

# AMANAC

## Advanced Materials and Nanotechnology Cluster

### D3.3 – Report with produced publicity material

**Due date of deliverable: 30/11/2016**

**Actual submission date: 24/11/2016**

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Status	Final

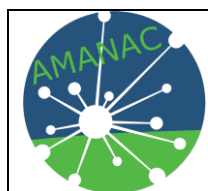
Dissemination level		
PU	Public	<input checked="" type="checkbox"/>
PP	Restricted to other programme participants (including the Commission Services)	<input type="checkbox"/>
RE	Restricted to a group specified by the consortium (including the Commission Services)	<input type="checkbox"/>
CO	Confidential, only for members of the consortium (including the Commission Services)	<input type="checkbox"/>

Version	Date	Description	Written By	Approved by
v1	2016-11-8	Draft report	Agnieszka Łukaszewska	
v2	2016-11-11	Reviewed version	Agnieszka Łukaszewska	
v3	2016-11-21	Final version	Agnieszka Łukaszewska	H. Cornwell

	<p>AMANAC Project – Grant Agreement No 636239</p>	
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### Executive summary

This document constitutes deliverable D3.3 – “Report with produced publicity material”. It includes an overview of publicity material created during the duration of AMANAC project. In addition to the material reported herewith, the AMANAC-CSA has prepared several project presentations that have been used to introduce the Cluster in the various conferences, exhibitions, training activities and thematic area meetings.



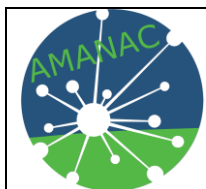
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## Acronyms

CSA	Coordination and Support Action
EMIRI	Energy Materials Industrial Research Initiative
ICAE	International Congress on Architectural Envelopes
EOTA	European Organisation for Technical Assessment
WSED	World Sustainable Energy Days
ECTP	European Construction Technology Platform





## 1. Poster

### 1.1. General AMANAC poster

The general poster explains the main activities of the AMANAC-CSA and shows the six thematic areas of the AMANAC Cluster Projects: lightweight components, insulation, embodied energy, indoor environment, smart windows and pilot production. The poster was produced in two formats:

- A0 format,
- Roll-up format of 85 x 210 cm.

The general poster was created by FASADA in M4 and was first presented at the VII International Congress on Architectural Envelopes (ICAE 2015) that took place on 27-28<sup>th</sup> of May 2015. The poster is shown in APPENDIX 1.

## 2. Brochures

### 2.1. Thematic area flyers

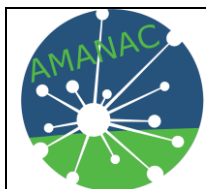
The goal of the thematic area technical flyers is to briefly present the scope of the projects in each thematic area and give a short description of the AMANAC cluster. The flyers are distributed by each of the projects during their dissemination events. The following flyers have been produced by the leader of each thematic area:

- Flyer about Lightweight components area describing projects: ADAPTIWALL, SESBE, ELISSA, FoamBuild, MF-Retrofit.
- Flyer about Insulation area describing projects: HIPIN, AERO COINS, VIP4ALL, HOMESKIN
- Flyer about Embodied energy area describing projects: LEEMA, SUS-CON, BIOBUILD, ECO-BINDER, ISOBIO.
- Flyer about Indoor environment area describing projects: OSIRYS, H-HOUSE, CETIEB, ECO-SEE, BRIMEE.
- Flyer about Smart windows area describing projects: WINSMART, SMARTBLIND, MEM4WIN, HARWIN.

The thematic area of Pilot production was created at the beginning of 2015 and it contains only one project, NANOLEAP. Thus the flyer for this thematic area has not been yet developed. The thematic area flyers are shown in APPENDIX 2.

### 2.2. Flyer about innovative materials technologies and systems for retrofits and new construction

For the seminar co-organised by AMANAC and EMIRI "Success Stories - Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe" that took place in Brussels, Belgium on the 16<sup>th</sup> of June 2016, a special flyer was created. It illustrates the innovative building components developed by five research projects from the AMANAC cluster that were selected for participation in the event. The flyer has a format of A4 and was prepared by FASADA. The flyer was also created in a format suitable for a roll-up poster. The flyer is shown in APPENDIX 3.



### 3. E-newsletters

#### 3.1. First E-newsletter

The first AMANAC E-newsletter was issued in May 2015 and it contained:

- An introduction to the AMANAC-CSA
- A description of the main events where AMANAC was presented or acted as organiser between M1 and M5:
  - o ComplC 2015 – Composites in Construction,
  - o The kick-off meeting of the EeB CSAs,
  - o AMANAC LCA Lightweight Components workshop,
  - o The workshop on Impact of the Energy-efficient buildings PPP.
- A description of the main upcoming events
  - o Announcement of AMANAC activities at ICAE and the Fire workshop.

The newsletter had a format of A4 (four pages) and was created by FASADA with the help of all consortium partners. The newsletter was also printed and distributed during dissemination events. The first newsletter is shown in APPENDIX 4.

#### 3.2. Second E-newsletter

The second AMANAC E-newsletter was issued in November 2015 and it contained:

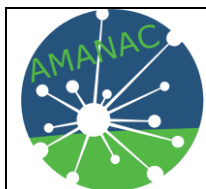
- A description of the main events organised by AMANAC between M5 and M11:
  - o ICAE 2015 and the Fire workshop
- A description of the main upcoming events:
  - o Financial opportunities Workshop,
  - o AMANAC standardisation Workshop,
  - o European Technical Assessment – Eeb CA2 workshop in collaboration with EOTA,
  - o Indoor Air Quality Stakeholder Workshop,
  - o Smart Façade Materials Conference at WSED.
- Presentation of success stories from research projects: description of key exploitation results of projects from the AMANAC cluster that had finished or would finish by mid 2016 (AEROCOINS, HIPIN, VIP4ALL, EnE-HVAC, HARWIN, MEM4WIN, BIOBUILD, LEEMA, SUS-CON, CETIEB).

The second newsletter had a format of A4 (sixteen pages) and was created by FASADA with the help of all consortium partners. The newsletter was also printed and distributed during dissemination events. The second newsletter is shown in APPENDIX 5.

#### 3.3. Third E-newsletter

The third AMANAC E-newsletter was issued in May 2016 and it contained:

- A description of the main events organised by AMANAC between M11 and M16:
  - o Financial opportunities Workshop,
  - o AMANAC standardisation Workshop
  - o European Technical Assessment – Eeb CA2 workshop in collaboration with EOTA,
  - o AMANAC Industry Advisory Board Workshop,
  - o Low Embodied Energy Thematic Workshop,
  - o Indoor Air Quality Stakeholder Workshop,
  - o Smart Façade Materials Conference at WSED,



- Ecobuild.
- A description of the main upcoming events:
  - AMANAC LCA workshop,
  - Seminar on Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe at EU Sustainability Week.
- Presentation of success stories from research projects: description of key exploitation results of projects from AMANAC cluster that were finishing in 2016 (ELISSA, NANOCOOL, WINSMART).

The third newsletter had a format of A4 (nine pages) and was created by FASADA with the help of all consortium partners. The newsletter was also printed and distributed during dissemination events. The third newsletter is shown in APPENDIX 6.

### 3.4. Fourth E-newsletter

The fourth AMANAC E-newsletter was issued in November 2016 and it contained:

- A description of the main events organised by AMANAC between M16 and M24:
  - AMANAC LCA workshop,
  - Seminar on Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe at EU Sustainability Week.
- A description of the main upcoming events:
  - AMANAC at the ECTP conference.
- A summary of facts and figures on exploitable results from AMANAC clustered projects.
- A spotlight on new research projects on highly efficient insulation materials with improved properties (EEnsulate, GELCLAD, INNOVIP, WALL IN ONE).

The fourth newsletter had a format of A4 (five pages) and was created by FASADA with the help of all consortium partners. The newsletter was also printed and distributed during the ECTP conference. The fourth newsletter is shown in APPENDIX 7.

## 4. Videos

The video describing the main project objectives and activities was created in month 16 by CBI. The video can be found at the following link:

<https://www.youtube.com/watch?v=81s1L1K4-GE>

The video describes:

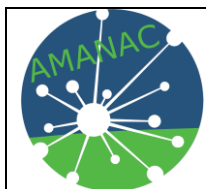
- The AMANAC cluster,
- The main activities of the AMANAC-CSA,
- The thematic areas of the cluster,
- Dissemination events.

A further video was prepared by the project to record the interview with Dr. Monique Levy regarding Clustering activities in H2020, in the frame of the 3<sup>rd</sup> SC meeting of AMANAC-CSA. The video can be found at the following link:

<http://amanac.eu/interview-monique-levy/>

## 5. Press release

AMANAC participated in the Ecobuild event on the 8-10<sup>th</sup> of March 2016 in London, Great Britain. For this event a special press release was prepared by TWI (APPENDIX 8).



## APPENDIX 1: General AMANAC poster



This project has received funding from the European Horizon 2020 research and innovation programme under grant agreement No 636239



# AMANAC: Advanced Materials And Nanotechnology Cluster

AMANAC is a collaboration and coordination platform across all the Advanced Materials and Nanotechnology projects, approved in the frame of the EeB-PPP, whose activities address development of (nano)materials, components and systems for the improvement of the energy efficiency in the built environment.



### AMANAC ACTIVITIES

**DISCOVER AMANAC**



[www.amanac.eu](http://www.amanac.eu)

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Joint Action Plan to support horizontal interactions of AMANAC projects

Identification of synergies and common practices for the development of LCA, LCC, fire safety, market exploitation, etc.

Analysis of hurdles that delay market exploitation, like standardization, nano-safety, etc.

Organization of thematic workshops and training events in areas of common interest across projects, like nano-safety, LCA-LCC, and fire safety

Creation of Web based dissemination tools and an AMANAC wiki that will facilitate better dissemination of technology developments in novel building materials for the energy efficient buildings of the future

Development of frameworks for effective business road map and plans to help projects with potential commercialisation of research results emerging from the projects participating in the AMANAC cluster

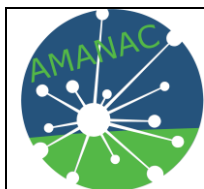
Cooperation and alliances with theme linked organizations, specifically: nano-safety Cluster, other CSAs under EeB-PPP, ECTP, ECCREDI, E2BA

Publicity materials and organization of joint large scale event participation for speeding-up the global impact of the research results coming from the Cluster projects

### PARTNERS







## APPENDIX 2 Thematic area flyers

### Flyer about Lightweight components area:

#### AMANAC-CSA CONSORTIUM



DISCOVER AMANAC  
<http://www.amanac.eu/>



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ADVANCED MATERIAL &  
NANO TECHNOLOGY CLUSTER

#### Lightweight Components



Südpark, Basel  
Architects:  
Herzog & De  
Meuron



The AMANAC project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 636239

#### ADAPTIVALL — Multi-functional light-weight WALL panel based on ADAPTIVE Insulation and nanomaterials for energy efficient buildings

Main technological achievements:

- Design and manufacturing of the 1m<sup>2</sup> lab-scale prototypes **Lightweight buffer**. Four prototypes are foreseen to be able to test the influence of different materializations and interactions of material components in an integrated element.
- Preparation of a lab-scale prototype of the buffer component of ADAPTIVALL.



##### • THEX

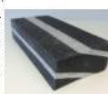
Specifications / requirements have been set for the realization of a **total heat exchanger (THEX)** that can be integrated in a prefabricated wall element.



#### SESBE — Smart Elements for Sustainable Building Envelopes

Main technological achievements:

- **Reactive Powder Concrete** with high volume of industrial by-products replacing cement clinker.
- Self-cleaning and heat reflective concrete surfaces with super-hydrophobic properties.
- **Sealing tape** in PU-aerogel foam and foam concrete-aerogel insulation with thermal conductivities around 35 and 30 mW/(m.K), respectively.
- Production of **Quartzene®** aerogel under ambient conditions significantly reducing the energy consumption and price.



- **Sandwich panel concept** and production of the first prototypes in lab-scale.
- **Scaling-up of the outer RPC panel** (2800x2800x25 mm) and production of pilot scale elements (1100x700x300 mm) for structural testing.



#### ELISSA — Energy Efficient Lightweight-Sustainable-Safe-steel Construction

Main technological achievements:

- Production of **prefabricated load bearing lightweight modular elements** with excellent thermal performance and in compliance with Eurocode requirements in terms of fire safety and seismic resilience.



- **ELISSA ventilated facade** (2.61 x 5.23m) has been constructed and a large scale open-air compartment fire test has been conducted in order to assess the ventilated facade system performance under fire conditions.
- Performing in-situ measurement of the hydro-thermal performance of the mock up building (next 6-months).
- With **half the thickness and 73% less weight** than a similar brick wall of the same U-value, the **ELISSA modules** offer a high level of flexibility and short construction times due to prefabrication. The ELISSA modules have ca. **60% lower U-value** than brick walls of the same thickness and can offer **up to 60% savings in energy costs**.



a high level of flexibility and short construction times due to prefabrication. The ELISSA modules have ca. 60% lower U-value than brick walls of the same thickness and can offer up to 60% savings in energy costs.

#### FoAM-BUILD — Functional Adaptive Nano-Materials and Technologies for Energy Efficient Buildings

Main technological achievements:

- Development of a **moisture detection system on the ETICS** (External Thermal Insulation Composite Systems)
- Preparation of **façade test** (2.5 m wide x 3 m high and west-orientated). Various sensors have been installed. The setup will demonstrate the influence of the weather and the control system on the growth of microorganisms on façades. The results obtained from the sensors have shown fast detection of **changes in humidity on the surface of ETICS**.



#### MF-RETROFIT — MultiFunctional Facades of reduced thickness for fast and cost-effective retrofitting

Main technological achievements:

- Successful development of **ultralow thermal conductivity clay aerogels**.
- Development of silica aerogels from rice husk ash (byproduct) demonstrating low thermal conductivity and good stability.
- Development of **geopolymers** as structural materials with low density compared to concrete.
- Development and production of **polyurethane materials with bio content**.
- Production of **doped TiO<sub>2</sub> nano powders** with high photocatalytic efficiency.
- Successful modeling of PCM placement and panel thermal performance.



Fly ash during the geopolymerization reaction



## Flyer about Insulation area:

The **AMANAC-CSA** aims to support and encourage long-lasting collaboration within all the “**Advanced Materials and Nanotechnology**” projects, to maximize the impact on European Industry and Society.

