

STRATEGIC EVALUATION ON ENVIRONMENT AND RISK
PREVENTION UNDER STRUCTURAL AND COHESION FUNDS
FOR THE PERIOD 2007-2013

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National Evaluation Report for Malta

Main Report

Directorate General Regional Policy

A report submitted by



in association with

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EXECUTIVE SUMMARY

See separate document.

1 OVERVIEW AND HORIZONTAL ISSUES

1.1 Country overview

<i>Indicator</i>	<i>Latest year</i>	<i>Trend (2000-04)</i>
<i>Area of country</i>	316 km ² (245.73 km ² Malta and 69.86 km ² Gozo and Comino)	-
<i>GDP per capita (Euro), 28.11.2004 exchange rate</i>	At 2000 prices:9,697 At market prices: 10,766 PPS (2004):16,194 ¹	2000 prices: -0.01% mkt prices: 0.03%
<i>Population</i>	402,700 ²	0.01%
<i>Number of households</i>	127,970 (1)	Not available
<i>Average household income (Euro)</i>	Lm 8202(1) ie EUR 19,105	Not available
<i>Unemployment rate (%) (ILO definition)</i>	Partial 2005: 7.9	0.03%
<i>Sector employment</i>	Agriculture: 3,174 Industry: 43,443 Services: 101,254	Agriculture:0.04% Industry: -0.02% Services: 0.02%
Exchange rate used for this study:0.429314 Eur for 1 Ml (on 28.11.2005)		

Note: all data referring to year 2004, besides (1) from Household Budgetary Survey 2000

Located in the Mediterranean Sea, just south of Sicily, the Maltese archipelago consists of three islands: Malta (from which the archipelago takes its name), Gozo and Comino.

Malta has an area of 316 km² (245.73 km² Malta and 69.86 km² Gozo and Comino) and a population of about 402,700 (including foreign residents) at the end of 2004. It has the highest population density in Europe, with an average of more than 1,250 people per km². Malta is highly urbanised and 23% of the surface area is built-up³.

Its strategic position and a well indented coastline have allowed Malta to develop as an important trading post. The Malta Freeport is one of the Mediterranean's leading ports for container transshipments

Real gross domestic product per head at 2000 prices (at 28 November 2005 exchange rate) was EUR 9,697 in 2004. After strong expansion at an annual average of 5% during 1994-2000, the Maltese economy practically stopped growing over 2001-2004 (slightly decreasing at an average

¹ EU Commission, 2004: Commission Working Document - country profile for Malta which is part of the State aid Scoreboard autumn 2004 update (COM(2004) 750 final of 16.11.2004).

² Eurostat, 2005

³ MEPA, State of the Environment Report 2005,

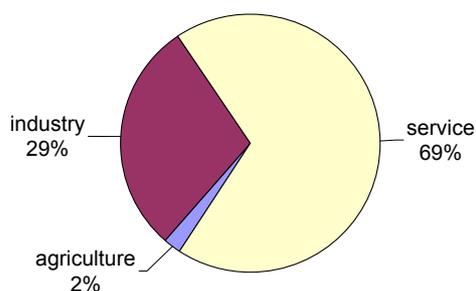
rate of – 0.01%), reflecting intensive industrial restructuring and deteriorating international competitiveness. Labour productivity growth has been well below EU average during the same period⁴. Over the same period GDP per head at market prices amounted at 10,766, growing at 0.03%.

Its total GDP is around 0.04% of that of the EU and it is one of the EU economies that is most exposed to international trade. The per capita income of its citizens is around 69% of the EU average and as a result, Malta qualifies for the maximum rate of development assistance from the EU.⁵

Malta's employment rate is only 54%, despite significant potential gains that could be achieved from the development of human capital⁴. The partial data for yearly unemployment rate, up to October 2005, according to ILO definitions, is 7.9%, thus standing below the EU 25 average rate of 8.7%. Since 2000 though it has been getting slightly worse (+0.04%)⁶, but still better than the EU average.

In 2004 employment was allocated as follows: 3,174 workers employed in agriculture, 43,443 in industry and 101,254 in the service sector (see Figure 1). The high employment in the service sector, occupying up to 68.5% of the whole employed class and rising at an average rate of 0.02% over the last five years, is due to the importance of tourism. Tourism is in fact the main industry, with over 1.1 million tourist arrivals in 2004, with an average stay of 9.35 days/tourist. Tourists increase significantly the pressure on local resources, particularly in the summer season.

Figure 1: Employment by sector in Malta (2004)



The number of households was about 256,000 in 2000, with an average income ranging from EUR 17,796 in Gozo to EUR 19,217 in the slightly better-off island of Malta.

State of the environment

As a consequence of its high population density there is significant pressure on natural resources, due to exploitation of water, energy and natural ecosystems, and to the high level of waste requiring disposal. Also the rising numbers of motor vehicles is having serious impacts on the natural environment. Waste generation is increasing rapidly, underground water is at risk of over-exploitation, sewage dumped into the sea affects the marine environment, GHG emissions registered a steep increase in the last decade. Some of the issues have been already addressed,

⁴ European Commission, 2006: Time to move up a gear – Malta annual report. http://ec.europa.eu/growthandjobs/pdf/2006_annual_report_malta_en.pdf

⁶ Eurostat data, harmonised unemployment rates, <http://epp.eurostat.ec.eu.int>

but further efforts needs to be made to preserve such a fragile and densely populated environment.

State of the environment infrastructure

The main infrastructure system related to environment is the complex system of water extraction and reverse osmosis plants for fresh water supply, though with low reservoir capacity. All households are connected to water supply.

All households are also connected to sewage networks, though the amount treated is still only a fraction (circa 13%) of the amount required by the Urban Waste Water Treatment Directive.

Many improvements have been reached in the waste system, with the implementation of a major new landfill site, with gas recovery system and leachate recirculation which has recently received an IPPC permit, and a system of separate waste collection in progress. There are still challenges with illegal dumping. There are no hazardous waste facilities in Malta.

Following a flood in 2003, investments have been made in widening water courses to reduce the risk of flooding.

As regards renewables, there is as yet little infrastructure, though there is high potential for passive solar (ie rooftop water heaters), wind and, in the long run, photovoltaic. Some of incentives are in place to encourage investment, but the development of RES technologies is still low.

1.2 Status of implementing the European environmental Acquis

The Ministry for Rural Affairs and the Environment (MRAE) is responsible for environmental policy and its integration into other Government policies. MEPA is the lead agency within MRAE responsible for implementing Government policies with regards to the regulation of the environment, including the implementation of the EU Environmental Acquis. MEPA is responsible for most of the Environmental Acquis, with shared responsibilities for the remaining obligations with other national agencies / authorities including:

- Ministry for Resources and Infrastructure
- Malta Resources Authority (MRA),
- Malta Maritime Authority (MMA)
- Malta Transport Authority (AdT)
- The Superintendence of Cultural Heritage
- WasteServ Malta Limited⁷

According to the 2003 EU Enlargement report ⁸ horizontal legislation is now in place and in line with the Acquis. Administrative capacities are in place, but further work is needed within the Malta Environment and Planning Authority (MEPA) to ensure a proper implementation of the Acquis. Up to 2004 Malta recorded five cases of non communication related to the adoption of measures to transpose EU Directives (in the air, chemicals, impact and waste fields), but no cases of non conformity or bad application was reported⁹.

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⁸ EU Enlargement Report, 2003

⁹ EU Commission, 2005: Commission's 6th Annual Survey of the implementation of EU environmental legislation. SEC (2005) 1055. <http://ec.europa.eu/environment/law/as04.htm>

In the field of waste, transitional agreements have been agreed for the recovery and recycling of packaging waste (31 December 2009) and for beverage packing (31 December 2007)¹⁰. Much has already been done for the **establishment of waste recovery and disposal facilities, but their development should continue in order to ensure compliance in accordance with the agreed deadlines**. In 2003 it was estimated that EUR 10 million (plus €10 million for composting facilities) would have been needed to implement the **landfill Directive**¹¹. Currently a lot of effort is ongoing at establishing **'bring-in sites'** and investments will be ongoing for some time to ensure wide accessibility by the population. The collection system (including that for batteries) needs to be expanded. The establishment of recovery and disposal facilities needs to continue in order to ensure compliance in accordance with the agreed deadlines. Furthermore, a clear strategy toward composting and other advanced treatment plants is required in order to reduce landfills share is needed, consistently with the below mentioned National reform Programme (NRP) environmental priorities.

In the area of water quality, further transposition has taken place in recent years, as Malta adopted the Drinking Water, Bathing Water and Water Framework directives. Authorisations for discharges of dangerous substances need to be issued and programmes for discharges of dangerous substances completed. Transitional arrangements have been agreed until 31 March 2007 for complying with waste water regulations and properly dispose of discharges of dangerous substances into the sea¹⁰. The infrastructure still needs to be extended and projects have been planned to build **WWT plants**. In this regard, some major investments have been already planned, while others are still needed. In 2003 it was estimated that full compliance with the UWWT Directive could cost some EUR 98 million¹¹.

While the transposition of the EU Acquis is quite satisfactory, the level of implementation of European regulations is not optimal, especially with regard to SEA.

1.3 Environmental Policies, Strategies and Planning

At the EU policy level, the main objective of the **Maltese Single Programming Document (SPD)**¹² had been to strengthen the competitiveness of Malta's economy in view of the imminent EU accession, whilst maintaining a sustainable use of the environment. The SPD gave attention to the quality of drinking water, waste disposal, nature protection and renewable energy. It also took into consideration the regional distinctiveness of Gozo, in order to address problems arising from the double insularity of the island.¹³

In the **2005 Budget** the Maltese government declared that the environment is one of the administration's main concerns. Two main areas are currently addressed by national policy: biodiversity and climate change.

¹⁰ Draft environmental targets based on Malta's EU & multilateral obligations, prepared by the EU and Multilateral Affairs Unit, Mepa

¹¹ IEEP, 2003: Policy Brief for the EP Environment Committee EP/IV/A/2003/09/01- Progress in the Implementation of Five Environmental Directives in the Acceding Countries. Brief number 06/2003

¹² Planning and Priorities Co-ordination Directorate, Office of the Prime Minister, 2003: Malta Single Programming Document 2004-2006

¹³ European Commission Directorate General for Regional Policy, 2005: Impact and added value of cohesion policy.

http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/impact_en.pdf

The **National Reform Programme 2005-2008 (NRP)**¹⁴, issued by the Ministry for Competitiveness and Communications, set out a strategy to deliver growth and jobs in line with the refocus of the Lisbon Agenda. Its key issues in terms of environment are the following:

- Halting biodiversity loss: Malta is currently preparing a National Biodiversity Strategy and implementing the Flora, Fauna and Habitats Protection Regulations, which covers among other aspects the setting up of the National Ecological Network and the selection of the candidate Natura 2000 sites. Three sewage treatment plants are going to be built, two in Malta and one in Gozo, and the collection system will be upgraded. Moreover, marine-scientific surveys are being carried out to ensure the halt of the loss of marine biodiversity.
- Internalisation of environmental externalities: Malta is currently preparing a local plan for both the ETAP and GPP, and taking the necessary measures to introduce the Polluter Pays Principle.
- Fight against Climate Change: At the moment, Malta does not have any binding greenhouse gas emissions targets given that it holds a non-Annex I status. Nevertheless Malta has assumed various obligations to fight climate change: reduction of greenhouse gas emissions (based on measures aimed at targeting sectors such as energy production, transport and waste), appropriate disposal of waste, and better utilisation of energy sources.

The following priorities have been thus accordingly identified by the NRP:

- Promoting the use of non-conventional sources of water;
- Promoting biological diversity;
- Promoting the development of means of internalisation of external environmental costs and decoupling of economic growth from environmental degradations in line with existing Community legislation and the Environmental Technologies Action Plan (ETAP);
- Fight against climate change.

Among the measures planned by the Malta National reform Programme 2005-2008, the following investments are those mainly related to the scope of this study:

Table 1: Extract from Malta National Reform Programme 2005-2008

Field	Measure	Total (EUR)	Timeframe	Status
Waste water	M05.5 Treatment of all sewage in Malta & Gozo (1)	82,450,800	End 2008	Planned
Water and Waste water	M05.13 Encourage the greater utilisation of non-conventional sources of water, namely treated sewage effluent and surface water run-off, instead of more costly drinking water for uses that are of a non-potable origin.	75,000	To commence by end 2008	Planned
Waste	M05.10 Capture of methane from waste disposal and treatment.	9,997,941	End 2008	Ongoing
	M05.11 Replace existing uncontrolled landfill with alternative engineered landfills and further improve upon the treatment of Municipal Solid Waste (MSW).	56,456,792	End 2008	Ongoing

¹⁴ Ministry for Competitiveness and Communications, 2005: National Reform Programme 2005 – 2008 - Malta's strategy for growth and jobs

RES	M05.12 Promote the increased use of bio-fuels through the exemption of excise duties on their importation as well as by encouraging increased throughput volumes as a result of a pilot collection scheme currently underway for the collection of used cooking oil.	5,393,150	End 2008	Ongoing
TOTAL		154,373,683		

(1) Projects subject to the securing of EU funds for the period of 2006-2008.

Over a total budget of €147.5 million dedicated to environmental projects, the National Reform Programme allocates more than €145 m in the areas of water, renewables and, in particular, waste water and waste (where the main chunk of investment is planned). These projects will be analysed in more details field by field, in the following chapters.

Minor projects are envisaged for the protection of biodiversity (especially marine) and the internalisation of environmental costs (eg through ETAP, polluter pays principle, Green Public Procurement etc).

According to the 2006 Commission's Assessments of National Reform Programmes¹⁵, the Maltese NRF presents the individual challenges in a well structured way, with clear timeframes and budgetary implications for most measures. However, the programme lacks of overall strategic vision integrated across all policy areas. The Commission is pleased by the fact that the environment is placed high on the reform agenda, and almost two-thirds of the funding is allocated to environmental measures. The substantial attention paid to this issue is seen as particularly appropriate for Malta, both in its own right and for the role of tourism in its economy. However, it is added, the link between environmental policies and competitiveness is not presented in the programme.

The major strategic objectives for the environment sector are identified in the **State of the Environment Report (2005)**¹⁶ as follows:

- Environmental data collection and research in order to know where Malta stands and what the best policy options are (esp. biodiversity, waste, environmental health and soil);
- Policy coordination between government ministries and agencies to increase coherence and effectiveness of policy;
- Finding finance to fund environmental improvements across government and the private sector in line with the EU Acquis;
- Drawing on public environmental concern to gain support for public and private initiatives;
- Focusing on impacts that have a serious effect on human health eg. Particulate matter in air;
- Improving capacity for implementation and enforcement of the Acquis;

The Draft **National Strategy on Sustainable Development**¹⁷ presents the Sustainable Development Strategy that is proposed to be adopted by Malta, with reference to the

¹⁵ European Commission, 2006: Time to move up a gear – Malta annual report.
http://ec.europa.eu/growthandjobs/pdf/2006_annual_report_malta_en.pdf

¹⁶ MEPA, 2005: State of the Environment Report

¹⁷ National Commission for Sustainable Development (NCSD), 2006: A Sustainable Development Strategy for the Maltese Islands 2006 -2016 - Third Draft.

environmental, economic and social dimensions. It is aimed at helping society work towards improving the quality of life of all members of society, promoting convergence between the interests of different sectors and layers of society and between the interests of current and future generations. The National Strategy considers the following areas as the main environmental challenges: air quality and climate change; energy efficiency and renewable resources; freshwater; biodiversity; wastes; marine and coastal environment; land use; promoting a sustainable transport system; natural and technological risks; leisure and the environment. For each of these fields strategic directions are proposed. Those more relevant to the purpose of this study will be discussed in the following chapters.

The draft **National Strategic Reference Framework**¹⁸ (NSRF) enlists the principal needs and challenges that Malta faces over the 2007-2013 period, which have been summarised in five categories:

- improve competitiveness
- address deficiencies in physical infrastructures (in particular those related to environment, energy, transport and ICT)
- ensure quality education and training for all
- raise employment rate
- address Gozo's environmental distinctiveness

In line with these assumptions, the Maltese NSRF highlights four strategic objectives to be accomplished in 2007-2013:

- 1) Sustaining a growing and knowledge-based, competitive economy
- 2) Improving the quality of life through environmental protection and urban regeneration
- 3) Investing in human capital
- 4) Addressing Gozo's regional distinctiveness

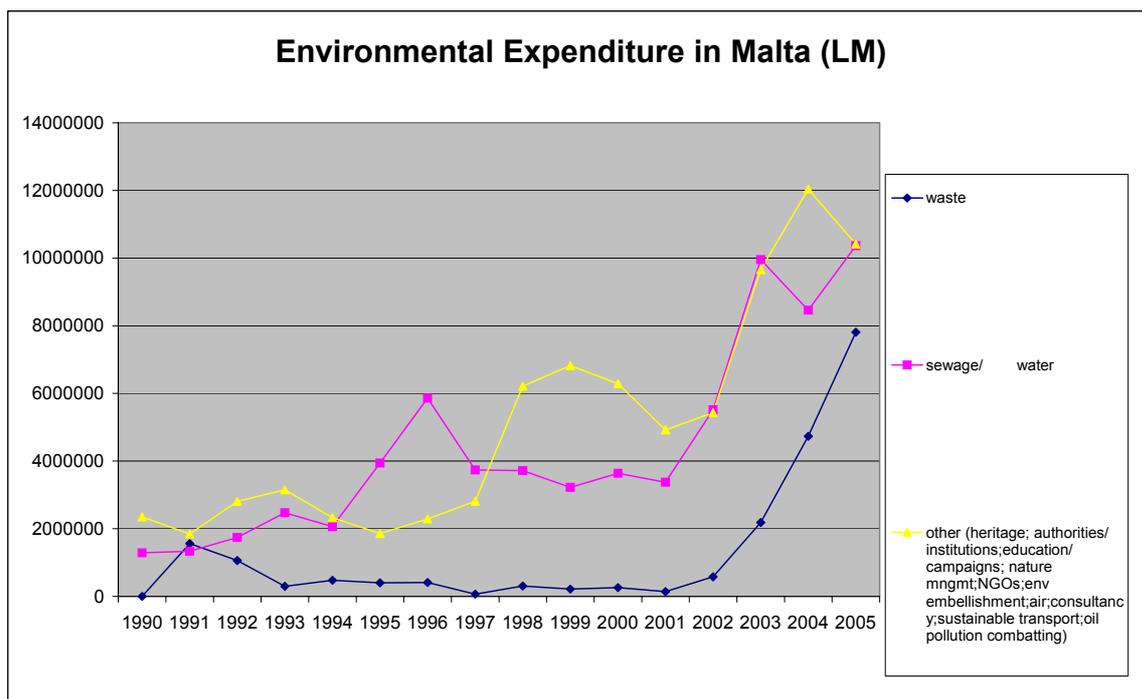
Of these, strategic objective 2 addresses explicitly environment, energy and risk prevention, through a series of potential measures: environmental protection and compliance with the Acquis; waste management; water; energy generation and efficiency; urban regeneration.

1.4 Overview of national environmental expenditure

Observing the historical series of environmental expenditures, it can be noted that investments have been increasing in the last 15 years, with a steep rise of the share of expenditure in waste policies after 2001 (*Figure 2: Environmental expenditure in Malta (1994-2005)*).

Figure 2: Environmental expenditure in Malta (1994-2005)

¹⁸ National Strategic Reference Framework – Malta – 2007 -2013. Draft Document for Consultation. March 2006



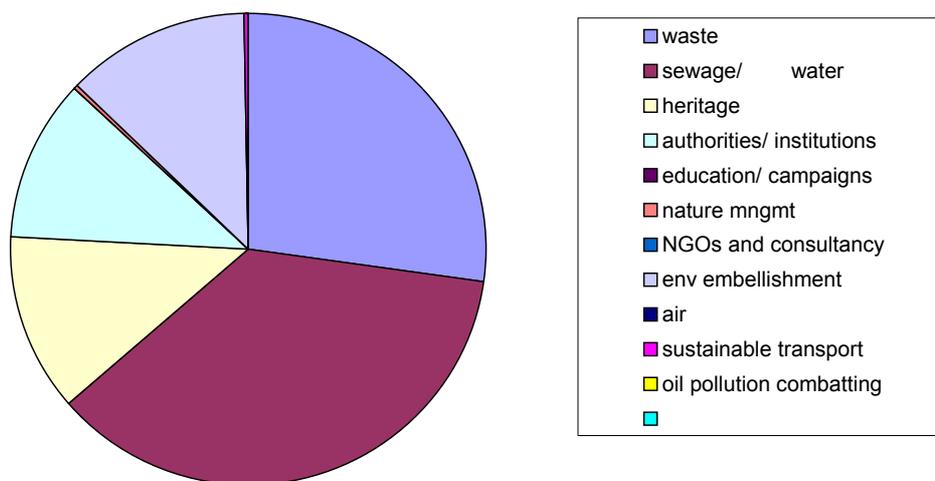
Source of data: State of the Environment Report 2005

In the run-up to EU accession, Malta’s environmental expenditure increased by 87% in the past ten years, from 0.5% of GDP in 1990 to 1.4% in 2004, mostly in the areas of waste management and infrastructure. In 2004 it was estimated that, in order to implement the acquis, new Member States would have needed to spend between 2 and 3% of GDP on the environment. EU funding was partly contributing to covering these costs: it was estimated that in 2005 EU funds, mainly Pre-Accession and Structural Funds, covered approximately 23% of environmental expenditure (about EUR 18,6 m).

In 2005 the environmental budget covered mainly projects in the area of water and waste water (about EUR 24,1 m) and waste (EUR 18,2 m), and fairly significant amounts were spent also on environment embellishment (EUR 8,4 m) and heritage protection (EUR 8,1 m).

Figure 3: Environmental expenditure in Malta 2005¹⁹

¹⁹ State of the Environment Report 2005



1.5 Insights on past programming/funding

Malta benefited from several financial instruments for environmental investments. Structural Funds and Cohesion Funds supported the upgrading of infrastructures related to waste management, air quality and water quality. Transition Facility programmes provided funds for institution building. Pre accession funds financed training and institution building related to the implementation of the environmental Acquis and waste water infrastructures.

Overall, the main priority for this funding has been waste management.

Table 2: Overall structural assistance (Malta) ²⁰

Structural assistance (2004-2006), in millions of EUR, at constant prices									
Objective 1	Objective 2	Objective 3	Interreg	Urban	Equal	Leader+	Fish eries	Cohesi on fund	All structural assistance
63.19	N/a-	N/a	2.37	-	1.24	-	-	21.94	88.74

Structural Funds

Over the period 2004-2006 there was an investment of about EUR 28.75 millions in the environment sector. Of these, almost EUR 0.2 million came from the European Social Funds for training job seekers to assist in the implementation of waste separation at source through a WasteServ project, while 28.5 million have been allocated from the European Regional Development Fund for environment infrastructure, particularly waste treatment, improvement of potable water, sewage transmission infrastructure and air monitoring and nature protection.

Objective 1

²⁰ http://europa.eu.int/comm/regional_policy/index_fr.htm

The whole territory of Malta is eligible for Objective 1 Structural Funds, which have been the major source of funding in the period 2004-2006. The overall aim of the Objective 1 programme for Malta was to strengthen the competitiveness of Malta's economy and to better equip the country to face its economic and social challenges, whilst also ensuring environmental sustainability. In order to achieve this overall objective, three specific national objectives were identified:

- promote environmental sustainability and assist Malta in the implementation of the EU environmental Directives and Regulations
- promote an open and competitive economy and to optimise the use of resources
- ensure that growth is spread equitably across the Maltese Islands

The Structural Funds provided EUR 63.2 million out of a total budget of EUR 86.5 million. Amongst the new Member States, Malta had the largest percentage share of Structural Funds allocated to environmental projects (41%).

The outline environment strategy to guide Structural Funds interventions in 2004-06 was laid down in the Single Programming Document (SPD), which set four priorities. These have been financed as follows:²¹

Table 3: Extract from Single Programming Document

Priority	Issues addressed	Source	EU contrib. (m EUR)	EU contrib (%)	Total cost (m EUR)
1. Strategic investments and strengthening competitiveness	Improvements in the environmental sector, with focus on quality of drinking water, waste, nature protection, renewable energy.	ERDF	39.5	72.2%	54.7
2. Developing people	Improvements of the employability and adaptability of the work force.	ESF	8.8	75.9%	11.6
3. Rural development and Fisheries	Investment in agricultural holdings, processing and marketing of agricultural products; fleet, aquaculture and port facilities.	EAGGF FIFG	7	72.9%	9.6
4. Regional Distinctiveness of Gozo	Addressing problems arising from the double insularity of the island: (transport, tourism, education)	ERDF ESF	6.5	74.7%	8.7
Technical assistance			1.4	73.7%	1.9
Total			63.2		86.5

Table 4: Financial breakdown by funds:

EU Contribution	ERDF	ESF	EAGGF	FIFG
Total : 63.2	46.7	9.4	4.2	2.8
100%	73,9%	0.2	6,6%	4,5%

²¹ Impact and added value of cohesion policy, 2005, and also http://europa.eu.int/comm/regional_policy/country/prordn/details.cfm?gv_PAY=MT&gv_reg=ALL&gv_PGM=2003MT161DO001&LAN=5

The SPD contained measures providing support for environmental projects either directly (through Improving Environmental Infrastructure Measure 1.1) or indirectly through other measures related to transport, tourism, regional distinctiveness of Gozo, as well as rural and fisheries related measures (EAGGF and FIG). It is interesting to highlight that Measure 1.1, which is the one more strictly related to environment, absorbed on its own 33% of the EU allocated funds.

Table 5: SPD Measure 1.1

Priority 1 – Strategic investments and strengthening competitiveness					
Measure 1.1 Improving the environment situation					
Objectives of the measure: to reduce sewage overflows; to minimise use of landfills; to reduce waste generated; to improve air quality; to improve the quality of drinking water throughout the Maltese Islands; to protect nature; to promote renewable energy.					
<i>Total public contribution</i>	<i>ERDF</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
28.55	20.83	73%	7.72	27%	0

Other measures have, indirectly, covered some environmental issues. For instance 6.6% of EU funds was meant for rural development (under measures 3.1 and 3.2). The measures with some relevance for the environment are listed in the table below.

Table 6: SPD other environment related measures

Priority 1 – Strategic investments and strengthening competitiveness					
Measure 1.3 – Support to Enterprises					
Among the eligible actions: supporting environmental initiatives; including environmental management system, waste management, products and materials, energy use, water use, air quality, noise pollution, building and green areas, local culture and guest information;					
<i>Total public contribution</i>	<i>ERDF</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
3.21	1.87	58%	1.34	42%	2.14
Measure 1.4 – Support to the Tourism Sector					
Among the eligible actions: supporting environmental actions to improve the quality and sustainability of tourism services (introduction of environmental/ waste management systems, use of eco-products/materials, resource-saving use of water/ energy and reduction of noise/ air pollution in building facilities and green areas of relevance for local cultural sites);					
<i>Total public contribution</i>	<i>ERDF</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
4.5	2.95	66%	1.54	34%	0
Priority 3 – Rural Development and Fisheries					
Measure 3.1 – Investment in Agricultural Holdings					
Among the objectives: to preserve and improve the natural environment, hygiene conditions and animal welfare standards; to contribute to improving existing, and to the creation of new, sustainable rural livelihoods, through higher efficiency and competitiveness; to improve the rural landscape and environment; to improve the conservation and utility of renewable resources.					
<i>Total public contribution</i>	<i>EAGGF</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
3.7	2.59	70%	1.11	30%	3,67 (1)
Measure 3.2 – Improving the Processing and Marketing of Agricultural Products					

Among the objectives: to encourage a decrease in dependence on natural resources such as water by improving the conservation, recycling and utility of renewable resources, e.g. run-off water, by-products, and processing effluents; to encourage the adoption of adequate environmental standards, including waste minimisation strategies.					
<i>Total public contribution</i>	<i>EAGGF</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
2.30	1.61	70%	0.69	30%	2.30(2)
Measure 3.3 – Fisheries					
Sub-measure 3.3.1 – Fleet					
Among the objective: to balance fishing capacity, fishing effort and fish off-take with sustainable fish stocks; to improve environmental impact (dumping, engine emissions); to comply with environmental, hygiene and safety legislation; to improve product quality.					
<i>Total public contribution</i>	<i>FIFG</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
1.02	0.84	82%	0.18	18%	0.85 (3)
Sub-measure 3.3.2 – Structures					
Among the eligible actions: developing techniques that substantially reduce environmental impacts (in the sub-field Marketing and Processing);					
<i>Total public contribution</i>	<i>FIFG</i>	<i>%EU contribution</i>	<i>National contribution</i>	<i>% national contribution</i>	<i>Private sector contribution (indicative)</i>
2.57	2	78%	0.57	22%	

(1)The total cost of the measure is 7,392,858 Euros of which the EU contribution will not exceed 35% of the total eligible cost, whilst Malta Government contribution will not exceed 15% of the total eligible cost. The private sector contribution is equivalent to 50% of the total cost

(2) The total cost of the measure is € 4,607,143 of which the EU contribution is 35% of the total eligible cost, whilst Malta Government contribution will not exceed 15% of the total eligible cost. The private sector contribution is equivalent to 50%

(3) For fleet renewal and modernisation actions, the co-financing rates will be FIFG 35%, Malta Funds 5% and private 60%. For adjustment of fishing effort and small-scale coastal fishing actions, the co-financing rates will be FIFG 75% and Malta Funds 25%.

A total of 8 environmental projects with the total value of over EUR 33 million have been supported under the Environmental measure 1.1, with three projects in the field of air quality, two in the waste sector, two related to nature protection and one in the field of water. Other projects indirectly related to the environment sector were financed under the other measures of the SPD.

Some synergy was recognizable between projects, some having a preventive approach and others utilising end-of-pipe technologies. For example, some measures are aimed at improving the quality of drinking water after it is extracted, whereas others are aimed at reducing groundwater contamination.

The measures were also assessed against Malta's sustainable development objectives, against national policies and plans and against EU Environmental Directives. For instance, all the waste management projects were a direct move towards the implementation of the Solid Waste Management Strategy for the Maltese Islands, 2001. On the other hand, although measures contained in Priority Axis 3 are related to the Rural Development Plan, they also offer environmental benefits and bring the agriculture industry more in line with EU Directives. Where schemes or grants were proposed, it was being suggested that favorable consideration be given to those projects that make specific reference to environmental upgrading, or in some way affect positively the environment.

With regards to the European Social Fund, that largely address training requirements and equal opportunities, it was considered necessary to add an environmental training component to these schemes to create more public awareness²².

