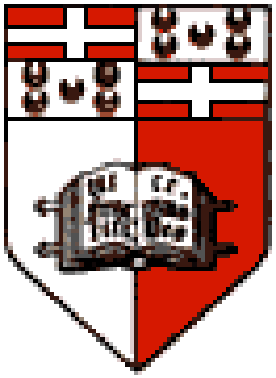
Sustainable Energy 2013
The ISE Annual Conference

Overview of the work of the Institute for Sustainable Energy University of Malta



Dolmen Hotel Qawra

21st March 2013

The Institute for Sustainable Energy
Triq il-Barrakki, Marsaxlokk

Aims

- To assist in the development of energy plans through studies in the use of new or renewable energy sources and methods of energy conservation;
- To originate and participate in teaching programmes and research projects in the field of energy technology;
- To disseminate appropriate methods and techniques relevant to the Institute’s area of interest;
- To design equipment adapted to local conditions.

Subject Areas of Interest

- Energy utilisation and energy efficiency
- Energy economics
- Energy policy and energy planning/modelling
- Air quality measurements and climate change
- Energy performance of buildings
- Solar and UV radiation
- Solar heating and cooling
- Solar photovoltaics
- Wind resource assessment & Wind Projects
- Wave energy
- Heat Pumps

Members of the Board

Dr Tonio Sant (Chairman)

Prof. Robert Ghirlando (Director)

Prof. Alex Torpiano

Prof. Cyril Spiteri Staines

Ing. Antoine Riolo

Ing. Anthony Rizzo (Representative, Malta Resources Authority)

Prof. Manfred Weissenbacher (Representative of ISE staff)

Ing. Robert N. Farrugia (Representative of ISE staff)

Perit Alison Attard (Student Representative)

Ing. Patrick Spiteri Staines (Student Representative)

Staff

- Dr. Tonio Sant – Chairman
- Prof. Robert Ghirlando – Director

- Prof. Manfred Weissenbacher
- Prof. Luciano Mule'-Stagno
- Ing. Robert N. Farrugia
- Eur Ing Charles Yousif

- Mr. Aaron Grech – administrative officer
- Mr. Manuel Aquilina – laboratory technician
- Mr. Malcolm Farrugia - handyman

Staff Research Interests

- Prof. Luciano Mule'-Stagno:

  photovoltaic wafer technology, wave energy;

- Prof. Manfred Weissenbacher:

  energy economics, energy planning/modelling, energy policy, energy storage, air pollution & climate change;

- Ing. Robert N. Farrugia:

  wind energy, solar heating, energy efficiency

- Eur. Ing. Charles Yousif:

  energy performance of buildings, heat pumps, photovoltaic systems, solar heating

Teaching:

Study units at Undergraduate level

MSc in Sustainable Energy

Training of solar installers

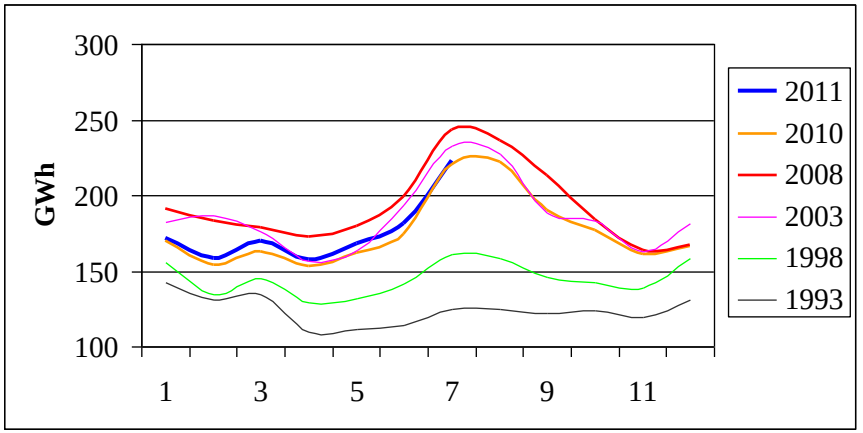
Technical services to the general public

