



European Union Energy Day

Clean energy solutions for the buildings
of the future

Astana EXPO, 24 July 2017

#EUenergyday



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Sustainable buildings development

10:20-12:30

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Sustainable buildings



Building + equipment + control + user

**Clean energy + energy efficiency
+ performance + smart buildings**



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Sustainable buildings



Environmental, economical, social
and **functional approach**



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REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 9 March 2011 (*Construction Products Regulation*)

ANNEX I
BASIC REQUIREMENTS FOR CONSTRUCTION WORKS

1. Mechanical resistance and stability
2. Safety in case of fire
3. Hygiene, health and the environment
4. Safety and accessibility in use
5. Protection against noise
6. Energy economy and heat retention
7. Sustainable use of natural resources

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Programmed research on sustainable buildings & users

(co-financed by public funds and industry)



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- ❑ **Climate change** (CC) impact assessment in hotels: methodology and adaptation strategies for high quality hotels
- ❑ **Adaptive thermal comfort** criteria and building design - a field work in Portugal
- ❑ Thermal performance of **cool façades**. Evaluation by infrared thermography.
- ❑ Analysis of the **perceived thermal comfort** in Portuguese Secondary **Schools**: Methodology and Results.
- ❑ Evaluation of **high reflective** products on flat **roofs rehabilitation**. Experimental study.



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*Field research on innovative **water retaining, in situ or prefabricated green/insulated** roofs (PhD thesis with industry support)*



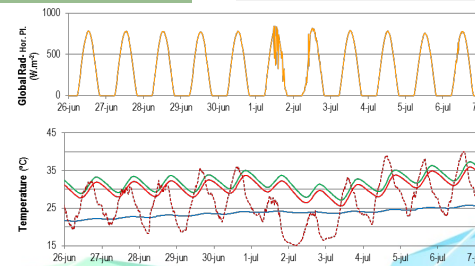
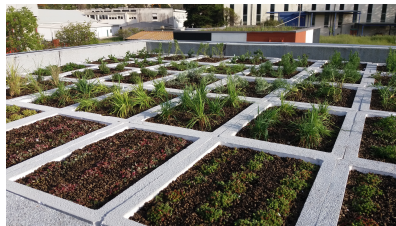
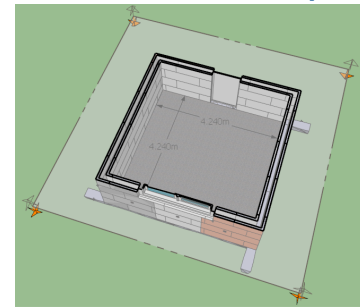
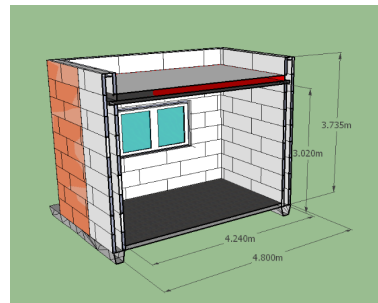
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Field study and computer simulation (from research to practice)



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European co-financed R&D
on sustainable innovative components and kits
for buildings

Industry + Laboratories + Universities



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BioBuild

High Performance, Economical & Sustainable Biocomposite Building Materials



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 285689.



<https://www.gelclad.eu/>

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BioBuild

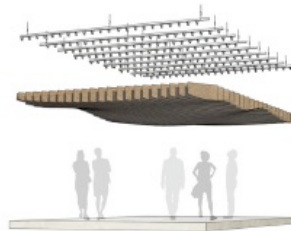
biocomposite materials
(**biopolymers + natural fibres**
+ agglomerated cork) to reduce
the embodied energy in
construction systems by at least
50% over current materials,
with no increase in cost.



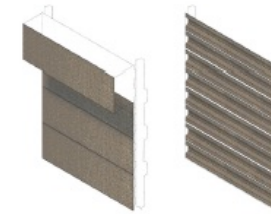
External Wall Panel



Internal Partition Kit



Suspended Ceiling Kit



External Cladding Kit

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GELCLAD

Highly efficient cladding eco-panels with improved nano-insulation properties



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723425



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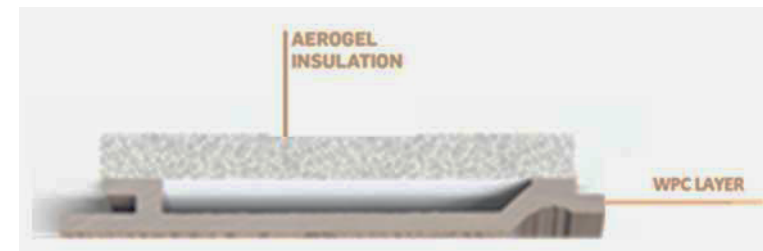


GELCLAD panels made from a functional **bio-polymer composite** and an **advanced foamable** and **extrudable aerogel**, produced using a co-extrusion/injection procedure, Cladding system can be set with **passive pre-programed materials** (dynamic response to ambient stimuli and control the air flow in the building facade system)

Targeted:
20% lower embodied energy than traditional oil based panels;
improvement of > 40% on energy savings in building refurbishment
reduced installation and maintenance costs (life span of 50 years)



GELCLAD PANEL CONCEPT
note: not final design



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An example of the perceived **Portuguese** experience

- ❑ *Increasing production and use of renewable energy (energy costs)*
- ❑ *Development according to energy consumption/expense patterns and energy policies*
- ❑ *Policies (in)coherence*
- ❑ *Solar hot water affected by initial bad workmanship, low equipment performance and inefficient use*

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- Phasing out of incandescent lighting replaced by CFL and now being replaced by LED lighting*
- Efficient standard equipment widely available (energy labelling and market response) at accessible costs*
- New buildings improved by regulations*
- Rehabilitation initial capital costs (and low energy consumption) prevent widespread improvement*

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- PV cost decrease and policy incentives increase use now*
- Heat pump cost decrease, increased performance and policy incentives promote increased use*
- Smart buildings control and data management (starting again)*
- Electric mobility and linking it to sustainable buildings (first steps, policy incentives)*
- Compatibility, obsolescence and perceived usefulness*

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Sustainable and smart buildings *for sustainable and smart users/consumers*

- Users and consumers are concerned with short term expenses and investments (limited investment capacity, lack of incentives)*
- Users lack (reliable) information and how to understand and use it wisely (even at energy labelling level)*
- Users sometimes feel rewarded and enthusiastically adhere but other times feel disappointed with the results and demotivated (recover is difficult)*

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New solutions are needed for more and better sustainable buildings and users of the future

Thank you for your attention



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