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# Report for the Stage 3 in-depth review of emission inventories submitted under the UNECE LRTAP Convention and EU National Emissions Ceilings Directive for:

# MALTA

# CONTENT

# INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols'* [(1)] – hereafter referred to as the 'Methods and Procedures' document.

2. This annual review has concentrated on $SO_2$, NOx, NMVOC, $NH_3$, plus $PM_{10}$ & $PM_{2.5}$ as well as Persistent Organic Pollutants (POPs) for the time series years 1990 – 2010, reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). Heavy Metals (HMs) have been reviewed to the extent possible.

3. This report covers the stage 3 centralised reviews of the UNECE LRTAP Convention and EU NEC Directive inventories of Malta coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 25th – 29th June 2012 in Copenhagen, Denmark, and was hosted by the European Environment Agency (EEA). The following team of nominated experts from the roster of experts performed the review: Generalist – Melanie Hobson (UK), Energy - Stephan Poupa (Austria) and Emmanuel Deflorenne (France), Transport & Mobile Sources – Jean-Marc Andre, Industry – Kristina Saarinen (Finland), Solvents – Ioannis Sempos (Greece), Agriculture & Nature - Bernard Hyde (Ireland), Waste – Kees Peek (The Netherlands).

4. Chris Dore (United Kingdom) was the lead reviewer. The review was coordinated by Katarina Marečková (EMEP Centre on Emission Inventories and Projections - CEIP).

[1] Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols. Note by the Task Force on Emission Inventories and Projections. ECE/EB.AIR/GE.1/2007/16 http://www.unece.org/env/documents/2007/eb/ge1/ece.eb.air.ge.1.2007.16.e.pdf

# PART A: KEY REVIEW FINDINGS

5. The ERT recognises that there can be resource limitations, especially for smaller countries, and commends Malta for their emissions inventory development work to date.

6. The ERT commends Malta for producing their first IIR.

7. The IIR explains that the inventory is based on the *2007 and 2009 EMEP EEA Inventory Guidebook* and the UNECE Reporting Guidelines. The IIR states that work is required in the coming months, so that the 2011 data submission is all based on the 2009 Guidebook. The ERT commends Malta on this initiative, and strongly encourages them to undertake as much of this work as feasible before their next submission.

8. Emissions are only presented from 2000 to 2010 for NOx, $SO_2$, NMVOC and $NH_3$. The ERT therefore encourages Malta to provide additional data covering the time period 1980 - 1999 for these pollutants.

9. The ERT identifies the need for further improvements in transparency and consistency. More detailed observations are made in the sectoral chapters (Part B of this report).

## INVENTORY SUBMISSION

10. In its 2010 submission, Malta reports emissions of NOx, $SO_2$, NMVOC and $NH_3$ for the time series 2000 to 2010 in the NFR format. Information on some additional pollutants is provided in the IIR, but the ERT encourages Malta to submit emission data on all of the pollutants compiled in the NFR format and to extend the time series back to 1980 for the main pollutants where possible.

11. The emissions are reported in NFR09 with notation keys used where appropriate, and the ERT commends Malta for this. Transport emissions are based on fuel used.

12. The CLRTAP inventory submitted by Malta is generally of good quality and documented in the informative inventory report (IIR). However, a number of improvements are recommended. These include providing further information on the sectoral methodologies, because in some cases limited information is provided (see recommendations in the individual sectoral chapters of this report).

13. The IIR follows the recommended reporting structure, but it does not provide sections on recalculations and planned improvements. It is noted that the IIR does provide some suggested improvements in the Sector Chapters, but the ERT encourages Malta to improve the IIR by including more comprehensive information on proposals for improvement, and a section on recalculations.

## KEY CATEGORIES

14. Malta has compiled and presented in its IIR a Key Source Category Analysis for the following pollutants: NOx, NMVOC, SOx, $NH_3$, CO, TSP, $PM_{10}$ and $PM_{2.5}$, as well as for selected heavy metals and selected POPs. The level assessment is performed for all pollutants for 2010. The results presented follow the guidelines and are consistent with the results obtained in the Stage 2 review. The ERT commends Malta for the inclusion of this information in the IIR.

15. No comments are made in the IIR as to whether the results of the KCA will be used to prioritise improvements. The ERT recommends that the KCA is taken into account in future planned improvements.

## QUALITY

### *Transparency*

16. The ERT recognises the level of effort undertaken by Malta in providing an inventory and an accompanying IIR.

17. Malta uses notation keys (NO where emissions are “Not Occurring”, NE where emissions are “Not Estimated”, IE where emissions are “Included Elsewhere” and NA where emissions are not applicable) for reporting in some cases. Tables (a) to (d) on pages 13 – 19 of the IIR provide further information. The following comments are made: (1) The titles of Tables (b) and (c) need to be amended as they refer to the notation key NE, when in fact they mean IE and NA respectively. (2) The use of notation keys varies between pollutants for the same sector. For example, NO should be used where a source or process does not exist and therefore it is appropriate to apply this notation key across all pollutants for sources that do not exist in Malta. The ERT recommends that the use of notation keys is reviewed and revised where necessary to ensure appropriate consistency and accuracy of reporting.

18. The IIR does not provide sufficient detail on the methodologies used to compile the emission estimates. For better transparency, the ERT encourages Malta to improve this information in subsequent IIRs. Specific areas for improvement are included in later sections of the report.

### *Completeness*

19. The ERT acknowledges the effort to which Malta has gone to provide estimates of emissions for all sub-sectors and all pollutants reviewed.

20. Due to the absence of detailed information on the methodologies and data used, the ERT was not able to evaluate the completeness of the inventory.

### *Consistency, including recalculations and time series*

21. The Malta inventory is currently based on different guidelines across the time series, which leads to major variations in the reported emissions across the years.

The ERT therefore encourages Malta to streamline their approach across the years so that a consistent inventory can be produced.

22. Malta does not currently report a time series for HM; only 2010 data is reported. Malta has not signed the HM Protocol; however, the ERT encourages Malta to report a time series for these emissions where possible.

23. No information is provided in the IIR on any recalculations undertaken. The ERT encourages Malta to include this information in subsequent IIRs.

### *Comparability*

24. The ERT notes that the inventory of Malta is comparable with those of other reporting parties. The allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines. The ERT encourages Malta to continue with this approach to national inventory calculation.

### *CLRTAP/NECD comparability*

25. The ERT noted that there are some very small differences between the estimates provided by Malta under LRTAP and NECD in the years prior to 2010. The ERT encourages Malta to provide information on the reasons for the differences in subsequent IIRs.

### *Accuracy and uncertainties*

26. Malta has not compiled uncertainty estimates for their UNECE submission. The ERT encourages Malta to compile at least tier 1 estimates for future submissions.

27. The Malta inventory is currently based on both the 2007 and 2009 EMEP / EEA Guidebook. It is recommended that in the first instance all the emission factors used are based on the 2009 Guidebook and that later on consideration is given to developing country-specific emission factors where possible.

### *Verification and quality assurance/quality control approaches*

28. Malta has stated in its IIR that it has identified the on-going need to develop the QA / QC system and that work to make progress with such a system has started. The ERT commends Malta for the work to date on QA / QC and encourages Malta to put in place a suitable system as soon as possible.

