



# MALTA ENERGY EFFICIENCY AND RENEWABLE ENERGIES ASSOCIATION (M.E.E.R.E.A.)

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## ENERGY PROFILE FOR MALTA

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The Republic of Malta is an archipelago of 3 islands and 4 islets right in the centre of the Mediterranean Sea. Malta joined the European Union in May 2004, and since then many of the EU Directives pertaining to energy and the environment have been transposed to national legislation. The Maltese Islands have a land surface area of 316 km<sup>2</sup> and a population density of 1,260 persons per km<sup>2</sup>; one of the highest in the world [1].

The three inhabited islands are interconnected by a single electricity grid, with electricity generation coming from two fossil-fuelled power stations having a total combined nominal installed capacity of 571 MW [2]. Malta is fully dependent on oil imports to supply its energy needs. To date, no commercially viable indigenous oil discoveries have been made. However the Islands enjoy an abundance of sunshine with a mean daily irradiance of 5 kWh/m<sup>2</sup> and certain locations possess a reasonable wind energy potential.

### 1. The National Energy Policy and the Renewable Energy Policy

In August 2006, a draft proposal for a national energy policy was published for public consultation. It is built on three main pillars; namely security of supply, competitive pricing and environmental responsibility. To date, Malta fulfils the definition of a 'small isolated system', because of its geographic size and isolation as well as the level of electricity generation that does not exceed the 2,500 GWh mark. However, this situation may change since the draft energy policy is now proposing a DC cable link to the island of Sicily, Italy, which is about 93 km north of Malta, while Enemalta Corporation – the only power producer – is planning to install an additional 100 MW of generating capacity [2].

Almost concurrently, a draft Renewable Energy Policy for Malta appeared on the Department of Information website [3]. This policy is proposing targets for 2010 and beyond. It is predominantly focusing on photovoltaics, wind energy conversion systems and energy production from waste.

The Malta Resources Authority was set up in the year 2000 to regulate, among other responsibilities, the energy sector in Malta [4].

### 2. Electricity Generation

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Malta mainly uses heavy fuel oil with 1% Sulphur content for the generation of electricity in two power stations. During peak hours, gas turbines running on light distillate gas oil containing 0.2% sulphur are brought on line. The latter fuel will be replaced by one with 0.1 % sulphur content as of January 2008 [2]. The use of coal for power generation was terminated in 1995. In 2005, the specific carbon dioxide emissions attributed to electricity generation were of the order of 0.87 kg/kWh generated. For a number of years, greater peak electricity demands are being experienced in summer rather than in winter, due to increased air-conditioning loads and this causes an added load on the electricity distribution system that have resulted in complete power failure for few times.

Although energy generation is in the process of being liberalized, energy distribution shall remain in the hands of the existing company, Enemalta Corporation. Up to now there are no major generating capacities other than the existing two power stations.

### **3. The Renewable Energy (RE) Situation**

A few years ago, the percentage contribution of renewable energy technologies in the electricity generation sector was nil. In recent years there have been some changes, mainly attributed to installation of small grid-connected solar photovoltaic (PV) systems, but the percentage contribution of RE still remains below 0.001% of the total electricity generation by fossil-fuels. It is worth noting that the potential for PV electricity generation could reach 9% of the total generated electricity of 2003 [5]. Government is offering a subsidy – limited to domestic PV systems not exceeding 3.7 kWp – of 20% of capital cost with an upper limit of 1,150 € for the first 1 kWp, and at a lower subsidy rate for the next 2.7 kWp [6]. Enemalta Corporation is offering a ‘net metering’ policy for solar-generated electricity that is fed into the grid, provided that production does not exceed consumption within a stipulated period of time. Excess solar electricity would be bought by the utility at 7 € cents, which is about half the current price of electricity sold to consumers [2].

