Energy Efficiency Policies and Measures in MALTA 2006

Monitoring of Energy Efficiency in EU 27,

Norway and Croatia (ODYSSEE-MURE)

MALTA RESOURCES AUTHORITY

Qormi, Malta
2009

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1 Executive Summary

Energy efficiency is perhaps the best most basic measure towards cutting back CO_2 emissions, even before resorting to Renewable Sources of Energy. Although an unspoken fact, the bare truth is that very few countries are willing to trade off their economic growth and social well-being to flag a fully green lifestyle. The right balance needs to be struck between economic growth, social well-being and environmental protection, the three pillars of sustainability.

Understanding and assessing energy efficiency is therefore a prerequisite for a sensible design of measures to improve energy efficiency as well as for monitoring the results. Across the diverse economies on the now enlarged EU-25 a cross-country comparison on energy efficiency indicators bundles together a set of sectoral indicators on an internationally comparable statistical basis. These indicators show the development of energy consumption as well as the main driving forces in a condensed manner. They also indicate areas where much of the energy efficiency measures can be translated into real savings and curtailment of CO_2 emissions.

The initiation of the energy indicator assessment across European borders finds its origins within ADEME, the French energy and environmental agency. It was supported by funds from the European Commissions' SAVE/IEE programme right from the start to 2009.

A network of institutions and a standard analysis method was developed through various phases, regularly refined to today's comprehensive project database across Europe (EU-25). Most of the backstage project work covers improvement of data reliability as well as annual data update and reporting. This sets the background for comparing a set of energy indicators and forecast scenarios. The final output is one aspect demonstrated through such national reports.

One tangible result of this project is the database ODYSSEE. It provides an easy access to the indicators. The database contains indicators for different sectors for all EU countries and for Norway. Today this also integrates Bulgaria and Hungary, as part of the EU-25 process of further enlargement. Other new countries aspiring to join the EU are almost bound to align their infrastructure towards such energy efficiency goals. The Commission provides the legislative framework, supported with 'best practice' examples from established economies in developed countries. It is then in each country's interest to follow suite.

Energy efficiency indicators used within this project refer to the economy as a whole, on a sector-by-sector basis, or to an end-use basis: an industrial process, mode of transport or energy services in the household or in the tertiary sector. The country report for Malta follows this pattern.

Energy Efficiency Policies and Measures in MALTA, 2009

Malta, being a relatively 'young' member of the EU. Capacity building is one of the keystones to implementation of the Acquis Communautaire. This is being carried out through the various Authorities set up by Government. In the energy sector, the MRA (Malta Resources Authority) is but one of them. (An outline of its roles is given in Annex 4 of this report).

An energy policy was launched by the MRA, in line with Government's objective towards a more sustainable development of the energy sector. Running parallel to this, the NCSD (a National Commission for Sustainable Development) was set up in 2002. Job creation and investment potential is also highlighted through this report. The RES policy also strives to promote job creation in the RES field, particularly training skilled workers as installers, maintenance and certifications of such systems. Further education through CPD (continued professional development) of existing allied professions and tradesmen is another positive aspect of such policies.

In 2008, the Malta Resources Authority compiled the national energy efficiency action plan. The scope of this action plan is savings in energy end use, in line with the energy services directive 2006/32/EC. This document includes descriptions of past, ongoing and proposed measures to reach the national energy efficiency target and the renewable energy sources target as stipulated in the energy services directive and in the proposal for renewable energy sources. Various entities were consulted before the final version of the National Energy Efficiency Action Plan was published.

The Energy Services directive 2006/32/EC was transposed to Maltese legislation. Various stakeholders were consulted to ensure that targets and policies are realistically achievable.

These regulations are expected to:

- remove existing barriers and imperfections that impede the efficient end use of energy;
- to set a target of 9 % savings in final energy consumption for the next 9 years starting from 2008;
- create the conditions for the development and promotion of a market for energy services and for the delivery of other energy efficiency improvement measures to final customers. However, Malta, in view of its derogation from the market opening required by the electricity directive 2003/54/EC, had requested that any such derogation be also respected in this directive. This concession is included in the Directive.

The directive applies to:

(a) providers of energy efficiency improvement measures, energy distributors, distribution system operators and retail energy sales companies;

(b) final customers; and

(c) the armed forces

To help Malta achieve these targets and obligations and to make sure that progress can be monitored, the Legal Notice sets up a harmonized framework through common tools, definitions and methodology. In this context, the LN provides for:

1. a system for the qualification, certification or accreditation of energy service providers, and the mutual recognition of those certificates;
2. an energy efficiency action plan that shall identify the progress made in achieving Malta's national indicative energy savings targets of 9% savings in final energy consumption;
3. promotion of energy end-use efficiency and energy services;
4. information on energy efficiency mechanisms and financial and legal frameworks;
5. ensuring the availability of independent and high quality energy audit schemes;
6. using energy efficiency funds as an option.
7. a system that ensures meters and systems measure accurately and frequently actual energy consumption; and that billing is informative and sufficiently frequent;

During the drafting of the provisions of this Legal Notice, the Ministry for Resources and Rural Affairs, Enemalta Corporation and the Malta Standards Authority were consulted. Their views and consultations regarding regulatory and operational provisions, accreditation and certification schemes were taken into consideration. Discussions with these stakeholders were conducted to ensure that the regulatory measures create the minimum impact possible.

Research and development almost feature in any policy towards scientific innovation. The MCST (Malta Council for Science & Technology) is an advisory agency to Government on a national policy for science and technology. It strives to promote an overall holistic research culture across the board. It is responsible for coordinating national interests in R&D, particularly in FP7 and other European and international programmes, even digressing beyond energy and the environment.

Standing and upcoming imminent legislation does not only strive to transpose EU legislation, but moreover beyond the Energy field, an overall sustainability approach is withheld, striking the right balance between the three pillars of sustainability.

Finally the text herein this technical report has been simplified within reasonable terms to render it more readable by a wider audience: The emphasis is on the determining factors and the risks associated with a trend scenario, as well as on the strategic orientations proposed for moving to an alternative more sustainable development scenario. It is hoped that this summary will encourage readers to explore the main report.

2 The Background to Energy Efficiency

Overall economic context

The Maltese archipelago comprises Malta, Gozo and Comino and a number of uninhabited islets. The total area is 316 km^2 and the population is approximately 400,000. Between 1931 and 2005 the population density increased from 764 to 1,282 inhabitants/km^2. Malta has one of the highest population densities in the world and this is almost 11 times the EU-25 average. The annual population growth rate over a ten-year period, 1995-2005, has been statistically established at 0.7% per annum.

The economy of Malta is highly dependant on tourism and the manufacturing industries. Tourism, although seemingly at a slower rate of increase, has still attracted heavy investment over the years, inclusive of the latest refurbishment and upgrade of the smaller hotels from three to four and five star categories. The manufacturing industry is characterised by a significant proportion of micro enterprises consisting around 94 % of the total number of firms in these two sectors. There are also a number of relatively large foreign owned subsidiaries of multinational companies operating; these are mostly export driven. Tourism, industry and the internal service industry all contribute significantly to Malta's economic growth, employment creation and foreign exchange earnings.

The building industry has also seen a progressive increase in land development and building activity at large. According to the 'State of the Construction Industry Report, 2005', the building construction industry continues to represent one of the most important sectors of the local economy, contributing significantly to the country's GDP, varying between 3.49% and 4.18% in the period 2000-2004. Out of these values, around 0.25% came from quarrying, while 11% came from the real estate (renting and selling), where a steady annual increase was registered.

A number of large scale private high-rise residential developments were launched over the last years, two Malta-Gozo sea passenger terminals, extensions to cruise liners' passenger handling facilities, new hotel developments, commercial centres, Smart City and lately a private hospital. As evident, all these augur for an increasing energy demand on the infrastructure.

Energy consumption trends

As a small Island State entity, the Islands of Malta and Gozo are totally dependent on imported fossil fuels for their energy needs. The Islands are devoid of any indigenous oil or mineral resources. It has no refineries, but imports refined primary energy needs chiefly from Italy. To date there are no gas network connections to mainland Europe or North Africa. Similarly there are no electrical interconnections, although there are feasibility studies that propose an

electrical unification with Europe. Up to the early 1990s imported coal was used for electricity generation by its older Marsa power station; this was stopped mainly for environmental reasons.

The State of the Environment report noted that in 2003 over 63% of the primary energy was used for power generation. The remaining oil consumption was mainly used for transportation (85%) and only a minor share was used for other purposes (15%). Heavy fuel oil and light distillate are used for power generation. Transport fuel consists of petroleum products and a small percentage of bio-diesel (0.52%) (1.5 million litres of bio-diesel).

Consumption of electrical energy has been increasing steadily over the years and this is due to various factors including economic growth and higher living standards. The electricity demand has increased from 284 GWh in 1970, 550 GWh in 1980, 1,186 GWh in 1990 to 1,603 GWh in 1995 to 2,263 GWh in 2005. Between 1970 – 1980 the average annual increase in electricity generation was 8.8 %. The average annual increase in electricity generation between 1981 – 1990 was 12 % and between 1991 – 2000 it was around 6.1%. In the period between 2000-2007 the final consumption of energy decreased by 0.1%.

Over the past few years the maximum active power demand in summer has surpassed the winter maximum demand in terms of magnitude. Considering the overall efficiencies for primary energy conversion into electricity at the two power stations, ranging between 33-45%, an average scientific calculation of power generated to CO_2 emissions conversion currently stands at 0.87kg of CO_2 per Unit (kWh) generated.

Metering consumption in the domestic sector

The design of energy efficiency activities requires some understanding of the energy consumption behaviour of the targeted consumer groups. With the exception of a study carried out in 1996 by EDF assisted by Enemalta Corporation in 1996, no such studies have been carried out previously. The Institute for Energy Technology provided the Authority with an estimate of consumption in water heating. No thesis were traced at the University of Malta on the subject. Data had to be collected first hand by the MRA. A desk exercise on the consumption of appliances taking into account penetration of appliances as measured by the National Statistics Office and the Authority during a number of surveys was carried out leading to the chart below. Significantly, water heating, air conditioning, refrigeration and lighting accounted for most of the consumption in this elementary model.

It was clear that additional monitoring was required, and for this reason the Authority purchased a number of plug-in meters to carry out surveys in actual domestic households. Although not randomly selected, the households are typical Maltese. Results still have to be analysed, but some early indications are available. The consumption of refrigeration equipment is higher than

that reported in other EU member states. This could be due to the higher ambient temperatures in Malta, but also due to a prevalence of older appliances. Weekly consumption in washing machines is similar to that reported elsewhere.

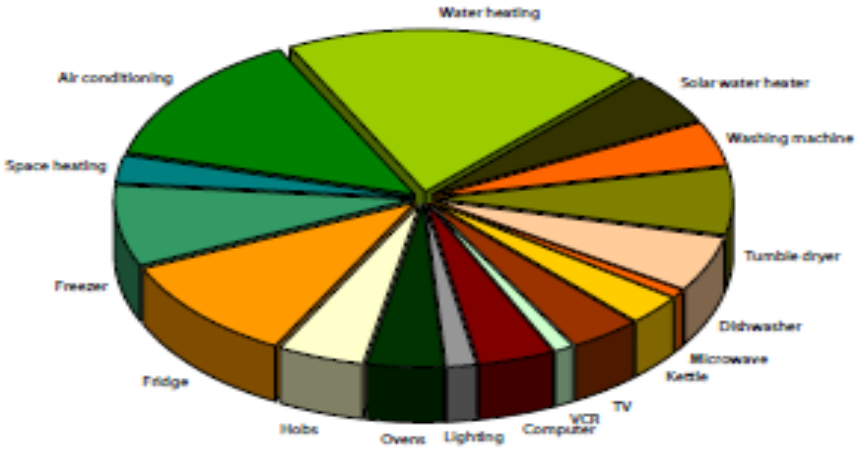

Figure 1: Metering Consumption

Figures 11-13 show the distribution of (extrapolated) annual consumption of these appliances. The variation of (extrapolated) annual consumption with age of the refrigeration equipment is also shown separately. Interesting was the consumption of seemingly innocuous appliances. Out of sixteen computer systems monitored, six consumed more than 500kWh per year, with one consuming more than 1500kWh per year. In another case, an aquarium accounted for 20% of the metered consumption. In another case, standby equipment accounted for over 1100kWh per year.

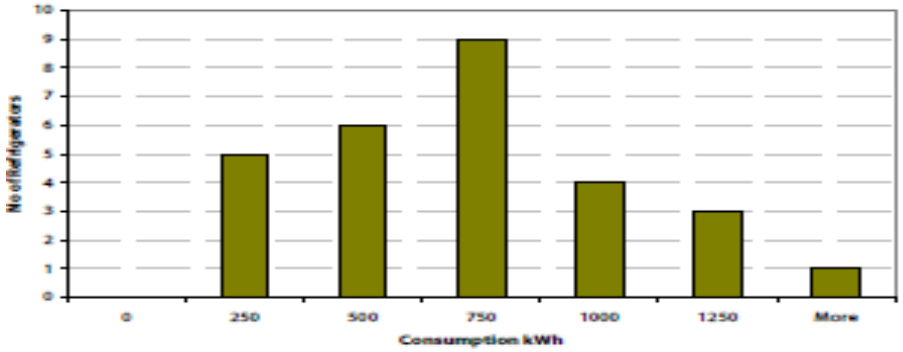

Figure 2: Refrigerators Energy Consumption

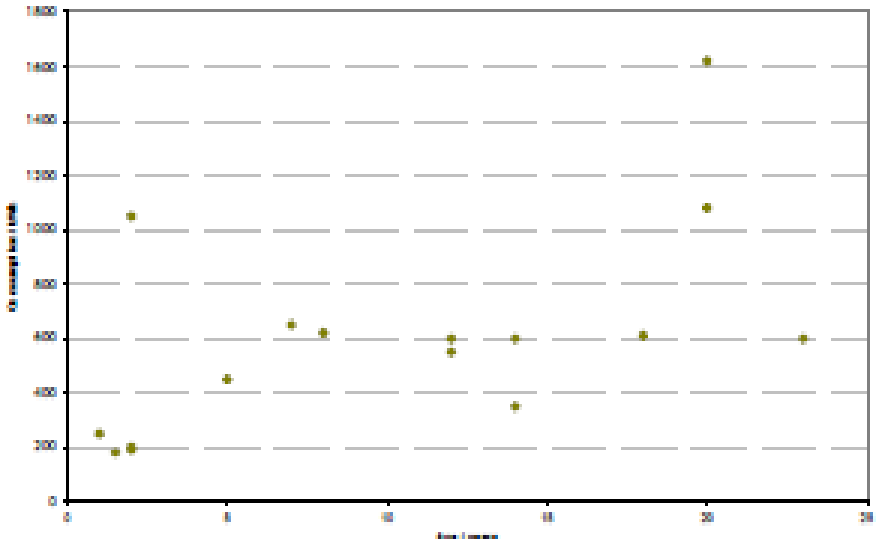

Figure 3: Energy consumption vs refrigerator age

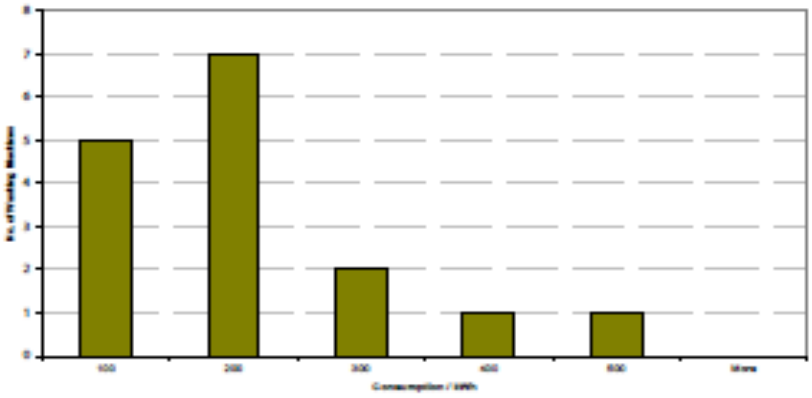

Figure 4: Washing machines Energy consumption

The Policy Background to Energy Efficiency

Greenhouse Gases – Status to date

Malta submitted its report to the first communication to the United Nations Framework Convention on Climate Change. This Communication provides a national greenhouse gas inventory for the period 1990-2000. Malta's total CO_2 emissions increased from 1,895 Gg in 1990 to 2,450 Gg in 1999. It has been noted that energy sector (power generation and transport) is a major contributor to GHG emissions in Malta. The sector contributes approximately 63 percent of Malta's direct GHG emissions, with approximately 75 percent of national CO_2 emissions. According to a technical report by Sammut and Micallef, (2004), Malta's CO_2 emissions from electricity generation stood at 1,397 Gg in 1990, rising to 1,727 in 1995 that gradually rose to 1,784 Gg in 2000 and to 1,973 Gg in 2003.

