the project
6th Month Technical Meeting	24.02.2014 – 25.02.2014	Zagreb (Croatia)	ALL	Monitor the progress of the project during the 6 first months.
Teleconference	18.06.2014	Skype	WP leaders: ENR, SOL, CNR, SYM, NOVA, ANC, IZNAB	Monitoring and Planning of WPs

Apart from the meetings mentioned above, we have planned periodically teleconferences with the purpose to track the project progress and react immediately when a bottleneck is detected.

2.3.4 Project planning and status

Table 4. Status of the project

Work Package		Year 1				Year 2				Year 3				Year 4			
		Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
WP1	Project management and coordination																
Task 1.1	Project and EC coordination																
Task 1.2	Project administration and control																
WP2	Continuous Assessment and Standardization																
Task 2.1	Buildings Code, EPBD analysis and standardization																
Task 2.2	Buildings characterization and Retrofitting Methodology Design																
Task 2.3	User needs, services and scenarios																
Task 2.4	Pre-Retrofit Building Assessment																
Task 2.5	Post-Retrofit Building Assessment																
Task 2.6	Gap between theoretical and experimental performance																
Task 2.7	Life Cycle Analysis (LCA) oriented sustainable re-design of existing buildings																
Task 2.8	Industrial viability of new technologies and replication potential analysis																
WP3	Envelope and Daylighting technologies																
Task 3.1	Specification of Insulation and daylighting requirements																
Task 3.2	Effective insulation solution (wall and window)																
Task 3.3	Daylighting system																
Task 3.4	Optimisation and evaluation of Insulation																
Task 3.5	Optimisation and evaluation of Daylighting system																
WP4	HVAC and RES integration																
Task	Specification of HVAC system																

4.1																	
Task 4.2	Capillary Tube Technology for cooling and heating																
Task 4.3	RE powered DC heat pump Integration																
Task 4.4	Integration and evaluation																
WP5	Intelligent Automation Unit																
Task 5.1	System requirements, specifications and architecture																
Task 5.2	Design of fixed sensor network																
Task 5.3	Data processing and management																
Task 5.4	Mobile Robot integration																
Task 5.5	Building modeling and Weather model integration																
Task 5.6	Optimizer & Control Unit (Control Strategy and action development)																
Task 5.7	Web service platform development (UI) and evaluation																
WP6	Operation and Maintenance																
Task 6.1	O&P Plan																
Task 6.2	Alarm system requirements and specifications																
Task 6.3	Diagnostic analysis algorithm design																
Task 6.4	Web service integration and Intelligent alarm generation																
WP7	Demonstration																
Task 7.1	Retrofitting specification																
Task 7.2	Retrofitting of the demo site																
Task 7.3	Monitoring and evaluation																
WP8	Dissemination and training activities																
Task 8.1	Dissemination plan, Information, Communication and Training Activities																
Task 8.2	Evaluation of end-user acceptance and public satisfaction																

Task 8.3	Benchmarking and business model																
Task 8.4	Exit strategy																

2.3.5 Impact of possible deviations from planned milestones / deliverables

The delays in Deliverable 1.1 and Deliverable D2.1 have not affected the overall project progress.

2.3.6 Any changes to the legal status of any of the beneficiary

There were no changes to the legal status of any beneficiary.

2.3.7 Development of the project website

By M5 IZNAB designed the website that is being used as a tool for the external dissemination of the knowledge generated within the project. Currently, the project website is fully operative and it is been handled and managed by IZNAB, with the other partners' contribution.

The EcoShopping website is the main communication tool, where dissemination materials will be published in a timely manner. Currently it includes:

- An overview of the project objectives.
- Details of the project partners.
- The activities (Work Programmes).
- Current news and events within the project.
- Download section, where the public reports, visual media and conference papers will be published.
- Links to related sites.

