European Commission

Impact of the Energy-efficient Buildings Public-Private Partnership

Workshop report

27-28 April 2015

EN

Research and Innovation

EUROPEAN COMMISSION

Directorate-General for Research and Innovation
Directorate D - Key Enabling Technologies
Unit D.2 – Advanced Manufacturing Systems and Biotechnologies

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Workshop report

April 2015

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Directorate-General for Research and Innovation
2015 Key Enabling Technologies EN

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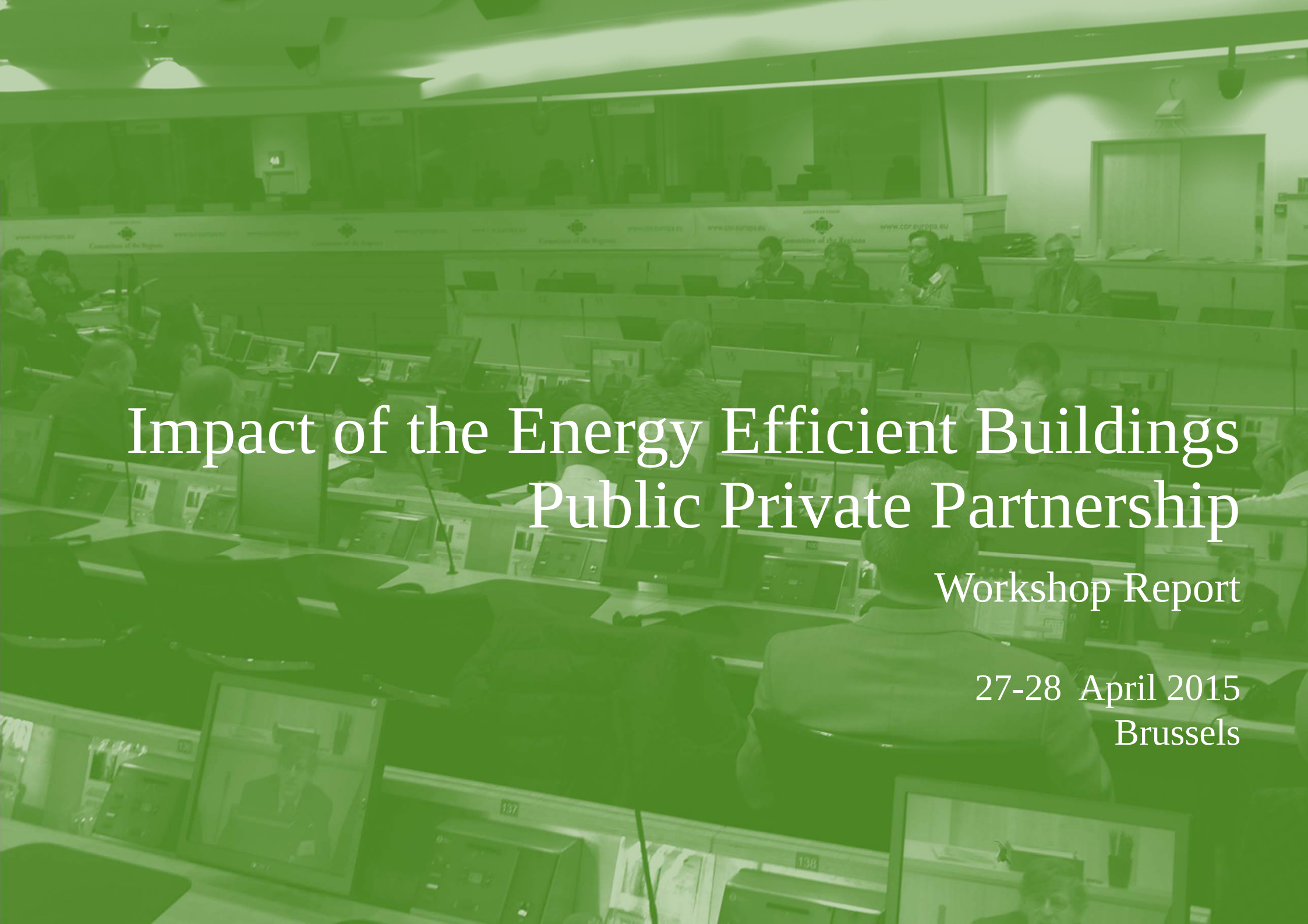

Impact of the Energy Efficient Buildings Public Private Partnership

Workshop Report

27-28 April 2015
Brussels

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Executive Summary

The Workshop on Impact of the Energy Efficient Buildings Public Private Partnership (EeB PPP) was conducted in Brussels on 27 and 28 April 2015. This event was organised jointly by the EC and the E2BA. It provided an opportunity to present projects, share results and highlight challenges. 90 projects presented included approaches to market assessment, performance monitoring, extensive demonstration activity, pilot production, training and education actions. Some projects are already demonstrating impactful results through patent applications, technology cost reduction and spin out set up.

At this fifth edition of the impact workshop, there was general agreement that PPPs have proven to be a successful and stable mechanism for research and innovation funding. The success of the projects is going to be measured through a set of key performance indicators agreed by the EC and the E2BA. The first half day was devoted to 3 parallel sessions dealing with Advanced Materials, ICT for energy efficient buildings and Integration and demonstration of technologies for EeB. The second day was focusing on policy matters, and exploitation activities. Clustering activities are enhancing communication between projects and providing multiple benefits to projects. The EC has now supported four Coordination Support Actions on clustering and there is a continuous emergence of informal networks across projects under the same area. Clustering is improving the visibility of results and optimising dissemination actions. As it becomes a more established activity, projects would like to formalise it so it is ubiquitous for each project. Outcome based clustering could also be considered to maximise cross-fertilisation.

In order to maximise impact of the PPP, participation of all the stakeholders is fundamental from end users to industrial/ academic partners and public authorities. Other important factors include early stage development of commercialisation strategies and approaches for standardisation of products. Projects also need support at early stage to develop solid exploitation strategies that speed time to market. Timely and targeted regulation are also strong drivers of market uptake.

The report includes recommendations for projects as well as the public and private partners.

1. Introduction and Objectives

The fifth edition of the Energy- efficient Buildings Public- Private Partnership (EeB PPP) Impact Workshop was held in Brussels on 27 and 28 April 2015.

The European Commission DG RTD hosted the session that brought together over 80 participants from running projects funded during FP7 (2010 to 2013 calls), and recently started Horizon 2020 projects (2014 call).

The Energy Efficient Buildings Association (E2BA) strongly supported the session and provided closing remarks from an industry perspective.