At the same time energy consumption has seen a growth of 61 % between 1990/1991 and 2001/2002. The domestic and commercial sectors have contributed most significantly to the increase in demand. Between 1990-1995 electrical energy production increased around 5.6 % annually. This increase eased off after 1995 because of the decline in electrical energy use by the Water Services Corporation (WSC), the largest single consumer, where electrical energy is used for desalination.[1]

Transport is also a major contributor to Malta's total GHG emissions. Between 1999-2000, the number of private cars increased by an annual average of 7%. CO_2 emissions from transport were estimated at 342 Gg in 1990, 440 Gg in 1995, 496 Gg in 2000 and rising to 525 Gg in 2003. Transport constitutes approximately 20% of the emissions from the energy sector. Road transport is the major contributor at 96-97 % of the CO_2 emissions from transport.

Malta's GHG Emissions Obligations

Malta ratified the United Nations Framework Convention on Climate Change (UNFCCC) as a non-Annex I party on 17th March 1994, and on the same basis, subsequently ratified the Kyoto Protocol on 11th November 2001. Malta is a non-Annex I party to the Kyoto Protocol. It is also excluded from the list of EU Member States forming part of the burden-sharing agreement under Council Decision 2002/358/EC concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the UNFCCC and the joint fulfilment of commitments there under.

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1 Desalination contributes to around 50% of Malta's potable water supply.

Currently Malta does not have any quantified mandatory targets for the limitation or reduction of greenhouse gas emissions. It is however obliged to comply to various EU Directives including the Emission Trading Directive as well as other various EU Directives on emission limitations, air and fuel quality.

Malta has submitted to the EU Commission its 2nd National Allocation Plan for the period 2008 - 2012 and this was prepared pursuant to obligations under Emissions Trading Directive 2003/87/EC. This Plan highlights Malta's overall greenhouse gas emissions are small compared to those of the European Union as a whole (at 0.058% of the total EU-25 emissions). This is due to the small size of the country in geographical, population and economic terms. Malta also has one of the lowest emission rates per capita within the EU (7 tonnes of CO_2 equivalent per capita, compared to an average of 11 tonnes for the EU- 25).

The specific GHG emissions per unit of gross domestic product (GDP) for Malta are 924 tonnes of CO_2 equivalent per million Euro of GDP, as against the EU average of 607 tonnes. Malta's NAP notes that this reflects more Malta's (relatively low) GDP rather than high emissions along with the fact that Malta is too small to benefit from 'economies of scale' (for example, in electricity production) and that it is (at present) an isolated energy system with a limited choice of fuels.

The National Allocation Plan proposed that Malta's proposed total quantity of allocation for the period 2008 to 2012, is therefore 14,777,981 tonnes of CO_2. A total of 10,946,653 tonnes of CO_2 would be allocated to Enemalta, with 3,831,328 tonnes of CO_2 held in reserve for new entrants (Ministry for Rural Affairs and the Environment, 2006).

The EU Commission is requesting Malta to make a number of changes to the NAP including a reduction in the total quantity of allowances to be allocated by Malta to installations and to new entrants to 2.143061 million tonnes. This is equivalent to a reduction of 0.812539 million tonnes per year for the trading period (Commission of the European Communities, 2006).

Further Environmental Impacts

Apart from greenhouse gas emissions, air quality is also a major environmental issue in Malta and the energy sector is also a contributory party. In 1995 for example coal for electricity generation was phased out due to air quality concerns in the vicinity of Marsa Power Station.

Various EU environmental directives exist which Malta has transposed and obliged to adopt to limit the emissions to the air resulting from various sources. These include the Large Combustion Plants Directive, the National Emission Ceilings Directive, the Integrated Pollution Prevention and Control Directive, Ambient Air Quality Assessment and Management Regulations, and the Greenhouse Gas Emissions Trading Scheme.

There is no fixed energy infrastructure connecting Malta to potential fuel product suppliers. All fuels are transported to Malta by ocean going vessels.

The transportation of fuels to Malta by sea going vessels poses inherent risks in terms of potential marine pollution. The risks from marine pollution in view of the country's geographical location are recognised particularly since Malta lies at the heart of major shipping routes.

Other environmental impacts associated with fuel storage include hydrocarbon losses and leaks from storage tanks and pipelines, which can contaminate the local terrain as well as surface, coastal and ground water resources. Typically such losses and leaks can arise out of insufficient asset maintenance or accidental damage. Apart from this, land use and site location can have a negative impact on the environment, not exclusive of which is the effect on the visual amenity associated with the location of such storage facilities.

3 Overall Assessment of Energy Efficiency Trends

3.1 Energy intensity trends

The general assessment of the energy efficiency performance of a country is commonly established by means of indicators such as the primary and final energy intensities, that is, the energy consumption per unit of gross domestic product (GDP) at the overall level of the economy.

The primary energy intensity is the indicator that correlates the total energy consumption to the country's GDP. It measures how much energy is required to generate one unit of GDP, in other words: the ratio between primary energy consumption and GDP.

The final intensity is necessary for the investigation of the end use of energy and measures the final energy required to generate one unit of GDP, in basic terms: the ratio between final energy consumption and GDP.

The analysis of the variation of these indicators with time displays first and foremost the progress in energy efficiency, as well as showing the impact of other factors that may either improve or impede energy progress, for instance: growing comfort levels in the residential sector; structural adjustments in the industrial sector; and other socio-economic variations that are not specifically shown in the GDP structure. Thus, energy intensities serve to indicate not only the State's level of energy efficiency but also to depict its energy productivity level.

The gross inland consumption of energy is calculated as the sum of five energy types being coal, electricity, oil, natural gas and renewable energy sources.

Malta's primary energy intensity fluctuates annually but has shown a fair decrease over the years 2003-2004. In fact this was around 5% less in 2005 compared to the previous two years. The Gross Domestic Product also rose by 5.3% in the same period. This has therefore led to the primary intensity going down in the 2005 fiscal year for the first time since 2002.

	2000	2001	2002	2003	2004	2005
Primary intensity	0.0459118	0.0461203	0.044966	0.046664232	0.0480175	0.04566
Final intensity	0.1212648	0.1044331	0.11786	0.128601033	0.1468872	0.158246
Ratio final/primary intensity	2.6412541	2.2643652	2.621127	2.755880226	3.0590386	3.465729

Table 1: Variation of Energy Intensities for the period 2000-2005

Source: NMC database.

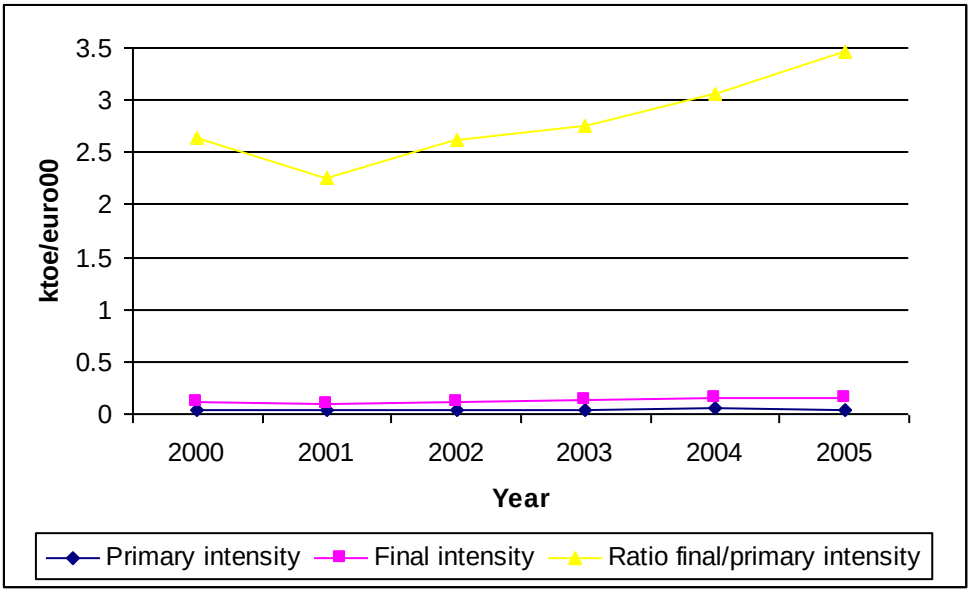

Figure 5: Variation of Energy Intensities in Malta

Source: NMC database.

In recent years, energy policies have been introduced so as to help reduce energy consumption. However, in Malta the energy intensity increased steadily in the period 2000-2005. This added up to about 30.5% in the period 2000-2005 as shown in Figure 2. This is linked with an increase in energy-intensive processes, higher living standards, etc.

Further measures have been introduced to help decrease energy consumption. The table below gives a summary of the measures and their status to date.

1	2	3	4	5	6
Measure Description	**Measure Rationale**	**Status 'Decision'**	**Status Implementation**	**Timeline Start**	**Timeline End**
Promotion of Renewable Energy Sources in the Domestic & Commercial Sector	Increase reliance on RES with the aim to diversify the fuel mix, reduce air pollution, reduce local dependence on polluting and costly fuel sources and ease economic burdens on domestic households	Proposal Introduced	Not Yet Initiated	Q4 2009	Q4 2013
Increase investment in R&I through the implementation of Malta's R&I programme	Significantly increase Government investment in Malta's national R&I funding programme .	Proposal Introduced	Not Yet Initiated	Q1 2009	Q4 2010
Manufacturing research projects	Three research projects are planned in relation to manufacturing research. These projects will involve industry-academia consortia working on common issues of relevance.	Proposal Introduced	Not Yet Initiated	Q3 2008	Q2 2012
Enhancing Malta's capacity to mitigate and adapt to climate change	Introduce a comprehensive national framework for climate change policy action in Malta, built on the results of scientific studies and assessment of international obligations and vulnerability of the country. As a result, a National Climate Change Strategy for Malta, disseminated nationwide and integrated in all major national policies, programmes and measures will be achieved.	Proposal Introduced	Not Yet Initiated	Q3 2008	Q2 2011

Table 2: Measures to Date

3.3 CO_2 emissions and efficiency

Malta is a minor emitter of CO_2. Malta's main emitter of CO_2 emissions is the electricity generation industry. Malta's total energy generated per unit GDP (at constant prices) has risen sharply, particularly since 2002, after declining during the 1990s. Probably the major contributing factor to this major change in direction is related to the sharp rise in energy generation, especially due to the hot summer temperatures of recent years, as compared to the rate of GDP growth, the latter which has been markedly slower.

The State of the Environment Report of 2005 notes that there is an urgent need to decouple economic growth from energy consumption and to limit CO_2 emissions from power plants (Malta Environment and Planning Authority, 2006).

The total CO_2 emissions in Malta increased from 1,895 Gg in 1990 to 2,450 Gg in 1999. The energy sector (power generation and transport) is the foremost contributor to GHG emissions in Malta, with circa 63 percent of Malta's direct GHG emissions. This amounts to about 75% of the national CO_2 emissions. (Sammut and Micallef, 2004)

CO_2 emissions from electricity generation have increased by about 41% in the period 1990-2003. At the same time energy consumption has seen a growth of 61% over the same period. The domestic and commercial sectors have been the main contributors to this significantly increase in demand.

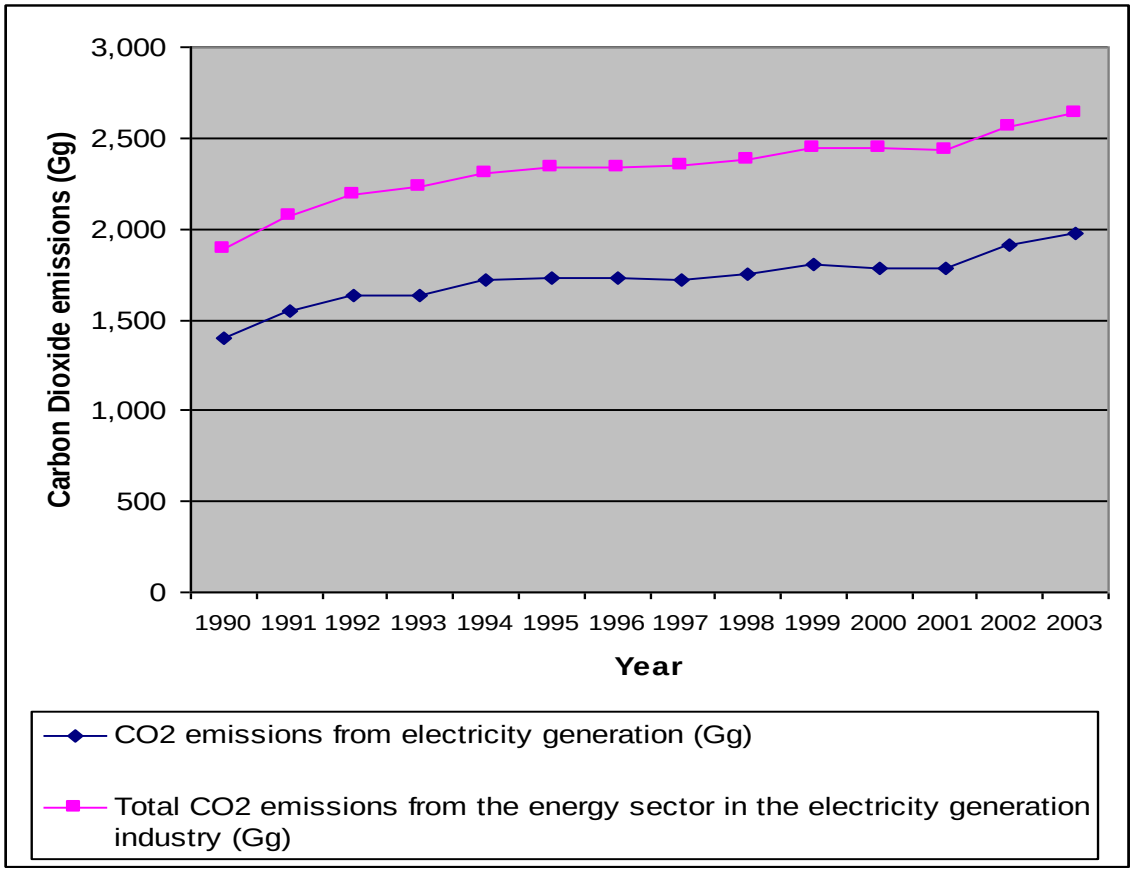

Figure 6: The Greenhouse Gas Effect for Malta

Sources: Sammut and Micallef, 2004; MRAE, 2006

The transport sector is another major contributor to GHG emissions in Malta. Between 1990-2000 the number of private cars increased by an annual average of 7%. In the period 2000-2004 the number of vehicles on the Maltese roads increased by 12.5 percent, dropping down the annual average to circa 3 percent. CO_2 emissions from transport were estimated at 342 Gg in 1990, 440 Gg in 1995, 496 Gg in 2000 and rising to 525 Gg in 2003. Transport constitutes around 20% of the emissions from the energy sector. The major contributor is road transport with 96-97 % of the CO_2 emissions from transport.

4 Energy Efficiency Measures

4.1 Recent Energy Efficiency Measures

Energy Policy

> *"Government will encourage and facilitate the achievement of increased energy efficiency in electricity generation and distribution, and in end-energy use, and will lead by example".*
>
> *- A proposal for an Energy Policy for Malta, MRA, June 2006.*

In essence this is one key objective of Malta's Energy Policy, which went through public consultation to completion in September 2006. Its policy areas hinge on the three pillars of EU energy policy guidelines, namely security of supply, a level playing field for an open energy market and the protection of the environment.