Interreg

Malta was involved in several Interreg projects: Interreg IIIA, IIIB (Medoc and Archimed programme) and IIIC. It received an overall co-funding of EUR 2.37 million. Some details are provided below:

- INTERREG III A: Italy – Malta Programme. The overall aim of the programme was to strengthen the integration between the South East of Sicily and Malta with a view to achieving a sustainable development of the area, in particular regarding the cultural, economic and social aspects.
- INTERREG III B: Archimed Programme. The programme is aimed at the sustainable development the central and eastern Mediterranean regions (ARCHI-MED area), including parts of neighbouring third countries, enhancing their competitiveness, improving the effectiveness of their transport networks and communication systems, and the development of their natural and cultural resources. The Medoc Programme aims to develop a zone of economic integration in the west Mediterranean area.
- INTERREG III C: Malta was involved in a range of projects aiming to improve the effectiveness of regional development policies and instruments through large-scale information exchange and sharing of experience.

Cohesion fund

The environmental sector made up 62% of the Cohesion Fund, for the upgrading Sant Antnin Recycling Plant and Material Recovery Facility (EUR 11.7 million), and for technical assistance in preparation of future environmental projects.

Transition Facility

Transition facility programmes provided financial resources for institution building. The main beneficiaries have been MEPA, which received about EUR 1.17 million for enhance institutional capacity to assist in the implementation of the Air Quality Framework directive, the Habitats and Wild Birds Directives, instruments applying the Polluter Pays Principle, and to enforce environmental legislation and policy. About EUR 1.75 million were allocated to Wasteserv for the implementation of the National Waste Strategy and to promote long-term waste treatment facilities.

Pre accession instruments

Malta was not eligible for ISPA funding, but received financial assistance through a special EU pre-accession financial instrument. In total, EUR 38 million have been provided (for all areas – not just the environment) over the period 2000-04. A large proportion of the financial instrument was

²²Malta Planning and Priorities Coordination Division, May 2005: Malta Objective 1 Structural Funds Interventions 2004 – 2006 - Programme Complement
to the Single Programming Document

used for environmental projects. Among these, the Water Services Corporation received about EUR 6.7 million to prepare the Sewerage Master Plan.

Loans

The Berlin Financial Perspectives provided for EUR 95 million until 2004.

Malta was also eligible for loans from the European Investment Bank (EIB) with EUR 30 million available for this purpose under the Fourth Financial Protocol. The grant element of the Malta-EU Fourth Financial Protocol (1995-1999) consisted of EUR 5 million and an additional EUR 2 million was earmarked for risk capital investments²³. The environmental projects which have been financed by EIB in Malta included sewerage and desalination systems.

Malta qualified for MEDA regional funds and the EUR 6.5 billion MEDA loan facility – of which Malta's share is not specified.

Italian Protocol

Malta obtained about EUR 20 million for the implementation of two projects related to the environmental sector, one for a waste incinerator and the other for the building of the Malta North sewage treatment plant.

Twinning

Malta is also eligible for TWINNING Programmes, and obtained EUR 8.819 million for major projects and EUR 810,000 for smaller self-contained institutional issues through Twinning Light. The projects interested different institutional issues. Environmental issues were quite relevant, and in some cases interrelated to other projects, eg on Health regulation.²⁴

LIFE

Malta benefited from limited LIFE funding. Between 1993 and 2003 more than EUR 2.2 million were obtained for eight environmental projects, among which a project on evaluation of pollution risk and prevention measures in Malta and one on maritime environmental risk management.²⁵

1.6 Administrative capacity issues

The administrative burden imposed by having to comply with the environmental acquis has been particularly severe given the comparatively small size of the Maltese bureaucracy. Some officials in the Ministry for the Environment and MEPA have felt overwhelmed by the transposition/implementation task. The waste sector has been one of the most difficult fields to manage, given the problems related to high population density and the huge process of renewal that the sector underwent in the past years. High density also hampered the implementation of regulations such as the Habitat and the Birds Directives.

²³ <http://europa.eu.int/scadplus/leg/en/lvb/e15112.htm>

²⁴ <http://ppcd.gov.mt/english/twinning/main.htm>

²⁵ <http://europa.eu.int/comm/environment/life/project/Projects/index.cfm?fuseaction=home.home&cfid=10593430&cftoken=4b6f3fd-000caab1-f816-1361-a8f1-8307fc480000>)

The Maltese administrative capacity started to be strengthened in early 2002 by reshaping environmental administrative structures. Malta then adopted a plan to enhance its administrative capacity and started to recruit and train environmental staff²⁶.

Further pressure on the Maltese administrative capacity may be due to the enforcement of new instruments for the application of the Polluters Pays Principle.

The absorption of EU funds has been relatively low up to today. Past experience revealed that investment planning has not always been efficient, and sometimes project timelines did not consider the timeframes for the carrying out of Environmental Impacts Assessments (EIA). Also public consultations should be given more time. MEPA wishes to promote a methodology (eg similar based on Strategic Environmental Assessments) to better assess project proposals, taking into more consideration their environmental impacts. The process should also ensure the respect of Community dispositions for consultation periods, appeals procedures and awarding of tenders. Within the context of the EU's Cohesion Policy such procedures should be completed before projects are approved for co-financing from Cohesion Policy in order to avoid delays in the approval and implementation of the projects. Big projects should have a more integrated approach towards environmental targets.

1.7 Contribution of Complementary or 'Flanking' Measures

Economic instruments

A risk-based approach is being adopted in rolling out a system of environmental permitting, which will streamline major obligations by subjecting them to a permit. A related function is the enforcement of environmental and planning legislation. The development control model where the Authority may fine offenders will be extended to increase the effectiveness of environmental enforcement.

Economic instruments in the form of environmental taxes or charges are currently in use in the policy areas of waste, water, natural resource management, biodiversity, land use, transport and energy. Revenue from environmental taxes is equivalent to 3.4% of GDP or 10.2% of total taxation, while the EU-25 averages are around 2.7% and 6.6% (2003)²⁷. The most developed system of economic measures is that used in the waste sector, where an eco-contribution was introduced in 2004, and extended to a number of items including plastic shopping bags in 2005.

The application of the Polluter Pays principle through economic instruments has strong potential to internalise environmental costs, but so far, however, lack of institutional capacity and the absence of a national strategic framework has limited the application of such instruments²⁸. Nevertheless more efforts have been recently put in the definition of appropriate environmental taxes and charges. The implementation of a system of environmental taxes and charges, in order to introduce the polluter pays principle, is being explored.

Milieu 2003. The enlargement process of the EU: consequences in the field of environment. European Parliament. ENVI 106 EN.

²⁷ European Commission, 2006: Annex to the Communication from the Commission to the Council and the European Parliament - 2005 Environment Policy Review {COM (2006) 70 final}. SEC(2006) 218

²⁸ MEPA, 2005: State of the Environment Report

In the field of transport, the implementation of the polluter pays principle, as a means of internalising external costs (according to NRP relevant priority) and addressing particulate matter air pollution (highlighted by 2005 Environmental Report) should be considered; it could be enforced with a mix of the following measures:

- Pricing access to city (historical) centres
- Parking pricing schemes (higher in more congested or valuables areas)
- Road pricing (that ought to be considered in the implementation of new infrastructures under SF and CF programme).

Revenues could be used to develop sustainable transport systems and incentives for modal shift to less polluting and more energy efficient means of transport (such as intra-harbour or port sea transportation – especially during the summer months).

Public and Private Partnership

Public and Private Partnership (PPP) has not been very developed so far, although some PPP is in place in the landscaping field. Nevertheless the Maltese government is motivated to further explore the option of having more collaboration and burden sharing with the private sector in a broad range of subjects, including the environmental sector. A separate unit on PPP in the Ministry of Finance currently exists.

2 WATER SUPPLY

2.0 Current situation

Type of investment	Physical Indicators	
Water supply (general issues)	Connection rate to drinking water supply (%)	About 100%
	Unit water supply (lts /inh/day)	193 m ³ /inh/day (Aug 04-July 05) (1)
	Total drinking water demand households (million m ³)/year	31,365,981 m ³ (Aug 04-July 05) (1)
	Total drinking water demand industry (million m ³)/year	
	Water price (EUR/ m ³)	Differentiated by water use and socio-economic factors. EUR 1.09 average
Reservoirs (eg to store surface waters and/or groundwater)	Volume in reservoirs (million m ³)	438,010 m ³ (1)
	Associated period of water reserve (days)	5 days ²⁹
Drinking water 'production' plant - ground/surface (quality)	Drinking water production capacity -by source (million m ³ /year) (groundwater, surface water, other)	12,022,073 mc/year desalination 14,343,908 mc/year groundwater (1)
Water transport -	Area / pop of the country self-sufficient in drinking water (%)	About 100%
Distribution of water (includes house connections)	Connection rate to drinking water supply (% population or households connected to systems)	100%
	Geographical variation (min % - max %)	Not relevant
	Continuity of supply (hours/day)	100%
Water loss minimisation	Water losses (% of volume and million m ³ or ILI: infrastructural leakage indicator))	Total: 6.7 million mc/year i.e. 20,376 mc/day 3.68 l/property/year 5.72 mc/km/day ³⁰ (1) ILI 1.5% Gozo, 4.7 Malta Target: 1.5% by 2007

²⁹ Although the period of water reserve is low, the risk of water scarcity is less dramatic given the existence of desalination plants.

³⁰ WSC, 2005: Annual Report 2004-2005

Monitoring	Drinking water sampling points – meeting drinking water quality standards (%)	100% microbiological standards 99% chemical standards, of which: <ul style="list-style-type: none"> • 75% nitrates • 0% Chlorides • 80% conductivity • 35% sodium (1)
Metering (eg households)	Households with metering public water supply (%)	100%
	Households with metering own (ground)water supply (%)	Info not available
Expenditure: Investment (EUR/year) and Operating & Maintenance (EUR/year)		
Public expenditure for water supply and sewage (2005)		24,150,157 EUR

(1) WSC, 2005: Annual Report 2004-2005

Water in the Maltese Island is a scarce resource, particularly in view of the local hydro-climatological conditions, including long dry hot summers, mild winters and heavy intense rainfall over a short span of time followed by long dry spells; a small surface area, but a relatively long coastline; the irregular topographic relief; fractured limestone; and one of the highest population densities in the world.

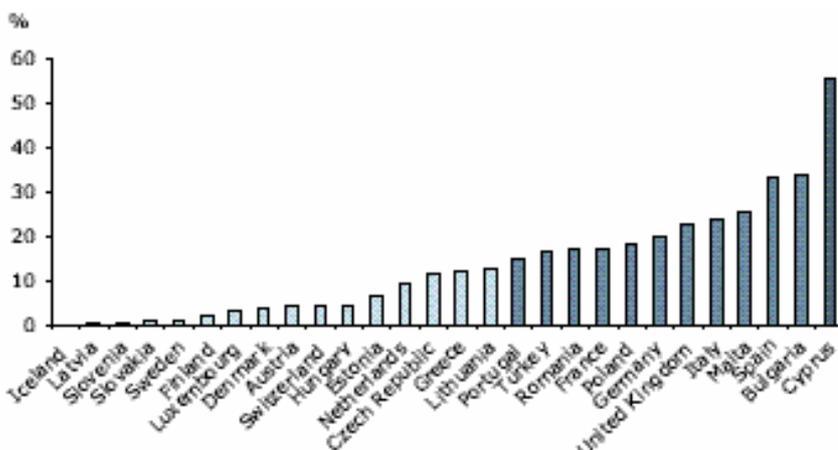
Historically Malta has always had a lack of natural water resources in relation to its needs and it often does not have any significant natural surface water resources. Malta has the lowest water resources index (40m³/year/capita) and the highest water competition index (24,800 inhabitant/hm³/year) in comparison with other countries' Mediterranean basins³¹.

Malta is quoted among the eight European countries considered more water-stressed, The country was ranked fourth in the EEA water exploitation index, right after Cyprus, Bulgaria and Spain.³²

Figure 4 Water exploitation index, 2002

³¹ (data 1995 source Margat J. and Valee D. 1999 Water resources and uses in the Mediterranean Countries: figures and Facts. Plan Bleu).

³² EEA Outlook 2005



Aquifers provide the only natural freshwater source in the Islands, with 16 to 25 per cent of the total annual rainfall infiltrating into the aquifers (importance of land use planning in increasing the share of rainwater reaching groundwater or any water reservoir).. The ground water is exploited for municipal and industrial use, by farmers and other irrigation purposes. Due to the sensitivity of coastal aquifers to abstraction, salinisation is an inherent characteristic. The level of exploitation is high and natural freshwater is not enough to supply demand, thus reverse osmosis plants have been put in place.

Between August 2004 and July 2005, almost 31 million m³ of water were pumped into the distribution system to meet the demand. This amount was obtained from two major sources: groundwater and reverse osmosis plants (see table below)

Table 7: water production by source (August 2004 – July 2005)³³

		m3	Total mc	% over tot
Seawater desalination			17.022.073	54,3
Groundwater potable	Malta	11,997,983	14.343.908	45,7
	Gozo	2,345,925		
			31.365.981	100

The annual supply has been decreasing since 1995, following demand decrease and leakage reduction. The trend of water production may be seen in the figure below.

Figure 5: Trend of production by source³⁴

³³ WSC annual report 2005

³⁴ Ibid. 9

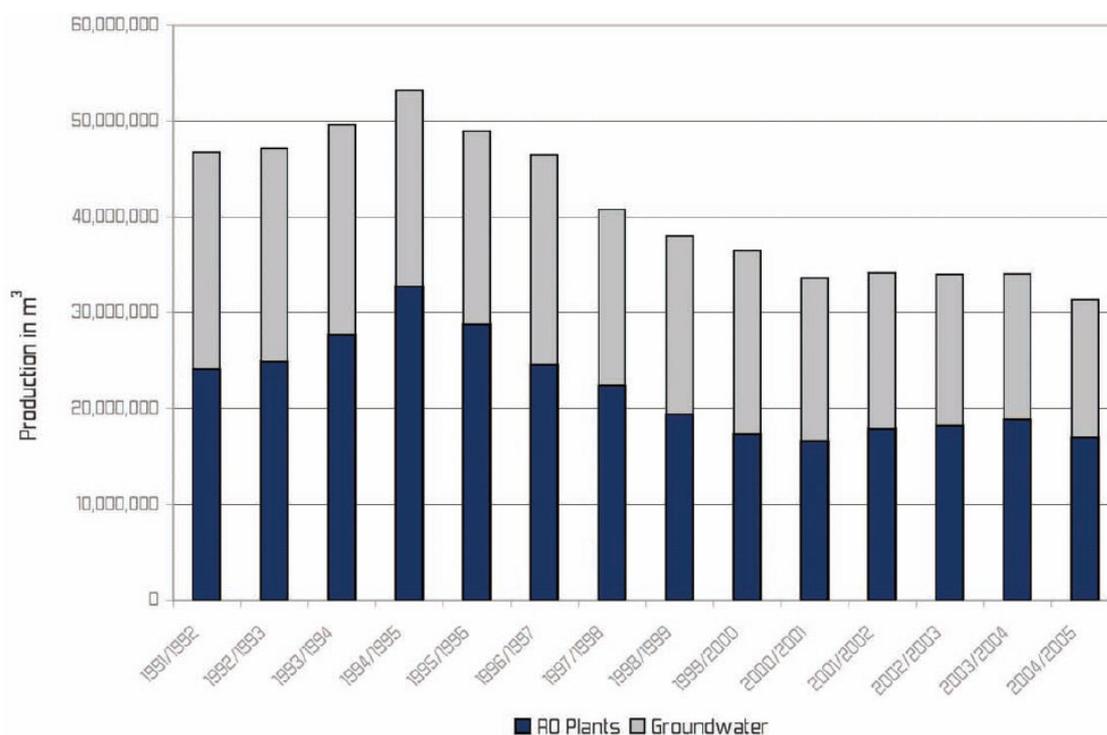


Table 8: Breakdown of water production by source compared with previous years.

	2000/01		2001/02		2002/03		2003/04		2004/05	
	m³/year	change	m³/year	change	m³/year	change	m³/year	change	m³/year	change
RO plants	16,575	-4%	17,825	7.5%	18,228	2.3%	18902	3.7%	17022	-9.9%
Groundwater	16,989	-11.8%	16,212	-4.6%	15,756	-2.8%	15116	-4.1%	14345	-5.1%
Malta	14,665	-13.1%	13,861	-5.5%	13,580	-2.0%	12940	-4.7%	11998	-7.3%
Gozo	2,323	-2.8%	2,351	1.2%	2,175	-7.5%	2176	0.0%	2346	7.8%
Total	33,563	47.4%	34,037	1.4%	33,984	-0.2%	34018	0.1%	31366	-7.8%

Although desalinated water has decreased the pressure on freshwater, the volume of water extracted is becoming increasingly significant due to significant share of (largely unauthorised) private groundwater abstraction, estimated at over 50% of groundwater abstraction and 30% of total water production, highlighting the vulnerability of groundwater to multiple private users.

Even if private suppliers of water for human consumption must now also conform to EU Drinking Water Directive standards, and thus should be registered with the Health Department, none had yet done so as of October 2005, although a small number have applied for registration and are carrying out the required tests. In addition, one water bottling company has been registered since February 2005. Illegal abstractions from unregistered boreholes, as well as stealing of water remain matters of concern³⁵.

Figure 6 Main aquifer blocks in the Maltese Islands³⁶

³⁵ MRA 2004.

³⁶ Malta Environmental Report 2002-03



According to the MRA estimates of 2003 sectoral water consumption, which took into account both private and unconventional water sources, groundwater remains the single most important freshwater production source. Together, private (30%) and WSC (26%) groundwater abstraction were estimated to account for 56% of the Islands’ total water production. Desalination is the second most important type of water production, with WSC production estimated at 32% of total and private production at 2%³⁷.

2.0.1 Drinking Water demand

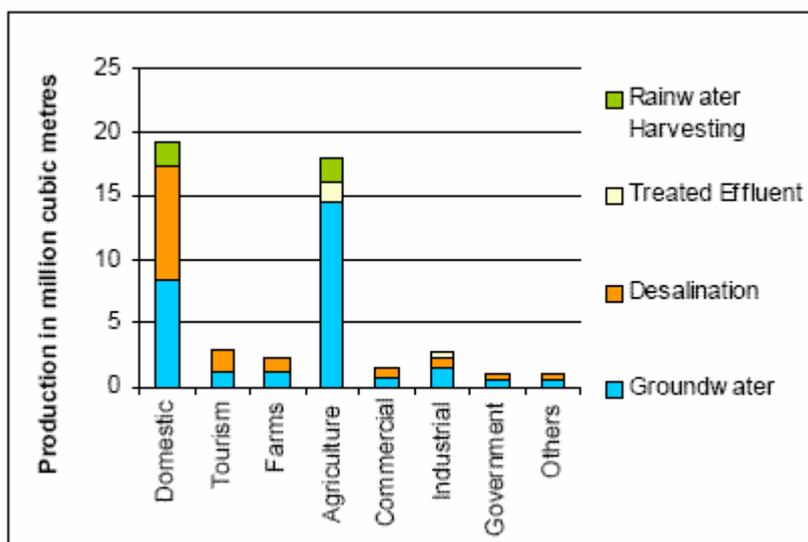
Water production has always been approximately equal to the system demand, due to the fact that the water storage capacity is relatively small. Water demand thus between August 2004 to July 2005 may be approximated to 31 millions m³, equivalent to an average of 193 m³/capita/day. Water demand was partly reduced due to reduction of leakages, and partly by water conservation programmes and tariff increases (above all after 1998).

MRA 2003 estimates attribute 39% of total estimated water consumption to the domestic sector, followed by arable agriculture at 37%. Harvesting of surface runoff and the use of treated sewage effluent (TSE) have been estimated to contribute just 3 and 7% respectively of total. The availability of TSE is expected to increase in the coming years with the coming on line of the planned Waste Water Treatment plants.

Figure 7: Estimates for sectoral water consumption by source, 2003³⁸

³⁷ MRA 2003.

³⁸ MRA 2003



The demand is subjected to seasonality, and it is higher in the summer season. Seasonal variation is more pronounced in Gozo, mainly for the temporary increase in population due to tourists' arrivals.

The water demand of Malta has approximately reached a plateau, while Gozo is experiencing a slight increase. For the near future, it is envisaged that the overall system supply will remain stable, since expected demand increases will be met by leakage reduction.

Table 9 shows the Annual Daily Average (ADA) and the Peak Week Daily Average (PWDA) water demand for the past three years. The System Demand (what is being fed into the distribution system), is the sum of delivered water (what is arriving at the consumer) and leakages.³⁹

Table 9: ADA and PWDA in 2002-2004

Annual Data for Calendar Year	2002			2003			2004		
	mc/day	% change	% of total	mc/day	% change	% of total	mc/day	% change	% of total
ADA Malta	86,360	1.1	93	86,686	0.4	93	82,687	-4.6	92
ADA Gozo	6,899	2.3	7	6,988	1.3	7	7,157	2.4	8
ADA Malta & Gozo	93,259	1.2	100	94	0.4	100	89,844	-4.1	100
PWDA Malta	96,599	0.8		98,287	1.7		94,513	-3.8	
PWDA Gozo	8,864	-2.2		9,836	11.0		9,176	-6.7	
PWDA Malta & Gozo	104,772	0.0		107,951	3.0		103,418	-4.2	

³⁹ WSC, 2005: Annual Report

2.0.2 *Drinking water quality*

Microbiological analysis is performed routinely, and in 2003, 99% of samples collected in different village sample points were found bacteriologically fit for drinking. There were no significant incidences of bacteriological contamination.

Full chemical water analyses are performed according to an Audit Monitoring Programme, which is conducted in line with the requirements of the EU Drinking Water Directive 98/83/EC.

The 2005 water quality monitoring of all potable water at source, distribution and consumer points presented the following results:

- Compliance with chemical parametric values listed in Annex 1, Part B: Compliant, with the exception of:
 - Nitrates: in 2004 nitrate level exceeded the Nitrate Directive trigger-value of 50 NO₃ mg/l in 15 per cent of WSC abstraction boreholes analysed. Contamination is associated with use of nitrogenous fertilisers on arable soil – that rainfall washes into the groundwater
- Part C of the Directive: non compliance as regard to three substances,
 - Chloride: all samples are exceeding the trigger value of 250 mg/l. This standard is not health related, but affect water taste and its corrosion potential
 - Conductivity: 20 per cent of samples are non compliant. Conductivity is related to the level of mineral salt dissolved in water
 - Sodium: 65 per cent of samples exceed the parametric value of 200 mg/l. This standard value is related to water taste.

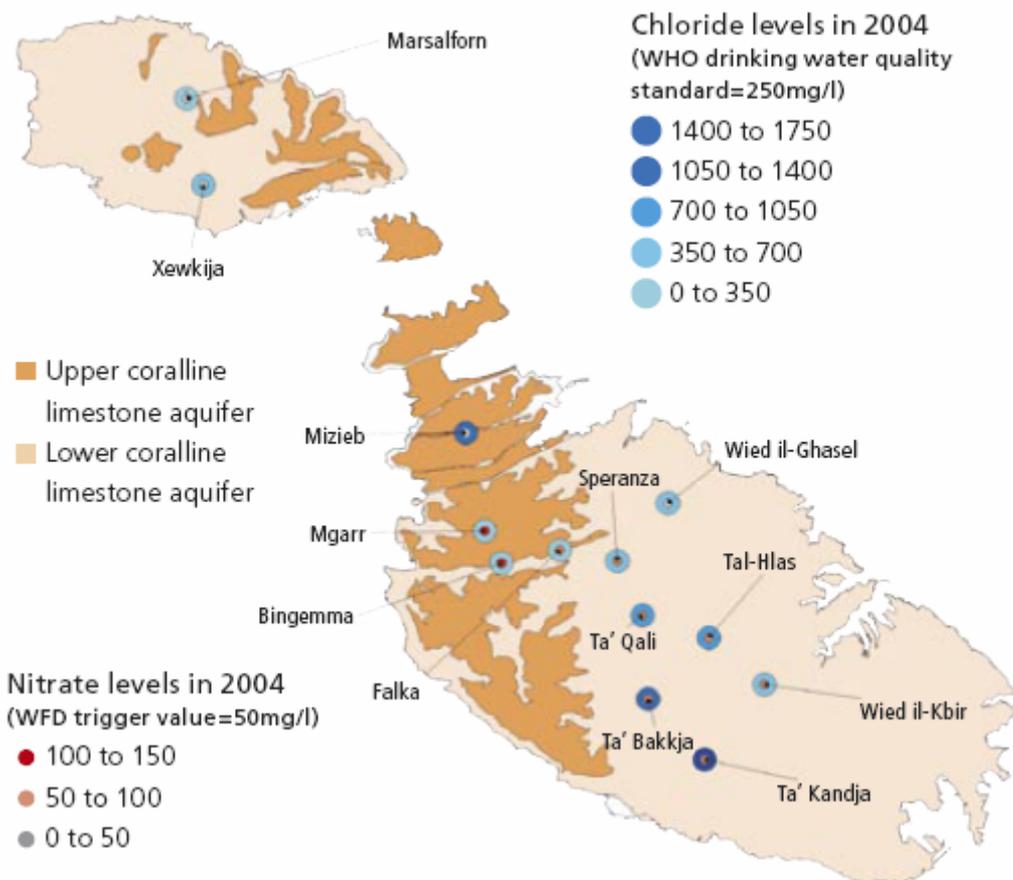
In order to meet EU standards, it is important to lower the level of nitrates and chlorides. Taking into consideration that water networks of Malta and Gozo are independent and that technical solutions leading to standards achievement are dissimilar, different time frames were negotiated in order to meet EU compliance. Thus, the nitrates parameter had to be reached by 2004 in the main island of Malta and by 2005 in Gozo, while the chlorides parameter had to be met by 2004 in Gozo and by 2006 in Malta.

Nitrates are present only in ground water as a result of pollution from fertilisation of agricultural land, waste disposal, wastewater leakage, leaking drains, and activities such as animal breeding. The chemical is not present in water produced from Reverse Osmosis (RO) plants. Therefore, the required standard can be reached if ground water is blended with RO water. Besides, better waste and wastewater treatment is required. In practice, this means ground water cannot be used as single supply source, but has to be collected in reservoirs where the blending with RO water can be carried out. The necessary infrastructural works involves the laying of 8.5km of new mains in Malta and 22.7km in Gozo. The majority of ground water sources has now been connected and all are delivering the water to main reservoirs.

The question of chlorides instead is more complex. Chlorides are present in ground water, as a result of seawater intrusion into the aquifer, as well as in water produced by RO plants, in proportion to the length of time the membranes are used without being replaced. Membranes thus will need to be replaced more frequently, bringing an increase in the cost of running RO

plants. In addition, in order to decrease chloride content, low-pressure treatment plants for the extracted ground water will be built. With this technology, though, Gozo ground water will no longer be able to cater successfully for the demand, due to the 20% reject that the polishing process demands. Water from Cirkewwa RO plant pumped via the existing submarine pipe between the two islands will make up for the shortfall between the reduced supply and the demand for water.⁴⁰

Figure 8 Levels of Nitrates and Chlorides in abstraction boreholes in 2004⁴¹



Source: MRA

With regard to quantitative levels, the WFD requires Malta to ensure a balance between abstraction and recharge of groundwater, and defines 'quantitative status' as groundwater levels where the long-term annual abstraction rate does not exceed the annual recharge. An initial characterisation of Malta's groundwater quantitative status in 2004⁴² confirms that despite data gaps that constrain accuracy, the major groundwater bodies in the Islands are being over-abstracted or are dangerously close to being over abstracted, so that their status is now in jeopardy. This is reflected in decreasing groundwater levels and spring flows. In addition, the

⁴⁰ WSC Annual Report 2003

⁴¹ source: State of the Environment Report 2005

⁴² MRA 2005

increasing urbanisation of Malta is reducing the natural replenishment of groundwater from rainfall since more water runs off into the sea.⁴³

Another concern related to ground water is pesticide contamination, in particular the plant protection products used in agriculture, since pesticide residues in water (and also soil) have a negative effect on human health and ecosystems. The lack of recent data on pesticides concentrations in boreholes water and tap water, together with the market increase of pesticides sells in the last years point to the need for a structured process of data gathering on pesticides in water.

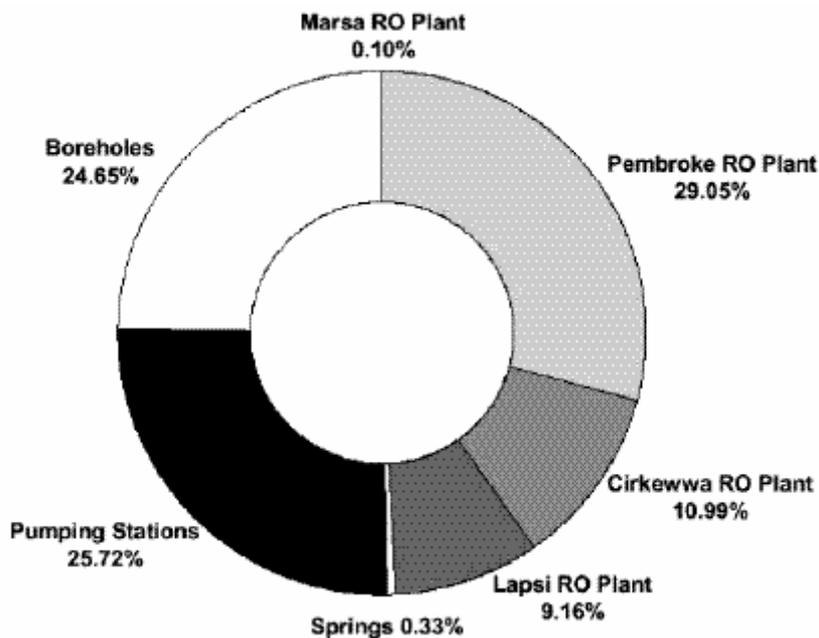
A EU grant was obtained in 2005 to run a project to improve water quality (see paragraph 2.2.4)

2.0.3 State of infrastructures

The Water Services Corporation (WSC) was set up in 1992 to produce and distribute potable water in the Maltese Islands. The Corporation owns three reverse osmosis plants, namely Pembroke, Cirkewwa and Ghar Lapsi. A new reverse osmosis system was commissioned in Gozo in September 2004. The first train, producing 800 cubic metres per day, is designed to serve as a spare while maintenance is done on the other trains, that are yet to be installed and will have a capacity of 1600 cubic metres per day each⁴⁴.

The remaining water is groundwater, ie produced from boreholes and springs.

Figure 9 Water production, 2000⁴⁵



The water distribution network consists of around 2,042 km of underground piping, and it is endowed with around 40 booster pumps to increase the water pressure in the supply mains.

⁴³ MEPA, 2005: State of the Environment report

⁴⁴ WSC, 2005: Annual Report

⁴⁵ Water Service Corporation, 2000

Virtually all households are connected. A substantial portion of the distribution mains used to be, however, old and badly sized, leading to high leakage and water quality problems such as high iron levels.