## FOLLOW-UP TO PREVIOUS REVIEWS

29. The ERT encourages Malta to check and respond to the previous stage 2 review findings and consider them when updating its inventory and IIR.

## AREAS FOR IMPROVEMENTS IDENTIFIED BY MALTA

30. The IIR identifies several areas for improvement. These include:

31. Extending the time series for heavy metals as at present only data for 2010 has been compiled.

32. Extending the time series for NOx, $SO_2$, NMVOC and $NH_3$ as at present only data for the period 2000 to 2010 has been provided. Ideally, data from 1980 onwards would be provided, but as a minimum data from 1990 onwards should be reported.

# PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

## CROSS-CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

33. The ERT identifies the following cross-cutting issues for improvement:

(a) The ERT encourages Malta to include further details on the methodologies used to compile the emission estimates. See the individual Sector Chapters for further detail.

(b) The ERT encourages Malta to streamline their approach with emission inventory compilation so that a consistent time series can be produced.

(c) Emission data on NOx, $SO_2$, NMVOC and $NH_3$ are currently reported for the period 2000 to 2010. The ERT recommends that Malta provide estimates from 1990 onwards, and also encourages Malta to report emissions from 1980 onwards where possible.

(d) The ERT encourages Malta to include information on recalculations and planned improvements in future IIRs.

(e) The ERT encourages Malta to use the outcome of the Key Category Analysis to prioritise improvements.

(f) The ERT encourages Malta to undertake an uncertainty analysis and to implement the QA / QC process which is currently being developed as soon as feasible.

(g) The ERT recommends that the use of notation keys is reviewed to ensure that the most appropriate notation key is always used.

# SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

## ENERGY

*Review Scope*

| **Pollutants Reviewed** | | $SO_2$, $NO_X$, $PM_{10}$ & $PM_{2.5,}$ Dioxin, PAH | | |
|---|---|---|---|---|
| **Years** | | 2000 – 2010 | | |
| **NFR Code** | **CRF_NFR Name** | **Reviewed (1)** | **Not Reviewed** | **Recommendation Provided** |
| 1.A.1.a | public electricity and heat production | x | | x |
| 1.A.1.b | petroleum refining | - | | |
| 1.A.1.c | Manufacture of solid fuels and other energy industries | - | | |
| 1.A.2.a | iron and steel | - | | X |
| 1.A.2.b | non-ferrous metals | - | | X |
| 1.A.2.c | chemicals | - | | X |
| 1.A.2.d | pulp, paper and print | - | | X |
| 1.A.2.e | food processing, beverages and tobacco | - | | X |
| 1.A.2.f.i | Stationary Combustion in Manufacturing Industries and Construction: Other (Please specify in your IIR) | x | | x |
| 1.A.2.f.ii | Mobile Combustion in Manufacturing Industries and Construction: (Please specify in your IIR) | - | | X |
| 1 A 3 e | Pipeline compressors ? | - | | |
| 1.A.4.a.i | commercial / institutional: stationary | x | | |
| 1.A.4.a.ii | commercial / institutional: mobile ? | - | | X |
| 1.A.4.b.i | residential plants | x | | |
| 1.A.4.b.ii | household and gardening (mobile) | - | | |
| 1.A.4.c.i | Agriculture/forestry/fishing. stationary | x | | |
| 1.A.4.c.ii | off-road vehicles and other machinery? | - | | x |
| 1.A.4.c.iii | national fishing? | | | |
| 1.A.5.a | other, stationary (including military) | - | | |
| 1.A.5.b | other, mobile (including military, land based and recreational boats)? | - | | |
| 1.B.1.a | coal mining and handling | - | | |
| 1.B.1.b | solid fuel transformation | - | | |
| 1.B.1.c | other fugitive emissions from solid fuels ) | - | | |
| 1 B 2 a i | Exploration, production, transport | - | | |
| 1 B 2 a iv | Refining / storage | - | | |
| 1 B 2 a v | Distribution of oil products | - | | x |
| 1 B 2 b | Natural gas | - | | |
| 1 B 2 c | Venting and flaring | - | | |
| 1 B 3 | Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1 B 2 | - | | |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns. | | | | |

*(1) A "-"indicates that no emissions have been reported.*

*General recommendations on cross-cutting issues.*

34. Malta provides estimates for the years 2000 to 2010. For stationary combustion all relevant (main) pollutants are covered as well as all heavy metals but POPs emissions in general (and PM emissions for some sectors) are only estimated for the year 2010. The ERT encourages Malta to estimate emissions also for previous years, e.g. by using activity data from the national GHG inventory if not already available.

35. Manufacturing industries (NFR 1.A.2) are only reported for category 1.A.2.f.i The ERT encourages Malta to provide emissions of manufacturing industries by the relevant sectors in order to increase the transparency of the inventory.

36. For power plants (NFR 1A1a) PM10 and PM2.5 emissions trends show strong decreases from 2009 to 2010 which is due to a change in the methodology. Some sources are not reported in a consistent way over the time series. For example, “included elsewhere” is used for some years. The ERT encourages Malta to apply the same methodology for PM emissions for the whole time series and encourages Malta to report the activities in a consistent way over the time series.

37. The IIR provides brief information about trends of main pollutants, a table with references of emissions factors and a chapter about direct measurements from power plants and how they are considered in the inventory. The ERT encourages Malta to provide a table with the selected emission factors in order to enhance the transparency of the methodologies.

38. Power plants are the biggest source of stationary combustion in Malta and direct measurements have been used for the estimates of the relevant main pollutants. All other stationary emission sources have been estimated with a tier 1 methodology and with emissions factors from the Guidebook. The ERT welcomes the use of direct measurements for large point sources. The ERT also encourages Malta to select emission factors for smaller combustion installations by considering specific technologies which are in use in the country in order to improve the accuracy of the estimates.

**Transparency:**

39. In the table “Additional info” of the reporting template, all IE and NE notation keys are explained for the reporting year 2010. The ERT commends Malta for this.

40. Malta uses notation keys and no zero values have been identified in the reporting template for the year 2010. However, there are still some empty fields for categories 1A5a and 1A5b. The ERT strongly encourages Malta to populate these either with a notation key or an emission estimate.

41. Malta uses “NE” and “IE” notation keys for categories 1A4ai and 1A4ci for selected years and pollutants. However, the ERT encourages Malta to use notation keys in a consistent way over the time series.

42. The IIR provides a table with references for emission factors, mainly stating that the EFs have been taken from the EMEP Guidebook 2009. However, the ERT encourages the party to present also the selected emission factors in the IIR to aid transparency.

43. The IIR provides information about emission trends for NFR 1A1a and explanations for some selected pollutants. However, the ERT encourages Malta to extend textual information with technical numbers about e.g. the sulphur content of fuels, in order to increase transparency.

44. Malta reports the categories 1A2a to 1A2e as not occurring. Although this might be the case in smaller countries for single sectors, reliable evidence should be provided in the IIR on this issue.

45. Malta uses the notation key “NO” for some pollutants where activities do occur. The ERT strongly encourages Malta to use the correct notation keys, e.g. NE or NA for these sectors and pollutants (e.g 1A1a – NH3). Furthermore, the notation keys are not always reported in a consistent way over the time series, an inconsistency which the ERT also encourages Malta to improve.

**Completeness:**

46. The ERT considers the energy sector 1.A to be complete for the reporting year 2010; however, the time series are in some parts not complete.

