# Proposed National Renewable Energy Action Plan

## Report

## 12th June 2010

Ministry for Resources
and Rural Affairs
www.mrra.gov.mt

**INDEX:**

## *1. Introduction*

Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources requires that Member States should achieve a share of energy of the gross final consumption from renewable resources. As per Annex I Malta has the obligation of achieving a 10% target for share of energy from renewable sources in gross final consumption of energy by 2020. This includes energy consumed in transport, electricity, heating and cooling.

The same Directive has also set an Indicative Trajectory for each Member State as a measure to monitor the progress over the next 10 years and as a means of review and reaction in time in case a Member State is falling short of the plans towards the set target. For Malta, the trajectory is shown in the table below:

| Period | Share of renewable energy trajectory targets |
|---|---|
| Starting case (2010) | 0% |
| 2011-2012 | 2.0% |
| 2013-2014 | 3.0% |
| 2015-2016 | 4.5% |
| 2017-2018 | 6.5% |
| 2019-2020 | 10.0% |

**Table 1 Trajectory and Final RES targets.**

Article 4 of the Directive defines the requirement that each Member State shall adopt a National Renewable Action Plan (NREAP) indicating the local measures for energy from renewable energy sources as well as energy efficiency strategies and any other measures required including cooperation with other Member States in joint projects, statistical transfers, joint support schemes as well as joint projects with third countries.

The same Article 4 also requires that the NREAP of each Member State is to be notified to the Commission by the 30th June 2010, and as per Article 22, on the 31st December 2011 and every 2 years thereafter.

The following report addressing such request is based on a conservative scenario of the renewable energy sources potential as a share of the estimated energy consumption in the next decade in the country of Malta. The projections are built on planned major

developments and estimated uptake of RES technologies and respective energy consumption requirements. These are subjective to risks and constraints which may be higher than anticipated following further studies yet to be commissioned.

## *2. Action at Policy level*

The first draft of the National Energy Policy was issued for consultation in 2006. The policy document was based upon the following three objectives all pursued in a balanced way towards a sustainable energy supply:

- security of supply,
- environmental protection; and
- the social dimension, affordability and competitiveness

The draft Energy Policy of 2006 was recently reviewed to reflect among others the conclusions of the EU climate change and energy package in December 2008. In particular, the revised energy policy takes into account the EU mandatory target for Malta to have a 10% share of renewable energy mix by 2020 including 10% in the transport sector.

The policy proposal includes a series of measures and actions to reach the various objectives, including measures to tap Malta's renewable energy sources potential.

In April 2009 a consultation process was launched on the revised Energy Policy. The outcome of the consultation is being analysed and concurrently the Strategic Environment Assessment (SEA) process on this policy was initiated.

In 2008, the Ministry for Resources and Rural Affairs (MRRA) appointed the National Climate Change Committee, an interdisciplinary committee consisting of senior players from appropriate public entities and the private sector, to draw up a strategy that will enable Malta to cohesively and coherently take measures to address Climate Change and specifically address one of the major harmful instigators of Climate Change: Greenhouse Gas emissions. In January 2009, this committee presented its Report entitled "National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions[1]". This report, while being in synergy with the draft national energy policy, also proposes measures to increase the uptake of renewable energy systems as part of the effort for climate change mitigation. Following a consultation process the report was reviewed and adopted by Parliament in September 2009.

An updated "Solid Waste Management Strategy for the Maltese Islands[2]" policy document was also launched for consultation in January 2009. The Energy from Waste strategy is in synergy with the other efforts being made by Malta to fight climate change and increase the contribution from renewable energy sources.

[1] The report submitted by the National Climate Change Committee can be found at www.mrra.gov.mt/cc_report.asp
[2] The Solid Waste Management Strategy for the Maltese Islands document can be found at www.mrra.gov.mt.

## *3. Developments in the renewable energy sector*

In 2008, a study[3] was commissioned to investigate the best and most likely options Malta should consider to meet its renewable energy targets, in line with the proposed Directive for the promotion of the use of energy from renewable sources. This study was concluded in January 2009. The report compares the technical and commercial aspects of various scenarios; local energy generation from renewable sources (RES), by wind and solar, joint projects in RES with other EU countries or through interconnection with non-EU Member States and the possibility of buying green certificates through statistical transfers.

The study recommended that the selection of the best option must asses the relative importance of the different benefits presented, in relation to costs, risks and environmental impacts, security of supply and generation of local jobs. The study indicated that investing in a joint project, such as an onshore wind energy project elsewhere in EU, could be the most financially attractive option. If the strategic benefits of generating renewable energy within Malta are considered a priority, offshore wind would be a more feasible option as this would contribute a higher proportion of renewable energy than solar photo-voltaic (PV). The main reason behind this recommendation is the perceived lack of public acceptance of onshore wind farms and the limited availability of suitable onshore sites. It is however Government's intention not to exclude any option available, including onshore wind energy projects, before a detailed assessment, including public assessment, is conducted.

### Wind Energy Plans

In 2009, the Government of Malta decided to assess further three sites for the development of wind farm facilities. The sites include two onshore sites and one offshore. The onshore sites are located at Baħrija and Ħal Far and the estimated potential wind farm capacity is 10.2MW and 4.2MW respectively. The offshore site is Sikka l-Bajda with an estimated potential of 95MW located at the north of the Island around 1.5km from the coast. These projects would come on line later than 2012 and would bring the wind energy generation capacity in Malta to 109.4MW with an estimated annual electricity generation of 254GWh.

The impact of the construction of large scale onshore wind generation facilities has been, from the outset, a source of concern. In particular, there are concerns linked with unacceptable visual and landscape impacts given the country's small superficial area and high population density.

[3] Feasibility Study for Increasing Renewable Energy Credentials: January 2009

The development of offshore wind farms using commercially available technologies is also limited by the bathymetry of the Maltese waters, since the 25 metre contour extends to just around 3km off the coast, which carries a high density of near-shore traffic and the approaches to the harbour. Additional constraints in locating offshore wind farm sites arises from the heavy and conflicting use of the water especially since the Maltese economy is significantly dependent on marine and tourism activities.

Other concerns are the possible negative effects of the development of the wind energy facilities on the fauna and flora on the chosen sites, in particular at Sikka l-Bajda.

The three sites will, therefore, be subject to all the necessary environmental assessment as required by the applicable directives and the local environment and planning regulations.

Wind data monitoring systems have been installed to enable a more accurate estimation of the wind energy yield from the three earmarked sites, and hence determine their economic feasibilities.

Another important factor is the impact on the stability of the electricity system of the integration of such intermittent generation sources. The current grid situation would not allow the connection of full 109MW wind farm capacity potential. A grid stability study has been carried out to determine the maximum wind farm capacity that could be integrated in the Maltese small isolated grid without jeopardizing continuity and reliability of supply. In addition, the studies have been further extended to determine the effects induced by the wind farm potential capacity on the grid, once the Malta-Sicily interconnection is in place.

It is not being excluded that other sites may be considered for the installation of other wind farms, subject to approval from the respective authorities. Further, Malta does not exclude the possibility of deep water offshore technologies once these have been proven.

**Micro-generation (wind and solar photo-voltaic)**

Malta has continued to adopt measures to increase the penetration of micro-generation from wind and solar photo-voltaic (PV).

*Residential sector*

The capital grant schemes for solar photo-voltaic systems and micro wind turbines introduced in 2006 continued to be applied up to mid February 2009. The scheme giving a grant of 25% on the purchase price of micro wind turbines – with a maximum generation capacity of 3.7kW and subject to a maximum of €232.94 is still ongoing.

In 2009, the previous capital grant scheme on pv systems for the residential sector was replaced by the following financial support mechanism:-

Capital grants of 50% up to a maximum of €3,000 on the purchase price of solar PV systems for installation in residential premises An original fund of €500,000 was allocated for this grant and has been further extended through a fund of €3.8m, co-financed by the European Regional Development Fund, for the three year period 2010-2013.

A net metering mechanism presently exists for electricity generated from grid connected renewable energy sources with a spill over tariff of € 0.069/kWh in case of any electricity excess exported to the grid above that consumed. In the meantime the Government is evaluating the introduction of a Feed-in tariff for grid connected systems. It is to be noted that Government is open for developers of large scale grid connected projects, especially on private locations. Negotiations of a tariff and other conditions will be dealt on a case by case basis.