The water supply is currently meeting the demand, and spillage has been reduced in recent years thanks to a leak detectors' programme. Leakage is monitored and evaluated through the Infrastructural Leakage Indicator (ILI), which measures the existing value of leakage against the 'unavoidable' level of leakage within the network. The ideal value is 1, meaning that existing leakage has been lowered to its lowest possible point. The ILI value for Malta as of July 2003 was at 4.7, whilst that of Gozo was maintained at a value of below 1.5. A more decentralised organisation structure and other technical works will be put in place in order to meet lower ILI levels, namely 1.5 by 2007. Currently the water leakage in Malta amounted to 6,7 mc/year.

The Operations and Maintenance Unit assisted a project of road construction, laying mains in conjunction with the upgrading of the road network. 20 km of mains under construction include:

- Mains to transfer water between reservoirs. This will enable the blending of water from different sources to improve water quality.
- Collection mains to collect ground water from boreholes and pumping stations, and blend this water with RO water found in reservoirs.
- Feeder mains to supply hydraulically-controlled, distribution zones.

In Gozo several new mains were laid, including the continuation and commissioning of the ground water collection network, which enabled the collection of all ground water sources at Ta' Cenc to be treated by the polishing plant installed last year. Two booster stations were upgraded⁴⁶.

Storm water is also a potential source of water – albeit small. During heavy rainfall, surface water flows along the beds of the major valley systems and to retain this storm discharge a large number of small dams have been constructed across most valleys at intervals from their source to their point of discharge into the sea. There are well over 50 dam systems on the Islands with a total capacity estimated at 154,000 m³.

The total capacity of storage reservoirs is around 438,010 m³. This capacity is small when compared to daily demand. Storage reservoirs are pressed into service as service reservoirs and break tanks in order to cater for fluctuations in daily demand patterns. Those available to the WSC do not have sufficient capacity to act as a backup storage in case of major breakdowns in production facilities, let alone cater for increase in demand at peak consumption. Increasing storage capacity is an option that has been taken into consideration, as it will be also needed for reducing the level of chlorides in drinking water.⁴⁷

Incentives will be developed to encourage the greater utilisation of non-conventional sources of water, namely, treated sewage effluent and surface water run-off, in place of more costly drinking water for uses that do not involve human consumption. Feasibility studies will investigate the possibility of distributing treated sewage effluent from the three sewage treatment plants under development to rural areas for use in irrigation.

⁴⁶ WSC 2005

⁴⁷ Ibid. 14

2.0.4 Water prices

Approximately all water users are endowed with a metering system.

Water tariffs in Malta are characterised by a rising block system, with a service charge paid independently of water consumed. The service charge includes a sewerage fee, but there is no transparent mechanism to identify and estimate this component.

Domestic, industrial (namely tourism and manufacturing) and commercial users can apply for rebates, and additional subsidies are available to vulnerable consumers, such as persons receiving social assistance and pensioners. Domestic users and farmers are charged a subsidised rate, with subsidies varying inversely with the size of household in the former case. In the case of water consumption the rate increases with higher consumption beyond a threshold⁴⁸. The service charge includes a sewerage fee, but this component is difficult to identify and estimate. Applicants are charged to obtain a permit for connection to the sewage network.

Water tariff rates have changed four times during the eleven-year period between 1987 and 1999. The table below lists the current tariff rates for the supply of water intended for potable use. The rates charged vary by type of consumer, with different charges for agricultural, industrial or other use. Apparently the increase in water prices received some response, resulting in a slight reduction of water demand.

The revenue generated, received by the National Government and shared with the Water Service Corporation, is earmarked for sustainable water production. However it is not enough to cover costs.⁴⁹ In 2001 the revenue was Lm 11,785,146 (around EUR 27.5 million).⁵⁰

Table 10: Water billed consumption and prices 1999/2000⁵¹

consumer type		no. active accounts	water consumption (m3)	% over total	average consumption charge (EUR/m3)
domestic	<i>residential</i>	160,250	10,547,000	59%	0.79
	<i>social assistance</i>	12,878	715,000	4%	0.56
	<i>others</i>	15,230	173,000	1%	2.24
	Tot domestic	188,358	11,435,000	64%	
economic activities	<i>industry</i>	1054	1,333,000	7%	1.30
	<i>farms</i>	1822	1,139,000	6%	0.49
	<i>tourism</i>	1997	1,448,000	8%	1.98
	<i>government</i>	1935	1,391,000	8%	2.59
	<i>commercial (bar and resto)</i>	1557	290,000	2%	1.96
	<i>commercial (others)</i>	16409	738,000	4%	1.61
	<i>others</i>	662	228,000	1%	0.86
	Tot economic activities	25,436	6,567,000	36%	
TOTAL	213,794	18,002,000	100%	1.09	

⁴⁸ PPP report 06_02_01

⁴⁹ Preliminary Commission services comments on the Malta Strategic Reference Framework for the Cohesion Fund in the Environment and Transport sector for the period 2004-2006

⁵⁰ Preliminary Commission services comments on the Malta Strategic Reference Framework for the Cohesion Fund in the Environment and Transport sector for the period 2004-2006

⁵¹ WSC annual report 2000

Table 11: Tariffs detail

Type of Consumer	Meter Rent		Consumption Charge		
	Lm	Eur	Consumption	Lm/m3	Eur/m3
Domestic			0-33m ³ /person	0.16	0.38
			>33m ³ /person	1.10	2.56
Social Assistance	Free	Free	0-5.5 m ³ /person	Free	Free
			-11 m ³ /person	0.16	0.37
			>11 m ³ /person	0.11	0.26
Agriculture and agro foods	8	18.63	0-2,270 m ³	0.18	0.42
			>2,270 m ³	0.35	0.82
Personal health use in field	4	9.32	0-5 m ³	0.22	0.51
			>5 m ³	0.6	1.40
Industrial	8	18.63		0.85	1.98
Food and beverage	8	18.63		0.6	1.40
Tourist Flats	8	18.63	0-84 m ³	0.75	1.75
			>84 m ³	1.1	2.56
Hotels	8	18.63	0-14 m ³ /bed	0.9	2.10
			>14 m ³ /bed	1.1	2.56
Laundry	8	18.63	0-2,270 m ³	0.75	1.75
			>2,270 m ³	1.1	2.56
Sea Craft	8	18.63		1.1	2.56
Government	8			1.1	2.56
Boat-house, Garden, Garages	4	9.32	0-10 m ³	0.85	1.98
			>10 m ³	1.1	2.56
Non-commercial	4	9.32	0-57 m ³	Free	Free
			57 m ³	0.35	0.82
Commercial and other	8	18.63	0-57 m ³	0.5	1.16
			57 m ³	1.1	2.56

Source: Malta Resource Authority

In order to estimate the cost of water prices for households, the overall charge for the domestic sector was calculated. It should be noted that, for ease of calculation, the domestic accounts called 'others' in table 10 were considered as 'residential'. Also, the water prices referred to are those for highest consumption (ie >33m³/person for residential and >11 m³/person for social assistance, as in table 11).

	m3	LM/m3	eur/m3	total LM	total eur	accounts	EUR/account
social assistance	715,000.00	0.11	0.26	78,650.00	183,199.25		
residential + others	10,720,000.00	1.10	2.56	11,792,000.00	27,467,076.87		
total	11,435,000.00			11,870,650.00	27,650,276.12	188,358.00	146.80

Non-potable water, that is water that has not been examined by WSC as being safe for consumption, is also supplied by WSC. Rates for non-potable water are listed in table below:

Table 12: Non potable water prices

Type of water	Use Intended	Consumption Charge	
		Lm	Eur
Non-Potable	Agricultural	0.04/m ³	0.09/m ³
	Industrial	0.04/m ³	0.09/m ³
	Building or Other	0.4/m ³	0.93/m ³
Treated Sewage	Irrigation	36/ha/year	83.85/ha/year
Distilled Water	Seacraft or aircraft	1.1/m ³	2.56/m ³
Distilled Water	Industrial or Commercial	2.2/m ³	5.12/m ³

Source: Malta Resource Authority

In its effort to introducing the polluter pays principle in environmental and financial policies, the Maltese government is considering some changes in water tariffs. Among the proposed measures, the Maltese is evaluating the option of progressively increase water charges, to reach full cost recovery. Such an instrument should be coupled with other incentives for storage of water and for education on water saving. In order to maintain the average burden unchanged for householders and industries, a system for rewarding efficient users and punish wasters should be implemented. Charges on water abstraction charges, currently not existing, may be also considered in the long term.

Household expenditure and Affordability: Estimated developments in total household expenditure on electricity and water, over the past five years is given in the table below. The share historically was nearer 2% but has risen significantly in 2006 - by around 1 percentage point, to 3%. This reflects in great part the higher electricity costs given a surcharge to reflect international oil prices. It has not been possible to split water and electricity estimates

It should be noted that in Malta most charging systems are done on the basis of 'rising block systems' whereby low usage / low incomes face very low costs and that any developments in pricing will inevitably keep the social elements in place to avoid the vulnerable groups not being able to afford basic resources.

Table 13: Expenditure on water and electricity⁵²

	2000	2001	2002	2003	2004*	2005*	2006+
	Lm'000	Lm'000	Lm'000	Lm'000	Lm'000	Lm'000	Lm'000
Expenditure on Water and Electricity Bills	19,300	21,645	21,208	21,147	21,175	24,470	34,147
Total Expenditure	965,045	1,009,601	1,012,639	1,036,942	1,066,308	1,103,979	1,142,000
% of expenditure spent on water and electricity	2.00%	2.14%	2.09%	2.04%	1.99%	2.22%	2.99%

Source: Household Budgetary Survey (2000) and Camilleri and Cordina 2006.

* authors' estimates

+ authors' projections assuming a 57% surcharge and zero price elasticity in the short run

Box 1: Interesting Practice: Malta Water pricing and social aspects

Maltese water prices are, on average, among the highest of the study countries. This system,

⁵² Prices are kept in Maltese lira for comparability across years – just note that the expenditure in 2006 amounted to about EUR 79,500 (LM 34,147) and total expenditure was about EUR 2.66 million

however, is a 'rising block' system where at lower levels of water use for households the rate per m³ is significantly lower than for higher use.

In 2000 there were nearly 13000 accounts that fell under the social assistance category. This group represented around 4% of total water use in Malta and around 6% of domestic use. Total water used in 2000 was 715,000 EUR/m³. The average consumption charge for the social assistance tranche was 0.56 EUR/m³, while for the general residential sector it was 0.79 EUR/m³.

Rates are higher (1.98 EUR/m³) for the tourist sector and commercial sector (bars and restaurants), where affordability is. Governmental institutions pay the highest charge (2.59 EUR/m³).

Details of the rising block: rates

- For 0 to 5.5 m³/person per year there is no charge.
- For 5.5 to 11 m³/person per year the charges is 0.16 LM/m³ (0.37 EUR/m³)
- For levels above 11 m³/person per year the charge is 0.27 LM/m³ (0.63 EUR/m³)

2.0.5 Institutional issues

The Malta Resources Authority (MRA) is a public corporate body with regulatory responsibilities for inland water (including drainage and sewage waters), energy and mineral resources. The MRA is also responsible for the issue of licences for activities or operations relating to energy, water and mineral resources.

Malta's principal instrument for ensuring the quantitative and qualitative status of water is the Water Policy Framework Regulations, which involves a target to achieve good status of water by 2015.

So far, the cost of water monitoring and testing has been borne directly by the Maltese public authority, but in line with the 'polluter pays principle' the developer may in future be asked to finance the investigations required to process their respective planning application.⁵³

2.0.6 Conclusions

Malta has solved its water supply problems through construction of several reverse osmosis plants. A key concern now is to increase water storage capacity.

Even though desalinated water lowered pressure on groundwater sources, Malta's freshwater is seriously at risk from over-exploitation and pollution. In 2004, nitrate levels at two thirds of WSC abstraction boreholes exceeded the Nitrate Directive trigger-value, so cleaning plants will be needed. Chloride levels in the mean sea level aquifer system indicate that abstraction boreholes are highly threatened by localised seawater intrusion.

Although the supply is able to meet the demand and the concentration of hazardous substances is being monitored, an important issue remains the quality of drinking water. Apparently desalinated water and groundwater have a high concentration of chloride and salt. Most of Maltese population prefers buying water in bottles rather than drinking tap water. Demand for water for irrigation is increasing, leading to an increase in uncontrolled tapping of the aquifer by individual farmers. • The large share of private water abstraction, estimated at 30 percent of total

water production in 2003, highlights the vulnerability of groundwater to multiple private users. So far, no private suppliers of water for human consumption have registered with the Health Department, which would ensure their compliance with Drinking Water Directive standards.

The use of non-conventional sources apart from desalination is low and could be increased.

Further demand reduction should be sought through improved water saving technologies.

2.1 Experience of Previous Investment Programmes⁵⁴

Drinking water projects received funding from ERDF and Interreg Programmes. The financed projects aimed at improving water quality.

Source of funding	Funding instrument	UE contribution (m EUR)	Total cost (m EUR)
EU	Structural Funds	3.20	4.38
	Interreg	0.22	

2.1.1 Structural funds (European Regional Development Fund) (2000-2006)

In 2005 a project on the improvement of water quality obtained co-funding under the European Regional Development Fund (ERDF). The project consists of the procurement of pipes, plant and equipment to be used by Water Service Corporation for the improvement of the drinking water quality. The project is also expected to contribute to better management of the country's freshwater resources, groundwater in particular.

Project title	Full cost (€)	Structural Fund (€)	EU-support (%)
Drinking water quality project (ERDF)	4,383,812	3,200,183	73%

2.1.2 Others

Under the Interreg IIIA Italia – Malta Programme, two projects are related to Water quality:

- Inwaterman: a project implemented by MEPA on the monitoring and management of water resources
- Monitamal: a project held by the department of Biology of the Maltese University on the monitoring of sea water quality, focussing on chemical pollution and marine species

Project title	ERDF amount (€)	Total Maltese Partner Budget (€)
Inwaterman	93,600	124,800
Monitamal	127,500	170,000

2.1.3 Good Practice Lessons or Examples

Good practices

⁵³ Environmental Report 2002-03

⁵⁴ Data from the Office of Prime Minister (OPM) – Planning and Priority Coordination Division

- Investment in desalination plant helps ensure continuity of water supply, reducing the risk of variable renewable resources. It also reduces some pressure on the groundwater aquifers. Waters from desalination plant are mixed with those from groundwater to reduce nitrates concentrations.
- Leakage rates are relatively low (compared to some other new Member States) and there are serious programmes and targets to reduce leakage. Water conservation programmes resulted in a significant decrease of water demand.
- The social pricing with rising block tariff system is a positive example of good practice

Lessons

- Reservoirs are still in short supply in Malta, offering little security of supply.
- Population prefer the taste of bottled water to water from desalination plant.
- There is a lack of a system to collect rain water and hence some potential for better management.
- Water prices are often below the costs of provision – though it is understood that the government is looking seriously at the potential for moving towards prices where costs are recovered more fully.

2.1.4 Conclusion

The system of water supply looks efficient if considering the water availability and the meeting with demand.

Still, more investment should be made in the building of reservoirs, in order to face peak of demand and to allow the meeting of nitrates concentration limit. Further investment is needed in leak control (already planned) and also for capture/collection of rainwater.

Further attention should be given also to the quality of the water provided, in terms of drinkability, as the levels of chlorine from desalinated waters lead to problems of 'taste' for consumers. This would require more regular technological change (more regular change of the membranes) at the desalination plant.

Furthermore, this environmental issue should be mainstreamed in agricultural practice (according to the nitrates directive), land use and waste management, in order to maximize the rate of rainwater being collected or reaching groundwater, and to reduce the nitrates flow (as required by the Sustainable Development Strategy)

The use of non-conventional sources, eg treated wastewater for irrigation, should be increased.

Review of Policy Objectives and Targets

Among the priorities set by the **Malta National Reform Programme 2005-2008**⁵⁵, the government identified the need to promote the use of non-conventional sources of water, namely treated sewage effluent and surface water run-off. Among the measures addressing climate change issues, one is meant to 'encourage the greater utilisation of non-conventional sources of water, namely treated sewage effluent and surface water run-off, instead of more costly drinking water for uses that are of a non-potable origin'. The total foreseen investment would be EUR 75,000, subdivided as follows

Measure	Total (EUR)	2005	2006	2007	2008
M05.13 Encourage the greater utilisation of non-conventional sources of water, namely treated sewage effluent and surface water run-off, instead of more costly drinking water for uses that are of a non-potable origin	75,000	-	25,000	25,000	25,000

The draft **Sustainable Development Strategy** highlighted the main strategic directions for the Maltese government: among these, those referring to fresh water are⁵⁶:

- Adopt a policy with the aim of ensuring the utilisation of the nation's water resources in a manner that is environmentally and economically sustainable.
- Allow the natural biodiversity of surface water ecosystems to be sustained and to flourish, and achieve good ecological status for inland surface waters by 2015 in line with the Water Framework Directive.
- Ensure a reliable, and good quality supply of potable water in accordance to international water quality standards.
- Reduce and prevent further pollution of waters with the aim to achieve good status of all water bodies by 2015 in line with the Water Framework Directive.
- Establish and operate comprehensive monitoring networks for all water bodies in the Maltese islands in order to reliably assess the achievement of 'good status' objectives in these bodies.
- Encourage initiatives for the adoption of water efficiency and conservation measures.
- Introduce effective catchment management and design roads so to maximise the channelling of water towards reservoirs.
- Improve public awareness on the environmental, social and economic value of water.
- Strengthen and enforce regulatory measures with regard to illegal abstraction.
- Encourage the recycling of non-potable sources of water for secondary use.

⁵⁵ Ministry for Competitiveness and Communications, 2005: National Reform Programme 2005 – 2008 - Malta's strategy for growth and jobs

⁵⁶ NCS D, 2006: A Sustainable Development Strategy for the Maltese islands 2006-2016 – Third Draft

- Assess projects that require large quantities of water in order to ascertain that they do not unduly create water supply shortages.
- Optimise the use of second class water particularly in those sectors that make heavy use of water.

According to what was discussed at the 2005 EMWIS (Euro-Mediterranean Information System on the know-how in the Water sector) Steering Committee meeting, The major challenges facing the water sector and the development objectives were considered to be — :

1. Meeting water demand by different sectors.
2. Achieving EU quality standards for drinking water supply.
3. Governance of water resources and fair allocation of water to all users.
4. Managing all water resources in an integrated manner, recognising the diverse requirements of different sectors of the economy.
5. Maximising efficiency and cost effectiveness in the use of water resources.
6. Applying “user pays” and “cost-recovery” principles effectively.
7. Restoration of the aquifers and protecting aquatic ecosystems.
8. Raising public awareness on water conservation.⁵⁷

The recent draft **National Strategic Reference Document 2007-2013** states that Malta strategic direction in the area of water supply is to continue to upgrade relevant infrastructures. Further attention will be given to reservoirs, the efficiency of sea water desalination (in order to reduce its electricity demand) and drinking water quality through improved distribution systems.

The increase of non conventional use of water represents a step in the good direction to lower the pressure on the Maltese water scarce resources, and may be effectively coupled with the development of new waste water treatments. Nevertheless further efforts may be needed to improve drinking water quality, through reducing the content of chemicals such as nitrates and chlorides. In addition, in order to lower the risk of over exploitation, an increase of water storage capacity is necessary. Although those objectives seem quite well understood and covered by the Maltese draft Sustainable Development Strategy, it will be important to develop a clear planning and implementation programme and allocate appropriate financial resources.

2.2 Needs for the future

2.2.1 Demographic and economic trend and projections

Malta's population in 2004 was of about 401,000 individuals, rising at an average rate of 0.01% between 2000 and 2004. Malta has the highest population density in Europe, with an average of more than 1,250 people per km².

⁵⁷ EMWIS Steering Committee meeting, Athens 23 June 2005: Water in Med islands - Malta

According to Eurostat projections, population is supposed instead to increase at an average rate of 0.4% in the next ten year, and at 0.5 % until 2050.

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Malta	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Considering that Eurostat population data for 2005 was 402,700 inhabitants, it is possible to draw the following population estimate:

2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
402,700	404,311	405,928	407,552	409,590	411,637	413,696	415,764	417,843	419,932

It can be thus assumed that over the programme period the population is not likely to increase sensibly and, in general, to remain quite stable around 400,000 units - according to Eurostat.

It has to be noted that population trends may not always be a good estimate of water demand, since also industry and agriculture make heavy demands on the water supply. The MRA 2003 estimates attribute 39% of total estimated water consumption to the domestic sector, followed by arable agriculture at 37%. Harvesting of surface runoff and the use of treated sewage effluent (TSE) was estimated to contribute just 3 and 7% respectively of total. The availability of TSE is expected to increase in the coming years with the coming on line of the planned Waste Water Treatment plants⁵⁸.

In addition, it has to be taken into consideration that Malta hosts more than a million tourists annually. Tourist arrivals make seasonal variation particularly pronounced in Gozo, and increase the pressure on, among others, water resources.

Groundwater in Malta is today under the threat of an increasing anthropogenic activity and slow depletion in terms of quality and availability of resources. The repletion capacity of groundwater is also related to rainfalls, that in Malta are relatively low, especially in summer.

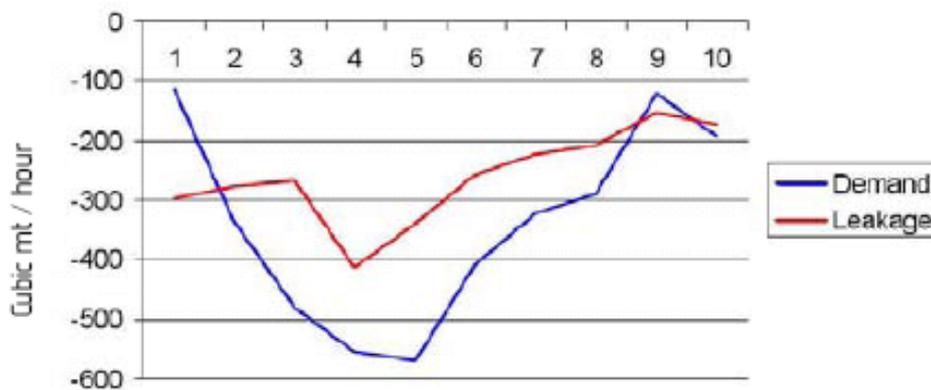
2.2.2 Unit Water Demand

Currently water demand per capita is about 220 litres/inh/day⁵⁹, which is well above the European average of 150 litres/inh/day. The demand has approximately reached a plateau in the Island of Malta, while Gozo is experiencing a slight increase. For the near future, it is envisaged that the overall system supply will remain stable, since expected demand increases will be met by further leakage reduction. Water conservation programmes contributed to the recent reduction of demand. In 2005 water demand has been reduced by more than 2.5 million mc (10% of the total system demand) over the preceding year. Leakage reduction and water control programme may still play a role in influencing future consumption level.

⁵⁸ MRA, 2003

⁵⁹ MRA 2004-2005

Figure 10: Leakage reduction



Source: WaterService Corporation, 2005: Annual report

2.2.3 Total drinking water need

In order to meet EU standards nitrates and chlorides need to be lowered.

Nitrates may be lowered by blending groundwater with desalinated water in appropriate reservoirs. The majority of ground water sources are now delivering the water to main reservoirs.

In order to reduce chlorides content, low-pressure treatment plants for the extracted ground water will be built. With this technology, though, Gozo ground water will no longer be able to cater successfully for the demand, due to the 20% reject that the polishing process demands. Water demand should thus be met through the auxiliary supply of reverse osmosis plants.⁶⁰ Chlorides may also be reduced by refurbishing Reverse Osmosis membranes more frequently, but this will sensibly increase the cost of running reverse osmosis plants.

Other concerns in terms of water quality are related to pesticide contamination and the over exploitation of groundwater sources, worsened by Malta's increasing urbanisation.

In terms of future drinking water demand, it can be assumed that slight population increases, together with increasing pressure from the tourism sector and economic growth are likely to lead to a certain increase of demand. This effect though could potentially be offset further implementation of water conservation measures. Overall, water demand could be reasonably taken as constant (ie around 31-32 million m³).

2.2.4 Physical investment needs

Infrastructures for drinking water production, transport, connection and metering appears to be already in place and meeting demand, although ordinary maintenance and periodical capital stock renewal will be required. There is scope for increasing the capacity of reservoirs and improving the monitoring system.

⁶⁰ WSC Annual Report 2003

Table 2B : Physical investment needs

Type of investment	Indicators	Average scenario
Reservoirs (to store surface water)	Extra volume needed in reservoirs (million m ³)	To be estimated
Drinking water production	Plants in need of investment to improve drinking water quality, surface water production (number)	None
	Extra volume needed of groundwater reaching drinking water quality standards (million m ³)	None
Transport and connection	Long distance drinking water network needed (km) – new and renovation	None
	Local drinking water network needed (km) – new and renovation	None
	House connections needed (number)	None
Monitoring & metering	Extra monitoring points needed	General improvement
	House metering needed (number)	None

2.2.5 Unit Investment & Operating Costs

Table 2C: Unit investment & operating costs

Type of investment	Indicators	Average Investment cost
Reservoirs (to store surface water)	Cost per volume needed in reservoirs (Euro per million m ³)	To be assessed
Monitoring & metering	Increasing the capacity for water and air monitoring (MEPA)	EUR 3 m
		EUR 800,000 pilot for marine water

2.2.6 Indicative Investment Requirement and Comparison – Water Supply

The key priorities for not yet covered investment needs are:

- Water reservoirs – as emergency capacity is very low (circa 5 days)
- Protection of groundwater aquifers which are in danger of facing salt intrusion and hence face difficulty in irreversible quality losses.
- Some water capture devices – as the current support level much lower than needs
- There is currently no metering for private bore holes and this is a major challenge as there is excessive and unregulated abstraction that adversely affects the water table. This de facto subsidy (ie no price paid for the water abstracted) can lead to inefficient use. There is need for investment/funding in

inspection – to check on the illegal boreholes – and make sure that all have abstraction licences.

It seems that the following areas require lesser attention by new EU regional funding:

- Water supply – there are already sufficient reverse osmosis plant to deal with demand, when the new Gozo plant is included
- Water quality sampling – understood to be more or less in place and not in urgent need of additional investment.
- Water quality – there are two main issues: nitrates and chlorides. Chlorides demand the replacement of membranes of the reverse osmosis plants which is understood to be taking place or planned for short term solution. As regards nitrates, mixing desalinated water (low in nitrates) and groundwater (high in nitrates) will address the problem. Apparently suitable mains have been built and have suitable links to reservoirs. EU funds have been awarded for the 'Drinking Water Quality project'.
- All households have metering for piped water – there is the usual upgrade but this does not look like a case for regional funding.
- Water transport and distribution – the networks are all in place and there is regularly need for maintenance and upgrades. No major additional investment required; regular significant scale upgrades take place, most recently with funding support by the Italian Protocol.
- There are ongoing investments at leakage control, though significant further efforts are possible.

2.2.7 Conclusions

To offer a quick summary, key needs in water supply are:

- Reduction of pesticides
- Reduction of nitrates leakage (from agriculture and waste management)
- Increase reservoirs storage capacity/number of reservoirs
- Protection of groundwater aquifers which are in danger of facing salt intrusion and hence face the problem of irreversible quality losses.
 - Increase use of non conventional sources of water (ie treated sewage and surface water run-off)
 - Increase use of water saving technologies
 - Leakage control (enforcing existing programme)
 - Demand control (eg through water pricing and public campaign)

- Restriction of illegal water abstraction (licensing bore holes etc)
- Improvement of reverse osmosis plants (to improve water quality and reduce chlorine), eg through more frequent changes of membranes

2.3 Priority Assessment

Ranking Types of Investment (Rank most important as 1)

Field	Type of Investment	Ranking
Water Supply	Reservoirs	1
	Drinking water production plant	3
	Transport (inc leakage) - long	2
	Transport (inc leakage) - local	2
	Metering	3
	Other: monitoring	1
	Other: illegal abstraction prevention	1

3 WASTEWATER TREATMENT

Acronyms

CSO :	Combined sewer overflow
DS :	Dry solids
DWF:	Dry Weather Flow, the amount of waste water to be treated during dry weather conditions. Can be expressed in m ³ /d or in l/PE/d (= unit dry weather flow)
PE :	Population Equivalent = the amount of waste water produced by 1 person = 1 PE = 60 gBOD/day
STP :	Swage treatment plant = municipal wastewater treatment plant
UWWTD :	Urban Waste Water Treatment Directive 91/271/EC
WWT :	Wstewater treatment

3.0 Current situation

Type of investment	Indicators	
Sewage networks and connections (eg households, small industry)	Sewage connection rates (% of population or households connected);	100% (from 1992 to 2001)
	Km of sewer networks	Approx 400 km
Treatment plant	% of country surface area classified as sensitive area for the UWWTD ⁶¹	To be determined
	Share of population or households connected to STPs	13% (from 92 to 2001)
	Number of agglomerations that have been defined for the implementation of the UWWTD	To be determined
	Number of STP in place that comply with the UWWTD standards (y)	UWWTD NOT TRASNPOSED YET
	Number of STP in place that are not fully compliant (z)	UWWTD NOT TRASNPOSED YET
	Total biodegradable capacity of the above (y + z) plants in PE ⁶²	17,000 m3/year
Sludge management (waste)	Quantity of sludge produced [tons DS/year];	Not available
	Type of sludge treatment used (dewatering, digestion; drying; other);	Not available
	Disposal or reuse route used (agriculture; soil; landfill; incineration; other)	25%

⁶¹ Urban Waste Water Treatment Directive 91/271/EC

⁶² 1 PE = 60 gBOD/day

Expenditure: Investment (EUR/year) and Operating & Maintenance (EUR/year)
See water supply

At the moment only a small percentage of wastewater is treated in wastewater plants, as most of it is directly discharged into the sea..

According to MRA estimates, only approximately 6.4% of sewage discharged at sea was treated in 2004. The Sant'Antnin wastewater treatment plant currently treats between 3,500m³/day and 10,500m³/day of effluent, with the flow being regulated by demand from the agricultural and industrial sectors (the latter making up 25% of demand). However both the agricultural and industrial sectors have noted that the treated sewage effluent has a poor standard particularly due to its high conductivity (4.99-9.56 dS/m). This is principally due to sea water infiltration through confined parts of the sewerage system, dumping of brine reject from inland private RO plants into sewers, and the use of seawater for toilet flushing purposes in hotels⁶³.

Also sewage sludge is currently dumped at sea, as the target to discontinue disposal of sewage sludge at sea by 2004 has not been reached. This has important health complications in terms of the content of heavy metals, the possibility of disease and infection from the contaminated sludge, and risk of loss of marine biodiversity.

The significant volume of water consumed in the Islands places a burden on the sewerage system. The system is further burdened by tourist arrivals, especially during the summer months. This overburdening results in frequent sewage overflows following storms⁶⁴. Following the publication of the Sewerage Master Plan in November 1992, however, several kilometres of sewers in coastal areas have been replaced.

