

Air Quality Plan for the Maltese Islands



January 2010



The Air Quality Plan for the Maltese Islands

Prepared by the Malta Environment and Planning
Authority

for the

Office of the Prime Minister

January 2010

Foreword



Air quality has become increasingly important in the agenda of the European Union. Since Malta's accession to the European Union, this has translated into specific targets covering this area, with very tight deadlines with respect to particular pollutants regulated by the EU Air Quality *Acquis*. In early 2003, the Maltese Government introduced lead replacement petrol which achieved a considerable decrease in ambient lead and benzene levels. Following this, the use of low sulphur fuel since early 2004 brought about a drastic decrease in ambient sulphur dioxide levels in most localities in Malta and Gozo, registering a nationwide reduction of 36%.

Notwithstanding these positive achievements, there are areas where we need to work harder to comply with the present thresholds. This is the case for very fine dust, termed as particulate matter (PM₁₀); a complex pollutant which can originate both from natural and man-made sources. The same applies for nitrogen oxides, for which higher concentrations are monitored in traffic sites as a result of the increase in car use which in turn results in intensification in the congestion.

The completion of the air monitoring network in 2007 enabled further studies to be carried out so as to identify the major contributors to PM₁₀ on the islands. Moreover, with the installation of the rural background station in Gozo, it was possible to initiate studies on the natural contribution of particulate matter, namely sea salt and Sahara dust. PM₁₀ data showed that the highest number of exceedances was registered in the traffic site.

In an effort to minimise exceedances of PM₁₀ the Malta Environment and Planning Authority has prepared this air quality plan containing short term and medium term measures aimed at ensuring compliance with the PM₁₀ daily limit value by June 2011. Policies and measures focus mostly on the road transport sector, being the greatest contributor to local air quality. Other measures are being proposed for the construction industry while a list of existing measures for the power generation sector are also listed in this document.

I would like to express my appreciation to the Ministry for Infrastructure Transport and Communications and to the Malta Transport Authority for contributing actively to parts of this report as well as to other ministries, including the Ministry for Social Policy which provided inputs with regard to environmental health, the Ministry for Resources and Rural Affairs, the Ministry for Finance, Economy and Investment, the Ministry for Justice and Home Affairs and the Ministry for Education, Culture, Youth and Sport. We remain committed to ensure that the quality of the air we breathe is clean both for our health and that of our environment. Through sustainable concepts and practices, the Government will continue with its efforts to minimize the impact that human activity constitutes towards the deterioration of the quality of the air.

A handwritten signature in blue ink, consisting of a stylized, circular scribble with a vertical line extending downwards from the center.

Peter Portelli
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Office of the Prime Minister

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Executive Summary

Directive 1999/30/EC (relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air) specifies thresholds for particulate matter (PM₁₀) – a daily and annual limit value which has been into force since 1 January 2005. Malta has been recording PM₁₀ exceedances since 2004. This brings up the need of the implementation of additional and stricter policy measures.

This document is aimed to act as policy guidance to reduce daily average PM₁₀ concentrations in ambient air in the Maltese agglomeration. The traffic measures proposed in this document are also aimed to bring the annual average of nitrogen dioxide within the acceptable thresholds. In an effort to minimise exceedances of PM₁₀, the Malta Environment and Planning Authority has prepared this air quality plan containing short term and medium term measures aimed at ensuring compliance with the PM₁₀ daily limit value by June 2011.

The measures contained in this document are being proposed for the major sources of PM₁₀ in the Maltese Islands, more specifically the construction industry, power generation and traffic. With respect to power generation, the measures contained in this document are conditions already set out and legally binding since earlier on this year through the IPPC (Integrated Pollution Prevention and Control) permitting process.

With respect to the road transport sector, national data shows that this sector is the major contributor to the exceedance of PM₁₀ concentrations in ambient air. This document therefore focuses on measures mainly aiming at reducing vehicle emissions, encouraging modal shift, reducing the traffic impact of new developments, managing the road network and promoting cleaner vehicle technologies.

This document proposes a series of initiatives that may be undertaken to ensure Malta's compliance with the Directives. This plan is seen as an incremental programme that would be implemented in parallel with the results of continuous monitoring of progress in compliance with the Directives to ensure that no unnecessary burdens are created on the mobility and economic and social vibrancy within the community.

1.0 Introduction

Council Directive 1996/62/EC on ambient air quality assessment and management regulates the concentrations of specific air pollutants in ambient air through the implementation of the Daughter Directives. More specifically Directive 1999/30/EC (relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air) specifies thresholds for particulate matter (PM₁₀) – a daily and annual limit value which has been into force since 1 January 2005.

Malta has been recording PM₁₀ exceedances since 2004. In 2005 Malta submitted a first set of plans and programmes to the European Commission outlining measures in road transport, power generation and the building industry. Notwithstanding the implementation of some of these measures, exceedances of PM₁₀ were still recorded. This showed the need of new and possibly stricter measures, especially in the road transport sector which through local data was identified as the main contributor to particulate pollution.

This report, wherever possible, has been structured according to the requirements present in Annex IV of Directive 1996/62/EC on ambient air quality assessment and management.

2.0 Drafting of the air quality plan

The process of drafting of the air quality plan was initiated by the Malta Environment and Planning Authority (MEPA), also the Competent Authority for the air quality *Acquis* under Ministerial guidance of the Office of the Prime Minister.

The process kick started with a public participation exercise whereby stakeholders and the general public were invited to suggest measures which would contribute to improving the air quality in the Maltese Islands. A consultation document was distributed to the relevant stakeholders¹, explaining the need for an air quality plan and providing guidance on which sector/s contribute most to particulate pollution. The stakeholders and general public participated actively in this first phase and the document entitled "Summary of Public Participation"² lists the suggestions and comments made in this phase. This document provides an overview of all measures suggested which are categorized

¹ <http://www.mepa.org.mt/file.aspx?f=3150>

² <http://www.mepa.org.mt/file.aspx?f=4183>

according to sector. This document also comments on additional measures that would be considered for inclusion in the final air quality plan resulting from suggestions made by the public during this stage of public consultation.

In the meantime, the Malta Environment and Planning Authority had been working on a document outlining traffic measures³, together with the Malta Transport Authority and the Ministry for Infrastructure, Transport & Communications. This document was also published for public consultation by this same Ministry.

The final version of the Air Quality Plan for the Maltese Islands consists of the traffic measures contained in the above-mentioned document, together with other valid measures which were suggested by the general public.

