HELLENIC REPUBLIC
National and Kapodistrian University of Athens

The Group of Building Environmental Studies (GRBES)

Group Leader

Dr. Margarita-Niki Assimakopoulos (F) is an Associate Professor at the Physics Department, Applied Physics and Meteorology sector of the National and Kapodistrian University of Athens (head of the Group of Building Environmental Studies). She graduated from the Imperial College of Science, Technology and Medicine (MEng. Electrical and Electronic Engineering, 1999) in London. Her post graduate studies as well as her PhD were completed in Ecole National de Travaux Publique de l'Etat in Lyon (D.E.A. Génie Civil, Bâtiment et Environnement, 2001 & Doctorat Génie Civil, Bâtiment et Environnement, 2005). The main research fields are: Energy efficiency of buildings, Indoor pollution and environmental quality, Building management technologies, Advanced building materials.

She has participated in more than 18 research projects both international and national. She is the scientific responsible of 6 European projects under the framework of HORIZON 2020 (1 European coordination). Author of more than 60 publications in peer reviewed international journals and conferences. Reviewer of energy efficiency and building physics scientific journals (Journal of the International Solar Energy, International Journal of Remote Sensing, Journal of Cleaner Production, International Journal of Ventilation, Advances in Building Energy Research).

Laboratories of the Group

- Laboratory of Advanced environmental materials - Nanomaterials
- Laboratory of Daylighting, Solar Radiation, Ventilation and Indoor Air Quality
- Laboratory of Intelligent buildings
- Laboratory of Urban Environment

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Description of the Group

The **Group of Building Environmental Studies**, (GRBES), operates under the frame of the Section of **Applied Physics**, Department of Physics at the University of Athens (NKUA). It carries out highly scientific Research and Development programs on the field of Environmental Physics, Meteorology and Energy studies.

Offering advanced level of graduate and post graduate academic courses and laboratories for students, together with a series of books and scientific papers published, the GRBES is considered a highly competitive group. It is considered advanced in terms of science, research, and academics; with a great collaboration with several Universities, Governmental and Industry partners, shown by holding and coordinating a large variety of prestigious National and International projects.

The group has a pluriform background and focuses on topics related to:

- Development of Intelligent Materials / Namomaterials
- Energy Performance of Buildings,
- Solar Energy Systems and Techniques,
- Energy Efficient Technologies, Indoor Environmental Quality,
- IT Technologies applied to Buildings,
- Energy Management System,
- Monitoring and Control of indoor and outdoor environmental conditions,
- Design and integration of smart systems in buildings and urban environment,
- Energy and Environmental Rating,
- Environmental Assessment through Life Cycle Analysis

GRBES is equipped with state-of-the-art infrastructure and highly qualified Researchers to perform advanced experimental studies on the above-mentioned fields. The research unit on Advanced Environmental Materials carries out research on issues related to the development of materials aiming to improve the energy performance of buildings and mitigate climate change in the urban environment. Detailed studies assessing the performance of materials and their impact on the urban environment have been carried out for a wide range of materials and companies. The lab includes a Surface Analyzer/ Porosimeter, a state of art Microwave oven for synthesis on nanomaterials, two advanced spectrophotometers, emmisometer, accelerated ageing test chamber and Hot Disk Thermal Analyzer system and a 3D printer Z printer 310 Plus, with Binder Jetting technology of open source powders and open source binders.

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The Laboratory of Ventilation, Indoor Air Quality, Day-lighting and Solar Radiation is equipped with single tracer gas equipment with an air chromatographer, a blower door, sensors of Temperature, humidity, air velocity, PMV-PPD, Ultrafine particles, Volatile Organic Compounds (VOCs), Particulate Matter (PM10, PM2,5, PM1), and other basic pollutants (NOx, CO2, CO, O3). Some more equipment of the Group include 2 test cells fully equipped to measure and control all climatic or energy parameters in buildings, mobile monitoring station with a 20 m height antenna and much more.