Malta will continue to seek community funds to provide financial assistance for micro-generation installations from renewable energy sources. An application for €9,000,000 in funds to be used for residential grant schemes was submitted to the EU Commission in 2008. This fund was subsequently granted.

*Public Sector*

Malta is continuing to promote such micro-generation through the implementation of a number of Government projects. During the period 2006-2009 a number of PV systems (amounting to a capacity greater than 130kWp) were installed on public buildings including schools and ministries.

The Government has also issued a call for expression of interest to lease out roof space available on Government buildings to one or more commercial operators. Interested parties have to design, build, operate and maintain PV systems as part of a concession for a number of years. The possibility of providing private investors with the opportunity to invest in PV systems and benefit from a return or a rebate in their utility bills is also being assessed.

A number of Government buildings were earmarked for an initial evaluation of the potential to house PV installation on their roofs. The buildings include water reservoirs, Government schools, hospitals and some Government departments. The initial assessment of the roofs of these buildings indicates a potential to accommodate 5MWp of PV generation capacity in the first phase and an additional 5MWp capacity in the second phase.

Other projects at the University of Malta, the Malta College of Arts Science and Technology and the various locations belonging to Wasteserv Ltd are being evaluated.

*Commercial and Industrial sector*

Malta is further promoting micro-generation renewable energy technologies in the commercial and industrial sector. During 2008, Malta Enterprise, the Government entity dealing with industrial promotion, co-financed with the EU, three PV installations in these sectors amounting to a total capacity of 62.3kWp.

Another similar scheme under the European Regional Development Fund 2007-2013 programme was launched in 2009, to provide financial assistance to operators in these two sectors, who wish to implement renewable energy and energy efficiency projects. The funds available amount to €10m and participants in this scheme can benefit from a 50% grant (maximum grant being €100,000).

A first call for proposals of projects was issued in early 2009. A total of 1.3MWp PV capacity was approved. A second call issued late 2009 approved a capacity of a further 2.1MWp. A third call issued earlier this year is in the approval process of the applications..

With the inclusion of a feed in tariff that is being considered, private entrepreneurs are showing interest in developing PV parks integrated in areas already utilised for other purposes.

The Climate Change Committee report "National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions"[4] recommends a set target of 4% of electricity generation to derive from solar technologies.

As regards to Micro-wind generation, the Malta Environment and Planning Authority has issued a draft "Planning guidance for Micro Wind turbines below 20kW capacity" which presently is in the process of being reviewed and endorsed by the Office of the Prime Minister. The guidance is addressed to installations in rural areas, as a first step for pilot projects, to determine the criteria and impacts on future installations intended in urban areas.

[4] The report submitted by the National Climate Change Committee can be found at www.mrra.gov.mt/cc_report.asp

**Electricity generation from biomass waste**

In the report submitted to the EU Commission in 2005, Malta indicated that the 3% electricity generated from waste is only achievable through the construction of a waste combustion plant. Furthermore, it was stated that in line with the Solid Waste Strategy published in 2001, a final decision for the construction of such a facility had to be deferred in order to exploit to the maximum the possibilities of waste recycling and composting facilities on the volume of biodegradable wastes and to be able to benefit from further advances in waste treatment technologies.

"A Solid Waste Management Strategy for the Maltese Islands[5]" was published for consultation in 2009. This document intends to update the 2001 strategy and the following options are considered as the most favoured configuration:

- The construction of three biological treatment plants (MBT) all equipped with energy recovery;
- The development of a waste to energy plant for the treatment of the residual fraction of waste, including RDF derived from the mechanical separation of MSW and rejects from the sorting of dry recyclables at the MRF.

The first mechanical biological treatment plant (MBT) in Malta is expected to start treating and receiving waste this year. In addition to this plant, two further MBTs are planned to be constructed by 2013 and, when operational, would generate more than 30GWh of electricity annually.

Previous projections that had been made regarding the potential of energy production from the installation of the gas extraction system at the Magħtab landfill have proved to be too optimistic since the gas quality resulted to be poor and unfit for electricity generation. However, Malta is actively pursuing the production of biogas from the Ta' Żwejra and Għallis engineered landfills and figures have been reviewed to include the latter sites in the recent estimates.

**Electricity generation from sewage sludge**

The potential of energy recovery from sewage sludge and the waste resulting from animal husbandry is not yet established. Co-digestion of various waste streams with solid waste is being considered for this type of waste.

Malta is presently implementing the required sewage treatment infrastructure, namely by the construction of three new sewage treatment plants, one in Gozo and two in Malta. The Gozo plant (40,000 population equivalent capacity) started operation in November 2007 whereas the Malta North plant (45,000 population equivalent capacity) was

[5] http://www.mrra.gov.mt/wastestrategy.asp

commissioned in March 2009. The largest plant in the South with an anticipated treatment capacity of 500,000 population equivalent will be equipped with anaerobic sludge digestion facilities generating enough biogas to supply 32% of the plant's electrical power requirements. It is estimated that the plant will have an electricity generating capacity of 990kW and 1046kW in heat. The construction of this plant started in January 2009.

**Renewable energy for heating: RES-H**

*Solar Water Heaters*

Malta is in the middle of the Mediterranean and thus is endowed with sunshine for most of the year. The abundance of solar radiation provides favourable conditions for the exploitation of solar energy on the island. This contributes to a high level of performance from solar water heaters. On average a solar water heater system has a potential of absorbing 1650 kWh/year[6]. Solar thermal applications (mostly used for the production of domestic hot water) are by far the most diffused renewable energy application in the country.

*Residential sector*

For the past few years Malta implemented financial incentives to promote the use of renewable energy in the domestic sector, namely solar water heaters (SWH). The first grant scheme on SWH was announced by the Government in 2005 and the maximum grant available was €116.48. The maximum grant allowed was doubled in 2006 to €232.94. In 2009, the grant was increased from 25% to 66% of the capital cost of these products with a capping of €460. A budget of €2million was allocated. For 2010 Government allocated a further €4.2 million for solar water heater grants, co-financed through ERDF, to be used over the next 3 years. The grant now is 40% of the eligible costs up to a maximum of €560.

In addition, in the case of Solar Water Heaters installed in new households, Enemalta Corporation is waiving €163 from the connection fee for new electricity supply connection in the same household.

The total installed capacity of solar water heaters in the residential sector in 2008 was estimated at 25,451kWth and equivalent to 64kWth/1,000 capita. Today it is being estimated that around 15,000 installations of Solar Water Heaters are installed in the Maltese Islands.

[6] Recommended value by the Institute of Sustainable Energy following tal-Ftieh housing project.

*Commercial and industrial sector*

In the first call for applications for funds under the ERDF 2007-2013 scheme, operators in the non-residential sectors submitted projects involving the installation of a solar thermal system. The savings from these projects are estimated to amount to 2,330,850kWh/yr. In the second call installations of solar thermal technology amounting to an estimated saving of 1,355,314kWh/yr had been assessed.

*Co-generation*

A Feasibility Study produced in June 2009[7] on the use of combined heat and power has also been submitted. With respect to Directive 2009/28/EC and the NREAP, such technology will help in the reduction of the gross consumption due to its increased efficiency with respect to conventional electricity and heat generation and due to the offsets of electricity distribution losses through decentralisation and power station self consumption. However if renewable fuels are to be used in such technology, as biomass or bio-fuels, the share of the output related to the renewable source part will also contribute directly to the RES target.

**Bio fuels in transport**

Malta has continued to implement fiscal measures to promote the use of bio-fuels - mainly the biomass content of bio-diesel is exempt from excise duty. It is estimated that approximately 1.5 million litres of bio-diesel were sold in 2007 compared to the 0.616 million litres sold in 2006. In the local market bio-diesel is mainly produced from waste vegetable oil. In order to achieve the required levels, bio-diesel may need to be imported.

A legislation setting the obligation of the use of bio-fuels as a share of the fuel supplies is currently undergoing consultation. This is intended to ensure the use of bio-fuels in the transport sector.

[7] http://www.mra.org.mt/library_publications.shtml Analysis of the potential for co-generation in Malta

## *4. Energy consumption data*

### Electricity demand projections

The sent-out figures of electricity till 2020 quoted by studies commissioned by the MRA[8] are also harmonised with other reports related to the Energy Package and the Climate Change Committee report of January 2009[9].

