TECHNICAL UNIVERSITY OF CRETE (TUC)
ENVIRONMENTAL ENGINEERING DEPARTMENT
RENEWABLE AND SUSTAINABLE ENERGY SYSTEMS LAB

IC BIOSOL 2011
September 12-17, 2011, Crete, Greece

«Solar application in the island of Crete. Examples of the Renewable and Sustainable Energy Lab, Technical University of Crete".
Activities and Expertise

Zacharias Gkouskos, MSc
Researcher
Dr. Theocharis Tsoutsos
Associate Professor - Lab Director

ReSEL Activities

The Laboratory of Renewable and Sustainable Energy Systems (ReSEL) covers a wide range of knowledge subjects, in the fields of Applied Research and Technology Development for RES and RUE, Energy Planning and Sustainable Energy Management, such as:

- **Sustainable Energy Systems**
- **Design of Renewable Energy Systems**
- **Energy Saving Systems**
- **Biofuels**
- **Sustainable Building – RES integration**

1. PV Systems

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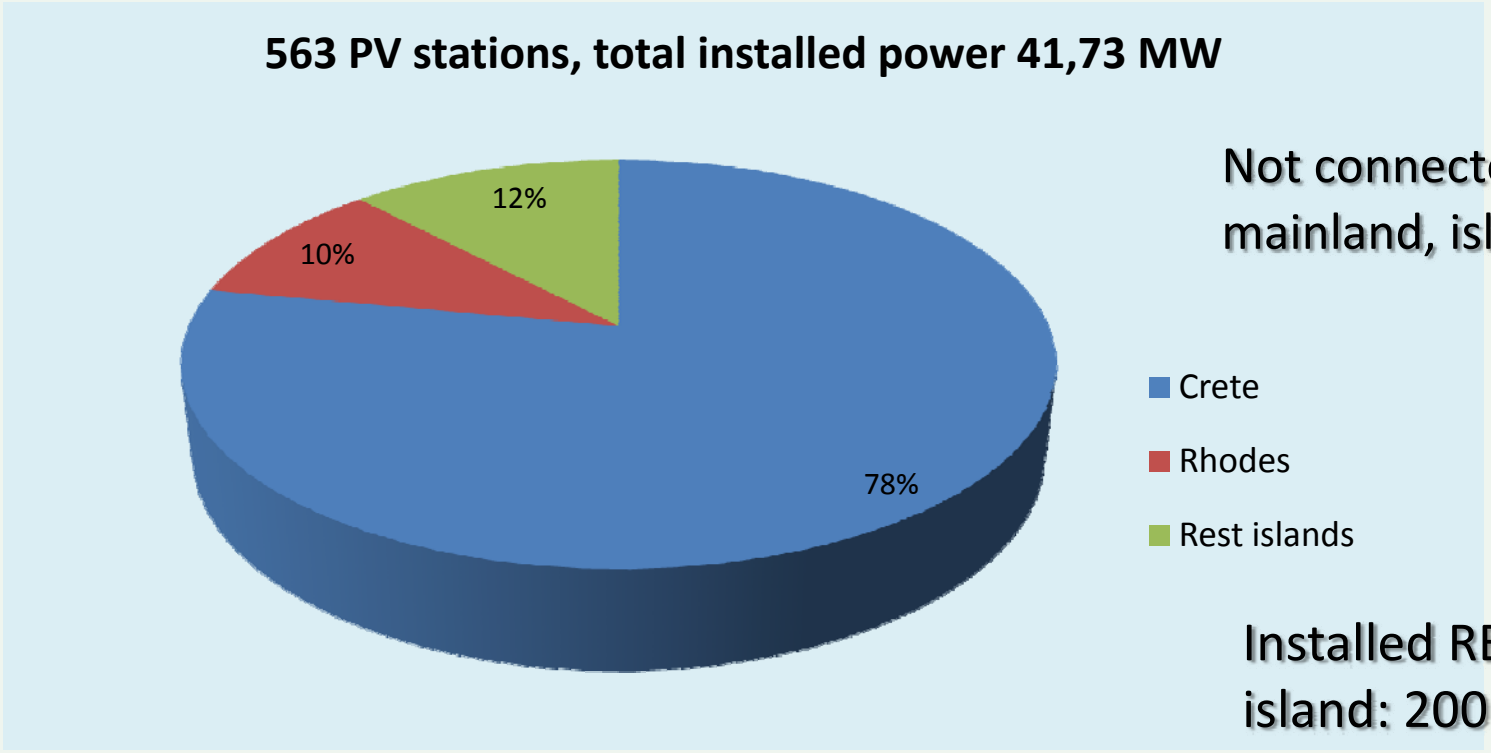
PV applications in Crete



Not connected to the mainland, islands

Source: PPC 01/2011

Installed RES power on the island: 200MW

Wind Parks: 167MW

PV Stations: 33MW

PV applications in Crete

Xerokampos 79,8 kWp

Armenoi 79,8 kWp

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PV applications in Crete

Installed PVs on roofs in Crete are 7 MW, applications for more than 27 MW have been submitted

Source: PV - Kritis

Source: ReSEL

Photovoltaic pilot installation 2 kW

2 kW

ReSEL – TUC, Kounoupidiana Chania

SHARP

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Photovoltaic pilot installation 2 kW

Scope

- quantify the effect of temperature on the PV System performance, using a normalised analysis
- investigate the reliability of the estimation in order to have a realistic approach for the analysis of PV efficiency

The output will provide safe estimations about improvements to be taken in order to create large scale installations in the Mediterranean countries in Northern Africa and Middle East.