A prelude framework document to the draft energy policy, published in 1999, highlighted the need for capacity building, prompting the need for a breakaway from the state-controlled (corporation) utility, Enemalta. This eventually led to the setting up of an energy regulator in 2000, the MRA (Malta Resources Authority).

Energy Efficiency Measures

As in most EU countries it is accepted that a good first step towards sustainability is energy efficiency on all fronts. Apart from reducing a country's energy bill and increasing security of supply, this is one reassuring way of curtailing harmful emissions into the atmosphere. Complementary to energy efficiency, a shift towards renewable sources of energy (RES) will reduce the dependency on imported fossil fuels. Such a policy strategy is highly crucial to Malta's scenario, which depends entirely on imported fossil fuels. On the other hand, land is at a premium, hence RES deployment in rural areas has always been considered critical. A holistic sustainable energy use is therefore the primary objective of any energy policy.

In 2005, a year after joining the European Union with the largest intake of 10 new members, the Maltese Government declared its clear intentions to evaluate the implications of an increased energy demand in such a country moving from a 'third developed country' status to an EU member state. In spite of this, it is also aware of the need for energy efficiency measures in all sectors, at all levels, especially in the wake of such an increased energy demand.

Institutions and Programmes

As part of Malta's alignment with EU policies, Parliament saw the setting up of the Malta Resources Authority (MRA Act, 2000) set up under the Ministry for Resources & Infrastructure. As a public corporate body its mandate is to regulate and advise Government on matters related to energy, water and mineral resources (including quarrying and oil exploration). Its role is also to advise, co-ordinate and assist other government entities, to promote and administer Energy legislation and to conduct analyses and assessments of developments in the energy sector.

Through the MRA, the Maltese Government has launched a number of energy efficiency programmes as part of a holistic energy policy, running in parallel with the three pillars of EU Energy Policy, namely security of supply, open market competition, and the protection of the environment. In tandem to the MRA, the MEPA (Malta Environment & Planning Authority), apart from being the Authority responsible for all master planning and local development, is also responsible for conducting air quality surveys and the drawing up of biennial 'State of the Environment Report'.

A Cleaner Technology Centre (CTC) was set up in February 1993 within the Malta University Services, with the role of advising local industry on introducing cleaner production processes which favour waste minimization and energy efficiency. The following initiatives have been implemented to enhance energy savings and improve energy efficiency in the industrial sector:

- Power factor correction for large scale energy users.
- Energy auditing scheme for major industrial activities (production processes).
- Eco-contribution as a disincentive to minimise waste (industrial, commercial & domestic sectors)

Administrative and Legislative Measures

Further to Malta's accession to the European Union, in line with its process of harmonisation and transposition requirements, Government has introduced various legal notices to address and promote energy efficiency. These include:

- Efficiency Requirements for New Hot-Water Boilers Fired with Liquid or Gaseous Fuels Regulations, 2002 (Legal Notice 62 of 2002)
- Energy Efficiency Requirements for Household Electric Refrigerators, Freezers and Combinations thereof, 2002 (Legal Notice 63 of 2002)
- Energy Efficiency Requirements for Ballasts for Fluorescent Lighting Regulations, 2002 (Legal Notice 100 of 2002)

- Indication by Labelling and Standard Product Information of the Consumption of Energy and other Resources by Household Appliances (Amendment) Regulations. (Legal Notices 99 of 2002, 27 of 2003 and 235 of 2003).
- Energy end-use Efficiency and energy Services Regulation (Legal Notice 289/2008)
- Promotion of Electricity produced from Renewable Sources Regulations, (amendment LN426/2007)
- Energy Performance of building regulations,2008(Legal Notice 261/2008)

Residential Sector

Energy consumption in buildings is the latest intensified energy conservation focused effort. This is spelt out through a specific Legal Notice (Nov 2006). With effect from January 2007 the main initiatives included a new stringent energy requirement in the Building Regulations (part F). This eventually lead to a harmonised energy certificate for all buildings by 2009. A standard national calculation software tool has been designed in conformity with EU methodology for energy certification of buildings at design and auditing stages. Household appliances are now subjected to an improved energy labelling scheme, enhanced inspection of boilers and ventilation systems and increased efforts in energy savings and green procurement in the public sector at large.

Transport

The Maltese government considers cost efficiency for commuters as one essential basic tool for regulating energy efficiency and minimising environmental impact of transport. In the absence of local air, surface rail or underground transport communal travel is encouraged through public transport by bus (diesel running). A 'Park and Ride' scheme has been in operation since 2006 and a new CVA (controlled vehicle access) scheme was introduced from 01 May 2007, This has introduced an hourly charge for entry into Valletta, a historical city, during office hours yet encouraging free access in the evenings promoting private enterprise and social activities.

Energy Prices and Taxes

Energy prices and taxes are among the most important determinants of energy consumption and have been successfully used to promote energy savings in Malta. Formerly, heavily subsidised electricity rates were always considered a social commodity, almost by right, provided by a state-monopoly corporation, Enemalta. However, electricity tariffs went through a general overhaul in 2003, essentially reflecting the true price of oil on international markets. In 2009 electricity tariffs per kwh increased substantially in addition to the fuel surcharge introduced in 2003. Although this affected all sectors, the household and tertiary felt this most,

raising a greater awareness of savings in consumption and the importance of energy efficiency at all levels.

Household Sector

In 2007, Government launched a scheme for grants on the purchase of household appliances for domestic use certified as being efficient in the use and consumption of energy.

This scheme came into effect from 1st November 2006 and was terminated in 2008. The measures included are listed in Table 3.

Appliances	**Category**	**20% of selling price but capped at a max grant of:**
Dishwashers	A	LM 25 (€ 58)
Refrigerators, Freezers	A Tropical	LM 50 (€ 116)
or	A+ Subtropical	LM 50 (€ 116)
Combinations of the 2	A Subtropical (till 31st March 2007)	LM 25 (€ 58)
Washing Machines	A	LM 25 (€ 58)
Tumble Dryers	A	LM 25 (€ 58)
Air Conditioning Units	A	LM 25 (€ 58)

Table 3: Energy Efficiency measures in the Domestic Sector

Importers generally said that there was a significant effect on consumer demand patterns, with the latest trends shifting to requests for energy efficiency labels instead of mere cost assessment only.

Household appliances are being replaced by more efficient models by most families. Also, ownership of domestic appliances in general has increased (particularly micro-wave ovens, dish-washers, dehumidifiers, portable gas heaters and domestic air conditioners). Technology transfer has also stimulated a shift towards leading edge state-of-the-art technology, such as home-cinemas with full-surround sound systems, home computers and digital television. Thus the move is being made from a sophisticated office system towards its replica as a home-office oriented 'gadget' system, including home servers and internal communication (telephone/hall porter, audio-visual) systems.

Category		2006 level of sales	2007 level of sales	2005 level of sales in EU15
Refrigeration	A+, A++	10%	29%	8%
	A, A+, A++	36%	77%	59%
Air conditioners	A	16%	44%	Not available
Washing machines	A	75%	86%	85%
Dishwashers	A	85%	96%	80%

Table 4: Transformation in the Appliance's Market

The results of the scheme have been a market transformation process as indicated in Table 5. The weighted average sales of each category of appliances increased in the A class sector. The poorest performing sector was that of air conditioners, inundated with cheap equipment imported from outside the EU with poor energy classifications. This data in this table is the result of a very limited response from importers participating in the scheme.
By the 30 September 2009, 47,585 applications were passed for payment.

Transport Sector

Between 2000 and 2004, the transport sector experienced a marginal increase in energy efficiency of 2%. This development is mainly due to the efficiency improvements in vehicle engines. Malta has no surface or underground rail transport systems; it only has a nominal domestic air and ferry system between the two Islands. For the same four-year period the EU-25 efficiency saw a marginally higher increase in efficiency of 3%.

Road transport is practically the only mode of transport in the country. Energy efficiency of the whole transport sector is therefore highly influenced by land commuting patterns and lifestyles. It is very closely connected to the energy efficiency of road transport itself. Energy efficiency improvements achieved are due to the replacement or upgrading of company fleets, introduction of a VRT (vehicle roadworthiness test) and more regular and direct inter-town bus routes, as opposed to the traditional Capital City hub, located in Valletta. The aggravating problem of scarce parking spaces is ever more on the increase, given a steady increase of car ownership per annum. A ‘park and ride’ scheme for the capital city has been introduced in November 2006. All these have enticed private travellers to use public transport more than ever, as noted by the ADT (Malta Transport Authority).

On the other hand, private travel may have also been encouraged through an improved road network (revamping of existing by-pass routes) as well as the introduction of a CVA (controlled vehicle access) system as from May 2007 for the Capital, whereby vehicles entering and exiting

are recorded and billed according to the time spent within the historic city walls. In the evening parking is free in Valletta; this enhances business and entertainment, formerly practically unknown. Such a system replaces the former annual additional licence fee to be paid by car owners regularly entering the City. Although this has induced a more fair and rapid rotation of car spaces, it has also introduced an increase in pollution due to more frequent car trips into the historic Capital. However, the use of electric vehicles is free at all times. It is still too early to know the results of both schemes although the local transport authority is undertaking regular professional monitoring.

Due to an improvement in the standard of living and the VRT scheme, car owners are regularly upgrading their private cars to a more fuel-conscious makes - albeit even if opting for a larger engine and off-road capabilities. In general the penetration of more efficient vehicles has also helped in this respect.

Sea travel co-exists with land transport. A ferry service runs regularly between Malta and the sister Island of Gozo. This peaks in summer with the influx of tourists and Maltese crossing over regularly for short breaks. The latest addition has been a seaplane service between the two Islands, commencing in July 2007. This replaces the former helicopter service that was wound up for financial reasons in November 2006.

Industrial Sector

The efficiency of the industrial sector (measured at the level over the 3 main branches (manufacturing, construction and mining) - in terms of energy used per production index or per tonne - and aggregated for the whole sector) showed a regression by 57% from 2000 to 2004 (measured over a steady four-year moving average). The EU average exhibited an increase in efficiency of 2%. The inefficiency is attributed to the food industry (-36%), textile (-119.6%), paper (-35.2%) equipment, machinery & vehicles (-100.5%), rubbers & plastics (-102.3%) contributed significantly to the negative Maltese end efficiency.

Tertiary Sector

Although the majority of white-collar workers still commute from home to office on a daily basis, however an increasing number of people are now working from home. This is particularly the case with part-time work evidently on the increase, and small to medium sized enterprises currently run from home, most being a family-business. This has stimulated a demand for higher environmental conditions, particularly thermal comfort and lighting levels. In this light, and in consideration of Malta's relatively small domestic and tertiary sectors, these may therefore be grouped together.

Cross-cutting measures

At a national level there are various principal actions and measures currently in force. Most are general others are more specific. All fall under a NEEAP (National Energy Efficiency Action Plan). The principal areas are outlined here.

- Energy efficiency in all sectors at all levels;
- Deployment of RES (Renewable Energy Sources);
- Transposition of the minimum requirements for Buildings Directive (2002/91/EC);
- Electrical Interconnection to the Euro-grid;
- Financial support scheme for energy efficient domestic appliances;
- Support schemes for purchase of electric vehicles;
- Encouraging modal shift from private to public transport;
- Energy efficiency in government-owned industry and public sector;
- Financial support scheme for roof insulation on domestic buildings;
- Energy efficiency policy for social housing: implementation of pilot projects by the Housing Authority;
- Green procurement and appointment of green leaders in public sector;
- Investment in efficient generation plant at the Power Stations;
- Improvement in distribution system efficiency (smart metering), distribution centres, increase in number of substations to eliminate transmission losses;
- Research, development and demonstration projects, in collaboration with partners in EU member states;

Other horizontal measures include education and information dissemination.

Water and Energy Interface

The only water utility in Malta is a government-owned corporation, the WSC (Water Services Corporation). This provides all the potable water needs of the nation. It has always been in the limelight in the past for its intensive yet vital energy demand on the national energy bill. In the light of latest water engineering and energy technology, the WSC has now moved on to be one of the finest examples of energy efficiency, undertaking the most dramatic changes over a short time span, to both the local infrastructure (house connection) and the plant and distribution

network. Reverse osmosis and desalination at one time (1985-95) consumed approximately one fourth of the national energy bill.

Electricity demand by WSC reduced from around 15% of total energy in 1995 to 6% in 2004 through a combination of actions including - modern energy recovery technology, leakage detection, demand management and water conservation;

Combined Heat and Power

EU Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC was transposed into Maltese legislation through Legal Notice 2 of 2007.

This Legal Notice seeks to promote cogeneration based on useful heat demand. Promotion measures transposed by the legal notice include the facilitation of access to the grid and the issue of guarantees of origin certificates for CHP installations.

At this stage, the potential for CHP in Malta is relatively unknown.

Energy Performance in Buildings

The Legal Notice 238/06 formally legalised the minimum requirements for energy performance in buildings. These were introduced with effect from 02 January 2007. The salient features include insulation to flat roofs and external walls and careful positioning and design of openings, including their double-glazing depending on size of apertures, use of BAT (best available technology) for environmental control systems and insulation of domestic hot water plumbing, among others.

The Maltese Building Regulations have been updated (part F) to incorporate, introduced elemental energy efficiency measures, with the aim to improving the overall energy performance of buildings in line with the requirements of Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings. These are legislated by Legal Notice 238/2006 "Minimum Requirements on the Energy Performance of Building Regulations, 2006" under the Malta Resources Authority Act. These regulations set out requirements, by means of a specific technical guidance document, giving attention to:

i. the application of minimum energy performance requirements for newly constructed buildings;
ii. the application of minimum energy performance requirements for large existing buildings that are subject to major renovation;

iii. the general framework for a national methodology for the calculation of the integrated energy performance of buildings;

iv. the energy performance certification of newly constructed buildings and large existing buildings subject top major renovation when these buildings change ownership or are rented out;

v. the regular inspection of boilers and of air-conditioning systems in buildings with regard to reducing energy consumption and limiting carbon dioxide emissions.

Minimum requirements for the energy performance of buildings in Malta have been set for separate building elements - floors, windows, walls and roofs.

4.2 Patterns and Dynamics of Energy Efficiency Measures

(i) Measures affecting the Residential Sector

The energy efficiency measures that affect the Maltese residential sector are mainly those of a financial nature (50%). These are followed by those in the informative, regulatory and voluntary agreements.

1.2 SUMMARY TABLE OF MEASURES

Energy efficiency improvement programmes, energy services, and other measures to improve energy efficiency planned for achieving the target	Type of measure
Domestic sector	
Rebates on energy efficient domestic appliances	Financial instruments
Promotion of solar water heaters	Financial instruments, informative
Promotion of micro-generation of electricity from RES	Financial instruments
Subsidy schemes for insulation for buildings	Financial instruments
Promotion of compact fluorescent lamps	Financial instruments
Industry	
Targets for energy efficiency in government owned industry	Voluntary – institutional organisations; Informative
Support schemes for industry and sme's	Informative, Financial instruments; voluntary agreements
Tertiary	
Action in the public sector	Voluntary – institutional organisations;
Energy efficiency promotion in the tourism industry	Informative, Financial instruments; voluntary agreements
Improvements in street lighting	Voluntary – institutional organisations
Energy efficiency in the commercial sector	Informative, Financial instruments; voluntary agreements
Transport	
Promotion of modal shifts	Informative; Financial instruments; Regulation
Provision of advisory services on energy efficient driving	Informative
Provision of energy efficiency services at petrol stations	Informative, Financial instruments; voluntary agreements
Promotion of e-work or tele-working	Voluntary – institutional organisations
Green travel plans for the public sector	Voluntary – institutional organisations;
Promotion of electric vehicles	Regulation; Informative; Financial
Horizontal and Cross-sectoral	
Review of administrative arrangements	Regulation
Publicity and information campaigns	Informative
Provision of advisory services	Informative
Creation of an energy fund	Financial instruments
Improvement in buildings efficiency	Regulation, informative,
Intelligent metering systems	Informative
Promotion of CHP for large industry and tourist complexes	Informative
Participation in research in energy saving measures	Informative

Table 5: Nature of Measures

(ii) Measures affecting the Transport Sector

The energy efficiency measures that affect the Maltese transport sector are in their majority of a fiscal, social-planning and information-education nature (25%). These incorporate the schemes for the purchase of electric vehicles, introduction of biodiesel in the local market, car-free day and mobility week as shown in Figure 12. These are closely followed by infrastructure and financial measures with 12% share.