EU and MCST funded Projects

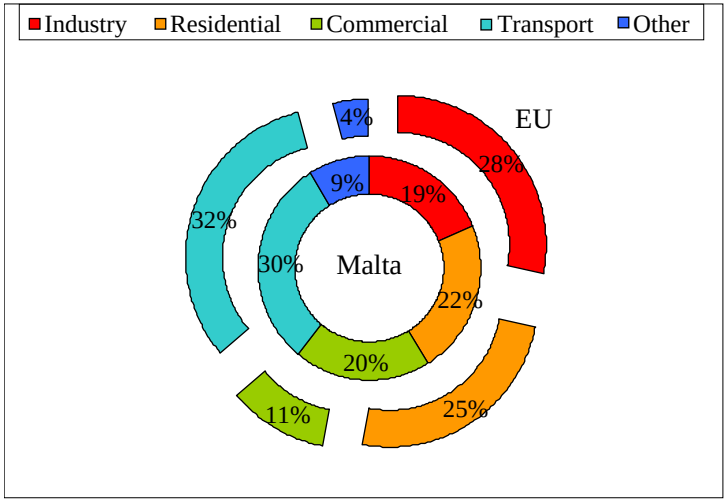
Energy Utilisation and Energy Efficiency

Charles Yousif & Manfred Weissenbacher

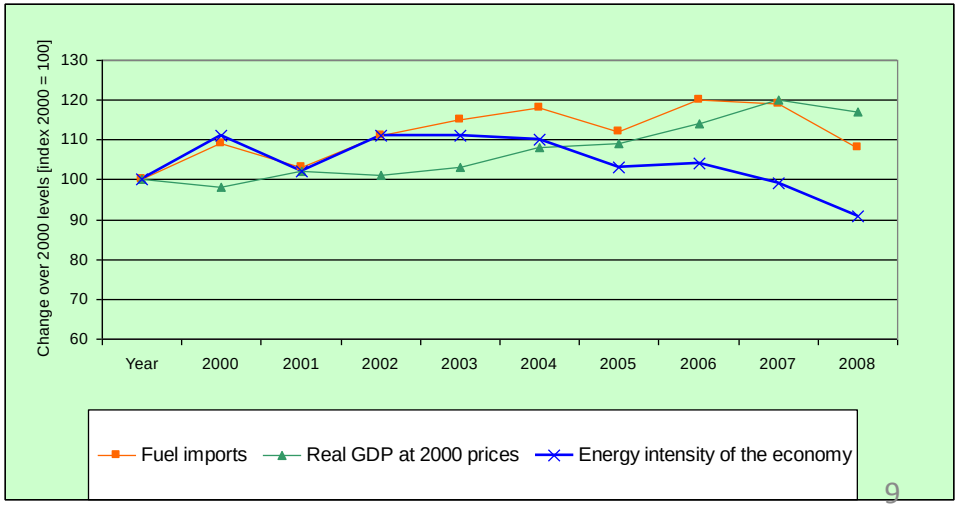
Electricity generation



Energy Consumption by sector



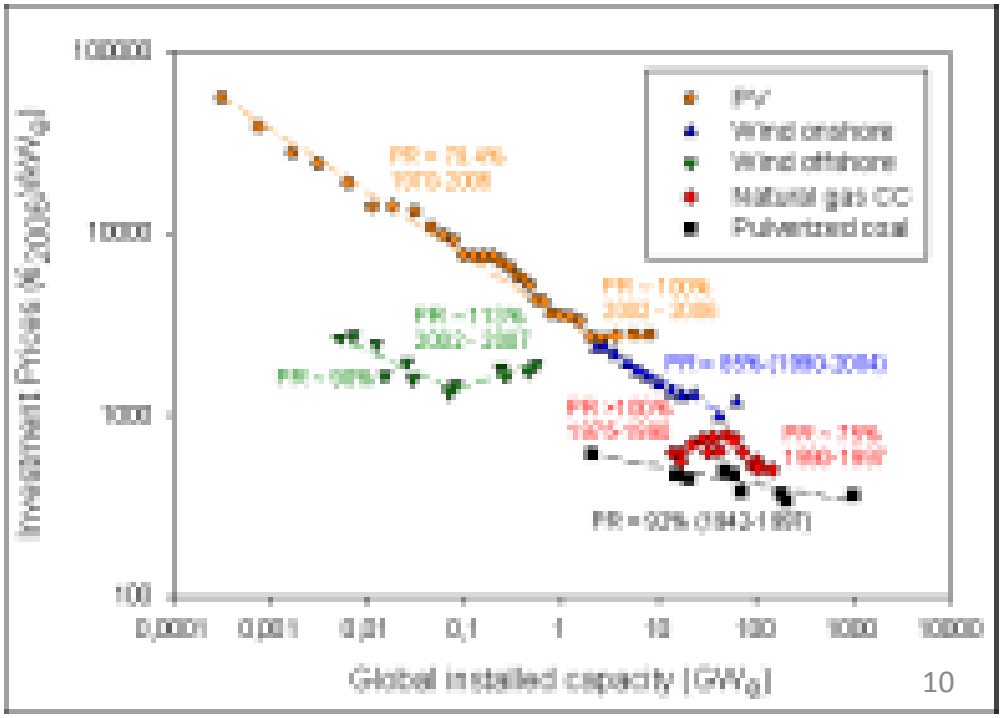
Energy Intensity, Fuel Imports & GDP



Energy Economics

Manfred Weissenbacher

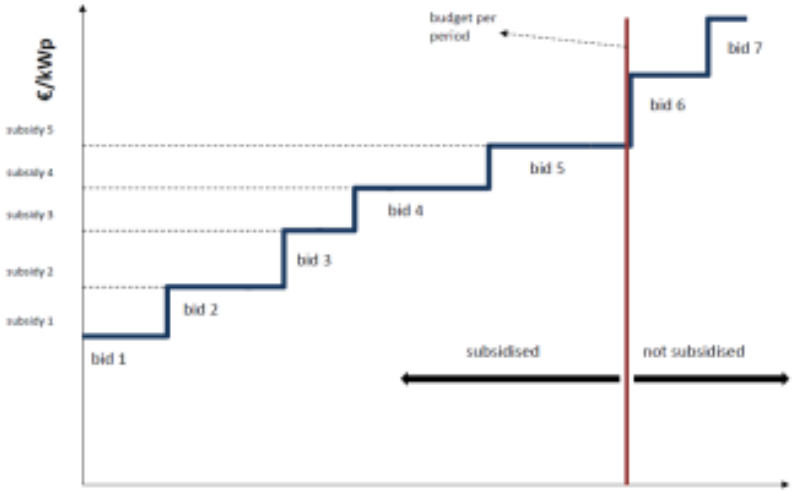
- Comparative cost analysis of various renewable energy systems
- Learning curves of renewable energy systems
- Cost-Benefit analysis
  of options
  for the thermal upgrade
  of existing building stock



Energy Policy and Energy Planning/Modelling