Temperature effect on PV Performance Experimental results from a 2,18 kWp thin film PV system, 26th EU PVSEC, Hamburg, in Germany (5-9 September, 2011)

Photovoltaic pilot installation 2,8 kW

Aim of this cooperation is to familiarize students with solar systems as well as to use the system as a laboratory exercise on designing and maintaining such plants

SILCIO
SOLAR TECHNOLOGIES
TRANSFORMING INSPIRATION INTO ENERGY

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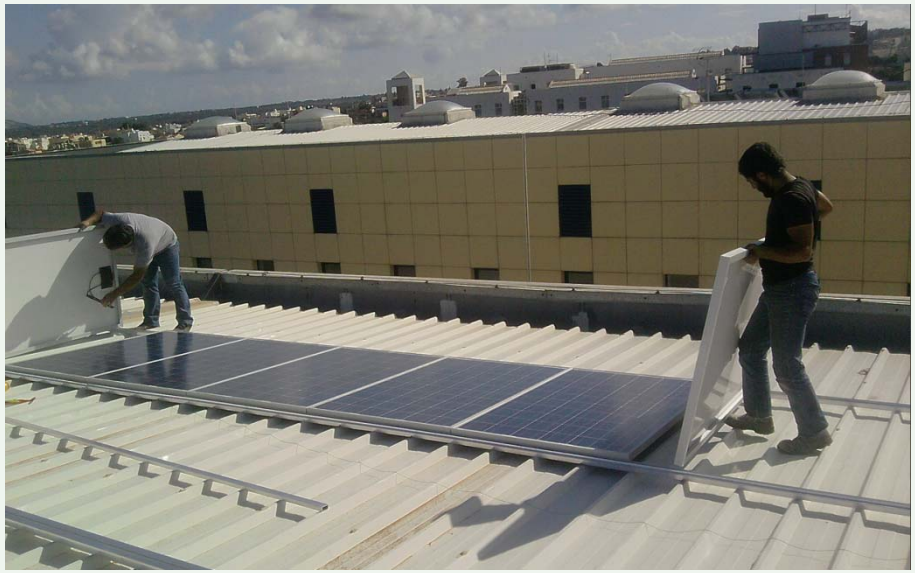
Photovoltaic pilot installation 2,8 kW



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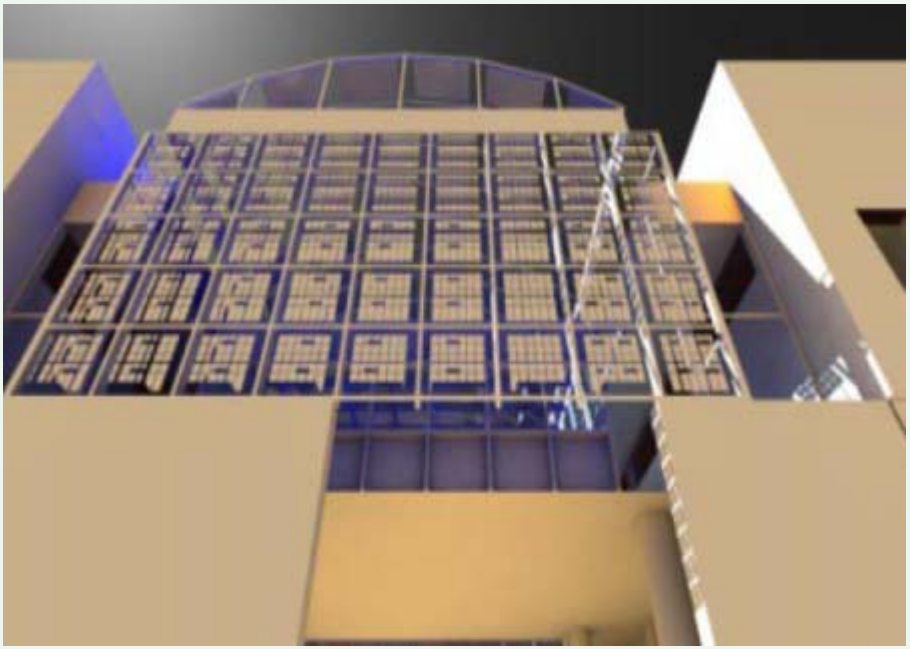
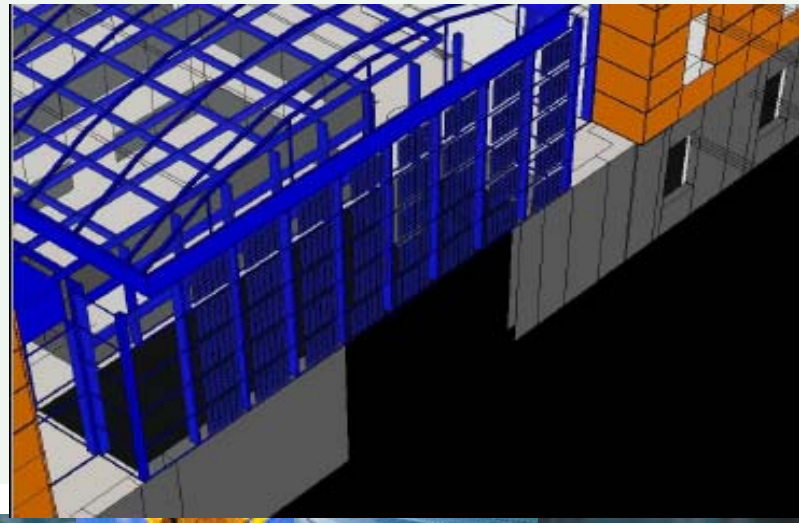
PV Integration in Building



Aim

- provide information for the installation of BIPV in existing buildings,
- analyse the influence of parameters such as orientation, architectural design etc on energy requirements of a building



The results of this study provide useful information and a good recommendation for architects and engineers to promote BIPV