3.0 Plans and programmes

3.1 Scope

This document proposes a series of initiatives that may be undertaken to ensure Malta's compliance with the Directives. This plan is seen as an incremental programme that would be implemented in parallel with the results of continuous monitoring of progress in compliance with the Directives to ensure that no unnecessary burdens are created on the mobility and economic and social vibrancy within the community.

The measures proposed in this document consist of short-term and medium-term measures. The timing of planning and implementation of these measures is envisaged to be as follows:

Short-term measures should be implemented immediately once approved and subject to budgetary allocation where this is required, by the end of 2010.

Medium-term measures should be implemented once the appropriate planning and funding is dedicated to each and every measure. Beginning of 2010 should be dedicated to the planning of those measures while implementation should start later on in 2010 to produce the required results by mid-2011.

The individual measures targeted to achieve the above are presented in Appendix 2.

³ https://mitc.gov.mt/MediaCenter/PDFs/1_Air%20Quality%20Plan%20v2.pdf

3.2 Pollutants to be targeted

This air quality plan is primarily focused to reduce concentrations of PM₁₀, with the aim to bring the daily averages in line with the thresholds present in Directive 1999/30/EC. However in 2006 and 2007 the annual limit value for nitrogen dioxide (NO₂) has been exceeded in the traffic site within the agglomeration. Therefore, these measures are also targeted to bring concentrations in this site in line with the annual limit value for NO₂.

3.3 Traffic measures

It is significant to note that with respect to measures related to transport, these proposed measures are being suggested against the background of a radical public transport reform that has already been approved, procurement for which is underway and the implementation of which is due for 2010. This is highly important since the absence of this reform would undermine the implementation on any measure involving restrictions on the use of private cars. The public transport reform includes a replacement of all pre-Euro III buses and ensures a continuous refresh of the fleet with minimum standards applicable in European Directives and Regulations.

The traffic measures aim to achieve the following goals:

- Reduction in vehicle emissions;
- Encouraging modal shift;
- Reduce traffic impact of new developments;
- Managing the road network;
- Promote cleaner vehicle technologies.

4.0 Localisation of excess pollution

The preliminary assessment of air quality in Malta (Stacey and Bush, 2002) designates the Valletta and Sliema area as the only agglomeration (a zone with population greater than 250,000 inhabitants) in the Maltese Islands. Additionally, the report identified the monitoring requirements so as to be in line with the provisions of the Directive.

Figure 1 shows the monitoring locations situated inside and outside the agglomeration (that is, the “Malta Zone”). Table 1 provides the nature of location of the stations together with geographical coordinates. Kordin station (situated in an industrial area within the agglomeration) was not functional in 2008.

| Station Name | Station type | Zone/ Agglomeration | EoI station code | Longitude decimal | Latitude decimal | Altitude / m |
|---------------------|---------------------|--------------------------------|---------------------------------|------------------------------|-----------------------------|-------------------------|
| Kordin | Industrial | Agglomeration | MT0003A | 14.512 | 35.882 | 40 |
| Zejtun | Urban background | Agglomeration | MT0004A | 14.538986 | 35.852292 | 56 |
| Msida | Traffic | Agglomeration | MT0005A | 14.489986 | 35.895833 | 2 |
| Gharb | Rural background | Zone | MT0007A | 14.197153 | 36.067069 | 114 |

Table 1: List of monitoring stations as at 2009

5.0 General information on the agglomeration

5.1 *Type of zone*

The Valletta and Sliema agglomeration (which is the zone in exceedance) consists of a total of 33 towns or Local Councils with a total area of 81 km² and a population of 262,061. One of the two power plants which provide electricity to the Maltese Islands (Marsa Power Station) is located within the agglomeration and the busiest roads lie also within this area. The agglomeration surrounds an area characterised by extensive natural harbours.

5.2 *Topography*

The Maltese Islands are characterised by limestone plateaus to the north and low lying, gently rolling plains to the south. The islands are generally treeless. Many of the hills are terraced for farming, giving much of the countryside the appearance of giant steps. The Valletta and Sliema agglomeration lies on the southern plains.

5.3 *Climate*

The Maltese Islands have a typical Mediterranean type climate with cold dry summers and wet mild winters. The islands are considered to be windy. Calm winds are experienced in only 7.7% of days in one year while most other days have wind with a speed of between 1 and 21 knots. The most common wind in all seasons is the cool North-Westerly which blows on average of 19% of the days in a year.

Figure 3 Proposed Valletta & Sliema agglomeration based on continuous urban fabric (urban areas separated by less than 200 metres)