(iii) Measures affecting the Industry Sector

The measures that affect the energy efficiency of Malta's Industrial sector are of a cooperative and crosscutting nature. These incorporate the scheme in the parastatal sector whereby the Water Services Corporation reduced its energy consumption from 15% to 6% over the period 1995-2004. Malta's largest exporter, ST Microelectronics, has also taken the initiative to use biodiesel fuel for its boiler systems and transport fleet.

(iv) Measures affecting the Tertiary Sector

Energy efficiency measures in Malta's Tertiary sector are highly based on financial and education-information-training measures (50%).

(v) General Cross-cutting Measures

General crosscutting measures was generally lacking in Malta before the formulation of the National Energy Efficiency Action Plan (NEEAP). The focus of the NEEAP is generally on market-based instruments and also fiscal-tariffs, legislative-normative and financial instruments.

Cross-cutting measures

The most effective crosscutting measures are financial instruments. Since these have a wide-ranging effect across all sectors, be it the conventional dwelling user, the home-worker, the commercial service provider or an industrial entrepreneur, all such Maltese citizens who pay their dues to the utilities, demand a service - and an efficient and effective one. In this light it is the utilities duty to provide the best energy-efficient service at a cost-effective price, with minimal impact on the environment. Hence financial crosscutting measures for all citizens were

applied across the board towards such goals complemented with an information-education campaign for all citizens, at all levels.

With a view to reducing demand for conventional electrical energy, Government introduced financial support scheme aimed at increasing energy efficiency at a first level, in the residential sector through grants on the cost price of thermal insulation materials, and double glazing..

At a second domestic level, energy efficiency for residences in use came in the form of a specific support scheme on 'white' goods. This consists of a finite grant scheme on the purchase of household appliances for domestic use of up to 20% rebate on initial cost price, capped at a maximum of LM 50 (€233) for cooling appliances and LM25 (€ 58) for other appliances. Equipment eligible for the rebate has to be labelled class 'A' or better in accordance with EU directives issued under the framework Council Directive 92/75/EEC[2] (in Malta transposed into LN 99/2002)[3]. These measures came into effect in January and November 2006 respectively.

Apart from curbing the demand for conventionally generated electricity, through oil or gas-fired boilers, Government has also introduced various financial support schemes aimed at increasing micro-generation from RES as well as passive use of renewable energy (passive solar design). Such measures include:

(i) an increase in the refund on the purchase price of solar energy products for domestic premises from 15% to 25% to 66% [subject to a maximum of € 460. In addition, the network connection fee of € 163 is waived by Enemalta Corporation in the case of new households installing these systems.

(ii) a grant of 25% on the purchase price of micro-wind systems (with a maximum generation capacity of 3.7 kW) and which are installed on domestic premises [subject to a maximum of LM 100 (€ 233)].

(iii) An increase in the refund on the purchase price of photovoltaic installations for domestic premises from 20% to 50% with a minimum size of 1 kWp and less than 3.7 kWp on domestic premises. This grant is subject to a maximum of € 3000.In addition other support measures for such installations include:

2 Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances

3 Budget Speech 2007 (Government of Malta, October 2006).

- waiving of the meter costs by Enemalta Corporation and amounting to €47 fee for the installation of the meter necessary for the operation of the photovoltaic technology;

- Net metering for electricity generated from renewable energy sources with a spill tariff of 3c/kWh (€ 0.07/kWh) for any excess electricity fed into the grid.

In addition Government has also introduced a tax incentive for the promotion of biofuels: the biomass content (i.e. percentage element) in biodiesel is exempt from the standard excise duty.

4.3 Innovative Energy Efficiency Measures

In Malta, at the threshold of this millennium, government's main policy on energy efficiency with innovative energy measures has been along three main thrusts:

1. Improving the present infrastructure;
2. Promoting an information-education campaign, with an emphasis on exposing the real price of oil on the international market, maintaining the fact that electricity can no longer remain a social commodity;
3. Setting up cross-cutting financial measures, ranging from support schemes for conventional power supply and RES generation, down to the end-users' grants for domestic appliances.

All three strategies were deployed at different stages over the last few years, yet maintaining the ultimate goal of improving the overall quality of life.

Educational Campaign on Sustainable Energy Use

Another national educational campaign is being planned to increase the level of the general public and consumers' awareness on sustainable energy use.

The education campaign will provide information on 'savings potential and hidden costs of inefficient energy use and lack of knowledge on the cost-effectiveness, returns and risks of investments in energy end-use efficiency' as required by the policy area 1B: Energy end-use efficiency of 'A proposal for an energy policy'. Action at EU level of the same proposal requires 'market based instruments to encourage energy efficiency'. This will be provided through the aid schemes that aim to impose market shifts through the reduction of high cost barriers.

An Education Campaign on Energy Efficiency will target the general public and school children in particular. This will include publicity and information sessions.

The education campaign will provide information to the general public on efficient energy consumption. The methods used in informing people will be:

- Billboards
- Printed Media
- MRA website
- Telephone (freephone)
- Television/radio programmes

- TV/radio spots
- Radio programmes
- Information sessions in schools and other organisations
- Walk through audits
- Other

The education campaign will focus on reducing energy usage; A survey will be carried out prior to the launch of the education campaign to identify areas and demographic regions that need to be tackled. An ex-post survey will be carried out to measure the effectiveness of the campaign. The education campaign is expected to generate awareness on:

- excessive energy consumption
- methods to save energy
- energy saving features when purchasing domestic technologies.
- renewable energy sources and methods to harness it
- Energy efficiency and conservation of electricity;
- Micro-generation through renewable energy sources and promotion of solar thermal systems;
- Energy efficiency in transport;
- Energy performance in buildings.

Energy Efficiency Policy Measures

Even if not completely innovative, there are several principal actions and efforts currently being undertaken at a national level to address our energy challenges:

The main areas of activity include:

1. Energy efficiency – (including: the National Energy Efficiency Action Plan)
2. Renewable energy;
3. Electrical interconnection to Europe;
4. Research, development and demonstration projects;
5. Other cross-cutting measures including education and information dissemination.

In order to achieve energy efficiency the Maltese Government has prepared the NEEAP targeting strategically critical areas. These are outlined herewith.

Main actions undertaken to date to achieve efficiency targets:

Energy Efficiency Actions

Main actions undertaken to date to achieve efficiency targets:

Energy Labelling of White Goods: In 2007 Government announced a scheme whereby the purchase of energy efficient appliances had to be incentivised through payment of a rebate on the purchase price of the appliance. The scheme was terminated in July 2008.

The scheme was very successful with 35,000 applications for the rebate being submitted to the Malta Resources Authority during the 20 month duration of the scheme.

The scheme required available technical documentation to demonstrate the eligibility of the registered appliances to be submitted and vetted for the rebate to be processed. Appliances that were registered for similar schemes in other EU Member States and/or subject to third party verification have been exempted from the need to be covered by such verification.

Energy Performance of Buildings*:* Through a legal notice dated November 2006, the minimum requirements on the energy performance of buildings came into force with effect from 1st Jan 2007. Such measures are not exclusive but include:

- Insulation of external walls and more efficient insulation of roofs;
- Double/triple glazing depending on size of apertures.
- Compensated transmission losses (U-value) for large-scale non-domestic buildings (e.g. offices, showrooms).
- Government financial support scheme applicable for roof insulation on domestic buildings.

The principal actions undertaken to date to achieve efficiency targets include:

Transport:

- Support schemes for purchase of electric vehicles;

- Encouraging modal shift from private to public transport.

National educational campaign on sustainable, intelligent and efficient use of energy – targeting the:

- Domestic sector (e.g. energy efficient appliances, elimination of standby, etc.);
- School students (e.g. energy wastage = increased CO_2);
- Industry and heavy consumers (introduction of energy audits and associated energy efficiency measures), power factor corrections, etc.

Other educational campaigns being undertaken:

- Various other informative activities – car free day, mobility week, world energy saving day etc.
- 'Progett Ecoskola' (Eco-school), 'Progett Dawl' (Lighting) among others.

Government committed itself to initiate energy efficiency by taking the role of 'leading by example'; certain actions undertaken to date demonstrate efficiency targets achieved, particularly in government-owned industry and public sector. These include:

- Investment in efficient generation plant at the Power Stations;
- Improvement in distribution system efficiency (smart metering)- distribution centres, more substations so as to eliminate loses;
- Electricity demand by WSC reduced from around 15% of total energy in 1995 to 6% in 2004 through a combination of actions including - modern energy recovery technology, leakage detection, demand management and water conservation;
- Energy efficiency in buildings (Housing Authority);
- Green procurement and appointment of green leaders in public sector.

National Energy Efficiency Action Plan

Other equally effective measures being considered for implementation in the latest NEEAP (National Energy Efficiency Action Plan) are:

Additional support schemes for domestic sector including:

- Continuation of measures to promote solar water heaters, solar photovoltaic systems and micro-wind;
- Continuation of measures to promote energy efficient appliances;
- Measures to promote compact fluorescent lamps (energy savers);
- Additional publicity and information campaigns.
- Provision of advisory services for domestic customers

Support schemes for energy efficiency in industry, SMEs, retail business and offices:

- Energy audits, (lighting, equipment, standby losses, high efficiency motors etc.);
- Power factor correction,
- Promotion of CHP,
- Efficient space heating and cooling,
- Energy efficiency in tourism industry.
- Studies on potential of centralised CHP systems and promotion of CHP for large industry and tourist complexes.
- Grant scheme for tourism enterprises
- Eco certification scheme for the hotel industry
- Promotion of CHP for large industries and tourist complexes

Efficiency in transport:

- Further promotion of modal shifts (cycling lanes, public transport efficiency improvements);
- Advisory services on energy efficient driving (vehicle and tyre labelling);
- Promotion of energy efficiency services at petrol stations;
- Promotion of e-work or tele-working;
- Green travel plans for public sector and large employers working within the Valletta/Floriana peninsula and their environs;

- Further promotion of electric vehicles through incentives (independent marketing by private importers);
- Improvement in street lighting (use of light sensitive sensors).
- Introduction of speed limits on roads
- Excise duty on mineral oils
- Mandatory introduction of biofuels

Efficiency in buildings:

- Information and labelling schemes for buildings;
- Energy management plans for major buildings.
- Energy efficiency action in the public sector
- Energy efficiency in the tertiary sector
- Energy efficiency in government-owned industry
- Improvement in building efficiency
- Minimum requirements for the energy performance of buildings
- Subsidy schemes for insulation in buildings
- Promotion of compact fluorescent lamps

Horizontal measures:

- Continuation and launch of additional educational and informative campaigns;
- Provision of advisory services on energy efficient driving
- Energy audits for industry
- Setting up of an energy fund for schemes for support for industry, tertiary, domestic and public sector;
- Continuation and further promotion for participation in research in energy saving measures (energy one of five priorities of national research plan);
- Review of administrative arrangements – changes to legislation and continuous review of NEEAP.

- Further crosscutting financial measures (further details to follow).
- Modernisation of agricultural holdings
- Participation in research in energy saving measures

Cross cutting Financial Measures

With a view to reducing demand for conventional electrical energy, Government introduced a financial support scheme aimed at increasing energy efficiency at a first level, in the construction and refurbishment of dwellings through a grant of 33% on the cost price of thermal insulation materials, subject to a maximum of € 300.

At a second domestic level, energy efficiency for residences in use came in the form of a specific support scheme on 'white' goods. This consisted of a finite grant scheme on the purchase of household appliances for domestic use of up to 20% rebate on initial cost price, capped at a maximum of €233 for cooling appliances and € 58 for other appliances. Equipment eligible for the rebate had to be labelled class 'A' or better in accordance with EU directives issued under the framework Council Directive 92/75/EEC[4] (in Malta transposed into LN 99/2002)[5]. Both measures came into effect in January and November 2006 respectively.

Apart from curbing the demand for conventionally generated electricity, through oil or gas-fired boilers, Government has also introduced various financial support schemes aimed at increasing micro-generation from RES as well as passive use of renewable energy (passive solar design). Such measures include:

(iv) an increase in the refund on the purchase price of solar energy products for domestic premises from 15% to 25% to 66% subject to a maximum of € 460. In addition, the grid connection fee of € 163 is waived by Enemalta Corporation in the case of new households installing these systems.

(v) a grant of 25% on the purchase price of micro-wind systems (with a maximum generation capacity of 3.7 kW) and which are installed on domestic premises [subject to a maximum of € 233].

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4 Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances

5 Budget Speech 2007 (Government of Malta, October 2006).

(vi) An increase in the refund on the purchase price of photovoltaic installations with a minimum size of 1 kWp and less than 3.7 kWp on domestic premises. This grant is subject to a maximum of € 3000. In addition other support measures for such installations include:

- waiving of the meter costs by Enemalta Corporation amounting to €47 fee for the installation of the meter necessary for the operation of the photovoltaic technology;

- Net metering for electricity generated from renewable energy sources with a spill tariff of 3c/kWh (€ 0.07/kWh) for any excess electricity fed into the grid.

In addition Government has also introduced a tax incentive for the promotion of biofuels: the biomass content (i.e. percentage element) in biodiesel is exempt from the standard excise duty.

Promotion of Renewable Energy

Offshore Windfarm Development

During 2006, Government, through the MRA, issued a Call for Expressions of Interest for Offshore Windfarm Development. Following receipt of the offers submitted in response to the Call, a detailed review and comparative assessment of the offers was carried out.
The viability of a location for siting commercial-scale offshore wind farm is determined by various physical and meteorological criteria. The most important include:
► Environmental Impacts including ecological issues, landscape and visual impacts, noise and vibration effects, marine archaeology and potential conflicts with sites of archaeological interest;
► Effects on other activities and uses of the potential sites including: maritime traffic and bunkering operations, air traffic and radar and navigational aids operation, communication facilities, tourism facilities, military and defence operations, fisheries and fishing activities;
► Wind resource potential and wind energy considerations including wind speed and duration and overall quality of the wind resource;
► Constructional, operational and maintenance issues which determine the economic viability of the project including:
» Foundation technology, depth of seabed and type of substrate; The geological characteristics of the potential sites are also required to be studied and the seabed constituency effects the type of foundation to be used
» Wave depths and hydrodynamic effects on offshore wind turbine structures;

» Distance of the site from the shore and interconnection facilities.

A detailed GIS mapping exercise was at the same time undertaken where the no-go zones and sensitive zones previously identified in the course of the Call for EOI were overlayed with bathymetric depths of the Maltese territorial waters. This exercise enabled analysis and clear identification of potential areas with depths up to 80 m which could be selected for deepwater offshore wind development. In view of the bathymetric conditions of Maltese territorial waters and the limited sites for locating offshore windfarms in shallow waters (< 20m), it has been decided that deepwater wind technologies should be assessed in further detail since this is a major aspect in the location of offshore windfarms. The difficulty with this type of technology lies in the substructure design. The Authority is closely following developments in two substructure technologies namely floating technologies and tripod / multipod jacket technologies. Both these technologies are currently at thedemonstration phase. Floating technology is being demonstrated through a scaled prototype at a distance of 10.6 nautical miles from the coast in Southern Italy. Quattropod jacket technology is being demonstrated through two wind turbine generators of 5 MW each in 45m deepwater near the Beatrice Alpha oil production platform in the Moray Firth offshore North East Scotland. At the same time the Authority has established contacts with Scottish Enterprise with the aim of getting assistance in our pursuit in deepwater offshore wind technology for electricity generation in Malta.
The Authority also assisted EuroMediTI and Malta Enterprise in the preparation of a project proposal for an offshore energy research and development project.