The self consumption figures of both Marsa power station and Delimara power station have been calculated based on data provided by Enemalta Corporation and further projections were based on MRA studies[10] calculated on the estimated generation of the respective power plant and type of fuel used. The estimated[11] interconnection cable losses have also been included.

The electricity distribution losses are being estimated to improve to a level of 5%[12] due to the reinforcement requirements on the local grid to integrate the electricity interconnection between Malta and Sicily as well as through the introduction of smart metering.

### End Use Energy efficiency measures

Malta published its National Energy Efficiency Action Plan in 2008 (NEEAP), aimed to achieve 9% savings by 2016. Most of the measures are being implemented and are ongoing with an effect on the gross final consumption. The net reduction in consumption projected and being adopted per sector by the NEEAP are being assumed and extrapolated till 2020 in the projections for the calculations of the gross final consumption figures.

In this exercise, however, the inclusion of micro-generation of electricity from RES and solar water heating, then being included as energy efficiency measures, have been removed and displaced as figures in the statistics of renewable energy sources, so as not to have double counting related to RES-E and RES-H. Only the gains derived from the elimination of the distribution and generation losses required otherwise to deliver power to the same applications have been considered as energy efficiency measures for such cases.

---

[8] Lahmeyer International: Energy Interconnection Malta-Europe, July 2009

[9] The report submitted by the National Climate Change Committee can be found at www.mrra.gov.mt/cc_report.asp

[10] IDEM

[11] Information provided by Enemalta Corporation.

[12] Information supplied by Enemalta corporation 'Tackling Inefficiencies in 2009"

## LPG market

In Malta Liquid Petroleum Gas, a fossil fuel derivative, is widely used for cooking and heating purposes. Past estimates have projected domestic heating would shift to LPG due to its favoured subsidised price in respect to the electricity alternative. Since the commercialisation and liberalisation of the LPG market and subsequent removal of subsidies in 2009, the price has increased. As the local liberalised market is still in the initial phase and the fluctuations in the fossil oil prices do affect price projections, the shift to gas could be unpredictable. When comparing the energy required from LPG and dispatched electricity[13] for the same energy application, the net gross consumption equivalent is almost the same for both sources. This makes such shift between electricity and LPG ineffective for these particular projections.

## Transport consumption figures

The estimates on the use of petrol and diesel in transport are based on data projections derived from the local transport authority, TM. The public transport reform is expected to have a positive effect on the fuel consumption of road transport through a modal shift of private car use to public commuting.

Electricity and other renewable derived fuels used in transport are also measures that are being investigated. Since no trains and tube systems exist in Malta, electricity use in transport will be addressing individual vehicle systems. The type of charging power and the respective emissions will be a function of the electricity mix supplied over the grid.

As already mentioned for bio-fuels, Substitution Obligation legislation will necessitate a mix of bio-fuels in the use of transport fuels. Cleaner petroleum products, such as the use of auto-gas measures, are also being included, as these displace the equivalent use of petrol vehicles from the transport target calculations, though they still contribute to emissions and the gross energy consumption.

[13] Directive 2009/28/EC is not based on primary energy sources for the generation of electricity, hence plant generation efficiency is not being considered in this comparison.

**Training and Certification of installers**

The University of Malta, as a self accredited body, together with the Malta Resources Authority, is preparing courses for the certification of technical personnel for the installation of solar water heaters and photo-voltaic systems. These training courses will be delivered as per Directive requirement, and will ensure that renewable technologies are installed at their optimal condition, re-assuring the public and consumers of the benefits in such technologies.

It is not to be excluded that other institutions would follow in providing the course as long as the contents are approved by the competent authority.

Legislation would also be reviewed as to guarantee that renewable energy sources systems are installed and endorsed by certified installers.

**Promotional Campaigns**

During the next two years the Malta Resources Authority is planning to organize a national wide campaign to promote energy efficiency and renewable energy amongst members of the public. The campaign will be carried out through adverts and articles published in the media, the distribution of an information booklet to all households in Malta and Gozo and through the participation in fairs. The Malta Resources Authority will also be carrying out a survey to see the perception of the Maltese public about renewables and energy efficiency. The survey will be carried at the beginning of the education campaign and at the end, in order to monitor the success of the campaign.

***Other options being considered***

**Heat-Pumps (Air-conditioners) for heating purposes**

The Directive 2009/28/EC specifies that the use of aero-thermal heat pumps is also considered as a means of renewable energy source, once the driving energy is deducted. The same Directive, in Annex VII, states that guidelines on the eligibility criteria of these technologies still need to be issued by January 2013. In the case of Malta, such benefits will only be reaped from the use of air conditioners for heating purposes. Data is not yet available in order to determine whether there will be substantial potential. Plans to collect this data are being laid out.

**Wave energy technology:**

Wave technology has a lot to offer, though it is a relatively new technology. There are a number of ideas and designs for wave energy devices. It cannot as yet be established what the potential of such technology will eventually be; hence it is yet unknown how much wave energy, if any, could contribute to Malta's renewable energy target by 2020. A report by Scott Wilson, for the Malta Maritime Authority,[14] gives an indication of the wave resource around Malta. A wave energy company which is in contact with MIEMA (Malta Intelligent Energy Management Agency) has shown interest in Malta and its surrounding sea. If wave technology starts to develop in the Mediterranean region it could be an important step towards renewable energy development, and Malta might eventually be able to benefit from it.

**Deep sea wind farms:**

Extensive areas of the Maltese seabed cannot lend themselves for the installation of current offshore wind turbine installations, as these normally require depths not exceeding 30m. The local seabed falls off to greater depths quite close to the coast.

Malta will continue to monitor the advances in the market and will eventually investigate possibilities of new technologies addressing wind farms in deep seas. Indeed, this technology would avoid the more serious objection to wind farms, that is, their visual impact.

**Solar concentration:**

Large scale solar concentration for thermal or photo-voltaic plant installations present a footprint concern, due to Malta's limited land area creating conflicts in land use, the high visual impact in the limited countryside and effects on local flora and fauna. The use of solar concentration for smaller applications, as for example solar cooling, is an option being considered.

**Geo-Thermal:**

The geothermal potential in the Maltese Islands is low grade and may be utilised for ground source heat-pumps. Enthalpy distribution maps for Europe show that Malta lays in a region of low enthalpy suggesting exploitation can only be obtained on a small scale.

[14] Scott Wilson [UK] – Malta Significant Wave Height Study.

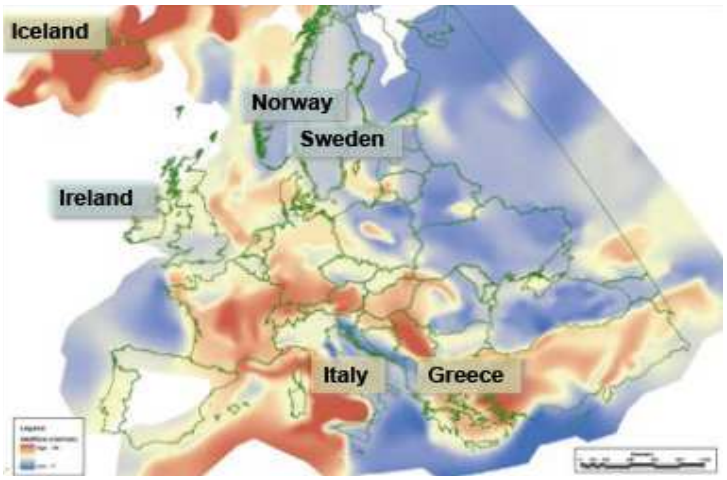


**Figure 1 Enthalpy distribution around Europe**

Geothermal technology should not be confused with the use of ground water for cooling and heating purposes. Given the importance but extreme fragility of the local aquifers in a region of high water stress, the Malta Resources Authority carried out a consultation process on the use of such resource for heating and cooling purposes with the aim of educating users into acceptance of a national policy that safeguards this asset while benefiting from such resource.

### *5. Assumptions, Risks and Concerns*

The data used in the calculation for the projections has been based on data made available to the Malta Resources Authority. Some calculated assumptions had to be taken where information was lacking. Assumptions were based on historical information and experiences, and have been addressed in such a way that their variation would only influence minimally the final results.

It is further assumed that the planned projected capacities and schedules submitted to the Malta Resources Authority will be developed and commissioned as planned.