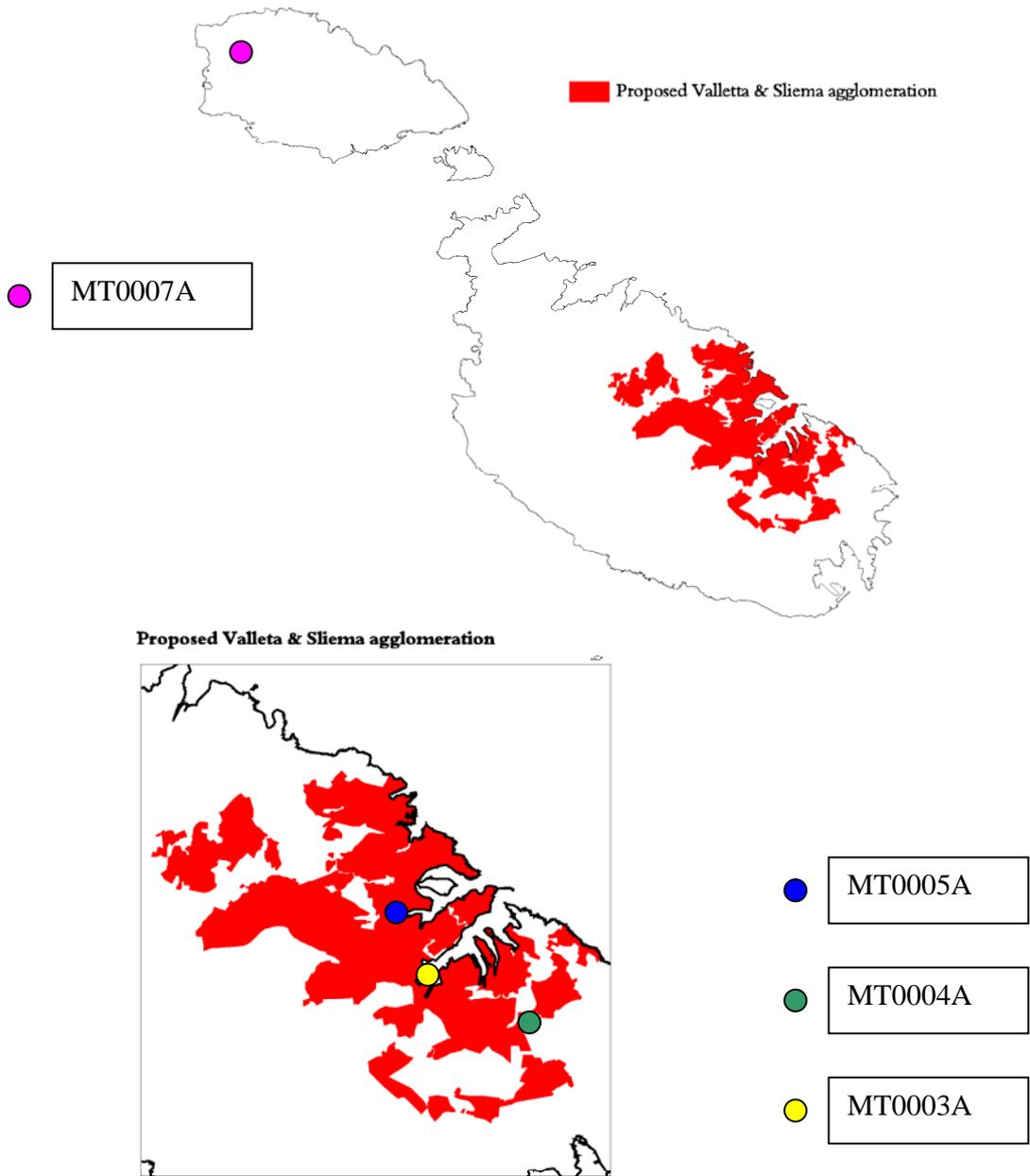


Figure 1: Malta agglomeration and location of PM₁₀ measuring stations

6.0 Nature and assessment of pollution

6.1 Concentrations observed over previous years

The problematic areas with respect to PM₁₀ concentrations in the Maltese Islands have always been experienced in the agglomeration, more specifically in traffic sites. Figure 2 shows the diurnal variation in a traffic site in 2004.

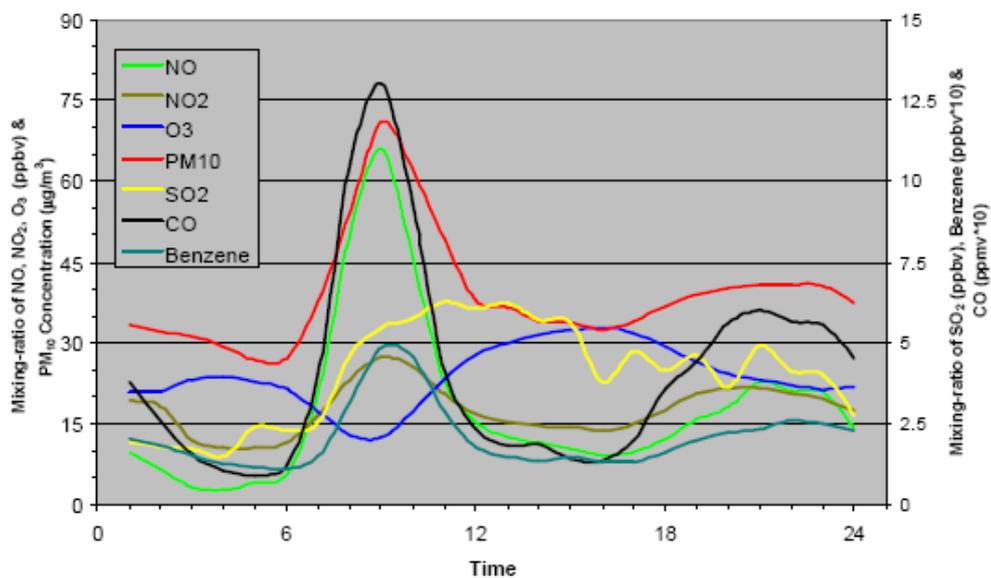


Figure 2: Diurnal variation of trace gases and PM₁₀ measured in a traffic site within the agglomeration from mid-September to December 2004

The traffic site was the only site which exceeded or was close to exceeding the allowed number of exceedances (35 times) of the daily limit value for PM₁₀. The exceedances were still present even after the first set of measures was implemented.

6.2 Techniques used for the assessment

The techniques used for the assessment of ambient air quality are in line with the requirements of the air quality Acquis. With respect to PM₁₀, this pollutant has been monitored with different types of near real-time analysers with different configurations. Malta's near real-time air quality monitoring network, operated and managed by MEPA,

had been expanded and restructured with the target of fulfilling the stations' siting criteria in an optimum manner, as well as improving on the data quality objectives.

The table in Appendix 1 lists the stations and the automatic analysers operated by MEPA and their configuration from 2004 until 2008.

7.0 Origin of pollution

7.1 Major sources

The major pollution sources on the islands are power generation and traffic. There are two power plants located in the Southern part of Malta, while traffic density is evident in the urban agglomeration. Other contributors to air pollution are dust from construction sites and quarries and smaller industries.

7.2 Total quantity of emissions from these sources

The following table gives an overview of the PM₁₀ emissions reported to the Convention on Long Range Transboundary Air Pollution (CLRTAP) for 2005 and 2007 respectively.

| PM ₁₀ / Gg | 2005 | 2007 |
|--|----------------|----------------|
| Power generation | 0.95353 | 0.99116 |
| Industrial | 0.00240 | 0.00078 |
| Road Transport:, Passenger cars | 0.09642 | 0.10250 |
| Road Transport:, Light duty vehicles | 0.01491 | 0.01377 |
| Road Transport:, Heavy duty vehicles | 1.00092 | 1.00368 |
| Road Transport:, Mopeds & Motorcycles | 0.00212 | 0.00400 |
| Commercial / Institutional: Stationary | 0.01426 | 0.01426 |
| Agricultural Livestock | 0.11457 | 0.10076 |
| SUM | 2.19914 | 2.23091 |

Table 2: PM₁₀ emission inventory as reported to CLRTAP

7.3 Information on pollution imported from other regions

Malta is also affected by natural sources of PM₁₀. PM concentrations in the Mediterranean are strongly influenced by the meteorology of the area, the vicinity to the sea shore, the frequent occurrence of Saharan dust episodes and local dust suspension in arid areas.

Malta has been conducting analyses for source apportionment of the PM₁₀ fraction since 2007. 2008 data from a rural background site (not affected or minimally affected by anthropogenic contributions from the agglomeration) showed that a minimum of 8% of the PM₁₀ fraction is generated by mineral dust events while another 8% is generated from sea salt. 25% of the PM₁₀ fraction (made up of 11% secondary inorganic compounds and 14% organic matter/elemental carbon) is due to transboundary contributions. This would possibly be the result of transboundary air pollution events which are known to affect Malta. Previous research has shown that such contributions originate from Italy. However other countries are not excluded in the contribution of transboundary air pollution affecting the Maltese Islands, whereas shipping is also considered to be a possible source. The heavy metal contribution is negligible in this site.