In line with the key national target for this issue, which is to ensure that untreated sewage will no longer be dumped at sea by 2007, Malta has committed itself to constructing three new wastewater treatment plants by this date. It is likely that only one of the three sewage treatment plants planned to treat all Malta's sewage by 2007 will be on board by the target date. The Gozo plant is at the initial stages of construction in Gozo..

3.0.1 Surface water quality

Aquifers

The water contained in the aquifers is over-exploited and is susceptible to the contamination coming from the surface of the ground. Therefore, the increase of the salinity in waters (by the high pressure coming from wells dedicated to irrigation) has a high concentration of nitrates coming from contamination of the ground (from agriculture and residues of the slaughterhouses). The aquifers of Gozo are high in fluoride content.

Bathing Water

⁶³ Cowiconsult 1992

⁶⁴ MEPA 2001

During the last few years, Malta came to recognise even more the importance of safeguarding the marine environment and has devised a monitoring programme jointly with the Department of Public Health, aimed to attain a level of quality according to the agreements reached by the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its Protocols.

With respect to the Barcelona Convention standards, in 2004 83% of bathing sites monitored in Malta classified as First Class, which represents an overall improvement from 1996 55% (although 2002 had 98 percent of sites classified First Class). Between 2001 and 2004, all bathing sites complied with the EU Bathing Water Quality Directive criteria, and at least 84 of the 87 sites monitored achieved optimum standards. 204

Faecal coliforms (FC) are the basic indicator for determining bathing water quality with respect to sewage. The Barcelona Convention requires that at least 90 percent of the total samples do not exceed 1000 counts per 100 ml, and also that in at least 50 percent of the samples FC counts do not exceed 100 per 100 ml. During the years 2002 and 2004, few of the samples indicated more than 1000 FC counts per 100 ml of seawater.

Although Malta's bathing waters meet Bathing Water Directive quality standards and mostly meet those of the more stringent Barcelona Convention, coastal waters inside harbours and near sewage outfalls (St. Paul's Bay and Birzebbuga), power station thermal discharge points, and to a lesser extent, in the vicinity of fish farms and Magħtab, remain a matter of concern⁶⁵.

3.0.2 State of infrastructures

Although approximately all of the population is connected to the sewage system, only 13% is connected to sewage treatment plants. Most sewage is currently dumped at sea, and the target to discontinue disposal of sewage sludge at sea by 2004 has not been reached. Hence of the around 67000 or 85 000m³ of waste water per day only around 9 000m³ are treated per day and 58 000 m³ per day remain untreated.

In some remote areas UWW is still catered via a system of cesspits which are emptied periodically and discharged through a selected number of monitored discharge points. The latter are located within the boundaries of bordering catchment areas discharging to the coastal waters. The Sewerage Master Plan commissioned in November 1992 proposes a series of improvements and upgrades to improve on the current system, which would amount to EUR 12 million EURO.

Sewerage system

The significant volume of water consumed in the Islands places a burden on the sewerage system. The sewerage system is currently burdened by the significant volume of water consumed and by tourist arrivals during the summer months. In the past this overburdening resulted in frequent sewage overflows following storms⁶⁶. Several kilometres of sewers in coastal areas have been replaced in order to face this problem.

⁶⁵ MEPA, 2005: State of the Environment Report

⁶⁶ MEPA 2001

In 2004 approximately 4.9 km of new sewer pipes were built, while about 2 km of extensions were carried out in the first half of 2005

The 'South Sewage Treatment Infrastructure Sewage Master Plan' will bring a major sewerage infrastructural upgrade in the South of Malta. The project will consist of the construction of 4.1km of pressure mains, a new 4.7km gallery and the upgrading of the Marsa sewage pumping station. The scope is to eliminate existing overflows to 'Il-Menqa tal-Marsa', Kalkara Creek and Paola by the year 2007. The project will be co-financed through the EU ERDF 2004-2006 Programme (EU 73% and 27% Local), and its estimated cost is mL 3,885,000 (Eur 9 million). The upgrading of these infrastructures will also benefit the future waste water treatment plant, which is planned to be built in the same area (see below).

A feasibility study was finalised on Bahrija in order to assess solutions to frequent sewage overflows resulting from the deficient existing sewerage system.

Another project, the Hal Far Industrial Estate sewerage scheme, was intended to address the existing sewage overflows in Wied Znuber to which all the sewage generated at the Hal Far Industrial Estate currently discharges untreated. A 1.7km pressure main and a 250m long gravity main were completed in November 2003. The building of a new sewage pumping station started in October 2005.

A project in Gozo aims at replacing the gravity and rising mains to eliminate the sewage outflow at San Blas. 1.6km pressure main were built in Nadur, in order to redirect sewage generated there produced to Ta' Mgarr ix-Xini, close to the site where one of the new urban waste water treatment plants is planned. A tender for a new sewage pumping station in the same locality will be awarded shortly⁶⁷.

Treatment plants

In Malta there is a single wastewater treatment plant, in Sant'Antnin – the Sant Antnin Sewage Treatment Plant (SASTP), which has the capacity to treat 17,000 m³/day of sewage⁶⁸, and it is currently treating between 3,500 and 10,500m³/day of effluent. Only 12 per cent of sewage is re-used by industry and agriculture, and the second class water produced has a poor standard particularly due to its high conductivity, due to sea water infiltration through the sewerage system, dumping of brine reject from Reverse Osmosis plants into sewers, and the use of seawater for toilet flushing purposes in hotels⁶⁹. The remaining wastewater is disposed untreated at Wied Ghammieg with an estimated annual rate of 18 million m³/year and a mean daily rate of 58,000 m³/day. The frequent rupture of the 716m long submarine pipeline implies that undiffused sewage is discharged at a distance much closer to the shore than actually intended⁷⁰. Wastewater in the northern Malta catchment is conveyed to two outfalls on the western coast.

In line with the key national target to ensure that untreated sewage will no longer be dumped at sea by 2007, Malta has committed itself to constructing three new wastewater treatment plants by this date, two of which in the island of Malta and the other in Gozo. It is now unlikely that the plants will be ready for that date, and they are now planned to be completed by the end of 2008.

⁶⁷ WSC, 2005

⁶⁸ According to Ministry of Environment, 2001

⁶⁹ Cowiconsult 1992

⁷⁰ Ibid. 28

The Gozo urban waste water treatment plant is co-financed through the EU 2003 Pre-accession Programme (EU 51%:Local 49%) whereas the Malta North urban waste water treatment plant and transmission infrastructure is covered by the 5th Italian Protocol Agreement .

The combined volume of sewage to be treated at the Gozo and Malta North Urban Waste Water treatment plants will be 12,000m³/day. The existing sewage transmission infrastructure already directs the sewage to the earmarked sites, where sewage is currently being discharged to the sea.

The Malta South urban waste water treatment plant will have a capacity to treat an average flow of up to 50,000m³ per day. The plant will be equipped with digesters for energy recovery to run under its own steam. The project will be proposed for EU finding under the next programming period.

This additional capacity will go a long way towards bridging the gap in treatment levels. The new plants are expected to be able to improve the treatment rate up to 100%.

3.0.3 Prices of the waste water service

Water Services Corporation (WSC) is also responsible for waste water. An annual licence is issued by MRA to WSC for the provision of sewerage services using the public sewage collections system. The quantum of this licence is not currently established in any particular legislation and appears to have been established on an ad hoc basis at Lm 25,000 (around EUR 60,000) per annum.

Discharges into the public sewers are controlled under the Sewer Discharge Control Regulation, which lists down those effluent discharges which are prohibited, and those discharges where a permit is required. These permits are subject to a Lm5 (about EUR 11.6) charge for first application, and for any subsequent application which is not a renewal. Up to 2001 there were 5,199 permits for effluent discharges.

In addition a sewage contribution fee is imposed on non-commercial buildings, ranging between Lm110 and Lm600 (around EUR 260-1400). A sewage contribution is also to be paid by commercial developments including garages and agricultural buildings. The sewage contribution is paid once upon the issue of the above mentioned permit. There are no recurrent charges for this services.

3.0.4 Institutional issues

The sewage system had been managed by the Drainage Section of MEPA until 2003, when the department was incorporated to the Water Service Corporation and named Wastewater Section. The Malta Resources Authority (MRA) is also responsible for drainage and sewage waters, as far as inland water is concerned. MRA is then responsible for securing and regulating '(...) treatment, storage, disposal, use or re-use, as appropriate, of sewage, waste water, sludge and storm water run-off; ensure the safe discharge, reception, treatment and disposal of trade effluent; encourage and regulate the re-use of treated effluent; ensure the proper and fit disposal of waste water sewage; maximise the use of storm water run-off'⁷¹

With effect from December 2005 responsibility for the sewer systems shifted from MRA to WSC. This made WSC wholly responsible for the complete water cycle from production to its safe disposal.

⁷¹ Malta Resources Authority Act, Article 4

3.0.5 Conclusions

- Connection rates to the sewerage networks are in place for virtually all of the population.
- Waste waters are only treated in part (circa 13%⁷²) and more investment is needed here.
- Measures need to be taken in order to prevent sewage and sludge discharge into the sea. Treatment plants need thus to be built and connected to the sewage system to avoid eventual problems with bathing quality, an important issue for Malta given the role of tourism, and other problems resulting from water pollution (eg biodiversity impacts).
- Given the problem of water supply the island has always been facing, and the increase of water demand by the agricultural sector, the percentage of re-used sewage water should be increased.

3.1 Experience of Previous Investment Programmes

The Maltese waste water treatment capacity is quite low, and projects financed by the EU and the Italian Protocol have been planned to assess and improve the existing infrastructures and build a new treatment plant in the North of Malta.

Table 4.2: Funding by source – MSW (Million Euro, 2000 – 2006)

Source of funding	Funding instrument	UE contribution (m EUR)	Total cost (m EUR)
National	Budget 2005		
UE	Structural Funds	6.64	9.10
	Pre accession	6.67	
Others	Italian Protocol	9.35	

3.1.1 Pre Accession Programme 2003

The Water Services Corporation is currently benefiting from EUR 6.669,444 million Pre-accession funds for the preparation of the Sewerage Master Plan. The Plan will assess the existing sewerage infrastructure, highlight problem areas and propose possible improvements. The project aims to preserve, protect and improve the quality of marine environment by meeting the Urban Waste Water Directive requirements; reduce the impact of raw sewage discharge to the marine environment at three points in Gozo; discharge the treated effluent in non sensitive area through the existing marine outfall; and ensure that the treated effluent is suitable for irrigation and industrial reuse.

3.1.2 Structural funds (European Regional Development Fund) (2000-2006)

About EUR 6.6 million have been allocated for the improvement of waste water treatment system. The project, not started yet, aims at upgrading the existing capacity of Malta's pumping station at Marsa, the building of a new relief gallery, and works on pressure mains. The

⁷² Eurostat 2006

upgrading is meant to reduce sewage overflows and their related environmental and health hazards.

Table 4.4: Overview of ERDF projects, 2000-2006

Project title				Full cost (€)	Structural Fund (€)	EU-support (%)
Malta	South	Sewage	Transmission	9,100,000	6,643,000	73%
Infrastructure						

3.1.3 Italian Protocol

Under the Italian Protocol EUR 9.353,085 are meant to be allocated for the building of the Malta North Sewage Treatment Plant, a new waste water treatment facility which will significantly increase the capacity of waste water treatment in Malta.

3.1.4 Good Practice Lessons or Examples

Good practices

- Connection rates for waste waters are very high ~ 100%

Lessons

- WWT is still low, and the challenge is significant.
- Some interest in using 'grey waters' - waters coming from treatment plant - for use in non sensitive activities to help address some water shortage issues.

3.1.5 Conclusions

An important matter of concern is direct dumping of wastewater and sewage into the sea. Efficient treatment plants needs to be built and connected to the sewage system. National institutions seem well aware of the problem, and projects are already ongoing. It is important to monitor that the problem is solved effectively and in due course.

3.2 Review of Policy Objectives and Targets

Among the priorities set by the **National Reform Programme 2005-2008 (NRP)**⁷³, the treatment of all sewage in Malta and Gozo is one of the measures planned for halting biodiversity loss in the Maltese territory. A budget of EUR 82.5 million, subject to the securing of EU funds for the period of 2006-2008, is foreseen to accomplish this goal by 2008. The total investment should be divided as follows:

⁷³ Ministry for Competitiveness and Communications, 2005: National Reform Programme 2005 – 2008 - Malta's strategy for growth and jobs

Table 14: Extract from National Reform Programme 2005-2008

Measure	Total (EUR)	2005	2006	2007	2008
M05.5 Treatment of all sewage in Malta and Gozo.	28,000	4000	24,000	-	-
o Gozo Treatment Plant -	6,500,000	1,950,000	4,550,000	-	-
o Malta North Plant - -	8,550,000	2,565,000	5,985,000	-	-
o South Sewerage Transmission Pipeline	9,097,800	2,729,340	6,368,460		
o South of Malta Treatment Plant	58,275,000	Still under negotiations			

Among the potential projects to be funded, the NRP also mentions the development of a system to reuse or dispose of sewage sludge resulting from treatment of urban wastewater (see chapter on water supply).

In addition, among the main strategic directions set by the 2006 draft National Strategy for **Sustainable Development**⁷⁴ in the field of waste water, is to 'optimise the use of second class water particularly in those sectors that make heavy use of water'.

The **National Strategic Reference Framework** 2007 – 2013 stresses out that the Government's objective in the field of waste water is to complete the sewage Master Plan, which aims to treat all waste water in compliance with EU regulations.

3.3 Needs for the future

3.3.1 Physical investment needs

Investment needs could be required for the building of the Malta South waste water treatment plant. The first phase of the project, concerning transmission infrastructure to avoid sewage overflow, has been already financed by ERDF funds. The actual building of the plant though, which is expected to cost about EUR 50-60 millions, may require further funding.

3.3.2 Unit demand for waste water treatment

Table 15 : Unit demand for the wastewater treatment of 1 PE

Unit demand	Present situation (e.g. year 2005)	Benchmark
Volume	220 l/day	150 l/PE/d
Organic biodegradable load	530 mg/L and SS=445 mg/L) and has a high salinity (sodium and chloride)	60 g BOD/PE/d
Nitrogen load	No data	10 g N/PE/d
Phosphorous load	No data	2 g P/PE/d

Since 1983, the effluent of the Sant Antnin sewage treatment plant has been used for irrigation. The current 12,800 m³/d of effluent are expected to be increased to 25,600 m³/d after expansion of the plant. The plant uses an activated sludge process followed by rapid sand filters (9 m³/m²-h). The effluent is then disinfected with gaseous and pumped into irrigation reservoirs with a free chlorine residual of 2 mg/L. Due to low water consumption per inhabitant, the raw sewage

⁷⁴ NCS D, 2006: A Sustainable Development Strategy for the Maltese islands 2006-2016 – Third Draft

in Malta is strong ($BOD_5 = 530 \text{ mg/L}$ and $SS=445 \text{ mg/L}$)⁷⁵ and has a high salinity (sodium and chloride) due to high levels of these ions in the domestic water supply. The effluent is used to irrigate 600 ha of crops by furrow and spray irrigation.

3.3.3 Conclusions

The following urgent needs have been already addressed by the Maltese government, and new treatment plants are under constructions

- Two new STP have been financed and will be built in the coming years (planned for 2008). These will increase the percentage of treated sewage (currently very low, around 13% according to Eurostat estimates) and reduce the discharge of untreated sewage into the sea
- leakage of sewage network

Further measures could be taken to

- build the Malta South STP
- explore potential for improving sewage system (eg reducing leakage further)
- re-use of treated sewage

The Maltese ambition is not just the UWWT Directive's full implementation but also respecting the commitments under the Barcelona convention - to reduce discharges of untreated wastewater into the Mediterranean by 2007.

3.4 Priority Assessment

Ranking Types of Investment (Rank most important as 1)

Waste Water	New STPs	1
	Renovation / upgrade STPs	2
	New Sewerage	3
	Renovation / upgrade sewerage	3
	Sewage pumping stations	4
	CSO upgrading	4
	Sludge treatment	1
	Sludge Disposal or reuse	1
	Other: Metering	2

⁷⁵ Add ref website

4 MUNICIPAL SOLID WASTE

4.0 Current situation

Type of investment		Physical Indicators	
Municipal Waste (general issues)		Total waste generated (mt/year and kg/year per capita)	188,000 t/year (2005) 572kg/capita(2004) ⁷⁶
Waste collection	Waste collection equipment (e.g. transport vehicles)	Coverage of waste collection system - % of population covered in urban/rural areas	100%
		Composition of municipal waste (%) (incl. % share of packaging)	Paper 14% Textile 5% Metal 4% Plastic 10% Glass 4% Organic 60% Other 3%
		Amount of selectively collected waste per household (tonnes per waste stream)	
	Recycling points for non-hazardous municipal waste (e.g. paper & cardboard, glass, metals, batteries, textile, construction waste)	Availability of on street facilities and more major collection points (rural/urban areas)	Bring in sites – 79 existing, 400 by the end of 2006 + 5 civic amenities sites. Construction work on three of the civic amenity sites is planned to start in 2006.
	Recycling / deposit system for hazardous municipal waste (e.g. batteries, waste oil products, fluorescent lamps)	Current amount and capacity of recycling/controlled deposit of hazardous waste	12 separate sites for waste vegetative oils for use to make biofuels.
	Import/export of waste collected	Amount (mt) of compliant import/export of municipal waste (e.g. for recycling)	Export of batteries and hazardous waste
Waste Treatment	Sorting facilities	Capacity of manual/mechanical sorting facilities (tonnes/year)	
		Availability of physical-chemical equipment for management of hazardous waste	0

⁷⁶ Eurostat 2004

Waste recycling	Recycling plant	Amount and share of municipal waste recycled (detail if available e.g. packaging)	2,250 t (2005) of which paper 49% plastic 16% cans 8% glass 26% over total: 1.2% (?)		
		Capacity of recycling facilities (t/year)			
	Composting	Amount (mt) of biodegradable municipal waste produced (current + 1995 level)	Data being sought (d.b.s.) ⁷⁷		
		Amount (mt) and share of biodegradable municipal waste composted	(d.b.s)		
		Capacity of composting facilities (t/y)	(d.b.s)		
Waste (Final) disposal	Incineration plant (for MSW)	Number of incineration facilities	(d.b.s)		
		Capacity (tonnes/year and GJ/year) and activity/availability of incinerators	(d.b.s)		
		Equipment of plants to achieve emission ceilings (incl. dioxins and furans)	(d.b.s)		
		Amount of municipal waste incinerated with energy recovery	0		
	Landfill sites (Municipal) – general and hazardous	Number of sanitary landfills	1		
		Number of non compliant landfills	0		
		% of recyclable/reusable waste that is landfilled	(d.b.s)		
		Number of illegal waste dumps in use	Several small illegal dumps Approx 20,000 t material illegally dumped (2004)		
		Closed waste dumps to be recultivated	2		
		Municipal waste landfilled (mt/year)	458 kg/capita ⁷⁸		
		municipal waste landfilled without treatment (mt/year)	(d.b.s)		
		biodegradable municipal waste landfilled (mt/year)	(d.b.s)		
		Hazardous waste (t/year)	10,000 t (2000) – industrial		
		Collection of leachate and biogas	(d.b.s)		
		Expenditure: Investment (EUR/year) and Operating & Maintenance (EUR/year)			

⁷⁷ Available data will soon be provided by Wasteserv

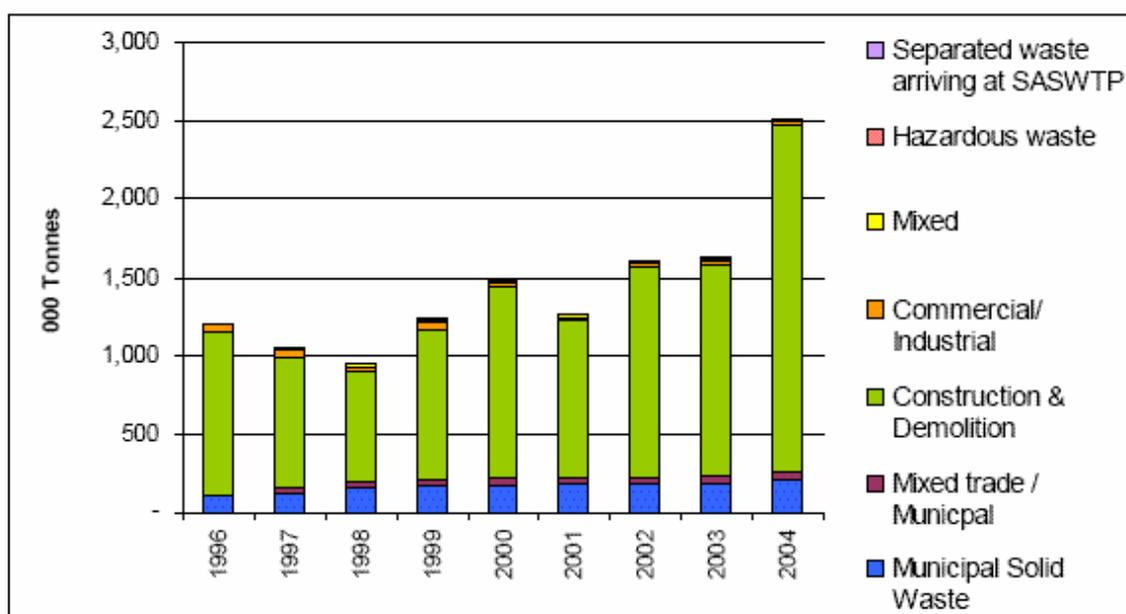
⁷⁸ Eurostat 2004

Waste flow

Between 1996 and 2004 there has been an increase of approximately 50 % in waste arriving at facilities, principally due to increases in the quantity of construction and demolition waste and municipal waste. Malta’s major waste fractions (by weight) are construction and demolition waste (88 %in 2004) and municipal waste (8 %) – see figure below.

Furthermore it is to be noted that these figures do not include illegal dumping. The Cleaning Services Department reports that 19,807 tons tonnes of material illegally dumped across the Maltese Islands was cleared during 2005, and that this removal cost about Lm 480,000 (EUR 1.1 million).

Figure 11 Waste arriving at principal waste management facilities by type⁷⁹



Sources: Maghtab - NSO, NSO 2002; Qortin - NSO, ME 2001; Sant’ Antnin – WasteServ Malta Ltd., MHAЕ 2002, EPD 1999; Other –WasteServ Malta Ltd., MHAЕ 2002

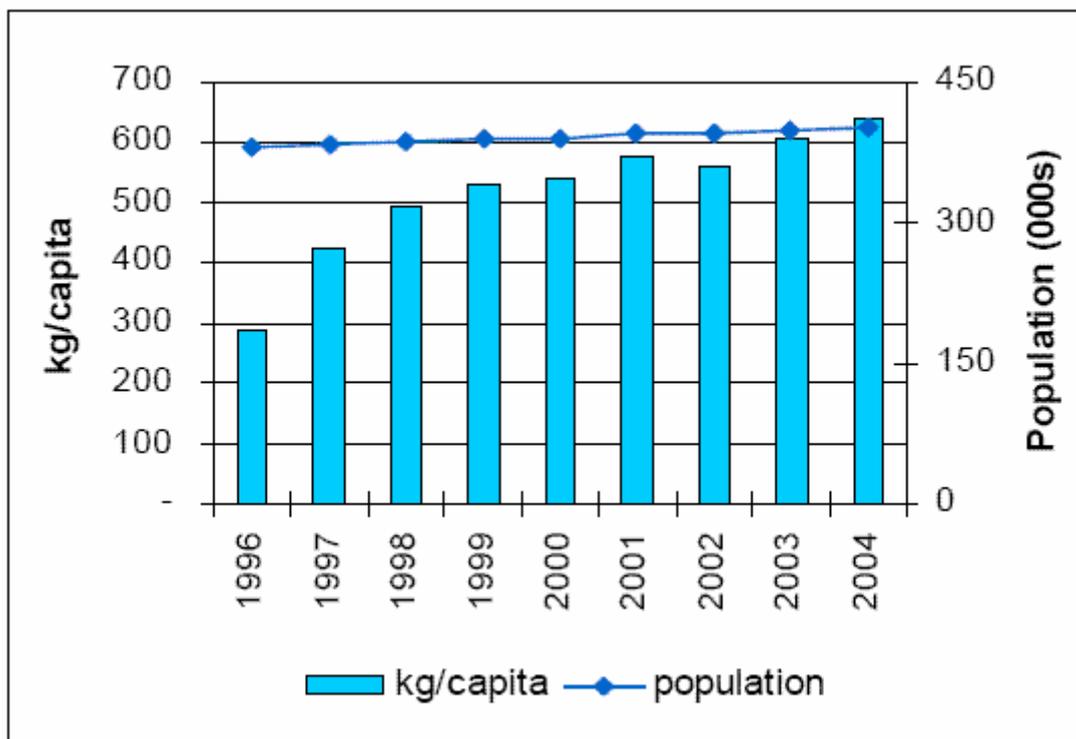
The high share of *construction and demolition waste* in Malta’s total waste generation in 1996 and 2004 may be related to excavations for major development projects. This waste stream is now being utilised to rehabilitate spent quarries, generated by extraction from open pits that did not penetrate the water table, located all over the islands. This is reducing pressure on other waste facilities and ensuring that inert waste is not contaminated by other waste fractions, which will make it easier to recycle in the future if necessary.

In 2005 Malta produced about 188,000 tonnes of *municipal waste*. Data are more reliable now, after weighbridges were installed in each site in 1997. The municipal waste per capita generated

⁷⁹ The data used in this indicator is not based on the European Union Waste Catalogue. WasteServ Malta Ltd. adopted this new methodology in 2003, however in order to present time series data, the former classification is retained here.

in Malta is relatively high (in 2003 it was 625 kg/capita, against EU 25 average of 534 kg/capita⁸⁰) and rising at an average yearly rate of 3%. The quantity of municipal waste generated increased by 53 % between 1996 and 2004⁸¹, most likely due to increased use of packaging.⁸²

Figure 12 Population and municipal waste generated per capita⁸³



Malta used to have a ban on non-reusable drink-containers, which allowed the achievement a re-use figure of 87% (by weight) of the total beverage packaging re-used on an annual basis. Nevertheless, the ban was likely to contravene requirements of the single market, thus after accession it was dropped. 37% of municipal waste consists now of packaging, which is still strongly coupled with economic growth and consumption patterns⁸⁴. In 2004, packaging waste represented approximately 3 % of total waste generated.

Fluctuations dominated the *commercial and industrial waste stream*, although there was a decrease in total amounts registered probably due to resource efficiency gains in industry as well as improved recycling practices.

As the industrial base only comprises light industry, *hazardous waste* usually consists of some metal waste, hospital waste and abattoir waste. From 2003 hazardous waste is treated on site by industry, or exported through private initiative. This activity ensued as a result of new national

⁸⁰ Eurostat 2005.

⁸¹ EEA, 2005 Report

⁸² Eurostat 2005.

⁸³ population NSO

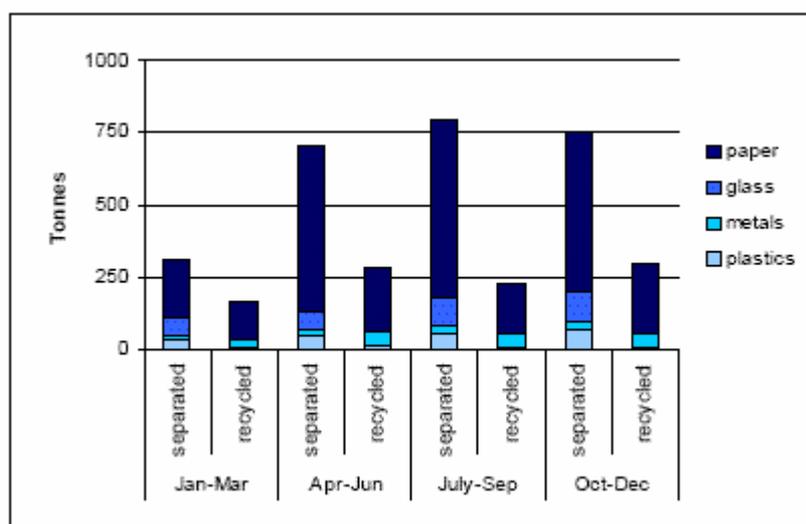
⁸⁴ EEA 2004

procedures being introduced pending the establishment of a national hazardous waste treatment facility and a hazardous waste landfill.

Waste recycling and disposal

A recycling system has been implemented, although only very recently, thus the recycling percentage is still low. Nevertheless, an increase of 64 % in separated waste arriving at the Sant' Antnin Solid Waste Treatment Plant has been registered since 2001. Waste separation from schools and households is on the increase, with recovered fractions amounting to over 170 tonnes of separated fractions per month in 2005. Increased facilities and greater exposure to waste management has, in June 2005, resulted in an increase of separated fractions of 52% for plastic, 45% for paper, 45% for metal and 32% for glass, compared to the same period in 2004.

Figure 13 Waste separated and recycled in 2004



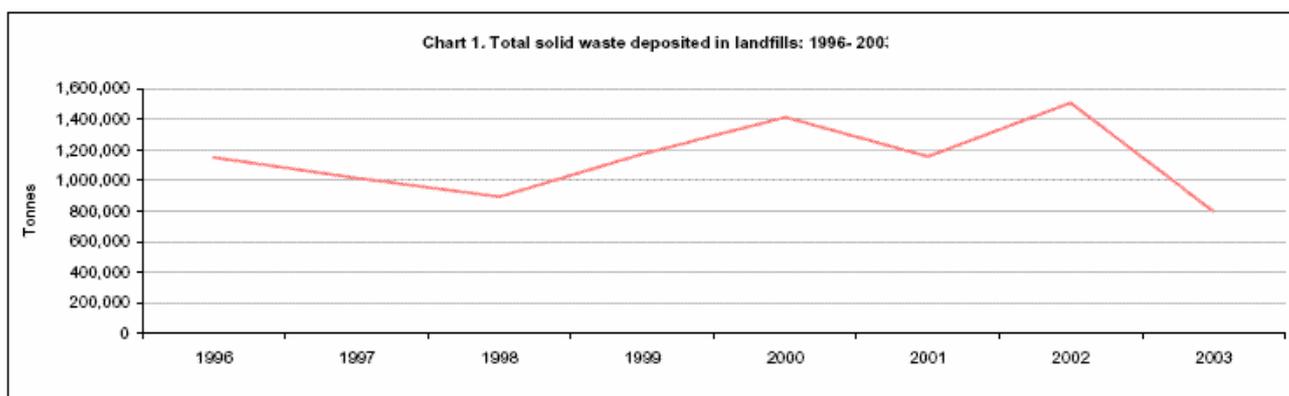
The quantity of waste landfilled has been recently decreasing:

Figure 14 Total solid waste deposited in landfills 1996-2003⁸⁵

	1996	1997	1998	1999	2000	2001	2002
Municipal	84,526	98,859	123,531	137,054	130,877	137,873	145,738
Debris material	1,036,304	817,151	692,053	956,372	1,196,223	939,125	1,289,248
Commercial/Industrial	31,223	41,657	31,408	31,324	32,314	24,684	24,693
Mixed trade/municipal	0	42,242	32,703	32,362	41,606	37,127	35,311
Mixed	0	17,162	14,408	16,591	14,190	19,465	15,419
Total Solid Waste	1,152,052	1,017,071	894,103	1,173,704	1,415,210	1,158,274	1,510,409
Waste treated at St Antnin	13,834	9,687	22,947	25,181	29,238	32,103	15,553

Source: Wasteserv

⁸⁵ NSO, 2004: Environment Statistics - Solid waste generation and disposal in the Maltese Islands. News release 29 September 2004



There is a voluntary collection system for *dry batteries*, through bins distributed in several outlets in Malta and Gozo. Collected batteries are stored by Wasteserv before being exported in bulk.