As the results of the work programme become available, we will produce derivative materials suitable to be published in the website. Such additional materials may include:

- Progress reports from individual work programmes.
- Promotion of the aims and achievements of the project.
- Education and training materials developed.
- Exploitation plan indicative strategy.

www.ecoshopping-project.eu/

Figure 3. The EcoShopping website

3. DELIVERABLES AND MILESTONES TABLES

Table 5. Deliverables

Del. Nº	Deliverable name	WP Nº	Lead beneficiary	Nature	Dissemination level	Delivery date	Comments
D1.1	Plan for IPR management, use and dissemination of foreground	1	1	R	PU	M3	N/A
D1.2	First Year Annual Report	1	1	R	PU	M12	N/A
D1.3	Second Year Annual Report	1	1	R	PU	M24	N/A
D1.4	Third Year Annual Report	1	1	R	PU	M36	N/A
D1.5	Fourth Year Annual Report	1	1	R	PU	M48	N/A
D2.1	Assessment of national building codes, EPBD implementation and standards identified.	2	11	R	PU	M4	Delayed 1 month
D2.2	Accomplishment and Recommendations of Standardization.	2	11	R	PU	M48	N/A
D2.3	Identification of European existing peri-urban commercial buildings stock and retrofitting methodology.	2	7	R	PU	M6	N/A
D2.4	Owner's requirements and usage scenarios	2	15	R	PU	M9	N/A
D2.5	Pre-Retrofit Building Assessment (Demo characteristic and Simulation Model).	2	15	R	RE	M12	N/A
D2.6	Post-Retrofit Building Assessment (Simulation Model, Monitored data and Calibrated Simulation Model).	2	7	R	RE	M45	N/A
D2.7	Analysis report of Gaps between simulation and monitored data, optimization recommendations and strategies.	2	7	R	RE	M45	N/A
D2.8	LCA report.	2	11	R	RE	M48	N/A
D2.9	Viability and feasibility report of retrofitting Technologies.	2	3	R	PU	M6	N/A
D2.10	Replication potential analysis report	2	3	R	PU	M48	N/A
D3.1	Specification of selected types of insulation solution based on the created database of the different conventional and most innovative insulation technology and self-cleaning materials.	3	9	R	PU	M9	N/A
D3.2	Day lighting requirements	3	12	R	PU	M9	N/A
D3.3	Evaluation and identification and of the most efficient insulation materials to be installed in field	3	9	R	RE	M21	N/A
D3.4	Design of day lighting system	3	14	R	RE	M21	N/A
D3.5	Evaluation of insulation system	3	9	R	RE	M45	N/A

D3.6	Evaluation of day lighting system	3	12	R	RE	M45	N/A
D4.1	Layout of system hydraulics, technical specification of main components and operation scheme	4	10	R	RE	M9	N/A
D4.2	Radiant ceiling system report: technical description, engineering design and requirements.	4	8	R	RE	M18	N/A
D4.3	Design of the RE powered DC Heat Pump system	4	13	R	RE	M18	N/A
D4.4	Prototype of air-water Renewable energy powered DC Heat Pump.	4	13	P	PU	M24	N/A
D4.5	Specification of the Integrated radiant ceiling and RE powered heat pump system.	4	10	R	RE	M27	N/A
D4.6	Guidelines and evaluation with measurement data.	4	10	R	PU	M45	N/A
D5.1	System requirements, specifications and architecture	5	4	R	PU	M9	N/A
D5.2	Design of fixed sensor network	5	5	R	RE	M15	N/A
D5.3	Acoustic and Environmental Data Processing implementation.	5	2	R	RE	M15	N/A
D5.4	Environmental Data processing implementation	5	5	R	RE	M15	N/A
D5.5	Interface between acoustic/environmental processing units and Optimizer & Control Unit (OCU)	5	2	R	RE	M24	N/A
D5.6	Mobile Robot integration	5	2	R	RE	M24	N/A
D5.7	Building modeling and Weather model integration	5	4	R	RE	M33	N/A
D5.8	Control Strategy and action development	5	6	R	RE	M33	N/A
D5.9	Development and evaluation of Web service platform	5	6	R	PP	M39	N/A
D6.1	O&P Plan, alarm system requirements and specifications for HVAC	6	16	R	PP	M15	N/A
D6.2	Diagnostic analysis algorithm description	6	6	R	RE	M27	N/A
D6.3	Updated Web platform integrated with alarm generation function	6	6	R	PU	M33	N/A
D7.1	Engineering process and constructive analysis report	7	1	R	RE	M12	N/A
D7.2	Documentation of EcoShopping best practice implementation procedures for improved replication	7	1	R	PU	M33	N/A
D7.3	Monitoring and Measurements' analysis during EcoShopping implementation process	7	10	R	RE	M45	N/A
D8.1	The Plan for the Use and Dissemination of Foreground (PUDF)	8	7	R	PU	M6	N/A
D8.2	Information,collaboration & disseminations plans. Web-site publication and database update	8	7	R	PU	M48	N/A
D8.3	Report on satisfaction of building managers, workers & visitants	8	6	R	PU	M48	N/A
D8.4	Business plan	8	7	R	RE	M48	N/A
D8.5	Exit strategy	8	1	R	RE	M48	N/A
	Submitted						