Manfred Weissenbacher

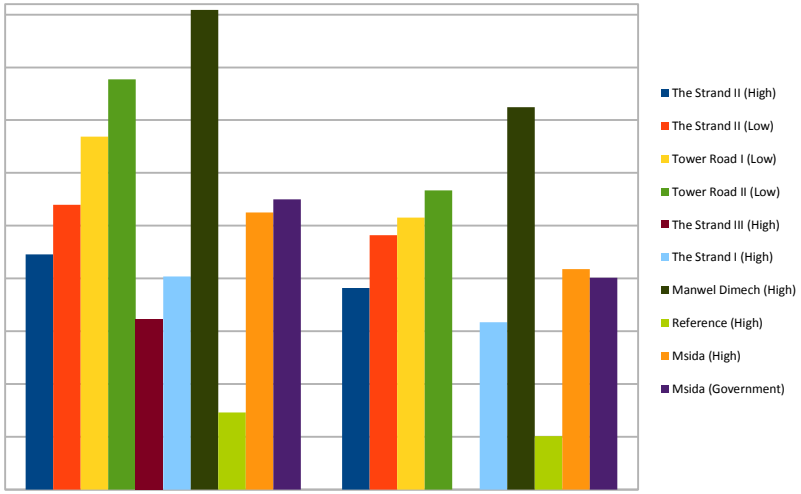
- Analysis of support mechanisms for renewable energy systems
- Strategies to overcome non-technical barriers to renewable energy
- Analysis of cooperation mechanisms within Directive 2009/28/EC
- Renewable energy grid integration issues
- Optimization of renewable energy mix compared to load profile



Air Quality and Climate Change

Manfred Weissenbacher

- Analysis of greenhouse gas emissions in the energy and transport sector
- Diffusion tube measurements of air pollutants
- Aethalometer measurements to determine energy-related black carbon as opposed to general particulate matter pollution