47. Malta does not report any emissions under category 1.B but uses the notation key “NO” for all categories except for 1.B.2 where “NE” is used for NMVOC. The IIR states that this is due to missing emission factors in the Guidebook. The ERT encourages Malta to use any methodology from other countries to complete these potential emission sources.

**Consistency including recalculation and time series:**

48. Malta has not carried out any recalculations, and the ERT strongly encourages Malta to address this.

**Comparability:**

49. Except for category 1A1a NOx, SOx and $PM_{10}$ Malta uses a simple tier 1 methodology for all stationary sources with emission factors from the Guidebook 2009. The emission estimates that are presented are therefore comparable; however, higher tier methods should be applied for key sources.

**Accuracy and uncertainties:**

50. Malta has not carried out any uncertainty analysis. The ERT encourages Malta to undertake uncertainty analysis for the Energy Sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

51. Malta does not provide any information in the IIR on sector-specific QA/QC checks. The ERT encourages Malta to implement some basic sector-specific OA/QC procedures as a next step in order to improve the inventory and ensure the correctness of calculations and reporting.

**Improvement:**

52. The ERT commends Malta for planning inventory improvements, and looks forward to seeing the results.

*Sub-sector Specific Recommendations.*

**Category issue 1: 1A1a electricity and heat production – SOX, PM10**

53. The ERT notes that p19 of the IIR states that emissions have been reduced by a shift to "cleaner fuels". However, there is no description of the fuel properties. Malta responded to ERT questions indicating that the sulphur content of oil was reduced from 3.5% to 1% in 2004 and further reduced to 0.7% in 2010 which also lowered PM concentrations by about 40%. The ERT encourages Malta to include this information in the future IIR.

**Category issue 2: 1A2a,b,c,d,e – All pollutants**

54. The ERT notes that for categories 1A2a to 1A2e the notation key "NO" is used for all pollutants. Malta has indicated that emissions from these activities are included in 1A2fi. The ERT recommends that Malta change the notation keys from "NO" to "IE" to increase transparency of reporting.

**Category issue 3: 1A2fii, 1A4aii, 1A4bii, 1A4cii - All pollutants**

55. The ERT notes that mobile machinery is reported as "included elsewhere" and the IIR (p15) states that emissions from 1A4aii are included in 1A4ai and emissions from 1A4bii are included in 1A4bi. This indicates that diesel/gasoline consumption is known. Malta responded to the ERT questions, indicating that this is not the case and that emissions are reported under 1.A.3.b road transportation. The ERT encourages Malta to correct the information in the IIR, as well as in the "Additional info" sheet of the reporting template.

**Category issue 4: 1A1a, Ratio of PM10 and PM2.5 on TSP**

56. For the PM10 and PM2.5 share of total PM the ratios of 75% and 45% have been selected, implying a PM10/PM2.5 ratio of 75/45 = 1.66. However, this is used for the year 2010 only. For the years 2000 to 2009 other ratios (between 3.19 and 3.26) have been identified. Malta responded to ERT questions indicating that emission factors for years prior to 2010 have been selected from CEPMEIP while 2010 data is based on continuous measurements and that it is planned to update the time series by using measurement data. The ERT commends Malta on this planned improvement, and looks forward to seeing this information used for the whole time series.

### Category issue 5: 1A1a Public electricity and heat production – Dioxins & furans

57. The ERT notes that measurements of PAH and dioxin emissions from power plants are described in the IIR. Furthermore, the IIR states that the measurements showed concentrations below the detections limits; therefore, it is considered that emissions have not been estimated. However, total PAH emissions (0.006 Mg) are reported for the year 2010. The ERT encourages Malta to make the IIR consistent with the data reported.

### Category issue 6: 1A2fi, Ratio of PM10/PM2.5

58. The ERT notes that for the years 2000 to 2009 PM10 emissions are lower than PM2.5 emissions. The ERT recommends that Malta include QA/QC checks to ensure that reported PM10 emissions are never lower than the reported PM2.5 emissions.

### Category issue 7: 1B2av Distribution of oil products - NMVOC

59. The ERT notes that no NMVOC emissions from fuel storage/distribution are estimated. The ERT encourages Malta to use a tier 1 methodology from the Guidebook 2009.

# TRANSPORT

*Review Scope*

| Pollutants Reviewed | | $SO_2$, NOx, NMVOC, $NH_3$, $PM_{10}$ & $PM_{2.5}$, POP's, HM | | |
|---|---|---|---|---|
| **Years** | | 1990 – 2010 + (Protocol Years) | | |
| **NFR Code** | **CRF_NFR Name** | **Reviewed** | **Not Reviewed** | **Recommendation Provided** |
| 1.A.3.a.i.(i) | international aviation (LTO) | X | | |
| 1.A.3.a.i.(ii) | international aviation (cruise) | X | | |
| 1.A.3.a.ii.(i) | civil aviation (domestic, LTO) | X | | |
| 1.A.3.a.ii.(ii) | civil aviation (domestic, cruise) | X | | |
| 1.A.3.b.i | road transport, passenger cars | X | | X |
| 1.A.3.b.ii | road transport, light duty vehicles | X | | X |
| 1.A.3.b.iii | road transport, heavy duty vehicles | X | | X |
| 1.A.3.b.iv | road transport, mopeds & motorcycles | X | | X |
| 1.A.3.b.v | road transport, gasoline evaporation | X | | X |
| 1.A.3.b.vi | road transport, automobile tyre and brake wear | X | | X |
| 1.A.3.b.vii | road transport, automobile road abrasion | X | | X |
| 1.A.3.c | railways | X | | |
| 1.A.3.d.i (ii) | international inland navigation | X | | |
| 1.A.3.d.ii | national navigation | X | | |
| 1.A.4.b.ii | household and gardening (mobile) | | X | |
| 1.A.4.c | agriculture / forestry / fishing | | X | |
| 1.A.4.c.ii | off-road vehicles and other machinery | | X | |
| 1.A.4.c.iii | national fishing | | X | |
| 1.A.5.b | other, mobile (including military, land based and recreational boats) | | X | |
| 1 A 3 d i (i) | International maritime navigation | X | | |
| 1 A 3 | Transport (fuel used) | | X | |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns. | | | | |

*General recommendations on cross-cutting issues.*

**Transparency:**

60. Malta provides an IIR which describes well the methodologies that have been used; however, the ERT notes that trends are not explained in detail - the dips and jumps could be explained better. Malta explains in the IIR that dips and jumps may be caused by using different editions of the Guidebook. The ERT therefore encourages Malta to describe trends transparently, by including - in the IIR - information on the relevant Guidebook edition that has been used, the detail regarding different sources of data etc.

**Completeness:**

61. The ERT considers the transport sector to be almost complete. But the ERT notes that some "NE" notation keys are used where emissions are expected. The ERT therefore encourages Malta to review the sources which are currently reported as "NE", in order to have a complete time series.

**Consistency including recalculation and time series:**

62. The ERT notes that Malta has not provided a consistent time series (see comments above). The ERT encourages Malta to address the issues raised by the ERT, in order to provide a consistent time series.

**Comparability:**

63. The ERT notes that the methodologies used for the inventory are not all consistent with the most recent version of the Guidebook. The ERT encourages Malta to develop a consistent methodology for all the time series in order to have a fully comparable inventory.