The **AMANAC** cluster projects are grouped into six thematic areas:

- **High Performance Insulation**
- **Embodied Energy**
- **Smart Windows**
- **Lightweight Components**
- **Indoor Environment Quality**
- **Pilot Production**

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### HIPIN- High Performance Insulation based on Nanostructure Encapsulation of Air

**Objective:** Development of a high-silica content robust aerogel to incorporate it into new affordable building materials such as paints, plasters, and panel systems to improve thermal efficiency in new and retrofitting buildings.

**Key Results:** Five key exploitation results can be highlighted for the project, viz. a high silica content precursor which can be used to make robust aerogel, a cost-effective route for synthesis of hydrophilic and hydrophobic aerogel, and three building products which incorporate the aerogel and demonstrate improved thermal performance - thermal paint, thermal plaster, and panels. The insulation benefits and performance of the 3-building products were established via the demonstrators in the project. Long-term durability (for the plaster) and the cost of the aerogel remain key factors that will drive commercial viability of the products. As the cost of the aerogel comes down with increasing demand, it is anticipated that the payback period for the investment will be low enough to create a market pull for these novel building insulation products, both for retrofits as well as new buildings.

### AEROCOINS- Aerogel-based composite/hybrid nanomaterials for cost effective building

**Objective:** Develop new composite/hybrid aerogel material suitable to be handled at construction sites, to improve the thermal insulating performance of existing buildings aiming at reducing their energy demands.

#### Key Results:

- New strategies for the preparation of mechanically reinforced aerogel based thermally superinsulating materials.
- Developing an ambient drying process for large aerogel boards.
- Designing and fabricating a novel building component prototype based on the developed aerogel-like material, which is compatible with conventional construction installations where the envelope is part of the buildings.
- Demonstration of the thermal, structural and mechanical performance of the highly insulating component under real conditions.

### VIP4ALL - Highly Sustainable and Effective Production of Innovative Low Cost Vacuum Insulation Panels for Zero Carbon Building

**Objectives:** VIP4ALL project aims to deliver to the building sector an alternative and cost-effective new VIP product solution, specially designed for energy efficiency goals and able to provide, at affordable price, superior thermal insulation for the major EU building renovation in progress.

Mainly by using a combination of natural, cheaper and sustainable materials for the creation of hybrid multi-level network structures, the ultimate goal is to develop new core systems that can cut up to 50% the costs of the conventional silica ones, making VIP4ALL a truly competitor in terms of price when compared with standard fiber and polymer insulation products.

**Key Results:** Up until now VIP4ALL trial panels have already been produced at industrial scale securing thermal conductivities around 7 mW/mK, thus comparable to standard VIP solutions. Accelerated ageing tests are currently under execution, in order to attest the service life expectancy and to ensure the long-time thermal performance for this novel market solution.

### HOMESKIN- HOMES Key Insulating material

**Objective:** The HOMESKIN project aims at developing a new silica Advanced Aerogel-Based Composite material possessing the lowest thermal conductivity of all insulation materials found in the market. The project will allow an accelerated industrial ramp up of this high performance insulation for a worldwide expansion. Through this project, Europe has the opportunity to take the lead on super-insulation systems.

**Key Results:** The proposed solution will bring to the market new insulation technologies that do not only possess very high thermal insulation performance but also are thinner, lighter, non inflammable, breathable and with lower CO<sub>2</sub> and VOC emissions. The new material developed can be applied to new building as well as for old buildings retrofit applications. Thanks to the use of mineral materials, our super-insulation products will be more sustainable and durable than other insulation.

### HIPIN



### AEROCOINS



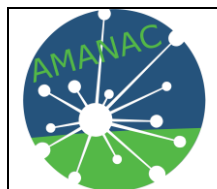
### VIP4ALL



### HOMESKIN







## Flyer about Embedded energy area:

**The main objective of the NMP "Advanced Materials and Nanotechnology" Projects Cluster is to unite efforts in order to promote synergies and fields of co-operation.**

AMANAC will allow the involved projects to be more productive, more competitive, successful and support them to establish a broader impact.

AMANAC projects are grouped in Thematic Areas to facilitate increase of impact

- Insulation Materials
- Reduced Embodied Energy
- HVAC
- Smart Windows
- Lightweight components
- Indoor Air Quality



Low embodied energy advanced (novel) insulation materials and insulating masonry components for energy efficient buildings  
[www.leema.eu](http://www.leema.eu)



Sustainable, Innovative and Energy-Efficient Concrete, based on the Integration of All-Waste Materials  
[www.sus-con.eu](http://www.sus-con.eu)



High Performance, Economical and Sustainable Biocomposite Building Materials  
[www.biobuildproject.eu](http://www.biobuildproject.eu)



Development of insulating concrete system based on novel low CO2 binders for a new family of eco-innovative, durable and standardized energy efficient envelope components



Development and Demonstration of Highly Insulating Construction Materials from Bio-derived Aggregates



**Advanced Materials & Nanotechnology Cluster**

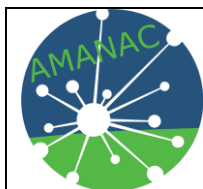
**Materials with Reduced Embodied Energy**



These projects have received funding from the European Union's Seventh Framework Programme and H2020 Programme for research technological development and demonstration.

LEEMA	SUS-CON	ISOBIO	BIOBUILD	ECO-Binder
<p><b>EMBODIED ENERGY CLUSTER</b></p> <p>The construction industry is one of the largest consumers of energy and raw materials, and highest contributor to the emission of greenhouse gases. Improvements in insulation and boiler efficiency now mean that the energy associated with the production of the materials used to construct a building is a significant proportion of the total energy consumed by the building during its life. By using low embodied energy construction materials the total energy use of a building can be reduced. However, the new materials must perform as well as or better than existing technologies and need to be lower in cost. The re-use of waste materials is an important route to achieving these goals.</p> <p><b>LEEMA - Low embodied energy advanced (novel) insulation materials and insulating masonry components for energy efficient buildings</b> <a href="http://www.leema.eu">www.leema.eu</a></p> <p>Development of a new generation of inorganic insulation materials and building insulation masonry components (33% with lower embodied energy (50% reduction), lower cost (cheaper by 15%) and upgraded properties compared to current technology.</p> <ul style="list-style-type: none"> <li>• Improvement of durability and energy performance at building level</li> <li>• Safer and cleaner indoor building environment due to incombustibility and absence of organic/fibrous compounds</li> <li>• Use of wastes from industrial minerals exploitation, recycled rejects from the glass industry and industrial byproducts</li> </ul> <p>LEEMA will achieve these aims by the development of new inorganic polymeric materials free from the drawbacks of current "geopolymers".</p> <p>Contact: Christine DEDELIQUIS - <a href="mailto:christinededeliouis@leema.eu">christinededeliouis@leema.eu</a> - +33 210629179</p>	<p><b>SUS-CON - Sustainable, Innovative and Energy-Efficient Concrete, based on the Integration of All-Waste Materials</b> <a href="http://www.sus-con.eu">www.sus-con.eu</a></p> <ul style="list-style-type: none"> <li>• The construction industry is one of the largest consumers of energy and raw materials, and highest contributor to the emission of greenhouse gases.</li> <li>• Concrete producers need new, eco-compatible and cost-effective materials for energy efficient building components.</li> <li>• Waste management is an increasingly complex and challenging task for both local authorities and waste recycler companies.</li> </ul> <p>SUS-CON aims to integrate waste materials into the production cycle of concrete for both ready-mixed and pre-cast applications. The main challenge is to produce an innovative light-weight, eco-compatible and cost-effective construction material, made using all waste raw materials and characterised by enhanced thermal insulation performance and a low embodied energy and CO2 footprint.</p> <p>Contact: Alexandre LARGO - <a href="mailto:alexandre.largo@sus-con.eu">alexandre.largo@sus-con.eu</a> - +33 051440406</p>	<p><b>ISOBIO - Development and Demonstration of Highly Insulating, Construction Materials from Bio-derived Aggregates</b></p> <p>The ISOBIO project will develop a new approach to insulating materials through the novel combination of existing bio-derived aggregates with low embodied carbon and with innovative binders to produce durable composite construction materials. These novel composites will target 50% lower embodied energy and CO2 at component level and 20% better insulation properties than conventional material. The project will also seek to demonstrate a reduction of at least 15% in total costs and 5% to total energy spent over the lifetime of a building.</p> <p>Contact: Alan TAYLOR - <a href="mailto:alan.taylor@isobio.uk">alan.taylor@isobio.uk</a> - +44 (0)223 895387</p>	<p><b>BIOBUILD - High Performance, Economical and Sustainable Biocomposite Building Materials</b> <a href="http://www.biobuildproject.eu">www.biobuildproject.eu</a></p> <p><b>Target</b> To use biocomposite materials to reduce the embodied energy in building facade, supporting structure and internal partition systems by at least 50% over current materials with no increase in cost.</p> <p><b>How?</b> By overcoming current actual and perceived shortcomings in biocomposites, such as:</p> <ul style="list-style-type: none"> <li>• Resistance to degradation by microbial attack</li> <li>• Flame resistance</li> <li>• Dimensional stability</li> </ul> <p><b>Why?</b> Natural fibres have significantly lower environmental impact than glass in particular in the areas of climate change, ozone depletion, toxicity and eutrophication.</p> <p>Contact: Anthony STEVENSON - <a href="mailto:anthony.stevenson@biocomposites.com">anthony.stevenson@biocomposites.com</a> - +44 (0)1246 286244</p>	<p><b>ECO-Binder - Development of insulating concrete systems based on novel low CO2 binders for a new family of eco-innovative, durable and standardized energy efficient envelope components</b></p> <p>The ECO-binder project aims to demonstrate the possibility of replacing Ordinary Portland Cement (OPC) and OPC based concrete and concrete products with new ones based on the new Belite-Yelimite-Ferrite (BYF) class of low-CO2 binders. This will enable the development of a new generation of concrete-based construction materials and prefabricated building envelope components with more than 30% lower embodied energy, 20% improved insulation properties and 15% lower cost than the actual solutions based on Portland cement.</p> <p>Contact: Federico MONEGHETTI - <a href="mailto:federico.moneghetti@deppolonia.it">federico.moneghetti@deppolonia.it</a> - +39 02 51 801062</p>





## Flyer about Indoor environment area:

The AMANAC-CSA aims to support and encourage long-lasting collaboration within all the 'Advanced Materials and Nanotechnology' projects, to maximise the impact on European Industry and Society.

The AMANAC cluster projects are grouped into six thematic areas:

- Insulation Materials
- Embodied Energy
- Smart Windows
- Lightweight Components
- Indoor Environment Quality
- Pilot Production

DISCOVER AMANAC  
<http://www.amanac.eu/>



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<http://www.osirysproject.eu/>



<http://www.h-house-project.eu/>



<http://www.cetieb.eu>

<http://eco-see.eu/>



<http://www.brimee.eu/>



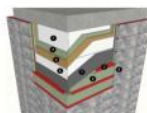
ADVANCED MATERIAL & NANOTECHNOLOGY CLUSTER

Indoor Environment Quality



### OSIRYS - Forest based composites for façades and interior partitions to improve indoor air quality in new buildings and retrofitting actions

OSIRYS proposes a holistic solution for façades and interior partitions for retrofitting and new construction by developing biocomposites to meet Building Code requirements which also improve indoor air quality by VOC and microorganisms elimination, increase thermal and acoustic insulation and control breathability of the construction systems. Research activities encompass new eco-innovative materials, aesthetic aspects, LCA and cost evaluation, compliance with the Building Code and consideration of different climates.



### BRIMEE — Cost-effective and sustainable Bio-Renewable Indoor Materials with high potential for customisation and creative design in Energy Efficient buildings

Today's challenge is the realisation of sustainable low-energy buildings, which combine thermal insulation properties with a healthy, comfortable and safe indoor environment.



The BRIMEE project aims to combine the development of better performing insulation materials providing a significant reduction of buildings operational energy, with the capability not to emit harmful substances and to act as an absorber for indoor pollutants.

### H-HOUSE - Healthier Life with Eco-innovative Components for Housing Constructions

An adequate building envelope should protect against moisture ingress, heat loss in winter, excessive heating in summer and noise. H-HOUSE will develop new eco-innovative materials and building components that prevent the accumulation of pollutants and reduce noise for a healthier indoor environment. Solutions for the building envelope and internal walls cover aspects of chemical and physical 'activity' of the building materials, embodied energy, suitability for different applications and environments, durability, cost-efficiency and long-term improvement of energy efficiency of buildings.



### CETIEB — Cost-Effective Tools for Better Indoor Environment in Retrofitted Energy Efficient Buildings

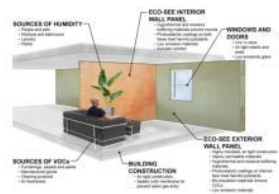
CETIEB developed innovative solutions for monitoring indoor environment quality and detecting insufficient comfort and health factors. Results achieved are a new single VOC sensor (MEMS based spectrometer on a chip) as OEM, a low-cost infrared vision system to monitor comfort parameters (MRT – Mean Radiant Temperature, PMV – Predicted Mean Vote), an air bio-filter to remove VOC, and a fully mineral thermal insulation plaster which is market ready in 2016. CFD-Modelling of indoor environments was performed for validation. A European cluster for Indoor Environment Quality was established to identify research needs.



### ECO-SEE — Eco-innovative, Safe and Energy Efficient wall panels and materials for a healthier indoor environment

The ECO-SEE project aims to address an emerging health problem associated with modern low carbon buildings, with research showing that a build-up of potentially harmful chemicals in the air may cause negative impacts on occupants. The project studies the use of innovative eco-building materials that will address poor air quality, while also radically improving the energy efficiency of buildings.

The project aims to deliver products with at least 15% lower embodied energy, at least 20% longer life, and at least 20% lower build costs, advancing the state of the art in the technology and application of multifunctional bio-based products in indoor environments.





## Flyer about Smart windows area:

**EELICON – Enhanced Energy Efficiency and Comfort by Smart Light Transmittance Control**

EELICON is concerned with an innovative switchable light transmittance technology developed previously in projects co-funded by the EU Framework Programmes. The core of this development is a mechanically flexible and light-weight electrochromic (EC) film devices based on a conductive polymer/nano-composite technology with a unique property profile far beyond the current state-of-the-art, opening the possibility to retrofit existing windows with electrically dimmable plastic film.