**Improvements on electricity distribution losses**

Figures supplied by Enemalta Corporation for the power plants' self consumption (Generated units less Sent-out units) and for the Losses in the Distribution (Sent out units less Billed units, thus including technical losses and unaccounted for consumption of electricity) are shown in the table below.

| Year | Percentage Self Consumption | Percentage Losses in Distribution |
|---|---|---|
| 2000/01 | 6.1 | 13.9 |
| 2001/02 | 6.0 | 16.5 |
| 2002/03 | 5.7 | 17.8 |
| 2003/04 | 5.8 | 17.5 |
| 2004/05 | 5.8 | 15.8 |
| 2005/06 | 5.8 | 13.0 |
| 2006/07 | 5.9 | 13.1 |

**Table 2 Power station self consumption and losses**

In studies carried out by Lahmeyer International, estimates of the self consumption of each generation plant with respect to average loading and fuel used were made and these have been used for the expected generation mix planned till 2020. There is an improvement trend due to the inclusion of new plants and the phasing out of the old power plants. For the Malta-Sicily electricity interconnection losses, a study provided by Enemalta Corporation has been used.

As the gross final consumption in electricity is represented by the Sent-out units and the generation plant self consumption, the losses in distribution are already being accounted for. Distribution technical losses are being considered as savings by decentralised generation and energy efficiency measures. The actual figure of the required technical losses is not available, but as predicted through the introduction of smart meters, the above quoted figures should reduce to around 5%. It is further assumed that Enemalta Corporation, through smart metering and through enforcement requirements in the integration of the electricity interconnection with Sicily and the large scale RES projects, will have improvements to a 4% figure[15]. The overall RES target is however not that sensitive to such estimated figures as these will only affect a small share of the electrical gross consumption figures.

[15] Hon. Minister,s comment – In-Nazzjon 30th October "Vantaggi ghall-konsumatur bl-ismart meters"

Below is a table of the projected self consumption figures and the estimated technical losses:

| Year | Estimated percentage Self Consumption | Estimated percentage Technical Distribution Losses |
|---|---|---|
| 2010 | 5.48 | 5 |
| 2011 | 5.49 | 4.9 |
| 2012 | 4.86 | 4.8 |
| 2013 | 4.59 | 4.7 |
| 2014 | 4.39 | 4.6 |
| 2015 | 4.2 | 4.5 |
| 2016 | 4.07 | 4.4 |
| 2017 | 4.09 | 4.3 |
| 2018 | 4.04 | 4.2 |
| 2019 | 3.87 | 4.1 |
| 2020 | 3.83 | 4.0 |

**Table 3 Power station projected self consumption and technical losses**

**Thermal energy equivalent from SWH**

The thermal energy generated by an average solar water heater has always been in discussion. A paper named "Performance Analysis of Water-in-Glass Evacuated Tube Solar Heating Systems in Malta, October 2008, C Yousif, C.Fernandez, V.Buhagiar" defines this at 1650kWh annually. The NEEAP assumes a 5kWh saving for 210 days, giving a result of 1050kWh. "Renewable Energy Potential of the Maltese Islands, R.N.Farrugia, M.Fsadni, C.Yousif (Xjenza 2005)" projects a 5kWh/$m^2$ radiation figure per day. EC 1099/2008 being referred to by the directive defines the solar energy as the heat available to the heat transfer medium; i.e. the incident solar energy less the optical and collector's losses..

**Bio-fuels use and cleaner measures in transport**

The alternative renewable energy sources to conventional fuel used in transport are either bio-diesel for diesel powered vehicles, or bio-ethanol for petrol powered vehicles.

Climate conditions in Malta make the blending of bio-ethanol environmentally harmful unless certain product specific measures are taken beforehand. Due to local temperatures, that are relatively higher than in other EU countries, direct blending of bio-ethanol will increase the content of airborne volatile organic compounds thus Malta stands at a technical disadvantage in using this alternative method, as petrol represents 52% of the projected consumption in road transport by 2020. A different approach is the use of bio-

ETBE as an oxygenate for the improvement of the fuel combustion. A maximum of 22% mix by volume of bio-ETBE as currently allowed would eventually provide 7.7% of energy share deriving from ethanol since this can be blended up to 37% of the bio-ETBE content.

For bio-diesel, the estimated data based on projected fuel needs by the Transport Authority, TM, have been calculated on the assumption that bio-diesel will have a substitution obligation according to suggested future of 10% FAME by volume. The share of bio-diesel derived from waste vegetable oils compared to other kinds of bio-diesel, has been estimated based on the possibilities of local suppliers producing bio-diesel from waste vegetable oils. The remaining balance is assumed to be imported and not necessarily deriving from second generation or waste generated fuels.

It is also still unclear whether measures taken to increase the use of bio-fuels utilising imported bio-fuels would contribute to Malta's GHG emission targets in the non-ETS sector, as the carbon reduction in the life cycle of the bio-element is reduced at source and thus Malta would still need to include the equivalent 'combustion' emission of such fuels in its inventory.

Further measures also include the use of auto-gas. Less $CO_2$ is emitted by vehicles running on auto-gas[16]. In this Directive the consumption of the fleet utilising auto-gas are excluded from the transport target. However their emissions still contribute to Malta's emissions inventory.

These last two points induce conflicting measures.

Alternative measures may include the use of gas extracted from engineered landfills but so far there is no guarantee that the production of gas will substantiate the demand required, especially for public transport. TM is further proposing and will be promoting the inclusion of electrical vehicles, with charging stations complemented by Photo-voltaic systems. These measures are still in the initial phases.

It is being clarified that the achievement of the transport target is not a matter of importing more bio-fuels. This lies due to the fact that fuel quality standards today do not oblige consumers to have an elevated mix of the bio-element in the fuel used for transport. Though higher blending levels are expected to be reviewed as mentioned earlier, car manufacturers might only guarantee a certain level of mix, and this is being assumed at 7%. If both petrol and diesel consumption may mix only 7%, the most evident target achievable is 7%. This can be enhanced only by the utilisation of second generation bio-fuels, not yet commercially available, and by the use of bio-fuels derived from waste vegetable oils, both counting twice as energy content. In the case of Malta the latter type of fuel may still be a problem for the required demand, especially from quantities derived from local waste.

[16] An LPG industry roadmap – by AEGPL – Europe 2009

**Risks on projects proposed.**

The target figure is highly dependent on the strategy, funding and possibility of major projects, the development of legal framework in case of obligations related to renewable sources of energy use and the successes of incentive measures, promotion and public acceptance.

The risks related to major projects may be categorised in:

- Over estimation (detailed actual data may prove otherwise)
- Scale of project may render the project non-economically feasible
- Environmental impacts, health issues and public non-acceptance
- Lack of interested developers and lack of financing possibilities

*Waste to Energy*

The waste to energy projects represents risks as defined above. The emissions of gases or calorific values from the waste mixture may be optimistically estimated. Projects in this category also have a risk of environmental concerns. For instance a waste to energy plant for the treatment of the residual fraction of waste is a highly emotional issue which is dependent on public opinion.

*Wind Farms*

The planning stage for a wind energy generation development involves a number of risks which could lead to the failure of such a project. Some risks may not materialise but others could lead to abandoning the project. Reasons for such failure could be related to cost, time and/or revenue caused by, but not limited to, natural potential. The risks discussed are related to the large scale wind energy developments.

There are generally a number of uncertainties at the initial stages of a development of a wind farm. On-site wind measurement is very important to make estimates of the annual energy yield from a prospective wind farm. Wind measuring campaigns at the three proposed wind farm sites will allow for such energy estimates. A few months worth of data must be gathered until the first energy estimates can be made.

Another risk is related to environment. Before an environmental assessment (Appropriate Assessment or EIA) is carried out at the three sites, the potential impact on local flora and fauna on-site will not be known – at least not in detail. The wind farm site at Ħal Far is in an industrial estate hence the impact is minimised. The one at Wied Rini and the offshore site need to be assessed.

The condition of the seabed at the offshore site is another risk issue. Surveys need to be carried out to evaluate the characteristics of the seabed and its nature. This is important to determine the type of foundation that the wind turbines will need and to plan the route of the export cable to shore.

Other risks could be related to procurement (supply chain), delays and vessel hire (for the offshore project). As data gathering accumulates, better and better estimates of cost and project viability will be made, thereby reducing risk and enabling final decisions to be taken.