The focus of this year's session was on networking and building links and contacts across different projects, and discussing the benefit from the on-going clustering activities. The Impact Workshop now has become a 'must-do' for live EeB projects as it is an occasion to share information, new ideas, discuss common challenges and strengthen the PPP community.

90 projects were presented over the two days with each summarising its scientific/ technical goals, the expected technical, environmental and socio-economic impact as well as cross-cutting issues and overall benefits from clustering.

This report highlights the main success factors and benefits for projects of working under the umbrella of the Contractual PPP (cPPP).

The workshop was designed to

- Demonstrate the value of the EeB PPP
- Capture successes from current projects
- Highlight challenges and barriers to maximising the impact of research
- Provide opportunity for project participant networking

2. Background

The EeB PPP is a partnership between the EC as the public side and the E2BA representing the private sector. E2BA is an initiative of the European Construction Technology Platform (ECTP). The EeB PPP promotes and supports research and innovation to reduce the energy consumption and CO_2 emissions related to new and retrofitted buildings across Europe. The PPP is not just a financing instrument, but also a mechanism of dialogue between industry and the EC services and it is being implemented in a true, positive partnership.

The PPP was launched in December 2008 under the European Economic Recovery Plan. It attracted significant industry interest and is helping to drive innovation in the building sector. Under the EU framework programme Horizon 2020 the contractual agreement launching a new contractual PPP on Energy-efficient Buildings was signed in December 2013 between the EC and the private side represented by the E2BA. This cPPP aims to develop cost effective innovative solutions for buildings and districts through the definition of an R&D programme/ and the associated calls for proposals.

E2BA is based in Brussels and is an international non-for-profit association which was founded in 2008. It promotes industry driven research, demonstration and innovation within the framework of the EeB cPPP.

The E2BA gathers large companies, SMEs, research centres, academic institutions and relevant stakeholders interested in RTD in energy efficient buildings and districts. E2BA has also been liaising with Member States and with other related national initiatives through the National Liaison Points network.

E2BA delivered in 2013 a multiannual roadmap for 2014-2020 setting a vision and a path towards developing a high-tech building industry, which turns energy efficiency into sustainable business. This roadmap outlines research and innovation topics agreed amongst a wide community of stakeholders across Europe.

E2BA's vision is to drive the creation of a knowledge-based building industry which turns energy efficiency into sustainable business, within the cPPP EeB under Horizon 2020

3. Workshop overview

The two day workshop commenced with three parallel sessions. The sessions were focused on Materials, ICT and Technology Demonstration. Each session presented clusters of projects from different call topics (FP7 and H2020)

The clusters were determined by the EC and are outlined to the right. Each cluster presentation provided information on:

- Scientific technical goals and achievements of the projects
- Current and expected impact of the supported area. Cross-cutting technical and non-technical challenges
- Synergies and benefits of clustering

Six high performing projects were selected as case studies with high impact and outcome and were presented in the plenary.

The four clustering activities supported by Coordination and Support Actions (CSAs) in the last call were also presented.

The following sections provide an overview of the three sessions and capture the case studies and clustering projects in each area.

Session 1: Nanotechnologies and advanced materials in EeB (28 projects)
Area 1: High performance insulation systems (3)
Area 2: Materials with reduced embodied energy (5)
Area 3: Nanotechnologies for HVAC systems (3)
Area 4: Novel materials for smart windows (6)
Area 5: Nanotechnologies for multifunctional lightweight construction materials and components (5)
Area 6: Technologies and materials for a healthier indoor **environment (6)**

Session 2: ICT for design, monitoring and management of energy efficient buildings and districts (34 projects)
Area 1: ICT and new business models (5)
Area 2: Design, decision and support tools for energy efficient buildings, districts and cities (9)
Area 3: Energy performance monitoring and management of energy efficient buildings (6)
Area 4: Energy performance monitoring and management at district and city level (14)

Session 3: Integration and demonstration of technologies for EeB (31 projects)
Area 1: Low carbon and efficient energy generation systems for buildings and districts (2)
Area 2: New high performance energy-efficient buildings (4)
Area 3: Deep energy renovation of existing buildings (14)
Area 4: Deep energy renovation of districts and smart energy efficient solutions for cities (8)
Workshop Overview
The second day kicked-off with presentations from Clara de la Torre, Director of DG RTD Directorate for Key Enabling Technologies. There was a presentation from the European Investment Bank on alternative finance for new technologies.

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The workshop closed with a panel discussion chaired by José- Lorenzo Vallés covering the topics of clustering, IPR, Spin-offs, exploitation, and maximizing impact and innovation strategy.

The questions addressed by the panellist were the following:

1. How do you understand project success and impact in exploitation for the EeB PPP? What is the role of patents, standardization and start-up creation?

2. What is the added-value of cooperation beyond the consortium to maximize project success (e.g. clustering and international cooperation)?

3. What could help to further ensure that the EeB projects and the PPP generate breakthrough exploitable results and maximize impact?

4. Nanotechnologies and advanced materials in Energy Efficient Buildings

Scientific and Technical Goals and Achievements

The research funded in this area includes New multifunctional materials such as bio-based or nano-enabled materials. The focus has been to develop thermally optimised materials that have hygrothermal, acoustic, fire, structural properties, etc. Also, materials with lower embodied energy with improved durability that result in a reduced energy consumption from improved insulation.

Projects are developing not only materials for the envelope but also the integration of new materials in components and systems such as smart windows and HVAC systems.

In addition to materials development, research in this area has funded technologies for monitoring, controlling and ensuring a high quality indoor environment.

Current and Expected Impact

The materials researched achieved a reduction of energy consumption by up to 50% and a reduction of 80% CO_2 emissions in a cost effective way versus traditional alternatives. Costs were reduced by 15-25% and materials have improved thermal, fire, structural safety and durability properties with lower embodied energy.

Regarding socio economic and environmental impact the materials researched have lower maintenance costs compared to existing solutions. They have been designed to reduce demand of primary raw materials and some are identifying approaches to reuse waste materials.

Projects are contributing to achieve EU policies to limit the carbon footprint to the materials of components they contribute to compared to 2005 values.

Sustainable environment within buildings, 80% reduction of CO_2 and cost reduction by 15-25%. Better material properties with lower embodied energy.

4.1 Cross-cutting Issues

All projects in this areas are successfully addressing the material and product development stage. However, not all projects are attempting to scale up and go into pilot production.

The impact of these projects could be maximised by addressing the following technical and non-technical cross-cutting issues.

