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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:

STAGE 3 REVIEW REPORT
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. This year an updated version[2] of the "Methods and procedures" document proposed by the Task Force on Emission Inventories and Projections (TFEIP) was tested. The principle for the calculation of technical corrections can be found in a draft document named "A Process for Technical Revisions During CLRTAP Emissions Inventory Review"[3].

2. This annual review, has concentrated on SO_x, NO_x, NMVOC, NH_3, plus PM_{10} & $PM_{2.5}$ for the time series years 1990 – 2015 reflecting current priorities from EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). HMs and POPs 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 19th June 2017 to 23th June 2017 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 – Ms. Elo Mandel (Estonia), energy - Ms. Marion Pinterits (EU), transport - Ms. Antonella Bernetti (Italy), industry - Ms. Maria Purzner (Austria), solvents - Ms. Mirela Poljanac (Croatia), agriculture - Ms. Simone Haider (Austria), waste - Mr. Dirk Wever (Netherlands).

4. Ms. Kristina Saarinen (Finland) was the lead reviewer. The review was coordinated by Ms. 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.ceip.at/fileadmin/inhalte/emep/review/review_guidelines.pdf

[2] Proposal for updating the 'Methods and procedures' document laying down the process for the EMEP emission inventory review. Available at: http://www.unece.org/fileadmin/DAM/env/documents/2016/AIR/EMEP/Informal_Document/3_Methods_Procedures_update_proposal_May2016_ISSUE1_TFEIP.pdf

[3] A Process for Technical Revisions During CLRTAP Emissions Inventory Review. Available at: http://webdab1.umweltbundesamt.at/Inventory_Review_2017/00_General/Technical%20corrections%20guidance/CLRTAP_Technical_Revisions_v3.pdf

PART A: KEY REVIEW FINDINGS

5. The ERT considers Malta's air pollutant emission inventory to be generally in line with the EMEP/EEA air pollutant emission inventory guidebook – 2016 (hereafter 2016 EMEP/EEA Guidebook or Guidebook) and the UNECE Reporting Guidelines (hereafter Reporting Guidelines). Transport emissions are reported based on fuel sold.

6. Emissions data in NFR tables and the Informative Inventory Report (hereafter IIR) were submitted with a delay with respect to the timeframe set in the UNECE Reporting Guidelines.

7. The ERT noted that recalculations have been carried out, but that they are not always consistent across the time series.

8. During the review the ERT identified several possible under- or overestimations in the inventory and proposed technical corrections for the energy, transport and agriculture sectors as presented under the chapter for technical corrections. The ERT strongly recommends Malta to consider these results in the next submission.

9. The 2017 submission showed some improvements in the agriculture sector since the previous Stage 3 review. Nevertheless, the ERT identified a need for further improvements regarding the completeness and the transparency of the inventory.

10. The ERT thanks Malta for participating actively in the Stage 3 review process by providing further information and data when requested. Based on that information, the ERT was able to review the inventory in detail and to provide a number of detailed recommendations.

INVENTORY SUBMISSION

11. Malta submitted NFR tables under the CLRTAP on the 21th February 2017 after the deadline of 15th February.

12. In the 2017 submission, Malta reported emissions in the NFR 2014 format for the time series from 2000 to 2015 (the most recent year). The ERT recommends Malta to estimate emissions also for the years 1990-1999.

13. The IIR was submitted on 29th May 2017 after the deadline of 15th March.

14. The submission under the NECD was reported on 21th February 2017 after the deadline of 15th February, and included data for 2000-2015 in NFR 2014 format with notation keys used where appropriate.

15. The submission did not include Large Point Sources (LPS) data or gridded emissions data. The ERT recommends Malta to include LPS and gridded emissions data next year and than again in the 2021 as required by UNECE Reporting guidelines.

16. The submission did not include data on projections. The ERT recommends Malta to include data on projections in the submission every four years from 2017 onward.

KEY CATEGORIES

17. Malta has carried out a level key category analysis (hereafter KCA) consistent with the 2016 EMEP/EEA Guidebook for the following pollutants: NO_x, NMVOC, SO_x, NH_3, $PM_{2.5}$, PM_{10}, TSP, BC, CO, Hg, Ni, Se, Zn, PCCD, POPs, HCB, PCBs.

18. The ERT noted that the KCA performed by Malta is not identical to the CEIP analysis for NO_x, NMVOC, $PM_{2.5}$, PM_{10}, TSP, BC and CO emissions for the year 2015. During the review Malta indicated that the inventory is currently still being updated by taking on board many of the suggestions brought forward by both CEIP and the ERT and that the KCA is not compatible with the recent submissions. The ERT recommends Malta to include the corrected KCA to the next submission.