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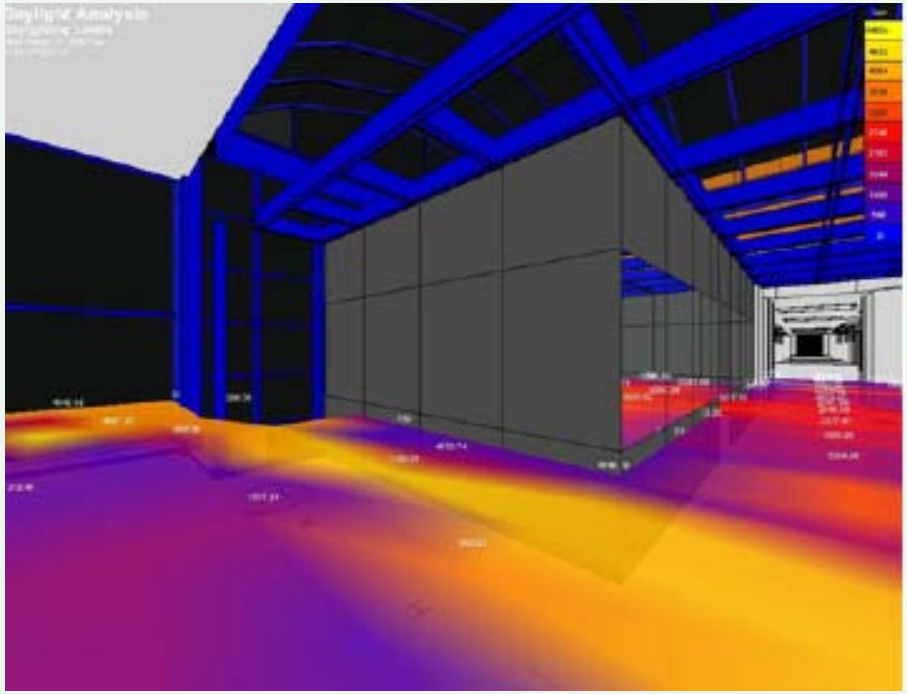
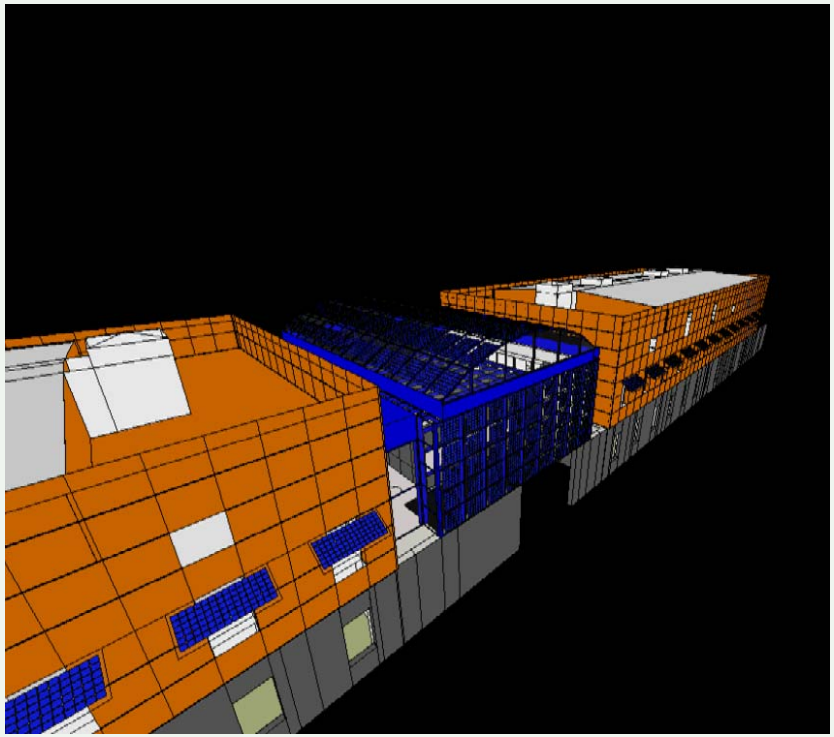
PV Integration in Building



