

## SOWING THE SEED FOR AN ENERGY CONSCIOUS SOCIETY IN MALTA

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### ABSTRACT

A one-day programme of studies aimed at school students between 13 and 16 years old has been devised and implemented for the last 3 years. The programme aims at increasing the awareness level of students and teachers, on the present energy situation in Malta and the detrimental effects that it is having on health, the environment and buildings. It also stimulates them to realise that their present social and living habits, whilst providing them with a temporarily better quality of life, frequently conflicts with the long-term sustainability of that quality. Remedies to these problems are discussed, which focus on energy conservation methods, energy efficiency implementations and use of renewable energy sources.

This is the first time that such a programme has been implemented in Malta. During the scholastic year October to May of every year, schools are invited to apply for a one-day presentation, held at the Institute's premises. The programme includes presentations, hands-on experience on operating renewable energy projects and video shows. Discussions are held and questions are asked in the course of the day.

The short-term effects are already appearing by raising the interest of the younger generation in energy conservation and renewable energy applications. Some of the students who had visited our premises have opted to work on projects that deal with energy, the environment, buildings and renewable energy, for their project in "Systems of Knowledge". This subject is compulsory for the final year of pre-university colleges, where a project involving "Technology and the Quality of Life", has to be prepared and presented. It requires that every student presents a written report and builds a working model to demonstrate the concept of the project.

On a long term basis, it is hoped that such initiatives will help promote energy consciousness among the citizens who will be more responsive towards the protection of the environment and the implementation of renewable energy applications in their own lives. It is also envisaged that university students will opt for specialised studies in these fields. Only then, one can launch national programmes to help alleviate the energy dilemma in Malta, where consumption is directly proportional to the rate of increase of the gross national product.

## INTRODUCTION

The Republic of Malta is mainly made up of 3 islands namely Malta, Gozo and Comino. These islands are situated in the centre of the Mediterranean Sea, 96 km south of Sicily and 290 km north of the Libyan Coast. The population is currently 379,000 with an additional number of 30,000 tourists visiting every month.

The island has no natural resources except solar and wind energy and remains so far dependent on oil imports to provide all of its energy needs. As Malta strives to become a member of the European Union, changes in the infrastructure and other issues such as commerce, health and the environment have to be made, to synchronise them to EU standards.

One of the issues that remain so far in the dark is the future of energy production in Malta. Enemalta, the national electricity utility, is the sole provider of electric power and supplier of all forms of petroleum products. The Company has two power stations in Marsa and Delimara. The use of coal has been phased out in 1996 and more recently combined cycle power plants have been installed at Delimara Power Station. It is hoped that these new plants will increase the overall efficiency of the power stations, which is currently standing at 28%. There are no active systems such as scrubbers, to control the emissions from the power stations. However, data monitoring of flue gases has been recently commenced in two steam power plants. To date, there are no specific plans to promote energy conservation or use renewables in the energy mix.

Electricity consumption had been steadily increasing at the rate of 7% per annum for the past 15 years. Only recently, it has decreased to 5% due to changes in the electricity tariffs. This drop proves that there is a potential for further reductions in electricity consumption, with the increase of environmental awareness and the introduction of a solar culture in society.

The Institute for Energy Technology has been set up by the Education Act of 1988 and it started functioning in 1992. Three years later, the Institute moved from the Campus of the University of Malta to its new premises at Marsaxlokk. Since then several collaborations with international universities have been established. A number of projects that deal with energy conservation and renewable energy applications have been carried out and more importantly, an awareness programme has been launched aimed at promoting energy conservation and renewables among school children and pre-University colleges.

## AIMS OF THE PROGRAMME

The aims of this programme are to create awareness and interest among the Maltese students on the potential and advantages of adopting a sustainable lifestyle, that respects the environment and make use of all possibilities to reduce electricity consumption. It also introduces them to new technologies in the field of energy conservation, solar and wind energy and enables them to visualise the changes that these technologies can bring in their own lives.

This programme does not address university students, who were found lacking in interest, due to pressure from their academic curriculum. At this stage, the introduction of courses at university level, would only serve as an informative and grading tool but does not necessarily change the attitude of the students towards energy consumption. For these reasons, the

Institute opted to dedicate this programme to the younger generation, who are more keen to learn and are more interested in exploring new lifestyles.