**Accuracy and uncertainties:**

64. The ERT notes that there is no uncertainty analysis. The ERT recommends that Malta develop an uncertainty analysis and include it in the IIR.

65. The ERT notes that no information is provided on sector-specific QA/QC procedures. The ERT encourages Malta to develop sector-specific QA/QC procedures, and include them in the IIR.

**Improvement:**

66. The ERT notes that Malta plans to improve their methodology by updating emission factors across the whole time series to be consistent with the most recent version of the Guidebook. The ERT commends Malta on this initiative, and encourages Malta to complete as much of this work as is feasible in time for the next submission.

*Sub-sector Specific Recommendations.*

**Category issue 1: All 1A3b: NOx, SOx, NMVOC and NH3**

67. The ERT notes that Malta reports, in the IIR, that emissions of some pollutants are estimated by using the 2006 EMEP/Corinair Guidebook, while the other pollutant emissions are estimated by using the 2009 EMEP/EEA Guidebook. Malta has indicated that it is a long-term goal to update the whole time series so that all data are consistent with the most recent version of the Guidebook. The ERT encourages Malta to update the inventory as much as is feasible in time for the next submission.

**Category issue 2: 1A3bi, 1A3biii, 1A3biv: TSP, PM10, PM2.5**

68. The ERT notes that the pollutant emissions have trends with dips and jumps. Malta has explained that the methodology differs between the year 2010 and other

years. The ERT encourages Malta to use the most up-to-date version of the Guidebook for emission factors across the whole time series.

### Category issue 3: 1A3bi, 1A3biii, 1A3biv: CO

69. The ERT notes that CO emissions were not estimated before the year 2009 and that there is a huge difference (-70%) between 2009 and 2010. Malta explained that they intend to update the time series. The ERT encourages Malta to update the inventory in time for the next submission, by using the emission factors from the most recent version of the Guidebook.

### Category issue 4: 1A3bi, 1A3biii, 1A3biv: Pb, PAH

70. The ERT notes that pollutant emissions were not estimated before the year 2010. Malta responded they would update the time series. The ERT encourages Malta to update the inventory in time for the next submission, by using the emission factors from the most recent version of the Guidebook.

### Category issue 5: 1A3bi: Cd, Cr, Cu

71. The ERT notes that the pollutant emissions for the year 2006 are two times higher than those for the years 2005 and 2007. Malta indicated that they used CEPMEIP emission factors and the fuel used. Malta provided a table of the passenger car fuel used which explains the trend, and explained that the data have been updated. These updated data will be used in the next submission. The ERT welcomes this improvement..

### Category issue 6: 1A3bii, 1A3biii, 1A3biv: All pollutants

72. The ERT notes that the activity data show dips and jumps for 2001, 2005 and 2010. Malta has explained that the input data (on fuel used and traffic) and the Tier 3 methodology that has been used give rise to these dips and jumps. ERT thanks Malta for this explanation, and considers this issue to be closed.

### Category issue 7: 1A3bii: Heavy metals

73. The ERT notes that emissions of heavy metals for this sector have not been estimated. Malta has explained that no emission factors are available. The ERT recommends that Malta use the emission factors in the latest version of the EMEP/EEA Guidebook to address this issue.

### Category issue 8: 1A3bii, 1A3biii: PAH

74. The ERT notes that PAH emissions have not been estimated for 2000-2009. Malta has explained that emissions will be updated and included in the next submission, based on the latest version of the Guidebook. The ERT welcomes this initiative, and encourages Malta to undertake this improvement.

### Category issue 9: 1A3biii, 1A3biv: Heavy metals

75. The ERT notes that emissions have not been estimated for the year 2010. Malta has explained that it was decided to prioritise emission estimates for NEC

pollutants, and that improvements on heavy metals will be made in time for the next submission. The ERT encourages Malta to improve the inventory before the next submission.

### Category issue 10: 1A3bv: NMVOC

76. The ERT notes that emissions have not been estimated for the whole time series. Malta has explained that this is due to a lack of resources associated with collecting relevant data. The ERT encourages Malta to improve these emission estimates as they are expected to make a significant contribution to NMVOC emission estimates.

### Category issue 11: 1A3bvi, 1A3bvii: TSP, PM10, PM2.5, Heavy metals

77. The ERT notes that the activity data are not available for the whole time series. Malta has indicated that this is due to a lack of resources for collecting the data. The ERT encourages Malta to address this as resources allow.

### Category issue 11: 1A3dii: NOx, NMVOC, SOx, TSP, PM10, PM2.5, CO, Cu, Pb, Ni, Se, Zn, HAP, PCB, HCB, HCH

78. The ERT notes the following in the NFR tables:

NOx emissions: change by +30% between 2009 and 2010,

NMVOC emissions: change by -25% between 2009 and 2010,

SOx emissions: change by -90% between 2009 and 2010,

TSP, PM10, PM2.5, Cu emissions have not been estimated (NE) for the 2000-2009 period,

CO, Pb, Ni, Se, Zn emissions: changes by -70%, +42%, +1458%, +991% and +30% respectively between 2009 and 2010,

POPs emission estimates have not been reported and no notation key has been reported for most pollutants and years.

Malta explained that there are two main reasons for the inconsistencies described above. First, there were two major changes in the compilation methodology for the year 2010 (compared to the rest of years). One change relates to a) update of fuel data and b) a change in the emission factors. In 2011 the Malta Resources Authority carried out an in-depth investigation of the fuel placed on the market. They conducted surveys and obtained more accurate information on fuel usage. Prior to 2010 the emission factors had been based mainly on IPCC 1996 and on the CEPMEIP Emission Factor database. In 2010 the emission factors in the 2009 Guidebook were used. Secondly, priority has been given to NEC Directive pollutants. The ERT recognises that there are often limitations to inventory improvement because of resource limitations. However, the ERT encourages Malta to improve the estimates for these pollutants as much as the resources allow.

# INDUSTRIAL PROCESSES

*Review Scope*

| Pollutants Reviewed | | NMVOC | | |
|---|---|---|---|---|
| **Years** | | 2000-2010 | | |
| **NFR Code** | **CRF_NFR Name** | **Reviewed** | **Not Reviewed** * source not occurring | **Recommendation Provided** |
| 2.A.1 | Cement production | | x * | |
| 2.A.2 | Lime production | | x * | |
| 2.A.3 | Limestone and dolomite use | | x | x |
| 2.A.4 | Soda ash production and use | | x | x |
| 2.A.5 | Asphalt roofing | | x | x |
| 2.A.6 | Road paving with asphalt | x | | x |
| 2.A.7.a | Quarrying and mining of minerals other than coal | | x | x |
| 2.A.7.b | Construction and demolition | | x | x |
| 2.A.7.c | Storage, handling and transport of mineral products | | x | x |
| 2.A.7.d | Other Mineral products (Please specify the sources included/excluded in the notes column to the right) | | x | x |
| 2.B.1 | Ammonia production | | x * | |
| 2.B.2 | Nitric acid production | | x * | |
| 2.B.3 | Adipic acid production | | x * | |
| 2.B.4 | Carbide production | | x * | |
| 2.B.5.a | Other chemical industry (Please specify the sources included/excluded in the notes column to the right) | | x * | |
| 2.B.5.b | Storage, handling and transport of chemical products (Please specify the sources included/excluded in the notes column to the right | | x | x |
| 2.C.1 | Iron and steel production | | x * | |
| 2.C.2 | Ferroalloys production | | x * | |
| 2.C.3 | Aluminium production | | x * | |
| 2.C.5.a | Copper Production | | x * | |
| 2.C.5.b | Lead Production | | x * | |
| 2.C.5.c | Nickel Production | | x * | |
| 2.C.5.d | Zinc Production | | x * | |
| 2.C.5.e | Other metal production (Please specify the sources included/excluded in the notes column to the right) | | x * | |
| 2.C.5.f | Storage, handling and transport of metal products (Please specify the sources included/excluded in the notes column to the right) | | x * | |
| 2.D.1 | Pulp and paper | | x * | |
| 2.D.2 | Food and drink | x | | x |
| 2.D.3 | Wood processing | x | | x |
| 2.E | Production of POPs | | x | |
| 2.F | Consumption of HM and POPs (e,g. Electrical and scientific equipment) | x | | x |
| 2.G | Other production, consumption, storage, transportation or handling of bulk products (Please specify the sources included/excluded in the notes column to the right) | x | | x |