The potential for wind generation is appreciable (estimated to reach up to 9% of electricity generated, based upon 2003 figures) [5]. The draft Renewable Energy Policy for Malta states that Government declared the construction of large-scale onshore wind farms unjustifiable due to the various impacts and that no such installations will be authorized[3]. This document acknowledges the potential for medium scale wind turbines (defined as turbines rated between 20 kW and 500 kW), and that these could supply energy on a localized level. Planning aspects such as aesthetics and the potential impacts on the local landscape patterns are highlighted. Micro wind turbines (rated at <20 kW) have also been identified as potential contributors, albeit on a smaller scale. The document declares that there could be visual impacts on the local urban and rural landscapes, as well as other issues associated with this technology in the local context [3]. Government is offering a once-only grant of up to 25% on capital cost capped at 230 € for wind-generators for domestic use [8]. To date, there are no grid-connected wind medium or large-scale wind turbines on the islands. The Malta Resources Authority has recently published a tender for expression of interest for the development of deep offshore wind farms in areas off the Maltese coast [4]. Meanwhile, the potential for near shore wind farms in areas having sea depths of up to 20 m is subject to further investigation, although such systems will not be adopted if the deep water offshore wind farm project is successful.

According to the draft Renewable Energy Policy, Energy from Waste projects are being developed with the first pilot project coming on line in 2008, followed by a plant in the northern

part of Malta and another in Gozo. It is envisaged that such plants would be of a limited size and distributed at suitable sites around Malta and Gozo. The “*Sant’ Antnin*” Solid Waste Treatment Plant is the first candidate site [3]. The overall potential for generating electricity from waste could reach 5.6% [5]. Power generation from waste would reach 0.24% by 2010, according to Malta’s report to the EU on the implementation of Directive 2001/77/EC [7].

Perhaps the most impressive development in the field of renewable energy is the application of domestic solar water heating systems that has increased by some 40% during the past year 2005. Although only 8% of households had an installed system in 2004 [9], sales are increasing due to escalating fuel surcharges on electricity bills. Since, the majority of homes in Malta use electric boilers to heat water, it is not surprising that consumers are now turning to solar water heating. In order to further encourage the use of solar heating, Government has introduced a once-only grant for first-time buyers amounting to 25% of capital cost with a maximum subsidy of 230 € per household [10]. It is estimated that if 75% of households install a solar heating system, this would translate to a saving of 5% of electricity generation of 2003 [5]. Moreover, Enemalta has an ongoing offer to waive the installation fees of domestic new single-phase and three-phase electricity meters, up to a maximum of 161 €, provided that a solar heating system is installed beforehand [2]. Notwithstanding that, there is very little being done to promote the installation of larger heating systems that may be adapted for other sectors such as the tourist industry, industrial zones, etc....

#### **4. The Transport Sector**

According to the National Statistics Office, it is now confirmed that up to September 2006 there is 1 private car for every 2 persons in Malta [1]. The consumption of fuel is continuously rising and as a result more pollution is being attributed to transport. In recent years, leaded fuel has been eliminated and has been replaced by a specific lead replacement fuel. Public transport, although relatively cheap, is constantly losing clients due to its own inefficiencies, although efforts are being made to improve the situation. The use of other mechanically driven vehicles such as bicycles is almost non-existent and limited only to leisure activities. The use of motorcycles is also limited due to a general belief of their lethal danger when involved in an accident, however, quad-bikes have recently been introduced and they seem to be more acceptable.

#### **5. Energy Use in Buildings**

The Maltese archipelago lies on latitude 36°N, with a typical Mediterranean marine climate with hot dry summers and mild wet winters, where humidity prevails throughout the year. Summer time temperatures can exceed 35°C between June and August, while winter temperatures, considered mild, only drop to around 10°C for a fortnight in January-February. It is for this reason that although some form of heating is required, summertime cooling exceeds this demand, inclusive of its duration, typically between May and September. The latter month is considered the wettest for two-fold reasons: the rainy season often opens with a vengeance over the preceding dry six months; moreover it is often the most humid, with predominant *Scirocco* (south east) winds bringing in warm humid air. Apart from air temperature, relative humidity constitutes an important component to thermal comfort. It generates both an unpleasant ‘stickiness’ in summer as well as a ‘perceived cold’ in winter.