### PROGRAMME DESCRIPTION

The programme started in 1997 and continued through the scholastic years of 1998 and 1999. Three members of staff are involved in organising this half-day 2-session programme. The first part consists of an introduction that is delivered to the whole group, which is usually made up of 25 students or less. After a short break, the students are divided into 3 smaller groups and further practical sessions are made for half an hour each. The groups are then circulated so that all will have the chance to get the same experience. Time is allowed for debate and questions.

Table 1, shows the general format and details of the half-day programme. If time permits, a video that presents state of the art of renewable energy applications in the world, is shown.

Table 1: Programme of visit to the Institute for Energy Technology, Marsaxlokk, Malta

<p><b><u>INTRODUCTION</u></b> (All the group)</p> <p>Energy Scenario in Malta Environmental Effects of Energy Use Role of Renewable Energy and Energy Conservation Role of the Institute and Programme of Work</p>
<p><b><u>DIVISION INTO 3 GROUPS</u></b></p>
<p><b><u>DESCRIPTION OF SESSIONS</u></b></p> <p>Site Visit on Roof of the Institute Solar Radiation Monitoring Project Weather Monitoring Station Grid-connected Photovoltaic Solar System Computer Presentation</p> <p>Energy use in Buildings Climate and Thermal Comfort Passive Measures to control indoor climate Simulation of Thermal Performance using a “Hot Box”</p> <p>Why Wind Energy? Feasibility &amp; Methods of Harnessing the Wind Wind Measurements and their Importance Environmental Aspects of Wind Energy Technology</p>
<p><b><u>VIDEO SHOW</u></b></p>

The Institute has several operating systems that are available for the students to see and touch:

- A 1.8 kWp solar photovoltaic grid-connected system;
- A 400 Wp solar photovoltaic water pump;
- A weather station;
- Solar radiation measuring instruments;
- Wind monitoring equipment;
- A ‘hot box’ for measuring heat transfer through different materials;
- Solar water heaters;
- Solar photovoltaic street lights (added in 1998);
- Solar hydrogen fuel-cell kit (added in 1999);
- Wind Atlas Simulation Programme (WASP);
- Solar simulation programmes (TRNSYS, F-Chart, PVFChart);

#### STATISTICAL INFORMATION

Invitations were sent to a number of schools from the three categories namely, the public, private and church schools. Figure 1 shows the number of students that have taken part in the programme for the scholastic years of 1996/97 up to 1998/99.

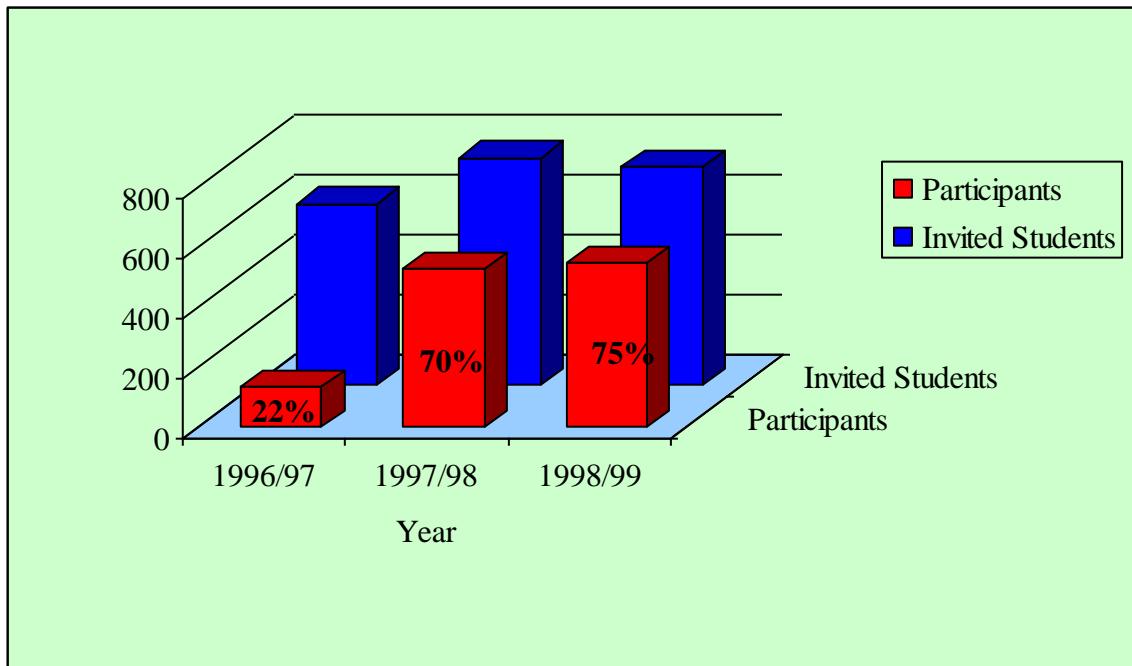


Figure 1: Number of students attending the programme and total number of invited students from Years 3, 4 and 5 (13 – 16 years old), for different years.