Technical Cross-cutting Issues

Assessment and validation
Completion of round robin tests
Evaluation of the long term performance of new materials for aging, durability and safety
Interaction of nano-particles with materials
Creation of harmonized life cycle assessment databases
Assessment to go beyond the level of materials to address whole buildings
Evaluation of recyclability of materials

Scale-up
Promotion of up-scaling at TRL 6+
Demonstration at TRL 7+
Building performance simulation
Standardization for products that are not included in current norms
Industrialized production
Understanding of logistics of application of the new products

Non-Technical Cross-cutting Issues

Market and Cost
Completion of market surveys to identify target markets for timely exploitation
Assessment of costs for demonstration on real-scale buildings

Environmental and social
Engagement of stakeholders – consumers, engineers, architects, applicators – to determine the value of the new materials and products
Addressing perceptions, traditions and/or psychological barriers (e.g. a waste-made or lightweight modular house)
Increasing visibility of results through selected stakeholders (e.g. getting the materials specified by architects and designers)
Cradle-to-cradle consciousness in building industry
Raised awareness of the ‘Circular Economy’
Development of educational material based on most relevant research results/handbooks

4.2 Synergies and Benefits of Clustering

All projects in the materials area are participating in the CSA AMANAC (see next page for further detail on this project).

Most projects are cross-referenced on each other's websites. There are also workshops organised in thematic areas addressing technical and non-technical challenges common across projects such us fire safety, life cycle assessment etc.

Thematic Area leaflets and posters have been prepared or are under preparation.

AMANAC has a key role to coordinate all projects in this area. The CSA will create databases, training events a web exchange platform and a wiki.

Benefits of Clustering

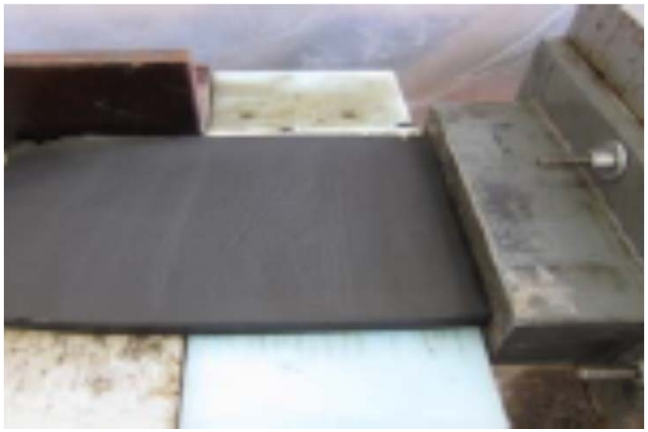
The main benefits of clustering highlighted by participants included increasing the visibility of results, developing new collaborations, exploring new approaches in LCA, publishing joint papers and developing training.

Clustering sets a new level of communication. It increases visibility of project results and provides a platform for the project partners to continue dialogue after the project ends.

Clustering can enable new collaborations. Costs are shared for cross project publications and activities. In this area clustering also helps to develop harmonized approaches in key issues like safety and standardization.

Competitiveness between projects due to the proximity of topics boosts the ambition to obtain valuable results

Clustering helps to develop harmonized approaches in key common issues like safety and standardization



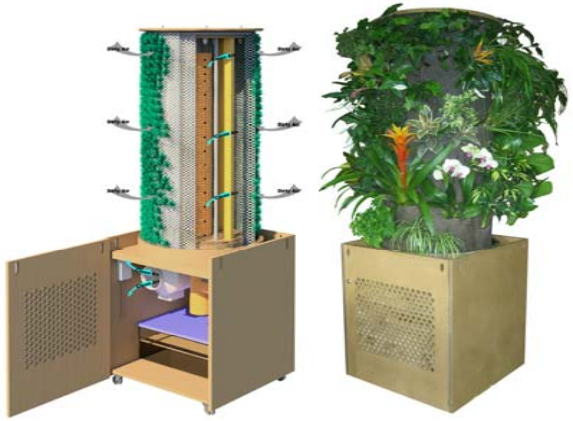
LEEMA

Development of a new generation of inorganic insulation materials and building insulation masonry components based on mineral tailings with lower embodied energy (over 50%) and lower cost (15%) and upgraded properties compared to the commercial ones.

The project developed three new materials suitable for five different applications including, insulation for brick cavities following an equivalent production process; highly flexible, lighter fibre-cement board; cavity wall insulation; thermal insulated brick; loose fill insulating material.

The curing time and temperature required are low and the production processes required are compatible with conventional shaping methods. In addition, they are suitable for the production of prefabricated non-structural components.

2011
Coordinator: Imerys
Budget: €8m
www.leema.eu



CETIEB

Develop cost-effective, innovative solutions for better monitoring of indoor environment quality and investigated active and passive systems to improve air quality. A European cluster for indoor environmental quality has been established.

The project focused on monitoring the environment, developing active control systems to monitor air quality and the use of new materials. The project has developed eight products two of which have patent applications. Some of the products developed include a VOC detection on a chip, infrared thermal comfort monitoring, RGB lighting system to assess colour, natural light illumination system and a multifunctional plaster system.

The university coordinator has set up a spin out to commercialise the infrared thermal comfort monitoring technology (TTI).

2011
Coordinator: University of Stuttgart
Budget: €3.6m + €130k from Taiwan
www.cetieb.eu

AMANAC-CSA

AMANAC is the cluster of all projects developing Advanced Materials and relevant Systems for energy efficiency in buildings, funded under FP7 or H2020.

AMANAC-CSA is an action aiming to coordinate and promote the activities of AMANAC. The coordination support action represents 28 projects and 255 partners in six themes. The thematic areas are flexible and will be evolving as projects close or start. Current thematic areas include:

1. High performance insulation materials and systems
2. Materials with reduced embodied energy
3. Novel materials for smart windows
4. Nanotechnologies for multifunctional lightweight construction materials and components
5. Technologies and materials for a healthier indoor environment
6. Pilot production

2014
Coordinator: NTUA
www.amanac.eu

5. ICT for Energy Efficient Buildings

Scientific and Technical Goals and Achievements

Business Models
The goal of the projects in this area is the development of new business models triggered by new emerging technologies and processes. Using a collaborative value chain approach and enabling energy balancing, demand response services, variable tariffs and easy change of supplier are some of the models that are being studied.

Design, decision and support Tools and Processes
Some projects are investigating energy efficiency decision-making tools pre-construction and tools to support the optimised and user-friendly designs. Tools need to be interoperable and connect with the district and the rest of the city. Real-time management, analytics and forecasting for decision support systems is the focus of some projects.