EEA Study on "Establishing environmentally compatible wind energy potential in Europe"

The Authority was invited to respond to a questionnaire developed by the European Environment Agency on establishing environmentally-compatible wind energy potential in Europe. This project involved quantification of the impact of environmental and other constraints on the potential of wind energy in different land use and sea use categories.
To assess and develop a detailed and scientifically sound response to this questionnaire the GIS-based mapping approach was utilised as part of Malta's response to this review. The various constraints identified by the EEA as applicable to Malta were mapped and country-specific recommendations submitted. Key stakeholders including MIA, MATS and the DCA as well as MEPA were consulted.
Submissions received in the course of complementary consultation exercises carried out also fed into this study's feedback.
The Authority's submissions were later presented in the course of an experts' meeting held in Copenhagen by the EEA.

Other Activities

Solaterm - Promotion of Solar thermal technologies

In November 2006 the Authority started participating in Solaterm, an EU funded RTD project (co-ordinated action) under the 6th Framework Programme. The overall objective of the project is the widespread application of solar thermal systems for the hot water preparation, space heating and climatisation in the Mediterranean partner countries in order to meet the increasing demand for hot water and cooling and to exploit the high potential of solar energy in the region. A country report was drafted on the status development of solar thermal applications in Malta. In addition a meeting was held in Cairo, Egypt where the framework conditions for solar thermal and the state of the art of solar thermal technologies in the southern Mediterranean countries were discussed. Further details are also posted on the project's website http://www.solaterm.eu

Reporting on Energy Efficiency and Renewable Energy in Malta

In December 2006 the Authority was requested by Plan Bleu to carry out a national study on Energy and Climate Change, Energy Efficiency and Renewable Energy under the United Nations Environment Programme – Mediterranean Action Plan. The main objectives of this study were to:

► quantify and analyse basic data and indicators stipulated in the Mediterranean Strategy and in the national strategies;

► present the RUE and RE strategies and policies currently under way in Malta;

► outline the effects and benefits gained from the current development of RUE and RE on an economic, social and environmental levels;

► present case studies dealing with good practices that may be communicated on a Mediterranean scale;

► analyse possible risks linked with the observed and forecasted trends as well as to highlight potential solutions which could be proposed in the scope of RE and RUE strengthening policies.

4.4 Semi-quantitative Impact Estimates of Energy Efficiency Measures

The last section summarised the innovative energy efficiency measures being adopted by Government through its holistic NEEAP. This will need to be followed by a semi-quantitative assessment of these measures over time. It must be declared from the onset that this section is only limited to qualitative information available through reliable information.

Household Appliances

The financial support scheme for energy efficient domestic appliances scheme was launched in November 2006. The MRA received 35,000 applications during the 20 month duration of the scheme.

Tertiary Sector

Considering the relatively small size as a sector in Malta, this is often grouped with the domestic sector. However, there is a notable increase in the family-run businesses, managed away from home. Although distances are short in Malta, much commuting is done with frequent travel between home and office. On the other hand most office practices (including government entities are encouraging work from home, particularly for part-timers and working mothers). Although never calculated, it is estimated that these have contributed to an improved energy efficiency, not to mention the time taken for travelling and in the ever-increasing traffic jams.

Transport Sector

The improvement in engine efficiency of most route buses, through more rigorous testing and better quality fuel has seen an improved bus fleet. New inter-city routes have been introduced as well as specific sector uses (such as hospital staff, factories, school and University transport, with dedicated time schedules). All these have contributed to a marked increase in the demand for public transport. On the other hand the improvement of a road network system may have also encouraged the use of private cars, even if marginally.

Industry

Private industry is leading by example. To their own merit, most entities are organising their own internal energy auditing schemes, whereby the money saved through energy efficient production methods is being re-invested to further improve their own efficiencies. Some have noted a net profit of 5-15% over a five-year period.

Since in the industry sector much is being done to assess the energy efficiency policy measures, both on a national scale as well as at internal level, through policy action checks, this

sector is perhaps the most quantifiable.To demonstrate this, two examples are taken as case studies: One is a public utility, namely the Water Services Corporation, and the second is a private company, which produces biodiesel, primarily for the local market. Both have made great strides in energy efficiency over a number of years. These are highlighted herewith:

Case Study 1: Energy Efficiency in Desalination - Water Services Corporation (WSC).

Energy Consumption

Desalination facilities were introduced in the 1980s in response to water scarcities arising from increasing demand and insufficient natural supplies. Today desalination contributes to around 50% of the potable water supply in Malta.

The first desalination plant was constructed in Malta at 'Lapsi' with a capacity of 20,000m^3/day in 1982 and increased to 24,000 m^3/day in 1986. Two others were added at 'Cirkewwa' in 1989 and 'Pembroke' and 1991, with a capacity of 19,000m^3/day and 54,000m^3/day respectively. Energy usage is a therefore a major cost element and creates an environmental impact in the operation of such desalination plants.

The Water Services Corporation is thus a major consumer of electricity in Malta and careful monitoring of its electricity consumption has been carried out through energy audits. Variances between actual data and design parameters are noted and recommendations to improve the plants' operating efficiency (including membrane additions or replacement) are considered and where applicable implemented (Water Services Corporation 2001).

The water services corporation embarked on projects to improve the output of the desalination plants with the intention of:

(i) increasing the production capacity of RO plants;
(ii) improving the quality of the desalinated water;
(iii) decreasing the energy consumption in the RO plants;
(iv) decreasing the reliance on groundwater for potable water supply.

The project consisted in the installation and commissioning of:

(i) two complete systems at Cirkewwa R.O. Plant and consisting in new pumps, pressure exchangers and membrane replacements;

(ii) two complete systems at Lapsi R.O. Plant and consisting in new pumps, pressure exchangers and membrane replacements;

(iii) three complete systems at Pembroke Phase 1;

(iv) replacement of membranes at Pembroke Phase 2.

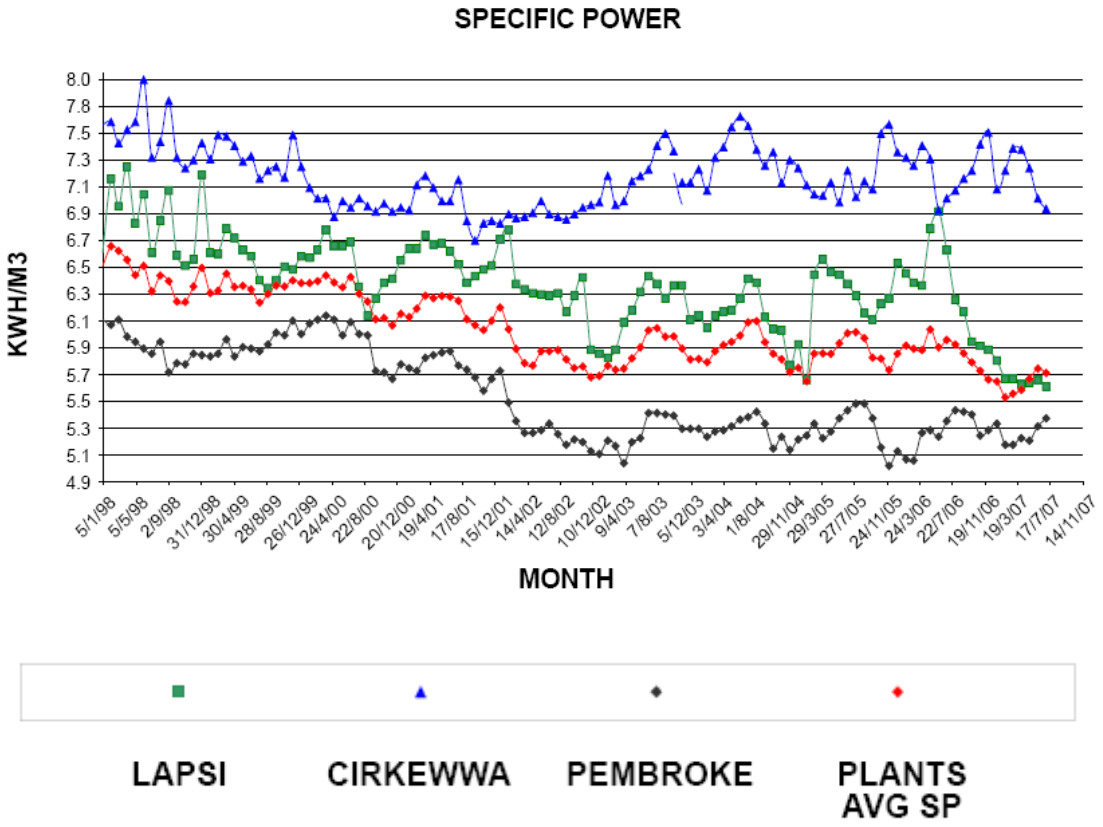
Energy Consumption of the RO plants

During the period 2006-2007, 97 million units of electricity were used to produce 16.97 million cubic metres of desalinated water. As the largest electricity consumer in Malta, the Corporation monitors its electricity consumption to minimise energy costs. Monthly energy audits are carried out to assess the energy absorbed by individual components thus ensuring the highest operating efficiency.

	Electricity Consumption kWhr	Production m^3	Specific energy Consumption kWhr/m^3
Production			
Lapsi	22,742,577	4,365,178	5.21
Cirkewwa	16,182,712	2,501,192	6.47
Pembroke	47,789,205	10,103,426	4.73
Subtotal	**86,714,494**	**16,969,796**	
Distribution			
Lapsi	2,619,107	4,365,178	0.60
Cirkewwa	1,825,870	2,501,192	0.73
Pembroke	5,859,987	10,103,426	0.58
Subtotal	**10,304,964**	**16,969,796**	
Total	**97,019,458**	**16,969,796**	**5. 72**

Plant	kWhr/m^3 2001 – 2002	KWhr/m^3 2002 – 2003	kWhr/m^3 2003 – 2004	kWhr/m^3 2004 – 2005	kWhr/m^3 2005 – 2006	kWhr/m^3 2006 – 2007
Lapsi	6.47	6.22	6.28	6.24	6.41	5.81
Cirkewwa	6.94	7.05	7.37	7.22	7.25	7.20
Pembroke	5.52	5.21	5.35	5.29	5.26	5.30
Average	**6.02**	**5.84**	**5.95**	**5.89**	**5.92**	**5.72**

Table 6 shows the specific energy used in RO plants for production and distribution purposes. During the period under review the specific power decreased by 3.4 million units of electricity which amounts to a saving of Lm86,545. The graph below shows the trend for specific power in each RO plant for the last 10 years.



Case Study 2 : Biofuel Production - Edible Oil Refining Co. Ltd.

Edible Oil Refining Co. Ltd. started operations in the early 1950s. Up to 1993 the company enjoyed a quasi-monopoly in vegetable oils in the Maltese internal market, but market share started being gradually eroded with a liberalization process.

In 2000 the EORC group embarked on a pilot project on the production of biodiesel from vegetable oils and fats. Trials were carried out for a 3-year period and during this time the company also carried out house trials on its fleet to ensure that optimum product would be

developed prior to its launch on the market. In 2004, EORC launched its biodiesel and sold some 150,000 litres. In 2006 sales of biodiesel surpassed 1.7 million litres. Apart from reducing the amount of waste cooking oil finishing in the sewers, presently this process is serving as the only source of indigenous production of biofuels in Malta.

The company considered that the most important issue was the sourcing of a reliable but competitive feedstock for the production of biodiesel since the use of virgin oils would have been far too expensive given the low price of fossil fuel prevailing at the time. The company realized that used cooking oil was a useful resource in this respect and which up to that time was being discarded and disposed in the waste stream. The company estimated that based on the total market sales of some 9,000 tons of material and taking into account European recovery statistics, the residual amount being disposed in the waste stream was some 3600 tons of fats and oils. Thus EORC implemented the following measures to recover used cooking oils from the waste stream:

1. An incentive was introduced to the catering sector by offering up to 33% rebate in fresh oil for those clients returning used cooking oil.

2. A number of strategic partnerships were struck between EORC and key entities including;
   (i) Malta Tourism Authority (MTA) where an audit trail and accountable system for all establishments processing and disposing of oils and fats were established. The document was also integrated and formed part of the licensing renewal conditions issued by the MTA.
   (ii) Wasteserv Ltd. for the use of biodiesel by government entities and corporations and the launch of a household collection scheme.
   (iii) Malta Hotels and Restaurants Association (MHRA) where members of MHRA were given special terms for the return of used oil.

To address quality issues in the production of biodiesel EORC together with the University of Malta (Department of Engineering) set up a testing and evaluation process to test the biodiesel produced. The MSA (Malta Standards Authority) on its part also defined the quality norms for biodiesel to be sold in Malta.

The Authority has a monitoring duty with regards to the effect of the use of biofuels in diesel blends above 5% by non-adapted vehicles through the use of surveys and, or any other means considered appropriate. The Regulation also imposes reporting duties on importers and producers as well as other obligations with regards to the sale and labelling of biofuels. Finally the Regulation also gives the Authority the power to issue compliance orders against any person who has contravened any of the provisions of the Regulation and makes it an offence to

contravene such compliance orders or any provision of the Regulation or to fail in one's obligations regarding disclosure of information.

The target is also established in a schedule to the Regulations and for 2005 the target is 0.3%.

Marketing Campaign and Consumer Awareness

In marketing the product and to increase public awareness EORC implemented various measures. These included:

1. An agreement reached with Enemalta on the retailing of fuels for transport in licensed service stations.
2. Appointment of Malta's largest independent fuel distributor as its agent in the market for industry.
3. Setting up of a sales team and invested in an educational programme through the Ministry responsible for the environment.
4. Opening up of a good dialogue with the Malta Resources Authority (the authority regulating the fuel sector in Malta) and agreement was reached on the form and manner in which biodiesel could be sold in the absence of a liberalized market
5. Sending diesel mechanics overseas to get educated in bio diesel and its role
6. Hosting of three national seminars where, apart from targeting the general public, specific audiences were invited (engineers and key stakeholders such as fuel station owners). Foreign guest speakers were invited to contribute to these seminars.
7. Joining Government's campaign on the "Clean the world";
8. Launching a mass media and public relations campaign including a household mail shot.
9. A promotional and educational campaign was set up in schools where audio visual aids were used to support the project and its benefits. This included in station promotions where franchise girls in bio wear gave promotional material to young children.
10. Consumers were educated on the use and application of biodiesel from an individual perspective as well as the environmental benefits associated with its use.

Government Incentives

Government on its part de-taxed biodiesel, and legislated its incorporation with fossil diesel at a maximum of 5% in line with the EU directive on the promotion of biofuels for road transport. Government also established a green procurement policy.

Results

During 2004, Government published Legal Notice 528 of 2004 establishing regulations on the promotion of biofuels or other renewable fuels for transport. This legal notice transposes Directive 2003/30/EC.

During November 2004, Government announced that as from 2005, the biomass content (i.e. the percentage element) in biodiesel is exempted from the payment of excise duty under fiscal control where such energy products are made up of, or contain, one or more of the following products:

- products falling within CN Codes 1507 to 1518;

- products falling within CN Codes 3824.90.55 and 3824.90.80 to 3824.90.99 for their components produced from biomass;

- products falling within CN Codes 2207.20.00 and 2905 11 00 which are not of synthetic origin;

- products produced from biomass, including products falling within CN Codes 4401 and 4402;

- products which contain water (CN Codes 2201 and 2851.00.10).

The project is mopping up over 1,200 tons of waste material produced locally that would have otherwise been thrown in the waste stream.

During 2007, total production of 100% biodiesel was around 66,900GJ, of which 60% was used for transport purposes, and 40% for industrial use. The total amount of biodiesel used in the transport sector 1.08% of fuel in the transportation sector. This increased compared to 0.52% share of biodiesel for road transport in 2005.

The project has also reached international acclaim when in 2005 it placed second in the BBC world challenge – (an international competition where 78 countries competed with 476 environmental projects) and sponsored by BBC World, Shell and Newsweek. The project was also featured in the Newsweek magazine and on BBC World.

The company has also attracted the participation in the world record-breaking circumnavigation attempt being carried out in March-April 2007 and powered exclusively with 100% biodiesel. This will include the refueling with biodiesel in Malta.