8.0 Existing measures

8.1 Measures existing prior to original date of compliance

The following table provides a summary of what measures were implemented before the original date of compliance, i.e. before 2005.

| Title of measure | Description | Implementation date |
|--|---|---|
| Use of cleaner fuel | Fuel with less sulphur content (<1%) started to be used in power stations. | 2004 - ongoing |
| Reduced taxation on battery operated vehicles | a) Registration tax on battery operated vehicles was reduced from a rate ranging between 50% and 75%, to 16.5%. b) Registration tax on battery operated motor cycles was reduced from a rate which ranged between 28% and 42%, to 6.5%. c) Electric cars were exempt from a fee of €46.59 a year to enter Valletta. d) An amount equivalent to 15.25% of the car's value up to a maximum of €1,164.69 was refunded upon purchase of an electric vehicle. | a)2001; Revised in 2003; Revised in 2005. b) 2003. |
| Government incentives towards public transport | a) Currently the Government subsidises public transport fares through a subsidy payable to Malta Transport Authority (ADT) such that the fares can be controlled by the Government, thus making the fares more attractive for commuters. b) Registration tax on buses was reduced by 6% for scheduled buses and 24% for unscheduled buses. c) Government offers the possibility of subsidising the purchase of new EURO 3 buses. | a) 2001 b) 2004 c) 2002 |
| Roadside emission testing | The Malta Transport Authority started roadside emission tests on private, passenger-carrying and goods-carrying vehicles (including public transport buses, coaches, trucks, heavy vehicles). | 2004 |

| | | |
|-------------------------------------|--|--------------|
| Dust abatement in Marsa Power Plant | Electrostatic precipitators were installed in three boilers at the Marsa Power Plant. These precipitators have a dust removal efficiency of about 70%. | 2000 |
| Closure of three dumping sites | Dumping sites in Maghtab, Qortin and Wied Fulija were closed and plans for their rehabilitation started. | 1995; 2004 |
| Speed limits and control | Installation of speed cameras in specific streets. | 2004-ongoing |

Table 3: Pre-2005 measures

8.2 Measures existing following original date of compliance

The following table provides a summary of what measures were implemented between the original date of compliance and this current year, i.e. between 2005 and 2009.

| Title of measure | Description | Implementation date |
|-------------------------|--|----------------------------|
| Emission Alert | A campaign was launched whereby the public was encouraged to report polluting vehicles by sending an SMS to ADT (Malta Transport Authority). The reported vehicles were asked to undergo VRT (Vehicle Roadworthiness Test) where the emissions were tested, and fined if high emissions were recorded. | 2005 |
| Park and ride and CVA | a) The park and ride scheme was introduced to allow people to park their car in a designated area, where a shuttle is provided to transport people to Valletta centre. This was done to decrease traffic flow towards the capital city. b) A CVA (Controlled Vehicular Access) system was implemented such that those cars wishing to enter Valletta have to pay parking rates, depending on the duration of stay. Additionally pedestrianisation was implemented in specific streets inside the city, provision of electric minicabs and water taxis | a)2006 b) 2007 |

| | | |
|---|--|--|
| Regulations for reducing PM from construction sites | <p>a) Cutting of stones and/or bricks shall be carried out in enclosed space.</p> <p>b) Tools with dust extraction systems are to be used.</p> <p>c) Sand, screed and other loose building material shall be transported, deposited and stored on site in rigid containers with suitable covers or sturdy sealed bags.</p> <p>d) Construction sites and their immediate vicinity are to be kept clean at all times.</p> <p>e) Indoor sanding activities may only be undertaken if all external apertures are appropriately boarded up, whilst sanding activities on the façade may only be undertaken utilizing equipment geared with dust extraction systems. Alternatively the whole working area must be covered with material that must form a barrier against the emission of dust.</p> | 2007 |
| Electricity tariffs | At present there is a surcharge to the electricity tariffs which is adjusted according to variations in the international price of oil. Surcharge is currently revised every 3 months. As from June 2008, the Government decided to increase the surcharge from 50% to 90%. | 2005 and updated every 3 months. |
| Renewable sources of energy | <p>a) In 2005, Government announced a scheme which allowed for a refund of 15.25% subject to a maximum of Lm50 (€16.47) on the expenditure made on the purchase of solar heaters for domestic use. In 2006, Government increased the refund limit to 25% subject to a maximum refund of Lm100 (€32.94). This scheme has also been extended to include wind energy as well as roof insulation for private homes. Enemalta also offers a refund on installation of electricity mains, which usually costs Lm70 (€163.06), to new households which install a solar water heater.</p> <p>b) In 2006 Government announced a scheme for the purchase of photovoltaic</p> | <p>a) 2005; Updated in 2006</p> <p>b)2006</p> <p>c)2005</p> <p>d)2006</p> <p>e) 2006</p> |

| | | |
|--|--|--|
| | <p>equipment by households whereby 25%, subject to a maximum of Lm500 (€1,164.69), of the expenditure incurred in the purchase of photovoltaic technology is refunded. Moreover, Enemalta does not charge the normal Lm20 (€46.59) meter installation fee necessary for the operation of the photovoltaics technology.</p> <p>c) Government announced that in an attempt to seek alternative sources of energy, the bio content of diesel, which is equivalent to 20% of bio-diesel, would be exempt from customs duty.</p> <p>d) A scheme was introduced whereby households that have introduced photovoltaic energy may sell their excess energy to Enemalta at a rate of Lm0.03 (0.07)/kWh.</p> <p>e) A subsidy scheme on the purchase of household appliance for domestic use, certified as being energy efficient, was launched.</p> <p>f) In 2009 the Government introduced new schemes related to solar water heaters, photovoltaic panels, roof thermal insulation and double glazed windows and doors. For solar water heaters the subsidy covers 66% of eligible costs up to a maximum of €460; for solar photovoltaic systems, 50% of eligible costs up to a maximum of €3,000; for double glazing and roof insulation, 33% of eligible costs up to a maximum of €300.</p> <p>g) In 2009, the Government introduced a support scheme to promote the domestic use of compact fluorescent lamps (CFLs). Households of one or two persons are entitled to receive five free lamps, households of three or four persons are entitled to 8 lamps whilst households of five or more persons are entitled to 10 free energy-saving lamps. The number of lamps is established according to the number of residents registered in that particular household with the Water Services Corporation according to the</p> | |
|--|--|--|