Monitoring
Diagnostics and monitoring of building energy consumption to close the gap between predicted and actual performance is a recurrent challenge under study as well as building health monitoring and automatic fault detection to ensure optimum operation. At district scale, there are projects looking into energy monitoring and advance simulation and alignment of energy demand with the availability of local renewables.

Current and Expected Impact

One of the key technical impacts expected from these projects is the reduction of building operation energy consumption in a cost effective way, reduction of maintenance needs and maximisation of performance of building systems.

Another technical impact includes optimising the electrical and thermal operation and energy management of buildings and districts. Real-time reasoning and decision making tools, and visualization of current business data supports business models and management strategies.

In relation to socio-economic issues it is important to consider that enabling stakeholders to take validated and quantified choices as early as possible creates more impact. Facilitating the communication between stakeholders and building occupants will increase the interest in investing in energy saving measures.

New business models lead to the creation of new roles in the market and small companies are benefitting by supplying tools to connect owners with suppliers for increased retrofitting. Better understanding of roles and motivations of district actors will help tailor the message for each stakeholder.

Impact is created during the life of a building or public infrastructure through continuity of information flows from design to maintenance. ICT-based tools and services under development create impact across different scales

5.1 Cross-cutting Issues

Projects in this area are facing the challenge of accessing accurate data. Working with real buildings has real restrictions. The tools being developed by projects are good, but the results are not accurate because input data is weak. Current simulation tools do not have the expected performance thus reducing their credibility and the interest of potential clients.

These projects are at a crossroad. The digital services market today needs developed technologies that are properly optimised. This is an area that requires a multidisciplinary approach. There are also plenty of non-technical barriers. People have developed habits which are not easy to change.

Impact of these projects could be maximised by addressing the following technical and non-technical cross-cutting issues.

Technical Cross-cutting Issues

Standardisation
Standardisation and certification activities concerning communication protocols and ICT solutions
Contribution to existing (national and international) standards in quality engineering, hardware interfacing and BIM open standards

Interoperability
Interoperability of tools and models, data access and format
Interfaces and Open Data APIs need to easily share information between them
Communication between existing sensors and BMS

Performance Measure
Development of a consistent set of key performance indicators for solutions performance assessment
Validation and evaluation of methodologies for energy performance in cities
Common calculation methodologies for carbon savings
Inclusion of economic and social impact as weighing factors in multi-optimisation tools

Data
Usage and availability of BIM for new construction and retrofitting
Ability of the technology to provide raw data for further econometric analysis.

Non-technical Cross-cutting Issues

End-user engagement
Development of methods for end users' engagement
Motivation and commitment of citizens to engage in pilots
Encourage people to learn how to do new things

Training
Creation of effective training materials on the developed solutions for stakeholder and designers
Development of dedicated guidelines to implement best practice
Steps/process required to bring products to market

Business Deployment
New business models development
Supporting new start-ups
Setting up spin-offs
Scaling up and exploitation strategies
Studying business models related to decentralised energy generation and energy management in neighbourhoods

5.2 Synergies and Benefits of Clustering

Clustering Activities

The main output of clustering is the creation of a body of knowledge that can outlive the projects. Clustering activities for this group of projects included workshops at European and international conferences on topics of interest across projects: business models, stakeholders involvement, data models and evaluation frameworks. The dissemination of project results has also been done through ee-WISE database and the European Innovation Partnership on Smart Cities and Communities.

In addition, an interest group has been set up on Open eeBIM Platform.

There are two CSAs in this area (SWIMMING and EEBERS) that are developing common dissemination activities through joint publications and promoting the project outputs. The projects are described in the next page alongside the case study for this area.

Benefits of Clustering at Project Level

Solutions development
Identifying alternative approaches to resolve technical issues
Bringing together all relevant stakeholders and defining common working paths

Access to people
Providing easy access to researchers and industry stakeholders
Creating a potential ‘early adopters’ group
Understanding complementary research work between different projects
Accessing areas of expertise not present in all projects

Dissemination
Accessing further demonstration sites to deliver a broader basis for benchmarking of own results
Improving reach and impact of dissemination activities
Defining the optimal representation of the data and end users interfaces
Promoting results in countries/regions not covered by a single consortium

Exploitation
Engaging stakeholders to adopt and implement the results of the project
Using of public deliverables from other projects
Defining new potential business models

Benefits of Clustering for Exploitation

Clustering activities contribute to creating a network of competence and a knowledge base that can be accessed by the scientific community and industry. This can help to integrate the developed tools from other projects and thus enhance the final product.

Clustering supports the development of joint actions for standardisation and business development, in special when targeting the same stakeholders. The scalability of the solutions designed allows replication in similar scenarios identified within the cluster activities.

Benefits after project completion also include the development of common approaches to increase market potential allowing interoperability and financial assessment.

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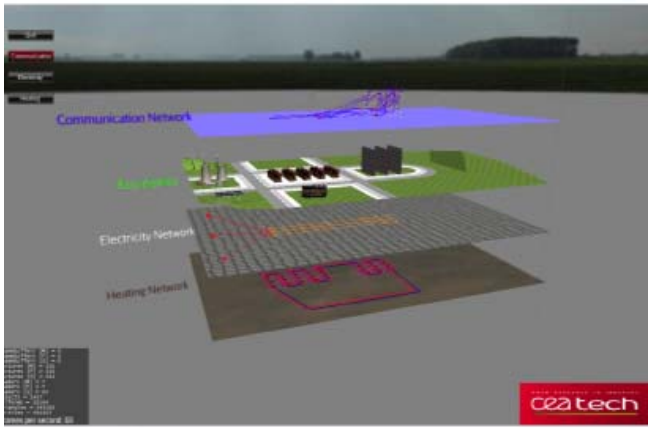
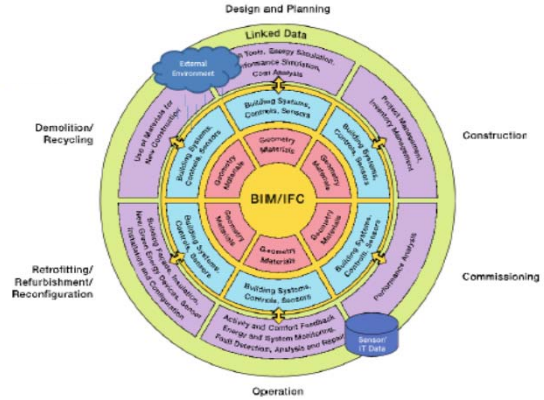


RESILIENT

The project aims to design, develop and install a new system of interconnectivity between buildings, grids and other networks at a district level, assessing the associated energy and environmental benefits. The project combines different innovative technologies including smart ICT components, optimized energy generation and storage technologies at a district level.