Following an illustration of some quantitative and qualitative assessments of energy efficiency measures, lessons learnt are now outlined in the following section.

4.5 Lessons from Quantitative Energy Efficiency Measure Evaluations

Overview

Based on available information, lessons learnt from quantitative evaluation and partially contributed qualitative critique, are now highlighted. These are non-sectoral but are more based on crosscutting measures affecting the Nation.

Water and Energy Interface

As illustrated through the above case study 1, clearly a quantitative assessment shows that with a concerted effort towards state of the art equipment with BAT (best available technology), energy efficiency measures produce tangible results as can be seen by a drop in energy consumption in the period 2000-2007. This is one crosscutting measure servicing all sectors. One clear lesson has been learnt.

Bio-diesel au lieu Fossil Fuel Diesel

From statistical records and a quantitative analysis, case study 2 points to the fact that a shift form a conventional fossil fuel to bio-diesel is real and already happening: In 2007, total production of 100% biodiesel was around 2 million litres, This signifies an increase of 0.5 million litres from the 1.5 litres produced in 2005.

The lesson learnt here is that considering Malta's 100% dependence on imported fossil fuels, and an ever-increasing car ownership, it makes logical sense to diversify sources, particularly with such a win-win situation, when such a non-fossil source as bio-diesel is also mopping up waste edible oil from being an environmental burden.

Car Sharing and Public Transport

Although no quantitative assessment was made to date, commuters' comments and general trends indicate a shift towards this mode of transport, particularly with the introduction of the 'park and ride' scheme and the 'controlled vehicle access' into the Capital. Both have alleviated traffic congestions and parking problems, particularly around the Valletta peninsula.

Public transport has also noted an increase in demand, albeit even though with no increase in capacity due to a finite number of bus licences. New inter-city routes, as opposed to the Valletta hub have proved to be successful. A new seaplane service between Malta and Gozo is still in its foetal stages to be quantitatively assessed. Its main drawback is inclement weather, perhaps

making it more sensitive to such a natural occurrence than the Gozo Channel ferry service. One lesson learnt is that a shift in both the type of fuel and the mode of transport have brought about a marked overall energy efficiency in transport.

Green Procurement Public Policy

This new policy adopted by the Central Administration has been passed down to the various ministries. Public tenders are requested to demand for the supply of materials and services through 'green' sources. This also includes energy consumption related to the procurement of such services. Although not quantifiable, it is envisaged that this will bring about a more environment-friendly attitude towards consumption.

Evaluation of Building Regulations (Part F)

The EU Directive on the Energy Performance of Buildings: COM 2002/91/EC was transposed to Maltese legislation in November 2006, and has been enforced by LN 238 as from 02 January 2007. Given Malta's condition, as an Island State with a typical Mediterranean marine climate, having its own indigenous stone (globigerina limestone) and building tradition, the demand for cooling energy has exceeded that for heating. The latter season is also much less spanning only three months between December – February, as opposed to a six-month heating season in central and northern Europe.

Lessons learnt through architectural science are that we cannot simply emulate the fully glazed edifices and roofed over courtyard buildings of northern Europe as these incur greater internal gains further increasing the demand for cooling energy. Much effort is being made through information to citizens and education of young budding architects at tertiary level.

Industrial Energy Audits

As a result of the launch of EC2002/91/EC Directive ,a few companies in industry have taken the lead in energy efficiency through their own internal energy auditing mechanism. Most have opted for a power factor correction, and plant sub-metering to identify losses or inefficiencies, making room for upgrading to BAT (best available technology) for equipment. Lessons learnt include a quantifiable decrease in energy intensity per product, meaning an increase in production for the same amount of energy. The larger 'energy guzzlers' are almost forced by Enemalta to convert to a power factor system, tagged with the incentive of improved electricity tariffs. If such effects are extrapolated into other areas, including the tertiary sector, energy efficiency benefits are felt immediately, especially in such a small oil-dependent country. This is in turn contributes to the national GDP.

In 2009 an EU funded scheme for energy efficiency in the industrial sector was launched. A greater number of companies are expected to shift to energy efficient operations.

Electricity Consumption Forecast

Current growth rate in peak demand (MW) for electricity is about 3% per annum over the present peak load with peaks occurring in both summer and winter months, but summer peak rising steadily to reach and occasionally higher than winter over the period 1996-2006. This increase in peak demand is associated with an increase in averaged out annual electrical energy consumption (MWh) of just over 2% of present demand.[6] Such shifts in peak and average demand are typically associated with a greater demand for space cooling through air conditioning (electricity) - albeit even if more cost-effective - while on the other hand in winter there is a notable shift towards space heating by open flame fireplaces (firewood/LPG) or portable heaters (LPG cylinders), even if only over a short two month heating season.

Enemalta Corporation (2006b) has estimated the anticipated increase in electricity consumption over the period 2005 to 2020 as shown in Figure 7. This estimate was based on an annual natural increase of approximately 2% of the present consumption (linear), with an expected decrease in this rate of increase brought about by the increased utilisation of energy efficient appliances and buildings and programmes for energy conservation.

It was noted that concurrently, a number of major developments are expected to be operational during the period that would increase the electricity consumption in a steep manner. In a small isolated system such as Malta's, major developments such as the commissioning of the new Mater Dei Hospital and the construction of new residential and commercial developments, such as Tigne', Fort Cambridge, Penderville, Manoel Island and 'Smart' City, will have a effect on the demand for conventinal power. Electricity consumption is thus estimated to increase from 2,263 GWh in 2005 to 3,293 GWh in 2020.Intuition and past experience teaches that if we do not implement energy efficiency measures now, Malta may need the equivalent of another power station in twenty years time. Electricity generation trend is illustrated in Figure 8.

[6] Enemalta Corporation Report 2006b

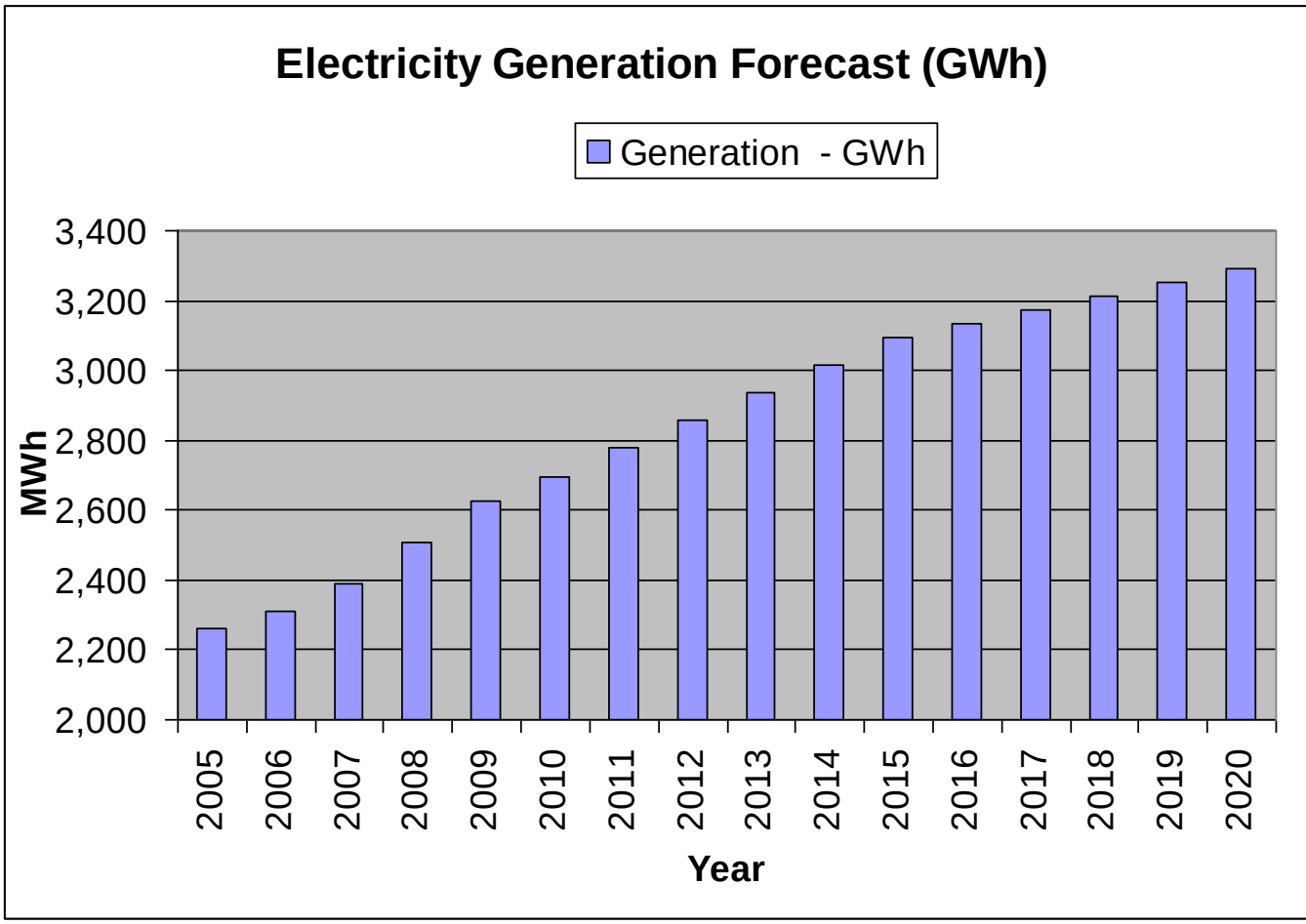


Figure 7: Forecast of Electricity Generation: 2005-2020

Source: Enemalta Corporation Report, 2006b

5 Energy demand by Sector

The total electricity consumption by consumers, categorised into the three main areas of Domestic, Commercial and Industrial demand have been charted, based on available data for the period 2001-2004 (MRA). Figure 23 overleaf refers.

Electricity demand by the domestic sector clearly takes up the largest component of power generated. It is also the area that has experienced the largest growth over the 2001 - 2004 period. Yearly demand increased during the 3 years 2001, 2002, 2003 but remained stable at 2003 levels through 2004. The largest increase was registered in 2003 with an increase of 11% in demand over 2002 figures. Commercial demand also registered a high increase in 2003 of 8% over 2002 figures, with demand for 2004 remaining stable at 2003 figures.

Industrial demand has been fluctuating with an increase of 4.5% being registered in 2002 over 2001 figures. Demand in the 2002 to 2004 period has remained relatively stable. This is also highlighted in the State of the Construction Industry Report (2005).

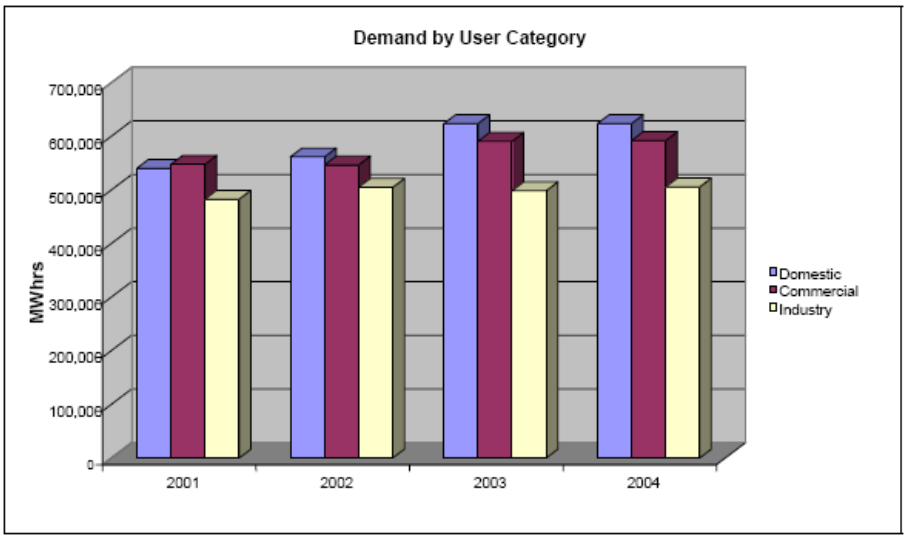


Figure 8: Electricity Consumption by Sector (2000-2004)

Source: MRA

	2001	2002	2003	2004

Domestic Demand (yearly in MWhrs)	540470	561474	623728	623672
Population	394641	397296	399867	402668
Consumption per person	1.37	1.41	1.56	1.55
% yearly increase		3.19	10.37	-0.70

Table 6: Domestic Consumption per Person

Source :Enemalta Corporation

Moreover, Table 7 further illustrates that the increase in consumption in 2003 can be related directly to an increase in the consumption per person. Monthly maximum consumption patterns are also indicated in Table 8, based on data collected by the MRA over the last 5-year period 2000-2005.

	2001	2002	2003	2004	2005
January	314	369	358	369	389
February	326	319	395	361	402
March	297	299	345	345	378
April	266	284	303	301	316
May	275	271	282	286	311
June	313	344	379	356	378
July	348	359	395	387	403
August	342	367	397	386	411
September	340	324	390	366	377
October	312	312	338	326	324
November	290	296	304	319	313
December	361	332	362	357	354
Legend:		Maximum Demand			90% Maximum Demand

Table 7: Electricity Maximum Demand (MW)

Source : MRA data, State of the Construction Industry Report 2005, BICC, MRI

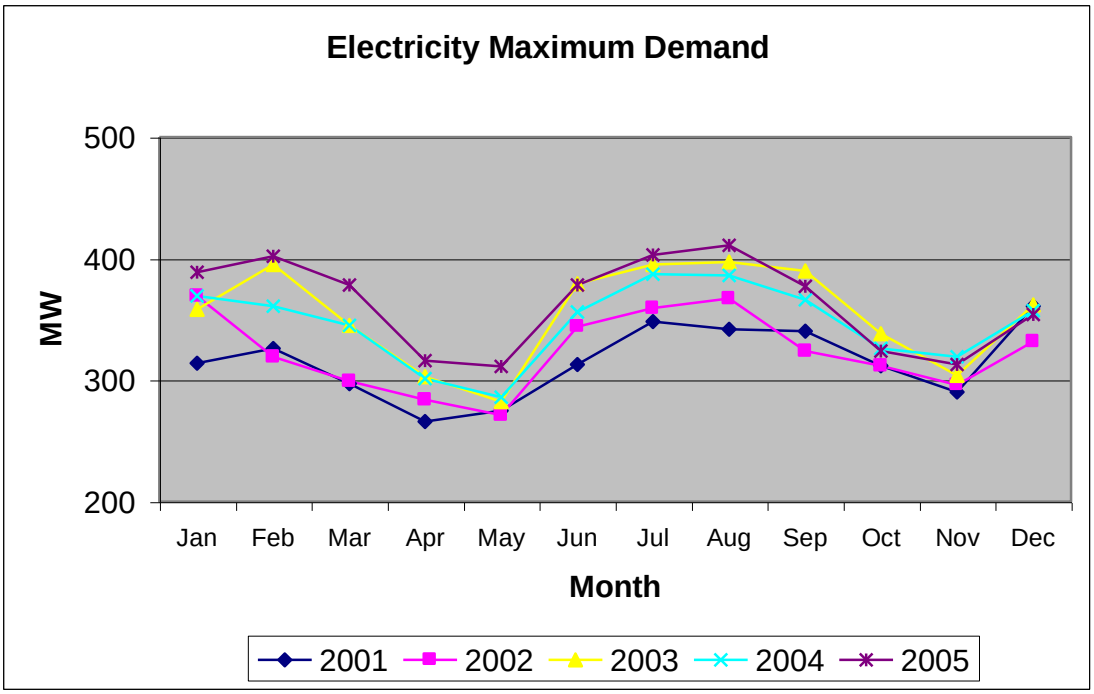


Figure 9: Electricity Maximum Demand per Month

Source: MRA

From the previous tables and charts, the following conclusions can be made:

- For the 5-year period under review (2000-2005), the maximum demand reached each month is showing a steady increase with the exception of December.
- Although in 2001 and 2002 a high demand was reached during 5 months of the year (90% or over of yearly peak), this high level of demand has for the years 2003, 2004, 2005 the same peak is now reached over 7 months of the year.
- The months of January to March have seen an average yearly increase in maximum demand of just under 20MW, while the months of April, May have seen an average yearly increase in maximum demand of just over 10MW.
- The months of June, July August have seen an average yearly increase in maximum demand of just over 15MW, while during September there has been an average yearly increase in maximum demand of just under 10MW.