Many of the projects have been undertaken in collaboration with well-known professionals of international allure. The group has a long experience in EU project management and coordination of a wide array of programs including FP7, MED, IEE, ICT-PSP etc. It is working on specific projects aiming to apply and demonstrate energy efficient technologies. GRBES has a long history in collaborating in international networks through which the number of projects has now exceeded 500, and paper publications exceeding well over 400. The group is always striving for and able to achieve excellence.

List of recent Projects:

- ZERO-PLUS. Achieving near Zero and Positive Energy Settlements in Europe using Advanced Energy Technology - H2020-EE-2014-2015/H2020-EE-2015-1-PPP – No. 678407
- Pro-GET-OnE, Proactive synergy of inteGrated Efficient Technologies on buildings, H2020 (2017-2021) ID: 723747
- HAPPEN! Holistic Approach and Platform for the deep renovation of the med residential built Environment', H2020 (2018-2021), ID: 785072
- QUANTUM, Quality management for building performance -improving energy performance by life cycle quality management, H2020 (2016-2020) ID: 680529
- DRIVE0, H2020 (2019- 2023), No. 841850, developing circular deep renovation solutions and supporting consumer centered business models in 7 demonstrators
- SMART GEMS, Smart Grid Energy Management, H2020 (2015-2019) ID: 645677
- SAVES 2, Students Achieving Valuable Energy Savings 2, Project ID: 754203, H2020 (2017-2020)

Physics Department
GROUP OF BUILDING ENVIRONMENTAL RESEARCH
National and Kapodistrian
University of Athens

Group Of Building Environmental Research - *GRBES*

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15784 , Athens
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Group profile- history

The Group operates under the Section of Applied Physics, Department of Physics of the University of Athens since 1991.

The Group is led by Associate Professor Margarita Assimakopoulos

Activities include

- ✓projects on energy and environmental quality of the built environment
- ✓education and training
- ✓development and testing of innovative materials

The staff consists of experienced researchers, mainly physicists, mechanical and electrical engineers and architects

Many International and National projects (more than 100) have been undertaken and completed in collaboration with well known professionals

- Environmental Monitoring
- Development of Intelligent Materials
- Energy Performance of Buildings
- Energy Efficient Technologies
- Indoor Environmental Quality
- Urban Environmental Quality

Research Fields

LABORATORIES-
Intelligent environmental materials

Two advanced spectrophotometers, emmisometer, accelerated ageing test chamber and Hot Disk Thermal Analyzer system

The group collaborates with major research institutes like *Laurence Berkley Lab, Tokyo Polytechnic, National University of Singapore*, while it has undertaken important research contracts from major international industrial and research organizations, on the development of advanced environmental materials like *DAIKIN Japan, Huntsman,* etc.

LABORATORIES-
nanomaterials

For synthetic procedure of the nanomaterials:

flexiWAVE- ADVANCED FLEXIBLE MICROWAVE SYNTHESIS PLATFORM MILESTONE

Surface area-porosity Gemini VII 2390 Series *Surface Area Analyzers*

For recycled building materials fabrication:

Open source 3D powder printer for recycled building materials

Ventilation and Indoor Air Quality Measurements

- **Ventilation**
  Multiple and single tracer gas equipment with an air chromatographer, a blower door

- **Thermal comfort**
  Temperature, humidity, air velocity, PMV-PPD

- **Indoor air quality**
  Ultrafine particles, Volatile Organic Compounds (VOCs), Particulate Matter (PM10, PM2,5, PM1), basic pollutants (NOx, CO2, CO, O3)