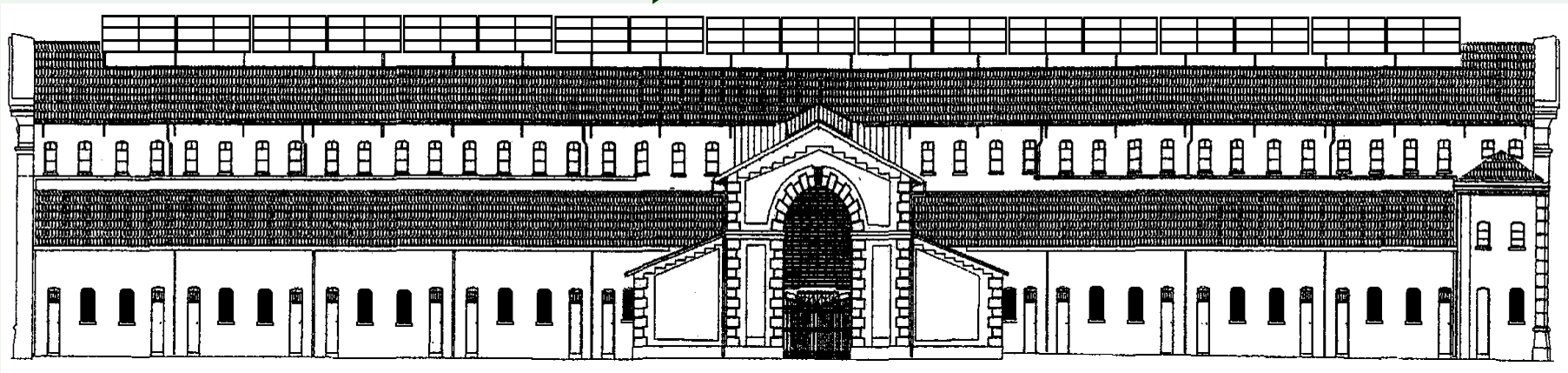


BIPV, Application in the TUC, TECHNIKA_CHRONIKA 09-10/2008

PV Integration in Building

Municipal Market - Chania

Glass surfaces – to be replaced by PVs



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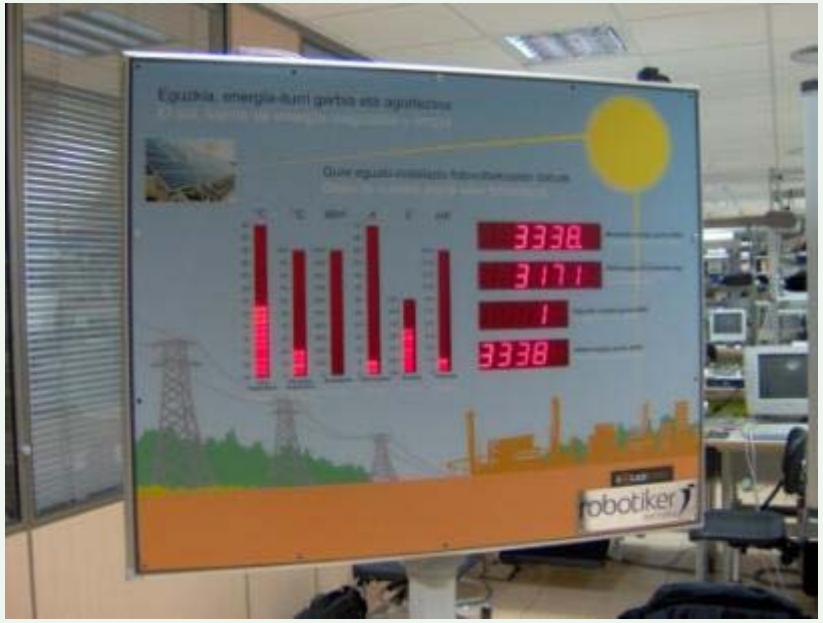
Use of Photovoltaic Systems in the Urban Environment through Demo Relay Nodes

PURE
Promotion of Building Integrated Photovoltaics



- TUC/RESEL (GR)
- EVE (ES)
- Instituto Superior Técnico (PT)
- SCHEUTEN SOLAR TECHNOLOGY (DE)
- PROVINCIA DI SAVONA (IT)
- Energy Centre Bratislava (SK)

www.pure-eie.com

Intelligent Energy Europe

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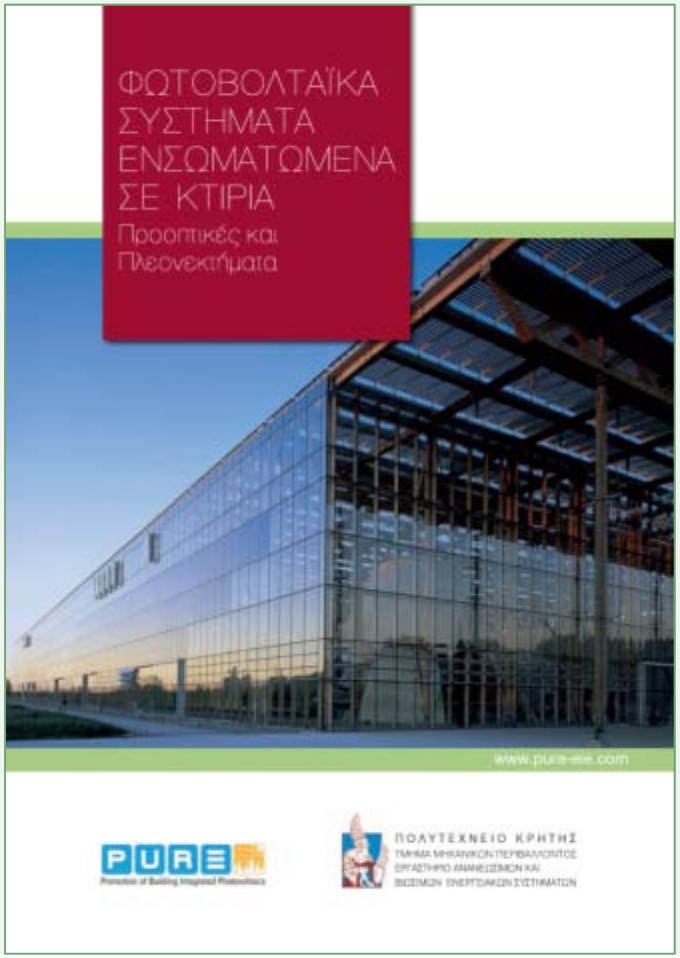
BIPV Guide



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PV TRIN Training and Certification of PV Installers

coordinated by ReSEL

Scope : development of a training and certification scheme for the technicians who are active in the installation and maintenance of small scale PV systems.

Aim: Set the base for the adoption of a mutually acknowledged certification scheme, which will be consistent to internationally acknowledged quality standards

www.pvtrin.eu

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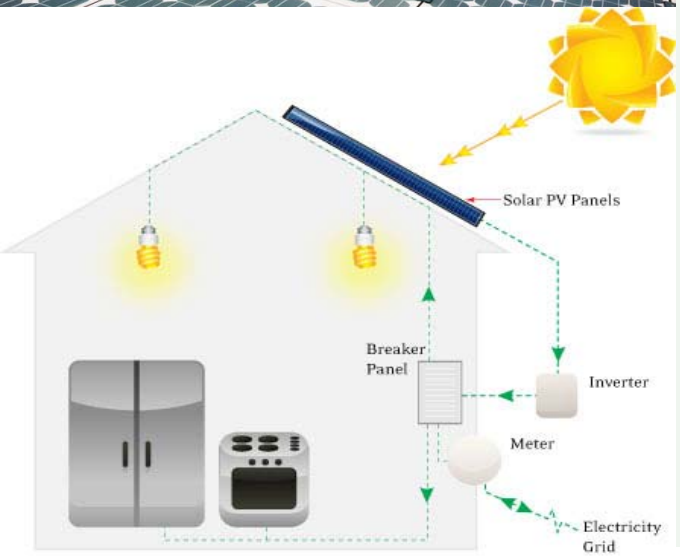
PV TRIN Training and Certification of PV Installers



PVTRIN
INSTALLER CERTIFICATION

coordinated by ReSEL

- European Photovoltaic Industry Federation– EPIA, EU
- Tecnalia-Robotiker, ES
- Sofia Energy Center–SEC, BG
- Agency of Brasov for the Management of Energy & Environment- ABMEE, RO
- Energetski institut Hrvoje Požar-EHIP, HR
- Technical Chamber of Greece-TEE, GR
- Scientific technical Chamber of Cyprus-ETEK, CY
- BRE Global Ltd, UK

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PV PARITY: Definition of grid parity for PV and development of measures to accompany PV applications to the grid parity and beyond

Aim: - contribute to the achievement of increased PV penetration in EU electricity markets and PV grid parity at a lowest possible price for the community.