According to life cycle assessment studies, considerable energy savings may result when such films are included in appliance doors, aircraft cabin windows, and automotive sunroofs. The development has been driven to the pilot-line production stage however, the decisive step from research to innovation could not yet be accomplished for a number of technical and economic reasons. To overcome this gap, EELICON will tackle existing drawbacks by removing equipment limitations, automating processes, and establishing a high-throughput prototype production for a cost-effective high performance EC film technology in Europe.

[www.eelicon.eu](http://www.eelicon.eu)



**AMANAC**  
Advanced Material and Nanotechnology Cluster

**SMART WINDOWS**



[amanac.eu](http://amanac.eu)



Horizon 2020  
European Union funding  
for Research & Innovation

**LaWin – Large Area Fluidic Window**

The Horizon 2020-funded project 'Large-Area Fluidic Windows' (LaWin) is intended to develop functional façades and window modules, together with an integrated production process to achieve an unmatched readiness to market. The core of the technology is based on structured glass which contains microfluidic channels through which a functional fluid circulates. As an example, this liquid will make it possible to automatically adjust the incidence of light or to harvest exterior heat which will then be transported to a heat pump.

[www.lawin.uni-jena.de](http://www.lawin.uni-jena.de)

**Lawin**

**SMART WINDOWS**

Energy consumption in building sector is larger than that in transportation and industrial processing sectors. In order to reduce energy demand in buildings and balance the energy consumption in the building by energy harvesting within the building, smart windows with focus on new materials, are conceived as multifunctional systems offering enhanced energy control. Goals of the EES Smart Windows Program:

- Energy savings over life cycle up to 20 %
- Weight reduction up to 50 %
- Insulating window with 0.3 W/m<sup>2</sup>/K at VLT > 50 %

**WINSMART – Smart, lightweight, cost-effective and energy efficient windows based on novel material combinations.**

The main goal of the project is to develop a smart window system that will contribute to meeting the energy efficiency targets of the building industry by 2020. This goal will be achieved through a new vacuum insulation glazing (VIG) combined with newly developed and robust switchable glazing systems mounted in durable and energy efficient sash and frame. For maximum impact and overall effectiveness, the new model window will be scalable for use in a range of building scenarios including renovation and retro-fitting of existing structures, be inexpensive and easy to install, be lightweight, durable and of reduced carbon footprint compared to current available solutions. VIG offers the potential of 2-5 times higher insulation performance with a doubly glazed pane, at the same time providing an extremely slim and lightweight solution.

In addition to high thermal performance, the smart windows will have improved control functions including switchable optical properties and exterior surface protection (anti-fogging, easy to clean, scratch resistant, etc.)

[www.winsmart-d3.dk](http://www.winsmart-d3.dk)



**SMARTBLIND – Development of an active film for smart windows with inkjet method. Application to a building envelope component: autonomous smart device.**

The SMARTBLIND project aims at developing an Energy Efficient Smart Window including a hybrid film constituted of an electrochromic LC film and a photovoltaic film both printed on the same long-lasting flexible substrate. The realization process will be implemented thanks to electrochromic and photovoltaic inks especially formulated to be ink-jet printed.



A reduction of the window U-value is targeted by combining the hybrid film to an appropriate window frame. An important part of the SmartBlind project is furthermore devoted to the related parts, such as connectors and film control, sustainability, life cycle and recyclability. More particularly, the SmartBlind consortium has defined four main objectives:

- To reduce weight by 50% compared to glass window, while offering transparency and flexibility.
- To improve the optical response time of windows while enabling the switching of large panes.
- To integrate an electronic control system with an embedded power source
- To guarantee a low-cost industrial solution adaptable to large and shaped surfaces.

[www.smartblind-project.eu](http://www.smartblind-project.eu)

**MEM4WIN – Ultra-thin glass membranes for advanced, adjustable and affordable quadruple glazing windows for zero-energy buildings.**

The goal of MEM4WIN is to introduce a novel Integrated Glazing Unit (IGU) for quadruple glazing containing ultra-thin glass membranes dedicated as frameless openable windows for direct application in facades. New tempered ultra-thin glass membranes with a thickness so far of 1.3 mm are employed. Due to this approach U-values of 0.3 W/m<sup>2</sup>/K can be achieved and weight reduction by more than 50 % and cost reduction by 20 %. In addition, MEM4WIN implements ink-jet printed organic photovoltaics (OPV) and fully integrated solar thermal collectors for energy harvesting and micro mirrors for energy control and advanced day lighting into the glazing. Fabrication costs will be reduced by replacing conventional and cost intensive materials used for contacts like ITO and silver by graphene. MEM4WIN is also introducing production methods like roll-to-plate and ink-jet printing to fabricate contacts for OPVs.

[www.mem4win.org](http://www.mem4win.org)



**HARWIN – Harvesting solar energy with multifunctional glass-polymer windows.**

One major direction of material development in HarWin is based on glass particle reinforcement of laminated glazing and glass fiber reinforcement of light weight polymer/glass-composite frames with the aim to significantly reduce the overall weight of windows while further improving their U-value. Another goal is the reduction of embodied energy consumption and material usage. Therefore life cycle environmental analysis is used as guiding tool for the development of the new glazing and frame window materials.

New additional functionality of the glazing is achieved by integrated functional coatings and employment of intelligent phase changing materials as well as introduction of novel glass-based materials with wavelength management capability.

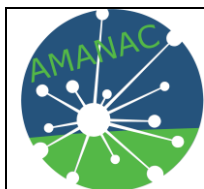


These new windows combine heat and noise control by means of new laminated and glass particle reinforced composites for glazing. Light weight polymer foam/glass fiber reinforced composite framing further reduces the weight of multiple glazing windows. The windows developed within HarWin will enable merging of different functionalities currently assigned separately to windows glazing and frame.

[www.harwin-fp7.eu](http://www.harwin-fp7.eu)


**HarWin**






## APPENDIX 3: Flyer about innovative materials technologies and systems for retrofits and new construction

This project has received funding from the European Horizon 2020 research and innovation programme under grant agreement No 636239

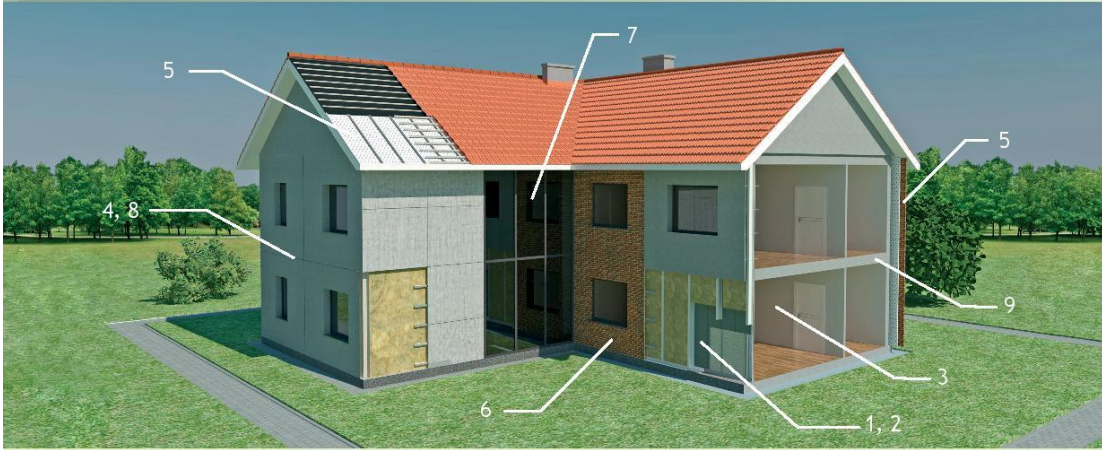




### AMANAC: Advanced Materials And Nanotechnology Cluster

AMANAC is a collaboration and coordination platform across all the Advanced Materials and Nanotechnology projects, approved in the frame of the EeB-PPP, whose activities address development of (nano)materials, components and systems for the improvement of the energy efficiency in the built environment.

For more information visit: [www.amanac.eu](http://www.amanac.eu)



### Innovative material technologies and systems for retrofits and new construction

Innovative building components at a glance:

1. Prefabricated (modular) lightweight steel skeleton elements with dry wall systems, vacuum insulated panels, intumescent paint with improved thermal, seismic and fire performance (project ELISSA)
2. Active Damping Device for vibration suppression (project ELISSA)
3. Partition walls with earthen plaster for healthier indoor environment (project H-HOUSE)
4. Prefabricated light-weight concrete façade elements with self-cleaning surfaces improved thermal properties (project H-HOUSE)
5. Low embodied energy 3i Loose Fill insulation material for cavities (project LEEMA)
6. Low embodied energy 3i insulation bricks and façades (project LEEMA)
7. Smart windows with: weight reduction, harvesting of energy, possibility to control of solar radiation and reduce U-value (0,3 W/m2K) & carbon footprint (project MEM4WIN)
8. Eco-sustainable lightweight concretes with 100% secondary raw materials for pre-cast products (panels and blocks) - (project SUS-CON)
9. Eco-sustainable lightweight concretes with 100% secondary raw materials for ready-mix products (screeds) - (project SUS-CON)

Durable

Low Embodied Energy

Low CO<sub>2</sub> emissions

Eco-friendly

Fire resistant

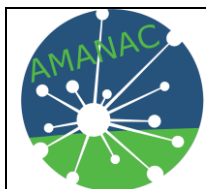
Seismic resistant

Increased thermal properties

Healthy indoor environment

Cost-effective





## APPENDIX 4: First E-newsletter



This project has received funding from the European Horizon 2020 research and innovation programme under grant agreement No 636239



# AMANAC: Advanced Materials And Nanotechnology Cluster

First Newsletter: May 2015

## WHAT IS AMANAC AND THE AMANAC-CSA?

AMANAC is a collaboration and coordination platform across all the Advanced Materials and Nanotechnology projects functioning in the frame of the EeB-PPP, whose activities address development of advanced materials, components and systems for the improvement of the energy efficiency in the built environment. AMANAC-CSA is a Coordinating Support Action of H2020, which aims to maximize the impact of the AMANAC projects towards the European Industry and Society and hence effectively support the objectives established by the European Commission and the EeB-PPP by addressing in a holistic way the relevant technical/technological, industrial, economic, societal, organizational and regulatory challenges.

### AMANAC covers six thematic areas:



LIGHTWEIGHT COMPONENTS



EMBODIED ENERGY



SMART WINDOWS



INSULATION



INDOOR ENVIRONMENT



PILOT PRODUCTION

1





## AMANAC: Advanced Materials And Nanotechnology Cluster

First Newsletter: May 2015

### AMANAC ACTIVITIES

- Joint Action Plan to support horizontal interactions of AMANAC projects
- Identification of synergies and common practices for the development of LCA, LCCA, fire safety, market exploitation strategies, etc. for novel building products
- Analysis of hurdles that delay market exploitation, like standardization, nano-safety, etc.
- Organization of thematic workshops and training events in areas of common interest across the projects, like standardization, LCA-LCC, and fire safety
- Creation of Web based dissemination tools and an AMANAC wiki that will facilitate better dissemination of technology developments in novel building materials for the energy efficient buildings of the future
- Development of frameworks for effective business road map and plans to help projects with potential commercialization of research results emerging from the projects participating in the AMANAC cluster
- Cooperation and alliances with theme linked organizations, specifically: other CSAs under EeB-PPP, ECTP, ECCREDI, E2BA, nano-safety cluster
- Publicity materials and organization of joint large scale event participation for speeding-up the global impact of the research results coming from the Cluster projects

### AMANAC NEWS AND EVENTS

#### AMANAC at CompIC 2015 - COMPOSITES IN CONSTRUCTION

February 3-4, 2015

A presentation about the AMANAC CSA was made at a special clustering event held at CompIC 2015, a conference focused on Composites in Construction, and held in Amsterdam, Netherlands on February 3<sup>rd</sup> and 4<sup>th</sup>. The conference attracted over 100 delegates, most of whom attended the clustering event also to get insights into various construction-themed European Commission supported projects. Before presentations by some of these projects, a keynote presentation by the AMANAC-CSA focused on the opportunity for coordination and networking of projects, and the synergies provided via this clustering activity. In addition, it was a good forum to raise awareness of the AMANAC projects

and the cluster coordination activities among various industry professionals who were in attendance, including architects, asset owners, research institutes, and various companies in the composites and building materials supply chain. The event also provided an opportunity to interact with many of the presenters from the AMANAC projects about the added benefits of the cluster via its execution of activities of common interest, such as training & education, IPR management, (nano)-safety, and standardisation and by exploiting synergies and sharing best practice on common themes and challenges across various projects in the AMANAC cluster.



## AMANAC: Advanced Materials And Nanotechnology Cluster

First Newsletter: May 2015

### AMANAC at Kick off meeting of EeB CSA's February 5, 2015

In continuation of the successful activities implemented under the PPP EeB in FP7, the EC and the Private side of the PPP, namely E2BA as representative of industry, signed a contractual arrangement in December 2013 for the continuation of the PPP EeB under Horizon 2020. One of the main obligations and benefits of the contractual arrangement between the EC and E2BA is to monitor and exploit the results of the projects supported in this framework. Therefore, the EC launched in February 2015, the implementation of 4 CSA's that will support the EC in monitoring the results of

the PPP EeB projects and foster the dissemination and exploitation of these results.

These 4 CSAs are:

- **EeB-CA2** (coordinated by CSTB on behalf of E2BA), which will consider the whole set of projects,
- **EEBERS** (coordinated by VTT), which will focus on ICT-related projects,
- **SWIMing** (coordinated by Trinity College Dublin), which will focus on Interoperability, Data Models and BIM aspects,
- **AMANAC** (coordinated by NTUA), which will focus on material-related projects.

### AMANAC "Lightweight Components" LCA Workshop March 27, 2015

Under the frame of dissemination and cross-linking of each participating project in the AMANAC Cluster, a thematic workshop was organized by CBI in Stockholm within the area "Lightweight Components" of the AMANAC cluster. The workshop gathered the LCA experts from each project within the thematic area. The aim was to discuss the

goal, framework and characterization models so as to unify efforts concerning sharing of deliverables and development of databases. Some of the main hurdles identified were the lack of updated information given the early stage of technological development of some of the materials and components.

### AMANAC at the "Impact of the Energy-efficient Buildings PPP" Workshop April 27-28, 2015

AMANAC was presented in the impact workshop as an "umbrella" of the Session 1 projects on Nanotechnologies and Advanced Materials in EeB. During the Session, 27 projects that participate in AMANAC, grouped in six thematic areas, discussed actions that could improve their technological and non-technological impact. The benefits of clustering were highlighted. It was recognized that project clustering sets a new level of communication. Projects that

participate in AMANAC increase the visibility of their results and achievements and learn to "share" and "listen". Among others, costs for participation in big events are shared among projects. Projects develop harmonized approaches in key issues (LCA/LCC, safety, standardization); they have access to AMANAC databases and committees, to training events and related material, to the AMANAC Wiki, web exchange platform etc.