| | | |
|--|---|------|
| | Electricity Supply Regulations. | |
| LPG | A subsidy on LPG was introduced, mostly for cooking and home heating. | 2005 |
| Financing package | Bank Of Valletta (BOV) in collaboration with the Malta Federation of Industry (FOI) launched the BOV Environment Finance Package for Industry. This aimed at facilitating access to finance environmental projects undertaken by members of the FOI operating in the manufacturing and services sectors. This package is aimed to support FOI members in their restructuring processes to conform to EU environmental directives and local legislation in areas such as energy saving, recycling projects and health and safety issues. | 2006 |
| Closure of 3 incinerators and commissioning of a replacement thermal treatment facility. | 3 incinerators were closed by December 2007, namely the St Luke's Hospital incinerator, Gozo General Hospital Incinerator and the Marsa Abbatoir. A thermal treatment facility started operating with an IPPC permit as a replacement. The emission limit values of this installation are according to the BAT reference documents. | 2007 |
| Fiscal incentives for the purchasing of cleaner private and commercial vehicles | As from January 2009, the road license of private vehicles is based on the emissions and age of car. As for commercial vehicles, the road license is based on the weight and age of vehicle as from January 2010. | 2009 |

Table 4: Measures implemented during the period 2005-2009

9.0 Future measures

9.1 Measures related to traffic and the construction industry

The measures planned to reduce PM₁₀ concentrations by June 2011 can be found in Appendix 2 to this document. The measures proposed in this document consist of short-term and medium-term measures.

Short-term measures should be implemented immediately once approved and subject to budgetary allocation where this is required, by the end of 2010.

Medium-term measures should be implemented once the appropriate planning and funding is dedicated to each and every measure. Beginning of 2010 should be dedicated to the planning of those measures while implementation should start later on in 2010 to produce the required results by mid-2011.

9.2 Measures related to power generation

Measures in the power generation sector are already applicable to the present two power plants through the environmental permits determined as an obligation present in the Directive 2008/1/EC on Integrated Pollution Prevention and Control (IPPC).

9.2.1 Marsa power plant

The IPPC permit (IP 003/07/A) for the Marsa Power Station was determined by the MEPA Board on the 26 March 2009 (<http://www.mepa.org.mt/ippc-applications-installations-mps>). This power plant lies within the agglomeration.

Amongst other conditions the permit includes limit values for dust, sulphur dioxide and oxides of nitrogen. These limit values cannot be higher than those set by the Large Combustion Plants Directive (LCP-D) 2001/80/EC. However, Malta has applied the limited lifetime derogation for this plant under Article 4(4)(a) of the LCP-D. This means that the limit values of the Directive are not applicable to this plant if Malta informs the Commission that the plant in question will not be operated for not more than 20,000 hours starting on the 01 January 2008 and finishing no later than the 31 December 2015.

In this case the limit values were negotiated between the regulator and the operator on the basis of what could realistically be considered as good practice for an old plant such as Marsa. Plant emissions for August 2009 (which is considered to be peak demand for

electricity) have been reported and are compliant with the emission limit values in the permit.

9.2.2 Delimara power plant

The IPPC permit (IP 003/07/A) for the Marsa Power Station was determined by the MEPA Board on the 1 October 2009 (<http://www.mepa.org.mt/ippc-applications-installations-dps>). This power plant does not lie within the agglomeration. Similarly to Marsa, amongst other conditions, this permit includes emission limit values (ELVs) for dust, sulphur dioxide and oxides of nitrogen, amongst other pollutants. These ELVs are in line with those present in the LCP-D, and in the case of sulphur dioxide, the ELV present in the permit is stricter than that specified in the LCP-D.

The permit for both plants includes conditions on the monitoring of the pollutants through the use of automated measurement systems (as per the relative CEN standards) in the waste gases from the power station. The operator is to submit monitoring results every quarter and is to include a summary of these results in the Annual Environmental Report.

10.0 Conclusion

This document is aimed to act as policy guidance to reduce daily average PM₁₀ concentrations in ambient air in the Maltese agglomeration. The traffic measures proposed in this document are also aimed to bring the annual average of nitrogen dioxide within the acceptable thresholds.

The measures contained in this document are proposed for the major sources of PM₁₀ in the Maltese Islands, more specifically the construction industry, power generation and traffic. With respect to power generation, the measures contained in this document are conditions already set out and applicable from earlier on this year through the IPPC process.

With respect to the road transport sector, national data shows that this sector is the major contributor to the exceedance of PM₁₀ concentrations in ambient air. This document therefore focuses on measures mainly aimed at reducing vehicle emissions and encouraging modal shift, amongst others.

Appendix 1: Instrumentation and configuration of near real-time PM₁₀ analysers in Malta's stations from 2004 to 2008

| YEAR | STATION NAME | ZONE CODE | EOI STATION CODE | PM ₁₀ ANALYSER TYPE | APPLIED CORRECTION FACTOR | COMMENTS |
|------|--------------|-----------|------------------|--|---------------------------|--|
| 2004 | Floriana | MT0001 | MT0002A | R&P standard 50 degree TEOM | 1.3 | |
| | Kordin | MT0001 | MT0003A | Environnement SA MP101(beta gauge) with standard 40 degree inlet | 1.3 | Commissioned in July |
| 2005 | Floriana | MT0001 | MT0002A | R&P standard 50 degree TEOM | 1.3 | |
| | Kordin | MT0001 | MT0003A | Environnement SA MP101(beta gauge) with standard 40 degree inlet | 1.3 | |
| 2006 | Floriana | MT0001 | MT0002A | R&P standard 50 degree TEOM | none | Decommission in December |
| | Kordin | MT0001 | MT0003A | Environnement SA MP101(beta gauge) with standard 40 degree inlet | none | |
| | Zejtun | MT0001 | MT0004A | Environnement SA MP101C (beta gauge) with +5°C above ambient inlet | none | Commissioned in July; inlet heater was not activated |
| | Msida | MT0001 | MT0005A | Environnement SA MP101C (beta gauge) with +5°C above ambient inlet | none | Commissioned in July; inlet heater was not activated |
| 2007 | Kordin | MT0001 | MT0003A | Environnement SA MP101(beta gauge) with standard 40 degree inlet | none | Station was overhauled in January 2008 |
| | Zejtun | MT0001 | MT0004A | Environnement SA MP101C (beta gauge) with +5°C above ambient inlet | none | |
| | Msida | MT0001 | MT0005A | Environnement SA MP101C (beta gauge) with +5°C above ambient inlet | none | |
| | Gharb | MT0002 | MT0007A | Thermo TEOM/FDMS + Partisol 2025 dichotomous | none | Commissioned in June; cooler temperature 10 degree |

| | | | | | | |
|-------------|--------|--------|---------|--|---|---|
| 2008 | Zejtun | MT0001 | MT0004A | Environnement SA MP101C (beta gauge) with +5°C above ambient inlet | corrected=1.2*measured+3.8µg/m ³ | Inlet heater was activated in May no correction before, formula applied for time after |
| | Msida | MT0001 | MT0005A | Environnement SA MP101C (beta gauge) with +5°C above ambient inlet | none | Inlet heater was activated in May |
| | Gharb | MT0002 | MT0007A | Thermo TEOM/FDMS + Partisol 2025 dichotomous | none | |