Figure 2 shows the number of students that applied to visit our stand and attend a condensed session of the programme during the Science and Technology Week. This is an annual event

organised by the Malta Council for Science and Technology and takes place in November. It aims to demonstrate that science and technology careers are interesting and challenging.



Figure 2: Scheduled students who visited the Institute's stand during the Malta Council for Science and Technology Week for different years.

## RESULTS

Figure 1 shows that the number of visitors to our Institute is increasing over the years. It is envisaged that this number will continue to increase over the years.

From Figure 2, it is clear that the number of schools that booked to visit us during the Science and Technology Week has dropped. This is because many schools have the opportunity to attend the full programme during the year, so they opt to visit other stands, which they would otherwise miss.

It is worth mentioning that students from different schools have found this programme very appealing and challenging. On their own initiative, a number of students have prepared reports that included photographs taken during their visit and displayed them at their schools. Male and female students have shown equal levels of participation. Students from private and church schools were generally more motivated than those coming from public schools. The majority of students and teachers have not heard or seen any renewable energy systems before.

Several students who had visited our Institute in the past have opted to work on renewable energy projects for their final year “Systems of Knowledge” projects. This subject is a prerequisite for graduating from high school and it involves technology and its impact on the quality of life. A model has to be built and presented during the oral examination.

Some of the projects that the Institute assisted in, were as follows:

- Building of a low-cost Solar Water Heater for the Climate of Malta (1997);
- Two Different Designs for Solar Water Heating Systems (1998);
- Components of Wind Turbines (1998);
- Natural Ventilation in Buildings (1998);
- Solar Photovoltaic Systems in Homes (1999);
- Solar Photovoltaic Facades in Buildings: Challenges for the New Millennium (1999);
- Control of Solar Radiation in Buildings (1999);

### FORTHCOMING INITIATIVES

In order to increase the dissemination of this programme for this year, an in-service development course was organised for the physics teachers during summer. In this course, a series of lectures were delivered to highlight the programme and to further disseminate the solar culture initiative.

Furthermore, a set of 4 brochures has been prepared and will be printed in November 1999. These brochures will be distributed to schools and during the Science and Technology Week 1999. The brochures deal with the following topics, which are relevant to Malta:

- Photovoltaics in Buildings: Power for the Future;
- The Wind: Wind Energy Applications and their Impact on the Environment;
- Solar Water Heating: Guidelines for a Better Choice;
- Building for Comfort.

Appendix A, shows a pre-print of these brochures, while Appendix B displays some photographs taken to highlight different aspects of this programme and the Science and Technology Week.

### FUTURE ENDEAVOURS

The Institute will assist to include parts of this programme in the national educational curriculum and will further develop programmes that promote energy conservation and the use of renewable energy sources. In order to achieve this, further training and information need to be given to the teachers beforehand. Also, new ways have to be created to reach younger generations.

### CONCLUSION

This paper described the first national programme that aims at promoting energy conservation and use of renewable energy applications. Malta, a Euro-Mediterranean country has a lot to benefit from and offer for both ends. On one side, wind and solar energies are abundant and on the other, the technology and know-how for applying renewable energy systems is available. Moreover, Malta can become on one hand, a model in the Mediterranean for applying an integrated sustainable energy programme and on the other, offer incentives for European investments, to build state of the art renewable energy systems in Malta.

This programme is sowing the seed for creating three essential elements that could promote energy conservation and renewable energy applications in our everyday life. These are

awareness, interest and initiative. Only then we can have more respect to the environment and to the future generations of mankind.

Appendix B: Photographs of some systems and activities of the Institute.



Figure 1: A 1.8 kWp grid-connected system on the roof of the Institute for Energy Technology. Delimara Power Station is seen in the background.



Figure 2: The Institute's stand at the “Science and Technology Week 1997”. From left to right: Electricity saving lights, solar water heating panel and solar photovoltaic water pump.



Figure 3: A weather station on the roof of the Institute.



Figure 4: A group of students and their teachers in front of the Institute's main building.

Appendix A: Pre-prints of 4 brochures are attached here.