	On process
	Next period

Table 6. Milestones

Milestone number	Milestone name	WP involved	Lead beneficiary	Expected date	Comments
MS1	Pre-Retrofit Building Assessment Report (Demo characteristic and Simulation Model)	2	15	M12	N/A
MS2	Analysis report of Gaps between simulation and monitored data, optimization recommendations and strategies	2	7	M45	N/A
MS3	Installation of the best insulating and self-cleaning materials and establishment of forefront strategies	3	9	M27	N/A
MS4	Installation of new day lighting system	3	12	M27	N/A
MS5	Prototype of air-water Renewable energy powered DC Heat Pump.	4	13	M24	N/A
MS6	Guidelines and evaluation with measurement data.	4	10	M45	N/A
MS7	System requirements, specifications and architecture	5	4	M9	N/A
MS8	Interface between acoustic/environmental processing units and Optimizer & Control Unit (OCU)	5	2	M24	N/A
MS9	Control Strategy and action development	5	6	M33	N/A
MS10	Evaluation of Web service platform development	5	6	M39	N/A
MS11	Updated Web platform integrated with alarm generation function	6	6	M33	N/A
MS12	Documentation of EcoShopping best practice implementation procedures for improved replication	7	1	M33	N/A
MS13	End of installation of the proposed technologies in the demonstration building	7	1	M33	N/A
MS14	End of monitoring and validation period	7	10	M45	N/A
MS15	Business plan and Exit strategy	8	7	M48	N/A
	Achieved				
	Correspondent to the next period				

4. EXPLANATION OF THE USE OF RESOURCES

The numbers reported here are just a summary of the financial expenditure during the twelve months based on estimations as at this point we are not claiming for contribution to the EC.

1. EnergoSys

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 19 149,51	€ 62 091,56	€ 57 280,12	€ 6 014,29	**€ 144 535,48**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 121,00	€ 456,00	€ 1 495,00	€ 0,00	**€ 2 072,00**
Overheads costs	€ 11 562,30	€ 37 528,54	€ 34 729,27	€ 3 608,58	**€ 87 428,69**
TOTAL	**€ 30 832,81**	**€ 100 076,09**	**€ 93 504,40**	**€ 9 622,87**	**€ 234 036,17**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 23 124,61	€ 50 038,05	€ 93 504,40	€ 9 622,87	€ 176 289,92
Requested EC Contribution					**€ 176 289,92**

2. Fraunhofer

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Overheads costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
TOTAL	**€ 0,00**	**€ 0,00**	**€ 0,00**	**€ 0,00**	**€ 0,00**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ -	€ -	€ -	€ -	€ -
Requested EC Contribution					**€ -**

3. SOLINTEL

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 41 089,31	€ 5 176,46	€ 6 789,70	€ 0,00	**€ 53 055,47**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Overheads costs	€ 24 653,59	€ 3 105,88	€ 4 073,82	€ 0,00	**€ 31 833,28**
TOTAL	**€ 65 742,89**	**€ 8 282,33**	**€ 10 863,52**	**€ 0,00**	**€ 84 888,75**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 49 307,17	€ 4 141,17	€ 10 863,52	€ -	€ 64 311,86
Requested EC Contribution					**€ 64 311,86**