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.

*General recommendations on cross-cutting issues*

**Transparency:**

79. Malta has documented the calculation methodologies of most emission estimates reported under the industrial processes sector. The ERT commends Malta for this. However, the ERT recommends that Malta provides more detail for method descriptions as indicated in the relevant sections below.

**Completeness:**

80. The ERT considers that some sources may be missing from the industrial processes sector inventory and that also other pollutants are likely to be emitted from the sources currently included in the inventory. Specific details are given in the sections below.

81. As explained in previous sections of this report, Malta has estimated emissions only from the year 2000 onwards, and the ERT recommends that Malta estimates emissions also for the years 1990-1999, and preferably from 1980 onwards.

**Consistency including recalculation and time series:**

82. In the NFR tables, for most industrial source categories, the use of notation keys varies between pollutants for the same sector as explained in the chapters below. The ERT recommends that Malta check the use of notation keys in the industrial processes sector.

83. There are inconsistencies in the time series due to the use of different data sources or methods over the years as explained in the sections below. The ERT commends Malta for documenting the reasons for these inconsistencies in the IIR.

**Comparability:**

84. Malta uses both default and country specific methods. The ERT strongly recommends that Malta provides more detailed information on country specific methods (see sections below). However, in general, the inventory is comparable to those of other countries.

**Accuracy and uncertainties:**

85. The ERT encourages Malta to undertake uncertainty analysis for the industrial processes sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

86. The ERT notes that Malta has started work to develop a QA/QC system and has given priority to ensuring that the best available sources of data are used. The

ERT commends Malta for this effort and encourages Malta to fully implement the QA/QC system.

**Improvement:**

87. Malta has indicated that they have been undertaking work on improvements for the industrial processes sector (explained in the sections below). The ERT commends Malta for this development.

*Sub-sector Specific Recommendations.*

**Category issue 1: 2A Mineral industry categories - All Pollutants**

88. Malta has included details, in the IIR (p18), on whether a mineral industry process occurs or not in Malta. The ERT commends Malta for providing this information.

89. The ERT notes that, in the NFR table, Malta uses different notation keys for different pollutants of the same NFR 2A category, i.e. NO and NA. The ERT recommends that Malta changes the notation keys to NO for all pollutants from a source which does not occur in Malta.

**Category issue 3: 2A3 Limestone and dolomite use - All pollutants**

90. Limestone and dolomite use is a source of particle emissions and Malta reports these emissions as NE. In the IIR (p14) Malta has indicated that there is not enough data to calculate emissions from NFR 2A3. The ERT recommends that Malta collect data to perform the calculations.

**Category issue 4: 2A4 Soda ash production and use - All pollutants**

91. Soda ash production and use is a source of ammonia and particle emissions. From the IIR and the NFR tables it is not clear if the source exists in Malta as all emissions from this source are reported as NA. The ERT recommends that Malta investigate whether soda ash production and use occurs in Malta, and then estimate emissions if relevant, and document the method in the IIR. Methodologies for estimating these emissions are presented in the EMEP/EEA Emission Inventory Guidebook (2009).

**Category issue 5: 2A5 Asphalt roofing - All pollutants**

92. Asphalt roofing is a source of NMVOC and particle emissions. In the IIR (p14) Malta has indicated that there is not enough data to calculate emissions from NFR 2A5. The ERT recommends that Malta collect activity data and use the methodologies presented in the EMEP/EEA Emission Inventory Guidebook (2009) to calculate emissions.

**Category issue 6: 2A6 Road paving with asphalt - All pollutants**

93. Malta has estimated NMVOC emissions from NFR 2A6 using an Italian emission factor (0.272 kg/t production). This emission factor is rather high compared to the one presented in the EMEP/EEA Emission Inventory Guidebook (2009), i.e.

0.016 kg/t (Table 3.1 in the Guidebook Chapter 2.A.6). The ERT recommends that Malta assess the current level of NMVOC emissions and their development through the time series and provide a more detailed description of the calculation of emissions in the IIR. They may also choose to reconsider their choice of emission factor.

94. Activity data used for NFR 2A6 is, according to the IIR, taken from customs statistics for the period 2000-2004 and from the Malta Transport Authority for the period from 2004 onwards. Due to the different data sources the emission time series is not consistent (10- to 20-fold increase in emissions after the change of the data source). The ERT recommends that Malta tries to use the same data source for all years or re-estimates the activity level for all the previous years since 1990 to improve the internal consistency of the emission estimates.

95. Road paving with asphalt is a source of particle and PCDD/F emissions, which Malta reports as NA and NE, respectively. The ERT recommends that Malta include these emissions in the inventory, and document the methodologies used in the IIR.

### Category issue 7: 2A7a Quarrying and mining of minerals other than coal - All pollutants

96. Quarrying and mining of minerals is a source of particle emissions. In the IIR (p14) Malta has indicated that there is not enough data to calculate emissions from NFR 2A7a. The ERT recommends that Malta collect activity data and use the methodologies presented in the EMEP/EEA Emission Inventory Guidebook (2009) to calculate the emissions.

97. NFR 2A7a is also included in the table presented on p18 of the IIR, for sources not occurring. The ERT recommends that Malta remove this source from the table if the source exists.

### Category issue 8: 2A7b Construction and demolition - All pollutants

98. Construction and demolition is a source of particle emissions. In the IIR (p14) Malta has indicated that there is not enough data to calculate emissions from NFR 2A7b. The ERT recommends that Malta collect activity data and use the methodologies presented in the EMEP/EEA Emission Inventory Guidebook (2009) to calculate the emissions.

99. NFR 2A7b is also included in the table presented on p18 of the IIR, for sources not occurring. However, as construction and demolition activities normally occur in countries, the ERT recommends that Malta remove this source from this table.

### Category issue 9: 2A7c Storage, handling and transport of mineral products - All pollutants

100. The storage, handling and transport of mineral products are sources of particle emissions. In the IIR (p14) Malta has indicated that there is not enough data

to calculate emissions from NFR 2A7b. The ERT recommends that Malta collects data to estimate these emissions.

### Category issue 10: 2A7d Other Mineral products - All pollutants

101. Other mineral products manufacturing may be a source of various emissions depending on the industrial activity – e.g. glass manufacture. The ERT recommends that Malta investigate sources that could fall under other mineral products, and then estimate relevant emissions from these sources.