## AMANAC: Advanced Materials And Nanotechnology Cluster

First Newsletter: May 2015

### AMANAC NEWS AND EVENTS

#### AMANAC on ICAE 2015 and FIRE WORKSHOP May 27-29, 2015

One of the AMANAC-CSA partners, TECNALIA Research & Innovation hosts the VII International Congress on Architectural Envelopes (ICAE 2015) on 27<sup>th</sup>, 28<sup>th</sup> and 29<sup>th</sup> May 2015. The event, which is held every 3 years, will take place at the Kursal Congress Center at Donostia - San Sebastian (Spain). The main topic of the Congress is related to "Smartization" and/or the introduction of new technologies in Architectural Envelopes.

Under the AMANAC umbrella, the following events are planned during ICAE 2015:

- Wednesday, 27 May 2015: "AMANAC projects special session", with oral presentation of the **Advanced Materials and Nanotechnology related projects** (11.30 - 18.30)
- Thursday, 28 May 2015: „AMANAC FIRE Workshop" (12.00 - 14.00)
- Thursday, 28 May 2015: Joint AMANAC and Indoor Environment Quality (IEQ) Cluster meeting (15:30 - 17:30)

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#### PROJECT INFORMATION

Project Acronym: AMANAC  
Grant no: 636239  
Start Date: 2015-01-01  
Duration: 24 months  
Project Cost: 479 530 €  
Project Funding: 479 530 €  
Website [www.amanac.eu](http://www.amanac.eu)

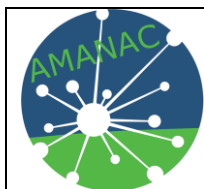
#### DISCOVER AMANAC



[www.amanac.eu](http://www.amanac.eu)

#### PARTNERS





## APPENDIX 5: Second E-newsletter



This project has received funding from the European Horizon 2020 research and innovation programme under grant agreement No 636239



# AMANAC: Advanced Materials And Nanotechnology Cluster

Second Newsletter: November 2015

## AMANAC NEWS AND EVENTS

### AMANAC on ICAE 2015 and AMANAC FIRE WORKSHOP

May 27-29, 2015

The Advanced Material and Nanotechnology Cluster (AMANAC), aiming to maximize the impact of the cluster participating projects towards the European Industry and Society, organized in collaboration with TECNALIA, the **AMANAC Projects Session** in the framework of the seventh International Congress on Architectural Envelopes (ICAE 2015), on May 27th 2015. Several AMANAC projects presented their results to new material developments and had the opportunity to exchange views and promote the scope of the Cluster. The Session covered 20 oral presentations and several posters. The abstracts were evaluated by an AMANAC Scientific committee.

**More than 15 projects participated in the event and the audience comprised 60% researchers, 7% specifiers (architects and consulting engineers), 30% from the industry sector and 3%, members of sector associations.**

Addressed topics included:

- Buildings with low embodied energy materials
- Lightweight materials and components for construction
- Insulation systems
- Nano based HVAC systems
- Indoor Environment Quality
- Smart windows

As part of the AMANAC-CSA activities, the **AMANAC Fire Workshop**, organized in the frame of the seventh International Congress on Architectural Envelopes (ICAE 2015) with the contribution of 3 cluster project (AEROCOINS, ELISSA, NANOCOOL), was held on May 28th providing an opportunity for exchanging experiences and knowledge in the field of Fire Engineering. Four speakers, Prof. Alberto Fina (POLITO), Dr. Aitor Barrio (Tecnalia Research&Innovation), Prof. Michael Delichatsios (FIRESERT - ULSTER University) and Dr. Dionysis Kolaitis (National Technical University of Athens - NTUA) shared with the audience their knowledge in new trends in fire retardant materials, overview of fire characterization of materials, the state-of-the art and the future needs in façade fire tests as well as computational tools for fire research. More than 50 participants attended the event.







## AMANAC: Advanced Materials And Nanotechnology Cluster

Second Newsletter: November 2015

### Financial Opportunity Workshop

November 5, 2015

The Workshop is organised by EC and AMANAC and it will be held on November 5th, 2015 at Covent Garden in Brussels, Belgium (COVE auditorium, ERCEA room 25 SDR1). The workshop aims to present funding opportunities for final stage or just finished AMANAC and/or advanced material projects. The participants will acquire understanding on the options, coaching, and various financing schemes which the European Commission or the Europe Enterprise Network can offer.

**This workshop is free and is open to any member of AMANAC, and particularly to industrial partners who want to exploit their project results and bring new products/systems on the market.**

Registration: Email Ms. Tasia Gkika (e-mail: [tgkika@central.ntua.gr](mailto:tgkika@central.ntua.gr)) to register. Prior registration is mandatory in order to issue an e-pass to the EC premises for all attendants.

### AMANAC Standardization Workshop

8:40- 12:35, November 6, 2015

The workshop will be held on November 6th, 2015 at BIP For Rent (Room Agora), Rue Royale 2-4, 1000 Brussels, Belgium. A Standardization Workshop is to be held under the AMANAC-CSA to facilitate the discussion between key personnel from the various AMANAC projects, companies and institutes involved in standards and certifications. The perspective of end-users on the challenges with regards to standardization and certification will also be presented.

**The number of participants is limited to 50 for the Standardization Workshop. The event is free.**

This Workshop will be followed by a training course “Introduction to European Technical Assessment (ETA)”, being coordinated by the EeB-CA2 in collaboration with EOTA.

Register for this workshop and the ETA Workshop (details below) at the Eventbrite link below.

### Introduction to European Technical Assessment (ETA) - EeB-CA2 Workshop in collaboration with EOTA

13.30 - 17.15, November 6, 2015

The workshop will be held on November 6th, 2015 at BIP For Rent (Room Atomium), Rue Royale 2-4, 1000 Brussels, Belgium. In collaboration with the European Organisation for Technical Assessment (EOTA), EeB-CA2 will provide a training course to provide insights into ETA and the pathway to obtain a CE-mark for construction products. The training is tailored to coordinators and partners of EeB PPP and AMANAC projects, where current strategic considerations for laying the ground for successful further development and market uptake of project results may include a CE-mark in the near future. Typically, such project results are stated with TRL 6-7.

#### Registration:

You can book a spot for both events at:

[http://www.eventbrite.de/e/amanac-standardization-workshop-and-eeb-ca2-training-introduction-to-european-technical-assessment-tickets-18837785323?utm\\_term=eventurl\\_textA](http://www.eventbrite.de/e/amanac-standardization-workshop-and-eeb-ca2-training-introduction-to-european-technical-assessment-tickets-18837785323?utm_term=eventurl_textA)



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### IEQ Thematic Stakeholder Workshop

February 18, 2016

The Indoor Air Quality (IAQ) Thematic projects of AMANAC, spearheaded by ECO-SEE project, will hold a Stakeholder Workshop on 18th February 2016 at Fraunhofer Offices in Munich, Germany. The theme of the workshop will be developments and innovations on materials to improve Indoor Environmental Quality (IEQ). The event is co-organised by

Fraunhofer IBP and the University of Bath. In addition to ECO-SEE there will be presentations from BREMEE and H-HOUSE projects. Contact Pete Walker ([P.Walker@bath.ac.uk](mailto:P.Walker@bath.ac.uk)) for further details.

### Smart Facade Materials Conference at WSED

February 24, 2016

The Smart Facade Materials Conference is to be held on February 24, 2016 in Wels, Austria as part of World Sustainable Energy Days (WSED), a key event in Europe. This conference will be an effective way for AMANAC projects to disseminate project results via Presentations and via a booth at the Exhibition to showcase prototypes and samples from the projects and industrial partners within the projects.

#### For further details see:

<http://www.wsed.at/en/programme/smart-facade-materials/>

#### Registration:

For presentations, please write to Sanjeev Naik ([sanjeev.naik@twi.co.uk](mailto:sanjeev.naik@twi.co.uk)) and for further details about exhibition opportunities you want to explore, please write to Monika Willert-Porada ([monika.willert-porada@uni-bayreuth.de](mailto:monika.willert-porada@uni-bayreuth.de)).

## SUCCESSFUL STORIES FROM THE RESEARCH PROJECTS

### Insulation & Smart Windows area

The development of cost-effective high insulation performance products and systems can contribute to improving the energy efficiency of buildings and to reducing CO<sub>2</sub> emissions in Europe.

According to the Buildings Performance Institute Europe (BPIE) the residential stock in Europe is the biggest segment and accounts for the 68% of the total final energy use in buildings. The majority of energy in a building is spent to satisfy heating and cooling demands accounting for 70% of the total final energy use. The energy performance of an average European building is poor, due to the fact that a high percentage of the European residential buildings were constructed before the 1960s, when energy building regulations were very limited, and have not undergone renovations to improve energy performance, meaning that these buildings have poor insulation levels and their systems are old and inefficient.

One method to improve the energy efficiency of buildings is to enhance the thermal resistance of the envelope. This can be achieved by: a) increasing the thickness of traditional materials something that is not always possible, as often, there are space limits; b) decreasing the thermal conductivity by using materials with lower thermal conductivity, thus, super-insulating materials such as aerogel and vacuum insulation panels (VIPs) and smart windows. For the same insulation performance, the thickness of the insulation layer is much thinner for the superinsulation materials in comparison to traditional materials.





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Part of AMANAC Cluster projects focus on this specific thematic area “Insulation” focusing on the development of innovative materials and components based on aerogels and VIPs to improve the thermal insulation performance of the envelope of the building and maximize their energy performance in order to contribute to reduction of CO<sub>2</sub> emissions.

Windows are a weak link in the modern building envelope with typically higher U-values than façade elements. There is therefore an urgent need to develop new technologies for smart, lightweight, cost-effective and energy efficient windows based on novel material combinations and designs. A number of AMANAC projects focus on developing such smart window systems and will contribute to meet the energy efficiency targets of the building industry by 2020.

### AEROCOINS - Aerogel-based composite/hybrid nanomaterials for cost-effective building superinsulation systems

June 2011-June 2015

Coordinator: TECNALIA; [www.aerocoins.eu](http://www.aerocoins.eu)



#### Key Results:

Exploitable Results (ER)	Key Partner	Description of ER
Trityl cellulose aerogels and their silica-based composites	ARMINES France (RTD)	New reinforcement strategies for the silica based aerogels
Pectin-silica one-pot	EMPA Switzerland (RTD)	New reinforcement strategies for the silica based aerogels
Hot-wire characterization method suitable for small samples	ZAE Germany (RTD)	A modified hot-wire set-up that allows analysis of thermal conductivity for small samples down to about 3 cm in diameter at height of about 1 cm.
Profile-based facade insulation system for highly insulating materials	TECNALIA Spain (RTD)	State of the art dry internal insulation systems rely on metal or wooden profiles/studs to mechanically bear the system and render. These solutions tend to produce relevant thermal bridge effects (above 30% reduction of insulation capacity) when used in highly insulated façades, and traditional solutions are not applicable when highly insulating materials such as aerogels are used. AEROCOINS profile system is feasible for any superinsulation material.
Method of identification of critical stress point in ambient pressure drying	TUL Poland (University)	A method that identifies the critical stress point when wet gels crack during Ambient Pressure Drying (APD). The method is based on the experimental analysis performed in a tunnel that can measure drying kinetics of solvent saturated gels under variable conditions and measure internal pressure in gel as a representative of stress formation inside.



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Exploitable Results (ER)	Key Partner	Description of ER
Knowledge for analysis, simulation procedures and sheltering principles	VTT Finland (RTD)	New materials have properties that differ from traditional materials, therefore, the building physics behaviours are also different. Reliable and verified simulation is one result of this research work within AEROCOINs. This can be used in all new superinsulation material concepts and also in different applications with different superinsulation materials. So it is not dependent of the material development in the project.

### Summary:

Main project objective is to develop new composite/hybrid aerogel material to improve the insulating performance of existing buildings aiming at reducing their energy demands. The AEROCOINs project has developed new reinforcement strategies in order to produce mechanically strong super-insulating aerogel composite/hybrid materials. The main approaches developed are based on the employment of two polysaccharides materials: cellulose and pectin, respectively. These strategies open new possibilities for further development of superinsulating materials.

It was found in this project that the critical stress point when wet gels crack during Ambient Pressure Drying (APD) can be found by measuring the internal pressure evolution. This valuable information can be used to reduce the drying rate before the crack develops. In the current state-of-the art it is commonly assumed that this point roughly corresponds to transition from the constant to the falling rate period, which requires sample mass monitoring in situ.

For the thermal characterization of this type of highly insulating materials, an optimized hot-wire method has been developed within AEROCOINs, which permits the characterization of very small samples (down to diameters of about 27 mm). This method has been validated by comparing it to measurement with the same set-up on larger samples and comparing it to hot-plate results.

In addition, an efficient ambient pressure drying process and optimization on the supercritical drying process have allowed the up-scaling manufacture of aerogel boards. Designing and fabricating a novel building component prototype based on the developed aerogel-like material has yield a component compatible with conventional construction installations where the envelope is part of the buildings. This building component integrates low-conductive plastic-composite profiles and plasterboard renders within a multi-layer arrangement, and it has obtained the best fire classification for organic materials: B-s1,d0.

Demonstration of the structural, mechanical and thermal performance of the insulating component under real conditions have been performed in two demo buildings (in the DemoPark in Madrid and KUBIK in Bilbao) and compared with conventional insulating materials.

### Project Pictures:







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### HIPIN - High Performance Insulation based on Nanostructure Encapsulation of Air

November 2011 - March 2015

Coordinator: TWI; [www.hipin.eu](http://www.hipin.eu)



#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
High silica content precursor (TEOS58)	Thomas Swan, UK (SME)	58% silica content compared to 28% for TEOS, usual precursor used in aerogel synthesis
Robust hydrophilic and hydrophobic aerogel based on TEOS58	Separex, France (SME)	Cost-effective method for aerogel synthesis, with in-line surface treatment during supercritical drying step.
HIPIN Thermal insulating plaster	Vimark, Italy (SME)	Thermal conductivity, $\lambda$ of 0.034 W/(m.K), compared to standard plaster which has a $\lambda$ of ~ 0.5 W/(m.K)
HIPIN Thermal insulating panels	Methodo, Italy (SME)	PU-aerogel composite for making panels provided a 30-40% improvement in thermal conductivity over encapsulated polystyrene (EPS) board
Paint system with enhanced insulating properties	ICI (Akzo-Nobel), UK (LE)	Improvement of thermal conductivity of 24% was obtained compared to standard paint, without affecting other paint properties

**Summary:** The main objective is the development of a high silica content robust aerogel to incorporate into new affordable building materials such as paints, plasters, and panel systems to improve thermal efficiency in new and retrofitting buildings. The three building products which incorporate the novel aerogel demonstrate improved thermal performance and provide an opportunity to utilize the usually fragile aerogel in both new buildings and retrofits. The insulation benefits and performance of the three building products were established by setting up demonstrators at Environment Park in Turin, Italy. A detailed techno-economic study completed within the project highlighted that the long-term durability (for the plaster) and the cost of the aerogel are the key factors that will drive the commercial viability of the products.