- develop a common definition of grid parity and define the measures to be taken to accompany PV application to the grid parity and beyond

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PV PARITY: Definition of grid parity for PV and development of measures to accompany PV applications to the grid parity and beyond

- WIP GmbH und Co. KG, DE (ccordinator)
- European Photovoltaic Industry Federation– EPIA, EU
- Energy Research Centre of the Netherlands, NL
- Research Centre for Energy and Environmental Law, DE
- Gestore dei Servizi Energeti – GSE Spa, IT
- Enel Green Power, IT
- Imperial College Consultants Ltd- ICON, UK
- University of Technology- TU Wien, AT
- EDF Energies Nouvelles EDF, FR
- IDAE, ES

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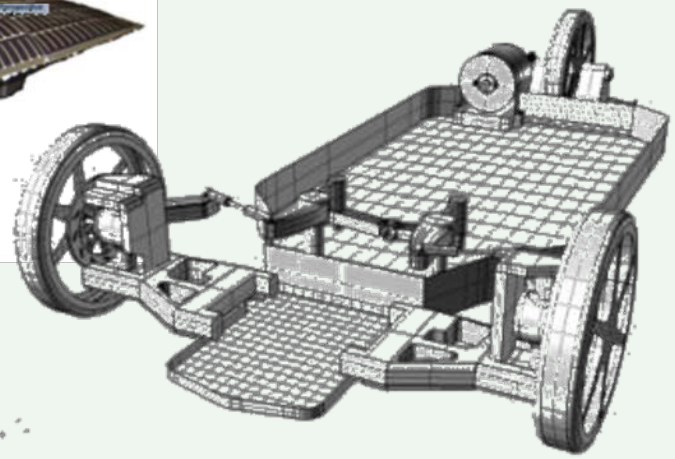
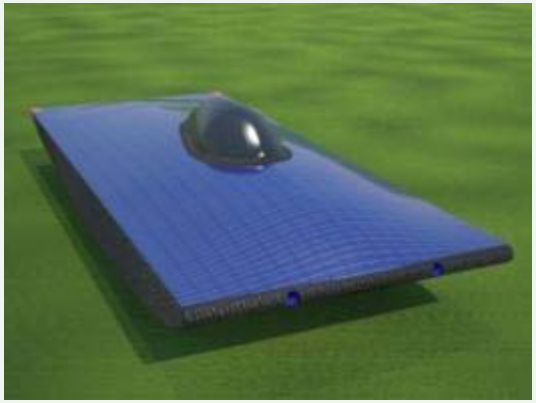
Solar Vehicle Design

“Hephaestus” TUC Team 2nd Award in Int. Contest





ΕΛΛΗΝΙΚΟ ΙΝΣΤΙΤΟΥΤΟ ΗΛΕΚΤΡΟΚΙΝΗΤΩΝ ΟΧΗΜΑΤΩΝ
HELLENIC INSTITUTE OF ELECTRIC VEHICLES

Awarded be the Greek National for the Environmenta and the Sustainable Development (ΕΚΠΑΑ)

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2. Solar Cooling Systems

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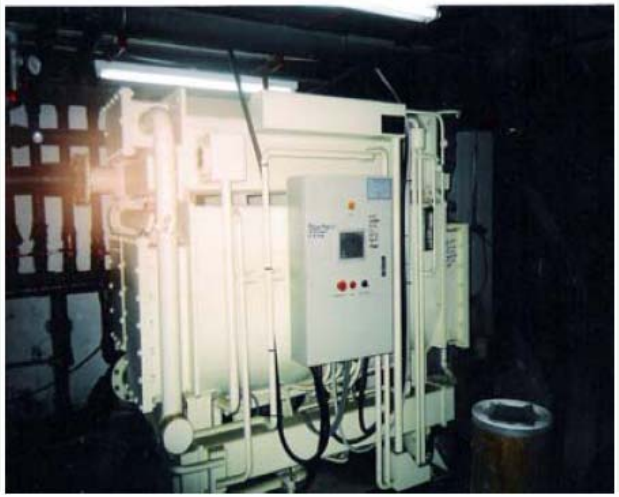
Solar Cooling Plants in Crete



Rethimno Village Hotel

Hotel

Flat solar panels: 480 m^2

Absorption chiller: 105 kW (COP 0,6)

Backup boiler: 80kW

Cooling area: 3.000m^2

The solar energy is transferred into the water system or ventilation system to cool down the building

Solar Cooling Plants in Crete

Hotel Lentzakis

Hotel

Flat solar panels: 448 m^2

Absorption chiller: 105 kW

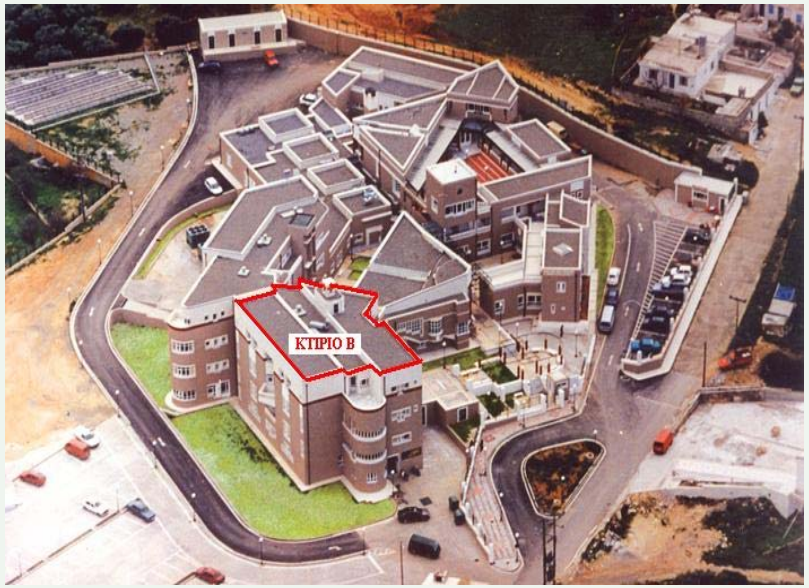
(COP 0,6)