*Photo-voltaic Installations*

The uptake of photo-voltaic technology has been and will be promoted through grant schemes or through other incentive mechanisms. The plan includes a number of major installations. Government intends to issue a tender for the coverage of circa 67,263m$^2$ of public space to be allocated to photo-voltaic systems. There is interest from private parties to install photo-voltaic installation of relatively large capacities. This will mainly depend on having an attractive mechanism which will enhance investment in such sector. This latter case represents a higher risk and will substantially influence the projections for such technology in case the project is not carried out.

*Thermal energy through Solar Water Heater*

The projections assume that uptake of solar water heaters will continue in the future. In the past years, there was a huge increase in the number of apartments built throughout the island. Since April 2005 many of these apartments and any three storey buildings were allowed to apply for a permit to construct a penthouse on the topmost floor. This has led to a situation where most apartment residents have no acess to the roof, and hence have no adequate roof space to install SWH. The irregular building patterns also mean that the sun's rays are often shielded by higher neighbouring buildings. Additionally the number of vacant dwellings in Malta is far larger than that of most other EU states. The latest census[17] shows that 43,108 properties are completely vacant all year round – excluding the 10,028 holiday homes which are occupied for some time of the year. One in every five dwellings in Malta and more than one in every three in Gozo are empty all year round.

Earlier this year Government, through the ERDF fund, launched a scheme to subsidise the cost for the purchase of a solar water heater for domestic use. According to advice received through the local Government entity coordinating with the Commission, a solar water heater unlike a photovoltaic unit is not grid connected and thus is not considered by the EU as an energy scheme. Due to this, solar water heaters fall under housing regulations which dictate that such schemes can only be available to cases of social cohesion. In this regard, the solar water heater scheme just launched was restricted to such cases. The scheme has so far been very unsuccessful as the take up rate is very low since it is targeting persons whose income is low and who are not ready to make the necessary capital investment. Besides, most persons on low income live in apartments and often do not have a right to install a solar water heater on the communal roof. The intention of these schemes is to incentivise persons to install renewable energy resources,

however due to a low take up by the persons targeted through this restricted scheme, this aim is not being fulfilled.

*Grid stability issues on integrated large scale RES (electrical) generators.*

Though the Malta Resources Authority has already commissioned a study to investigate the concerns related to the integration of large scale RES (electrical) into the grid, and this study is being finalised, the projects may either be delayed due to the required grid infrastructure upgrading# or might require the diminishing of operational capacities during specific conditions.

*Delay in securing of construction vehicles*

It is to be kept in mind that there is a high demand for renewable technology installations especially for wind farms. There is also a lack of construction supporting vehicles especially for off-shore wind farms. The projects planned for Malta are relatively small and do not benefit from economies of scale. Furthermore, any developer would prioritize larger projects and Malta's projects may consequently be delayed.

*Density of population for integrating on-shore wind technologies:*

The installation of on-shore wind farm technologies presents an issue due to the high population density and due to the fact that any rural area may be quite possibly populated by a number of families inside the required buffer space. Hence the selection of a site having the appropriate requisites for grid connection, access and environmental impacts for an on-shore wind farm is quite limited. The plan to install a first wind farm in an industrial park in Hal Far also envisages such installation to serve to educate public opinion and foster public acceptance.

## *6. The Resultant Projections*

The projections are being reported in similar tables as requested by the National Renewable Action Plan (NREAP)

Based on the currently available information and forecasts, indications would show that Malta estimates to meet all the interim targets and the final 2020 target through domestic means. The 10% transport target may also be achievable based on the conditions defined in the directive pre-amble (9) i.e. subject to production being sustainable, second-generation bio-fuels becoming commercially available and the directive relating to the quality of fuels being amended to allow for petrol and diesel fuels adequate levels of blending.

| As Part B of Annex I to the Directive | | | **2011-2012** | **2013-2014** | **2015-2016** | **2017-2018** | | **2020** |
|---|---|---|---|---|---|---|---|---|
| RES minimum trajectory | | | 2.00% | 3.00% | 4.50% | 6.50% | | 10.00% |
| RES minimum trajectory (ktoe) | | | 9.13 | 14.27 | 22.28 | 33.29 | | 53.46 |

**Table 4 National 2020 target and estimated trajectory targets**

| **%** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RES-H&C | 7.9% | 8.4% | 8.8% | 8.5% | 8.2% | 7.9% | 7.6% | 7.4% | 6.8% | 6.6% | 6.2% |
| RES-E | 0.6% | 1.1% | 1.5% | 3.7% | 6.9% | 7.0% | 9.5% | 14.8% | 14.4% | 14.1% | 13.8% |
| RES-T | 2.8% | 3.0% | 3.3% | 3.6% | 3.9% | 4.2% | 4.6% | 5.8% | 7.1% | 8.2% | 10.7% |
| Overall RES share | 1.8% | 2.3% | 2.6% | 3.8% | 5.4% | 5.5% | 6.8% | 9.7% | 9.6% | 9.7% | 10.2% |
| Of which required from cooperation mechanism | | | | | | | | | | | |
| Surplus for cooperation mechanism | | | 0.45% | | 1.60% | | 1.69% | | 3.14% | | 0.20% |

**Table 5 Estimated trajectory of energy from renewable sources in heating and cooling, electricity and transport**

| **ktoe** | **2010** | | **2011** | | **2012** | | **2013** | | **2014** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency |
| 1.Heating and Cooling | 45.92 | **44.76** | 55.97 | **54.51** | 58.14 | **56.39** | 60.43 | **58.39** | 62.77 | **60.43** |
| 2.Electricity | 225.52 | **215.36** | 231.05 | **219.97** | 238.25 | **226.31** | 244.87 | **232.06** | 251.47 | **237.76** |
| 3. Transport as in Art 3(4)a | 152.21 | **152.21** | 153.57 | **153.54** | 154.93 | **154.86** | 156.29 | **156.19** | 157.65 | **157.51** |
| 4.Gross Final energy consumption | 517.35 | **506.36** | 534.29 | **522.38** | 545.02 | **532.22** | 555.30 | **541.56** | 565.59 | **550.87** |
| | *The following calculation is needed since final energy consumption for aviation is expected to be higher than 4,12%* | | | | | | | | | |
| Final Consumption in Aviation | | 93.70 | | 93.70 | | 93.70 | | 93.70 | | 93.70 |
| Reduced for aviation limit Art 5(6) | | 20.86 | | 21.52 | | 21.93 | | 22.31 | | 22.70 |
| **Total Consumption after reduction for aviation limit** | | 433.52 | | 450.20 | | 460.45 | | 470.17 | | 479.87 |

| ktoe | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency | reference scenario | additional energy efficiency |
| 1.Heating and Cooling | 65.64 | **63.01** | 67.84 | **64.92** | 70.27 | **67.35** | 72.23 | **69.31** | 74.18 | **71.26** | 75.65 | **72.73** |
| 2.Electricity | 258.16 | **243.57** | 264.56 | **249.08** | 270.51 | **253.78** | 276.92 | **258.95** | 283.83 | **264.65** | 290.54 | **270.12** |
| 3. Transport as in Art 3(4)a | 159.01 | **158.83** | 160.37 | **160.15** | 161.66 | **161.41** | 162.95 | **162.66** | 164.24 | **163.92** | 165.27 | **164.91** |
| 4.Gross Final energy consumption | 576.51 | **560.73** | 586.47 | **569.63** | 596.14 | **578.08** | 605.80 | **586.53** | 615.96 | **595.42** | 625.17 | **603.34** |
| | *The following calculation is needed since final energy consumption for aviation is expected to be higher than 4,12%* | | | | | | | | | | | |
| Final Consumption in Aviation | | 93.70 | | 93.70 | | 93.70 | | 93.70 | | 93.70 | | 93.70 |
| Reduced for aviation limit Art 5(6) | | 23.10 | | 23.47 | | 22.70 | | 24.17 | | 24.53 | | 24.86 |
| **Total Consumption after reduction for aviation limit** | | 490.13 | | 499.40 | | 507.08 | | 517.00 | | 526.25 | | 534.49 |