4. AIT

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 56 770,00	€ 0,00	€ 0,00	€ 0,00	**€ 56 770,00**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 2 252,76	€ 0,00	€ 565,01	€ 0,00	**€ 2 817,77**
Overheads costs	€ 41 000,00	€ 0,00	€ 0,00	€ 0,00	**€ 41 000,00**
TOTAL	**€ 100 022,76**	**€ 0,00**	**€ 565,01**	**€ 0,00**	**€ 100 587,77**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 75 017,07	€ -	€ 565,01	€ -	€ 75 582,08
Requested EC Contribution					**€ 75 582,08**

5. ISA

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 105 159,66	€ 0,00	€ 0,00	€ 0,00	€ 105 159,66
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00
Other direct costs	€ 4 062,97	€ 0,00	€ 0,00	€ 0,00	€ 4 062,97
Overheads costs	€ 45 184,33	€ 0,00	€ 0,00	€ 0,00	€ 45 184,33
TOTAL	€ 154 406,96	€ 0,00	€ 0,00	€ 0,00	€ 154 406,96
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 115 805,22	€ -	€ -	€ -	**€ 115 805,22**
Requested EC Contribution					**€ 115 805,22**

6. NOVAMINA

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 23 855,81	€ 2 615,66	€ 0,00	€ 0,00	**€ 26 471,47**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 952,73	€ 0,00	**€ 952,73**
Overheads costs	€ 26 241,39	€ 2 877,23	€ 1 048,00	€ 0,00	**€ 30 166,62**
TOTAL	**€ 50 097,20**	**€ 5 492,89**	**€ 2 000,73**	**€ 0,00**	**€ 57 590,82**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 37 572,90	€ 2 746,44	€ 2 000,73	€ -	€ 42 320,08
Requested EC Contribution					**€ 42 320,08**

7. IZNAB

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 40 803,70	€ 6 843,93	€ 0,00	€ 7 071,87	**€ 54 719,50**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 948,29	€ 0,00	**€ 948,29**
Overheads costs	€ 24 482,22	€ 4 106,36	€ 568,97	€ 4 243,12	**€ 33 400,67**
TOTAL	**€ 65 285,92**	**€ 10 950,29**	**€ 1 517,26**	**€ 11 314,99**	**€ 89 068,46**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 48 964,44	€ 5 475,14	€ 1 517,26	€ 11 314,99	€ 67 271,84
Requested EC Contribution					**€ 67 271,84**

8. GeoClimaDesign AG

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 20 649,00	€ 815,00	€ 0,00	€ 1 835,00	**€ 23 299,00**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 360,00	€ 0,00	€ 1 475,00	**€ 1 835,00**
Overheads costs	€ 12 389,20	€ 705,00	€ 0,00	€ 1 986,00	**€ 15 080,20**
TOTAL	**€ 33 038,20**	**€ 1 880,00**	**€ 0,00**	**€ 5 296,00**	**€ 40 214,20**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 24 778,65	€ 940,00	€ -	€ 5 296,00	€ 31 014,65
Requested EC Contribution					**€ 31 014,65**

9. CNR

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 33 903,60	€ 0,00	€ 0,00	€ 0,00	**€ 33 903,60**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 540,17	€ 0,00	€ 0,00	€ 0,00	**€ 540,17**
Overheads costs	€ 21 916,19	€ 0,00	€ 0,00	€ 0,00	**€ 21 916,19**
TOTAL	**€ 56 359,96**	**€ 0,00**	**€ 0,00**	**€ 0,00**	**€ 56 359,96**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 42 269,97	€ -	€ -	€ -	€ 42 269,97
Requested EC Contribution					**€ 42 269,97**

10. Symelec

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 34 378,81	€ 17 362,69	€ 0,00	€ 0,00	**€ 51 741,50**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Overheads costs	€ 20 627,28	€ 10 417,62	€ 0,00	€ 0,00	**€ 31 044,90**
TOTAL	**€ 55 006,09**	**€ 27 780,31**	**€ 0,00**	**€ 0,00**	**€ 82 786,40**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 41 254,57	€ 13 890,15	€ -	€ -	€ 55 144,72
Requested EC Contribution					**€ 55 144,72**