102. NFR 2A7d is included in the table presented in the IIR (p18) for sources not occurring. The ERT recommends that Malta remove this source from the table if the source exists.

### Category issue 11: 2B5b Storage, handling and transport of chemical products - NMVOC

103. Malta has reported NMVOC emissions under 2B5b Storage, handling and transport of chemical products. The emissions originate from ship purging and are estimated by scaling emissions reported by the UK. The ERT commends Malta for including this source, but strongly encourages Malta to provide a more detailed explanation of the method in the IIR, and also to estimate emissions for all years since 1990.

### Category issue 12: 2B Chemical industry categories - All pollutants

104. Malta has indicated in the IIR (p18) whether emissions are present from chemical industry processes. The ERT commends Malta for providing this information.

105. In the NFR table, Malta uses different notation keys (NO and NA) across the different pollutants for the same chemical industry category. The ERT recommends that Malta revise the current notation key (NA) to NO for sources that do not occur.

### Category issue 13: 2C Metal industry categories - All pollutants

106. Malta has indicated in the IIR (p18) whether metal industry processes occur or not in Malta. The ERT commends Malta for providing this information. According to the table, no metal industry processes occur in Malta.

### Category issue 14: 2D1 Pulp and paper - All pollutants

107. Malta has reported in the IIR (p18) that pulp and paper industry does not exist in Malta. The ERT commends Malta for providing this information.

### Category issue 15: 2D2 Food and drink industry – NMVOC

108. Malta has estimated NMVOC emissions from food and drink industries using Eurostat statistics and IPCC 1996 Revised Guidelines methodology. The emissions include wine and bread production. Malta indicates in the IIR that they do intend to move on to the EMEP/EEA Emission Inventory Guidebook 2009 methodology for future submissions. The ERT encourages Malta to revise the estimates using the

EMEP/EEA methodology for the next submission. The ERT also recommends that Malta include estimates of particle emissions in the inventory from these sources, and that emissions are estimated for all years since 1990.

109. In the IIR Malta explains that the inventory does not include emissions from beer production due to the confidentiality of the activity data. The ERT encourages Malta to find a method for including these emissions in the inventory e.g. by aggregating the emissions with emissions from another NFR category. This would follow good practice guidance.

### Category issue 16: 2D3 Wood processing – All pollutants

110. Wood processing is a source of NMVOC and particle emissions. In the IIR (p14) Malta has indicated that there is not enough data to calculate emissions from NFR 2D3. The ERT recommends that Malta collects data to estimate the emissions. A methodology for estimating particle emissions is presented in the EMEP/EEA Emission Inventory Guidebook (2009).

### Category issue 17: 2E Production of POPs – All pollutants

111. Malta has documented in the IIR (p18) that production of POPs does not occur in Malta. The ERT thanks Malta for providing this information.

### Category issue 18: 2F Consumption of POPs and heavy metals– All pollutants

112. Malta has reported mercury emissions of about 4 tonnes annually from consumption of POPs and heavy metals. However, there is no documentation in the IIR regarding the source or the methodology used to quantify the emissions. The ERT recommends that Malta include this information in future versions of the IIR.

### Category issue 19: 2G Other - All pollutants

113. In the IIR (p19) Malta indicates that activities under NFR 2G do not occur. Other industrial activities may be sources of various emissions, depending on the industrial activity. Industrial processes such as ceramics and bricks (tile) manufacturing fall under this NFR category and are likely to occur in Malta. The ERT recommends that Malta investigate if these sources occur, and then estimate any relevant emissions.

## SOLVENTS

*Review Scope*

| Pollutants Reviewed | | NMVOC, PAHs, TSP, PMs, HMs | | |
|---|---|---|---|---|
| **Years** | | 1990 – 2010 | | |
| **NFR Code** | **CRF_NFR Name** | **Reviewed** | **Not Reviewed** | **Recommendation Provided** |
| 3.A.1 | Decorative coating application | X | | |
| 3.A.2 | Industrial coating application | X | | |
| 3.A.3 | Other coating application (Please specify the sources included/excluded in the notes column to the right) | X | | |
| 3.B.1 | Degreasing | X | | |
| 3.B.2 | Dry cleaning | X | | |
| 3.C | Chemical products, | X | | |
| 3.D.1 | Printing | X | | |
| 3.D.2 | Domestic solvent use including fungicides | X | | |
| 3.D.3 | Other product use | x | | |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns. | | | | |

*General recommendations on cross-cutting issues*

**Transparency & Completeness**:

114. According to the IIR submitted by Malta, the solvents sector comprises emissions from: the cleaning substances used in dry cleaning, printing activities, metal degreasing and a variety of other industrial applications as well as household use. The ERT commends Malta for including these sources, but recommends that Malta include more detail in the IIR, to indicate exactly which SNAP categories (or detailed sources) are reported in the solvents sector.

115. The ERT notes that Malta applies a mass balance per volatile chemical / solvent that it is imported in the country to estimate NMVOC emissions at an aggregate level from the solvents sector. During the review, Malta provided more detailed data about the application of the mass balances and the chemicals included in the calculations. The ERT concluded that the methodology used by Malta to estimate NMVOC emissions from the solvents sector is transparently described and commends Malta for this. In order to increase transparency, the ERT recommends that Malta include the data provided during the review about the application of the mass balances in the next IIR.

116. The estimates of the NMVOC emissions of the solvents sector are reported at an aggregate level for the 3D3 category, with emissions from 3A, 3B, 3C and 3D1 and 3D2 reported as “IE”. The ERT notes that this aggregated reporting affects the level of transparency and comparability of the solvents inventory. During the review, Malta explained that emissions were reported as aggregates because disaggregated

data were not available. In order to increase transparency and identify possible issues of incomplete reporting for the solvents inventory, the ERT recommends that Malta make an approximate (at least) allocation of the NMVOC emissions to detailed SNAP categories of the solvents sector that occur in Malta. The ERT also recommends that Malta report the outcomes of this exercise in the next IIR.

117. Malta has reported PAHs emissions from 3C and 3D3 source categories as NA. PAHs are emitted from asphalt blowing and wood preservation when creosote preservatives are used. In the EMEP/EEA Guidebook there is a Tier 2 method for estimating these emissions that uses asphalt produced as activity data. Emission factors are also provided for other pollutant emissions from asphalt blowing (NMVOC, TSP, heavy metals). A method is also provided for emissions from 3D3. During the review, Malta explained that NMVOC emissions from asphalt blowing were reported under 2A6, and that creosote chemicals were imported into the country but that the end use of them could not be ascertained. The ERT recommends that Malta make efforts to assess the occurrence of these emissions, estimate them and then report accordingly in the next submission.

**Accuracy and uncertainties**:

118. The ERT noted that Malta did not perform an uncertainty analysis for the solvents sector. During the review, Malta explained that they were planning to perform an uncertainty analysis in the future, when adequate resources would be made available. The ERT understands that resources can often be a limiting factor, but strongly encourages Malta to perform an uncertainty analysis at least for the key categories of the solvents sector. Conducting an uncertainty analysis is considered a high priority because the results can be used to prioritize improvement actions, and provide an indication of the reliability of the inventory data.