**Table 6 Expected gross final consumption for Malta in heating and cooling, electricity and transport up to 2020, taking into account the effects of energy efficiency and energy saving measures 2010-2020**

| ktoe | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **(A) Expected gross final consumption of RES for heating and cooling** | 3.5 | 4.6 | 4.9 | 4.9 | 4.9 | 4.9 | 5.0 | 5.0 | 4.7 | 4.7 | 4.5 |
| **(B) Expected gross final consumption of electricity from RES** | 1.3 | 2.3 | 3.3 | 8.6 | 16.4 | 17.1 | 23.8 | 37.5 | 37.4 | 37.4 | 37.2 |
| **(C) Expected final consumption of energy from RES in transport** | 3.0 | 3.4 | 3.8 | 4.2 | 4.6 | 5.1 | 5.5 | 6.6 | 7.7 | 8.9 | 12.8 |
| **(D) Expected total RES Consumption** | 7.8 | 10.3 | 12.0 | 17.8 | 26.0 | 27.1 | 34.2 | 49.1 | 49.8 | 51.0 | 54.5 |
| **(E) Expected transfer of RES to other MS** | | | | | | | | | | | |
| **(F) Expected transfer of RES from other MS & 3rd countries** | | | | | | | | | | | |
| **(G) Expected RES consumption adjusted for target (D) - (E) + (F)** | 7.8 | 10.3 | 12.0 | 17.8 | 26.0 | 27.1 | 34.2 | 49.1 | 49.8 | 51.0 | 54.5 |

**Table 7 Calculation Table for the renewable energy contribution of each sector to final energy consumption**

| ktoe | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (C) Expected final consumption of energy from RES in transport | 3.0 | 3.4 | 3.8 | 4.3 | 4.7 | 5.2 | 5.7 | 6.9 | 8.1 | 9.4 | 13.5 |
| (H) Expected additional part RES Electricity in road transport | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.6 | 0.7 |
| (I) Expected additional part consumption of bio-fuels from waste, residues, non-food cellulosic and lingo-cellulosic material in transport | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 2.0 | 2.7 | 3.2 | 3.2 |
| (J) Expected RES contribution to transport for the RES-T target (C) +(2,5-1)x(H) +(2-1)x(I) | 4.2 | 4.6 | 5.1 | 5.6 | 6.1 | 6.7 | 7.3 | 9.4 | 11.5 | 13.4 | 17.7 |

**Table 8 Calculation table for the renewable energy in transport share**

**Contribution indicators:**

The following information is an indication of the contribution of each technology being considered with the planned timing for commissioning.

| Major RES Projects Start-up | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| **Electrical** | WSL landfill gasses 5.4GWh | WSC Ta' Barkat 7.8GWh | Digestor from cattle farm 1.7MWh | Gozo & North MBT 33GWH | CHP in Hotels & industry 19GWH | | |
| | Sant Antnin - MBT 7.6GWh | | | Wind Farm Hal-Far 4.2MW 10GWh | | Wind Farm Wied Rini 10MW 27GWh | Wind Farm Sikka l-Bajda 95MW 216GWh |
| | ME ERDF(2) - PV 2MW 3GWh | MCAST-PV 130KW 0.2GWh | GoM-roofs, UoM, WSL - PV 5.6MW 8.4GWh | GoM-roofs - PV 5MW 7.5GWh | | | |
| | | | | | | | |
| **Thermal** | WSL landfill gasses 7.5GWh | | | Gozo & North MBT # | CHP in Hotels & industry 35GWh | | |
| | Sant Antnin MBT 10GWh | WSC Ta' Barkat 8.2GWh | | | | | |
| | ERDF(2) - SWH 4GWh | | | | | | |

# Heat generation will not be utilised

**Table 9 - Major projects plan**

| % Share of category in Gross Energy Contribution | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Stations | 49.38% | 48.35% | 48.43% | 47.52% | 46.12% | 46.21% | 45.12% | 42.56% | 42.86% | 43.19% | 43.57% |
| Conventional CHP Electricity | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.06% | 0.11% | 0.16% | 0.21% | 0.26% | 0.31% |
| Conventional CHP Heat | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.08% | 0.15% | 0.23% | 0.30% | 0.36% | 0.43% |
| Petrol | 17.83% | 17.17% | 16.78% | 16.42% | 16.07% | 15.70% | 15.37% | 15.05% | 14.74% | 14.41% | 14.12% |
| Diesel | 16.59% | 16.18% | 16.02% | 15.88% | 15.75% | 15.60% | 15.50% | 15.26% | 15.03% | 14.79% | 14.01% |
| Auto-gas | 0.08% | 0.15% | 0.21% | 0.28% | 0.34% | 0.40% | 0.46% | 0.52% | 0.57% | 0.63% | 0.68% |
| Biofuel | 0.69% | 0.75% | 0.83% | 0.90% | 0.97% | 1.03% | 1.10% | 1.30% | 1.49% | 1.68% | 2.40% |
| LPG | 3.79% | 5.45% | 5.47% | 5.50% | 5.53% | 5.55% | 5.57% | 5.61% | 5.64% | 5.66% | 5.70% |
| Aviation Fuel (4.12% of Total gross consumption) | 4.81% | 4.78% | 4.76% | 4.75% | 4.73% | 4.71% | 4.70% | 4.69% | 4.67% | 4.66% | 4.65% |
| Other fuels excluding aviation | 5.72% | 5.64% | 5.70% | 5.87% | 6.04% | 6.30% | 6.43% | 6.67% | 6.86% | 6.98% | 7.07% |
| PV | 0.12% | 0.13% | 0.31% | 0.74% | 0.73% | 0.72% | 0.71% | 0.71% | 0.70% | 0.69% | 0.69% |
| Offshore wind | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.98% | 3.66% | 3.60% | 3.54% | 3.48% |
| Onshore wind | 0.00% | 0.00% | 0.00% | 0.08% | 0.19% | 0.30% | 0.66% | 0.65% | 0.63% | 0.62% | 0.61% |
| Microwind ~ | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Medium wind @ 0.36 GWh per annum ~ | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Energy from waste - Electricity | 0.17% | 0.38% | 0.41% | 1.02% | 2.51% | 2.45% | 2.41% | 2.37% | 2.29% | 2.25% | 2.18% |
| Energy from waste - Heat | 0.23% | 0.44% | 0.48% | 0.47% | 0.46% | 0.45% | 0.44% | 0.44% | 0.38% | 0.37% | 0.32% |
| Solar Water Heater | 0.58% | 0.58% | 0.59% | 0.58% | 0.57% | 0.56% | 0.55% | 0.54% | 0.53% | 0.52% | 0.52% |
| Geothermal (small scale) # | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heat-pumps # | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |

~ Negligable  # To be investigated further

**Table 10 - contribution of each energy sector in annual consumption**

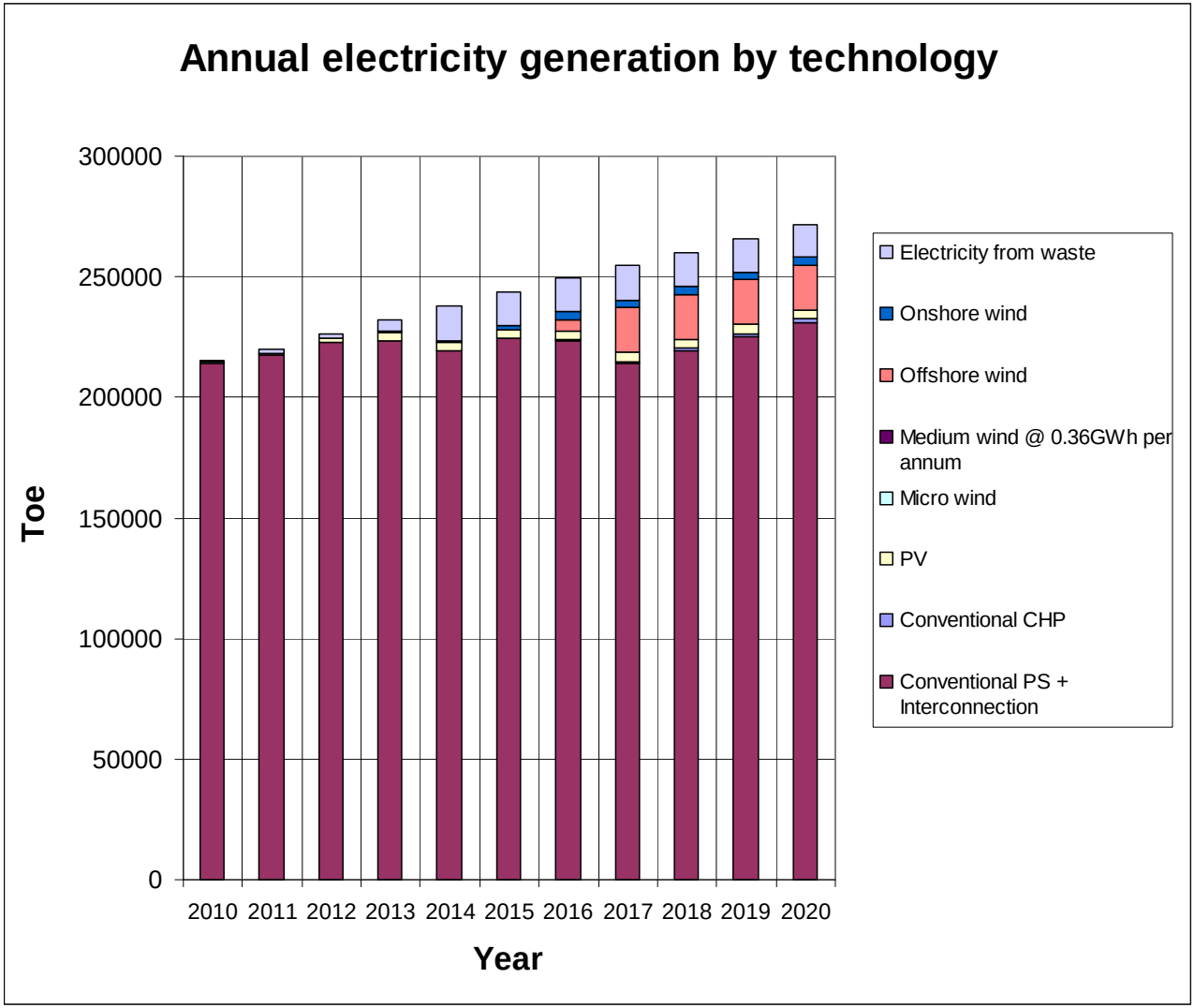


**Figure 2 - Electricity demand and contribution by technology**

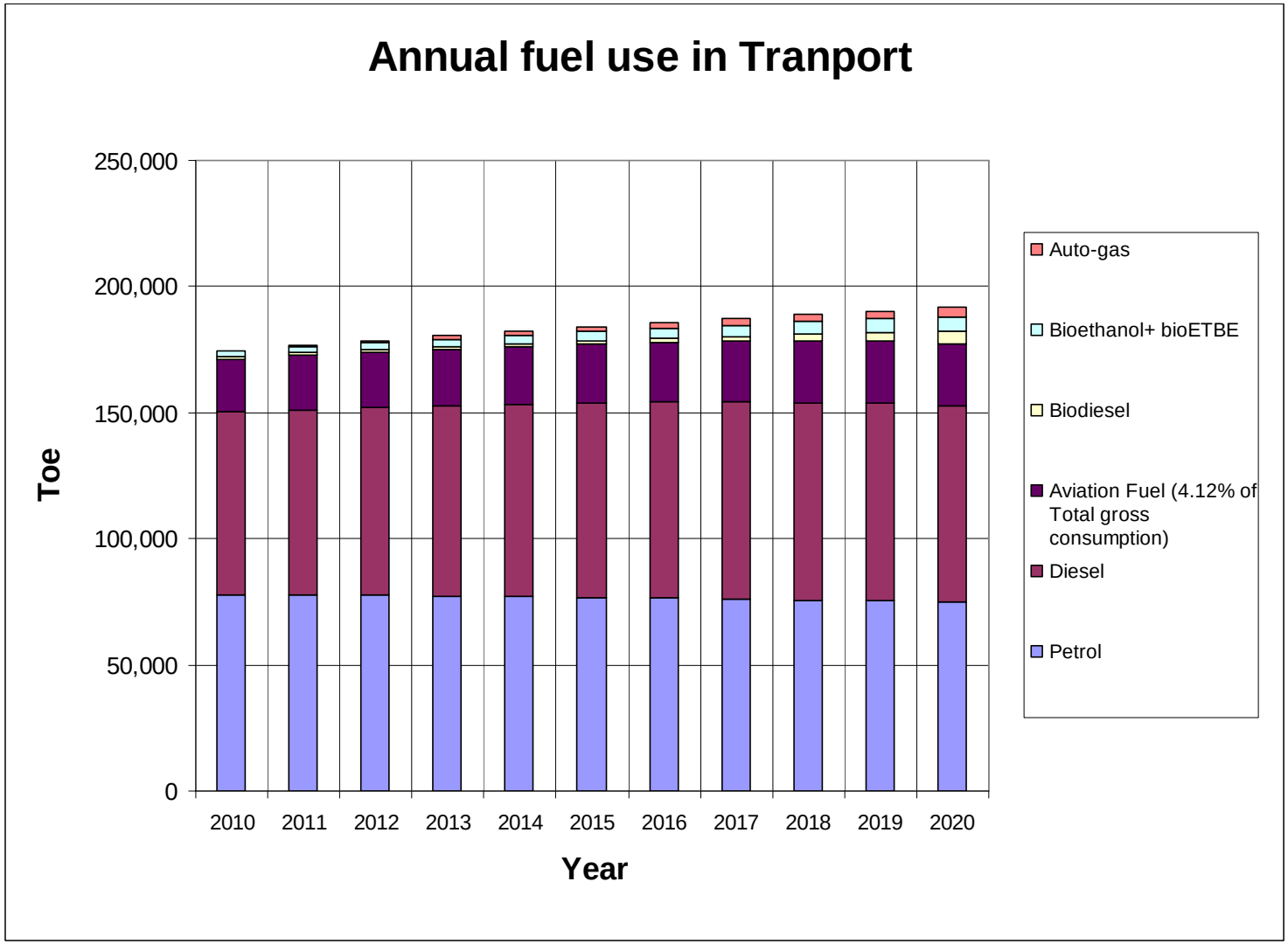


**Figure 3 Fuel consumption**

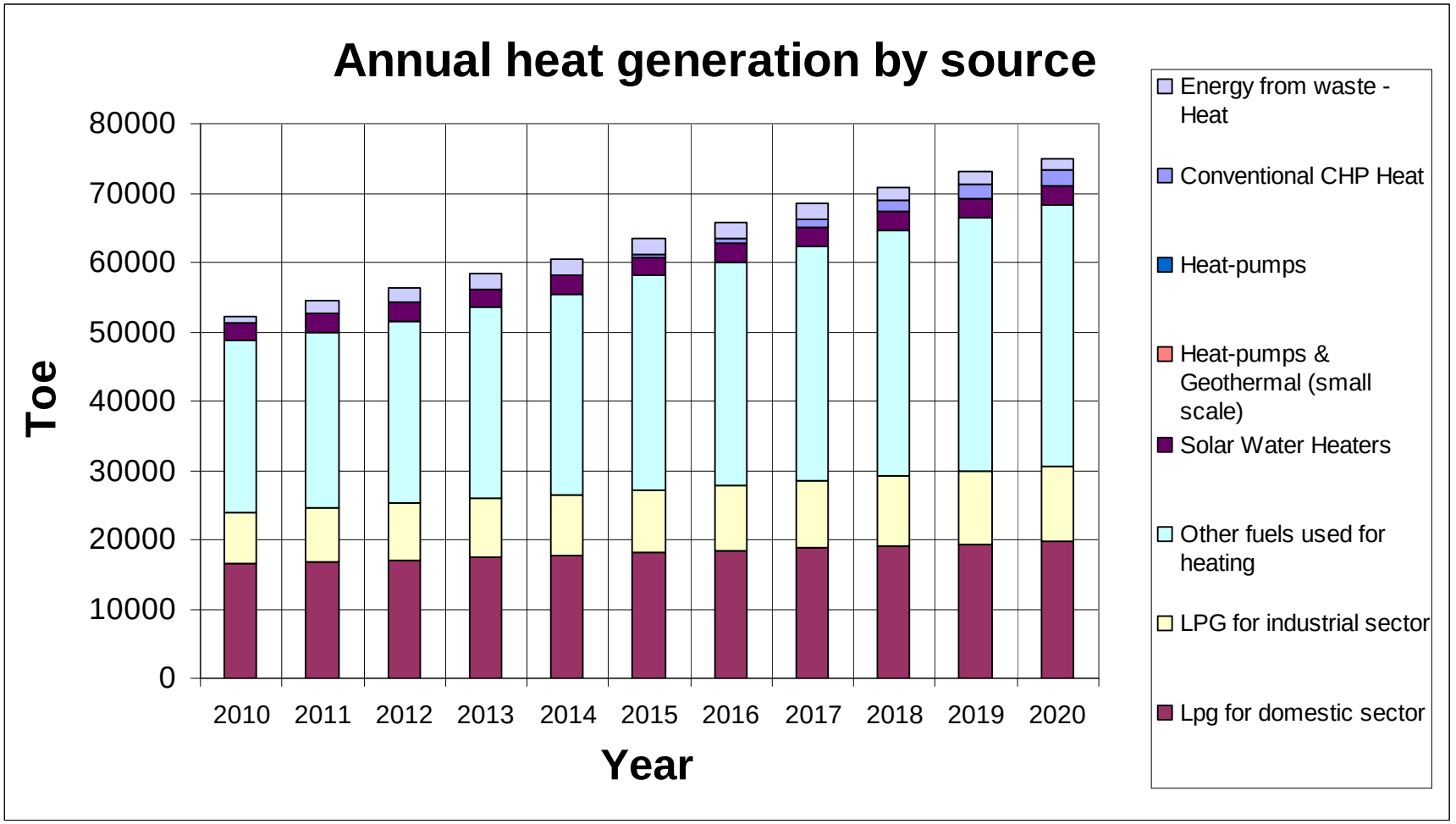


**Figure 4 - Heating consumption**

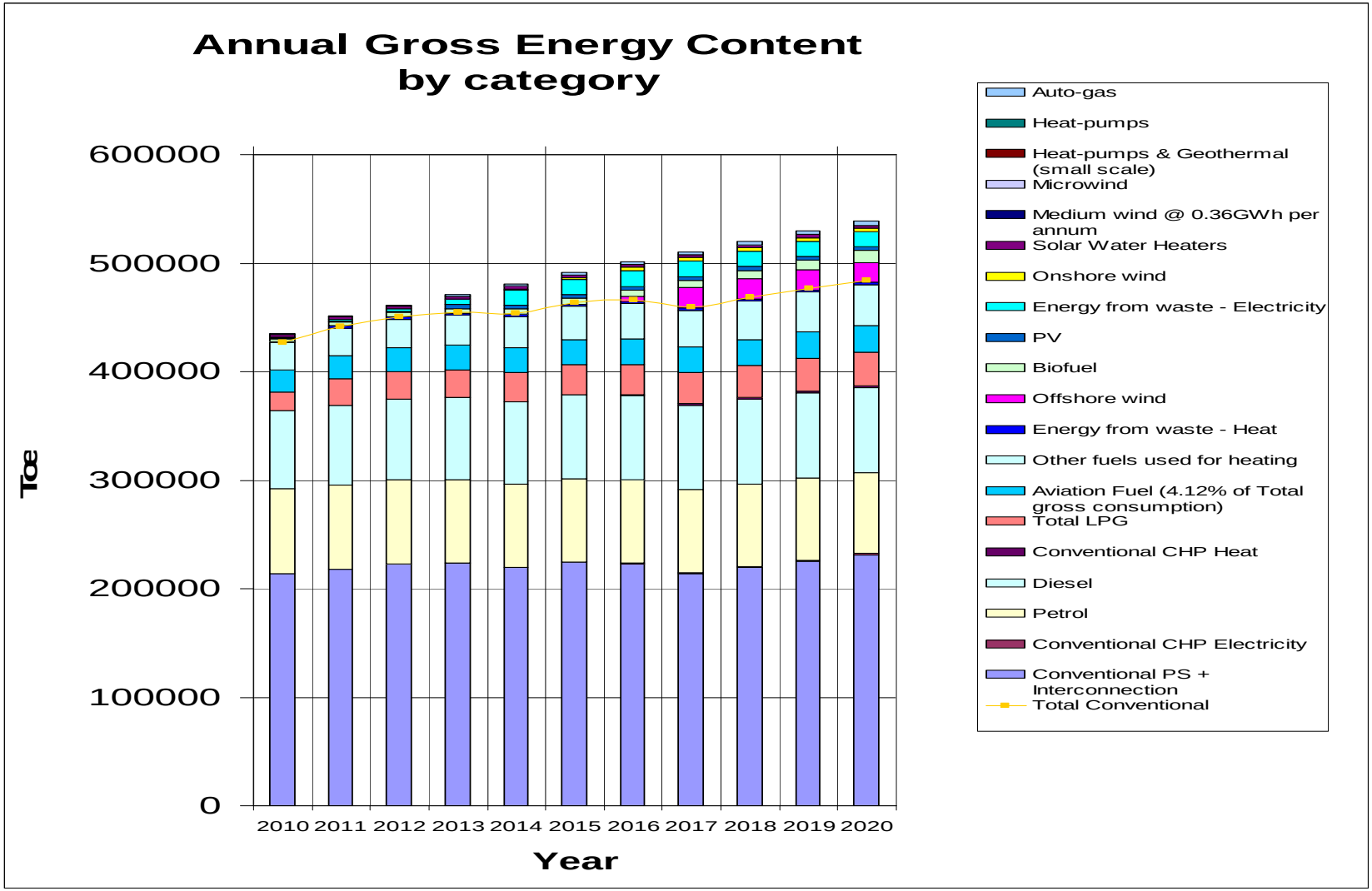


**Figure 5 - Contribution of all energy sources**

**Alternative Plans:**

Though the plans forecasted and projections over the next decade are indicating that Malta would eventually manage its targets, the plan is quite aggressive, as most large projects have substantial risks, and require investments.

As an alternative, it is being recommended that Malta, through diplomatic channels, starts negotiating the possibilities of making use of either/or a combination of the mechanisms available in the Directive, namely:

- Statistical Transfers
- Joint projects, in EU and in third countries,
- Joint support schemes

Such initiative can be followed in the light that if any forecasted project may fail, the overall impact would have high consequences. Some members of the EU are also proposing a subsequent higher target, ideally globally, and though Malta's initial forecast has indicated that Malta would miss its final targets, the reviewed measures now put Malta in a better position as to bargain a better deal.

It must be further clarified, that in case the Malta-Sicily interconnection link is delayed, though such project is required to utilise the whole potential of grid connected renewable energy sources, the mechanisms provided by the renewable directive do not require the physical connection of Malta to mainland Europe, with regards to renewables. This may have different impacts in relation to Malta's GHG