A project on an *oil collection* system has started, based on the offer of special containers for cooking oil and fat that, once full, should be delivered to one of six service stations.. The waste cooking oil is meant to be processed and converted into bio diesel (see box Energy chapter)

Electronic waste, including monitors, computer terminals, keyboards, printers and photocopiers started to be exported for recycling in 2003.

Home *composting* is encouraged through the offer of subsidised compost bins. A 2003 NSO survey⁸⁶ indicated that between 58 to 66% of the waste generated by households is biodegradable and in the Northwest, which is less urbanised, the fraction of biodegradable waste is higher.

From May 2004 a restriction of specific waste streams going to landfill (including tyres) was enforced. Presently, this material is shredded and either exported for recycling or reused locally.

Bulky refuse is sorted and treated before disposal at the Zwejra facility.

4.0.1 State of infrastructures

The landfills at *Maghtab* (Malta) and *Qortin* (Gozo) were closed down in April 2004. The municipal solid waste is currently being deposited at the engineered site of *Ta' Zwejra*, located to the south of the Maghtab closed landfill. The new dump was provided with the necessary infrastructure to operate a facility for Municipal Solid Waste (MSW) with a combined gas recovery system and leachate recirculation, and recently obtained an IPPC permit. This facility has a projected lifespan of seven years and its estimated volume is of 500,000 cubic metres.

During 2006, it is projected that work on the development of the long term landfill facility at *Għallis* will be initiated. This landfill is meant for the disposal of non-hazardous, non-inert waste, and will also include the development of a hazardous waste treatment facility for the pre-treatment of this waste stream prior to export. Work on the EIA of these facilities is nearing completion.

Concurrently, the old facility of Zwejra will be permanently sealed off and rehabilitated. This facility will be landscaped with a vegetative cover for aesthetical and technical reasons. All gases

⁸⁶ NSO 2003a.

will be collected. Work on the rehabilitation of Magħtab, Qortin (Gozo) and Wied Fulija will continue, particularly with the initiation of the aerial emissions control works planned for these sites. During 2006, work to capture and treat the gases emanating from these disused dumps will be initiated to minimise their impact on the environment. The monitoring programme will also be intensified as per contract requirements.

A permanent waste transfer station will replace the closed Qortin (Gozo) dump. At the moment a temporary waste transfer facility at Qortin Landfill (Gozo) has been developed, in order to transfer non-inert and non-hazardous waste originating from the islands of Gozo and Comino to Malta via the Gozo Channel.

Construction waste follows a different path. The Government awarded a five-year contract to a private contractor who is rehabilitating *quarries* by filling them up with uncontaminated construction material. Between May 2003 and August 2005, over 3.57 million tonnes of construction waste have been disposed of in various quarries across the island. These quarries have been eyesores for years and they are finally being rehabilitated into fields. The quarries currently being used for the disposal of construction material are situated in Mgarr and Qrendi.

Malta is establishing *Bring-in Sites* where the public can deliver source-segregated recyclable materials. The Bring-in Sites consist of four containers for plastic, paper, glass and metal. By June 2005, 75 bring-in-sites had been set up across the Islands. Through EU Structural Funding Malta intends to establish around 400 bring-in sites (approximately 1 site for every 320 houses) by 2006. Civic Amenity Sites will be used to recover bulky refuse in separated fractions. It is planned to have 5 of these sites across Malta and Gozo by the end of 2007.

Materials from bring-in sites are collected separately and taken to *Sant'Antnin Waste Treatment Plant*, where they are further sorted and sent for recycling. The plant was commissioned in 1993 but has been beset with a series of technical and environmental problems throughout its history and the quality of the finished product has always been unsatisfactory. During 2006 a redevelopment of the existing waste treatment and composting facility is planned, and will include a Material Recovery Facility. The plant is expected to treat 35,000 tonnes of organic waste (through a bio digestion system) and 36,000 tonnes of dry recyclables. The treatment of the organic fraction through a digestion plant will also recover biogas sufficient to supply 1400 homes with electricity all the year round, with an energy production target set between 6.5 and 10 GW/year. The entire project will cost EUR 16.4 million investment, and it will be mostly financed by the EU cohesion fund.

By 2003 Malta had to close down all non-conforming incineration plants. However it did not meet this target, notably in the case of the St. Luke's Hospital incinerator. In line with Malta's target to ensure that as from 15th July 2006 shredded used tyres will not be accepted in a landfill, this type of waste is being diverted from landfill. Tyres are shredded at the Sant'Antnin plant and stored to be used for landfill construction. An agricultural waste management plan is currently being drawn up.⁸⁷

Additionally, Malta is exporting its first consignment of spent batteries to France for treatment. About 50 tonnes of spent batteries, collected from around Malta and Gozo, will be exported by a private contractor. Some 1.5 tonnes of batteries are collected per month from various outlets such as local councils, schools and commercial outlets.

⁸⁷ SOER 2005

4.0.2 Waste fees/taxes

The collection and removal of municipal solid waste falls under the responsibility of the local councils which provide for the service on a daily basis at no cost to households. This is somewhat of a perverse subsidy as the free collection of waste probably induces households to waste more. On the other hand, industrial waste falls under the responsibility of the producers who must dispose of the waste at their own expense.

Tipping fees are due for the deposit of domestic, construction and mixed waste. The following list indicates the fees that must be incurred by the tipping vans when disposing of the different waste, and their increase after 2004.

Table 16: Tipping fees: EUR/t (exchange rate at 28.11.2005)

Site	Waste type	Former price EUR(1)	Current price EUR	%increase
Ta' Zwejra	Domestic	0	0.91	
	Mixed	2.75	5.50	100%
Quarries	Inert	2.54	3.26	28%
Sant'Antnin	Separated	0	0.91	
Quortin (temporary)	Domestic	0	0.91	
	Mixed	2.75	5.50	100%
	Separated	0	0.91	

(1) until 31 December 2004

On the positive side, charges have been increased in 2004 in order to encourage separate collection and recover more costs. Nevertheless there is still some way to go before full cost recovery and due price signalling. In fact the Government is also subsidising the disposal costs through a subvention to WasteServ.

The generation and movement of all waste, including hazardous waste, is now being controlled through the gradual introduction of new *permitting systems*. Permitting has initially targeted the infilling of disused quarries with inert waste; the landfilling of non-hazardous, non-inert waste; the transfer of waste (particularly hazardous waste) between the producer and the treatment facility, and the shipment of waste.

Construction waste constitutes the largest amount of waste that is disposed of in public waste deposit sites. To sustain the closure of the Magħtab dump and the rehabilitation of disused quarries with inert material, the Maltese Government gradually phased out all subsidies for the disposal of this material. As from January 2005, all subsidies were removed with approximately Lm1.2 million (EUR 2.8 million) of savings made. The removal of these subsidies was meant to encourage lower construction waste. However it appears that more waste is now being dumped in private quarries rather than to the designated dumping sites⁸⁸. Any inert waste which is contaminated or mixed with other materials cannot be disposed of in the quarries and must be disposed of in the two other facilities (Ta'Zwejra or Qortin temporary facility). MEPA has also the power to grant a permit for the dumping of inert waste (which must be certified as clean and non-contaminated) at sea, at the charge of Lm 2/tonne (approximately EUR 4.66/tonne).

⁸⁸ PPP report 06_02_01

Quarry operations are currently licensed by the MRA. The annual operating licence fee for anyone who quarries or sells soft stone or hard stone derivatives amounts to Lm 300 (about EUR 700). Revenues earned by MRA from renewals of quarry licences during the 11 months to August 2005 amounted to Lm 28,400 (about EUR 66,150) and were in respect of 50 quarries (including renewals in arrears). Apart from a licence, initially a quarry needs to have also a development planning permit issued by MEPA.

Furthermore, whenever *blasting activities* are carried out, MEPA monitors the activity and charges a monitoring fee in the region of Lm 55 (EUR 128). During 2005 MEPA earned circa Lm 4,500 (EUR 10,500) from this activity.

Further revenues are provided by *annual operating licence* fee for anyone who quarries or sells soft stone or hard stone derivatives, monitoring fees for blasting activities, hazardous waste temporary storage fees, cross boarder movements permits, illegal dumping fines and a tax imposed on several products, meant to reflect the cost of disposing of the used items ('eco-contribution').

Hazardous waste is not disposed of in Malta, and is currently exported. WasteServ offers the possibility of storing hazardous waste, on behalf of the producer, against the payment of a fee. Both the storage of hazardous waste and its transshipment require permits, which are currently issued by MEPA free of charge.

In addition, in a drive to crack down on widespread illegal dumping and littering from 2006, Government has issued new legislation that has significantly raised fines and will enable 'ecowardens' to enforce this regulation⁸⁹.

An *eco-contribution* was introduced in 2004, aiming at reducing the production of waste and incentivate its recovery and the use of refund-schemes. To a wide range of products thus a tax was imposed, meant to reflect the cost of disposing of the used items. Products subject to an eco-contribution include, but are not restricted to:

Table 17: Eco contribution

Product	Eco-contribution (Lm)	EUR
beverage bottles which are made from glass, plastic or metal	Between Lm0.01 and Lm0.05	0.02 – 0.12
tyres for motor and commercial vehicles	Lm2.00	4.66
Batteries	between Lm0.025 and Lm0.70	0.6 - 1.63
petroleum products	Lm0.10 per litre	0.23
a number of white goods such as air-conditioners, fridges and freezers, washing machines, cookers and ovens	between Lm2.50 and Lm30.00	5.82 – 69.88
plastic bags	0.06 each	0.14

The Government claimed that the eco-contribution has resulted in a series of positive results. For the first time Malta managed to curb the increase in plastic bags, with projections indicating

⁸⁹ SOER 2005

“that some 20 million plastic bags will be removed from circulation during 2005”⁹⁰. Of course such figures would need to consider any imports which are not passing through the normal channels and are therefore not being reflected in the official results. Revenues collected from eco-contribution during 2005 amounted to about Lm 4.4 million (EUR 10.25 million)⁹¹, and these were earmarked towards financing the operations of WasteServ.

4.0.3 Institutional issues

MEPA is responsible for waste management activities, through its Resources Management Unit of the Environment Protection Directorate. Among its most recent responsibilities MEPA’s Waste Management team took care of the regulatory aspects related to the implementation of the National Waste Management Strategy, ensuring that the body of waste-related legislation was in line with the EU Acquis, managing the permitting of waste management activities and the implementation of the hazardous waste consignment note system. The Waste Management Team has also been responsible for providing expert support to the Planning Directorate on development applications that are either directly related to waste management or developments which are likely to generate significant quantities of wastes. In 2005 two technical committees were appointed: One technical committee will review the current status of energy from waste. Findings made will be incorporated in the work of the second technical committee responsible for updating the Solid Waste management Strategy of 2001.

For the forthcoming years, the focus of the waste management team will be on permitting waste activities, the collection of waste-related data and the implementation of the Producer Responsibility Directives (i.e. Packaging Waste Directive, End-of- Life Vehicles Directive and the Waste Electrical and Electronic Goods Directive).⁹²

In November 2002 WasteServ Malta Ltd. was established. This is a publicly owned company falling under the direct responsibility of MRAE. WasteServ is responsible to organize, supervise and control the provision of major waste management facilities and related services throughout the Maltese Islands.

In addition local councils, among their functions, are responsible for the collection and removal of all refuse from any public or private place within the locality.

4.0.4 Conclusions

The waste management and disposal challenge is already well understood in Malta, and many initiatives under route to address the problems. Investment costs are very significant, but funding obtained for a number of these. It is unclear how much additional funding will be required (*to be covered under the next phase on ‘needs’*). Key conclusions:

- Illegal dumping is a major problem in Malta.
- The policy for inert waste (rehabilitation of quarries) should be continued and enhanced.
- As for hazardous waste, Malta will have to ratify the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention).

⁹⁰ Pre-Budget Consultation Document 2006 - 2010

VAT Department

⁹² MEPA Annual Report and Accounts 2005

- It is clear then that even though toxic waste is to be exported, there are still investment requirements. A facility for crushing/cutting and storing the waste prior to export is needed.
- There is scope for improving separate collection and implementing systems to obtain energy from waste; since most of the waste is organic fraction, the key point is composting (necessarily both home composting – focusing on sparsely populated areas – and ad hoc plant); compost would then be used either in agriculture or in sites rehabilitation.

4.1 Experience of Previous Investment Programmes

Major EU funds and national resources were invested in the rehabilitation of the Magtab, Qortin and Wied Fuija dumps. Also the redevelopment of Sant'Antrnin plant represented a relevant project, financed through the Cohesion Fund. Further resources have been allocated for the implementation of a separate waste collection system, through the establishment of bring-in sites.

Source of funding	Funding instrument	UE contribution (m EUR)	Total cost (m EUR)
National	Budget 2005	17.24	
EU	Cohesion Fund	12.22	17.33
	Structural Funds	9.64	13.20
	Transition Facility 2005	1.08	
	Pre accession	0.14	
Others	Italian Protocol	10.8	

4.1.1 General MS funding

Malta has been investing about 0.16% of its GDP in environmental policies in 2001 and 2002. 82.22% of these resources were invested in waste programs.

The budget allocation for waste management for 2005 was driven by the priority to safeguard against resorting to the bad practices of the past. Lm 7.4 million (about EUR 17.24 million) from 2005 national budget and EU co-financing contribution were allocated to upgrade the waste infrastructure.

4.1.2 Pre Accession Programme 2003

The Pre-Accession Programme 2003 allocated EUR 137,515 for the preparation of the relevant documentation for the development of solid waste management and waste collection services, in line with the Acquis and in view of targets for the future upgrade of the composting plant and material recovery facility.

4.1.3 Cohesion fund (2000-2006)

Two have been the projects financed by the cohesion fund, both of which in the field of waste (see table below). The first is a project aiming at upgrading (but mostly rebuilding anew) the

Sant'Antnin site to incorporate a new materials recycling facility and a digestion plant for clean biodegradable waste. The project is expected to start by the end of 2006.

The second project regarded the design of the treatment facility to include technical drawings for the Environmental Impact Assessment, the preparation of the documents required for the completion of the Cohesion Fund application form and the drawing of technical working papers and cost-benefit analysis

Project title	Full cost (€)	Cohesion Fund (€)	EU-support (%)
Upgrading of the Sant'Antnin waste treatment plant and material recycling and recovery facility	16,747,500	11,723,250	70%
Preparatory studies for the setting up of a mechanical biological treatment plant	582,665	495,265	85%
<i>Total</i>	<i>17,330,165</i>	<i>12,218,515</i>	

4.1.4 Structural funds (European Regional Development Fund) (2000-2006)

Between 2004 and 2006 Malta benefited from about EUR 3.4 Euros in Structural Funds to set up the necessary facilities that helped the implementation of separate collection, recycling and reuse of waste, in line with the Environmental Acquis and the Solid Waste Management Strategy for the Maltese Island 2001. Recovery of waste material will be achieved through 400 bring-in sites, 5 civic amenity sites and the segregation of waste at source. It is estimated that there will be one bring-in site for every 320 households. Up to date 79 bring in sites exist. By the end of 2006 bring-in sites should grow up to 400, and works on 3 civic amenity sites would have started. A communication campaign is also being implemented in order to promote and educate Maltese citizens on the importance of appropriate waste management.

Another EUR 6.1 million were invested in aerial emission controls for the three closed down landfills, though the installation of pumps, pipe-works and a gas treatment plant to allow 50% of landfill gases to be captured and from within the waste mass and treated. The system is also meant to minimise odours and treat any harmful component in the gas prior to release in the atmosphere. The gas management system is meant to be extended to also to Ta' Zwejra new landfill.

Minor investments (around EUR 150 thousands) were allocated for the training of job seekers in waste separation methods in order to educate households about waste minimisation, separate collection, bring in sites and civic amenity sites. SO far 7,000 households have been visited, while new education material is being planned. Additional new training is now taking place.

Project title	Full cost (€)	Structural Fund C	EU-support (%)
Establishing civic amenity and bring in sites, a separate waste collection and an integrated communications strategy' (ERDF)	4,600,000	3,358,000	73%
Aerial Emissions Control for Maghtab, Qortin and Wied Fulija Landfills (ERDF)	8,400,000	6,132,000	73%
Training job seekers to assist in the implementation of waste separation at	200,000	150,000	75%

source (EQUAL or ERDF)			
<i>Total</i>	13,200,000	9,640,000	

4.1.5 *Transition Facility*

WasteServ is currently benefiting from a Transition Facility Programme, which allocated more than EUR 1 million to two projects on the waste sector. One is meant to ensure that the employees responsible for the implementation of the National Waste Strategy, as well the stakeholders who will be affected by the implementation of the 'Producer Responsibility' principle, acquire the professional skills and expertise needed to execute their tasks properly. Another project aims at promoting long-term sustainable waste treatment facilities for construction and demolition waste, municipal solid waste and some commercial waste.

Project title	Transition Facility (€)
Technical Assistance to explore long-term projects to manage specific waste streams in a more sustainable manner.	675,000
Technical Assistance for the development of implementation systems for the 'producer responsibility' principle	400,000
<i>Total</i>	<i>1,075,000</i>

4.1.6 *Italian Protocol*

Under the Italian Protocol a project for the provision of a fixed incinerator at the Marsa abattoir received EUR 10,800,000 financing.

4.1.7 *Good Practice Lessons or Examples*

Good practices

- Major investment in new landfill with suitable leachate control and gas capture systems.
- There exist pricing schemes for waste and efforts are being made to have a further look at pricing with a view (by some parties) of moving towards a full cost recovery system, also incentivating the reduction of mixed waste
- Recycling has received incentives, and bring-in sites implemented
- Interesting initiative regarding collection of waste vegetable oils – to use as a resource for biofuels production.

Lessons/examples

- Efforts being made to address illegal landfills/dumps – still a major issue.

4.1.8 *Conclusions*

Huge investments have been already made in the field of waste. Old landfills have been closed down and new systems have been put in place. Nevertheless populations are still concerned with the presence of smells in the surrounding areas of the old landfills. In addition, illegal dumping is still an issue.

Further investment will be needed to complete the process of modernisation of waste management, collection and treatment in Malta and Gozo. It will also be crucial to provide substantial monitoring of the closed down landfills, and in reclaiming contaminated areas.

4.2 Review of Policy and Targets

In the **National Reform Programme 2005-2008** Malta has assumed various obligations to fight climate change, among which the appropriate disposal of waste. Part of the budget (around EUR 71.8 million) has been thus allocated to waste related projects such as:

- Capture of methane from waste disposal and treatment.
- Replace existing uncontrolled landfill with alternative engineered landfills and further improve upon the treatment of Municipal Solid Waste (MSW) – this is the project absorbing most of the planned budget
- Promote the increased use of bio-fuels through the exemption of excise duties on their importation as well as by encouraging increased throughput volumes as a result of a pilot collection scheme currently underway for the collection of used cooking oil.

The investment will be subdivided as follow:

Table 18: Extract from National Reform Programme 2005-2008

Measure	Total (EUR)	2005	2006	2007	2008
M05.10 Capture of methane from waste disposal and treatment	9,997,941	2,833,030	4,176,970	2,186,494	801,447
M05.11 Replace existing uncontrolled landfill with alternative engineered landfills and further improve upon the treatment of Municipal Solid Waste	34,116,437 (landfills)	2,279,021	13,659,930	11,198,685	6,978,801
	22,340,355 (MSW).	801,515	11,714,335	8,287,119	1,537,386
M05.12 Promote the increased use of bio-fuels through the exemption of excise duties on their importation as well as by encouraging increased throughput volumes as a result of a pilot collection scheme currently underway for the collection of used cooking oil.	4,950,000 (excise duties)	900,000	1,350,000	1,350,000	1,350,000
	443,150 (cooking oil)	33,750	409,400	-	-
Total (EUR)	71,847,883	6,847,316	31,310,635	23,022,298	10,667,634

Potential funding projects include also the development or update of existing waste management strategy and plans.

In addition, the encouragement of sustainable use of natural resources and maximisation of the use of renewable energy resources, minimising waste generation and the detrimental effects of consumption of natural resources and waste generation is mentioned among the medium and long term priorities for the planning responsibilities of MEPA

Furthermore the Maltese **Draft National Strategy for Sustainable Development** listed the following main strategic directions with regard to wastes:

- Prevent and minimise waste by achieving EU waste-related targets, reviewing Malta's Waste Management Strategy by 2007

Establish waste management systems for hazardous (including pharmaceutical) and non-hazardous wastes.

- Commission the sewage treatment plants and find ways to use the treated water
- Close all non-compliant incinerators and replace incineration plants in hospitals by non-burn technology
- Introduce economic instruments, such as additional deposit refund schemes, conducive to improved waste management practices
- Increase the number of bring-in sites and introduce additional facilities, such as civic amenity sites, which will help to increase waste separation at source
- Develop facilities for the separate collection of wastes by Local Councils
- Upgrade the present sewerage system to decrease to a minimum the present rates of failure of some coastal pumping stations as well as Malta's major sewage outfall at Wied Ghammieq
- Entice the construction industry to reduce demolition and construction waste

It further addresses the question of waste when dealing with the construction industry, proposing to:

- Enhance enforcement and monitoring to reduce of the destabilising effects on society of construction and quarrying activities
- Conserve mineral resources by minimising waste and promoting the reduction and reuse of building material and proper disposal of building waste in approved sites.
- Provide incentives for the use of lower quality stone or the reuse of stone which has become part of the waste stream.

In order to meet the deadlines set by the two transitional agreement (end of 2007 to cease the ban on plastic beverage packing and end of 2009 for recovery and recycling of packaging waste) it will be important to improve the system of separate collection and recycling. The recent system of bring in sites is showing some positive results, ie an increasing percentage of separated waste. EU Structural Funds have been already granted to bring these sites up to 400 by the end of 2006. In addition, the Maltese Draft Sustainable Strategy lists, among its objectives, the improvement of waste prevention, minimisation, reuse and recycling.

Some economic incentives encouraging waste separate collection are under evaluation.

The draft **National Strategic Reference Framework** highlights that waste minimisation remains a critical strategic objective, as well as recycling, recovery of resources and the efficient utilisation of the remaining residues for energy production. The strategic development of waste infrastructures should be towards expanding the network of waste facilities. In this line, it is envisaged to set up the basic infrastructures for managing waste, to upgrade the Sant'Antinin waste treatment plant and material recovery facility, to reduce aerial emissions from the disused landfills and to rehabilitate disused quarries. In general, more efforts are needed to fully comply with the Acquis in the waste sector.

4.3 Needs for the future

4.3.1 *Indicative Investment Requirement and Comparison – Municipal Solid Waste*

Among the projects under discussion by the Maltese government, one is the so called ‘waste to energy’ project, aiming at implementing a thermal treatment plant for the production of energy from waste. Its cost is envisaged to be around EUR 50 millions.

Furthermore a new waste treatment plant is planned in Gozo. It will treat between 100,000 and 200,000 tonnes of waste, serving about 28,000 inhabitants (equivalent to Gozo population). The plant is also expected to have some waste to energy facility. The expected cost is 10 m EUR⁹³. Also the upgrading of the abattoir incineration plant is under discussion, in order to make it able to treat also some type of hazardous waste.

Table 4D: Summary of investment cost – municipal solid waste

Type of investment	Indicative Investment Cost
	M Euro
Waste collection	-
Waste sorting	-
Recovery : waste to energy	50,000,000
Gozo treatment plant	10,000,000
Abattoir upgrade	To be verified
Disposal	-
Total investment	To be calculated
Total investment (% of GDP)	To be calculated

4.3.2 Summary, Insights, needs etc.

Among the issues that still need to be addressed in the waste sector, the following are the most relevant:

- Reduce the problem of illegal dumping: increase monitoring, enforce fines (and possibly increase them) by the Littering Regulations that came into effect in January 2006.
- Increase the compost share
- Complete the process of modernisation of waste management, collection and treatment – bring in sites and civic amenity sites
- Remediation of contaminated areas (eg closed down landfills)
- Control waste production: through prices and public campaign
- Explore further potential for energy from waste (incineration, biomass)

⁹³ WasteServ – interview with Aurelio Attard

- Explore potential of hazardous waste disposal in Malta
- Explore real potential of biofuel from used oil – improve the system / make it work.
- Potential for biofuels should be explored, especially second generation biofuels (which have better environmental characteristics)

4.4 Priority Assessment

Ranking Types of Investment (Rank most important as 1)

MSW		
	Waste collection	2
	Waste sorting	2
	Recovery (waste to energy)	1
	Disposal	3
	Remediation of disposal sites	1
	Other: illegal dump prevention	1

5 RENEWABLE ENERGY

5.0 Current Situation

As regards renewables, there is very little capacity installed in Malta, as it can be seen in the table below. Solar thermal has some market penetration but far from fulfilling potential and PV penetration is still very low. Wind and biomass infrastructures are not in place. Other technologies (eg hydropower) are not applicable in the islands. In addition hydropower, biomass (energy crops), wave, tidal, and geothermal, are not considered to be feasible for exploitation at least in the short term for various reasons, including absence or low level of resource intensity and/or state of development of the technology⁹⁴.

Type of investment	Physical Indicators	
Wind	No. of wind turbines	0
	capacity of wind turbines (MW) and % over total energy production	0
	Output of wind turbines (MWh) and % over total energy production	0
	Areas and energy potential (E.g. wind speeds above 5m/s)	By 2010 On shore: small/medium: 1.45 GWh Post 2010 Offshore (<20m) 60GWh/a Offshore (>20m) 240 GWh/a
Biomass	MWh/ GJ/ ToE produced and %	0
	suitable assessment of potential based on land area and suitable crops.	0
Solar thermal	GJ capacity installed (MW) and %	To be assessed (if data available)
	m ² installed	15,360 in 2004 ⁹⁵ 19360 in 2005 ⁹⁶
	GWth produced	10.8 MWth in 2004
PV	Capacity installed(MW) and %	< 1 MW (0.009MWe 2004)

⁹⁴ A Draft Renewables Energy Policy for Malta, August 2006 see <http://www.mcst.org.mt/Renewable%20Energy.pdf>

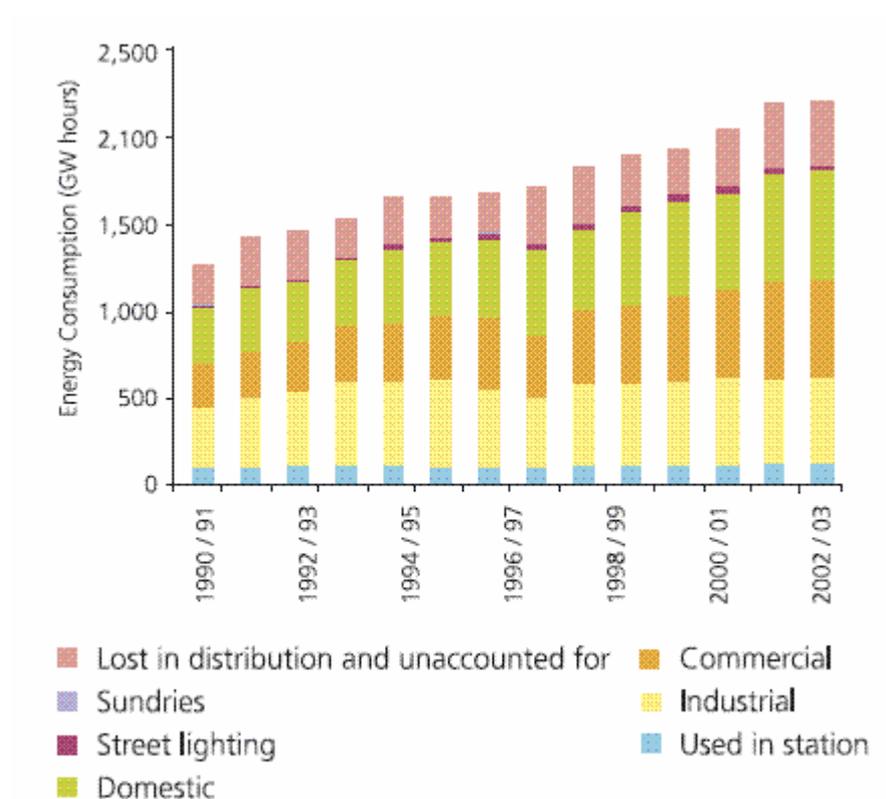
⁹⁵ http://www.energies-renouvelables.org/observ-er/stat_baro/barobilan/barobilan5.pdf

⁹⁶ http://www.estif.org/fileadmin/downloads/Solar_Thermal_markets_in_Europe_2005.pdf

GWh produced and %	< 1GWh
m ² installed	Very little – virtually insignificant
number of homes/roofs	Very few

Between 1990 and 2004 Malta’s gross energy consumption increased from 1,300 to 2,200 GWh, a rise of 73%. The domestic and commercial sectors have contributed significantly to this increase with the commercial sector growing by 128%, and the domestic by 94%⁹⁷ (see figure below).