11. BRE

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 23 893,14	€ 0,00	€ 3 075,52	€ 1 894,99	**€ 28 863,65**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 1 062,80	€ 0,00	€ 1 559,00	€ 0,00	**€ 2 621,80**
Overheads costs	€ 23 893,14	€ 0,00	€ 3 075,52	€ 1 894,99	**€ 28 863,65**
TOTAL	**€ 48 849,08**	**€ 0,00**	**€ 7 710,04**	**€ 3 789,98**	**€ 60 349,10**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 36 636,81	€ -	€ 7 710,04	€ 3 789,98	€ 48 136,83
Requested EC Contribution					**€ 48 136,83**

12. RED

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 125 000,00	€ 55 000,00	€ 0,00	€ 5 000,00	**€ 185 000,00**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 1 600,00	€ 3 200,00	€ 800,00	**€ 5 600,00**
Overheads costs	€ 75 000,00	€ 33 960,00	€ 1 920,00	€ 3 480,00	**€ 114 360,00**
TOTAL	**€ 200 000,00**	**€ 90 560,00**	**€ 5 120,00**	**€ 9 280,00**	**€ 304 960,00**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 150 000,00	€ 45 280,00	€ 5 120,00	€ 9 280,00	€ 209 680,00
Requested EC Contribution					**€ 209 680,00**

13. YASAR UNIVERSITESI

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 22 525,00	€ 3 500,00	€ 0,00	€ 875,00	**€ 26 900,00**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Overheads costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
TOTAL	**€ 22 525,00**	**€ 3 500,00**	**€ 0,00**	**€ 875,00**	**€ 26 900,00**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 16 893,75	€ 1 750,00	€ -	€ 875,00	€ 19 518,75
Requested EC Contribution					**€ 19 518,75**

14. NTUST

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 4 796,00	€ 3 597,00	€ 0,00	€ 0,00	**€ 8 393,00**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 8 949,00	€ 11 032,00	€ 0,00	€ 0,00	**€ 19 981,00**
Overheads costs	€ 0,00	€ 0,00	€ 1 874,00	€ 0,00	**€ 1 874,00**
TOTAL	**€ 13 745,00**	**€ 14 629,00**	**€ 1 874,00**	**€ 0,00**	**€ 30 248,00**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 10 308,75	€ 7 314,50	€ 1 874,00	€ -	€ 19 497,25
Requested EC Contribution					**€ 19 497,25**

15. Lagross

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 71 869,35	€ 0,00	€ 0,00	€ 1 723,77	€ 73 593,12
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00
Other direct costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00
Overheads costs	€ 43 121,61	€ 0,00	€ 0,00	€ 1 034,26	€ 44 155,87
TOTAL	€ 114 990,96	€ 0,00	€ 0,00	€ 2 758,04	€ 117 749,00
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 86 243,22	€ -	€ -	€ 2 758,04	€ 89 001,26
Requested EC Contribution					**€ 89 001,26**

16. ANCODARQ

Financial Expenditure 1st Year	RTD	Demonstration	Management	Other	Total
	(A)	(B)	(C)	(D)	(A+B+C+D)
Personnel costs	€ 42 948,56	€ 7 964,80	€ 0,00	€ 0,00	**€ 50 913,35**
Subcontracting	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Other direct costs	€ 0,00	€ 0,00	€ 0,00	€ 0,00	**€ 0,00**
Overheads costs	€ 25 769,13	€ 4 778,88	€ 0,00	€ 0,00	**€ 30 548,01**
TOTAL	**€ 68 717,69**	**€ 12 743,68**	**€ 0,00**	**€ 0,00**	**€ 81 461,37**
% EC Contribution	75%	50%	100%	100%	
Maximum EC Contribution	€ 51 538,27	€ 6 371,84	€ -	€ -	€ 57 910,10
Requested EC Contribution					**€ 57 910,10**

5. FINANCIAL STATEMENTS

There is no need to provide the financial statements at this point because we are not claiming for any financial contribution.

6. CERTIFICATES

Any financial contribution is not been claimed so certificates are not needed at this point.