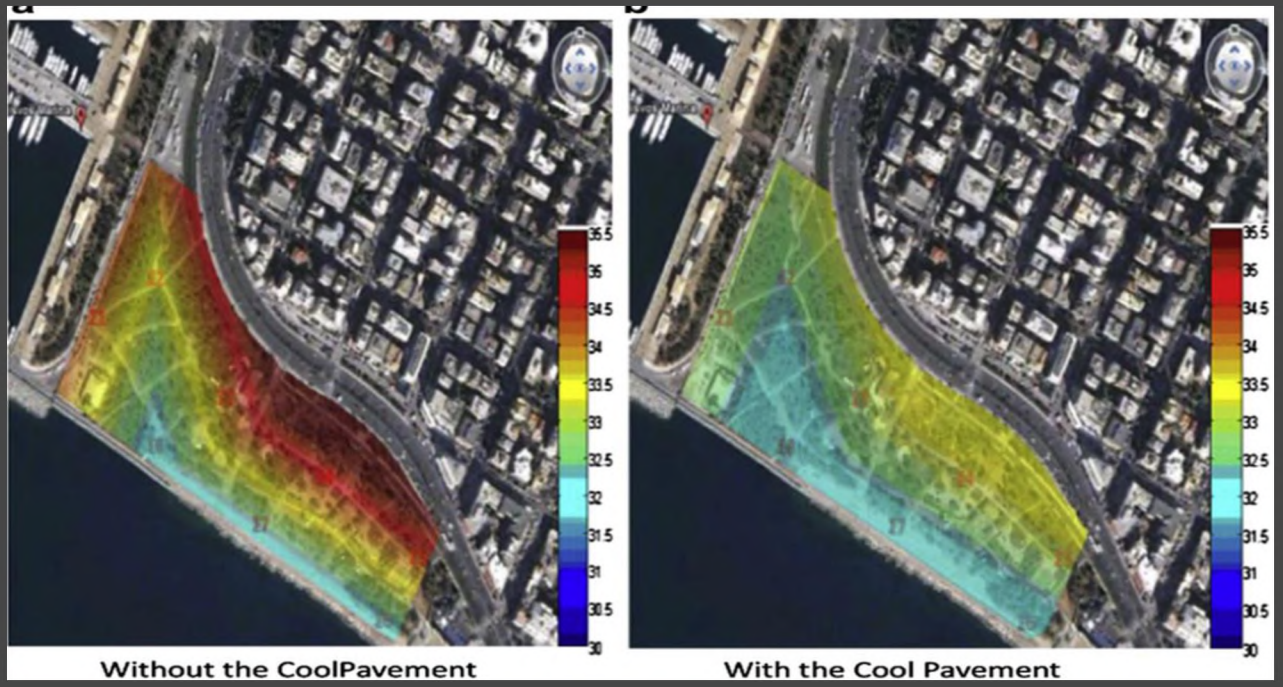
Blower door

Tracer gas decay method

Real scale applications
design, optimization and monitoring

THE FLISVOS COOL PARK IN ATHENS

Use of the Developed Advanced Materials
Decrease of the Peak Summer Temperature by 1,5 K.
The project is under continuous monitoring for the last 4 years.



Source : Santamouris et al : Using Cool Paving Materials to Improve Microclimate of Urban Areas – Design Realisation and Results of the Flisvos Project. Building and Environment, 53, 2012,

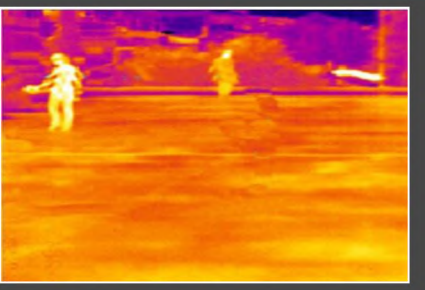
Increased roof reflectance on a school building in Athens

Source: Synnefa, M. Saliari, M. Santamouris : Experimental and numerical assessment of the impact of increased roof reflectance on a school building in Athens Original Research Article Energy and Buildings, 55, 2012,

Implementation of cool asphaltic and concrete pavements covering a total zone of 37,000 m2