Figure 15 Sectoral electricity consumption 1990-2002⁹⁸

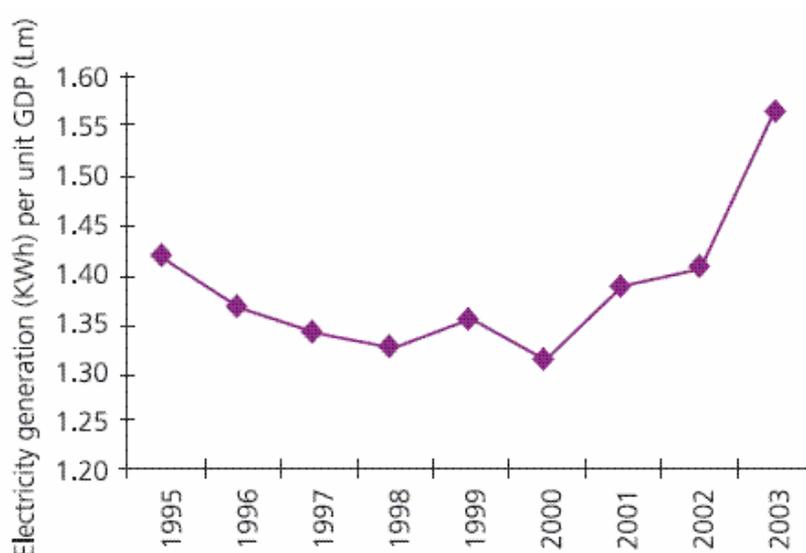


⁹⁷ Enemalta 2003

⁹⁸ SOER 2005 – source: NSO

Malta's total energy generated per unit GDP (at constant prices) has risen sharply, particularly since 2002, after declining during the 1990s. Major contributing factors to this change in direction may be related to the sharp rise in energy generation since the hot summer of 2003 as compared to the rate of GDP growth, which has been slower. This trend is a matter of concern since it indicates that Malta is moving away from 'cleaner' economic growth.⁹⁹

Figure 16 Energy intensity of growth¹⁰⁰



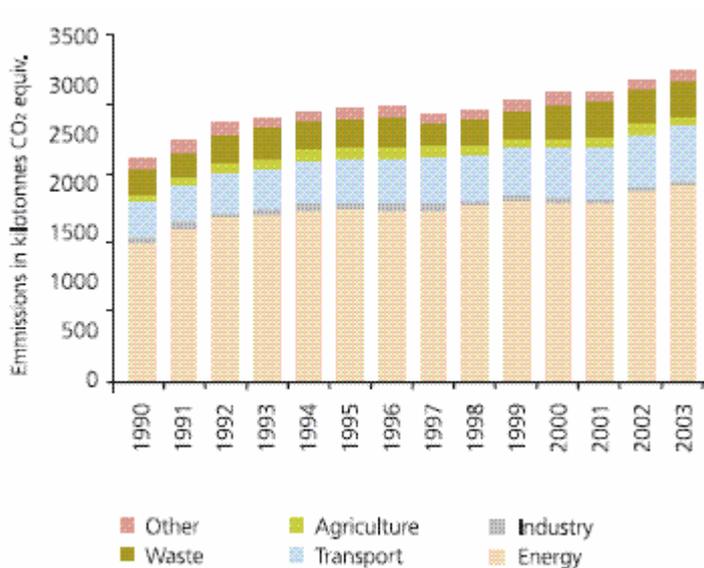
Malta's greenhouse gas (GHG) emissions rose by more than 44% between 1990 and 2003, with CO₂ (carbon dioxide) being by far the most significant contributor. Despite its rising emissions, Malta had one of the lowest GHG emission rates per capita in the EU (7 tonnes compared to the EU average of 11 tonnes in 2000). Nevertheless Malta has a relatively high rate of GHG emissions per unit GDP, standing at 910 tonnes of CO₂ equivalent per million Euro as against the EU average of 605 tonnes in 2000, which is likely to be related to low levels of efficiency in energy generation and consumption, as well as transport.

The energy sector is main sector responsible for GHG emission, as it contributes approximately to 63% of Malta's emissions.

⁹⁹ SOER 2005

¹⁰⁰ MRAE 2004b, NSO

Figure 17 Green House Gas emission by sector¹⁰¹



Households' annual expenditure expense on fuel was estimated to be approximately Lm83 (about EUR 193), equivalent to 56 litres/month.¹⁰²

Table 19: Key Energy Figures for 2002¹⁰³

Total Primary Energy Supply (TPES)	MToe	0.790
TPES per capita	toe/capita	2.0471
TPES / GDP	toe /000Lm	0.472

¹⁰¹ MEPA 2005b

¹⁰² Household Budgetary Survey 2000/2001 – National Statistics Office

¹⁰³ Enemalta Corporation, National Statistics Office, Malta Resources Authority

Total Electricity Generated	MWh	2,057,301
Electricity Consumption /capita	MWh/capita	5.331
Electricity consumption /GDP	kWh/Lm	1.228

Note: TPES includes all inland consumption of fuel (automotive fuels, gasoil, kerosene fuel oils and LPG)

Imported petroleum products and fossil fuels (fuel oil and gas oil in particular) are the primary energy source for Malta. During 2002 and 2003 there was the complete phasing out of leaded petrol from Maltese markets, and the full compliance with Council Directive 98/70 on the quality of fuels. In the private sector, there are initiatives for cleaner technology alternatives. For example, bus owners that do not operate on the scheduled public transport system have undertaken a feasibility study with a view to change their diesel combustion engines to Liquid Petroleum Gas (LPG) or Compressed Natural Gas (CNG).

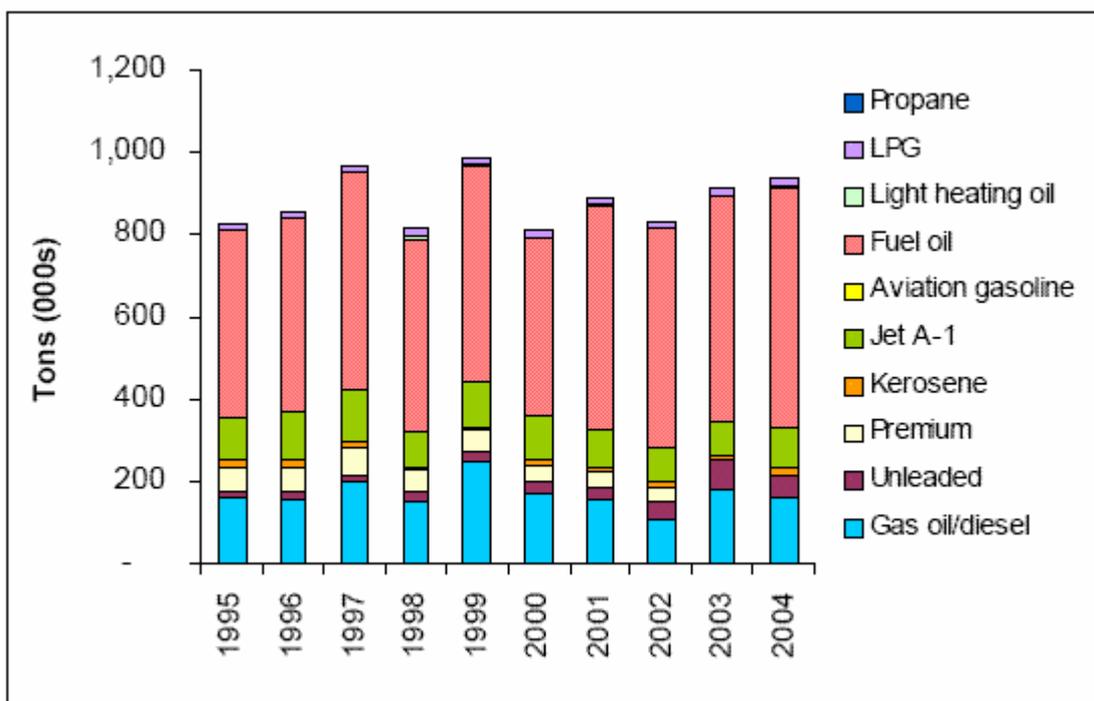
No renewable source of energy has been implemented so far, though some research institutes have undertaken pilot projects and studies to assess the potential and applicability of renewable sources, mainly wind and solar power, and photovoltaic (PV) generation of electricity has been used for a small number of specialised applications.

Malta's usage of bio-fuels is still very low at 0.1% of the total fuel used for road transport¹⁰⁴. A pilot project on biodiesel has recently been launched, aiming at collecting used cooking oils for the production of biofuel (see box). Total renewable energy sources contribution to total primary energy demand was around 0.09% in 2004, compared to an average of 5.61% in the EU and an indicative target of 12%.

*Figure 18 Energy Balance*¹⁰⁵

¹⁰⁴ Times of Malta: EU urges more use of bio-fuels, 14th February 2006

¹⁰⁵ source NSO



Box 2: Malta Biodiesel Future¹⁰⁶

According to the latest data published for 2004, Malta's usage of bio-fuels is still very low at 0.1% of the total fuel used for road transport¹⁰⁷. WasteServ Malta Limited launched in May 2005 a pilot project for the collection of used cooking oil from 16,400 households to turn it into biodiesel... The project, it was believed, could have not only stimulated the production of biofuels, but also reduced sewage blockages, given that 35% of the 960 blockages recorded per year are caused by cooking oil and fats that end up in sewers

The public has been encouraged to collect containers against a deposit fee of Lm 0.50 (EUR 1.16) from local council and then to dispose the used oil at the nearest petrol station. The only incentive for households participating in this scheme though is a token, which can be exchanged for gifts drawn by means of a lottery.

5.0.1 State of infrastructures

Enemalta Corporation still holds a de facto monopoly on fuel importation and wholesale. In view of the eventual market liberalisation, a phased price adjustment mechanism for petrol, diesels and kerosene was launched in November 2001 by the Minister of Finance.

¹⁰⁶ A.D. Gatt, 'Malta Biodiesel Future', Sunday, 06 March 2005,

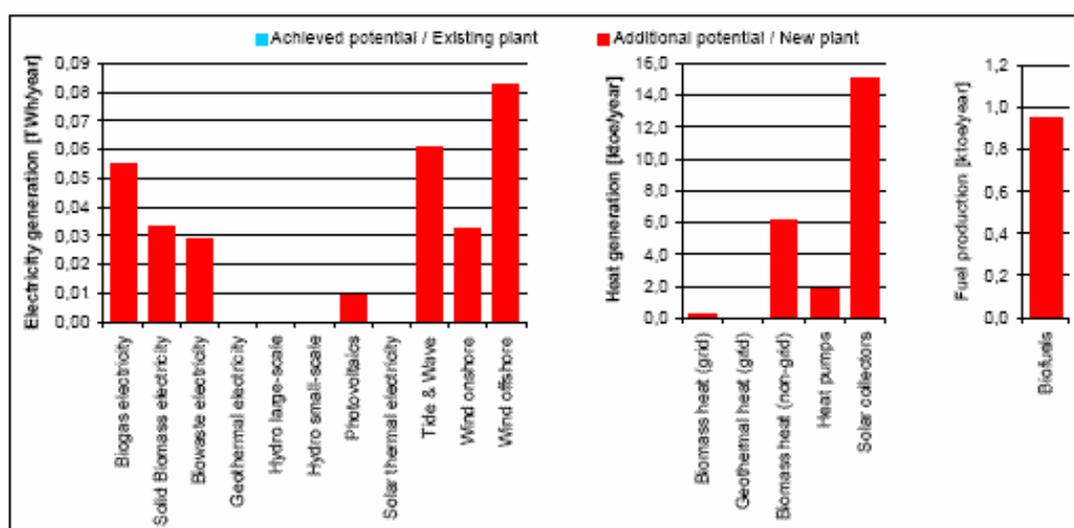
:http://www.biodieselresource.com/index.php?option=com_content&task=view&id=39&Itemid=2

¹⁰⁷ Times of Malta: EU urges more use of bio-fuels, 14th February 2006

After energy demand peak registered in 2003, Enemalta has applied for the extension of Delimara power station, with a view to producing an additional 50 MW of power¹⁰⁸.

No commercial utilisation of renewable energy has been done so far. The energy infrastructure up to now has been oriented to subsidised oil products¹⁰⁹. Despite the existing potential for renewable energy sources (see *Figure 19*) there is no significant infrastructure in place to exploit these sources except for a small but growing sector of domestic solar water heaters¹¹⁰. Some pilot projects and studies to assess the potential and applicability of renewable sources (mainly wind and solar power) are under research, and photovoltaic (PV) generation of electricity has been used for a small number of specialised applications.

Figure 19 Mid-term potentials of RES electricity, heat and transport in Malta



Several studies investigated the potential for energy from renewables. The most feasible sources seem solar thermal, photovoltaic and wind energy.

SOLAR THERMAL – Solar Water Heating (SWH): At the moment there are 20 local suppliers of solar water heaters and prices range from as low as Lm 180 up to Lm 1000 depending on size and model. The solar systems are presently charged at a VAT rate of 18% and Lm 3 Eco-tax Contribution. The only incentive available applies exclusively to first-time applicants to electricity meters, whereby the installation costs are waived by Enemalta, if a SWH is installed beforehand. Moreover, it is estimated that only about 5% of domestic households have solar systems and very few central systems are installed in communal buildings or industries. Most SWHs that were

¹⁰⁸ SOER 2005 quoting The Times (20.04.2005).

¹⁰⁹ EU Commission, 2004: The share of renewable energy in the EU Country Profiles - Overview of Renewable Energy Sources in the Enlarged European Union. {COM(2004)366 final}, Brussels, 26.5.2004, SEC(2004) 547

¹¹⁰ SOER 2005

inspected had a combined loss ranging between 15 and 24% of their potential heating capabilities. Only 20% of all systems were considered to operate at acceptable conditions.¹¹¹

PHOTOVOLTAIC: Photovoltaic applications in Malta that were so far restricted to research and demonstration systems will soon be available for everyone to install, according to the regulations to be set by the Malta Resources Authority. Besides the demonstration projects, there are so far only two privately owned solar grid-connected systems in Malta, one at a residence in Madliena operating since May 2002 and another one in a Marsa factory, installed in September 2002. Three different solar systems are also in operation at the Institute for Energy Technology. The oldest grid-connected photovoltaic system in Malta is the 1.8 kWp stationary plant installed on the Institute's rooftop in Marsaxlokk. The second system so far produced 1,500 kWh. Besides the technical studies, the widespread applications of solar photovoltaic systems require an analysis of the economic and social viability, as well as an energy dissemination plan that will implement incentives to accelerate the use of such technologies in Malta, both now and in the future. Hence, periodical studies are being carried out to analyse the life cycle costing of different photovoltaic grid connected systems for residential and commercial buildings and to correlate the system size with the electricity price, the payback period and the required rooftop areas. Some of the results obtained indicate that solar electric systems could be economically feasible. Nevertheless the addition of PV cells on rooftops would only account for a maximum of about 15% of the overall electricity generation due to limited areas of rooftops available.¹¹²

WIND ENERGY: Wind and solar energy have long been perceived as resources with which the Maltese Islands seem to be abundantly endowed. Based upon the results of wind research programme, a number of sites have exhibited reasonable wind characteristics. A single typical 600 kW turbine erected at one of the best locations would produce an estimated 1.7 GWh per year with a capacity factor of 30%. From this data it is also possible to calculate the total annual down time, which cumulatively adds up to 13%¹¹³. Another case study evaluated the potential for offshore wind generation of a turbine installation on the offshore reef of Sikka I-Bajda

5.0.2 Renewable energy pricing and support issues

In 2006 the Government introduced a scheme for households that have introduced photovoltaic and are generating more energy than they are consuming. Under this new scheme excess energy being produced can be channelled to the national electricity grid and will be refunded at the rate of Lm0.03/kWh (Eur 0.07). It has to be noted though that this buy back rate is relatively low, given that it is below the cheapest rate per kWh payable to Enemalta by households.

It has to be mentioned though that LPG, mostly used for home heating and/or cooking, is still subsidised by the Maltese Government. This fuel is supplied by Enemalta to consumers at below cost, and during 2005 the Government paid the provider a contribution of Lm1.8 million (EUR 4.2 million) -projected to increase to Lm2.1 million (EUR 4.9 million) for 2006 - which was aimed at keeping the prices of LPG at their present level.

The table below summarises the difference between the production and distribution cost and the actual retail cost of LPG, with the difference being subsidised by Government.

Table 20: LPG costs

¹¹¹ Solar Water Heating Systems under the Lens (Dec. 2004) R.N. Farrugia, M. Fsadni and C. Yousif, <http://home.um.edu.mt/ietmalta/swh.htm>

¹¹² Source: Towards a Solar-Powered Era - Charles Iskander Yousif <http://home.um.edu.mt/ietmalta/solarera.html>

¹¹³ Source: Wind Power and the Local Wind Potential - Ing. Robert N. Farrugia <http://home.um.edu.mt/ietmalta/windpower.html>

	Lm or EUR/cylinder					
	10 kg		12 kg		15 kg	
	Lm	EUR	Lm	EUR	Lm	EUR
Price based on actual fuel costs	4.21	9.81	4.90	11.41	6.12	14.26
current price	2.06	4.80	2.32	5.40	2.89	6.73
Government contribution	2.15	5.01	2.58	6.01	3.23	7.52

Source: DOI press release 25 October 2005 – IEEP elaboration

Under the existing arrangement Government covers over 50% of the actual cost of the LPG, and it will carry on providing the subsidy for a further year although, it was noted, such a subsidy may run against the EU free market rules.

The demand for LPG has increased considerably following the increase in the price of kerosene. The table below summarises the increase in demand over the last few years, together with the results of Enemalta's gas division over the period 2000 to 2004.

Table 21: LPG demand¹¹⁴

	2000	2001	2002	2003	2004
	Lm	Lm	Lm	Lm	Lm
Turnover	3,336,000	3,121,000	3,288,000	3,106,000	3,049,000
Loss for the year	(1,191,000)	(980,000)	(270,000)	(908,000)	(1,379,000)
Sale of LPG Mixture/Propane in Metric Tons	17,496	16,467	17,168	17,962	18,189

Source: Enemalta's financial statements

5.0.3 Institutional and public support issues

Energy regulation within a small economy is still a novel discipline for Malta. Indeed, the regulatory framework is still being built, and the operation of competition rules within the energy sector has still to be tested.

Nevertheless MRA's aim is to ensure that the future of the sector is sustainable in the long term and market policies and mechanisms should, while ensuring secure and regular supplies, promote rational, efficient and diversified production and use of energy. Thus open market economy will be promoted, and regulation built.

Council Directive 2001/77 sets the EU indicative target of 22% share of total energy consumption to be met by renewable sources by 2010. Malta's indicative target was set at 5%, to be met by 2010, although recent studies undertaken by the government shown that the actual potential could be much lower.

¹¹⁴ Figures have been left in Lm for comparability across years. Note that in 2004 the turnover was about EUR 7.1 million and the loss around EUR 3.2 million

The MRA is actively promoting the use of renewable energies in major projects currently underway in Malta. Such projects include energy recovery from sewage treatment and other waste treatment plant projects currently in the planning or development stage. The MRA has also authorised two pilot projects using solar panels for the production of electricity and for their connection to the grid. The use of renewable energy for transport is fairly novice in Malta although private industry has already taken up the production of bio-fuels, albeit in very small quantities.

In June 2001, the Malta Energy Efficiency and Renewable Energies Association (M.E.E.R.E.A.) was established. Among its main objectives is the promotion of sustainable energy policies that emphasize energy efficiency and use of renewable energies in Malta.

A strategy will be drawn up to identify mechanisms for the achievement of greater energy efficiency on a national scale and to set appropriate targets to 2010. It is expected that the strategy will cover energy efficiency in buildings and energy-using products (particularly lighting and heating). A strategy will also be drawn up to identify and encourage the use of suitable sources of renewable energy. The strategy will cover the development of support mechanisms and structures to back the use of renewable energy, such as tax incentives, investment grants and tariffs payable for the feeding of power to the national grid. Measures will be identified and adopted to encourage the use of alternative energy sources in cars, particularly biofuels.

5.0.4 Conclusions

Given the poor state of development of renewable energy infrastructures, this area may be considered in need of financial help. Key issues of the development of the sector are a clear framework for access to market of the Electricity produced and long term strategy to incentivise plant investment, in order to develop the industrial sector (import/production and implementation/maintenance).

Further investigation are advisable for all those technology with higher resource potential in Malta, such as wind, solar photovoltaic, biomass waste, landfill gases and sewage treatment plant gas¹¹⁵.

The considerations on climate change expressed in the last Malta State of the Environment Report reports that Malta's greenhouse gas emissions increased by 44 percent between 1990 and 2003, and derive largely from the energy and transport sectors, so that there is urgent need to decouple economic growth from energy consumption. An increasing shift to renewable resources could lead to a reduction in GHG emissions, and should be therefore encouraged. A shift to renewables should be further encouraged in the light of Malta's commitment to RES taken during the accession process. Malta in fact committed itself to produce 5% of electricity from renewable sources by 2010.

There is interest in exploring the use of renewables in high energy demanding processes, such as in reverse osmosis plants.

The planning and implementation of renewable energy infrastructures though should always take into consideration the environmental needs of the islands, such as the conservation of habitats and landscapes.

¹¹⁵ MRI, 2005: Report by Malta to the European Commission on the Implementation of Directive 2001/77/EC on the promotion of Electricity from Renewable Energy Sources

5.1 Experience of Previous and Other Ongoing Investment Programmes

In an attempt to incentivise people to switch to *solar heating*, government in 2001 reduced the VAT rate on solar heaters and solar panels from 15% to 5%. The rate however had to be increased in May 2004, upon accession to the EU, in accordance with EU regulations. Consequently the VAT rate on solar Heating Energy Savers stands at 18%, the current VAT rate. In 2005 a regulation was proposed whereby every new household was obliged to install a solar water heater and/or PV panelling. The financial incentive accompanying this regulation was that such households would be given a grant of 15.25% of the purchase price, up to a maximum limit of Lm 50 (about EUR 116). In 2006 the refund limit was increased to 25%, subject a maximum limit of Lm100 (about EUR 233).

This scheme has also been extended to include *wind energy* as well as *roof insulation* for private houses. Enemalta is also offering a refund on electricity mains, which usually cost Lm 70 (EUR 163), to those new households which install a solar water heater.

Government is attempting to incentivise photovoltaic by refunding 25% subject to a maximum of Lm 500 (about EUR 580) of the expenditure on the purchase of PV technology. Moreover, Enemalta is also not charging the Lm 20 fee (EUR 47) for the installation of the meter necessary for the operation of the PV technology. In addition, for those households that have introduced PV Technology are generating more energy than they are consuming, the government set a scheme to allow the excess to be channelled to the national electricity grid. Excess generated energy will be bought by Enemalta at a rate of Lm 0.03/kWh (EUR 0.073)¹¹⁶. Whilst the measure carries with it an estimated cost of Lm 300,000 (almost EUR 700,000) per year, it also has a positive impact in that it reduces the amount of energy generation, and hence subsidy provided to Enemalta.)¹¹⁷ The measure though is not considered efficient, since the price paid by Enemalta for excess energy generated by PV is lower than the price consumers pay for energy from the grid.

5.1.1 Good Practice Lessons or Examples

Good practice

- The collection of used cooking oils for the production of biodiesel may be a good example of recycling and a tool to raise the citizens' interest on cleaner energies.

Lessons

- The purchase price of domestic produced renewable electricity (Eg from PV) is only Lm0.03/kWh (7 Euro cents) whereas the sales price to households is Lm0.04/kWh (9 Euro cents) - plus the surcharge in connection with the rise in international oil prices. This creates not only a financial barrier (some argue that more than Lm 0.03/kWh is needed), but also a perception barrier. Ideally they should be the same.

5.1.2 Conclusions

Given Malta strong potential in terms of location, solar and wind exposure, it will be strongly advisable to define potential investment on renewables such as photovoltaic, solar thermal and wind energy. The potential of energy form waste should also be explored further. Nevertheless it

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¹¹⁷ GREENER BUDGET PROPOSALS 2004

will be important to take into consideration the environmental implications of each of these technologies. In addition Malta is a small island, highly relying on tourism, and landscape effect of big infrastructures needs to be carefully taken into consideration.

5.2 Review of Policy Objectives and Targets – and supporting instruments

The fight against climate change is one of the most relevant objectives of the **Malta National Reform Plan 2005-2008**. Although Malta does not have any binding greenhouse gas emissions targets, given that it holds a non-Annex I status, it has assumed various obligations to fight climate change: reduction of greenhouse gas emissions (based on measures aimed at targeting sectors such as energy production, transport and waste), appropriate disposal of waste, better utilisation of energy sources, etc. Among the planned projects, one is aiming to promote the use of bio-fuels, and it is supposed to be founded as follows (see also Waste chapter):

Measure	Total (EUR)	2005	2006	2007	2008
M05.12 Promote the increased use of bio-fuels through the exemption of excise duties on their importation as well as by encouraging increased throughput volumes as a result of a pilot collection scheme currently underway for the collection of used cooking oil.	4,950,000 (excise duties)	900,000	1,350,000	1,350,000	1,350,000
	443,150 (cooking oil)	33,750	409,400	-	-

Potential funding projects include the following:

- Development of effective CO2 emissions trading scheme for Malta with the possible extension to other greenhouse gases to effectively participate in the European Community framework trading scheme
- Develop domestic programmes for energy efficiency

As for the planning responsibilities of MEPA, among the medium and long term priorities the following is mentioned:

- Encourage sustainable use of natural resources and maximising use of renewable energy resources, minimising waste generation, and detrimental effects of consumption of natural resources and waste generation

Malta's Draft **Sustainable Development Strategy** (SDS) addresses the issue of resources and emissions of greenhouse gases, proposing to:

- Put in place a policy for rapid introduction of renewable energy sources.
- Take steps to continue reducing greenhouse gas emissions - this will at the same time enable Malta to fulfil its commitments under the "UN Framework Convention on Climate Change".
- Step up funding for research to improve knowledge on local materials and conditions in building and in the use of renewable energy sources.

The topic of renewables is further mentioned also when the SDS addresses the problems related to sustainable consumption and production patterns, and among the key issues it is proposed to:

- Promote consumption and production patterns that economise on the use of non-renewable resources, minimise waste and pollution, and allow enough time for regeneration of renewable resources.

The Maltese **National Strategic Reference Framework** highlights the problems related to an increasing energy demand and the heavy contribution (63%) of the energy sector to GHG emissions. It also stresses that challenges for the future of the energy sector will be measures aimed at improving efficiency and increasing the use of renewable sources. Among the country weaknesses high dependency on non renewable energy sources is mentioned, and potential for an increased use of RES is seen as a valuable opportunity. Nevertheless, the focus of the NSRF seems to rely more on energy efficiency measures, since ‘they are likely to be more rewarding than the introduction of renewable energy sources in reaching the national objective of reducing fossil fuel consumption’¹¹⁸.

The following actions relative to sustainable renewable energy exploitation in Malta are being discussed in the pre-budget document ‘**A Better Quality of Life**’¹¹⁹:

- Government is close to finalising the national target for the consumption of electricity in terms of total consumption for 2010. Preliminary indications point towards targets in the order of 0.5% to 1% for wind and solar sources and 3% from waste by 2010. the following provisional conclusions were drawn about large wind farms:
 - Government has decided that it will not offer public land for large scale wind farm (tall turbines) development given their high ‘visual’ impact on the landscape;
 - Offshore Wind is the next-best technology in terms of price. Nevertheless constraints against wind farm development on reefs have been highlighted. Reefs are generally 20 metres deep, which is the limit of current proven wind farm technology, and thus in terms of sea depth they will represent the best location. But reefs are considered to be of extremely high ecological value for the marine environment, thus the installation of wind farms in these areas should not be taken into consideration
- Further investigations into offshore possibilities down to 50 metres depth are being undertaken.
- Government will shortly put forward improved schemes with appropriate penetration targets for the generation of photovoltaic electricity and electricity from wind from medium sized turbines – a draft has just (August 2006) been published and this country report has had some key features from this added..

The target for electricity produced from renewables set during the accession process was 5% by 2010. Nevertheless recent studies conducted by the Malta Resources Authority (MRA)¹²⁰ revealed that the achievable target could be much lower. In fact the potential for renewable sources of energy appeared to be much lower than expected, and some technologies seem not feasible given the peculiar Maltese landscape characteristics.

¹¹⁸ National Strategic reference Framework – Malta 2007-2013. Draft Document for consultation, March 2006

¹¹⁹ Government of Malta, 2005: A Better Quality of Life – 2006-2010 pre-budget document. Government Printing Press

¹²⁰ EU Affairs, Policy Development and Programme Implementation Directorate – Ministry for Resources and Infrastructures, 2005: Report by Malta to the European Commission on the Implementation of Directive 2001/77/EC on the Promotion of Electricity from Renewable Energy Sources.

The current development of renewables technology is very low, since only few households PV systems have been installed, and political debate on RES seems quite stagnating around the discussion on whether investing in renewables will be worthwhile or not at all. The department in charge of energy management (MRA) showed little interest in investing in renewable resources of energy. The Maltese Prime Minister recently announced the intention to investigate the potential of off shore wind farms at high sea depths, but it appears quite unlikely that such an investment could be economically viable in the short term, since technologies for deep sea level wind farm are still very young and expensive. It is seen as viable in the longer term if and when technology issues are overcome and costs come down.

On the other hand, studies carried on by the Maltese University instead showed higher potential for renewable resources. PV is pointed out as the most reliable and feasible technology for Malta, given high insulation and relatively low impact (compared to other devices). Pilot projects for solar reverse osmosis plants are under investigation, and investment in research on onshore wind is recommended by the academic staff.

The studies of MRA and of the University of Malta are further discussed in the following chapters.

Note that very recently (August 2006) A Draft Renewables Energy Policy for Malta was produced. This confirmed that there is real albeit limited potential for PV, short term potential for small scale less intrusive onshore wind, no potential for large scale visual impact wind, and post 2010 potential for offshore wind.

5.3 Needs for the future

5.3.1 Supply and Demand Forecasts

Recent studies carried on by MRA analysed possible development of renewable resources in Malta, and showed that the potential for electricity produced from renewables is much lower than expected. The analysis took into consideration wind, solar photovoltaic, biomass wastes, landfill gases and sewage treatment plant gas. The findings of these studies have been recently reported by the Ministry for Resources and Infrastructures to the European Commission¹²¹. According to the study it seems that:

- it is not possible to meet 4.5% of electricity generation by onshore wind constrained to 40 MW and solar by 2010
- a 4.5% electricity generation target to 2010 from wind and solar is only possible if onshore and offshore wind farms are developed
- supporting renewable target only with medium scale wind and solar will be very expensive
- with the construction of one onshore wind farm, the expected output will likely be 1.13%.

¹²¹ EU Affairs, Policy Development and Programme Implementation Directorate – Ministry for Resources and Infrastructures, 2005: Report by Malta to the European Commission on the Implementation of Directive 2001/77/EC on the Promotion of Electricity from Renewable Energy Sources.

- the construction of a large (low-depth – less than 30m) onshore wind farm is likely to be unfeasible, given public opposition, high visual impact, limited land availability, shadowing effects, impacts on bird migratory routes, noise and vibration, etc
- without large on shore wind development the electricity that may be generate from RES (excluding waste) is very low (around 0.1%)
- beyond 2020 the most cost effective way of raising the contribution of renewables (excluding waste-derived projects) will be developing two onshore wind farms during 2005 to 2020. If this option is not feasible, given onshore wind farm impacts, developing and offshore wind farm has been proposed as a second best alternative

Overall the national indicative target for electricity generated from renewable energy sources by 2010 is expected to be 1.37% of gross electricity consumption if a land-based wind farm is constructed. Nevertheless, the report stresses out that, without the construction of such a wind farm, a more realistic figure will be 0.31%.