Backup boiler: 80kW

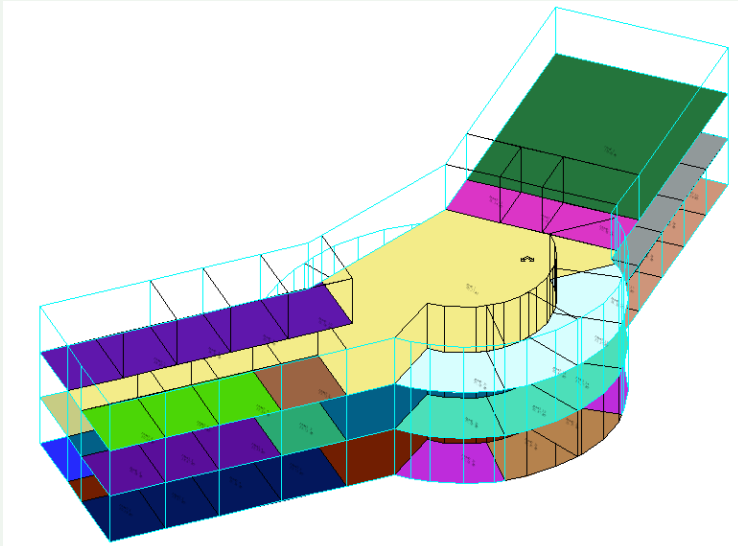
Cooling area: 2.175m^2

Design of Solar Cooling systems

Hospital of Sitia, building B



N. Kazantzakis municipality, Townhall



Design of a solar absorption cooling system in a Greek hospital.
Energy & Buildings , Vol 42 (2), 2010, pp 265-272

SOLCO – Removal of non-technological barriers to Solar Cooling technology across southern European islands

SOLCO

ISLENET

itc apea Agenzia provinciale Energia Ambiente

ΙΔΡΥΜΑ ΕΝΕΡΓΕΙΑΣ ΚΥΠΡΟΥ

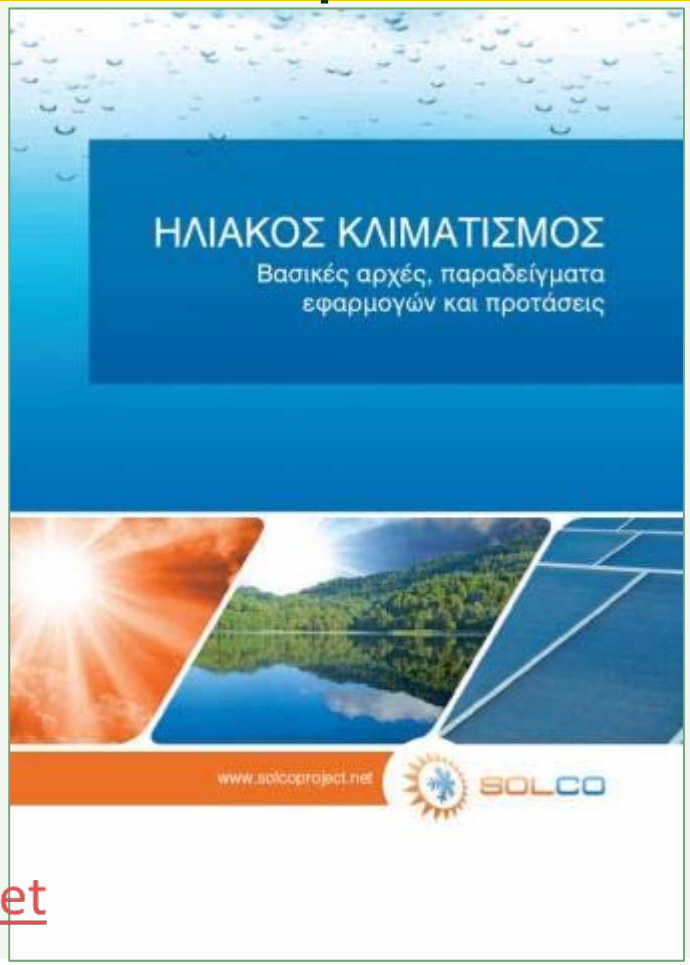
ESCO SARDENIA

The SOLCO database provides information on both solar panels and chillers locally available on 4 insular markets.

Information on :