With equivalent performance taken as the functional unit for analysis, a life-cycle analysis indicates that these novel building products compare favourably to existing comparable products. For example, HIPIN plaster, when compared to a commercial thermal insulating plaster ( $\lambda = 0.088$  W/(mK)) gave a global warming potential (100 years) reduction of 87% and primary energy demand (PED) reduction of 47%.

#### Project Pictures:





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### VIP4ALL - Highly Sustainable and Effective Production of Innovative Low Cost Vacuum Insulation Panels for Zero Carbon Building Construction

October 2013 - September 2015

Coordinator: GARCIA RAMA; [www.vip4all.com](http://www.vip4all.com)

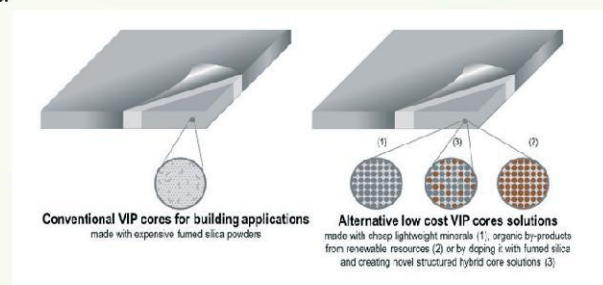


#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Sustainable functional core systems for vacuum insulation products and their related processing technologies;	Brunel University, UK (RTD) Instituto Pedro Nunes, Portugal (RTD)	Develop new enhanced multi-level VIP core systems from low cost natural mineral resources and organic renewable/recyclable resources to replace standard high cost materials currently used.
Novel generation of thermal insulation vacuum panels called VIP4ALL	va-Q-Tec, Germany (SME)	Develop VIPs with low thermal conductivities, comparable to standard VIP solutions and life-time expectancy of at least 50 years, without losing significant thermal performance. Develop VIP4ALL with reduced production costs: cutting up to 50% the costs of the conventional silica VIPs, making VIP4ALL capable of competing in terms of price with standard fiber and polymer insulation products. Offer a new product to the retrofitting sector, capable of saving at least 3 times more living space, compared to conventional fiber insulation products. Achieve sustainable construction by using at least 50% of low energy renewable materials for the VIP product.
Software development	Brunel University, UK, (RTD) Instituto Pedro Nunes, Portugal (RTD)	Composition and performance simulation software to assist product development and market acceptance.

**Summary:** The aim of the proposed work was to select and preliminarily evaluate alternative core materials towards the generation of novel cost-effective VIP building solutions. Based on natural and sustainable materials, mainly in the form of residues, multi-level hybrid structured cores were envisaged, by partially or fully replacing the fumed silica content, allowing to cut considerable the raw materials production costs. A preliminary evaluation shows that cores having a 50-80% content of these alternative materials can present thermal conductivities close to those of pure fumed silica up to gas pressures around 10mbar. The outcomes of this work suggest a true potential upon the usage of these alternative powders to create less costly VIP with good insulating properties.

#### Project Pictures:







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### EnE-HVAC - Energy Efficient Heat Exchangers for HVAC Applications

October 2012 - September 2015

Coordinator: Danish Technological Institute; [www.ene-hvac.eu](http://www.ene-hvac.eu)

#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Anti-ice surface coatings	DTI, Tekniker IK4, LuVe SpA and Exhausto A/S	Significantly prolonged run time for air heat exchangers before over-icing.
Structured surfaces for enhanced pool boiling	DTI, Vahterus Oy	A large increase in heat transfer efficiencies have been demonstrated for developed surfaces using NH <sub>3</sub> and CO <sub>2</sub> as refrigerants
Technique for cost-effective nano- and microstructuring of large complex surfaces	DTI	Structures from 200nm-2000nm have been produced on 17m <sup>2</sup> of heat exchanger plates
Model for simulation of enhanced boiling and heat transfer effects	ESI Software Germany GmbH	Computer models have been developed for simulation and prediction of effects of enhanced surfaces in boiling heat transfer
Encapsulated phase change materials (PCMs)	Tekniker IK4	Inorganic encapsulation of PCM materials where demonstrated, yielding increased stability in brine systems
Chemical surface modification of NanoDiamonds	Carbodeon Oy	Miscibility tailored for and thus significantly enhanced in selected solvents including ammonia

**Summary:** Main project goal is to improve the efficiency of currently applied state-of-the-art HVAC systems through development of new and innovative technologies for increasing the efficiency of currently applied state-of-the-art HVAC systems. The technologies developed and investigated are:

- Nanotechnological coatings with anti-freezing properties to limit over icing of heat exchangers.
- Nanostructured coatings including Sol-gels and PVD coatings for increased heat transfer.
- Nanofluids for the improvement of heat transport.

Developed surfaces have demonstrated significant improvements in the heat transfer efficiency in heat exchanger systems. For Anti-ice surfaces these systems have been demonstrated on full-scale air-air and air-liquid heat exchanger systems by Exhausto A/S and LuVe SpA and significantly prolonged uptimes and significantly smaller build-up of ice was observed. Techniques for structuring large complex surfaces have been developed and demonstrated on two full-scale heat exchanger systems each with a surface area of approx. 8.5m<sup>2</sup>. The effects of the structured surfaces on heat exchanger efficiencies where demonstrated in these full-scale systems at Vahterus Oy and DTI.

The development and use of computer models for prediction of boiling effects and heat transfer of enhanced surfaces as well as velocity, temperature, and pressure distributions within full heat exchanger systems where developed in tight collaboration between DTI, Vahterus Oy and ESI Software Germany GmbH.

#### Project Pictures:





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### HarWin - Harvesting solar energy with multifunctional glass-polymer windows

September 2012 - August 2015

Coordinator: University of Bayreuth; [www.harwin-fp7.eu](http://www.harwin-fp7.eu)



#### Key Results:

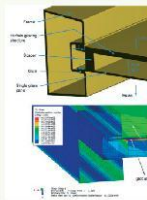
Exploitable Results (ER)	Key Partner	Key Performance Criteria
Glass particle reinforced composite polymer foils for thin glass lamination	UBT, GermanyInGlas (SME), Germany	PVB with stiffness varying from 10 MPa to 10 GPa, stable T <sub>g</sub> , adjustable sound absorption, superior moisture barrier properties, haze comparable to pure PVB.
Thin glass reinforced laminate multiple glazing	UBT, GermanyInGlas (SME), Germany	Weight reduction of glazing by 50% (compared to triple glazing), U-value 0.50 W/m <sup>2</sup> K (Ar filling), safety glass features, noise protection
Light weight polymer-GF reinforced polymer foam frame	UBT (Germany), WUT (Poland), Isomatex (SME), Belgium	Thermal conductivity of the polymer-foam-polymer skin composite 0.05 W/mK, very high stiffness due to glass fibre reinforced polymer skin, light weight.
New LCEA methodology and simulation tool	JRC Ispra (Italy)	Feature specific tool for the eco-design of windows, multi criteria life cycle impact assessment, recyclability analysis method
Building simulation tool for HarWin glazing	International Environmental Solutions, IES (SME), UK	HarWin type windows data base implemented into building performance model, LCC analysis for new window type included. Cost reduction for refurbishment of buildings demonstrated.

**Summary:** Main project objective is the development of light weight reinforced thin glass pane laminated glazing and polymer-glass composite frames to significantly reduce the overall weight of windows while further improving their U-value and visible light transmission. In HarWin new materials and simulation methods have been developed for next generation light weight windows. These windows reduce significantly the embodied energy of windows and enable extension of window functionality. The improvements are based on reduced weight and thermal conductivity, improved weight specific mechanical performance along with added functionality, like wavelength specific energy management, including wave length conversion with coatings but also with a new active luminescent glass. A data base and a simulation tool which is including End of Life recycle ability of materials were developed for LCEA analysis of HarWin windows. In addition, a HarWin window module for building performance simulation has been implemented into existing sophisticated building performance software, based on extensive characterisation of optical and thermal properties of HarWin windows. For the new materials a data base has also been implemented into a cost analysis tool. The benefits of the light weight glazing and frame materials in terms of energy and cost savings and in particular for refurbishment of old buildings were clearly demonstrated. For energy harvesting with the help of phase changing materials a thorough analysis of inorganic and organic materials has been accomplished, showing the superiority of organic materials for achievement of high light transmission.

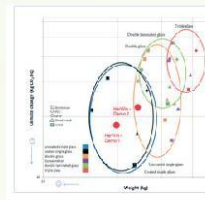
#### Project Pictures:



Light weight double-glazing



Light weight frame: LCEA guided design



LCEA tool





## AMANAC: Advanced Materials And Nanotechnology Cluster

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**MEM4WIN - Ultra thin glass membranes for advanced, adjustable and affordable quadruple glazing windows for zero-energy buildings**

October 2012 - March 2016

Coordinator: LiSEC Austria GmbH; [www.mem4win.org.com](http://www.mem4win.org.com)



### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Tempered ultra-thin glass membranes	LiSEC	~ 0.9 mm thickness up to 40% energy savings in comparison with conventional tempering furnaces. Minimum optical distortions (no roller waves)
Novel lamination technology for encapsulation of functional layers in glass-glass modules	LiSEC	~0.01 g/m <sup>2</sup> /day water vapour diffusion tightness ~4 min cycle time
Quadruple insulated glass unit with novel spacer technology	LiSEC	0.3 W/m <sup>2</sup> K Ug-value ~0.60%/a gas loss rate
Frame-less, openable window for application in facades	LiSEC	Openable wing not visible in the façade Low distortions in the appearance of the façade due to asymmetric construction of the IG-unit
CVD Graphene for direct transferred transparent contacts	Aixtron	~ 20 $\Omega/\square$ sheet resistance ~ 90% transparency
LPE Graphene ink for direct inkjet printed hole-transport-layer in OPV modules	TIGER Coatings	> 1 g/L solid content Printhead compatible solvents
OPV glass-glass module with direct inkjet printed organic photovoltaic cells	Belectric OPV	Freedom of design ~ 30 years lifetime ~ 3% module efficiency
Industrial large-format inkjet printer for direct printing of active OPV layer on window glass	DURST	160 cm printing width 1000 dpi resolution up to 100 m <sup>2</sup> /hour productivity
Micro mirror arrays for control of solar radiation and light guidance	University of Kassel	< 0,1mm <sup>2</sup> mirror area, which means about 12.000.000 mirrors / m <sup>2</sup> <1 mW/m <sup>2</sup> power consumption in holding position at least 75% and 2% transmission (open and closed)
Solar-thermal collector (fully integrated in IG-unit)	Energy Glas	> 80% optical efficiency > 300 W energy gain (vertical façade integration) < 50mb drop in pressure

### Summary: Objective MEM4WIN are:

(1) To introduce a novel IG-Unit for quadruple glazing containing ultra-thin glass membranes dedicated as frameless openable windows for direct application in facades. Due to this approach U-values of 0.3 W/m<sup>2</sup>K can be achieved reducing weight by more than 50% and costs by 20%.



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(2) To implement ink-jet printed organic photovoltaics (OPVs) and fully integrated solar thermal collectors for energy harvesting and micro mirrors for energy control and advances day lighting.

(3) Fabrication costs will further be reduced by replacing conventional and cost intensive materials used for contacts like ITO and silver by graphene. MEM4WIN will introduce production methods like roll-to-plate transfer printing and ink-jet printing to fabricate contacts for OPVs.

At the end of the project the aforementioned modular components like micro mirrors, OPVs, solar thermal collector as well as organic light emitting diodes (OLEDs) will be integrated into a demonstrator of 1230 x 1480 mm size showing the suitability of the used equipment, processes and new materials developed within MEM4WIN.

**Project Pictures:** Photos of exhibited preliminary results, © PROFACTOR



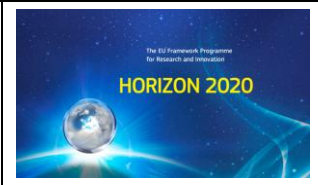
### Embodied Energy & Indoor Environment Area

High levels of indoor environmental quality and energy efficiency in buildings are the pillars of a sustainable, green and healthy built environment. The integration of innovative and eco-friendly materials and solutions, together with a novel and knowledgeable approach of construction sector devoted to reduce the consumption of natural resources in terms of energy and raw materials, is the main way to improve the level of sustainability of next-generation buildings. Some of the AMANAC Cluster projects focus on these two specific thematic areas “Indoor Environment” and “Low Embodied Energy materials”.

Regarding energy efficiency in buildings, nowadays the embodied energy of materials and operating energy of buildings represent a huge amount of energy consumption. The construction industry is one of the largest consumers of energy and raw materials, and one of major contributor to the emission of greenhouse gases. Improvements in insulation and boiler efficiency now mean that the energy associated with the production of the materials used to construct a building are a significant proportion of the total energy consumed by the building during its life. By using low embodied energy construction materials the total energy use of a building can be reduced. However, the new materials must perform as well as or better than existing technologies and need to be lower in cost. The re-use of waste materials is an important route to achieving these goals.

Together with energy efficiency, it is fundamental considering the level of quality of indoor built space. Unfortunately, the issue of indoor air pollution has been largely overshadowed by the attention focused on air pollution outdoors related to industrial and transport emissions. In reality indoor air quality is influenced not only by penetrating outdoor air but also by specific indoor pollution sources, interactions between building system/construction techniques and occupants. For this reason the “Indoor Environment” thematic area projects focus on the development of innovative materials and components to reduce the presence of harmful chemicals in internal environment and novel solutions for better monitoring the indoor environment quality.