Three pilot projects are being used to assess energy and environmental benefits of the integrated concept. The demonstrators are validating models and technologies in different climatic areas. Nine exploitable results have been identified by the consortium e.g. ICT tools and components for energy district management, innovative technological solutions towards the increase of energy efficiency and tools for increasing potential of replication. One of the partners already filed one patent in the framework of the project.

2012
Coordinator: D'Appolonia
Budget: €8.1m
www.resilient-project.eu



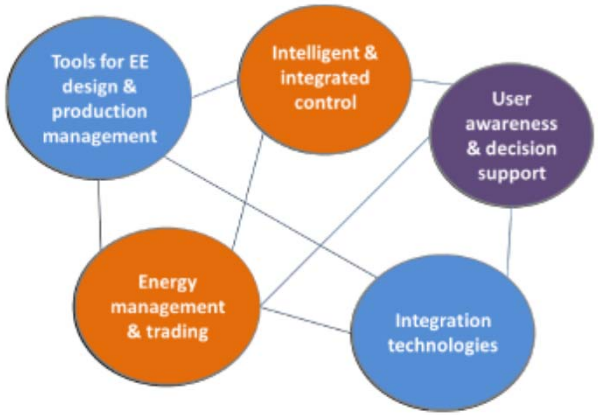
SWIMMING (CSA)

The aim of SWIMing is to address the challenge of managing the huge amounts of data generated across the building life cycle of relevance to building energy management. Building Information Modelling BIM has played a key role in this process for over 20 years.

The project provides the basis for the creation of a Building Information Modelling cloud that can support Building Life Cycle Energy Management Services and Applications. In particular, those developed in active and past FP7 and H2020 EeB Projects.

The objective is to increase the ease and efficiency with which linked data will be exploited in building life cycle energy management for EeB Projects.

2014
Coordinator: Trinity College Dublin
www.swimming-project.eu



EEBERS (CSA)

The mission of EEBERS is to identify opportunities for synergies in ICT related energy efficient buildings projects and to engage stakeholders in networking for future research and exploitation of results.

The project is mapping eighty nine projects grouped in five clusters and seventeen sub-clusters developed from the REEB project. The five clusters include: Tools for energy efficient design and production management, Intelligent and integrated control, User awareness and decision support, Integration technologies, Energy management and trading.

2014
Coordinator: VTT
www.eebers.eu

6. Integration and Demonstration of Technologies for Energy Efficient Buildings

Scientific and Technical Goals and Achievements

The projects in this area are focused on technologies for space and water heating and cooling, deep energy retrofitting of residential, public and commercial buildings and deep energy renovation at districts and city scale.

The first scientific and technical goal of projects in this area are to advance technology by applying materials and energy systems, implementing ICT and enhanced control mechanisms and developing design and decision support tools and system-level approaches for renovation.

The second goal is to understand the financial and environmental impact both through demonstration activity and monitoring and performance assessment. This will help to determine how to achieve return on investment under current market conditions.

The third goal is to enter the market using new business and financial models and engaging stakeholders across the supply chain. At the same time, the development of standards and understanding of regulation is key to the success of these demonstration projects.

Current and Expected Impact

The impact expected of these projects includes the demonstration of energy savings over 50% and CO_2 emissions savings ranging from 30 to 80%. The reduction on GHG emissions is not only at building scale but also on an energy system perspective.

The scale up and industrialisation of solutions and maximum replicability are part of the expected technical impacts. These projects are focused on developing robust, high quality solutions and innovation in construction process that is cost effective with an expected payback period of seven years.

Testing new technologies or different combinations of energy efficiency measures and interfaces with consumers is part of these projects (e.g. target group dependent feed-back systems via in-home displays).

Demonstration projects are also contributing to raise the performance standards and regulations on European, national and local level, in the construction industry and building sector.

In relation to environmental and socio economic impact, demonstration projects are expected to achieve significant environmental and social footprint. They involve a large number of users and have great potential to foster the generation of high-tech SMEs.

Systematic approaches and thought-through solutions that fit together is economically more viable than heavy investments in technology. This is achieved by a combination of technology with training to support the smart consumer and user of the new technology.

Scale up and maximum replicability of robust and cost-effective retrofitting solutions for buildings, districts and city scale

6.1 Cross-cutting Issues

The potential for impact of these projects is very high given that they are creating highly visible demonstrators. However, they are complex projects with a large number of stakeholders.

Impact of these projects could be maximised by addressing the following technical and non-technical cross-cutting issues.

Technical Cross-cutting Issues

Technologies
Performance of solutions and technologies in demonstrators allowing an energy consumption lower that 60kWh/m2.yr

Process
Building a systemic approach and related tools such us building information modelling tools
Developing decision support tools
Considering a life cycle approach
Studying a district scale approach

Assessment and Monitoring
Simulation and monitoring programmes
Identification of unified criteria, indicators and approaches to understand real performance of buildings
Addressing the gap between projected energy use and actual energy use after refurbishment
Common monitoring data structure and sharing of monitoring results

Non-technical Cross-cutting Issues

Regulation
Promotion of more rewarding thresholds for new and efficient technologies in energy labelling
Effective implementation of nearly zero energy buildings directive by 2020 (Energy Performance of Building Directive 2010/31).
Standards compliance

Business models
Development of business and financial models
Cost-effectiveness analysis
Exchange of experience in financial aspects of low energy buildings
Larger use of public administration spending (Green Public Procurement) for driving the market towards more cost effective and efficient buildings (both new and retrofit)

Stakeholder engagement
User engagement and acceptability
Project follow up
Combination of hard EE measures with soft, educational measures
Design of interface
Constant, regular training of users
Low disruption to the tenants and building owners

6.2 Synergies and Benefits of Clustering

An example of clustering activity to highlight in this area is ‘My Smart City District’. The initiative has built a network of seven projects and twenty one cities from twelve different countries interested in integrated renovation and energy solutions for districts. They have joined forces to better share content and promote energy efficient renovation for cities and communities leading to large-scale replicability. The network has organised knowledge transfer events between the pilot cities taking part in the different projects. The group of projects has organised joint communication and dissemination actions and a smart cities conference on technologies and business models.