Source: Using reflective pavements to mitigate urban heat island in warm climates - Results from a large scale urban mitigation project G-E. Kyriakodis ,M. Santamouris-Urban Climate 2017

Real scale applications
design, optimization and monitoring



Rehabilitation of 3 squares in the Municipality of Dafni-Ymitos

Reducing the peak summer ambient temperature up to 1,7 K, surface temperature up to 12,3 K

Source: On theTime Varying Mitigation Performance of Reflective Geoengineering Technologies in Cities V. Lontorfos, C Efthymiou, M. Santamouris- Renewable Energy Sep.2017

Holistic retrofit of a social building in Peristeri, West Athens

Source: Transformation through renovation: An energy efficient retrofit of an apartment building in Athens- Synnefa et al, Procedia Engineering 180 (2017) 1003 – 1014

Real scale applications
design, optimization and monitoring

RECENT EUROPEAN PROJECTS

Project title: SMART GEMS
Project value : € 1 012 500€
Recipient /contracting Entity: European Commission , Marie Curie
Summary description of project: Smart Grid Energy Management
The aim of the SMART GEMS project is to use Smart Grids' optimization and reliable operation concept as the common basis for collaboration and staff exchange among the partners. Collaboration and staff exchange is pursued through a significant number of secondments from academic to industrial partners and vice versa.

Project title: HAPPEN
Project value : € 2 108 827,50
Recipient /contracting Entity: H2020-EU.3.3.7./H2020-EU.3.3.1./European Commission
Summary description of project: Holistic AProach and Platform for the deep renovation of the med residential built ENvironment
The project is aimed at stimulating the market uptake of deep retrofitting of buildings, with special regard to the Mediterranean area and to the residential built stock, by tackling major bottlenecks.

Project title: QUANTUM
Implementation dates: January 2016 – February 2020
Project value: 6 .889. 097,50€
Recipient /contracting Entity: H2020-EeB-2015 / European Commission
Summary description of project: Quality management for building performance - improving energy performance by life cycle quality management

EUROPEAN PROJECTS

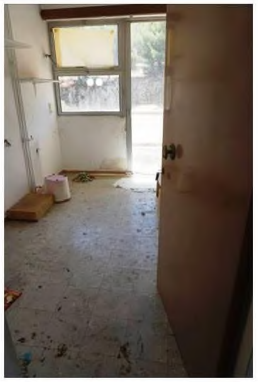
Project title: ZERO-PLUS
Implementation dates: 01/10/2015 – 30/09/2020
Project value : 4.171.947,50 €
Recipient /contracting Entity: European Commission , H2020
Summary description of project: A comprehensive, cost-effective system for Net Zero Energy (NZE) settlements will be developed and implemented. A reduction of operational energy usage to an average of 0-20 kWh/m2 per year will be achieved through a transition from single NZE buildings to NZE settlements, in which the energy loads and resources are optimally managed.

Project title: Pro-GET-OnE
Implementation dates: 01/05/2017 – 30/04/2021
Project value: 5.064.600 €
Recipient /contracting Entity: European Commission , H2020
Summary description of project: Proactive synergy for Greater Efficiency On buildings' Envelopes aims to combine in a same integrated system based on pre-assembled components the highest performances in terms of: i) Energy requirements ii) Safety – by using appropriate steel structures to reduce horizontal loads and implementing the structural safety while supporting the new envelopes.

Project title: DRIVE 0
Implementation dates: 01/10/2019 – 30/09/2023
Project value: 4.750.641 €
Recipient /contracting Entity: European Commission , H2020
Summary description of project: The DRIVE 0 concept is based on developing circular deep renovation solutions and supporting consumer centered business models for 7 specific study and demonstration cases as real environments. The selected cases are already in preparation and each of these cases have a specific local driver for the need of a holistic and circular deep renovation.

More than 100 projects

University campus, Athens, Greece



Physics Department

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