119. During the review, Malta explained that given the resources currently available, the only sector specific QA/QC check that is carried out is a double check of the calculations used to estimate the pollutant emissions. Given the fact that the solvents sector is responsible for ~70% of the NMVOC emissions, the ERT encourages Malta to develop and implement solvent specific verification procedures and report these accordingly in the next submission. To help with this, Malta can draw on reporting / information gathered through the implementation of EU Directives 1999/13/EC, 2004/42/EC, 2010/75/EC and any other directives relevant to NMVOC emissions from solvents use.

**Comparability:**

120. The ERT has noted that the per capita ratio of NMVOC emissions from the solvent sector in Malta is of the same magnitude as in other neighbouring countries and / or countries with similar national circumstances (e.g. Cyprus). The ERT acknowledges this observation as an indication of completeness and comparability of the NMVOC solvents inventory and commends Malta on their work.

**Consistency including recalculation and time series:**

121. The ERT noted that no recalculations were performed in the solvents sector in the 2012 submission.

122. The ERT has noted that the NMVOC emissions time series shows an unexpected trend. For example, during the period 2003-2006, emissions increased, whereas for the years 2006-2009 they decreased before increasing again in 2010. Emissions in 2006 were ~50% higher than in 2003 and 2009. Given the fact that the Malta is small compared to other countries, the ERT acknowledges that changes in activities and local practices may have significant impacts on emissions. However, the ERT encourages Malta to make efforts to explain (qualitatively) the changes observed in the time series of NMVOC emissions from the solvents sector, and to identify the drivers that affect the emissions. This should ensure/improve time series consistency reporting. The ERT encourages Malta to report accordingly in the next IIR.

**Improvement**:

123. The ERT encourages Malta to develop an improvement plan for the solvents sector, based on the findings included in this report and any other QA/QC procedures that have been developed. The ERT encourages Malta to report accordingly in the next IIR.

# AGRICULTURE

*Review Scope:*

| Pollutants Reviewed | | $SO_2$, NOx, NMVOC, $NH_3$, $PM_{10}$ & $PM_{2.5}$ | | |
|---|---|---|---|---|
| **Years** | | 1990 – 2010 + (Protocol Years) | | |
| **NFR Code** | **CRF_NFR Name** | **Reviewed** | **Not Reviewed** | **Recommendation Provided** |
| 4 B 1 a | Cattle dairy | $NH_3$, $PM_{2.5}$, $PM_{10}$, TSP | | |
| 4 B 1 b | Cattle non-dairy | $NH_3$, $PM_{2.5}$, $PM_{10}$, TSP | | |
| 4 B 2 | Buffalo | | | |
| 4 B 3 | Sheep | $NH_3$ | | |
| 4 B 4 | Goats | $NH_3$ | | |
| 4 B 6 | Horses | $NH_3$ | | |
| 4 B 7 | Mules and asses | | IE | |
| 4 B 8 | Swine | $NH_3$, $PM_{2.5}$, $PM_{10}$, TSP | | |
| 4 B 9 a | Laying hens | $NH_3$ | | |
| 4 B 9 b | Broilers | $NH_3$ | | |
| 4 B 9 c | Turkeys | | IE | |
| 4 B 9 d | Other poultry | $NH_3$, $PM_{2.5}$, $PM_{10}$, TSP | | |
| 4 B 13 | 4 B 13 Other | $NH_3$ | | |
| 4 D 1 a | Synthetic N fertilizers | $NH_3$ | | |
| 4 D 2 a | Farm-level agricultural operations including storage, handling and transport of agricultural products | | | |
| 4 D 2 b | Off-farm storage, handling and transport of bulk agricultural products | | | |
| 4 D 2 c | N excretion on pasture range and paddock unspecified (Please specify the sources included/excluded in the notes column to the right) | | | |
| 4 F | Field burning of agricultural wastes | $NH_3$ | | |
| 4 G | Agriculture other(c) | | | |
| 11 A | (11 08 Volcanoes) | | | |
| 11 B | Forest fires | | | |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns. | | | | |

*General recommendations on cross-cutting issues*

**Transparency:**

124. Emissions for the agriculture sector would benefit from improved transparency; more specifically, sub-sectoral descriptions of estimation methodologies are not provided in the Informative Inventory Report. Furthermore, in its description of $NH_3$ emissions from synthetic N fertilizer application for 4D1, Malta

describes the methodological approach of the IPCC 1996 Guidelines for the estimation of $N_2O$ from fertilizer application, but not for $NH_3$ emissions from fertilizer application. The ERT encourages Malta to improve the transparency of its emission estimates in future submissions by providing clearer descriptions in its Informative Inventory Report of the methodologies applied, the emission factors used and the activity data on which emission estimates are based.

125. Malta does not provide any information in its Informative Inventory Report with respect to the estimation of emissions of particulate matter for those sub-sectors for which estimates are provided. The ERT encourages Malta to provide a description of the methodological approach to particulate matter emission estimates in the Informative Inventory Report of its next and future annual submissions.

**Completeness:**

126. Malta has not provided a full time series of emission estimates for the period 1990-2010. Emissions are reported for the years 2000-2010 only. The ERT encourages Malta to provide estimates for all years in its next and future annual submissions using the approaches outlined in the latest EMEP/EEA Emission Inventory Guidebook.

127. Malta, in its NFR, reports emissions of $PM_{2.5}$, $PM_{10}$ and TSP for some source categories by only including 4B1a, 4B1b, 4B8, 4B9d and 4D1a. The ERT encourages Malta to estimate emissions of $PM_{2.5}$, $PM_{10}$ and TSP for all sources categories where methodological approaches are provided in the EMEP/EEA Emissions Inventory Guidebook.

128. Malta does not currently include estimates of NMVOC emissions from the agriculture sector. The ERT encourages Malta to include estimates of NMVOC emissions for each of the source categories of the agriculture sector for which emission factors and methodological approaches are presented in the latest EMEP/EEA Inventory Guidebook.

129. Malta does not currently include estimates of NO emissions from the agriculture sector. The ERT encourages Malta to include estimates of NO emissions for each of the source categories of the agriculture sector for which emission factors and methodological approaches are presented in the latest EMEP/EEA Inventory Guidebook.

**Consistency including recalculation and time series:**

130. The ERT identified a number of discrepancies with respect to the data presented by Malta for 2009. Specifically for 4B1a, 4B1b, 4B3 and 4B4, an increase in the implied emission factor between 2008 and 2009 can be observed, whereas there is a decrease in the implied emission factor for 4B8. Malta utilises the default emission factors from the EMEP/CORINAIR Inventory Guidebook 2007 for its estimation of emissions, thus ther should be no differences in implied emission factors for one particular year in the time-series. In response to a question raised by the ERT during the review week Malta stated that the AD varied; however, Malta reported the same activity data for these source categories in 2008 and 2009 (e.g.

7,247 head dairy cattle in 4B1a). The ERT therefore encourages Malta to investigate further this apparent discrepancy and recalculate emission estimates for the source categories identified.

**Comparability:**

**Accuracy and uncertainties:**

131. In response to a question raised by the ERT during the review week with regard to the significant increase in emissions of $NH_3$ between 2000 and 2001 for 4B13 and the significant reduction in emissions of $NH_3$ for sector 4B9d, Malta stated that Agriculture Census data 1991 was used for 2000 and that a further census conducted in 2001 was used for that year. The ERT's view is that the Agriculture Census data 2001 should also be used for 2000 and emissions of $NH_3$ and those emissions of $PM_{2.5}$, $PM_{10}$ and TSP should be reported for the full time series 1990-2010. In addition, Malta suggests on page 36 of its 2012 IIR that fertilizer use data is available from 1990 onwards, although from different sources.