- The months of October to December have recorded a relatively low increasing trend in maximum demand.
- During the period 2003-2005 the peak in maximum demand has shifted from the winter months to the summer months and has been reached in the hottest months of the year, July and August. This is attributed to increase in air conditioning units installed.

Demand Side Management (DSM) is one important aspect for maintaining a steady balance between demand and supply at the stations. Energy efficiency measures, possibly legislative, will go a long way in maintaining such a balance.

6 Outlook: Future National Developments under the EU Energy Efficiency Directive

Directive 2006/32/EC of the European Parliament and of the Council of the 5th April 2006 on energy end-use efficiency and energy services sets the targets for energy efficiency achievements in energy end use for each Member State with a cumulative target of at least 1% of inland energy consumption for each year reaching a total 9% reduction within 9 years.

The idea is to improve energy efficiency in all end-use sectors, with a view to solving environmental, self-sufficiency and cost problems while adequately providing for increasing needs for lighting, heating, cooling and motive power without major upheavals. This is especially true when seen in the light of the Kyoto Agreement to reduce carbon dioxide emissions, where improved energy efficiency will play a key role in meeting the EU Kyoto target in an economic way.

The current EU strategy is to ensure the development of market-based instruments so as to promote energy efficiency. There are limitations to what such instruments may attain and the mode of their implementation in such a small economy as Malta, due to the small size of the market.

The NEEAP (National Energy Efficiency Action Plan) is the latest innovative national measure to be taken under the EU Energy Efficiency Directive, as detailed earlier in section 4.3.

Under the most recent energy strategy for Malta dated June 2006, that was entitled “A Proposal for an Energy Policy for Malta”, one of the priorities is energetic efficiency. This policy proposes a holistic and balanced approach for Malta to achieve the internationally accepted objectives of security of supply and competitive pricing of high quality energy services, with due regard to environmental sustainability. The main policy areas that are targeted to bring about these objectives are:

1. Energy efficiency - in end use and in electricity generation and distribution;
2. Reduction in reliance on imported fuels - by the development of RES and oil exploration;
3. Stability in energy supply - through interconnection with European systems and contingency planning to cater for short-term interruptions to supply and international action.

Measure	Lead Agency	Actions	Agency	Targets and deadlines
1B Energy end use efficiency				
Bring all current initiatives within a more holistic national energy efficiency action plan by 2007 including targets for energy efficiency up to 2015;	MRA	1. Establish energy efficiency indicators, and benchmark performance with other EU member states; 2. Initiate a structured holistic programme to promote energy efficiency 3. Finalise national action plan including targets	MRA MRA MRA	On-going On-going finalised
Ensure that competitively priced energy services are made available and promoted to final customers;	EMC	1. Revise Enemalta Act to permit EMC to provide energy services	EMC	finalised
Adopt exemplary energy efficiency practices in the public sector;	MRRA	1. Appoint green leaders in all government owned entities 2. Carry out one energy audit per year per Ministry 3. Adopt green government plan and a corporate strategy for the entities where there is government investment 4. Develop a green public procurement national action plan taking account energy efficiency. 5. Implement measures to further reduce consumption of electricity in the water sector for desalination 6. Implement guidelines to reduce energy consumption in new government schools 7. Prepare and implement a Green Public Procurement Policy 8. Include energy saving features in all Housing Authority projects, and the results of the Birkirkara pilot project will be analysed to achieve better energy performance in housing units designed by the Authority; 9. Establish green travel plans for commuting to Valletta	MRRA MRRA MIIIT MRRA WSC FTS Housing MUDR	finalised on-going In hand On-going finalised In hand finalised finalised
Develop and adopt legislative and administrative instruments to achieve energy efficient and environmentally friendly buildings and services;	BCID	1. Transpose and implement EU legislation on energy performance of buildings; 2. Draft regulations to set minimum energy performance requirements for buildings and building services and issue legislative/regulatory notice to render such requirements obligatory. 3. Draft and issue a standard national methodology for the calculation of the energy performance of buildings 4. Introduce energy certification of newly constructed or renovated buildings and buildings that change ownership or are rented out 5. Take measures to see that buildings with a useful floor area over 1000 sq.m. occupied by public authorities and institutions providing services to a large number of persons display an energy certificate in a prominent place. 6. Introduce and operate a system for the regular inspection of boilers and air conditioning systems as indicated in articles 8,9 & 10 of Directive 2002/91/EC 7. Identify and disseminate information on best practices in building design and construction	MRES/ BCID	finalised finalised finalised December 2009 December 2009 On-going

Table 8. Malta's targeted measures for energy end use efficiency.

Source: MRA

The ultimate goal is to reduce Malta's energetic dependence and to obtain a sound use of the available resources, promoting diversification of energy sources, using more environment friendly methods. It also highlights renewable energy sources, aiming at the reduction of

greenhouse gas emissions and pursuant of the EU energy efficiency directive. The document also includes a series of measures and actions designed to reach various objectives. Measure 1B on energy end use efficiency is illustrated in Table 9.

The drafting of the proposal for Malta's energy policy was coordinated by the Malta Resources Authority that was also entrusted with the management of the consultation process on behalf of Government of Malta. In the process of preparing this draft policy, the Authority had broad consultations with inter-governmental stakeholders, who implement policies within their sphere of activities that influence the direction of energy policy. These consultations led to a proposal for a national energy policy that is essentially a compilation and consolidation in one coherent document of Maltese Government policies in the energy sector. The consultation process was then extended to include constituted bodies, NGO's and the general public. A second consultation process is currently in progress.

In line with the national energy policy , the Government of Malta has published a number of legislative measures, followed by regulations in the respective sector in order to promote energy efficiency (MRI, 2006). These are in line with harmonisation and transposition requirements associated with Malta's accession to the European Union

Regulations have also been introduced with the aim to improve the energy performance of buildings in line with the requirements of Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings. These are legislated by Legal Notice 238/2006 "Minimum Requirements on the Energy Performance of Building Regulations, 2006" under the Malta Resources Authority Act. These regulations set out requirements, by means of any technical guidance document, with regards to:

(i) The application of minimum energy performance requirements for newly constructed buildings;

(ii) The application of minimum energy performance requirements for large existing buildings that are subject to major renovation;

(iii) The general framework for a national methodology for the calculation of the integrated energy performance of buildings;

(iv) The energy performance certification of newly constructed buildings and large existing buildings subject top major renovation when these buildings change ownership or are rented out;

(v) The regular inspection of boilers and of air-conditioning systems in buildings with regard to reducing energy consumption and limiting carbon dioxide emissions.

Minimum requirements for the energy performance of buildings in Malta have been set for separate building elements - floors, windows, walls and roofs.

Furthermore, a National Educational Campaign on Sustainable Energy Use is being planned to increase the level of the general public and consumers' awareness on sustainable energy use. The aims of this campaign are:

1. To educate consumers through dissemination of information and knowledge:

    i) On Malta's dependency of oil;

    ii) Associated measures that may be implemented to reduce this dependency on oil including energy efficiency measures, energy conservation measures and integration of renewable energy sources;

    iii) Benefits of sustainable energy use to the environment and society as a whole;

2. To increase public participation and change consumers' behaviour towards more sustainable energy use.

The educational campaign will address the following key issues:

i) Energy efficiency and conservation of electricity;

ii) Micro-generation through renewable energy sources and promotion of solar thermal systems;

iii) Energy efficiency in transport;

iv) Energy performance in buildings.

a) educate heavy consumers on measures and best practices for sustainable energy use;

b) disseminate information on Government's policies, measures and support mechanisms to assist heavy consumers in energy efficiency, energy conservation and use of renewable energy sources;

c) ensure heavy consumers are aware of their energy consumption and understand the benefits associated with energy efficiency and conservation and contribution of micro generation from RES (wind and solar).

Annex 1

Selected Graphs on Energy Efficiency Trends (for sectors not covered; short comments on graphs)

Mtoe	Primary Energy Supply	Domestic Production	Net Imports	Final Energy Consumption	Electricity Generation (TWh)
Solid fuels					
Oil	0.9		0.9	0.3	2.2
Gas	<0.1				
Nuclear	n/a				
Electricity				0.2	
Renewables	<0.1				
Other					
Total	**0.9**	**0.0**	**0.9**	**0.5**	**2.2**

Table 9. Fuel Mix and energy consumption by sector

Source: European Commission

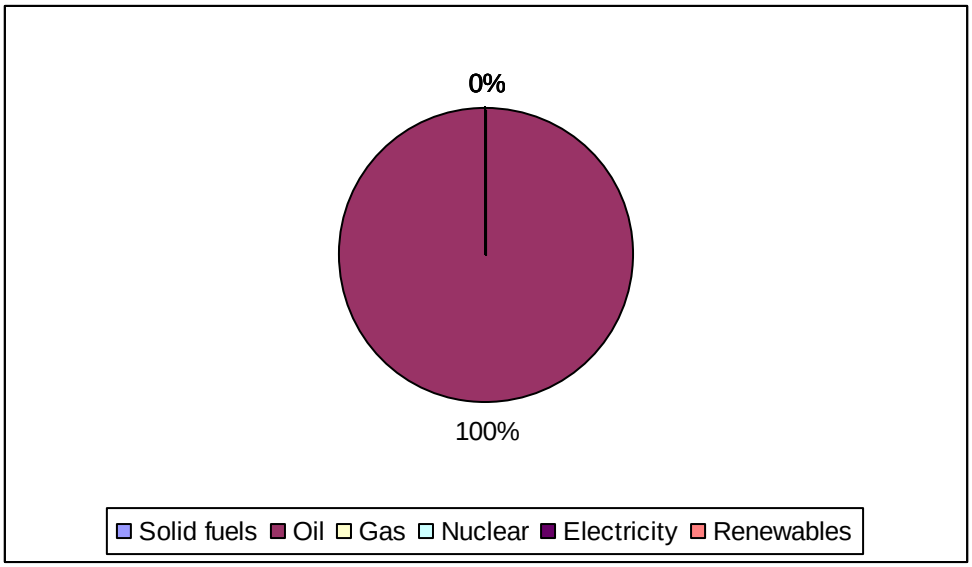


Figure 10: Energy Mix - Key Figures - 2007

Malta's primary energy supply is exclusively based on oil that is completely imported from overseas. Electricity generation in Malta has been totally based on oil since 1995, which was

the last year that hard coal was used for electricity generation. Total generation has been steadily increasing over the years.

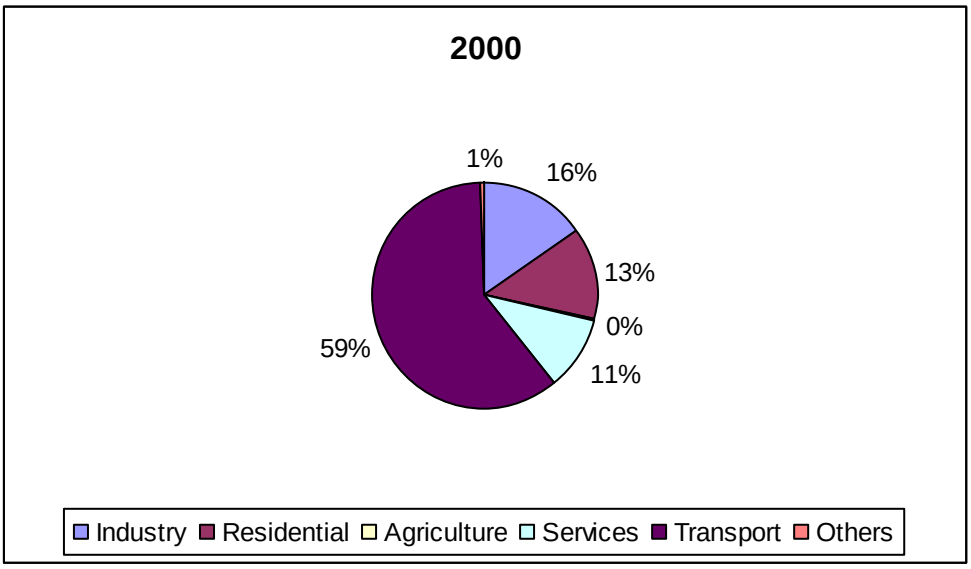


Figure 11: Total final Energy Consumption by sector for the years 2000 and 2005

Source: NMC database

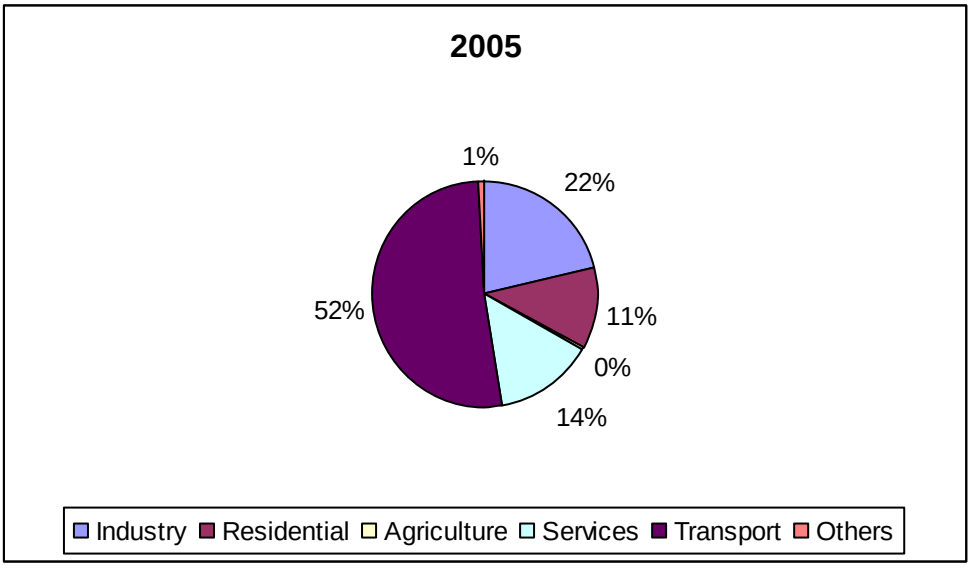


Figure 12: Total final Energy Consumption by sector for the years 2000 and 2005

Source: NMC database

The greatest consumer of energy remains the transport sector, even though consumption has gone down by circa 7%. It is then followed by the industrial, services and residential sectors. One must mention the construction of various tourism related, large scale commercial and residential development, private hospitals, nursing homes etc. which have all contributed to a higher quality of life and improvement in services in Malta as well as associated increases in energy demand.

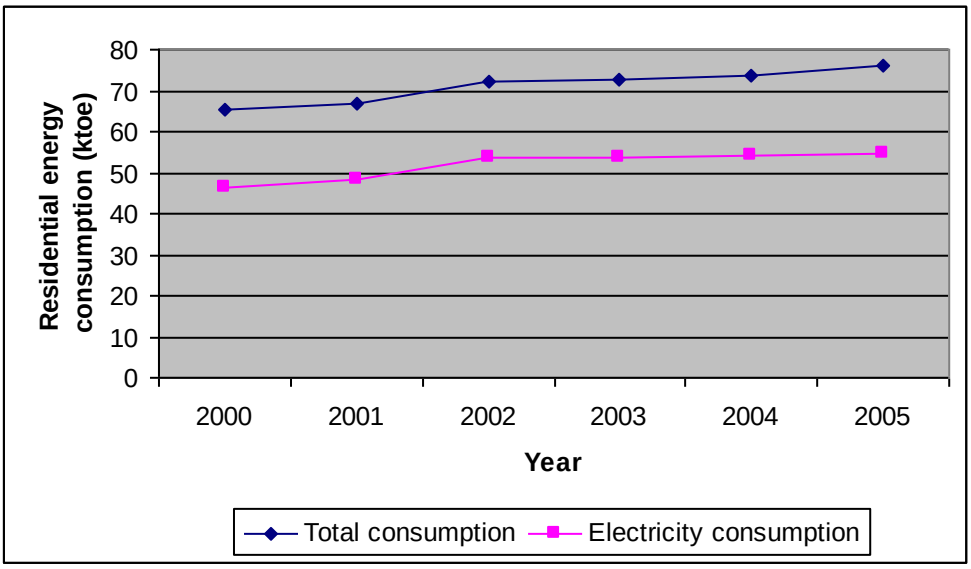


Figure 13: Residential Energy Consumption for the period 2000-2005

Source: NMC Database

Consumption of energy for residential purposes has been increasing steadily over the years. In fact, residential final energy use grew by 16.5% (2.75% per annum) over the period 2000-2005, to a figure of 75.9 ktoe. This is due to various factors including higher living standards. Changing lifestyles including increased purchases of and demands for various energy-related products. For example there has been a significant market penetration of new equipment particularly air-conditioning systems that have contributed to increases and shifts of the active power maximum demand in any one year from winter to summer. During this time, the number of households in Malta increased by 3.6% from approximately 123,128 to 127,540 at the end of 2005.