Appendix 2: Future measures

Traffic measures

Short-term measures

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|--|---|---|--|--|
| 1 | Reduce vehicle emissions | Monitor effectively the transport measures proposed in this air quality plan with regular monitoring and data collection of traffic numbers and patterns of behaviour in affected areas. | Monitor air quality and traffic counts in identified areas where most traffic measures are implemented. Real time information panels are to be provided where real time monitoring of air pollution is carried out. Air pollution index (API) to be linked to air quality index (AQI) to indicate risks of related health effects. | Malta Transport Authority (ADT) / Malta Environment and Planning Authority (MEPA)/Health Division | Pros: Effective monitoring of policies which leads to better implementation | Areas where measures are being proposed. |
| 2 | Reduce vehicle emissions | Enforcement of the regulation of vehicle exhaust from polluting trucks, cars and buses. | Wardens issue penalties to offenders. This should be accompanied by a training programme to wardens so that they can understand the aims and objectives. | Regulated by ADT, enforced by Police and Local Councils. | Pros: (1) Encourages improved vehicle maintenance (2) Effective in terms of awareness raising (3) Potential to | Everywhere. |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|---|---------------------------------|--|---------------|
| | | | <p>This should also include public and visible spot checks, with emphasis on eventual fines.</p> <p>Eventually pass on part of revenue from fines to Local Council to encourage them to participate in this initiative.</p> <p>This measure should also involve the introduction of a point system which would include suspension of driving license.</p> | | <p>reduce noise by encouraging the repair of damaged exhausts and fining cars technically modified.</p> <p>Cons: Could be costly in terms of time and manpower.</p> | |
| 3 | Reduce vehicle emissions | Enforcement of quality of fuel used in cars, trucks and buses | Fuel samples should be taken and confiscation of vehicle considered when non-standard and polluting fuel types are used. | Malta Resources Authority (MRA) | <p>Pros: (1) This could lead to immediate air quality improvements in street frequented by vehicles and buses that may be abusively using polluting fuel types (eg. kerosene, heating oil with a high sulphur content, untreated waste edible oils, and waste oils).</p> <p>Cons: (1) Could be costly in terms of time and manpower. (2)</p> | Everywhere |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|---|--|---|---------------|
| | | | | | Amendments to the present legislation may be necessary. | |
| 4 | Reduce vehicle emissions | Educational campaign targeting the general public on better driving practices, car maintenance, associated health benefits etc. | <p>Correct driving techniques, fuel efficiency and economy, smoother driving, journey planning - TV, radio, newspapers. Inclusion bicycle weeks and car free days. Information area in bus stops. Incentives to convert private cars to LPG. Real time information near air monitoring stations through panels installed near air monitoring stations.</p> <p>Car free days could be made more effective by combining them with festive activities. This could include incentivating Local Councils to organise local activities combined with car free</p> | ADT with collaboration of Public Broadcasting Authority, Local Councils, Health Division | Pros: Improves awareness on environmental considerations and could lead to change in behaviour. | NA |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|--|--|---|---|
| | | | <p>days.</p> <p>Car-free periods could be introduced around places used by children such as playing fields, nurseries and community centres.</p> | | | |
| 5 | Reduce vehicle emissions | Regulate and enforce "engine switch off" powers to local wardens. | Issue fixed penalties to persistent offenders who leave their engines running in places such as bus stops. | Regulated by ADT, enforced by Police and Local Councils. | <p>Pros: This measure could help to prevent/reduce exhaust odours in public places</p> <p>Cons: (1) A mandatory scheme could have negative public perception</p> <p>(2) Amendments to the present legislation may be necessary.</p> | Everywhere with special attention (enforcement) on localities exceeding limit values. |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|---|------------------------------------|--|---|
| 6 | Reduce vehicle emissions | Develop or facilitate pool car and ride-sharing schemes. | Establish a car share database (example within Local Councils websites. See www.carsharerbyshire.com) including sub-group areas for individual businesses and government entities. This measure has to be accompanied by an educational campaign (same campaign as per measure No. 4). | ADT/Local Council Association/MEPA | Pros: Reduces vehicle emissions by reducing number of km travelled. This also reduces fuel use and tackles congestion by reducing number of cars on the network. | Everywhere with special attention on localities exceeding limit values. |
| 7 | Reduce vehicle emissions | Restrict circulation of public transport vehicles to Euro 3 buses in localities where limit values are being exceeded | | ADT | Pros: Helps to prevent increased emissions | Localities exceeding limit values |
| 8 | Reduce vehicle emissions | Introduce traffic direction variable lane on roads which can accommodate this concept. | Temporary lane conversion in specific times of day. Traffic direction variable lane would become an additional lane in the direction of heavy traffic flow. | ADT enforced by local wardens | Pros: Reducing congestion and thus emissions: An example is the 4 lane road system in Msida/Pieta which could be converted to 3 lanes going one | Localities exceeding limit values |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|--|--|-------------------------------------|---|---------------|
| | | | | | direction during morning peak hours and the reverse situation during the evening rush hour (a working committee needs to be set up on the implementation of this measure with possible participation of respective authorities) | |
| 9 | Reduce vehicle emissions | Certification exercise for all VRT stations. | The VRT stations should undergo inspections to identify issues which need to be solved, especially in the emission testing part of the test. Certificates should not be awarded if the station does not comply following spot checks. In the near future, VRT stations should be compliant with specific standards and acquire accreditation for such. | ADT/Malta Standards Authority (MSA) | Pros: Better regulation of vehicle emissions through VRT testing. | NA |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|--|---|--|---|