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### BioBuild- High Performance, Economical and Sustainable Biocomposite Building Materials

December 2011 - May 2015

Coordinator: NetComposites; [www.biobuildproject.eu](http://www.biobuildproject.eu)



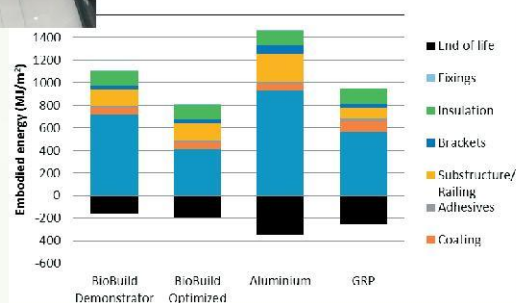
#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Process for producing pre-pregs of polyfurfuryl alcohol resin and woven natural fibre fabrics (with or without FR additives)	NetComposites	Cured mechanical properties greater than the same thickness of timber. Fire performance: Euroclass B-s1, d0
Quickscan tool to convey & compare environmental sustainability data into the design of building components and system	TNO, Aup & GXN	Flexible software tool to rapidly produce LCA assessment on assembled systems based on partial data at design stage
Methods of chemical & plasma treatment of natural fibres for improvement of moisture resistance and compatibility with resins	KUL	Increase in transverse three point bend strength by a factor of 10. Reduction in water uptake by a factor of 3.

**Summary:** The aim of BioBuild was to develop novel building components based on biocomposite materials in order to reduce the embodied energy of construction products. To achieve this the perceived shortcomings of biobased materials, such as poor performance in fire and susceptibility to degradation by weather, had to be addressed by fibre treatments, additives or coatings (as one would do with wood).

Significant improvements were made in the science of fibre treatment and the production of biocomposite components. The desired levels of performance were achieved through the use of functional fillers, coatings or fibre treatments. A 50% reduction in embodied energy can be achieved by the use of composites of polyfurfuryl alcohol resins and jute fibre fabrics.

#### Project Pictures:





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### LEEMA - Low Embodied Energy Insulation Materials and Masonry Components for Energy Efficient Buildings

January 2012 - December 2015

Coordinator: S&B Industrial Minerals; [www.leema.eu](http://www.leema.eu)

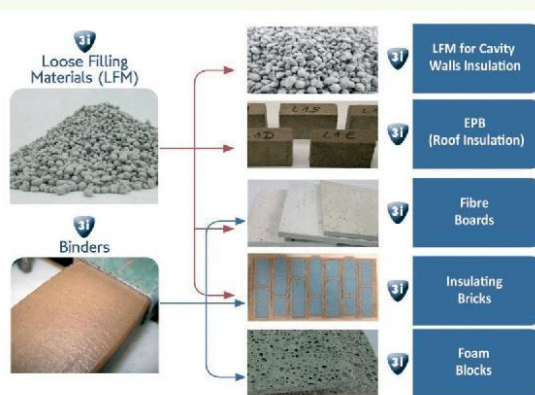


#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
3I Loose Filling Materials for cavity walls	SandB, GR (LE)	"3I" Loose Filling materials for use as cavity walls insulation or as lightweight aggregate in various insulation and building products (boards, bricks etc.). LBD: 62 kg/m <sup>3</sup> and $\lambda=0.038\text{W/mK}$
3I Binder for building products	NTUA, GR (University)	"3I" binders, based on mineral wastes, to replace cementitious and clay-based binders in various building products (such as bricks or boards), easy to shape by current methods (casting or extrusion)
3I Foamed Blocks	FIBRAN, GR (LE)	"3I" Foamed blocks based on mineral wastes, for use as lightweight and insulating masonry components. Density~700kg/m <sup>3</sup> and $\lambda=0.1\text{ W/mK}$
3I EPBs	SandB, GR (LE)	"3I" EPBs ("expanded perlite boards") replacing expanded perlite with 3I Loose Filling materials
3I Fibre Boards with 3I LFM	ETEX, BE (LE)	"3I" fibre Boards, replacing expanded perlite with the new 3I Loose Filling materials.
3I Fibre Boards with 3I binder and 3I LFM	ETEX, BE (LE)	"3I" fibre Boards, combining an inorganic polymer binder and 3I Loose Filling materials.
3I Bricks with 3I LFM	SCHLAG, DE (LE)	"3I" Bricks, consisting of a clay brick body and 3I Loose Filling materials filling. $\lambda=0.035\text{W/mK}$ (in insulation filling)
3I Bricks with 3I binder and 3I LFM	SCHLAG, DE (LE)	"3I" Bricks, consisting of an inorganic polymer brick body and 3I Loose Filling materials filling.

**Summary:** Within the LEEMA project a number of new building components were developed based on the novel 3I materials (Inorganic, Insulating and Incombustible). The 3I materials are produced by inorganic polymerization and by utilizing mineral tailings and industrial by-products which allows them to have significantly lower embodied energy. A new insulation product has been developed as Loose Filling material for cavity walls insulation that exhibits similar performance to commercial organic counterparts (EPB) and up to 76% reduced embodied energy. A new fibre cement board has been developed of lower density, higher thermal insulation and lower embodied energy. Also, a thermal insulating brick was developed with an overall  $\lambda$  value  $\leq 0.090\text{ W/(mK)}$  and at least 10-15% lower embodied energy vs current solutions while in a more futuristic approach, which has been proven in concept, the whole brick will consist

of geopolymer (60% less embodied energy). Additionally, a new foam block to replace aerated concrete blocks with at least 50% less embodied energy was designed.







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### SUS-CON - Sustainable, Innovative and Energy-Efficient Concrete, based on the Integration of All-Waste materials

January 2012 - December 2015

Coordinator: CETMA; [www.sus-con.eu](http://www.sus-con.eu)



#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
New SUS-CON lightweight aggregates from solid waste	CETMA, Italy (RTD) ACCIONA, Spain (LE) IRIDEX, Romania (SME)	<ul style="list-style-type: none"> <li>Cost effectiveness</li> <li>Lightness</li> <li>Thermal insulation</li> </ul>
Novel SUS-CON geopolymers binders	NTUA, Greece (RTD) QUB, UK (RTD)	<ul style="list-style-type: none"> <li>Cost effectiveness</li> <li>Low energy consumption</li> <li>Reduced CO<sub>2</sub> emissions</li> </ul>
Novel SUS-CON all-waste concrete	CETMA, Italy (RTD) MAGNETTI, Italy (LE) ACCIONA, Spain (LE) QUB, UK (RTD) IRIDEX, Romania (SME) ISTON, Turkey (LE) NTUA, Greece (RTD) S&B Industrial Minerals (part of Imerys group), Greece (LE)	<ul style="list-style-type: none"> <li>100% waste concrete</li> <li>Reduction of carbon footprint (50%)</li> <li>Increment of thermal insulation</li> <li>Reduced tendency to transmit ultrasounds</li> <li>Suitable for both ready-mixed and pre-casted applications</li> </ul>
Decision-support tool within information on waste in Europe and on new SUS-CON concrete	TRE, Italy (RTD)	

**Summary:** The overall goal of project is the development of new technology routes to integrate waste materials (aggregates and binders) in the production cycle of concrete, for both ready-mixed and pre-cast applications to manufacture a sustainable, innovative and energy-efficient concrete made by all-waste raw materials. The main exploitable results of SUS-CON project concern a **novel type of aggregates** composed completely of **waste materials** (mixed plastic waste, Waste Electrical and Electronic Equipment - WEEE, waste polyurethane foams and scraps of the sorting process of Municipal Solid Waste - MSW), **novel geopolymeric binders** made of waste only, **novel all-waste concrete** and finally a **Decision Support tool** to manage and share EU streams wastes data and SUS-CON concrete technical information.

The lightweight, eco-compatible, cost-efficient and all-waste concrete (realized with novel SUS-CON binder and aggregates) is applicable for both ready-mixed products (floor screed and floor screed underlay) and pre-casted applications (blocks and panels). The SUS-CON concrete, in comparison with other existing lightweight concretes, has a good performance in terms of:

- Decrease of the **embodied energy**, especially by the substitution of the cement (15%)
- Decrease of the **CO<sub>2</sub> footprint** by the reduction of raw materials processing (50%)
- Improvement of the **insulation properties** (due to novel aggregates)
- Increase of **cost effectiveness** (due to lower costs of the raw materials)



## AMANAC: Advanced Materials And Nanotechnology Cluster

Second Newsletter: November 2015



### CETIEB - Cost-Effective Tools for Better Indoor Environment in Retrofitted Energy Efficient Buildings

October 2011 - September 2014

Coordinator: USTUTT (MPA); [www.cetieb.eu](http://www.cetieb.eu)



#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Wireless monitoring system	Smartmote, D (SME)	Extended to indoor climate application; Inclusion of advanced sensors (VOC, Thermal comfort, RGB for colour assessment)
Thermal comfort infrared vision system	UNIVPM, I (University)	Patent applied; Spin-off planned; Demonstration with Active Control System - 15% energy savings
MEMS based VOC spectrometer	Infratec, D (SME) Fraunhofer IPM, D (RTD)	Tunable IR optical gas sensor for VOCs (detection limit: > 2 ppm); Cooperation with industry on air quality sensing, medical gas analysis, health and safety technology
Air Biofilter	DWEcoCo, IRL (SME)	Reduction of VOCs demonstrated; For use in office environments
Mineral based thermal insulation plaster system with thermal storage and photocatalytic behaviour	Schwenk, D (Industry) S&B, GR (Industry)	Thermal conductivity $\lambda = 0.074 \text{ W/m}^{\circ}\text{K}$ (comparable with EPS plasters); Product in application phase further improved: $\lambda = 0.055 \text{ W/m}^{\circ}\text{K}$ ; indoor / outdoor (pilot), available on the market 2016
Natural Light Illumination System	NTUST, TWN (University)	4 patents applied; Demonstration in Taipei (TWN) at a prominent university building; Demonstration in Europe planned - Eco-shopping, Sopron, Hungary





## AMANAC: Advanced Materials And Nanotechnology Cluster

Second Newsletter: November 2015

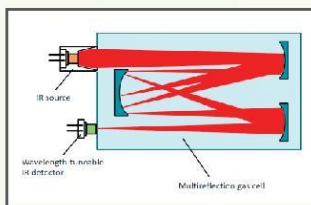
**Summary:** CETIEB addressed three main objectives: a) Development of monitoring systems (wireless and/or partly wired) to detect insufficient comfort and health factors. A modular version allows a cost-effective adaptation for different monitoring tasks; b) Development of control systems for indoor environments, using both passive elements like cost-effective photo-catalytic materials or phase change materials, and active systems which control the air flow rates based on the monitoring data. In addition, a plant based system was implemented; c) Modelling of indoor environments to assess and validate monitored data and to optimize control parameters and systems for energy efficiency. The focus was on cost-effective solutions to ensure a wide application. The project demonstrated in real buildings the efficiency of technologies and systems developed, and disseminated results and recommendations for new policies and regulations within the EU.



Monitoring scheme



IR scanning system



VOC spectrometer cell



Light collecting element

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### PROJECT INFORMATION

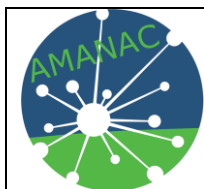
Project Acronym: AMANAC  
Grant no: 636239  
Start Date: 2015-01-01  
Duration: 24 months  
Project Cost: 479 530 €  
Project Funding: 479 530 €  
Website [www.amanac.eu](http://www.amanac.eu)

### DISCOVER AMANAC

[www.amanac.eu](http://www.amanac.eu)

### PARTNERS





## APPENDIX 6: Third E-newsletter



This project has received funding from the European Horizon 2020 research and innovation programme under grant agreement No 636239



# AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

## AMANAC NEWS AND EVENTS

### Financial Opportunities Workshop November 5<sup>th</sup>, 2015

The workshop was organized by the EC and AMANAC on November 5<sup>th</sup>, 2016 at the Covent Garden building in Brussels. During the workshop, participants were introduced to various funding opportunities for final stage or recently finished research projects. The participants acquired a detailed understanding of the options for various financing schemes and coaching for SMEs which the European Commission or the Europe Enterprise Network can offer. Presentations focused on:

- General presentation on the AMANAC-CSA and its role and impact
- Strategic Energy Technology (SET) Plan 2015, “Smart Finance for Smart Buildings Initiative” and “Project Development Assistance under H2020”
- Fast track to Innovation (FTI) and SME instrument
- InnovFin - EU Finance for Innovators
- Regional programmes - The European Structural and Investment Funds (ESIF), Smart Specialisation Strategies & Synergies with Horizon 2020
- The INCOMERA project

Over 40 people attended, with a lot of interest from SMEs from AMANAC project consortiums.

### Standardisation Workshop November 6<sup>th</sup>, 2015

The workshop was held on November 6<sup>th</sup>, 2015 at the BIP for Rent building in Brussels, Belgium. The Workshop was organized together with a workshop on European Technical Assessment (ETA) organized by the EeB CA2 in collaboration with the European Organisation for Technical Assessment (EOTA). The Standardization Workshop was focused on presentations and discussion about:

- Contribution of standardization to economic Impact (EC, Monique Levy)
- Certification and testing of construction products (TUV Italia)
- Standards and requirements for buildings in Europe (Building Research Institute, ITB)
- The influence of standardization on the innovation process (ARUP)

The second part of the event was the training organized in collaboration with EeB-CA2 and EOTA. During the training, the participants had the opportunity to gain insights into ETA and the methodology to obtain a CE-mark for new innovative construction products.







## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

### AMANAC Industry Advisory Board Workshop November 6<sup>th</sup>, 2015

A workshop with the AMANAC Industry Advisory Board (IAB) was held in Brussels on November 6<sup>th</sup>, 2015. The IAB is comprised of senior representatives from various industrial partners from various thematic areas of the AMANAC cluster. The workshop started with an enlightening presentation from Dr. Monique Levy from the European Commission (EC) about “Results of a survey on burdens that hinder project results entering the market”. This survey was conducted in 2014 by the EC and had more than 300 participants. One of the goals of the survey was to rank the common challenges for sustainable construction and to determine the most important obstacles including material development. This presentation served as a good starting point for the second part of the workshop - which was an interactive discussion. This section consists of discussion on seven questions related to the successful implementation of new materials and products developed during AMANAC projects.