- 1. Technical characteristics
- 2. Sizes
- 3. Costs
- 4. Commercial contacts

www.solcoproject.net



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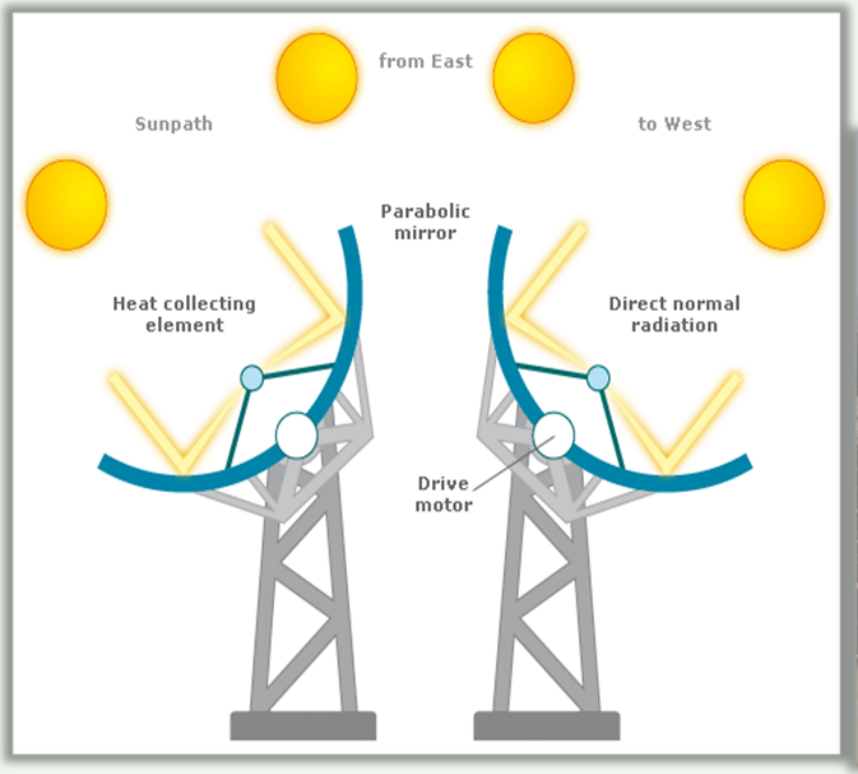
3. Solar Thermal Electric Power Systems



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Solar Thermal Electric in Crete

Production licences from RAE for

- 60MW Chonos, Itanos region, «SUSTAINABLE SOLAR THERMAL FUTURE EAST – CRETE»
- 38MW Plagies, Atherinolakos region, Leyki region «NUR-MOH»
- 70MW Fournia, Itanos region, «Solar Power Plant RES»
- 50MW Akrotiri, Chania , «NATURA POWER»

Solar Thermal Electric Power Plants in Crete

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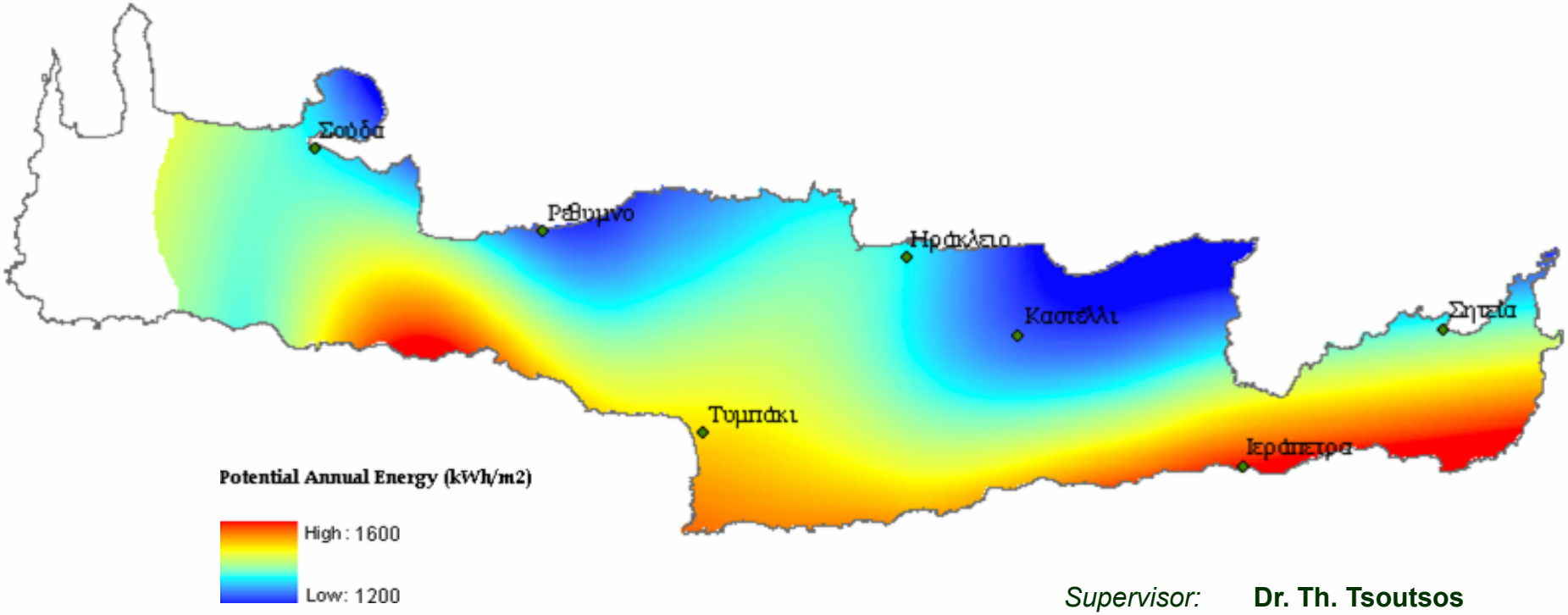
Solar Map of Crete



Supervisor: **Dr. Th. Tsoutsos**
MSc Students: **G. Zidianakis**
M.Latos
I. Methymaki

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Environmental Impact Assessment - NATURA POWER

Proposed plant to be situated in the region of Chania in the North-West side of Crete Island. 16 km from the city of Chania 2 km North-West from the airport of Chania

Renewable and Sustainable Energy Systems Laboratory / ReSEL (coordinator)

- Electric Circuits and Renewable Energy Resources Laboratory

- Geoenvironmental Engineering Laboratory

-Laboratory of Atmospheric Aerosols

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Environmental Impact Assessment - NATURA POWER

Technological analysis

Analysis of potential

- groundwater impacts
- change in the microclimate
- aesthetic impacts
- effects of noise
- effects on flora and fauna

Development of a monitoring system for flora and fauna

Analysis of the natural environment

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4. Phase Change Materials

Next generation cost effective phase change materials for increased energy efficiency in RES in buildings

A large number of researchers are currently working in the areas of PCM & RES and this Action will allow cross fertilisation of ideas and solutions to our growing energy demand

COST Action:TU0802

Acronym: NeCoE-PCM

- 2009-2013
- ~60 partners from 17 countries

www.tu0802.eu

Aim of the project is the promotion and development of PCMs used both in building elements and as components of new renewable energy technologies.