| 10 | Reduce vehicle emissions | Improving other forms of transport | (1) Improve marine connections via ferries. This measure should be accompanied by a mini-van service. (2) Introduce the Valletta electric city cabs to other areas (3) Incentivise taxi drivers to invest in cleaner vehicles (could also be mandatory for taxis operating in Floriana/Valletta) subject to consultations with operators and availability of budget. | ADT / Malta Maritime Authority (MMA) | Pros: Reduce vehicle emissions | Everywhere with special attention on localities exceeding limit values. |
| 11 | Reduce vehicle emissions | Better management in timings and routes taken up by Refuse Collection Vehicles (RCVs) and entities conducting road / embellishment works. | (1) Ban domestic waste collection during the day and particularly during peak hours. (2) Liaise with Environmental Landscaping Consortia (ELC) to stop carrying out road / embellishment works during peak hours. | Local Councils / Office of the Prime Minister (OPM) | Pros: Reduce congestion and emissions from RCVs and all fleets | Everywhere with special attention on localities exceeding limit values. |
| 12 | Reduce vehicle emissions | Fiscal incentives for the acquisition of cleaner technology vehicles. | Implement motor vehicle licence and registration measures to encourage acquisition of lower emission vehicles. | Government | Pros: Encourage the use of cleaner vehicles | NA |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|--|--|---|---|---------------|
| 13 | Reduce vehicle emissions | Modify vehicles that are still in Government fleet to use cleaner fuels. | Modification of existing vehicles or engines of vehicles to take cleaner fuels (e.g. LPG) or to install particulate traps/filters on exhausts. | OPM | | |
| 14 | Reduce vehicle emissions | Revision of the system of accident reporting. | (1) Issue instructions for drivers to fill up bumper to bumper form in the closest lay-by (2) Extend bumper to bumper form for other minor accidents | ADT (needs to amend regulations accordingly and to include enforcement by the Police Authorities and Local Councils). | Pros: Avoid congestion by (1) avoiding cars completing the forms while traffic jams increase (2) avoiding to wait for wardens to come on site | NA |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|---|---|--|---|
| 15 | Reduce vehicle emissions | Re-schedule repair and maintenance to work to non-peak hours | Reduce artificially created congestion. This includes work at night in non-residential areas | Government | Pros: Reduce congestion Cons: This increases the costs which need to be budgeted for | Areas of major exceedance. |
| 16 | Reduce vehicle emissions | Introduce a water taxi system | Implement an effective water taxi system to shift from private to public modes of transport | MMA | Pros: Reduction in vehicle emissions | Wherever possible |
| 17 | Reduce vehicle emissions | Plant vegetation along roads and around industrial estates to absorb emissions. | Encourage the use of tree and plant species which have the maximum capacity to absorb and filter air pollution. | OPM/Ministry for Resources and Rural Affairs/MEPA | Pros: Reduction in vehicle emissions, noise nuisance, aesthetic impact, shade for drivers, pedestrians and | Localities exceeding limit values (wherever possible) |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---|--|--|---------------------|---|------------------------|
| | | | | | cyclists. An increase in absorption of vehicle emissions by road side plants and vegetation. | |
| 18 | Reduce vehicle emissions/Encouraging modal shift | Monitoring and review of Valletta Strategy including Park and Ride Scheme. | Monitoring for traffic counts accompanied with air pollution monitoring should be carried out to revise the Valletta Strategy. | ADT/MEPA | Pros: (1) Achieve a better result from the present measure, resulting in a reduction of air pollution (2) Reduce emissions from vehicles repeatedly driving round to find a parking space in Valletta (3) Reduce congestion around the city centre by preventing repeated trips around the same busy area (4) VMS could be extended to include information about delays, | Valletta/Floriana area |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|--------------------------------|---|--|---------------------|--|---------------|
| | | | | | <p>pollution levels and promote the use of park & ride.</p> <p>Cons: Relies on adequate funding and linking to compatible monitoring equipment in the case of VMS.</p> | |
| 19 | Encouraging modal shift | Achieve set targets for tele-working and e-services | (1) Encourage and develop home working initiatives within all Government entities and Departments. Specific targets should be set and met. (2) Fiscal incentives should be provided to businesses which show interest to set up a system to provide customers with e-services (e.g. supermarkets - home delivery of shopping). | Government | <p>Pros: (1) Minimise car trips and reduce vehicle emissions and congestion</p> <p>(2) Increase awareness</p> | NA |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|--|---|--|----------------------------------|--|---|
| 20 | Encouraging modal shift | School travel plans | Formal plans developed in partnership with schools to encourage walking, cycling, or the use of efficient public transport for travel to and from school. Facilitate cycling by providing for secure cycle parking spaces and safe continuous cycling paths. Cycling shall be taken up for non-busy roads, in remote localities far away from busy centres; while public transport is being proposed for secondary school students where only one bus route is used. | Education Authorities, ADT, MEPA | Pros: (1) Can have associated health benefits if non-busy roads are used to cycle/walk (2) Minimise exhaust emissions and congestion by reducing car journeys. | Everywhere with special attention on localities exceeding limit values. |
| 21 | Reduce traffic impact of new developments | Apply Supplementary Planning Guidance (SPG) on the assessment of the air quality impacts of new development including preparation of guidance notes for developers. | SPG's have to be given weight in planning decisions. Provision of design guidance on minimising exposure to areas of poor air quality through the use of site layout and mitigation measures. Improvements of guidance documents for EIA's should be made (traffic impacts should be modelled and monitored). This guidance could also include provisions on distance of new roads from residential areas. | MEPA | Pros: Can be very effective in integrating air quality considerations into the early stages of planning (example using trees as natural barriers, promote layouts that prevent congestion) | Everywhere with special attention on localities exceeding limit values. |