19. Malta does not specify if the results of the KCA are used to identify priorities in improvements of the inventory in the IIR. The ERT recommends that Malta uses the results to prioritise improvements in the inventory.

20. Tier 2 or higher methodologies have been applied only to some key categories. The ERT encourages Malta to use higher Tier methods for all key categories in line with the Reporting Guidelines in order to increase the accuracy of the inventory.

QUALITY

Transparency

21. The ERT found Malta's inventory to be detailed and generally transparent. The IIR mainly follows the recommended structure of the IIR according to Annex II of the Reporting Guidelines. The IIR provides brief information about the trends of the main pollutants, a table for key categories, information on the completeness of the inventory as well as some information on how emissions are estimated. The ERT commends Malta for that.

22. The ERT notes that the IIR does not contain detailed information on methodologies, activity data and emission factors for the energy, transport, industrial processes, solvent and other product use, agriculture and waste sectors. The ERT encourages Malta to complete this information by providing emission factors and activity data used in the calculation of emissions and more detailed information on the methodologies used, as well as information on the sources of the EFs, methods and data, in order to enhance the transparency of the inventory.

23. The ERT notes that the IIR contains no or only limited information on recalculations. The ERT encourages Malta to document all recalculations in a transparent way in the IIR.

24. The ERT notes that the use of notation keys varies between pollutants for the same sector as explained in the sector specific chapters below. The ERT recommends Malta to use notation keys in a consistent way over the time series according to the definitions of notation keys in the Reporting Guidelines and encourages Malta to include an explanation in the IIR whether the activity existed in a certain year or not, and under which NFR it was included.

25. The ERT notes that many sources under the energy, transport, solvent use, agriculture and waste sectors are not reported in a consistent way over the time series. During the review, Malta indicated that the improvement of the time series consistency on the already submitted years is their first focus in the inventory improvement programme. The ERT recommends Malta to harmonize the methodologies used to calculate emissions for the whole time series and encourages Malta to document the calculation of all years in a comprehensive and transparent way in the IIR.

26. Malta states in the IIR that methodologies form the 2013 and 2016 Guidebooks are applied. The ERT recommends applying the methodologies from the most recent Guidebook, i.e. the 2016 EMEP/EEA Guidebook.

Completeness

27. The ERT acknowledges the effort Malta has taken to provide estimates of emissions for almost all pollutants for almost all sub-sectors. Malta reported emissions from 2000 to 2015. The ERT notes that the inventory covers more pollutants since the 2012 CLRTAP Stage 3 in-depth review and the ERT commends Malta for the effort made to improve their inventory.

28. During the review, Malta indicated that the first focus is to improve the time series consistency for already submitted years. However, the ERT recommends Malta to estimate emissions from all years since 1990 at least for the main pollutants.

29. Malta uses the notation keys “NE” (Not estimated) and “IE” (Included Elsewhere) in a number of cases, and provides an explanation in the 2017 IIR under the chapter “General Assessment of Completeness”. However, the ERT recommends Malta to make an effort to calculate and report all relevant emissions from all source categories.

Consistency, including recalculations and time-series

30. Malta has carried out recalculations for the transport and agriculture sectors for the year 2014 only. The ERT recommends that Malta undertakes efforts to update the whole time series according to methods provided the 2016 EMEP/EEA Guidebook for the next submission and also encourages Malta to report information on recalculations in the IIR.

Comparability

31. The ERT notes that the inventory of Malta is comparable with those of other reporting Parties. The allocation of source categories follows the one provided in the EMEP/UNECE Reporting Guidelines. However, the ERT made the following findings:

(a) In the energy sector Malta has summed up the values of several heavy metals to one value for the heavy metal Pb. Also, the allocation of emissions does not fully follow the allocation requested by the Reporting Guidelines. The ERT recommends Malta to report the emission values of each pollutant separately under the correct NFR category and pollutant in the NFR tables.

(b) In the transport sector Malta has included the POP emissions in the NMVOC national total emissions. The ERT recommends Malta to provide the emissions time series separately for each of the different POP compounds as well as for NMVOC according to the definition of pollutants in the Reporting Guidelines and to apply the methodologies provided in the latest version of the Guidebook.

(c) In the Solvent sector Malta reports emissions from four source categories 2D3f dry cleaning, 2D3g chemical products, 2D3h printing and 2D3i other solvent use summed up in the category NFR 2G other product use. The ERT recommends Malta to estimate and report all emissions separately under the correct source categories.