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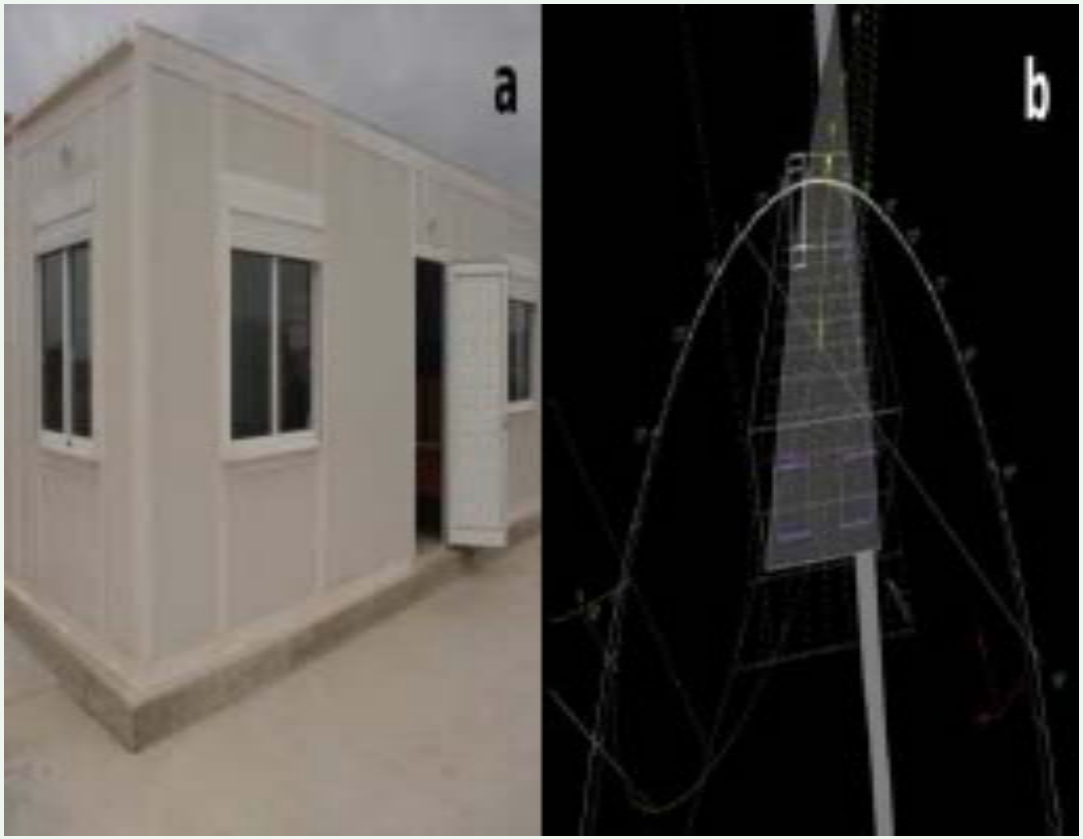
Phase change materials for energy efficiency in building



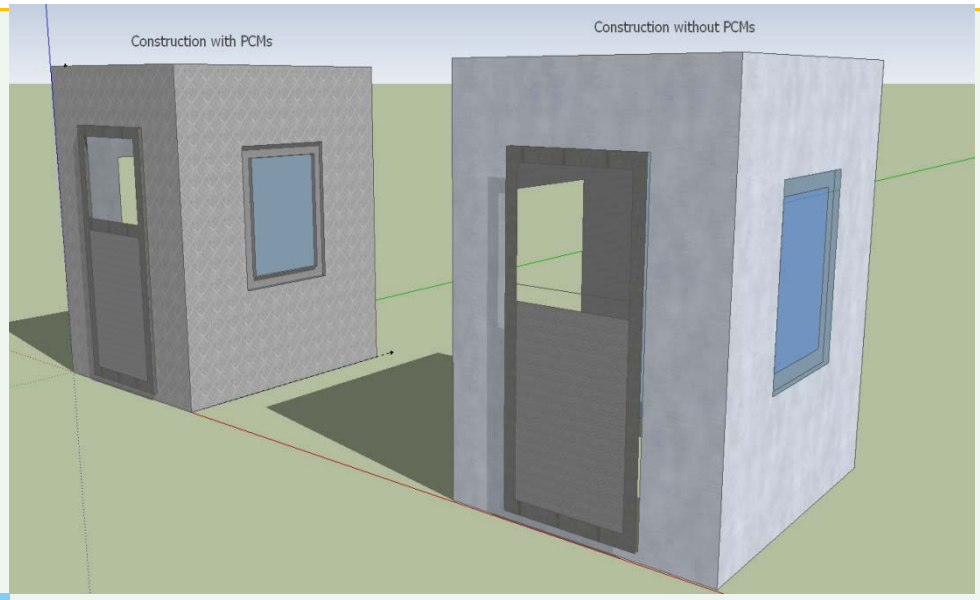
Use of PCMs in building envelopes as an energy efficiency technology in the Greek climate conditions. Emphasis is given to the inclusion of PCMs in light building constructions

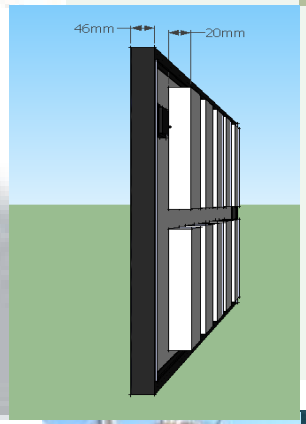
Study of energy saving in a Greek building using PCM, EuroSun 2010, Graz, Austria, 29 September - 1 October 2010

Next generation cost effective phase change materials for increased energy efficiency in RES in buildings (2009-)

Future Work

Construction of 2 buildings in scale





Integration of PCMs on panels

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IC BIOSOL 2011
September 12-17, 2011, Crete, Greece

THANK YOU
FOR YOUR KIND ATTENTION!

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