Energy Performance of Buildings

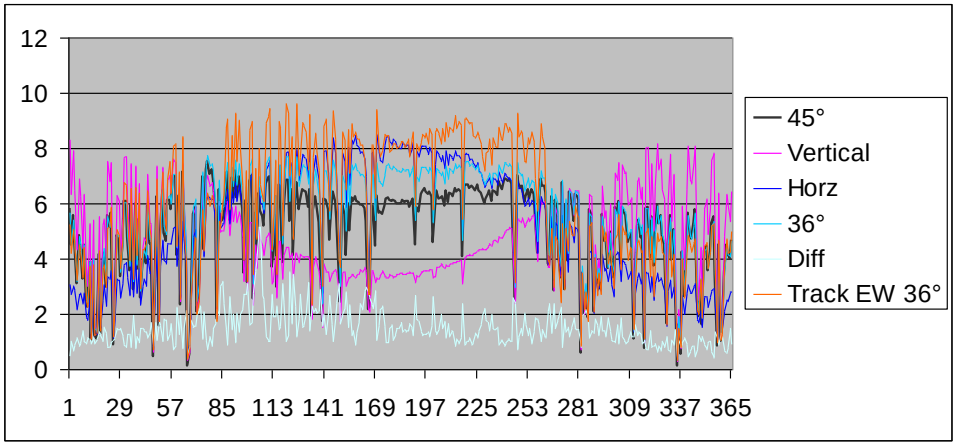
Charles Yousif

- Evaluation of the Maltese software EPRDM for residential sector
- Preparation of energy-plus weather file for use with DesignBuilder-EnergyPlus software
- Evaluation of energy efficiency measures for buildings that are effective and economically feasible
- Validation of energy efficiency retrofits and integrated designs in new buildings in terms of thermal performance

Solar and UV Radiation

Charles Yousif

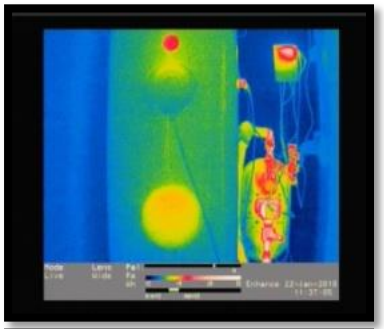
- Global solar radiation on horizontal
- Global diffuse radiation on horizontal
- Inclined radiation at latitude of Malta (36°)
- Solar radiation at 45°
- UVA and UVB radiation
- Collaboration with Valladolid University, Spain to measure Erythermal radiation and UV index

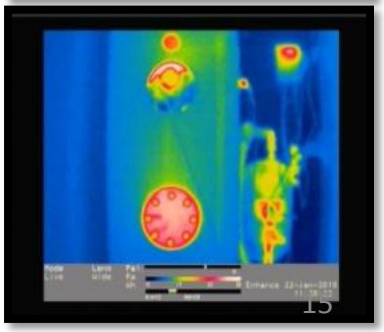


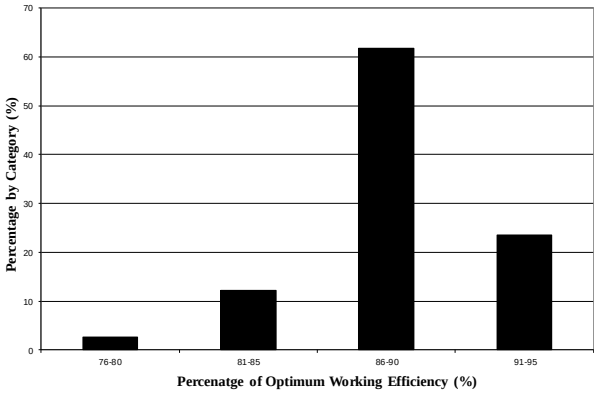
Solar Heating

Charles Yousif & Robert N. Farrugia

- Design of solar heating systems for apartments (linearsolar)
- Evaluation of installed solar heating systems
- Design of solar thermal energy meters
- Vertical solar heating systems for apartments
- Consultation to Government for large scale solar heating systems in housing projects