The first part of the discussion was devoted to the regulatory and pre-normative studies for the innovative products. It was concluded that a significant barrier is the lack of standards and test methods for innovative products. An important part of the product development is also up-scaling and manufacturing. Participants stressed that attention needs to be paid on Manufacturing Readiness Level (MRL) in parallel with development of Technology Readiness Level (TRL) for commercial uptake. In order to successfully promote and implement innovative products, it is important to focus on Life Cycle Analysis and Costs because initial cost of the novel building materials can be higher than incumbent materials but life cycle costs can be lower. Thus, calculation of the return of investment and cost benefits for novel materials should reflect the whole life cycle of the product, including end-of-life scenarios, if appropriate. During the workshop it was clearly pointed that the AMANAC-CSA helps to increase the visibility of the products developed under the research projects. Moreover the horizontal actions performed by AMANAC-CSA can be very beneficial and contribute to changing the perception of innovation in construction.

### Low Embodied Energy Thematic Workshop December 3<sup>rd</sup>, 2015

The Thematic Workshop entitled “Towards greener and more energy efficient buildings: novel construction materials and processes” was held at Palazzo Granafei-Nervagna in Brindisi, on 3<sup>rd</sup> December 2015. The Workshop presented the cutting-edge developments in the area of “Low Embodied Energy materials and Energy Efficient Buildings”, produced by projects under the financing of EU in the frame of FP7 and Horizon 2020. About 70 people (engineers and researchers, local engineer association, companies, R&D centers, Universities, Municipalities etc.) have joined the event. The core of

the workshop was the presentation of results and activities of the projects (LEEMA, SUS-CON, ISO-BIO and ECO-Binder) with an introductory presentation of AMANAC Cluster. Great interest was shown for the projects, not only during the Workshop but also at the exhibition area, where some prototypes from SUS-CON and LEEMA were presented, together with posters, roll-ups, flyers and videos of production processes.



### Indoor Air Quality Thematic Stakeholder Workshop February 18<sup>th</sup>, 2016

The Indoor Air Quality Workshop was held successfully in Munich on February 18<sup>th</sup>, 2016 at the premises of Fraunhofer.

The event brought together over 40 stakeholders from the research and industry sectors to discuss the achievements of projects from the Indoor Air Quality Thematic, which included the ECO-SEE, BRIMEE, HHOUSE and OSIRYS projects. The workshop presented the various eco-innovative materials developed by the projects and addressed upscaling, prototy-



## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

ping and LCA topics. Participants were particularly interested in the impact of novel building materials on human health and on their scalability potential, and showed great interest in receiving more details from the projects in the future. Jurgen Frick from Material Testing Institute at the University

of Stuttgart also spoke about H2020 funding opportunities for research on Indoor Environment Quality. This event was the third of a series of regional stakeholder workshops organised by ECO-SEE. The next and last workshop will take place in early 2017.

### AMANAC at the Smart Façade Materials Conference at WSED 2016

February 24<sup>th</sup>, 2016

AMANAC was one of key organizers of the Smart Façade Materials Conference held on February 24<sup>th</sup>, 2016 in Wels, Austria as part of World Sustainable Energy Days (WSED), a key event in Europe. The conference was divided into two main parts:

Plenary Session with presentation and discussion on innovative construction materials and new concepts for adaptive envelopes

Parallel workshops on the topics of: New research results on building facades, Smart windows, Active & energy harvesting facades, Novel insulation materials

With more than 15 presentations given by speakers from AMANAC projects, the conference allowed a great forum for discussion of AMANAC project results with the key stakeholders in the building and construction industry. In addition, the conference also allowed for some exhibition space to showcase samples and prototypes and disseminate newsletters about these novel technologies.

With over 100 experts from 35 countries attending, the conference was a good forum for the discussion about research and market uptake possibilities for new innovative and sustainable building facades.



### AMANAC at Ecobuild 2016

March 8-10<sup>th</sup>, 2016

The AMANAC CSA and the cluster projects ELISSA, FOAM-BUILD, ECO-SEE, HOMESKIN and SUS-CON participated at ECOBUILD 2016 organised on March 8-10<sup>th</sup>, 2016, the leading UK exhibition and conference for the construction

and energy market. More than 500 visitors to the booths had the opportunity to be informed about the activities of the cluster, received publicity material about the AMANAC thematic areas and outcomes of the individual projects. Visitors discussed developments of their projects with the exhibitors and also were able to see exhibits from the projects, including not only samples and small prototypes but also systems made with innovative materials and components developed in AMANAC projects.

Participation in ECOBUILD 2016 increased the visibility of all AMANAC projects to targeted audience and hopefully will lead the way for future collaborations and market uptake in the future.







## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

### AMANAC LCA workshop

May 19<sup>th</sup>, 2016

The AMANAC LCA Workshop (for all thematic areas) will take place in Athens (Greece), on May 19<sup>th</sup>, 2016. It will be a one-day workshop, presenting the results of the LCA work done in AMANAC-CSA projects but more importantly will involve a round-table discussion, allowing the opportunity to address some of the most recognised 'problems' in LCA, as identified by the projects' LCA Experts.

More information about the workshop can be found here:  
<http://amanac.eu/achievements/lca-lcc-approach/>

### Seminar on Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe at EUSEW, Brussels

June 16<sup>th</sup>, 2016

AMANAC and EMIRI will jointly organise a 90 min Seminar in the frame of EU Sustainability Energy Week (<http://eusew.eu>) on "Success Stories - Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe". The meeting will take place in Salle Polak at the Résidence Palace, International Press Center, Rue de la Loi 155, Brussels, June 16<sup>th</sup>, 2016 - Time: 09.00 - 10.30 am. The scope of the meeting is to:

- Highlight the key role of the Advanced Materials Industry in tackling the EU energy challenges
- Present success stories of new Advanced Materials and solutions for more sustainable buildings in Europe
- Discuss policies / regulations needed to ensure Industrial Leadership of the European Industry of Advanced Materials for low carbon energy technologies
- Discuss policies / regulations and Innovation in the Building & Construction Industry

#### Registration:

You can register for the event at:

[http://eusew.eu/usr\\_account/register](http://eusew.eu/usr_account/register)

For further information please visit

<http://eusew.eu/success-stories-advanced-materials-and-solutions-low-carbon-energy-and-more-sustainable-buildings>

and/or

[www.amanac.eu](http://www.amanac.eu).





## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

### ELISSA - Energy Efficient Lightweight-Sustainable-Safe-Steel Constructions

September 2013 - August 2016

Coordinator: National Technical University of Athens; [www.elissaproject.eu](http://www.elissaproject.eu)



#### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Thermal Bridges: A technical reference guide for evaluating the thermal bridges in lightweight drywall systems incorporating super insulation materials	NTUA, ZAE	The innovation content of the result is the development of a methodology for calculating 1-D, 2-D and 3-D thermal bridges in lightweight construction combining highly conducting steel structures with extremely low conducting insulation materials.
VIP CombiPlate Element	VA-Q-TEC	Vacuum Insulation Panel embedded into thin polyurethane foam. It will be further improved after the end of the project.
Intumescent paint for internal use	FARBE	Formulations that improve applicability of intumescent paints on steel structures for internal use. The new paint is able to protect a product from destructive heat (e.g. during a fire) according to the norm EN 13381-4. The thickness of paint to be applied depends on the required fire resistance, the massiveness and the stresses applied to the structures. Could enter the market after the end of the project.
Anti-seismic active vibration reduction system	WBI	This result consist in the development of a demonstrator of anti-seismic active vibration reduction system, which enables to mitigate damages in lightweight steel buildings subjected to moderate earthquakes (which are related to the damage limit state of buildings). The system will be further developed to a product after the end of the project.
Characterization of the local and global behaviour of identified seismic resistant subsystems	UNINA, WBI	This result includes the experimental and theoretical optimization of the seismic performance of the lightweight systems and its main components.
Modular lightweight wall/floor/ceiling elements with excellent thermal-fire-seismic behavior	COCOON, KNAUFGK, KNAUFIT	Design and thermal-fire-seismic testing of innovative composite, modular wall/floor/ceiling systems with lightweight steel frames, ready to be used in prefabricated modular construction (new buildings and renovation). Design, construction and testing of representative building modules (the ELISSA house) implementing the new systems. Proof of more than 50% reduction in energy reduction, improved fire and seismic safety. Mass production of ELISSA systems should be investigated before entering the market.



## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Market extension for lightweight steel construction	COCOON	Market extension for lightweight steel construction through optimized Cocoon concept for modular buildings. The ELISSA house targets planners, engineers, architects, private and public investors and construction companies interested in future-oriented ways to construct buildings. The users of the ELISSA house enjoy faster building times, customized solutions, light & slim constructions, process & quality improvements through prefabrication and high performance in seismic, fire & thermal behavior of the buildings. The concept opens opportunities to extend the market for lightweight steel constructions into markets with high temperature sensitive requirements, high standards for fire resistance and areas with high risks of earthquakes.

### Summary:

The main goal of the ELISSA project is the development and demonstration of nano-enhanced prefabricated lightweight steel skeleton/dry wall systems with improved thermal, vibration/seismic and fire performance, resulting from the inherent thermal, damping and fire spread prevention properties of carefully preselected inorganic nano-materials (aerogels and VIPs) and MEMS as well as the development of industrially friendly methods for their application. The design and construction practices of the elements and ELISSA modules, as well as the new encapsulated VIPs (CombiPlate), the two new intumescent paints, the Active Damping Device and its power supply can be independently applied to various segments of the construction market. The new developments will improve the contribution of lightweight dry-wall steel skeleton modular buildings to energy savings and citizen safety (fire and earthquake) and will increase the international market share of this type of construction.

### Project Pictures:



VIP based “CombiPlate” - VIP foamed into slim polyurethane (PU) layer (“Va-q-safe” received the innovation product for architecture and building praxis award, Munich building fair, BAU 2015)



Engineering design concept for lightweight ELISSA house



Elissa Modules: Prefabricated lightweight steel skeleton / drywall / VIP / intumescent paint modules that are fast and easily constructed and can be adjusted for specific uses.





## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

**NANOCOOL - An Energy Efficient Air Conditioning system with Temperature and Humidity independent controls based on the combination of a Liquid Desiccant Cycle with an adapted conventional air cooling system.**

September 2012 - February 2016

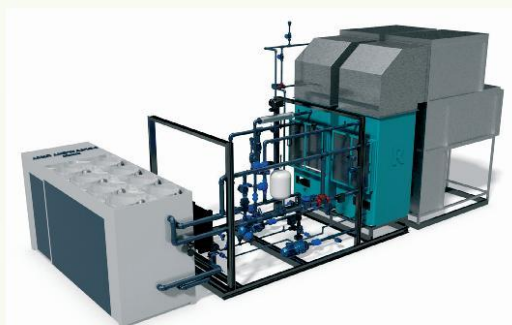
Coordinator: TECNALIA; [www.nanocoolproject.eu](http://www.nanocoolproject.eu)



### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
A hybrid liquid desiccant based technology for HVAC applications with cooling/heating capability	Joint Ownership	The system has been working from November 2015, continuously from 01/01/2016. 27% electrical energy savings over traditional VC systems. 28% electrical energy savings yearly based (extrapolated). Good comfort and no bad smells according to users. H,T independent control achieved. No carry over (<1,25g/h) and corrosion (until January 2016).
A liquid desiccant based unit for DESICCANT applications	Joint Ownership	See above.
Falling film on internally cooled /heated heat exchanger for heat and mass transfer comprising: 1) A process fiber glass tower ("TOWER") 2) A non-atomizing sprinkler ("DISTRIBUTOR") 3) A "BUNDLE" of plasma treated plastic tubes carrying cooled or heated water 4) An advanced anticarryover filtering solution ("DEMISTER")	Technion, URV, Tecnalia, Polito, Decsa, Ridan	Heat transfer coefficient using plastic anticorrosion materials was in the same range than titanium based apparatus.

**Summary:** The humidity treatment part of air conditioning is crucial in order to achieve a satisfactory internal air quality. Traditional HVAC solutions are not efficient or economically viable for applications with a low sensible heat ratio because of the wasted energy used to reheat the air after dehumidifying it. The Nanocool project presents an innovative solution based on a Liquid Desiccant System (LDS) combined with conventional HVAC systems, in which the absorber and regenerator are internally cooled and heated. The main advantages of the system are cost-effective operation in strongly humid conditions, compatibility with renewable heat or cold sources, design flexibility, cost. After preliminary tests carried out at Technion facilities, a rigorous testing of the whole Nanocool system has been carried out at the URV facilities in Tarragona, prior to sending the



Nanocool system to the Demo site placed in TBTC Taiwan in July 2015. NanoCOOL prototype is fully operational from November 2015. Energy consumption has been reduced 27%





## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

in monitored period against conventional air vapor compressor units. Yearly energy savings are estimated at 28% (electric power savings), thermal energy savings are 55%, cost saving range from 2 - 5 000 EUR.

### Project Pictures:



### WINSMART - Smart, lightweight, cost-effective and energy efficient windows based on novel material combinations

September 2012 - September 2016

Coordinator: Danish Technological Institute (DK); [winsmart.eu](http://winsmart.eu)



### Key Results:

Exploitable Results (ER)	Key Partner	Key Performance Criteria
Improved VIG sealing solution	EMPA	Flexible edge seal with laser-welded metallic ribbons soldered onto the glass, rather than with fixed seal with glass solder. Flexible seal allows for large vacuum glazing.
Photochromic device	University of Ljubljana	Device optimized to reach colouring and bleaching with switching times below 20min. The visual transmittance reduced from 62 % to 17% by solar irradiation.
Electrochromic device with redox	FhG-ISE	Device optimized to reach a fast colouring and bleaching with switching times below 15min, where the visual transmittance can be reduced from 74% down to 2% and a nearly neutral colour in bleached state can be achieved.
Test method for qualification and life-time prediction of VIG edge seals	FhG-IWM	Accelerated, yet accurate estimation of long-term performance under realistic load conditions.

**Summary:** WINSMART is an inter-European research and development project aiming at creating the windows of the future - low U-value, fully sustainable, lightweight, smart Windows - by combining vacuum insulation glazing (VIG) with suitable optical transmission control schemes and super-insulating sash and frame. The project takes a three-way approach to developing the window of the future by targeting significant technological advancements within both glazing production technology, frame manufacturing, and optical control mechanisms.



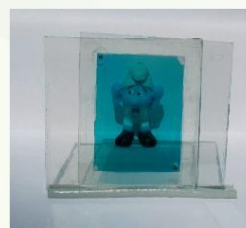
## AMANAC: Advanced Materials And Nanotechnology Cluster

Third Newsletter: May 2016

The WINSMART project is still ongoing with developments focusing on achievement of the final goal of the WINSMART project i.e. to produce a prototype window incorporating the developments of the project. Targets for the development are to end up with a window with the following characteristics: slim, lightweight (down to 50% weight reduction), low u-value (down to 0.3 W/m<sup>2</sup>K), sustainable (low embodied energy), and cost effective.