132. The ERT encourages Malta to undertake an uncertainty analysis for the agriculture sector in order to help inform the inventory improvement process and to provide an indication of the reliability of the inventory data.

133. Malta, in its Informative Inventory Report, states that it has some basic QA/QC checks. The ERT encourages Malta to implement sector specific OA/QC procedures for the agriculture sector in future submissions.

**Improvement:**

134. The ERT notes Malta's intention to improve emission estimates through the use of the latest EMEP/EEA Inventory Guidebook for future submissions and encourages Malta to undertake this planned improvement and to report emission estimates for the full time series 1990-2010.

# WASTE

*Review Scope:*

| Pollutants Reviewed | | NOx, NMVOC, SOx, $NH_3$, $PM_{10,}$ $PM_{2.5,}$ TSP, HM, POPs | | |
|---|---|---|---|---|
| **Years** | | 1990 – 2010 | | |
| **NFR Code** | **CRF_NFR Name** | **Reviewed** | **Not Reviewed** | **Recommendation Provided** |
| 6.A | solid waste disposal on land | X | | X |
| 6.B | waste-water handling | X | | X |
| 6 C a | Clinical waste incineration (d) | X | | X |
| 6 C b | Industrial waste incineration (d) | X | | X |
| 6 C c | Municipal waste incineration (d) | X | | X |
| 6 C d | Cremation | X | | X |
| 6 C e | Small scale waste burning | | X | |
| 6.D | other waste (e) | | X | |
| Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns. | | | | |

*General recommendations on cross-cutting issues*

**Transparency:**

135. Malta's inventory for the waste sector is generally transparent and well organised. However, the ERT notes that as an overview of the waste sector, a description per sub-sector (with a short description of all sources and details on which tier methods have been used) is missing. The ERT encourages Malta to add the missing elements to its next submission.

136. The ERT notes that Malta has derived emissions from the Annual Environmental Report of the Marsa Thermal Treatment Facility and encourages the Party to continue with this. Additional details and specific recommendations are provided in the sub-sector section below.

137. The ERT notes that the results of the key source analysis are presented in the general chapter of the IIR and compliments the Party for this.

138. The ERT notes that all the emissions for 2010 are based on the latest EMEP/EEA Guidelines while the previous years are based on different standard guidelines like IPPC 1996, and outdated EMEP/EEA Guidelines. The ERT recommends that Malta use the emission factors from the 2009 Guidebook for the full time series in next submission.
(see also under Improvements).

139. Furthermore the ERT found differences in the use of notation keys in the IIR and the NFR tables. In response to questions from the ERT, the Party replied that this would be corrected in next submission.

140. In its IIR Malta states that before 2010, Malta used to estimate emissions for the 4 NEC-D pollutants only, which means that it is not possible to derive and discuss trends for the other pollutants. However, in the 2000-2009 NFR tables of the current submission also emission figures for Particulate Matter, CO, Priority Heavy Metals and Other Heavy Metals can be found. The ERT recommends that the Party also give a description of the trends of these pollutants in next submission.

141. Furthermore the ERT notes that there were enormous emission increases of several compounds in 6Ca in 2010. The ERT recommends that the Party include explanations of dips and jumps in their next submissions.

**Completeness:**

142. Malta has submitted its first Informative Inventory Report (IIR) and the ERT compliments the Party for this.

143. The ERT notes that only emissions are available for the period 2000-2010 and recommends that Malta provide the whole time series in their next submission (see also under Improvements).

144. The ERT notes that the notation key NE has been used many times in 6A, because no EFs are available in the 2009 Guidebook. To avoid underestimation, the ERT encourages Malta to include actions in their inventory improvement programme that will address the missing emissions (NE) either by obtaining data to allow an emission estimate to be made, or by reporting the emissions as not applicable. These planned improvement actions should be described in the IIR.

**Consistency including recalculation and time series:**

145. The ERT notes that no information on recalculations is included in the IIR.

146. The time series of the EFs used to calculate emissions are not the same for every year. The ERT recommends that Malta correct this inconsistency in their next submissions.

**Comparability:**

147. Malta has reported its emissions inventory in accordance with the reporting requirements and submitted it in the requested NFR format.

148. However, the ERT notes that Malta has not used the available EFs from the EMEP/EEA Emission Inventory Guidebook 2009 for the whole time series. To avoid under-/overestimations, the ERT recommends that Malta uses the available EFs from the EMEP/EEA Emission Inventory Guidebook 2009 or country- or plant-specific EFs in the future.

149. The ERT has noted there are no differences between CLRTAP and NEC emissions in the IIR and commends that Party on this.

**Accuracy and uncertainties:**

150. The ERT notes that Malta has started to develop a QA/QC system. The ERT commends Malta for this and encourages the Party also to implement sector specific OA/QC procedures for the waste sector in the next submissions.

151. For this submission Malta has not performed an uncertainty analysis. The ERT recommends that Malta undertake an uncertainty analysis for the waste sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

**Improvement:**

152. The ERT has found that there are no planned improvements specified in the IIR. However, Malta's aim for the next emission inventory submission is to have all 2011 emission estimates based on the latest revision of the Inventory Guidebook. Malta also aims to subsequently apply this to all the full time series. The ERT encourages Malta to list desired improvements in its IIR to help support improvement prioritisation.

*Sub-sector Specific Recommendations.*

**Category issue 1:**
**6 C a Clinical waste incineration / 6 C b Industrial waste incineration / 6 C d Cremation**

153. The ERT notes that Malta uses the following 2 methods to determine emissions from 6Ca, 6Cb and 6Cd:

(a) Method 1:
Emissions of SO2, NOx, CO, dust, total mercury, total heavy metal and total PCDD/PCDF are derived from the Annual Environmental Report of the Marsa Thermal Treatment Facility.

(b) Method 2:
The individual heavy metals (Pb, Cd, As, Cr, Cu, Ni, Zn), total PAH and NMVOC emissions are estimated by using Tier 2 emission factors for NFR 6Cd while Tier 1 emission factors are used for NFR 6Ca and 6Cb.

154. The ERT also notes that the heavy metals are analysed as total antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel, vanadium and their compounds, expressed as their total native elements, not individually as per reporting requirement under CLRTAP. Mercury and its compounds are analysed individually.

155. To transfer the heavy metals (Pb, Cd, As, Cr, Cu, Ni, Zn) from Method 2 to Method 1 the ERT encourages Malta to convince the Marsa Thermal Treatment Plant that it is necessary to analyse the other heavy metals individually too in the future.

## LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Malta responded to question raised prior to and during the review:
   - Energy questions Q1 – 6
   - Transport questions Q1 – 22
   - Industrial Processes questions Q1 – 2
   - Solvents questions Q1 – 7
   - Agriculture questions Q1 – 9
   - Waste questions Q1 – 6

2. Malta provided additional data related to the questions raised by the ERT:
   - Solvents import.xls
   - Vehicle numbers.xls
3. Malta Stage 2 S&A report
4. Malta Stage 1 report 2010
5. Malta IIR 2010