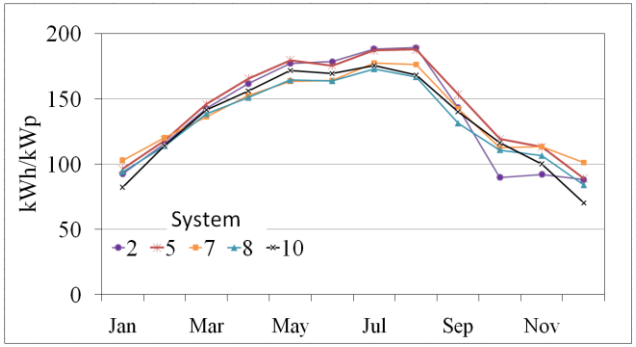




Solar Photovoltaics

Luciano Mule'-Stagno & Charles Yousif

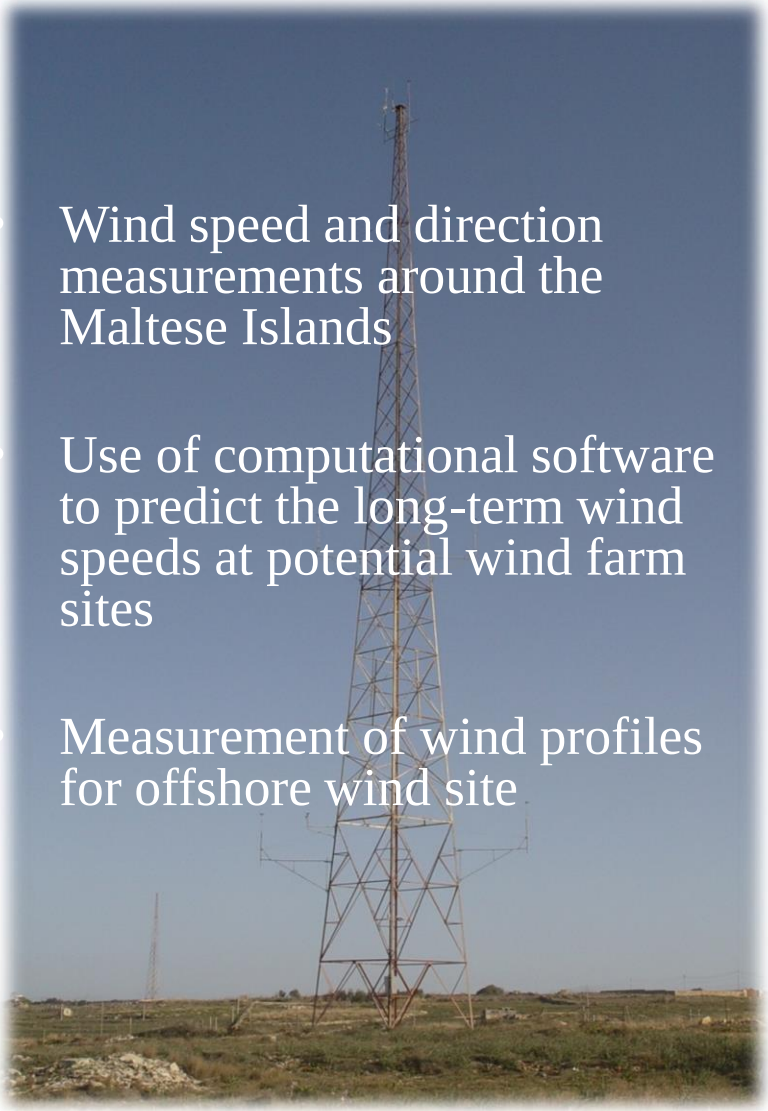
- Installation of first PV systems in Malta in 1993
- Performance evaluation of operating systems of different capacities
- Tracking PV systems



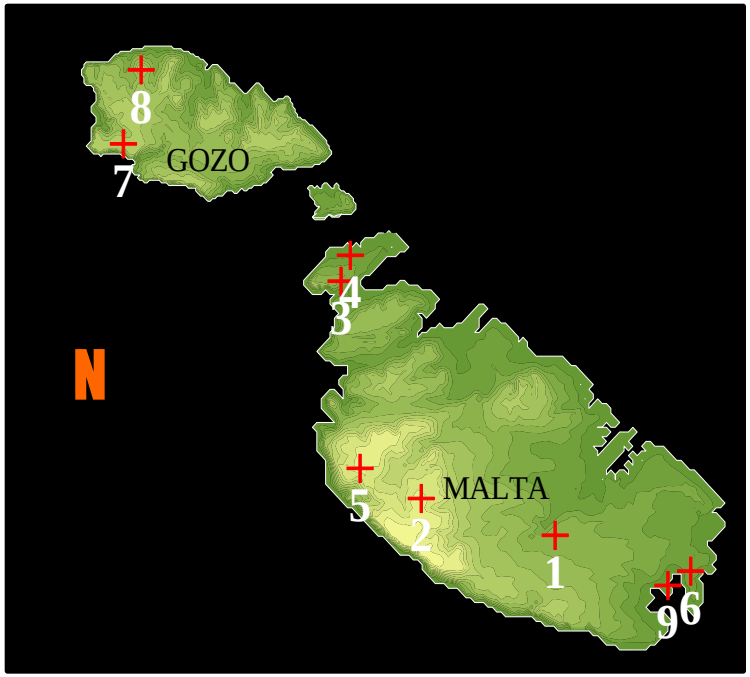
- Floating PV systems (New R&I project)
- Support to Government to launch a 4.5 MW project on public roofs (Largest roof to host 1 MW)

