Project Overview

BFIRST project deals with the design, development and demonstration of a set of innovative photovoltaic products for building integration, based on a new technology for cell encapsulation within fibre-reinforced composite materials.

By means of this new technology, cell encapsulation within composite materials takes place in a single step, yielding a self-supporting, monolithic and lightweight photovoltaic module. Curved and complex geometries can be obtained, opening a wide range of new BIPV products with enhanced building integration possibilities. A high versatility can be achieved from different materials (resins, fibres, additives) and processes (pre-preg (pre impregnated composite fibres), infusion, RTM, hand lay-up, etc.).

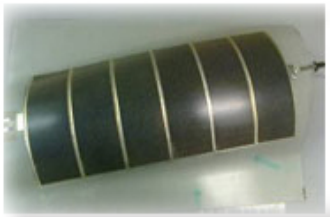
The resulting PV modules present advanced characteristics in terms of structural capacity, transparency, adaptability to non-planar geometries, protection, weight and reduction of stages in the manufacturing process, as well as issues concerning transport, manipulation, assembly and safety and security.

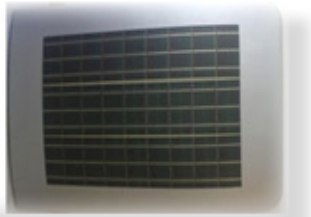
Building codes and standards

Multifunctionality of the developed components will be addressed in order to comply with existing building codes and standards, with the specific goal of enhancing the global energy efficiency of the building.

Five standardized BIPV components are going to be developed within the project, for different BIPV applications. Laboratory testing following EN standards will be carried out in order to offer a complete characterisation which helps designers, installers and final users making an optimal profit of the possibilities of the products. Applicable standards include both photovoltaic and construction aspects of the modules. The developed components will be demonstrated in three sites.

The scope of effort by the consortium of this project will also be expanded to areas including education and training of designers/architects.





The Consortium

Coordinator

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CYPRUS UNIVERSITY OF TECHNOLOGY (Cyprus)

ITALIAN AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT (Italy)

VUE-SUR-MONS (Belgium)

BEAR HOLDING BV (Netherlands)

bfirst

fibre-reinforced solar technology

Collaborative Project

Grant agreement nb.:
ENER/FP7/296016/"BFIRST"

Development and demonstration of standardized building components

BUILDING-INTEGRATED, FIBRE-REINFORCED SOLAR TECHNOLOGY

Duration: 4 years
Starting date: 1st May, 2012

SEVENTH FRAMEWORK PROGRAM THEME ENERGY 2011-2.1-4

Funded by the European Union

Objectives

The overall objective for B-FIRST project is the development and demonstration of a set of standardized multifunctional photovoltaic products for building integration based on a recently developed technology for solar cells encapsulation within glass fibre-reinforced composite materials. Currently available photovoltaic solutions will be extended with a portfolio of new products with advanced performances developed to a pre-industrial stage.

Scientific and technical objectives

◇ Design and development of a set BIPV products based on alternative encapsulation materials (composite materials) with same efficiency levels of traditional modules.
◇ Enhanced properties of PV modules due to: monolithic structures, light weight, modularity, flexibility in shapes, finishes and colours.
◇ Light transmission properties tailoring depending on the application.
◇ Multifunctional performance complying with building and photovoltaic standards.
◇ Up-scaling of production processes for real-scale prototype fabrication.
◇ Definition of successful integration strategies for the developed products.
◇ Demonstration of BIPV products in three different sites (with different climates and general frameworks for BIPV).
◇ Technical assessment of BIPV products (including architectonical and electrical integration, energy yields and performance).
◇ Development of product catalogues and datasheets of new standardized components, with complete information on characteristics, performance and building integration methods for each product.