Globigerina limestone the principal building material quarried in Malta, has a high porosity. This contributes further to the higher indoor humidity, particularly in older houses with no

damp-proof course. However they have thicker walls, higher ceilings and are decently sized, with diagonally located ventilation holes, placed above occupancy level to permit the right draft for humidity exclusion, in both summer and winter. Unfortunately, new buildings do not follow course and as a result, occupants often suffer from overheating in summer and a cold environment in winter and consequently most modern buildings are now being equipped with split-type air-conditioning.

The diminishing cost of air conditioning units have paved the way for their swift introduction to the Maltese domestic sector, including the middle and lower income earners. However, this was at a time when energy prices were at their lowest. Every breadwinner is now realising the qualm over such brisk decisions, since with the onset of the present electricity prices, higher running costs are being incurred.

Building technology has now exposed its handicap in energy saving too. Buildings tend to lack a general level of detailing for draft-proofing, double glazing, noise and thermal insulation and a generally low level of natural light entrained in buildings, when considering the Mediterranean climate blessed with over 300 sunny days a year.

Planning disposition in residential buildings has always been generated by the long-standing sanitary laws, dictating minimum standards for lighting and ventilation, today overridden by MEPA's design guidelines [11]. There is also the blatant disregard for thermal insulation in the external building envelopes, be it cavity walls or roofs – the latter being more grave as flat roofs experience the greatest exposure to Malta's high solar insolation levels of a mean of 5 kWh/m<sup>2</sup>/day [5].

In the spirit of Malta's new status as a member of the European Union, in abidance with the Energy Directive for energy use in buildings (2002/91/EC), the Maltese government has just released Part F of the upcoming Building Regulations [11]. These have been put in effect in January 2007 and include measures to improve energy performance for roofs, walls, windows and other exposed areas. There is also a strong accent on water conservation, being energy driven, where each household is to have its own underground reservoir, to sustain its second class water needs. In spite of the potential for solar water heaters to replace electric boilers, the Building Regulations only encourages their use but does not mention any mandatory measures. Similarly, solar photovoltaics are being superficially treated with no guidelines on placing them on facades, for example. Small rooftop wind systems are also lightly brushed over with an advice to seek building permit beforehand.

In Malta, space heating is predominantly electric with only a recent popularity of localised gas (LPG) heating through mobile stand-alone units displaced through the house on castors. Centralised systems are almost unheard of, although large building developments are now marketing them as an added prestige to modern finished apartments. In any case, winters are mild and no sub-zero temperatures have ever been registered in Malta.

Buildings, considered as the mainstream energy guzzlers, are to be the first protective skin from the elements. Given the potential thermal inertia of local *franka* stone (globigerina limestone), there is little awareness of its potential energy saving through passive solar design, especially when combined with a rigorously thought out ventilating regime and carefully sized glazed areas for the right orientation.

Since land available for building is depleting – given the existing boundaries for development - many developers are turning to built up sites, buying 20-30 year old houses, and “re-cycling “ the building site – but not the material – so far at least. Waste management has taken a different route now that the national ‘Maghtab’ dump has been closed down, with building materials depots being set up in different locations such that instead of dumping all demolition waste in one place (formerly contributing to over 60% of its volume by weight), it is intended to be sorted by material or building element. This has its own second class market, thus increasing the longevity of the materials as part of its life-cycle process, to the tune of sustainability in the building industry.

Worldwide, in developed countries buildings consume between 45 to 60% of a country’s national energy bill between construction processes and operation requirements. Although still unquantified, Malta falls within this range, today still 100% dependent on fossil fuel, on the threshold of the 21<sup>st</sup> century.

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