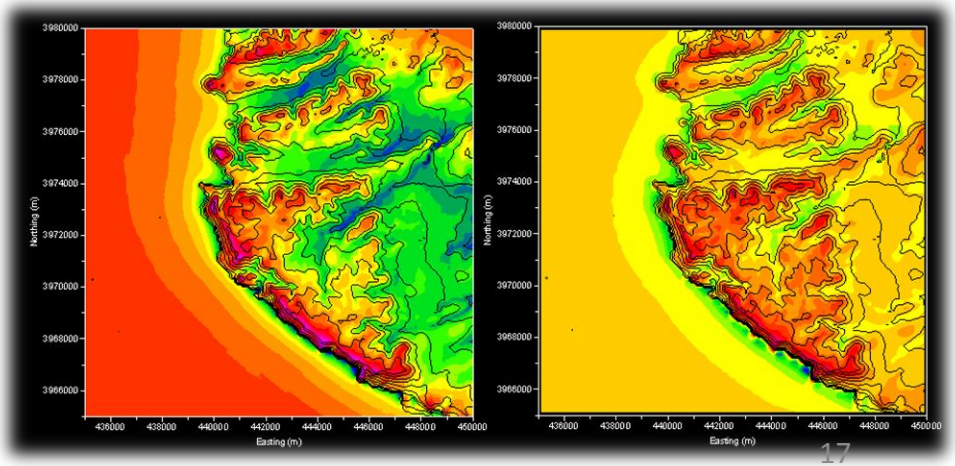
Wind Resource Assessment

(Robert N. Farrugia & Tonio Sant)



- Wind speed and direction measurements around the Maltese Islands
- Use of computational software to predict the long-term wind speeds at potential wind farm sites
- Measurement of wind profiles for offshore wind site





Wind Projects

Tonio Sant & Robert N. Farrugia

Deep Offshore Wind (DOW):

- Design of a deep water wind turbine support structure, in collaboration with the Faculty of Engineering, GREEN Ltd. And Honeycomb Ltd., co-financed by National funds of the MCST.

Chicago WindMill:

- Design and build of a wind turbine prototype for rural environment, initiated and financed by the Ministry for Resources and Rural Affairs. The Faculty of Engineering and the ISE are the main contributors.

Wave Energy

Luciano Mule'-Stagno

- Blue Ocean Energy Project (National R&I project)
- Testing of prototype of a wave powered electrical generation unit with Dexawave Energy Malta Ltd., IOI-Malta Operational Centre and IEPC (UoM) – started in March 2011
- Design of linear motor at UoM

Heat Pumps

Charles Yousif

- Performance testing of integrated air-to-water heat pump with storage

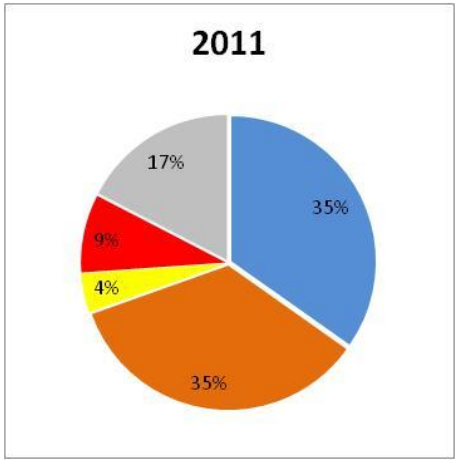
- Testing of thermodynamic solar collectors with heat pump and photovoltaic systems