Economical objectives

◇ Development of BIPV elements with costs comprised between 1,5 and 2,5 €/Wp.
◇ Reduction of 20% on transport, manipulation and installation costs based on lighter weight, materials substitution, enhanced modularity and fixing strategies integrated in the BIPV products manufacturing process.
◇ Specific BIPV systems for retrofitting market.
◇ Economic assessment of BIPV products.
◇ Exploitation plan.

Standardisation objectives

◇ Detection of current and future harmonisation needs for standardisation of BIPV components.
◇ Recommendations to extend the existing building codes regarding the integration of standardised PV components.

Educational objectives

◇ Easy-to-use guidelines for architects and decision makers for enhancing the use of PV building components.
◇ Educational and training material for professionals and students. Training activities.
◇ Dissemination plan and its deployment.

BIPV products and demonstration buildings

Five standardized BIPV components have been proposed to be demonstrated within the project:

Product 1: composite-based hybrid BIPV/T ventilated façade panel with embedded crystalline silicon cells, designed as the external skin of a ventilated façade, in such a way that the resulting façade system can be considered as a lightweight cavity wall.

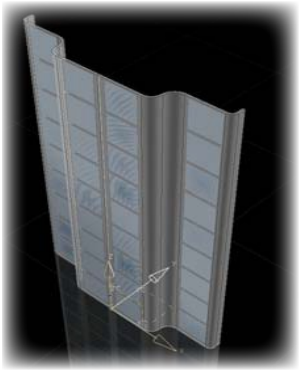
Products 2&3: Prefabricated PV composite sheet which can be introduced within any standard window/curtain wall or skylight by manufacturers without the need of any special additional manufacturing process. This is thus a highly standardised product, as it is as flexible and suitable to any building project as glass is.

Product 4: roofing shingle. Flat, lightweight and monolithic shingle, with embedded crystalline silicon cells. The composite panels can be designed and manufactured so that the fixing or joining elements are integrated within the panel, thus enabling a rapid and easy manipulation and assembly into the building.

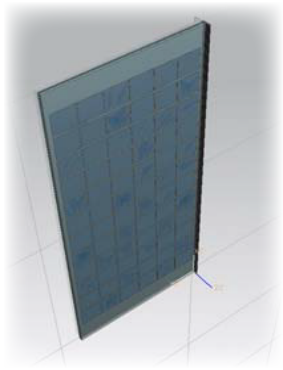
Product 5: solar shading system, sharing similar characteristics and advantages as previous products. In this particular case sandwich structures could be considered depending on structural requirements. These BIPV products will be demonstrated and evaluated at three sites:

◇ Large experimental facility for smart-grids electrical testing: INGRID. (Bilbao, Spain). New building.
◇ Uni-familiar residential house (Pikermi, Attica region, Greece). Retrofitting.
◇ Residential complex, several uses (Mons, Belgium). New building.

Examples of initial design of BIPV products

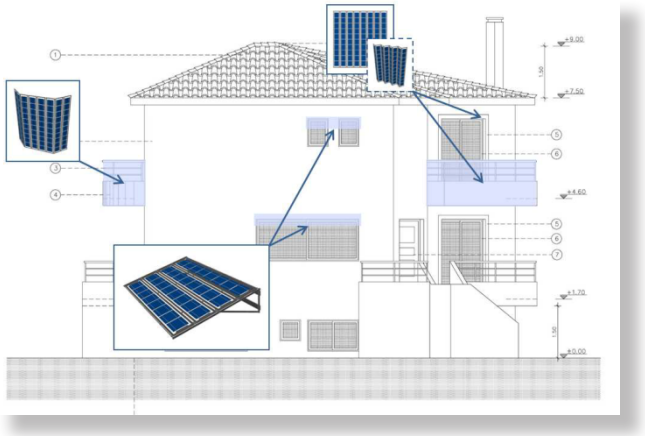


Ventilated PV facade



BIPV curtain wall/skylight

Demonstration building at Pikermi-Greece, with foreseen integrations of BIPV products



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