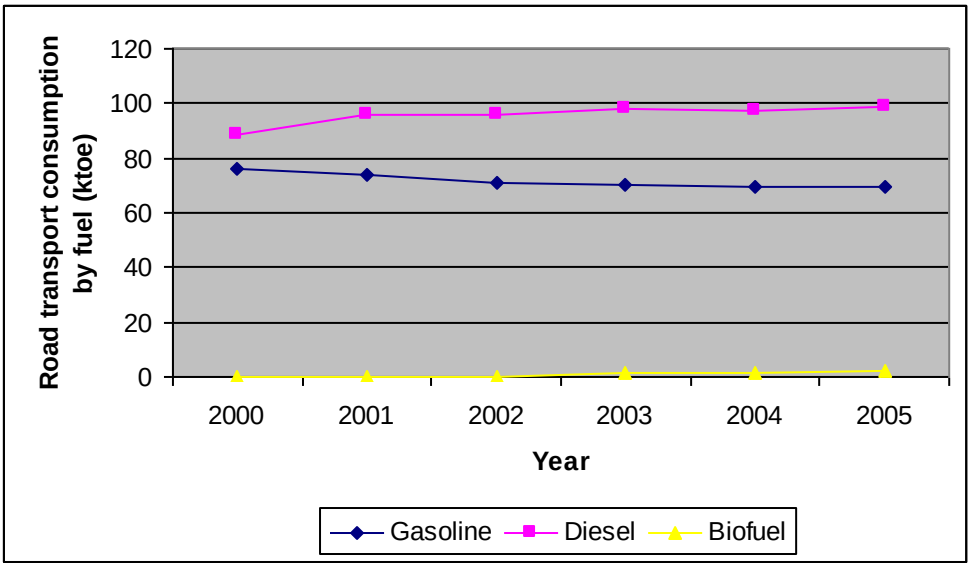


Figure 14: Fuel Consumption in road transport for the period 2000-2005

Source: NMC Database

Conventional petroleum-based fuels, namely gasoline and diesel, provide the vast majority of transport fuels in Malta. However, biofuel production and use has seen significant penetration rates in Malta. Biodiesel accounted for 0.52% of total fuel used for road transport in 2005, a significant improvement on the 0.1% achieved in 2004 and 0.02% in 2003.

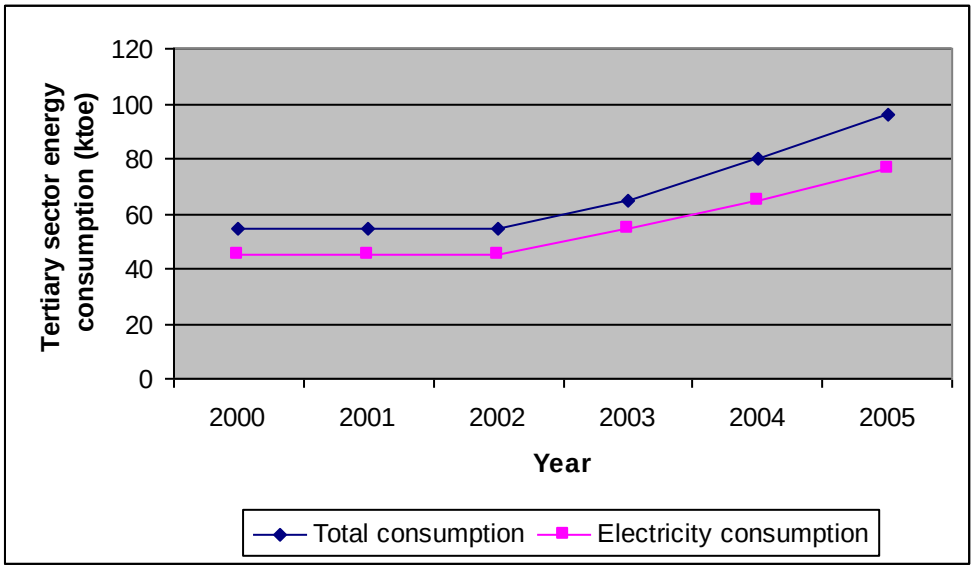


Figure 15: Consumption of energy in the tertiary sector for the period 2005-2005

Source: NMC Database

The services sector was one of the fastest growing sectors for final energy consumption in the period 2000-2005, growing by almost 76% in this period (12.6% annually).The hospitality sub-sector is amongst the higher users of energy. Changing lifestyles have also brought about increased purchases of energy-intensive services.

Annex 2

Summary of Energy Efficiency Measures

These are detailed in a comprehensive list of energy efficiency measures, as adopted by the Government of Malta, already included in Malta's country profile report, reproduced in Annex 3 to follow.

Annex 3

Country Profile

Energy Efficiency Trends in *Malta*

Overview

In Malta, the energy efficiency of final consumers decreased by 6.0% during the period 2000-2004 (bottom-up index, referred to as ODEX), decreasing from a datum of 100% in 2000 to 106% in 2004). All sectors have contributed to this marginal decrease in energy efficiency. In the same period, the EU average exhibited an increase in energy efficiency of 3%. A difference of 9% therefore exists.

Industry

The efficiency of the industrial sector (measured at the level over the 3 main branches (manufacturing, construction and mining) - in terms of energy used per production index or per tonne - and aggregated for the whole sector) showed a regression by 57% from 2000 to 2004 (measured over a steady four-year moving average). The EU average exhibited an increase in efficiency of 2%. The inefficiency is attributed to the food industry (-36%), textile (-119.6%), paper (-35.2%) equipment, machinery & vehicles (-100.5%), rubbers & plastics (-102.3%) contributed significantly to the negative Maltese end efficiency.

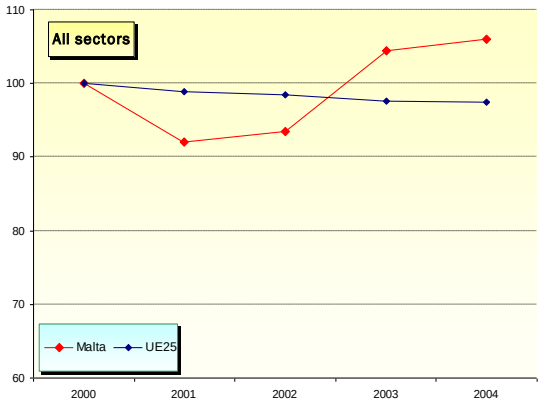
Households

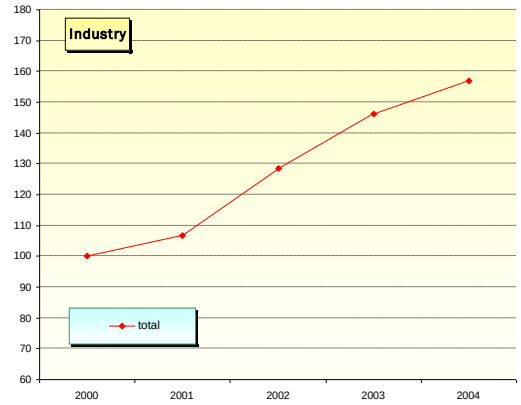
Between 2000 and 2004, the total energy efficiency of households increased by 9%, while the EU average exhibited an increase of 2%. Malta was therefore 7% more efficient than EU-25 households. For heating, the data cannot be classified as the energy is mainly electrical, which is lumped with other consumption. Nevertheless, the energy demand for cooling is significantly on the increase with a greater importation of air conditioning units. Its consumption is also lumped with electricity for lighting and cooking.

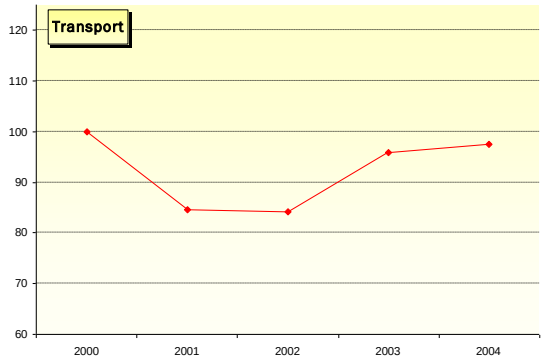
However since 2000 there was a notable shift from electric space heating to the use of portable gas (LPG) heaters; the same can be said of cooking from electrical to gas cookers.

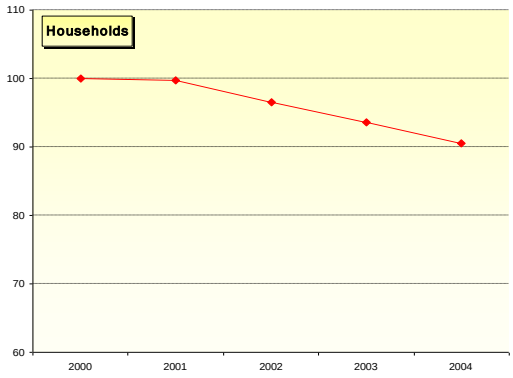
Transport

Between 2000 and 2004, the transport sector experienced a marginal increase in energy efficiency of 2%. This development is mainly due to the efficiency improvements in vehicle engines. Malta has no domestic air or rail transport systems. For te same four year period the EU-25 efficiency saw a marginally higher increase in efficiency of 3%.









Energy Efficiency Policy Measures

Sector	Measure Description	Since
Electricity		
1.	Rebate on energy efficient appliances for domestic use	2004
2.	Grant on roof insulation for domestic premises	2004
3.	Minimum requirements on the energy performance of buildings	2006
4.	Tips on energy conservation by Enemalta	2004
5.	Investment by WSC in energy efficient plant	2003
6.	World Energy Saving Day.	2002
Road Transport		
7.	'Park and Ride' scheme promoting car-free-access to Valletta, the Capital City	2006
8.	'Controlled Vehicle Access' scheme curtailing vehicular access to Valletta	2007
9.	Car Free Day and Mobility Week	2002
10.	Green Travel Plans	2002
RES		
11.	Grant on Solar Water Heaters for domestic use	2004
12.	Waiver of grid connection fee by Enemalta with installation of a SWH	2004
13.	Grant on solar water heaters for domestic use	2004
14.	Grant on solar photovoltaic measures for domestic use	2004
15.	Grant on small scale wind turbines for domestic use	2004
16.	Net metering on electricity generation from RES	2004
17.	Call for expression of interest for off-shore wind farm development	2005
18.	National energy saving campaign for sustainable energy use	2004
19.	Installation of PV systems on Government Departments	2006
20.	Housing Authority policy towards passive solar design and installation of PV and SWH to new housing blocks	2005
21.	Exemption form excise duty for bio-fuels for road transport	2004
Miscellaneous		
22.	Green public Procurement	2002
23.	Eco-school project - 'Green Flag' awards for eco-friendly schools & projects	2005
24.	Eco-certification of Tourism accommodation establishments	2004
25.	Drawing up of a National Strategy for Sustainable Development	2006

Annex 4

The role of the MRA, Data Situation and Data Quality

The role of the MRA was established through Article 4 of the Malta Resources Authority Act, 2000 (Chapter 423 of the Laws of Malta). The MRA was delegated the following functions, listed intact hereunder.

(a) to regulate, monitor and keep under review all practices, operations and activities relating to energy, water and mineral resources;

(b) to grant any licence, permit or other authorisation, for the carrying out of any operation or activity relating to energy, water and mineral resources;

(c) to regulate and secure interconnectivity for the production, transmission and distribution of the services or products regulated by or under this Act;

(d) to ensure fair competition in all such practices, operations and activities;

(e) to establish minimum quality and security standards for any of the said practices, operations and activities and to regulate such measures as may be necessary to ensure public and private safety;

(f) to secure and regulate the development and maintenance of efficient systems in order to satisfy, as economically as possible, all reasonable demands for the provision of the resources regulated by or under this Act;

(g) to carry out studies, research or investigation on any matter relating to the resources regulated by or under this Act;

(h) to provide information and issue guidelines to the public and to commercial and other entities on matters relating to the said resources;

(i) to regulate the price structure for any activity regulated by this Act and where appropriate to establish the mechanisms whereby the price to be charged for the acquisition, production, manufacture, sale, storage and distribution thereof is determined;

(j) to establish the minimum qualifications to be possessed by any person who is engaged or employed in any activity regulated by or under this Act;

(k) to establish measures for the protection of the environment in the practices, operations and activities regulated by or under this Act;

(l) to ensure that international obligations entered into by the Government relative to the matters regulated by or under this Act are complied with;

(m) to advise the Minister on the formulation of policy in relation to matters regulated by this Act, and in particular in relation to such international obligations;

(n) otherwise to advise the Minister on any matter connected with its functions under this Act;

(o) to formulate and implement the policies and strategies with short-term and long-term objectives, in relation to the activities regulated by this Act;

(p) to perform such other functions as may from time to time be assigned to it by the Minister.

In addition with respect to energy resources the Authority is also responsible for:

(i) promoting, encouraging and regulating the harnessing, generation and use of all forms of energy; and

(ii) encouraging the use of alternative sources of energy and for such purpose in accordance with such regulations as may be prescribed, to impose levies on energy produced by non renewable sources and grant subsidies in connection with the production of energy from renewable sources.

In view of the above mostly open-ended functions clauses (f), (g), and (h) particularly highlight its role of data collection and data quality towards ensuring a steady improvement in energy efficiency.

In view of an ongoing process towards finalising the present draft energy policy, data acquisition and regular updates is a must. There is no other Authority in Malta better well equipped and legally obliged to collect such data other than the MRA. It was given the power to call up statistical records of energy and water consumption through the NOS (National Office of Statistics), the WSC (Water Services Corporation), and Enemalta, with the latter two falling directly under its jurisdiction.

The formulation of any local legal framework or transposition of any standing EU legislation merits such data input for ease of monitoring and follow-up action. Therefore the quality of such data is equally important. All utilities (Enemalta & WSC) are legally bound to keep regular records of consumption (apart form billing purposes), such data can be collected and collated under different categories, by type of fuel, by sector, or by end product deliverable., This is equally important to establish patterns in market trends in the national economy. Given today's state of the art technology this is not such a mammoth task. The quality of the data is therefore the sole responsibility of the respective entity, inducing NSO, which processes the data for various purposes, including Eurostat.

In the process of the compilation of this report the data quality was classified on a (reliability) scale of 1 to 5, with 1 being the most reliable. An extra column was inserted for this purpose in the database [nmc_03072007.xls]. Almost all data entries have this quality rating respective to its source. Data was also laboriously updated later when a more reliable source was found and discrepancies were detected. For example, for basic data, compiled earlier from Eurostat (through unknown sources), it was discovered that more refined values (and their breakdown) could be more justified, hence such items were revised and the quality scale re-classified accordingly. One such example is the energy consumption trends for transport, largely digressing between Eurostat and values quoted by Enemalta and the Transport Authority Naturally data closer to the source was considered more reliable. Therefore one standard norm for quality in data collection is to obtain it as close as possible to the source itself.

Another aspect is that raw data should be collected as much as possible; this should then be processed accordingly in order to establish trends both from primary energy sources as well as end-consumer trends. These also indicate the level of energy efficiency almost directly for quick comparison with other countries. These two parameters should ensure better data quality throughout.

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