FOREST BASED COMPOSITES FOR FAÇADES AND INTERIOR PARTITIONS TO IMPROVE INDOOR AIR QUALITY IN NEW BUILDS AND RESTORATION

Informe

Información del proyecto

OSIRYS

Identificador del acuerdo de subvención: 609067

Estado
Proyecto cerrado

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Periodic Report Summary 2 - OSIRYS (FOREST BASED COMPOSITES FOR FAÇADES AND INTERIOR PARTITIONS TO IMPROVE INDOOR AIR QUALITY IN NEW BUILDS AND RESTORATION)

Project Context and Objectives:
Indoor Air Quality and emissions from building materials have been over the last decades a major challenge for scientists, industry and consumers. Traditional construction materials contribute to contaminants such as VOCs, formaldehyde, particulates and fibres. However, new eco-innovative building materials are able to provide a healthier indoor environment both by substituting source of contamination and by elimination of contaminants arisen from other indoor sources.

Within OSIRYS project a holistic solution for facades and interior partitions is being developed ready to be applied in building retrofitting and new construction by means of the development of biocomposites with different functionalities able to meet the strictest requisites of the Building Code as regards fire and structural performance, improve indoor air quality by VOC and microorganisms elimination, increase thermal and acoustic insulation and control breathability of the construction systems, and increase durability of the construction elements. The new systems will be lighter leading to weight savings and will reduce implementation costs during both manufacturing and assembly processes due to the “Lego” based concept and the modular elements of the industrialized system.

Furthermore, low-embodied energy materials will be used, being the biomass feedstock in each building element >75%. Thus, global warming will be minimized contributing to mitigate climate change problems.

In order to achieve the results the project is divided in various research activities:
- Analysis of requirements as regards materials to be used, design of products, standards, market, and building typologies
- Development and testing of the new eco-innovative materials and products
- Design and engineering to ensure the technical viability, aesthetical aspect and ease to incorporate the system in building retrofit actions. Study on the adequateness to the requirements of the Building Code
- Environmental assessment: indoor air quality, LCA, evaluation of the reuse and recycling
- Economical assessment
- Demonstration activities by applying the final system in a test building and in two real buildings that will...
enable validation in two different climates

All the work is being carried out by a multidisciplinary team which is being able to combine the knowledge and capabilities of experts in materials and architecture.

Project Results:
The scientific and technological strategy of OSIRYS is deploying over the 48-months duration of the project. The technical approach can be divided in various levels.

LEVEL 1: ANALYSIS OF REQUIREMENTS
Setup the basis regarding materials, design, standards, market aspects and building typologies

LEVEL 2: DEVELOPMENT OF MATERIALS, COMPONENTS AND PRODUCTS
- Development of each material (coating, foam insulation, cork insulation, composites with good mechanical, outdoor durability and fire performance)
- Integration and testing of the developed materials into components (assembly technologies, lightweight sandwich structures)
- Design and testing of products (multilayer façade, curtain wall and window, and interior partition)

LEVEL 3: DEMONSTRATION
- Architectural projects of the demo sites
- Manufacturing of prototypes at real scale (up-scaling, integration in real buildings)
- Monitoring (Kubik Lab, Northern Europe, Southern Europe)

LEVEL 4: ENVIRONMENTAL AND ECONOMIC ASSESSMENT
- Indoor air quality (materials, products)
- LCA
- Recycling
- Economic assessment

The second reporting period covers from Month 19 to 36. During this time different activities have been carried out in Levels 2, 3 and 4 with different intensity. Objectives of Level 1 were achieved during reporting period 1. Within Level 2 development of materials was finished and the following main results were obtained:
- A photocatalytic coating which is active indoor was developed. The coating was self-extinguishing and could be obtained in various soft colours.
- A wood-based internal wall and insulation panel were obtained, which exhibited good fire performance.
- A cork panel with good fire and microbiological performance were developed to be used as insulation system.
- Biocomposite profiles comprising a bioresin and a combination of natural and glass fibers were obtained.
- Biocomposite panels to be used outdoor were developed using a bioresin and jute fabrics.
- Biocomposite panels with good fire performance were obtained to be placed in the multilayer façade to promote fire resistance.

As a second phase of Level 2, these materials are being combined to obtain and test the components of
With the performance of the different materials, the products were designed. Designing process was intimately linked to Level 3 where architectural projects of the demonstration sites were set up. The designs of the products combined different requirements ascribed to performance of the materials, architectural demands, aesthetics and functionality of the demos. So, layouts were drawn for the different elements. The designs provided the shape of the elements but also the dimensions, the amount of material for each demo and the required performance. Thus, these designs were also considered for the up-scaling of the different manufacturing processes to obtain the materials at pilot scale for the demos.

On the other hand, monitoring plan for the KUBIK Lab was prepared in order to have a ready-to-test first demo site prior to real demos. Within this plan indoor air quality and energy aspects were considered.

As part of Level 4 indoor air quality of materials was assessed and reuse and recycling of materials and components as well as LCA aspects were evaluated.

Different dissemination activities carried out during this period:
- Maintaining of project web page
- Clustering events as part of AMANAC cluster
- Press notes and newsletters in various internet media
- Articles in journals
- Workshops and Congresses
- Flyers and posters

All deliverables and milestones were reported and achieved, but for D5.4, 5.5, 6.5 and MS6, corresponding to Tasks 5.3, 5.4 and 6.5 which suffered a delay. Manufacturing of materials for lab-scale systems in T5.3 took longer than expected. So, they could not be tested in T5.4 and thus, real scale prototypes could not be obtained and tested in T6.3. However, contingency measures were taken to avoid any delay in the Project. A new schedule for the delayed tasks is provided.

Potential Impact:
The final results will include the development of 7 materials (multifunctional coating, light foam panel, cork panel, fire resistant biocomposite panel, weathering resistant biocomposite panel, and high mechanical performance biocomposite profile), and the design and validation of 4 products with the new materials (multilayer façade, curtain wall, window, and partition system).

As regards societal impact, the project has two main objectives:
- Development and use of new technologies that reduce consumption of fossil resources. Thus, movement towards sustainability is facilitated while keeping the quality of life high.
- The new solution reduces health respiratory diseases associated to humidity, VOCs and microorganisms.

It is estimated that the price of the new system will not exceed 20% over traditional materials. Moreover, maintenance operations and costs will be reduced due to the longer life of products.

It is also worth mentioning that bioeconomy will strength as a collateral wider societal implication of the project. Thus, economic development of rural farm, forestry and biobased material companies is expected
as long as this solution is industrially exploited.

List of Websites:
www.osirysproject.eu

Other report summaries

Periodic Report Summary 1 - OSIRYS (FOREST BASED COMPOSITES FOR FAÇADES AND INTERIOR PARTITIONS TO IMPROVE INDOOR AIR QUALITY IN NEW BUILDS AND RESTORATION)

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