Benefits of Clustering at Project Level

All projects acknowledged the impact of clustering activities during the project life. This include:

Visibility of results
Improvement of dissemination and greater visibility of results
Networking for joint follow up activities
Development of roadmaps for market deployment beyond the project

Access to data and best practice
Accessibility of new knowledge and benchmarking of results
Sharing good practice and experiences with different and similar technologies
Awareness of project achievements among stakeholders
Sharing project difficulties

End user engagement
Increased engagement with stakeholders including citizens
Effective training and education of building users

Efficiency
Sharing cost and efforts for joint exploitation events
Development of common strategies for marketing and deployment of results

Benefits of Clustering for Exploitation

Clustering can also bring benefits to maximise the exploitation potential of the project through identifying partnerships and market opportunities.

It creates a contact network after the project’s lifetime, facilitating study visits and staff exchange as well as peer reviews. Clustering helps to increase awareness and reliance of potential customers and end-users.

Clusters can support the definition and spreading of innovative financial and business models and increase opportunities for joint ventures. Sharing expertise in Market Deployment planning can improve impacts even beyond the project life.

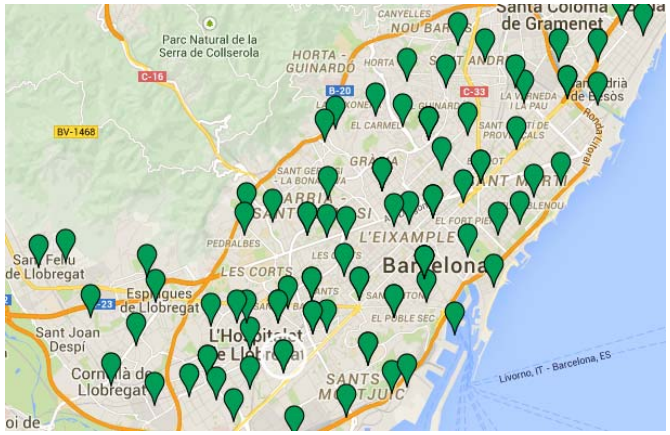
RETROKIT

Established from current best practices and innovative methodologies for the deep retrofitting of existing residential buildings. The project is aimed to develop baseline methods, decision support tools and to validate them into real cases to address ambitious energy efficiency targets at reduced negative impact for the tenants.

Retrokit is a four year old project that has three demo buildings in three different climatic zones: Madrid, Frankfurt and Piteå.

The expected impact of this project includes:
Industrial scale-up to reduce manufacturing costs and construction times
Reduced time of retrofitting, reduced use of scaffoldings
Business models accounting for beyond energy saving

2012
Coordinator: D'Appolonia
Budget: €10m
www.retrokitproject.eu



URB-GRADE

The URB-Grade project designs, develops and validates a Platform for Decision Support that will allow city authorities and utilities to promote and choose the correct actions to upgrade a district to become more energy efficient, cost effective and to increase comfort for its citizens in a District as a Service Platform approach.

3 Pilot District Profiles will be setup for the validation of the approach for different types of consumers in 3 different locations: Eibar - Street Lighting, Barcelona - Street Shops, Kalundborg - Residential Homes.

The main achievements of this project include:
Decision Support Platform development; Profiling Module; Analytics and Quantification Module; Prediction Module; Deployment in 3 pilot sites and use of the platform for decision support

2012
Coordinator: Alexandra Institute of Denmark
Budget: €2.6m
www.urb-grade.eu

NEED4E2B

The project is a six year undertaking with the objectives of developing a replicable methodology for designing, constructing, and operating very low energy new buildings. The project has five demonstration sites across Europe including different types of buildings, from dwellings to universities and commercial buildings.
The sites will help to validate and refine
the methodology, by means of the integration of innovative and cost-effective technologies that reduce energy consumption.

Some of the demos have been completed already and prove the increased energy and resource efficiency of the new buildings. The project is developing cost effective practices and technologies and is contributing to social awareness and training of professionals. Through determining the value increase of an energy efficient building in relation with a standard one, the project is developing financing and business models for investors.

2012
Coordinator: CIRCE
Budget: €9.5m
www.need4b.eu

7. Measuring Success

Impact of the PPP mechanism

The cPPP mechanism has already proven to be a more effective approach to fund research and development than other mechanisms under FP7 and H2020. So much so that the EC is investing in six more new cPPPs over the next few years. Some of the key factors of success include:

- Shorter time to grant
- Over 50% industry participation
- Over 30% SME participation
- Better support for innovation activities
- Wide participation of non-E2B members
- Projects closer to market
- Demonstrators to promote market uptake
- Balanced distribution of funding across countries
- Opportunity to engaged with past projects
- Engaging the whole supply chain

The process remains simple since the route to funding is the same as H2020. The private sector is highly engaged through advising on research and innovation priorities and the responsibility and implementation remains with the EC. During FP7, the success rate for the PPP was higher than normal FP7 projects. However, this year the success rate has dropped from 14% in 2014 to 9% in 2015. This drop has generated some disappointment but at the same time shows the high level of interest in the subject.

Measuring the success of the PPP projects

At the session there was an opportunity to discuss what determines the success of a project and how impact can get measured. The role of patents, standards and spin outs was raised. The key issues raised by participants as good indicators of success included achieving the technical objectives of the project, hitting the energy efficiency and CO_2 targets, effective engagement of the value chain including users and generation of replicable results that are validated through demonstration.

There was general agreement that patents are not the best measure of success, but the generation of new products might be a better thing to look at. The patent application process extends beyond the life of the project, is a costly process and nowadays there are successful open source construction products in the market. In addition, IPR is not a measure that applies to ICT projects.

Start ups are a positive measure of success. They are a good way to reduce the gap between the research and the market.

The EC has developed a set of key performance indicators (KPIs) for the cPPP. The E2BA is surveying all awarded projects on the agreed indicators and will analyse the results to understand what is being achieved.

"PPPs have proven to be a successful and stable framework for joint R&D investment"

"The lower success rate has generated disappointment but at the same time shows raising interest"

"Patents are not the best measure of success. The generation of new products is the key indicator to look at"

"In order to increase the number of breakthrough technologies, there needs to be a higher appetite for risk"

8. Value of Clustering

Clustering means taking dialogue to the next level. It means engagement not only between projects but also with investors, end users and standardisation bodies.

Some of the benefits during project life include: knowledge sharing, project results benchmarking, best use of resources and critical mass of demonstration actions. However, clustering can be challenging when activities involve direct competitors. The provision of best practice guides for pre-competitive collaboration would facilitate cooperation.