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|--|-----------------------------------|--|---------------------|---|-----------------------------------|
| 22 | Reduce traffic impact of new developments | Avoid development intensification | Whenever possible avoid development that would contribute to more vehicles on the road | MEPA | Pros: Halts increase in traffic flows due to new development. | Localities exceeding limit values |

Medium term measures

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---------------------------------|-------------------------|---|-------------------|--|---------------|
| 1 | Reduce vehicle emissions | Reform Public Transport | Provide better quality buses, increased frequencies, increased service hours, introduce night services, update transportation routes and generally overhaul public transport service. | ADT | Modal shift from private car use to public transport | Nationwide |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|--|-------------------|--|-----------------------------------|
| 2 | Reduce vehicle emissions | Extension of Controlled Vehicular Access (CVA) to Floriana | Extend CVA to Floriana as originally proposed to Cabinet prior to its implementation. The necessary consultations with stakeholders need to be carried out. | ADT | Pros: Reduces car use | Floriana/Valletta |
| 3 | Reduce vehicle emissions | Introduce a system of cycle rental and design appropriate cycle paths | Provision of cycle rental stands possibly subsidised by Government accompanied by road safety measures for cyclists. Cycling must be encouraged and made safe, by designing cycle paths, cycle tracks and cycle lanes. | ADT | Pros: Contribution to modal shift to non-polluting transport means for short distance trips. | Localities exceeding limit values |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|---|---|--|-----------------------------------|
| 4 | Reduce vehicle emissions | Increase provision and use of park and ride facilities | Sensitive areas need to be tackled: Sliema, Hamrun amongst others. This measure should be implemented with parking and charging policies to encourage the use of park&ride. Traffic can be minimised by servicing congested areas such as Sliema, St Julians, Qormi, Hamrun, in addition to the existing one in Floriana. | ADT | Pros: Help tackle congestion | Localities exceeding limit values |
| 5 | Reduce vehicle emissions | Undertake roadside emission testing issuing penalties to those who continue to pollute excessively. | Wardens give a warning to first time offenders and issue penalties the second time. Allowed emissions need to be identified for different car types according to Euro standard. This should be accompanied by a training programme to wardens so that they can understand the aims and objectives. | Regulated by ADT, enforced by Police and Local Councils | Pros: (1) Encourages improved vehicle maintenance (2) Effective in terms of awareness raising (3) Potential to reduce noise by encouraging the repair of damaged exhausts and fining cars technically modified. Cons: (1) Could be costly in terms of portable equipment (portable emission monitors could be purchased through EU funding instruments), time and manpower (2) Amendments to the | Localities exceeding limit values |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---------------------------------|--|---|-------------------|---|---------------|
| | | | | | present legislation may be necessary. | |
| 6 | Reduce vehicle emissions | Replace a percentage of Government old vehicle fleet | Replacement of current fleet with a cleaner fleet comprising Euro 5/electric/LPG/hybrid vehicles subject to availability of budget. | OPM | Pros: Sets a good example to businesses Cons: The purchasing of electric cars reducing air pollutant concentrations locally but requires power generation, which may result in pollution elsewhere. Additionally vehicle re-charging points would need to be made available. | N/A |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---------------------------------|---|---|---|--|--|
| 7 | Reduce vehicle emissions | Declare low emission zones to manage access to more polluting vehicles and introduce regulations on access restrictions and controls | Heavy duty vehicles, private and commercial cars that do not comply with an established emission standard are prevented from entering towns exceeding limit values. This could be carried out either by payment for the more polluting vehicles or else by enforceable exclusion. Thus there are 2 options; further discussions on implementation have to take place. | Regulated by ADT, enforced by Police and Local Councils | Pros: Achieving limit values in the exceeding Councils (if appropriately enforced). Cons: Unpopular measure with the public and could be a disincentive for businesses to develop. | Localities exceeding limit values |
| 8 | Reduce vehicle emissions | Feasibility study on the possible installation of a rail-based (electrically powered) transport connection/tram. The implementation is to be undertaken as long as it is financially feasible. It is also a long term measure, if at all. | Connection to major employment hubs and the airport would greatly increase use and demand for this system, improving financial viability. This needs to be linked with park and ride facilities, and other transport modes. | ADT | Pros: Reducing congestion in urban areas | This would be applicable for the towns exceeding limit values, also densely populated towns such as Sliema, Valletta, B'Kara and the Three Cities. |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---------------------------------|--|---|---------------------------|---|---------------|
| 9 | Reduce vehicle emissions | Training/information course to operators of public transport network encouraging smoother driving, the importance of emission testing etc. | Increase awareness on problems related to air pollution including health effects and environmental concerns. | ADT/MEPA | Pros: Reduction in emissions through better driving practices | N/A |
| 10 | Reduce vehicle emissions | Encourage increased use of greener fuels including biofuels | Implement an efficient system whereby, wherever possible, vehicles make use of cleaner fuel. This could be accompanied by a study on the feasibility of such fuel use on the local fleet composition. | Malta Resources Authority | Pros: Reduction in vehicle emissions | N/A |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|--|---|---|-------------------|---|--|
| 11 | Reduce traffic impact of new developments | Set out land use zoning parameters in the approved local plans to set air quality targets. | Controlling land use in problem areas identifying mitigation measures (including traffic control mechanisms) which would be subject to review. These could include a complete ban in development within the areas which are exceeding limit values. | MEPA | Pros: Reducing congestion in urban areas Cons: Unpopular measure with the developer | Localities exceeding limit values |
| 12 | Reduce traffic congestion/managing the road network | Implementation of the Intelligent Traffic Management System (ITMS) depending on availability of budget. | Enable traffic flows to be managed, reduce congestion and favour bus routes at key traffic signals. This should specifically include lowering of speed and other traffic measures in case of high pollution peaks (i.e. short-term action plans). | ADT | Pros: Tackles congestion and improve air quality in sensitive areas Cons: ITMS moves emission around rather than removing them. | Everywhere |
| 13 | Reduce traffic congestion/managing the road network | Review of the traffic lights system in specific areas, especially in the major traffic nodes. | Fine tune / adjust time of stopping of traffic lights using Intelligent Traffic Management Systems | ADT | Pros: Could reduce congestion and therefore improve air quality in sensitive areas Cons: Could result in an unfavourable situation if not well considered on a case by case basis. | Wherever possible with special attention to localities exceeding limit values. |

| No. | Aim | Description of measure | Implementation | Lead organisation | Benefits and disadvantages | Applicability |
|-----|---|--|--|-------------------|---|---------------|
| 14 | Promote cleaner vehicle technologies | Encourage local car dealers to promote the sale of cleaner technology vehicles. This would work well coupled with the new vehicle registration tax regime (Budget 2008). | Dealers could also invest in the conversion to and provision for the maintenance of cleaner technology vehicles. | ADT/MEPA | Pros: Raise public awareness of vehicle choices and therefore create more demand for cleaner technology vehicles. | NA |

Measures related to the Construction Industry

Short-term measures

| No. | Aim | Description of measure | Implementation | Lead organisation/s | Benefits and disadvantages | Applicability |
|-----|---|--|---|---|--|--|
| 1 | Reduce emissions from the construction industry | Better enforcement of policies relating to building industry. | Re-assess the current enforcement system and study room for improvement in the building operations in construction sites (such as covering of material etc.). | Ministry for Resources and Rural Affairs/MEPA | Pros: Reduction in particulate matter from construction activities | As relevant to LN 295 of 2007 (Environmental Management Construction Site Regulations, 2007) |
| 2 | Reduce emissions from the construction industry | Stricter controls and enforcement to reduce dust emissions both in quarries and in transit from quarry to building site. | Enforcement of existing measures such as covering the loaded material on transport vehicles, use of water to reduce dust transport, water sprinkling etc. | MEPA/ADT/MRA | Pros: Reduction in particulate matter from quarrying activities | N/A |