This dim future for renewable energy resources though seems contradicted by other studies conducted by the University of Malta¹²², which report more optimistic targets for renewables potential. Taking 2003 as the base year for electricity production, it was estimated that rooftop PV systems could produce up to 9.1% of electricity, onshore wind farms 5.4% and offshore wind (in sea depths of 20 m or less) about 3.4%. Energy from waste could offset another 5.6%. Overall the cumulative contribution of renewable resources to power production could reach about 24% of the total electricity generated in 2003. Furthermore solar water heating could save additional 4.8%.

The table below provides estimates of the future energy supply from renewable sources. The future scenario for 2010 builds on the assumption made by the report of the Ministry for Resources and Infrastructures (2005)¹²¹, which foresees a national indicative target of 1.37% of electricity from renewables by 2010. The overall potential is based on the estimates made by the University of Malta research¹²².

Table 1 Existing and future supply

Renewables Type	Power/generation/annual production			Installed capacity (GW/year)		
	Current (2005)	Future (2010) MRA Min scenario	Future Malta University Max scenario	Current (2005)	Future (2010) MRA Min scenario	Future Malta University Max scenario
Large scale (onshore) wind	0	30.2 GWh/year	100-120 Gwh/year	0	15 MW wind farm	45 MW (assuming that all practical

¹²² Farrugia, R.N., Fsadni, Yousif, C., Mallia, A., 2005: The renewable energy potential of the Maltese Islands. Institute for Energy Technology and Department of Physics, University of MALta

Medium scale (onshore) wind	0	1.45 GWh/year		0	5 wind turbines/year (60 kW nominal capacity) for the period 2008-2010	land area – estimated to be about 6km) is used for wind farm installations)
Offshore wind (< 20m sea depth)	0	n.e.	200 GWh/year	0	n.e.	14 MW (if 2 turbines installed)
Solar electric (PV)		0.54-1.08 GWh/year	202 GWh/year ¹²³		Penetration rate of 40-80 installations/year between 2008-2010 (3 kWp)	153.64 MWp
Solid waste		6.80 GWh/year	123 ¹²⁴ GWh/year		Mechanical biological Treatment Plant with input capacity of 71,000 t/year ¹²⁵	From 2000 equivalent of treated solid and liquid waste and animal husbandry
Liquid biofuels		n.e.	n.e.		n.e.	n.e.
Solar thermal		n.e.	106 GWh/year (energy saving)		n.e.	182,625 m ² (adopting the same number of effective roofs assumed for PV)

n.e. = not estimated

¹²³ This figure is calculated on the basis that 30% of all domestic buildings with roof space accommodate 1.2 kWpPV systems, 50% roof areas of eight industrial zones are available for PV installation, and that all schools and education centres, hospitals, retirement homes and hotels can be endowed with PV systems

¹²⁴ The energy produced from waste was estimated on the basis of methane produced from solid and liquid waste treatment and from animal husbandry in 2000 (15 Gg), and assuming that proper treatment of the material available can be achieved.

¹²⁵ This corresponds to the planned capacity of Sant'Antin treatment plant. Energy resulting from methane capture from the closed down landfills of Maghtab and Qortin is not taken into consideration.

Estimates for bio-energy potential have also been calculated by EEA (2006)¹²⁶. The measure used is MtOE, and potential is constrained by the assumption that the level of bio-energy produced has to be environmental-compatible.

Table 22: Bio-energy potential (Mtoe)

2010			2020			2030		
agriculture	forestry	waste	agriculture	forestry	waste	agriculture	forestry	Waste
n.a.	n.a.	0.05	n.a.	n.a.	0.05	n.a.	n.a.	0.04

Further estimates have been included in the very recently published Draft Renewables Energy Policy for Malta. The estimates are presented in the table below.

- Small scale on-shore wind an important, albeit limited, opportunity, already an opportunity for the short term, though limited in scope given land restrictions.
- PV important but limited given costs and land area.
- In the medium term (beyond 2010, but perhaps still before 2013), small scale offshore wind could offer real potential – 60GWhs.
- In the long term (Beyond 2010), off shore wind in waters deeper than 20-30 m will offer very significant potentials.
- Energy from waste the largest realistic potential in the short to medium term.

¹²⁶ EEA, 2006: How much bio-energy can Europe produce without harming the environment? EEA report 7/2006. ISBN 92-9167-849-X

Table 3.2: Progress towards RES targets (2010 & post 2010)

	Resource	Update on Progress towards - 2010 target GWh/annum	Estimated Contribution - post 2010 GWh/annum TENTATIVE	Comments
Solar	Photovoltaic	0.5 - 1.1	Annual penetration rate: 0.48 GWh/annum	
	Large scale – onshore (WT> 0.5 MW)	0	0	System will not be adopted
Wind	Offshore (at depths < 20m)	0	60	Subject to further investigation Note: If deepwater windfarm is developed, system may probably not be adopted
	Offshore (at depths > 20m)	Not expected to be developed before 2010	240	Deepwater windfarm proposal being evaluated
	Medium scale wind (20 - 500kW)	1.45	Annual penetration rate: 0.18-0.36 GWh/annum	Targets are subject to planning permission and mitigation of impacts
	Micro wind (WT < 20kW)	Negligible		
Biomass	Solid waste	7 – 10		Target 2010 – based on St. Annin Solid Waste Treatment Plant
		18.68		Possible construction of 2 further MBTs subject to funding by 2010
			36	RDF in waste to energy plant
	Solid waste – energy recovery from landfills	2.6	11	1. A 0.3 MW generator planned for 2006/07 2. A 0.5 MW generator planned for 2010 3. A 0.5 MW generator planned for 2013
	Sewage	Not expected to be developed before 2010	6.7	Energy recovery from Malta South Sewage Treatment Plants being considered
	Animal waste	Not expected to be developed before 2010	24	Anaerobic digestion of animal waste being evaluated

5.3.2 Costs of Infrastructure / Technologies (Unit Investment & Operating Costs)

The studies undertaken by the University of Malta estimated of the typical cost for renewable technologies. These estimates should be taken as an indication, rather than actual data, to provide an idea of the cost that the implementation of certain technologies could imply for Malta.

PV: The typical capital installation and commissioning cost for small systems (1-3 kWp) in Malta would be about 7 EUR/Wp installed. The life cycle costing, based on 4% net discount factor and a

20-year lifetime span, could be between 34-39 EURc/kWh. This can be dropped down to 28-37 EUR/kWh considering the current state subsidy of 20% of capital cost capped at 1,150 EUR. The costs will also continue to fall given that international PV prices are dropping due to learning and economies of scale - the costs of photovoltaics have been falling over the past 20 years at a rate of around 5 per cent per annum with increased worldwide market development. Note that for Malta receives a significant amount of solar radiation and therefore has a high unconstrained potential for solar energy use. The PV-generation potential per installed kW peak in Malta has been estimated around 1600 kWh/annum compared to around 600 kWh/annum in Northern Europe.

Wind – on shore: studies conducted by EWEA (2005)¹²⁷ estimated that the approximate investment cost for an onshore wind farm, based upon a new onshore wind turbine of 850 to 1500 kW capacity, can range from 900 and 1,100 EUR/kW. Operation and maintenance costs are approximately 0.012 EUR for turbines' 20-year lifetime and annual discount rate of 7.5%. At low wind-speed sites (average 5.4 m/s at 50 m a.g.l.) the costs of electricity ranges from 0.06 to 0.08 EUR/kWh. At higher wind speeds this would be between 4 and 5 cents per kWh. Average generation prices are higher for micro-schemes (eg house's rooftops).

Prices for wind farms are likely to be higher than EU average, given constraints placed by land availability and thus turbine size, small grid and logistic difficulties.

Wind – offshore: according to BWEA (2000)¹²⁸ costs stands at an indicative level of 1,600 EUR/kW for near-shore installations, leading to a price nearer 7 to 8 c/kWh. It is useful to distinguish between off shore at depths less than 20 or 30 metres – where the technology is largely proven, though the visual impact important in Malta – and those at depths greater than this – where the technology still faces technical difficulties

Domestic Solar Water Heaters: given average water consumption (about 80 litres at 60 C), and government subsidy of 230 EUR for first time users. The payback period of a SWH is about 4.5 years, which is lower than its expected lifetime (10 years). Without government subsidy the payback would rise to 7 years.

Energy from waste: Existing plants converting methane from landfills into energy with 40% efficiency would hold a unit cost of 1.5 EUR cent/kWh. Operations and maintenance would imply an extra 0.5 EUR cent, while another 0.2 EUR cent would be added by the process of gas collection and power losses, and the disposal of small amounts of hazardous waste from gas purification. Total unit cost then would range from 2.5 to 3.5 EUR cents. Real costs, including initial waste collection and landfill engineering costs would bring the cost to approximately 0.10 EUR/kWh.

It is non-trivial to calculate expected costs of renewables given that it is difficult to see where the political choice for renewables will be made that will allow the 5% target / 100GWh to be reached by 2010. If wind gets acceptance (planning permission) then it will be relatively speaking low cost – though not as low cost as it could be as the large on shore turbines will probably not be acceptable and only small/medium turbines will be realistic. If PV is to be supported, it will be higher cost.

¹²⁷ EWEA, 2005: Wind Energy – The Facts. In collaboration with the European Commission's Directorate for Transport and Energy (DG Tren), www.ewea.org, consulted 12th June 2005

¹²⁸ BWEA (British Wind Energy Association), 2000: Prospects for Offshore wind energy'. Report written for the EU by BWEA.

On the basis of 5% of electricity demand coming from RES, then around 100GWh/year will be required from RES. If this is all wind (**low depth off shore wind**) then this require 40MW of capacity and would amount to around 7 million EUR per year as an average generation price for RES could be 7 c/kWh¹²⁹ as it would have to rely primarily on off shore wind. The installation costs are around 1500EUR/kW and hence around 60 MEUR These are the gross costs.

For net, or incremental prices, these will be significantly lower. With a 2c/kWh premium then this would amount to 2MEUR/year, though with higher costs up front to cover the investment side. For current costs, if 30% of costs have to be covered outside the market (ie electricity users paper for 70% given 'normal' electricity' purchases. Then around 18MEUR would be needed.

In practice, some in the short term some **small scale on shore wind** will be needed, raising the costs. Here the estimate is around 10EURc/kWh for a capacity around 1.5 GWh, or 150,000EUR/year, and an associated investment cost of around 1MEUR up front, of which half would be covered by the market.

For **PV** the prices would be significantly higher the gross costs are significantly higher than conventional generation. Here prices of 30cEUR/kWh¹³⁰ for 1 GWh (max potential for 2010) would lead to 0.3MEUR/year gross and around 0.20MEUR/year net (after consumer prices) which is just under 2MEUR for the period 2007-2013.

This gives a broad figure of around 20MEUR for electricity generation needs that require finance beyond the sources of the electricity market.

Note that the chapter in this report on waste cover the waste to energy schemes.

For heat production – eg from **domestic solar** panels - relates to the energy as % of total primary energy consumption, and hence complementary to the electricity targets. The expectation is not high for the increased use for heating, despite high insolation levels, though some interest is seen in solar thermal cooling. At the moment Malta has 50m² per 1000 population or around 0.05m² per person. This is low given insolation levels, and far shorter than the Cypriots (leaders per capita) or Greeks (second) in Europe, but higher than Spain and Portugal (though these are fast growing markets). It is has not been possible to asses incremental costs for heat as the technology is generally affordable, and it is more an issue of awareness raising and proper maintenance to help ensure the benefits arise. There is also potential for solar thermal cooling, there is more promise, but difficult to assess market opportunities and incremental costs.

The recent Draft Strategy also offers estimates for the costs of generation – presented in LM or Maltese cents per kWh (recall an exchange rate of 2.33 EUR/LM) – see overleaf.

¹²⁹ Building on the aforementioned prices and used to develop an 'order of magnitude' estimate. Note that the Draft Strategy notes an average 3.1Maltese c per kWh = 7.22 EURc/kWh, confirming the order of magnitude estimate.

¹³⁰ Current prices will drop fro the 32 to 37 EURc/kWh by 2013 – generally 5% per year. We use 30 EURc/kWh average here.

Table A2: Characteristics of Various Renewable Energy Technologies (continue on next page)

	Solar			Small Scale Wind		Large Scale Wind		
	Thermal	PV	Microwind	Medium scale wind	Onshore Wind farms	Offshore wind farms (30 metres Depth)	Distant Offshore wind farms	
	Estimated average cost of power ¹		14-16 c/Wh	5 c/Wh	4.4 c/Wh	2.2 c/Wh ¹	3.1 c/Wh ¹	Innovative and emerging technologies – estimated 4c/Wh ²
Contribution to national energy economy at practical penetration rates ²	Very low	Very low	Very low	Very low	Low eg. 1% at Marina Ridge	3.1 c/Wh	Can be very significant eg. 10% per farm	
Interface with national electricity grid	Not directly connected to the grid	No problems – they are small, distributed and stable	Trough variable, they are small in relation to grid, hence no problem		Grid stability issues, the severity of which depends on the ratio of the generated power in relation to grid load. Hence will vary between day and night in our small isolated system and will be eliminated once Malta is linked to the European Grid.			
Compatibility with energy demand patterns	Problems: • Full potential may not be utilised depending on consumer habits. This might change when solar air-conditioning technology becomes available • High demand during when cost of (cheap) night schemes are introduced.	Excellent: • Full potential can be exploited through export to the grid. • Full production coincides with daytime peak demand. • Will be advantageous when dual tariffs are introduced.	Energy output depends on which characteristics and full potential can be exploited through connection to the grid. No structured relationship with energy demand patterns.		Energy output depends on wind characteristics. No structured relationship with energy demand patterns. Due to grid stability issues, energy that can be accepted by the network depends on the demand on the network at that point in time, and Malta remains a small isolated system.			
Maturity and potential development of the technology	Technologies involved are low level and well known. No major improvement expected as equal for solar driven air conditioning	Potential of significant improvement in efficiency, but difficult science involved	Though can be refined, no significant change is likely		No jump in performance likely but development will lead to increased reliability and less maintenance on hardware.		As for onshore and near offshore sites, except for platform technology for deep sites is still in its infancy. Its reliability is currently being demonstrated.	
Public Acceptability	No problems	No problems	No problems in moderation. May give rise to issues of poor neighbourhood & planning problems.	Visually intrusive		Should give rise to no visual intrusion and public acceptability problem since such farms can be located well out of sight.		

¹ Based on amortisation period of 15 years
² Based on amortisation period of 8 years (due to unproven technology and financing conditions)

5.3.3 Review of Instruments and Support Schemes - Enabling/hampering factors to meet needs

Enabling factors

Renewables could be an appealing source of energy for a country like Malta, which enjoys abundance of sunshine and mild and warm temperatures, which favour the application of solar PV and solar water heaters.

In 2006 the Government introduced a scheme for households with PV systems generating more energy than they are consuming. Under this new scheme excess energy being produced can be channelled to the national electricity grid and will be refunded at the rate of Lm 0.03/kWh (Eur 0.07). It has to be noted though that this buy back rate is relatively low, given that it is below the cheapest rate per kWh payable to Enemalta by households¹³¹ - Lm 0.04/kWh (EUR 0.09) plus the surcharge due to the increase in international oil prices.

Barriers

- Technical barriers: a major physical barrier is represented by the very limited area and high population density of Malta, which set tight limits on the potential from land-based RE generators (which typically have low energy intensity per area). The inclusion of sea areas for offshore wind puts up installation and other costs, which will likely require private investment. Onshore wind may induce problems such as visual intrusion, high noise, disruption of migratory bird routes and radar interference.

In the case of Solar Water Heating, inadequate technical backup leading to poor performance has generated low level of customer satisfaction. In addition, water in Malta is salty and hence technical life of passive solar power (water heating) is shortened to 10 years rather than 20, thus affecting the feasibility of the investment.

- Planning barriers: in Malta building codes are such that no solar water heater may be installed within 2 metres of the building façade – this makes some installations impossible.
- Public barriers – Landscape is key issue for tourism and leisure activities. Thus the general public is generally opposing the idea of having huge structures with high visual impacts, such as wind farms, since they will strongly affect the islands landscape
- Policy barriers –LPG, mostly used for home heating and/or cooking, is still subsidised by the Maltese Government, covering over 50% of its cost. This fuel is supplied by Enemalta to consumers at below cost, and during 2005 the Government paid the provider a contribution of Lm1.8 million (Eur 4.2 million), projected to increase to Lm2.1 million (EUR 4.9 million) in 2006 to keep the prices of LPG at their present level. Distortions have been thus created, making fossil fuels seems more appealing, in terms of cost, than renewables resources. Furthermore, the selling price of PV electricity is lower than the current price of electricity paid by households.

The fact that currently there is no national energy policy, or a policy for RES, is of course of no help for the development of renewables. Preoccupation with satisfying public demand for low price electricity has discouraged firm action in the field of renewable energy. Low investment has been made by Enemalta, the state-owned energy provider. Finally, fragmented ministerial responsibility led to disjointed, and sometimes even counter productive measures.

- Market barriers (demand side): lack of clearly defined conditions for selling electricity from RES

- Market barriers (supply side): the sector needs a long term incentive policy for the process pipeline enhancement.

5.3.4 Investment Calculation and Comparison

In Malta energy supply relies almost entirely on imported fossil fuels. This is likely to become an increasingly relevant expense, given the rising price of oil and the increasing demand related to economic development. In addition about half of water supply in the islands relies on reverse osmosis plants, which are high energy demanding plants and currently absorb about 30% of the energy resources. The diversification of energy source thus appears imperative, and the increase of renewable sources of energy advisable. Nevertheless several constraints have hampered so far the implementation of such technologies, especially land scarcity and high population density.

Given the small dimension of the island, the presence of several environmental protected areas, the importance of landscape also in the context of tourism, structures with a high visual impacts, such as on shore wind farm, has always received strong public opposition. Also Government agencies, are highly concerned about the environmental impacts that this kind of installations can produce in a small country like Malta. Off shore may have a lower impact on the Maltese landscape, but will lead to further environmental impacts if installed nearby the coast, on reef at no more than 20m sea depth. Proposals to install off shore wind farms in deeper sea seem quite unrealistic, given the high cost and the quite young technology implied. On the other hand, wind farms are an appealing source of energy, given wind potential in the island and relatively low costs (if compared with PV). Other stakeholders, such as some University faculties, are thus quite keen to explore this potential further, eg through feasibility studies, which may require some EU funding.

Photovoltaic systems can be accepted by the public more easily, and offer a good source of energy given the high insulation rate of the islands. Some economic instruments are already in place to incentivise PV private installations, but have not proved to be very effective so far, given the low penetration rate of these systems. Further efforts will be required to make this technology more affordable, eg considering increasing the selling price of excess energy produced by PV, installing PV systems in public buildings.

Energy from waste is a project which has been already explored quite extensively by the Maltese government. Cohesion funds have been already allocated to upgrade Sant'Antnin plant, which is meant to become a facility able to treat up to 71,000 tonnes of waste per year. The government is willing to invest more on 'waste to energy' projects, and foresees an overall financial need of about EUR 51 million.

5.3.5 Conclusions

Before its accession Malta set a target of 5% for electricity from renewables. Now that further studies have been carried on by the Maltese government, it turned out that this target was too high. Official estimates reveals that, if no onshore wind farm is developed, a reasonable target will be about 0.3%.

Given high public resistance it is indeed unlikely that onshore wind farm can be developed in the near future, while offshore results difficult to implement both for economic, environmental, and technical (if on 50 meters sea depth) constraints. Nevertheless it could be worthwhile undergo some feasibility studies to assess the actual environmental impacts, identify possible solutions and build public awareness.

Having said that, the best investment in the short term is likely to be in PV systems, in order to increase the degree on penetration in private households and commercial/industrial activities and endow public buildings with photovoltaic panels. To this end PV electricity pricing systems should be re-defined and improved.

Also solar thermal has clearly a high potential, through increasing the number of public and private solar water heaters and improving the performance of the existing ones through appropriate maintenance.

Further investigations are required as far as other sources (included tidal or sea energy).

It will also be worthwhile to explore further the potential of energy from waste (see waste section)

The idea of coupling renewable energy sources with reverse osmosis plants could be further explored, given that reverse osmosis plants are the highest energy demanding facilities in Malta.

Energy efficiency and energy saving should be improved through saving technological innovation (eg improvement of reverse osmosis plants energy efficiency)

The production of biofuel from cooking oils should be improved, and other sources should be explored.

5.4 Priority assessment

Ranking Types of Investment (Rank most important as 1)

Renewables	Wind	1
	Hydro (>15 MW)	-
	Hydro (<15 MW)	-
	Solid biomass	3
	Liquid biofuels	2
	Geothermal	-
	Solar thermal	2
	Solar electric (PV)	1
	Other (Specify)	-

Although interesting in term of potential and cost, wind is ranked after the other renewable sources give the low level of public acceptance of infrastructure with high visual impact over the landscape. Thus technologies which can be easily implemented have been given higher importance, such as PV. This does not imply that wind farm should always be regarded as unfeasible in Malta, but this should likely be taken into consideration in the future, and public awareness should be built.

6 NATURAL RISK MANAGEMENT (FIRE, DROUGHT, FLOODS)

6.0 Current situation

Malta has been suffering from flooding episodes in the past years. The building of the Qormi - Marsa watercourse has been vital to decrease the flooding. In addition, 7km of cleansing works in valleys have also been instrumental to decrease flooding in areas such as Rabat, Attard and Wardija. Meanwhile works are also being carried out at Karwija, limits of Kirkop.

On 15 September 2003 a devastating storm damaged the area of Qormi. It was established that the area most hit by the floods was that from Triq Manwel Dimech, that is, the Marsa catchment, to the Cassar Shipyard. It was also established that this tract is riddled with obstacles and structures that are not adequate to withstand the massive volume of rain water that fell on that day. Therefore plans were made for a program of works so that these structures are modified so as to withstand the force of the flood in possible storms in the future. The works physically started at the beginning of February from near the Lowenbrau factory at Qormi, where various water courses were widened.

Other works carried out included the replacement of some bridges and the demolition of structures that used to shackle the water's course. The actual widening of the water course consisted in the dredging and formation of the sub-base, and its eventual asphaltting. Retaining walls, made up of large blocks, have being constructed.

6.0.1 Existing risk assessments

Storms of short length and strong intensity seem to happen on a quite regular basis every year, especially in the autumn season. The phenomenon has been perceived to be increasingly violent and disruptive in recent years.

Densely populated valleys are particularly vulnerable. Storm water tends to flow down these areas and cannot be absorbed or find a way out given the high level of urbanisation. In addition in these areas human and economics losses can be higher, since there is a high concentration of population, infrastructures and buildings which can be easily damaged by floods.

6.0.2 Institutional issues

Problems of floods and similar natural hazards, together with the related infrastructural works, have been carried out so far by the Ministry for Resources and Infrastructure

The government intends to centralise ongoing valley rehabilitation and cleaning work in a single unit within the Works Division of the Ministry for Resources and Infrastructure, in order to carry out such work more systematically and efficiently.

6.0.3 Conclusions

Floods are the major issue in the islands, due to quick but violent storms. Given the high population density of certain areas of the country storm water cannot be absorbed by the soil and channelled into water courses, and it thus damage infrastructures, buildings, and in some cases caused the loss of human lives.

Barriers to flood prevention are represented by the high urbanisation of some areas, which in many cases makes impossible the building of superficial water courses to collect storm water. Underground waster collectors have been identified as a possible way out.

6.1 Experience of Previous Investment Programmes

Table 6.2: Funding by Source – Natural Risk Management (Million Euro, 2000 – 2006)

Source of funding	Funding instrument	UE contribution (m EUR)	Total cost (m EUR)
EU	Cohesion Fund	0.32	0.38
	Structural Funds	0.16	0.20
	Solidarity Fund	0.96	

6.1.1 Cohesion fund (2000-2006)

A project financed by the Cohesion Fund aimed at formulating a Stormwater Masterplan including an assessment of the current situation, the impacts associated with stormwater, flooding and proper disposal, road infrastructure, deterioration and traffic management and asset management, civil protection. The project is also expected to explore the possibilities to harvest, store, reuse, treat and distribute stormwater. An environmental Impact Assessment and Cost-Benefit analysis will also be applied to a list of priority projects set out in the Masterplan.

Project title	Full cost (€)	Cohesion Fund (€)	EU-support (%)
Technical assistance to Formulate a Stormwater Masterplan towards the sustainable management of stormwater	381,969	324,674	85%

6.1.2 Structural funds (European Regional Development Fund) (2000-2006)

About EUR 146000 were allocated for the improvement of Wied il-Mielah Valley through conservation and protection of its surroundings. The project includes strategic interventions to repair and clear debris from within the existing dams and stopping waste disposal abuses.

Project title	Full cost (€)	Structural Fund (€)	EU-support (%)
Wied il-Mielah Valley Restoration and Management of Storm Water	199,760	145,830	73%

6.1.3 Solidarity Fund

Heavy storms and flooding on 15 September 2003 caused severe disruption to economic activities, including fish farming installations at sea, and damaged infrastructures and the natural environment throughout the islands of Malta and Gozo. The Commission considered that this disaster qualified for aid under the 'major disaster' criterion of the EUSF regulation. The total direct damage was estimated at EUR 30.172 million. The Solidarity fund contributed to

compensate costs linked to emergency operations (estimated to be about EUR 11.3 million). As a result, an amount of EUR 961,000 was granted.¹³²

6.1.4 Conclusions

In the past the country suffered from floods, due mainly to weather conditions, the geomorphology of the Maltese territory and high urbanisation. Problems increased due to a lack of drainage system, which resulted in damage to human lives and infrastructures. Current aids have been efficiently allocated for the development of a Stormwater Masterplan and related assessments, and for the improvement of the existing infrastructures. The solidarity fund, in addition, contributed to the partial coverage of the damages incurred during the strongest storm in 2003. Nevertheless the problem of floods seems far from being solved, given also the worsening of the storm phenomenon (due to increased precipitations) and the increasing urbanisation of the island. The issue thus needs to be addressed further, also in consideration that an appropriate collection and storage of storm water could also alleviate the pressure on water resources. Storm water in fact can potentially be used for secondary use, eg in agriculture.

6.2 Review of Policy Objectives and Targets – and supporting instruments

The Maltese government is highly concerned about the phenomenon of flood caused by stormwater, which are said to have been increasingly violent in recent years. The strong storm of 2003 created major damage to the urban environment. Malta engaged in works on existing watercourses, and implemented its own Stormwater Mastplan. It is a general feeling though that more should be done, and new infrastructures built, in order to mitigate the problem.

During 2006, Malta intends to continue to invest towards the recreation and completion of two watercourses (the Qormi-Marsa Jetties Wharf watercourse and the Burmarrad/Salini watercourse) and to rehabilitate the Attard-Wied Incita Valley.

The **National Strategic Reference Document** states that risk prevention is highly important for the Maltese government. IN this regard, it is said, the development of infrastructural solutions to address the incidence of high storm water volumes within highly urbanised areas constitutes a major priority. Furthermore, it is also taken into consideration that storm water may provide an additional source of fresh water which currently is not utilised to its full potential.

In this regard, the Maltese government is currently evaluating the feasibility of developing a storm-water retention and disposal system in Birkirkara/Msida. This would rely on underground tunnels to be dug at a depth which would not interfere with normal above-ground development and the provision of infrastructural services.

6.3 Needs for the future

¹³² EU Press release IP/04/313 of 09/03/2004, <http://www.eu.int/rapid/pressReleasesAction.do?reference=IP/04/313&format=HTML&aged=1&language=EN&guiLanguage=en>

6.3.1 Enabling/hampering factors to meet needs

One of the main reasons for water floods after heavy stormwaters is the great urbanisation of some areas of the country, which hampers the natural absorption of water from the soil and results in damages to the built infrastructures and, in some occasions, in loss of human life. High urbanisation in addition makes difficult the construction of surface water courses in heavily populated areas, although these are the most hit by water storms. For these reasons the building of underground tunnels has been taken into consideration by the Maltese government.

6.3.2 Investment Calculation and Comparison – Natural Risk Management

The Ministry for Resources and Infrastructure is investigating a possible project to build a storm-water retention and disposal system in Birkirkara/Msida. This is one of the most populated areas and one of the most affected by floods. The project will consist of the construction of tunnels to collect and store storm water, with an overall capacity of about 700,000 m². The construction of this infrastructure is expected to take about 5 years, and to collect about 5 to 10% of total rainfalls in the island. It is expected to have 6-7 years pay back period. The water collected could be used for secondary use, eg in industry or for agriculture irrigation. Feasibility studies and analysis (eg on the level of pollution of the storm water and its feasibility for agriculture) will need to be undertaken. MRI estimates that the project will cost overall about EUR 120 million, and will need EU financial support. Operational cost will be relatively small compared to capital cost, which will represent the bulk part of the investment.

6.3.3 Conclusions

The issue of flash floods has always been an issue in Malta, and it is likely to remain so in the future. The increased violence of the phenomenon and the increasing urbanisation of the islands are contributing to worsening the problem. Although some improvement has been made to the existing water courses, the current infrastructure seems not sufficient to mitigate the problem, especially in the highly urbanised areas geomorphically exposed to water flows.

The systems of water collections should thus be improved for controlling floods. In addition, in light of the scarcity of water in the island, Malta should seriously take into consideration the option of increasing the use of alternative sources of water. For instance, water for irrigation is currently extracted from boreholes, depleting the already scarce water resources. Storm water thus could be usefully collected and used for this purpose, alleviating pressure on boreholes.

The project about to be proposed by the Maltese government could partly address both this issue, and the two issues of collecting storm water from a densely populated area and storing it for secondary uses. The project though is expected to bear a high cost, thus appropriate feasibility studies should be done and economic evaluations carefully taken into consideration.

6.4 Priority Assessment

Ranking Types of Investment (Rank most important as 1)

Natural hazards	Drought ¹³³	-
	Fire	-
	Flood	1
	Heat wave	-
	Storm	1
	Other (Specify)	-

¹³³ The issue of drought could be addressed with policies on water supply and wastewater (see related chapters)

7 CROSS FIELD PRIORITY ASSESSMENT

Types of Investment within Fields

The chapters above have identified the priorities according to each issue. These are reproduced in the table below.