This year there is increased and clear evidence of the value that projects are getting from collaborating with each other. The new clustering CSAs supported by the EC presented on their plans and aspirations. There are also self-starting communities that are growing organically, eager to maintain a dialogue and discuss common challenges during large scale demonstration projects.

There is clear consensus about how clustering can help reduce the cost of development by enabling pre-competitive collaboration. However, it also needs great effort and to make it successful it needs time beyond the project tasks.

The discussion highlighted the appetite to improve the level of cross-fertilisation between projects through a different approach to clustering.

Clustering could be done through looking at the project domain i.e. low energy buildings, building retrofit, district interventions and bring together a mix of materials, ICT and demonstration projects. This might enhance transfer of results.

The E2BA led CSA EeB-CA^2 is an overarching CSA lead by E2BA that groups EeB PPP projects according to 5 construction-related research and innovation areas, plus a cross-cutting approach. The CSA will provide instruments supporting technology and geographic clustering across the whole set of EeB PPP projects which could help address the interest in vertical clustering.

"Clustering is taking communication to the next level"

"We need more vertical clustering of projects for cross-fertilisation of results"

"Projects should have an allowance for clustering activities"

8. Maximise Impact

The EeB PPP projects could bring significant innovations to market. In order to maximize impact, the differences between projects need to be clear to ensure each solution has a unique selling point.

Participation of all the stakeholders is fundamental to maximise impact. End user engagement is crucial for demonstration projects. Unfortunately there are not many tools available to connect with the end-user at this stage. The involvement of industrial stakeholders that own the data in pilots is key for the validation of solutions. The presence of external advisors e.g. experts from Industry, City Administration and Academia, can help gather best practices from similar initiatives.

Projects also need support at early stage to develop solid exploitation strategies that speed time to market. There needs to be a clear understanding of the end customer and the gap between the innovation and the market. Projects should also ensure the solutions are cost-effective.

There are regulatory interventions that would also help maximize impact. A good example could be a common legal framework across Europe to achieve a real de-regulated and open market. Such a framework would enable variable tariffs, allow local energy production and the entrance of new companies in the market. Driving legislation can contribute to creating a market.

Education a social awareness means better informed consumers that would welcome more innovative solutions.

“The E2BA roadmap for energy efficient buildings addresses the main challenges and it should be kept live as it will help de-risk future private investment”

”Projects need to collaborate in order to produce contribution to the standards”

“Dissemination activities need to be more focused on benefits, profit and job creation”

9. Conclusions and Recommendations

The PPP impact workshop organised jointly by the EC and E2BA provided an opportunity to present current projects (under FP7 and H2020) and assess the impact of the PPP to date.

Projects are demonstrating more sophisticated market assessment and patents and spin-outs are starting to flourish. There is strong demonstration activity and extensive training and education.

PPPs are a successful framework for collaborative research and development investment. The success of projects could be best measured through the generation of new products and the development of spin outs. The cPPP has a set of KPIs which were agreed by the EC and E2BA.

There are now well established and well funded clustering activities that will increase the visibility of results, will enable benchmarking across projects and stakeholder engagement whilst optimising resource use.

Clustering could be improved through combining the current thematic approach with vertical clustering of projects based on the expected outcome.

The following are a set recommendations for EeB projects, the EC or the E2BA that emerged from the workshop to maximise cooperation and impact

Projects

Creation of networks, forums and communities that can be enlarged and taken over by future projects

Enlarging the scope of the project to create a potential early adopters group

Clustering workshops for inter project collaboration as well as for industry interaction and sharing of other dissemination activities.

'Solutions development' projects can collaborate with 'educational/skills building' projects in order to provide training and courses about the tools being developed

Make use of 'Innovation Actions' for technologies at TRLs 6-7 to support the business model development and exploitation after project life

Add business related competencies to projects for better market approach

Make use of available training, national initiatives that help to develop the skills to take technologies to market

European Commission

Share success stories across services to promote knowledge exchange and cross fertilisation

Successful projects completed in line with the European strategy would like to find calls to continue development work

Clustering and engagement across projects should be included in the tasks of the project

Invite consortia members to the impact workshops one or two years after project completion to present on how partners have benefitted and discuss how clustering can continue after project life

Energy Efficient Buildings Association

Analyse the results of the response to KPIs of the cPPP to determine which are easy to achieve and which ones are no being fulfilled and why.

Host an exhibition event with all FP7 projects on the EeB PPP programme to showcase demos and pitch innovations open to potential clients and investors

Provide tailored training on commercialisation of results e.g. certification, pricing, licensing, IPR

Appendix 1 Agenda

April 2015, Monday

14:00-18:00 **Parallel Sessions: Presentations on the Impact of EeB PPP**
Aim: To assess the impact achieved and the potential benefits of clustering

Session 1 (JDE 3253): Nanotechnologies and advanced materials in EeB
Chairs: Nathalie Gautier-Hamel, Lafarge, Monique Levy, DG RTD
Rapporteurs: Maria Founti, NTUA

Session 2 (JDE 53): ICT for energy-efficient buildings
Chairs: Antoine Aslanides, EDF
Carlos Saraiva Martins, DG RTD
Rapporteurs: Isabel Pinto, VTT, Alexandre D'ANGELO, DG RTD

Session 3 (JDE 52): Integration and demonstration of technologies for EeB
Chairs: Miguel Segarra, Dragados
José Riesgo, DG RTD
Rapporteurs:Nikos Sakkas, Apintech Ltd, Dominique Planchon, DG RTD

18:30 Networking Cocktail

April 2015, Tuesday

Plenary session
Chair: José-Lorenzo Vallés, Head of Unit, DG RTD

8:00-8:10 **Welcome and Objectives**
8:10-8:25 **EeB and Horizon 2020**
Clara de la Torre, Director, DG RTD

8:25-8:40 **Presentation of the 4 CSA's on support for enhancement of the Impact of EeB projects**
Luc Bourdeau, E2BA

8:40-8.50 **EIB financing for companies investing in KETs. An InnovFin Advisory perspective.**
Piermario Di Pietro, Senior Advisor, EIB Advisory Services

8:50-9:50 **EeB Success Stories – Projects with high impact and outcome *(6 presentations focused on impacts)***
RETROKIT (RTD D2)
RESILIENT (RTD D2)
BioBuild (RTD D3)
NEED4B (ENER C2)
URB-GRADE (CNECT)
CETIEB (RTD.I.3)

9:50-10:20 **Coffee break**

10:20-10:35 **Reports of the 3 Parallel Sessions**

10.35.11.35 **Panel discussion: Maximising impact and successful innovation strategy**
Moderators: José-Lorenzo Vallés, DG RTD
Stefano Carosio, d' Appolonia
Panellists: Antoine Aslanides (EDF), Jesus Isoird, (Acciona), Nathalie Gautier-Hamel, (Lafarge), Margherita Scotto, D'Appolonia and Maria Izquierdo, Fundacion Circe.