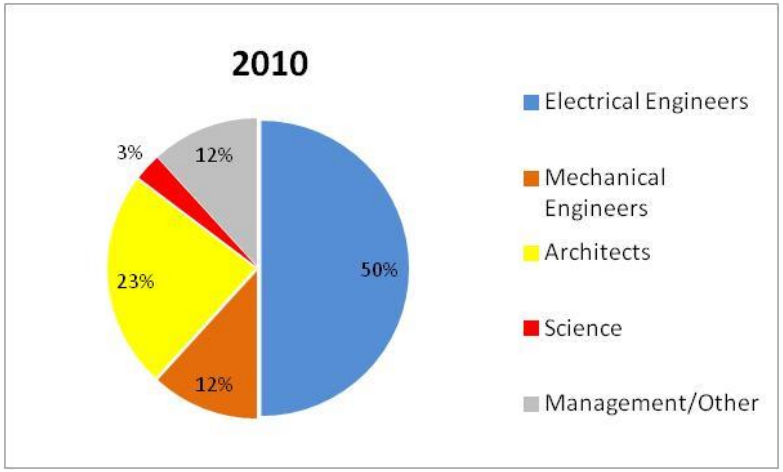
Undergraduate Teaching

- Renewable energy
- Energy use and efficiency
- Energy in Buildings
- Energy and economics
- Climate change and social aspects

Post-graduate M.Sc. Course

- Three years of evening part-time studies.
- First two years taught and third year thesis project
- Covering all areas of fossil fuel technologies, renewable energies, energy economics, climate change, sustainable energy in buildings and transport
- Course opened for first time in 2010
- In 2012, we introduced video-conference to Gozo University Centre
- October 2010: 28 started
- October 2011: 17 started
- October 2012: 11 started





Training of Solar Installers

- Leading to solar installers' certification by Malta Resources Authority
- Started in May 2011
- ISE2101: Single-Phase Photovoltaic Course
- ISE2103: Single and Three-Phase PV Course
- ISE2102: Solar Heating Course
- Total number of candidates 58 persons

Collaboration with foreign Universities

James Madison University (USA)

Under-graduate Collaboration: Summer Study Session (Bi-annual) since 1997

Post-graduate Collaboration: teaching in joint Masters with UoM,

MSc in Sustainable Environmental Resource Management (SERM)

Vallodolid (Spain)

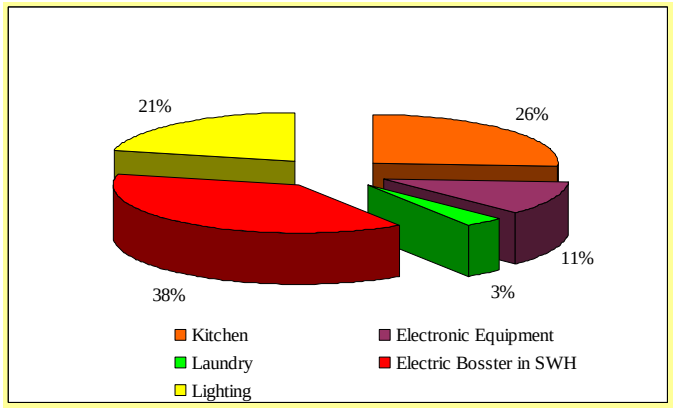
Students from Vallodolid carry out their undergraduate thesis project at ISE.

ISTIA - Universite Angers (France)

Student Erasmus visits

Technical Service to the General Public

- Technical Visits to Installed Solar Heaters
  - Inspection
  - Questionnaire
  - Technical Report
- Information Sessions to Potential Buyers of Solar Heating Systems
- Presentations for schools, local councils and associations
- Train the trainers programme for EcoGozo Initiative of the Ministry of Gozo, to make the Island of Gozo an Eco-Gozo by 2020.



EU funded projects

La Vigna Enegetica (solar driven refrigeration)
Robert Ghirlando

Renewable Energy Scenarios in Islands (RESI)
Manfred Weissenbacher

MCST R&I funded projects

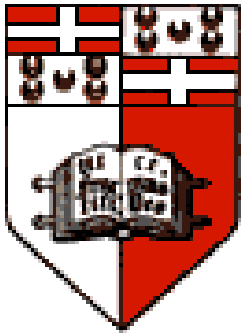
Deep Offshore Wind (DOW)
Tonio Sant & Robert N. Farrugia

Blue Ocean Energy (wave energy)
Luciano Mule Stagno

Innovative Photovoltaics on Water (SOLAQUA)
Luciano Mule Stagno

Development of a Hollow Concrete Block with Improved Thermal Properties (THERMCB)
Charles Yousif

Thank you for your attention



http://www.um.edu.mt/ise