

## **Group of Building Environmental Studies**

**Department:** Environmental Physics and Meteorology, Laboratory of Meteorology

### **Main Team Members :**

- Santamouris Mattheos, Professor, Professor
- Assimakopoulou Margarita-Niki, Lecturer
- Synnefa Afrodith, PhD Researcher, Physicist
- Gaitani Niki, PhD Researcher, Physicist
- Karatasou Stavroula, PhD Researcher, Physicist
- Georgaki Chrysoula, PhD Researcher, Physicist
- Karlessi Theoni, MSc Researcher, Physicist
- Vassilakopoulou Kostantina, MSc Architect Researcher
- Laskari Marina-Theoni, MSc Researcher, Physicist
- Giannopoulou Konstantina, MSc Researcher, Mechanical Engineer
- Giannarakis Ioannis, Student at the Department of Science of Materials, University of Patras
- Efthymiou Chrysanthi, MSc Researcher, Physicist
- Mastrapostoli Eleni-Kyriaki, MSc Researcher, Physicist
- Lympelopoulou Chrysida, Administrative support

### **Short Description**

The Group of Building Environmental Research, (GRBES), operates under the frame of the Section of Applied Physics, Department of Physics of the University of Athens. It carries out specific research and development programs on the field of environmental quality of the built environment. In parallel, offers education and training to under and post graduate students, and prepares educational material and books on the field of energy and environment. By using its modern and complete experimental facilities the Group has undertaken many audits aiming to identify energy and environmental problems in the built environment. Specific and optimised solutions are then prepared and proposed for implementation.

## **Selected Publications**

1. M. Santamouris, S.M. Alevizos, L. Aslanoglou, D. Mantzios, P. Milonas, I. Sarelli, S. Karatasou, K. Cartalis, J.A. Paravantis, Freezing the poor—Indoor environmental quality in low and very low income households during the winter period in Athens, *Energy and Buildings*, Volume 70, February 2014,
2. M. Santamouris, D. Kolokotsa, Passive cooling dissipation techniques for buildings and other structures: The state of the art, *Energy and Buildings*, Volume 57, February 2013, Pages 74-94, ISSN 0378-7788, <http://dx.doi.org/10.1016/j.enbuild.2012.11.002>.
3. M. Santamouris, K. Pavlou, A. Synnefa, K. Niachou, D. Kolokotsa, Recent progress on passive cooling techniques: Advanced technological developments to improve survivability levels in low-income households, *Energy and Buildings*, Volume 39, Issue 7, July 2007, Pages 859-866, ISSN 0378-7788,
4. M. Kapsalaki, V. Leal, M. Santamouris, A methodology for economic efficient design of Net Zero Energy Buildings, *Energy and Buildings*, Volume 55, December 2012, Pages 765-778, ISSN 0378-7788
5. A. Sakka, M. Santamouris, I. Livada, F. Nicol, M. Wilson, On the thermal performance of low income housing during heat waves, *Energy and Buildings*, Volume 49, June 2012, Pages 69-77, ISSN 0378-7788

## **Research Projects**

### **1. Project title: Promotion of cool roofs in the EU 'COOL ROOFS', (IEE/07/475/SI2.499428)**

**Duration: 01/09/2008 - 28/02/2011**

**Funding: EU under IEE program**

**Description:** A cool roof is a roofing system that is characterised by high solar reflectance and high infrared emittance and delivers cooling energy and financial savings, improved thermal comfort conditions, mitigates heat islands and reduces air pollution. The proposed action aims to create and implement an Action Plan to promote cool roofs technology in EU. The specific objectives are: to support policy development by transferring experience and improving understanding of the actual and potential contributions by cool roofs to heating and cooling consumption in the EU; to remove market barriers and simplify the procedures for cool roofs integration in construction and building's stock; to change the behaviour of decision-makers and stakeholders so to improve acceptability of the cool roofs; to disseminate and promote the development of innovative legislation, codes, permits and standards, including application procedures, construction and planning permits concerning cool roofs. The work will be developed in four axes, technical, market, policy and end-users

### **2. Project title: TEENERGY SCHOOLS**

**Duration: April 2009 – September 2011**

**Funding: MED**

**Description:**The general objective was to promote energy efficiency in existing secondary school buildings developing a common Strategy based on the 3 typical climatic and architectural models that characterize the MED area: coast, mountain and city. The specific objectives were: To create a transnational network among partners, other Public Authorities, Universities or technical bodies and schools, involving students in the educational dimension of Teenergy. To experiment benchmark activities for comparing buildings energy performances and defining a common Action Plan, for retrofitting as well as for new constructions. To implement a Concept Design action based on technological solutions for passive cooling, natural lighting and ventilation, integrating the use of renewable energies-also through the organisation of 3 international Workshops in Cyprus, Spain and Italy and one Campus Week in Greece. To promote synergies with private operators and leader companies in this field, in order to foster technological innovation and new economic sectors. To diffuse and capitalize the results with the aim of increasing the awareness on energy saving practices and standards and –in medium-long term – integrating and improving the policies at MED level.

**3. Project title: Demonstrating through Intelligent Control (smart metering, wireless technology, cloud computing, and user-oriented display information), Energy and Water wastage reductions In European Social Housing, 'ICE -WISH' (GA no 270898)**

**Duration: 01/04/2011 to 31/03/2014**

**Funding:** EU under the Information and Communication Technologies Policy Support Programme

Description: ICE-WISH will install mature ICT-based innovative energy and water monitoring system, including non-invasive and utilise smart metering, wireless communication, 'cloud' computing, and standard low cost Set-top box (STB) that will be connected to standard home TVs. ICE-WISH will monitor simultaneously 300 social houses in ten European countries - acknowledging the climatic diversity and statistical significance- over one full calendar year to demonstrate that mature and interactive ICT addressing users can contribute not only to reducing both waste of energy and water without compromising living conditions; but also to engage consumers as active players in developing water and energy conservation practices. ICE-WISH service will provide customised, tailored and appealing information at both individual (householder) and collective (housing associations) level to empower occupants to control their energy usage and to seek a reduction in consumption of 15%. (with corresponding reductions in bills).

**4. Project Title: H.E.R.B. Holistic Energy-efficient Retrofitting of residential Buildings (GA no 314283)**

**Duration: October 2012- April 2016**

**Description:**Europe is facing a large challenge in relation to the energy consumption of its housing stock. Buildings consume about 40% of total final energy requirements in the continent and in the context of all the end-use sectors, they are the largest (followed by transport with 33%).Although building new homes to the demanding energy efficiency regulations in Europe is essential, the benefits will accrue slowly as it will take several decades before such houses form a significant proportion of the stock. The major challenge is retrofitting existing, energy-inefficient homes, to meet 21st century standards within the constraints enforced by structures built in the 19th and 20th centuries.Key to achieving this goal is understanding the process on how best to select and integrate various technologies from the many available, to optimise performance for different building types, climates and socio-economic conditions – a truly holistic approach is therefore required.The HERB project has been established to develop and demonstrate new and innovative energy efficient technologies and solutions for retrofitting older buildings. These shall be installed and performance monitored in a number of typical residential buildings in EU countries.

#### **5. Cost-Effective - Resource and Cost-effective integration of renewables in existing high-rise buildings**

**Duration: October 2008 – September 2012**

**Description:** The project wants to contribute to the development of a competitive industry in the fields of energy efficient construction processes, products and services, with the main purpose of reaching the goals of the EC set forth for 2020 and 2050 to address climate change issues and to contribute to improve EU energy independence. The public Summary Report can be downloaded from the directory Publication/Project reports.