11:35-11:45 **Conclusions from the Rapporteur for the event**

11:45-11:55 **Statement from the Private side of the EeB PPP**
Paul Cartuyvels, Bouygues-Europe

11:55-12:05 **Statement from the Public side of the EeB PPP**
EC representatives

12:10 **End**

Appendix 2 List of Attendees

Name	Company	Project
Agnieszka Lukaszewska	Prefasada	ADAPTIWALL
Aidan Melia	IESVE	INDICATE
Alain Zarli	CSTB	Odysseus
Alan Taylor	TWI	HIPIN - ISOBIO
Alessandro Largo	Cetma	SUS-CON
Alfredo Samperio	Schneider Electric	AMBASSADOR
Ali Vasallo Belver	Cartif	CITyFIED
Ander Romero	Tecnalia	FASUDIR
Andoni Diaz De Medibil	Tecnalia	nanoCOOL
Andrea Ferrari	D'Appolonia	RESILIENT - RetroKit
Andreas Mader	Lisec	MEM4WIN
Angel Diez Dominguez	Mondragon	
Anne Claire Streck	Ei University	EeBCA2
Antoine Aslanides	EDF	
Arturo Salomoni	Centro Ceramico	
Asa Hedman	VTT	CITYOPT
Chris Hare	Netcomposites	BIObUILD - OSIRYS
Christian Artelt	Heidelberg Cement	
Christian Mastrodonato	D'Appolonia	READY4SmartCities
Christoph Mack	Ict Fraunhofer	FoAM-BUILD
Christos Dedeloudis	Imerys	LEEMA
David Corne		ORIGIN
David Tetlow	Nottingham University	HERB
Elisa Moron	Isotrol	DAREED
Elisabetta Del Ponte	D'Appolonia	HOLISTEEC
Emmanuel Onillon	CSEM	TRIBUTE
Enrico Macii	Politecnico di Torino	DIMMER
Ernst Jan De Place Hansen	Sbi Aau	RiBUILD
Etienne Wurtz	CEA	
Eva Boo	LGI Consulting	READY
Federico Noris	R Msolution	Built2SPEC
Florencio Manteca	Cener	EU-GUGGLE
Francisco Rodriguez	Tecnalia	ZenN
Freek Bomhof	TNO	STREAMER
Germain Adell	Nobatek	E2EVEN
Graham Ormondroyd	Bangor	ECO-SEE
Heidi Rohwer	Funiber	Energy IN TIME,
Helen Threlfall	Ltd.Co University	PERFORMER
Helga Treiber		R2CITIES
Ingrid Weiss	Wip Munich	Orpheus
Isabel Pinto-Seppa	VTT	EEPOS
Javier Del Pozo	Tecnalia	NewBEE
Jesus Garcia Dominguez	Acciona	BRESAER
Jesús Isoird	Acciona	
Johan Norden	SP	SINFONIA
Juan Manuel Mieres	Solintel	Design4Energy
Juan Perez	Tecnalia	EFFESUS
Juan Ramon Cuevas Jimenez	Acciona	BRICKER
Julia Vicente	Cartif	DIRECTION
Jurgen Frick	Stuttgart University	HomeSkin - CETIEB
Karsten Menzel	Ucc	Campus 21
Katarina Malaga	CBI	H-HOUSE
Kris Mcglinn		Swiming
Kristina Mjörnell	SP	
Krzysztof Piotrowski	IHP Microelectronics	e-balance
Lola Alacreu	Grupoetra	BESOS - BEAMS
Luc Bourdeau	CSTB	
Magdalena Rozanska	Acciona	MEEFS Retrofitting
Margherita Scotto	D'Appolonia	EASEE
Maria Founti	Technical University Athens	ELISSA - AMANAC
María Izquierdo Sanz	Circe	NEED4B
Marta Fernandez	Arup	
Miguel Segarra	Dragados	
Miimu Airaksinen	VTT	
Mirko Presser	Alexand Ra	URB-Grade
Nathalie Gautier-Hamel	Lafarge	
Nick Purshouse	IESVE	UMRELLA
Nikos Sakkas	Apintech	RESSEPE
Noemi Jimenez	Cemosa	SEEDS
Paul Cartuyvels	Bouygues University	
Peder Fynholm	Teknologisk	WINSMART
Peter Op 'T Veld	Huygen	Moreconnect
Prof. Nashwan Dawood	Tees	IDEAS
Raimar Scherer	TU Dresden	eeEmbedded
Roberto Fedrizzi	Eurac	INSPiRE
Roberto Lollini	Eurac	CommONEnergy
Roland Zinkernagel	Malmo University	Buildsmart
Rudy Rooth	Kema	NEXT-Buildings
Sabina Jordan	ZAG	
Sergio Jurado	Sensing Control	I-URBAN
Sergio Saiz	Tecnalia	EINSTEIN
Simon Mokorel	Envigence	NRG4Cast
Stefano Carosio	D'Appolonia	
Ton Damen	Demobv	Insiter
Urs Muller	CBI	SESBE
Veronika Schropfer	Ace	A2PBEER
Wolfgang Ottow	Esi Group	Ene-HVAC

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At the fifth edition of the impact workshop, there was general agreement that PPPs have proven to be a successful and stable mechanism for research and innovation funding. The success of the projects is going to be measured through a set of key performance indicators agreed by the EC and the E2BA. The first half day was devoted to 3 parallel sessions dealing with Advanced Materials, ICT for energy efficient buildings and Integration and demonstration of technologies for EeB. The second day was focusing on policy matters, and exploitation activities. Clustering activities are enhancing communication between projects and providing multiple benefits to projects. The EC has now supported four Coordination Support Actions on clustering and there is a continuous emergence of informal networks across projects under the same area. Clustering is improving the visibility of results and optimising dissemination actions. As it becomes a more established activity, projects would like to formalise it so it is ubiquitous for each project. Outcome based clustering could also be considered to maximise cross-fertilisation.
In order to maximise impact of the PPP, participation of all the stakeholders is fundamental from end users to industrial/ academic partners and public authorities. Other important factors include early stage development of commercialisation strategies and approaches for standardisation of products. Projects also need support at early stage to develop solid exploitation strategies that speed time to market. Timely and targeted regulation are also strong drivers of market uptake.

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