inventory as Malta would still need to generate the equivalent power. This holds as well if Malta invests in a renewable electricity generation plant in a third country, either on its own or as a joint venture with an other MS, as long as the consumption of such energy is consumed in the EU community.

However, the role of the MS and the private investor and their interaction is yet not clear. It is not being necessarily expected that the MS Government invests in a project itself, and that certain rules would need to be followed with regards to state aid issues. These are the items which will be further discussed in the coming months.

Nomenclature

| | |
|---|---|
| $CO_2$ | - Carbon dioxide |
| EC | – European Community |
| EIA | – Environmental Impact Assessment |
| EU | – European Union |
| ERDF | – European Regional Development Fund |
| FAME | – Fatty Acid Methyl Ester |
| GHG | - Green House Gasses |
| GWh | – Giga Watt Hour (Energy) |
| ISE | - Institute for Sustainable Energy |
| kWh | – Kilo Watt Hour (Energy) |
| kWp | – Kilo Watt Peak (Power peak capacity) |
| LPG | – Liquid Petroleum Gas |
| MBT | – Mechanic Biological Treatment |
| MIEMA | – Malta Intelligent Energy Management Agency |
| MRA | - Malta Resources Authority |
| MRRA | - Ministry of Resources and Rural Affairs |
| MSW | – Municipal Solid Waste |
| MRF | – Municipal Recycling Facility |
| MW | – Mega Watt (Power) |
| MWp | – Mega Watt Peak (Power peak capacity) |
| NEEAP | – National Energy Efficiency Action Plan |
| NREAP | – National Renewable Action Plan |
| PV | - Photo- Voltaic |
| RDF | – Residual Derived Fuels |
| RES | – Renewable Energy Source |
| RES-E | – RES in electricity |
| RES-H | – RES in heating |
| RES-T | – RES in transport |
| SEA | – Strategic Environmental Assessment |
| SWH | – Solar water heater |
| TM | - Transport Malta |