Table. Ranking (Rank most important as 1)

Field	Type of Investment	Ranking
Water Supply	Reservoirs	1
	Drinking water production plant	3
	Distribution (inc leakage) – long	2
	Distribution (inc leakage) – local	2
	Metering	3
	Other: monitoring	1
	Other: illegal abstraction prevention	1
	Waste Water	New STPs
Renovation / upgrade STPs		2
New Sewerage		3
Renovation / upgrade sewerage		3
Sewage pumping stations		4
CSO upgrading		4
Sludge treatment		1
Sludge Disposal or reuse		1
Other: Metering		2
MSW	Waste collection	2
	Waste sorting	2
	Recovery (waste to energy)	1
	Disposal	3
	Remediation of disposal sites	1
	Other: illegal dump prevention	1
Renewables	Wind	1
	Hydro (>15 MW)	N/a
	Hydro (<15 MW)	N/a
	Solid biomass	3
	Liquid biofuels	2
	Geothermal	N/a
	Solar thermal	2
Solar electric (PV)	1	
Natural hazards	Drought	N/a
	Fire	N/a
	Flood	1
	Heat wave	N/a
	Storm	1

In addition, other environmental issues are also of importance in Malta, and additional funding priorities probably exist beyond those analysed in this study. Among these, it should be mentioned:

1. Hazardous waste management – Malta does not have any system for hazardous waste, which is currently exported. Proposals have been evaluated to upgrade a newly commissioned the existing incineration plant (at the abattoir) to treat some of this waste
2. Biodiversity – Malta has a unique and fragile environment. Marine ecosystems will benefit from those projects aiming at increasing waste water treatment, since they will reduce the amount of sewage dumped directly into the sea. Nevertheless further efforts should be taken to monitor and preserve the Maltese ecosystem. For instance excessive bird hunting is contravening to the Bird Directive (in June 2006 a legal infringement procedure was opened by the Commission), and will need to be taken under control.
3. Energy saving: although outside the scope of this study, energy saving devices should be taken into consideration when evaluating the needs for renewable energy technologies.
4. Capacity building: several projects are likely to be proposed by certain Maltese Authorities, such as MEPA, which are willing to increase institution capacity and training
5. Cross field projects: some projects on cross fields monitoring, training, assistance to SMEs, enforcement of EIA, SEA etc are expected to be proposed for the next programming period

Each type of investment has been assessed for its contribution to the following criteria:

1. securing compliance with the acquis
2. avoiding economic and social damages
3. encouraging new technology and market development with the potential to replace imports or generate exports
4. generating employment opportunities in line with national and regional employment goals
5. providing employment and training opportunities for low skilled workers or 'hard to reach' groups (e.g. ethnic minorities, women, older workers)
6. promoting cross-border co-operation
7. delivering national and regional environmental strategies and plans which are well integrated with wider development strategies and plans
8. promoting more cost-effective programme design and delivery

The scores have been represented in the table below. The analysis identified the following priorities:

- Water supply: some additional reservoirs may be needed, to contribute to the overall water policy, as this may reduce pressure on water sources eg in period of peak demand

- Waste water treatment: the installation of sufficient capacity for waste water treatment and sludge disposal will be crucial for the compliance with the Acquis (especially the UWWT Directive)
- Waste: additional efforts in waste collection, recovery and disposal and for the remediation of existing landfills will be important to meet the Acquis requirements and can bring some economic benefit, eg if energy is produced waste
- RES: investments in PV, solar water heating and wind technology can reduce the dependence of Malta on imported fossil fuels, spur innovation and foster employment. Such investments could also help filling the gap towards the 5% target of electricity from renewables and, indirectly, reducing its GHGs.
- Natural hazards: projects aiming at reducing the floods induced by flash storms can reduce the social and economic losses caused by this phenomenon, and potentially provide an additional source of water for secondary uses.

Multi-Criteria Assessment for Malta

This table score the potential investment benefits of new investments above and beyond those that are already planned.

Score are given to each of the five fields analysed by this report, according to eight parameters:

1. securing **compliance with the acquis** (e.g. because of replacement of non-compliant treatment plant)
2. **avoiding economic and social damages** (e.g. because of reduced natural risks of flooding, fire or because of improved environmental quality, or because of increased security of supply)
3. **encouraging new technology and market development** (e.g. priming the development of local PV or passive solar market) with the potential to replace imports or generate exports
4. generating **employment opportunities** in line with national and regional employment goals (e.g. for employment in lagging regions, or in particular cities or in rural areas - because of improvements in environmental quality in particular areas or because of the location of utilities and construction firms)
5. providing employment and training opportunities for **low skilled workers** or 'hard to reach' groups (e.g. ethnic minorities, women, older workers)
6. promoting **cross-border co-operation** (e.g. management of cross-border flooding)
7. **delivering national and regional environmental strategies** and plans which are well integrated with wider development strategies and plans (e.g. where environmental priorities are well linked to economic or social objectives)
8. promoting more **cost-effective programme design and delivery** (e.g. encouraging the use of public-private partnerships, or more effective procurement, or through use of well developed technologies which take account of subsequent maintenance arrangement.

The key used is the following:

- Very Strong Contribution: Score 10
- Strong Contribution: Score 7
- Limited Contribution: Score 3
- Negligible Contribution: Score 0

A more detailed explanation of the score assessed is given in Annex IV.

Field	Type of investment	1	2	3	4	5	6	7	8
Water Supply	Reservoirs	3	3	3	0	0	0	7	3
	Drinking water production plant	0	0	0	0	0	0	0	0
	Transport (inc leakage) - long	0	0	0	0	0	0	0	0
	Transport (inc leakage) - local	0	0	0	0	0	0	0	0
	Metering	0	0	0	0	0	0	0	0
Waste Water Treatment	New STPs	10	7	3	3	0	0	7	3
	Renovation / upgrade STPs	0	0	0	0	0	0	0	0
	New Sewerage	0	0	0	0	0	0	0	0
	Renovation / upgrade sewerage	0	0	0	0	0	0	0	0
	Sewage pumping stations	0	0	0	0	0	0	0	0
	CSO upgrading	0	0	0	0	0	0	0	0
	Sludge treatment	10	7	3	3	0	0	7	3
	Sludge disposal	10	7	0	3	0	0	7	3
MSW	Waste collection	7	7	3	7	7	0	7	7
	Waste sorting	7	3	3	7	7	0	7	7
	Recovery	7	3	7	3	3	0	3	7
	Disposal - new disposal facilities	0	0	0	0	0	0	0	0
	Disposal - remediation of existing	7	7	3	3	3	0	3	7
RES	Wind	3	3	7	3	0	3	3	7
	Hydro (>15 MW)	N/a							
	Hydro (<15 MW)	N/a							
	Solid biomass	3	7	7	0-3	0	3	7	7
	Liquid biofuels	3	7	7	0-3	0	3	7	7
	Geothermal	N/a							
	Solar thermal	0	3	3	3	3	0	3	7
	Solar electric (PV)	3	3	7	3	3	3	7	3
Natural Hazards	Drought	N/a							
	Fire	N/a							
	Flood	0	10	7	3	0	3	3	3
	Heat wave	N/a							
	Storm	0	10	7	3	0	3	3	3

8 CONCLUSIONS

8.0 Key points from current situation

In order to provide a short assessment of how the investment needed contributes to meeting each of the assessment criterion – compliance with the Acquis, regional development and contribution to other policies –, the major environmental challenges for Malta are described below.

- *Acquis communautaire*

Waste and **waste water** remain two key areas for meeting European environmental standards, since further efforts are required to meet the agreed deadlines and reach full compliance to the Acquis.

Further investments are needed in the field of **RES** if Malta wants to meet the target of 5% of electricity produced from renewable energy sources by 2010, agreed during its accession process, in line with EU Directive 2001/77/EC on the promotion of electricity from renewables.

- *Regional development*

Investment in **waste water** treatment could improve the whole environmental situation of the Maltese islands, and improve health conditions and the quality of bathing water, support amenity and ultimately support tourism, a key revenue sources and driver in regional development. An appropriate level of waste water treatment could increase the availability and hence use of treated water by agriculture and industry, thus releasing some pressure from groundwater sources and reducing demand of drinking water. This will reduce the scarcity of groundwater and hence reduce pressure on development associated with access to groundwater.

Investment in the **waste** sector. There is ongoing investment in 'bring in sites' with 400 such sites to be in place by 2006, part financed by the structural funds. This should lead to significant improvements in waste collection and disposal and complemented by other policies (eg strict enforcement of the Litter Regulations, including the application of fines) could lead to clear urban environment and hence support tourism. Investment in sanitary landfills and clamp down on fly tipping and waste dumps should also prove valuable to local development as areas are cleaner and hence have improved locational quality.

Investments in **renewable sources of energy** could reduce the dependency of Malta on imported fuel – which is basically oil. Renewable energy could be particularly helpful to reduce the consumption of fossil fuels by high energy demanding processes, such as reverse osmosis plants.

Investment in **natural hazard prevention**. There is some potential for small scale water capture systems for households/commercial properties that could contribute to flood risk reduction and to drought avoidance. Similarly there is capacity for ongoing leakage reduction in water support and sewage, which will also reduce the risk of drought.

- *Contribution to other policies*

Investment in **renewable sources of energy** could help tackling the problem of climate change. Malta's GHGs emission rose by more than 44% between 1990 and 2003, with CO₂ being the most significant contributor. Malta has a relatively high rate of GHG emission per unit GDP, which is likely to be related to low levels of efficiency in energy generation and consumption. In fact the energy sector currently relies totally on imported petroleum products and fossil fuels, and it contributes alone to about 63% of GHG emission.

Redefining Malta's public transport policy in order to ensure the most efficient use of energy sources and reduce congestion on the, already heavily laden, road network should be a priority for the Maltese government in order to achieve: lower GHG emissions, savings on fuel consumption and; reduction of pressure on the fragile infrastructure whilst shifting to more efficient modes of transport. In addition, the revision of pricing systems for the use of private cars in certain areas of the Island, such as historical centres, as well as the introduction of paid parking spaces could counter the use of private cars and help reduce emissions, fuel consumption and congestion.

8.1 Summary of environmental investment needs

The following tables summarise the needs for environmental improvements that emerged through the present analysis and the Overview report. The table highlights the aspects that need further investment efforts, those still existing but already addressed and on the way to be solved, and those which are currently not relevant, either because they are not an issue in Malta or because they have been addressed in the past and satisfactorily managed.

Table 1: Needs Summary: Qualitative Analysis

MALTA	WATER	WASTE WATER	WASTE	RES	NATURAL HAZARDS	OTHER AREAS (if of critical importance)
Ongoing needs that need further attention	Reservoirs Water capture devices Illegal abstraction prevention Demand control Reduction of pesticides Water saving technologies Monitoring	One additional STP (Malta South) Renovation / upgrading of sewerage Sludge disposal or re-use Distribution of treated Sewage for secondary uses Metering	Additional waste treatment plant New sanitary landfill (incl. storage for small hazardous waste)? Landfills remediation Illegal dumping prevention Waste production control/reduction	Wind: onshore Wind: offshore Additional efforts on liquid biofuels Additional solar electric (PV)	Storm water collectors Monitoring	Ecolabel/EMS for tourism Energy saving technologies Biodiversity - marine (links to waste water disposal) Biodiversity – birds protection
Needs been (at least) partly addressed by current initiatives	Improvement of existing plants New network (pipes, pumps, etc) Renovation of existing network Leakage control	New sewerage Renovation / upgrading of sewerage Sewage pumping stations Sludge treatment	Manual/mechanical sorting facilities Recycling yard Incineration plants Existing plants/landfills upgrade New landfills Gas capture devices	Liquid biofuels	Watercourses upgrading	Biomass Additional solar thermal and improving efficiency of the existing SWHs
No needs (no issue or already addressed)	Metering New production plants (including reverse osmosis plants)	2 new STPs already financed CSO upgrading	Waste collection service Waste transfer station	Hydro (>15 MW) Hydro (<15 MW)	Wetland rehabilitation	Geothermal
<i>Key:</i>	Bold: high relevance;	<i>Italics: expected relatively high investment required;</i>	Red: expected (relatively) high cost			

Table 2: Needs Summary: Key Actions needed

MALTA

NEEDS ASSESSMENT TABLE – SUMMARY 2

The aim is to note the key needs for the country

	WATER	WASTE WATER	WASTE	RES	NATURAL HAZARDS	OTHER AREAS (if of critical importance)
Future needs requiring planning and/or investment in 2007 – 2013 – indicating the type and physical requirement (eg no of population to be connected, or number of plant to be built / upgraded or capacity to be installed)	Water monitoring (likely to be proposed by MEPA)	<i>Malta South Sewage Treatment Plant</i> <i>Max (expected) capacity 9 million m³/year</i>	<i>Waste to energy plant(s)</i>	Extension of photovoltaic and other solar systems	<i>Tunnels for storm water collection and storage in Birkirkara/Msida.</i> <i>Max (expected) capacity 700,000 m²</i>	Control on bird hunting (for compliance with Birds Directive) – awareness raising, flanking measures, etc
	Control of illegal water abstraction (monitoring, flanking measures)	Reuse of treated water: network infrastructures	Improved waste sorting, recycling, composting facilities	Feasibility studies for wind farms	Feasibility studies for tunnels	Energy saving technology
	Water capture devices and reservoirs	Metering (in order to better assess flanking measures)	Upgrading of incineration plant (abattoir) for treatment of some hazardous wastes	Early small scale onshore wind	Storm water analysis to assess level of pollution – suitability for agriculture uses	Tourism: urban and environment restoration, support to SMEs (including Environmental Management Systems), etc
			Landfills remediation:	Offshore wind in less than 30m water		Capacity building
			Illegal dumps prevention			Air monitoring equipment.
Key:	Bold: high relevance;	<i>Italics: expected relatively high investment required;</i>		Red: expected (relatively) high cost		

Summary of investment needed over the 7 Year Programme Period, providing examples and illustrations. Key gaps are highlighted in the last row.

Table 3: Needs Summary: Indicative Investment Needed

MS **NEEDS ASSESSMENT TABLE – SUMMARY 3**

Needs requiring investment in 2007 - 2013	WATER	WASTE WATER	WASTE	RES	NATURAL HAZARDS	OTHER AREAS (if of critical importance)
Indicative level of investment for the Field (Meuro):	> EUR 3 m	EUR 50-60 m	EUR 50 m	EUR 60m of which general market will provide EUR 40m pay back through prices.	EUR 120 m	
Indicative examples of the types of investment needed:	Monitoring EUR 15 m (of which EUR 3 m for water) reservoirs: illegal abstraction	<i>South Malta STP</i>	<i>Waste to energy thermal treatment plant</i>	Wind feasibility study: to be assessed PV and SWH: to be assessed	<i>Storm water infrastructures and studies:</i>	Energy saving: to be assessed Hunting: measures to be decided Tourism: Urban areas EUR 35 m City gardens: EUR 20 m SMEs: EUR 25-50m
Key data gaps:	eg) no official population forecasts to estimate demand	UWW Dir parameters		To be assessed how much can be covered by flanking measures.		
Key: Bold: high relevance; <i>Italics: expected relatively high investment required;</i> Red: expected (relatively) high cost						

8.2 Overall national priorities

Water supply: the sector is quite well developed, as water supply is guaranteed by the existing groundwater and RO (reverse osmosis) plant. Nevertheless further investment should be made on water reservoirs, water quality monitoring and prevention of illegal abstraction. These will helpfully decrease the pressure on the scarce groundwater resources.

Waste water: the amount of treated sewage is currently very low, and most of it is dumped directly into the sea, rising concerns about marine biodiversity and water quality. The treatment of all sewage produced on the island is foreseen through the implementation of three STP (sewage treatment plant), but one of them is still in need of financial coverage.

Waste: the basic infrastructure is now in place, but further efforts should be put on waste management, collection, recycling and disposal. A project on waste to energy, for the construction of a thermal treatment plant, could be useful to reduce the amount of waste landfilled and generate energy.

Renewables: the issue of renewables is highly debated. The island is in need of additional sources of energy, since it is now totally relying on imported fossil fuels, whose price is constantly increasing. Nevertheless some infrastructures, such as wind farm, are likely to have a high impact on the island landscape, given the small dimension of Malta. Landscape is important not only as a public good for the Maltese citizens, but also for the role it plays in tourism, since it is one of the main asset of the island, and should thus be taken in careful consideration. Investment in PV and solar water heating, at least in the short run, could be accepted more easily by the public, although less cost effective than wind farm.

Natural hazards: the issue of floods is quite relevant in Malta, especially given the high urbanisation of some valleys which makes water flows/collection quite difficult. Past events, especially the storm of 2003, create several economic and social damages. The project that is likely to be proposed by the Maltese government is the building of an underground system of tunnels for the collection of stormwater. This could help reduce the impact of such a phenomenon, and possibly storing stormwater for secondary uses (eg agriculture). The project though is likely to have a high cost.

On the basis of the national strategy plans and policies and comments received from national officers, an overview of the priorities perceived as most relevant in Malta can be sketched. The following thus appear to be the projects which could likely be proposed for regional funding by national authorities:

- In the field of water: water quality monitoring
- For waste water: on additional STP (Malta South - Max expected capacity 9 million m²/year)
- For **waste**: additional waste treatment plant (especially plants endowed with waste to energy technologies), landfill remediation and illegal dump prevention
- For **natural hazards**: storm water collectors (tunnels for storm water collection and storage in Birkirkara/Msida. - Max expected capacity 700,000 m²)

According to the conclusions drawn by this report, these priorities seem to be in line with the priorities that this country analysis would suggest as important. Nevertheless a certain lack of commitment on investing in renewable resources was noted. Further priorities which have been highlighted by this study, and which could thus deserve additional funding, are:

- For **water**: Prevention of illegal water abstraction, reservoirs and water capture devices
- For **waste water**: reuse of treated waste water (eg in agriculture and industry sector)
- For **renewable resources**: PV and solar water heating promotion (eg through pilot projects), study on wind farms (and/or pilot projects)
- Although beyond the scope of this study, attention should be paid also to **other issues** such as: biodiversity protection against bird hunting (eg through awareness raising, flanking measures, etc) and energy saving policies and devices.

Among important flanking measures that should be encouraged, the following appear to be the most relevant/feasible:

- Evaluation of future waste fees for households could represent an incentive to encourage recycling
- Metering could be installed to assess (and possibly charged) on the basis of sewage production (metering will be required)
- The price of excess energy channeled to the grid should be equal to the selling price of energy
- Additional subsidies for PV (photovoltaics) and SWH (solar water heaters) could be needed in order to encourage penetration.

This table summarises the main priorities and indicates the financial requirements (in M EUR).

Table 4: Financial Summary of the Priority Assessment

MALTA

PRIORITY ASSESSMENT TABLE – SUMMARY

	WATER	WASTE WATER	WASTE	RES	NATURAL HAZARDS	OTHER AREAS (if of critical importance)
Priority areas that the country analysis would suggest as important	Water capture devices & water monitoring.	Malta South Sewage Treatment Plant EUR 50-60 m Reuse of treated water: network infrastructures	Waste to energy plant(s) EUR 50 m	Estimate of EUR 20 m for: Extension of photovoltaic and other solar water heaters Feasibility studies for wind farms & pilot small scale schemes Offshore wind	Tunnels for storm water EUR 120 m	Control on bird hunting (for compliance with Birds Directive) – awareness raising, flanking measures, and energy efficiency.

ANNEX I - LIST OF INTERVIEWEES

The present work has benefited from several interviews with members of the Maltese Ministries and public authorities.

We would like to thank for their precious collaboration:

John Aquilina	Office of the Prime Minister - Management Efficiency Unit
Marlene Bonnici	Office of the Prime Minister – Planning and Priorities Co-ordination
Chris Ciantar	MRAE
Marie Briguglio	MEPA
Aurelio Attard	WasteServ Ltd
Marc Muscat	Water Services Corporation
Joseph Cilia	University of Malta
Marie Louise Mangion	MTAC
Franklin Mamo	MRI
Maurice Grech	University of Malta
Antoine Riolo	MRA

ANNEX II – CHAPTER 3: WASTE WATER - ADDITIONAL TABLES

Table 3-1: physical investment needs –sewage treatment plants

Nominal load of the agglomeration, expressed in PE (population equivalent)	Number of Agglomerations	Total nominal load of the agglomerations , expressed in PE (population equivalent)	Number of existing STP		Organic biodegradable capacity of existing STPs		Number of STP under construction (completion before 31/12/2006)	Organic biodegradable capacity of STP under construction	Number of Planned STPs	Organic biodegradable capacity of planned STPs
			Compliant	Non-compliant	Compliant	Non-compliant				
[PE ¹³⁴]	Number	[PE]	Number	Number	[PE]	[PE]	Number	[PE]	Number	[PE]
2000-10000	2	7,500 PE								
10000-15000	0									
>15000	6	530,000 PE								
Total			1		17,000 m3/day		0	0	3	62,000 m3/day
			Total number		Total capacity					

Total Organic biodegradable capacity (existing + under construction + planned)	79,000 m3/day
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¹³⁴ PE : population equivalent = the amount of waste water produced by 1 person = 1 PE = 60 gBOD/day

ANNEX III – MULTICRITERIA ASSESSMENT

In the assessment of the five field, some investment were given 0 points in all the eight parameters when these were not considered relevant priorities.

A description of how scores were allocated is provided by field and investment.

Water

➤ Reservoirs

Parameter	Score	Description
1. securing compliance with the acquis	3	Assuring availability of drinking water is not a requirement of the Directive, but can reservoirs are needed to dilute nitrates and thus comply with Drinking Water directive
2. avoiding economic and social damages	3	Through better water quality and reducing risk of water scarcity. The issue is less relevant though in Malta given the presence of desalination plants.
3. encouraging new technology and market development	3	Well established market for reservoirs, limited room for development
4. generating employment opportunities	0	Negligible effect
5. providing employment and training for low skilled/'hard to reach' groups	0	Negligible effect
6. promoting cross-border co-operation	0	Negligible effect given the geographical isolation of the islands
7. policies well integrated with wider development policies	7	Link with Water Framework Directive
8. promoting more cost-effective programme	3	Potentially positive effect on better water management.

- Investments in drinking water production plant, long and local transport and metering are not considered priorities, thus their score has been set 0 by default.

Waste water

➤ New STPs

Parameter	Score	Description
1. securing compliance with the acquis	10	Required by the UWWT Directive for all agglomerations > 2.000 PE
2. avoiding economic and social damages	7	Important for improvement of environmental conditions. Eg improvement of marine and coastal water, with positive impact on tourism
3. encouraging new technology and market development	3	Not a high-tech business
4. generating employment opportunities	3	Some scope for additional employment opportunities in water management sector

5. providing employment and training for low skilled/'hard to reach' groups	0	Negligible effect
6. promoting cross-border co-operation	0	Negligible effect given the geographical isolation of the islands – no transboundary effect on water quality
7. policies well integrated with wider development policies	7	Integration with Waste Water Directive
8. promoting more cost-effective programme	3	The waste water sector is not very suitable for PPP. Nevertheless, the possible re-use of treated water could benefit agriculture and industry sectors

➤ Sludge treatment and Sludge disposal (similar considerations)

Parameter	Score	Description
1. securing compliance with the acquis	10	Same priority for compliance with UWWT Directive as STP
2. avoiding economic and social damages	7	Same as STP
3. encouraging new technology and market development	3/0	Potential innovations for sludge treatment: mechanical dewatering, anaerobic digestion, sludge drying. No relevant innovations for sludge disposal
4. generating employment opportunities	3	Same as STP
5. providing employment and training for low skilled/'hard to reach' groups	0	Same as STP
6. promoting cross-border co-operation	0	Same as STP
7. policies well integrated with wider development policies	7	Same as STP
8. promoting more cost-effective programme	3	Same as STP

- Investments in renovation/upgrade STPs, new sewerage, renovation/upgrade sewerage, sewage pumping stations and CSO upgrading are not considered priorities, thus their score has been set 0 by default.

Municipal Solid Waste

➤ Waste collection

Parameter	Score	Description
1. securing compliance with the acquis	7	Pre-condition to meet requirements in different EU acquis
2. avoiding economic and social damages	7	Improved environmental quality – if properly managed and monitored could reduce illegal dumping
3. encouraging new technology and market development	3	Scope for improving collection practices

4. generating employment opportunities	7	Labour intensive activity – potential for generating work opportunities
5. providing employment and training for low skilled/'hard to reach' groups	7	Potential opportunities for low skilled workers
6. promoting cross-border co-operation	0	Limited scope
7. policies well integrated with wider development policies	7	In line with national development strategies, waste strategy
8. promoting more cost-effective programme	7	Potential for public/private partnership

➤ Waste sorting

Parameter	Score	Description
1. securing compliance with the acquis	7	Pre-condition to meet requirements in different EU acquis,
2. avoiding economic and social damages	3	Limited effect, but precondition for proper recovery and disposal
3. encouraging new technology and market development	3	Possible scope for research on new sorting technologies
4. generating employment opportunities	7	Labour intensive activity – potential for generating work opportunities
5. providing employment and training for low skilled/'hard to reach' groups	7	Potential opportunities for low skilled workers
6. promoting cross-border co-operation	0	Limited scope
7. policies well integrated with wider development policies	7	In line with national development strategies, waste strategy
8. promoting more cost-effective programme	7	Potential for public/private partnership

➤ Recovery

Parameter	Score	Description
1. securing compliance with the acquis	7	Meeting requirements of Landfill Directive (99/31/EC) related to reduction of biodegradable municipal waste in waste landfilled.
2. avoiding economic and social damages	3	precondition for optimal final disposal
3. encouraging new technology and market development	7	New composting technologies with biogas recuperation, technologies to recover energy from landfills
4. generating employment opportunities	3	Potential positive impact on local employment
5. providing employment and training for low skilled/'hard to reach' groups	3	Potential opportunities for low skilled workers
6. promoting cross-border co-operation	0	Limited scope
7. policies well integrated with wider	3	In line with national development strategies,

development policies		waste strategy
8. promoting more cost-effective programme	7	Potential for public/private partnership

➤ Disposal – remediation of existing

Parameter	Score	Description
1. securing compliance with the acquis	7	Meeting requirements of Landfill Directive (99/31/EC)
2. avoiding economic and social damages	7	High scope for improved environmental quality
3. encouraging new technology and market development	3	Limited improvements on monitoring, control, remediation techniques
4. generating employment opportunities	3	Potential positive impact on local employment
5. providing employment and training for low skilled/'hard to reach' groups	3	Potential opportunities for low skilled workers
6. promoting cross-border co-operation	0	Limited scope
7. policies well integrated with wider development policies	3	In line with national development strategies, waste strategy
8. promoting more cost-effective programme	7	Potential for public/private partnership

- Investment in new disposal facilities is not considered a priority. The score has been set 0 by default.

Renewable energy

➤ Wind

Parameter	Score	Description
1. securing compliance with the acquis	3	Investments can enable compliance with the RES directive
2. avoiding economic and social damages	7	Mixed effect. +ve: potential mitigation of global warming, and alleviation from dependency of imported fossil fuels. –ve: relevant visual impact, thus negative impact on tourism
3. encouraging new technology and market development	7	Emerging market, new technologies (offshore deep sea wind farm almost pioneer technology)
4. generating employment opportunities	3	Potential positive impact on employment
5. providing employment and training for low skilled/'hard to reach' groups	0	Limited scope
6. promoting cross-border co-operation	3	Limited or no share of environmental impacts due to geographic isolation, but possible know-how exchange
7. policies well integrated with wider	3	RES development is mentioned in several

development policies		national development strategies/policies. Wind though is not always seen as the most feasible solution for Malta
8. promoting more cost-effective programme	7	Wind is a cost effective source of energy

- Hydroelectric technologies are not applicable in Malta, as well as geothermal systems. The assessment is not applicable to investments in these areas.
- Solid biomass and Liquid biofuels (similar considerations)

Parameter	Score	Description
1. securing compliance with the acquis	3	Investments can enable compliance with the RES directive
2. avoiding economic and social damages	7	Mitigation of global warming and alleviation from dependency on imported fossil fuels
3. encouraging new technology and market development	7	Biomass and biofuels are among the sources slated for the greatest growth in Europe. Collection of cooking oil for the production of biofuels is an example of good practice
4. generating employment opportunities	0-3	Negligible to little potential impact on employment
5. providing employment and training for low skilled/'hard to reach' groups	0	Limited scope
6. promoting cross-border co-operation	3	Limited or no share of environmental impacts due to geographic isolation, but possible know-how exchange
7. policies well integrated with wider development policies	7	RES development is mentioned in several national development strategies/policies
8. promoting more cost-effective programme	7	Biomass and biofuels are among the less expensive source of RES

- Solar thermal

Parameter	Score	Description
1. securing compliance with the acquis	0	Negligible effect on acquis compliance
2. avoiding economic and social damages	3	Mitigation of global warming and alleviation from dependency on imported fossil fuels – limited effects though given small size of Malta and that SWH could mainly represent cost savings for households
3. encouraging new technology and market development	3	Well established technology, limited scope for innovation. Key will be maintain efficiency through regular maintenance and develop the market
4. generating employment opportunities	3	Potential positive impact on employment, especially if maintenance is done on a more regular basis and by expert staff (rather than domestically)
5. providing employment and training	3	Some potential work opportunities for low

for low skilled/'hard to reach' groups		skilled work for installation and maintenance
6. promoting cross-border co-operation	0	No cross border environmental effects due to geographic isolation; limited know-how exchange due to well established technology (although some scope for information sharing on market development, but limited)
7. policies well integrated with wider development policies	3	RES development is mentioned in several national development strategies/policies.
8. promoting more cost-effective programme	7	SWH are cost effective source of energy and potential is high given high insulation

➤ PV

Parameter	Score	Description
1. securing compliance with the acquis	3	Investments can enable compliance with the RES-e directive
2. avoiding economic and social damages	3	Mitigation of global warming and alleviation from dependency on imported fossil fuels – limited effects though given small size of Malta. Also high cost of PV technology.
3. encouraging new technology and market development	7	There is scope for innovation in the PV sector
4. generating employment opportunities	3	Potential positive impact on employment, especially if panel production and PV installation is dealt with in Malta
5. providing employment and training for low skilled/'hard to reach' groups	3	Some potential work opportunities for low skilled work for installation and maintenance
6. promoting cross-border co-operation	3	No cross border environmental effects due to geographic isolation, but possible know-how exchange
7. policies well integrated with wider development policies	7	RES development is mentioned in several national development strategies/policies.
8. promoting more cost-effective programme	3	PV energy is still relatively expensive.

Natural hazards

➤ Floods and storm (similar consideration, since floods are generated by flash storms)

Parameter	Score	Description
1. securing compliance with the acquis	0	Negligible effect
2. avoiding economic and social damages	10	Floods generated relevant social and economic damage in the most exposed urban areas
3. encouraging new technology and market development	7	Systems of water collection in urban areas could encourage the development of new technologies and engineering expertise

4. generating employment opportunities	3	Potential positive impact on employment for the building and managing of new infrastructures
5. providing employment and training for low skilled/'hard to reach' groups	0	Little or no scope
6. promoting cross-border co-operation	3	Limited or no share of environmental impacts due to geographic isolation, but possible know-how exchange
7. policies well integrated with wider development policies	3	Some integration with national development strategies
8. promoting more cost-effective programme	3	Some scope for potential encouragement of PPP