Electrochromic device prepared by sputtering with redox electrolyte in bleached (left,  $T_{vis}=74\%$ ) and coloured state (right,  $T_{vis}=2\%$ , applied potential 1V)



Photochromic device prepared by solgel in bleached state (left, low intensity of irradiation,  $T_{vis}=62\%$ ) and coloured state (right, intensity of irradiation corresponds to sunlight,  $T_{vis}=17\%$ )

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### PROJECT INFORMATION

Project Acronym: AMANAC  
Grant no: 636239  
Start Date: 2015-01-01  
Duration: 24 months  
Project Cost: 479 530 €  
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Website [www.amanac.eu](http://www.amanac.eu)

### DISCOVER AMANAC

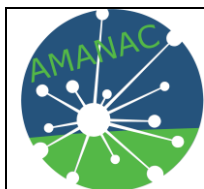


[www.amanac.eu](http://www.amanac.eu)

### PARTNERS







## APPENDIX 7: Fourth E-newsletter



This project has received funding from the European  
Horizon 2020 research and innovation programme  
under grant agreement No 636239



# AMANAC: Advanced Materials And Nanotechnology Cluster

4<sup>th</sup> Newsletter: November 2016

## AMANAC NEWS AND EVENTS

### AMANAC LCA Workshop

May 19<sup>th</sup>, 2016

In May 2016, LCA Experts from the AMANAC Cluster Projects held a joint meeting to discuss LCA methodologies and good practices followed within the AMANAC projects. About 25 experts were present at the event. The core of the LCA Workshop was the presentation of LCA activities and strategies used within the AMANAC projects, along with presentations of four Key LCA topics (collection of data, scaling up, reference models and energy mix), as identified by the LCA Experts of the AMANAC CSA.

The presentations from the event can be found on the AMANAC website at:

[www.amanac.eu/workshops/lca-lcc-approach](http://www.amanac.eu/workshops/lca-lcc-approach)



### Success Stories - Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe

June 16<sup>th</sup>, 2016

As part of EUSEW 2016, AMANAC and EMIRI successfully co-organised the seminar *“Success Stories- Advanced materials and solutions for low carbon energy and more sustainable buildings in Europe”*. During the seminar, the role of the advanced materials industry in tackling EU energy challenges was discussed. Representatives of ELISSA, H-HOUSE, LEEMA, MEM4WIN and SUS-CON projects shared their success stories, covering the most recent developments within materials and components for energy efficient buildings which have emerged from these AMANAC projects. More than 70 participants representing a wide variety of sectors (e.g. architects, consultancy firms, public authorities and independent associations) attended the seminar. The seminar was recognised as being highly relevant, promoting

discussion on critical issues to ensure Industrial Leadership of the European industry on providing innovative advanced materials for low carbon energy technologies. A lively discussion on policies and regulations that delay market implementation of advanced materials in the building and construction industry with robust participation from the audience concluded the seminar.



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## AMANAC: Advanced Materials And Nanotechnology Cluster

4<sup>th</sup> Newsletter: November 2016

### AMANAC at the 7<sup>th</sup> ECTP conference

November 17<sup>th</sup> - 18<sup>th</sup>, 2016

The AMANAC CSA will participate in the 7<sup>th</sup> open conference organised by the European Construction Technology Platform (ECTP) that will be held on the 17<sup>th</sup> and 18<sup>th</sup> of November at the Centre for Fine Arts in Brussels. The event will present and discuss current and future innovations in the built environment field. Plenary sessions with speakers from academia, industry and the European Commission will provide a global overview and the visions of various stakeholders. Meanwhile, thematic parallel sessions will

address specific issues under the five current challenges of the ECTP. A hall for booths and posters will exhibit examples of innovations developed within European projects.

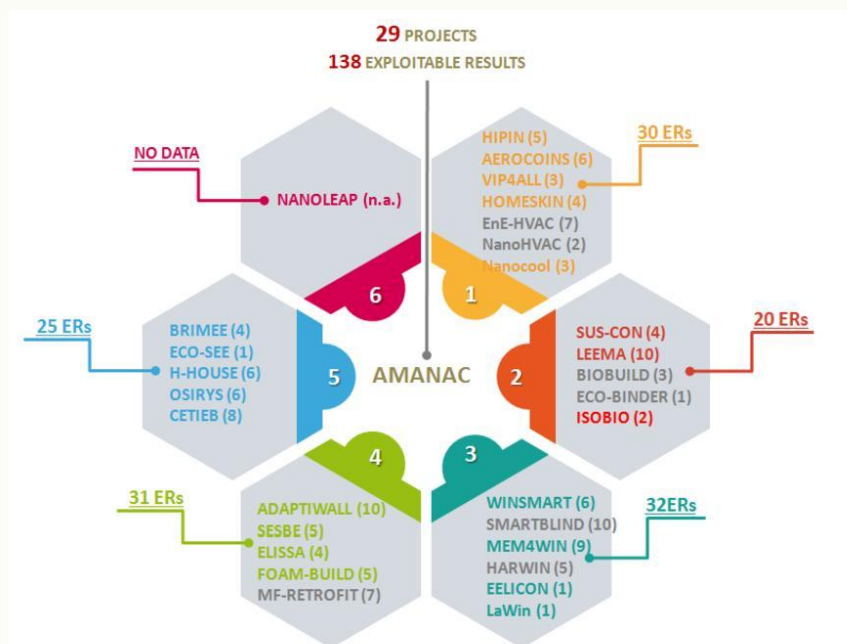
The AMANAC CSA will have an exhibition booth, and will deliver presentations on both the AMANAC CSA project and also the “Key-findings and impact of European research projects under AMANAC” within the “Materials and Sustainability Innovation in Construction” session.

For more information and registration, please use the link:

<https://fr.xing-events.com/ECTPConference2016.html>

## AMANAC PROJECTS: FACTS AND FIGURES ON EXPLOITABLE RESULTS

One of the milestones of the AMANAC CSA project was to map and integrate the outcomes of the 29 projects participating in the AMANAC cluster. This activity has been documented in two confidential deliverables of the project (D2.2 and D2.3). The output of this work is a detailed compilation of data and information concerning the current and future exploitable results of the projects clustered under AMANAC.





## AMANAC: Advanced Materials And Nanotechnology Cluster

4<sup>th</sup> Newsletter: November 2016

In addition, the analysis also focused on the potential **gaps** in the research undertaken during the project lifetime, the **obstacles** to the **exploitation of the outcomes** and on the potential **synergies by technology combinations** amongst different projects. Particular attention has been devoted to this last issue by exploring what can be done at a Cluster/Thematic Area level and the opportunities offered by project clustering and cross-project collaboration to increase overall impact.

In order to collect the data and information effectively, a plan was defined based on a three-stage methodology involving: 1. a **survey** of projects via the project coordinators and/or key contact persons within each AMANAC project; 2. a **desk study** of information provided by the projects through other sources (EeB-CA2 Project Questionnaires, AMANAC CSA e-Newsletters, CORDIS, E2B PPP project review, projects public deliverables, etc.); 3. a collection of the main **RTD achievements and exploitable results** together with the identification of **potential barriers to exploitation and potential collaboration activities** among projects (the data were collected one by one from most of the projects over the 2 years of the AMANAC-CSA project duration).

A total of **21 surveys** were collected and analysed. For each project all exploitable results have been identified and described. For the 8 projects which did not participate actively in the AMANAC survey, other public information sources were used to collate and compile information on the key technologies developed within these projects.

The overall number of exploitable results identified is **138, from 28 projects**.

Each project has been described in a tabular format composed of different sections:

- The Main information about the project (start/end date of the activities, work programme, total cost and EU contribution in Euro, status of the project, number of partners, countries involved, list of the partners),
- A brief description of each result,
- The key partners who participated in the development of the result,
- The TRL level of the result,

- The most crucial quantifiable property/ies considered,
- Photographs (if available),
- The list of Information sources used.

In addition, through the analysis of the responses, it was possible to explore the barriers and bottlenecks faced by the project consortia during and/or after the projects' lifetime. This analysis has revealed several different obstacles:

- **Technical obstacles:** Difficulties regarding the availability of materials to be used in the project and/or the scalability of the process.
- **Market implementation obstacles:** Difficulties entering into the market due to the high cost of the new product/material or due to the tension between innovative solution and user acceptance.
- **Internal communication and management difficulties:** Occasionally there may be poor internal communication or obstacles arising from the withdrawal of a partner during the project lifetime.

In parallel the kind of help/support the project consortia expect in order to overcome the obstacles encountered or to speed up activities was investigated. The requirements can be classified as:

- **Technical support:** Help from public authorities for demonstration activities; opportunities to get in touch with experts in specific thematic areas; greater production/supply of materials from other partners.
- **Market implementation:** Promotion of innovative technologies to key stakeholders.
- **Support in management issues:** Extension of the project duration; knowledge sharing among consortium members; new funding to continue the activities after project completion.

Finally, other aspects of the projects were investigated, such as the **capacity and need to cooperate beyond the border of the single consortium**. The lesson learned from this activity is that some issues can be shared more easily than others (e.g. LCA/LCC knowledge). On the other hand the different consortia were aware of the necessity to collaborate as this is a good way to accelerate and improve the impact of the communication and dissemination process.





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**These comments confirm that an active project cluster can facilitate collaboration between different research groups and encourage sharing and cross-fertilisation of knowledge.**

*Acknowledgements:* The AMANAC CSA partners would like

to thank all participants in the survey for sharing their information, thoughts and opinions that were fundamental to this evaluation.

## NEW RESEARCH PROJECTS ON HIGHLY EFFICIENT INSULATION MATERIALS WITH IMPROVED PROPERTIES

The four new projects that have been approved in the frame of the EEB-01-2016 call joined AMANAC. All four projects address the development and characterisation of new insulation materials and solutions based on nanotechnologies and/or advanced sustainable materials and offer enhanced insulation properties and environmental performance.

### **EENSULATE: Development of innovative lightweight and highly insulating energy efficient components and associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades**

August 2016 - January 2020

Coordinator: D'Appolonia S.p.a

EENSULATE will develop an affordable and lightweight solution for envelope insulation to bring existing curtain wall buildings to “nearly zero energy” standards while complying with the structural limits of the original building structures and national building codes.

### **GELCLAD - Highly efficient cladding eco-panels with improved nano-insulation properties**

September 2016 - August 2019

Coordinator: Instituto Pedro Nunes Association for Innovation and R&D in Sc. and Tech.

The Gelclad project aims to generate an affordable advanced external wall insulation system for building envelopes. Gelclad will be a sustainable lightweight, ready-to-use composite product, made of a distinct aerogel insulation core and a weatherproofing ecoWPC skin panel in one single and easy to handle unit, able to attain high energy efficiency goals and specially designed for the major building renovation action desired by the EU.





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### INNOVIP - Innovative multi-functional Vacuum-Insulation-Panels (VIPs) for use in the building sector

October 2016 - September 2019

Coordinator: Forschungsinstitut für Wärmeschutz e. V. München

INNOVIP will reinvent VIPs by using new materials for the core, new foils for the envelope, new production technologies and innovative cladding materials that offer extra functionality to the user, whilst addressing LCA issues. The results will be demonstrated at several locations throughout Europe.

### WALL IN ONE - WALL Insulation NOvel Nanomaterials Efficient systems

October 2016 - September 2019

Coordinator: Quick-mix Putztechnik GmbH & Co. KG

WALL IN ONE will develop a consistent package of new advanced sustainable insulation products and systems. The HONEST (High performance Optimized Nanomaterial Energy efficient SysTem) package is a “modular toolbox system” providing a set of complementary solutions that will address most of the complex challenges raised by thermal renovation as well as new construction.

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#### PROJECT INFORMATION

Project Acronym: AMANAC  
Grant no: 636239  
Start Date: 2015-01-01  
Duration: 24 months  
Project Cost: 479 530 €  
Project Funding: 479 530 €  
Website [www.amanac.eu](http://www.amanac.eu)

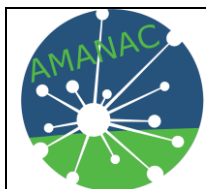
#### DISCOVER AMANAC



[www.amanac.eu](http://www.amanac.eu)

#### PARTNERS





## APPENDIX 8: Press release



### Discover novel materials for building and construction at the AMANAC project exhibits at Ecobuild 2016, 8-10 March, ExCel London

*Find us at Booths E4103, E4105, E4106, E4109, and E4111 in the Ecobuild Innovation Pavilion in the Sustainable Design and Construction area*

The **Advanced Material and Nanotechnology Cluster (AMANAC)** projects focus on the development of novel materials for energy efficient and sustainable buildings and construction; they range from lightweight components, novel insulation materials for improved energy efficiency of buildings, materials that contribute to an improved indoor environmental quality and comfort, materials for smart windows, and sustainable materials, including recycled materials, for construction.

Come visit us to learn about the newest developments of the following projects:

1. **ELISSA** – Energy Efficient Lightweight-Sustainable Safe Steel Construction (Lightweight Components Thematic; <http://elissaproject.eu>)
2. **Foambuild** – Functional adaptive nano-materials and technologies for energy efficient buildings (Lightweight Components Thematic; <http://elissaproject.eu>)
3. **HOMESKIN** – Thinner insulation systems based on Advanced Aerogel-Based Composites (Novel Insulation Materials Thematic; <http://homeskin.net>)
4. **ECO-SEE** – Eco-innovative, Safe and Energy Efficient wall panels and materials for a healthier indoor environment (Indoor Environment Quality Thematic; <http://www.eco-see.eu>)
5. **SUS-CON** – Sustainable innovative energy-efficient concrete (Low Embodied Energy Materials Thematic; <http://www.sus-con.eu>)

The Cluster exhibition is organised by **AMANAC-CSA** (Coordinating Support Action) that aims to create an effective and long lasting collaboration and coordination platform among the AMANAC projects to increase their impact. These projects have been approved in the frame of the Energy Efficient Buildings Public-Private Partnership (EeB-PPP) of the European Commission, whose activities address development of materials, components and systems for the improvement of the energy efficiency in the built environment.

Visit <http://amanac.eu> for more details about the AMANAC project news, see our product gallery and wiki and learn about our past and future activities and events.

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*The AMANAC-CSA project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 636239.*



## Acknowledgements

The AMANAC Consortium would like to acknowledge the financial support of the European Commission under the HORIZON 2020 Program, Grant N° 636239.