32. The ERT notes that Malta uses both default and country specific methods. The ERT recommends Malta to provide more detailed information on country specific methods, to justify their use and to provide the reference to the source of the methods (see sections below).

CLRTAP/NECD comparability

33. According to the results of inventory comparisons carried out by the CEIP, there are no differences in the data between the submissions under the CLRTAP and NECD.

Accuracy and uncertainties

34. Malta did not perform an uncertainty analysis as part of the 2017 submission. During the review week, the Party indicated that there are no capacities to do this. The ERT regrets the difficult conditions in which the inventory work has to be accomplished, but recommends the Party to carry out an uncertainty analysis, at least for key categories, and encourages the Party to describe the quantification of uncertainties and the results in the IIR.

Verification and quality assurance/quality control approaches

35. The IIR does not provide information on verification of the inventory.

36. Only limited information on QA/QC procedures is provided in the IIR. The ERT recommends Malta to further elaborate their QA/QC procedures in accordance with the Guidebook and encourages Malta to include information on QA/QC procedures and the results in the IIR.

FOLLOW-UP TO PREVIOUS REVIEWS

37. Results from Stage 1 and Stage 2 reviews of the 2015 emission data were used in this Stage 3 review. The ERT invites Malta also to refer to these previous reviews when examining this review report and when updating its improvement plans.

38. The ERT noted that Malta has carried out some improvements in the agriculture sector since the 2012 CLRTAP Stage 3 in-depth review. The ERT has listed areas for further improvements in Part B.

AREAS FOR IMPROVEMENTS IDENTIFIED BY MALTA

39. Malta has not provided information about an inventory improvement plan in the IIR. During the review week, Malta indicated that the inventory would have to be improved through a succession of steps and also indicated in response to questions raised during the review to already work on or have identified certain improvement needs. According to the Party the first improvement should be ensuring that the time series is consistent, in a sense that all estimates are based on the same methodology. The Party's ability to do this will depend on the availability of staff. The ERT welcomes this and encourages Malta:

(a) to include information about the inventory improvement plan in the next submission of the IIR.

(b) to estimate emissions of the entire road transport time series with COPERT 5 methodology.

(c) to use an appropriate notation key for NFR 2A1.

REVISED ESTIMATES AND TECHNICAL CORRECTIONS CONSIDERED AND/OR CALCULATED BY THE ERT

40. The ERT identified several significant inconsistencies in the inventory and proposed the Party potential technical corrections for:

(a) NFR category 1B2av distribution of oil products for NMVOC emissions

(b) NFR 1A3b road transport: NO_x, SO_2, NMVOC, NH_3 and $PM_{2.5}$.

(c) NFR 3B manure management for NH_3 and $PM_{2.5}$. The PTC calculation file also includes PTCs for NO_x and NMVOC emissions according to the 2016 EMEP/EEA Guidebook.

(d) NFR category 5A biological treatment of waste - solid waste disposal on land for TSP, PM_{10} and $PM_{2.5}$, NMVOC emissions.

Malta accepted the potential technical corrections calculated by the ERT (Table 1).

41. In response to the ERT's observations, Malta provided revised estimates during the review for:

(a) NFR 1A1a public electricity and heat production for PM_{10} and $PM_{2.5}$ emissions.

The ERT accepted the revised estimates provided by Malta (Table 1).

42. Detailed information on the technical corrections and revised estimates is provided under the sector specific chapters below.

Table 1 Summary of Potential Technical Corrections for Malta

NFR	Pollutants	Years	Calculated by country/ ERT	Potential contribution to national total (%) in 2015, 2010 and 2005	PTC calculation in file
1A1a	PM10	2005-2015	Malta	-47%(2015)	TC-Malta-2017-1A1a,xls
1A1a	PM2.5	2005-2015	Malta	-42%(2015)	TC-Malta-2017-1A1a,xls
1A3bi-v	NMVOC	2005-2015	ERT	54%(2015), 15%(2010), 2%(2005)	TC-Malta-2017-1A3b.xls
1A3bi-iv	NOx	2005-2015	ERT	69%(2015), 8%(2010), 1%(2005)	TC-Malta-2017-1A3b.xls
1A3bi-iv	SOx	2005-2015	ERT	0.1%(2015), 0.01%(2010), -0.1%(2005)	TC-Malta-2017-1A3b.xls
1A3bi-iv	NH3	2005-2015	ERT	6%(2015), 2%(2010), 3%(2005)	TC-Malta-2017-1A3b.xls
1A3bi-iv	PM2.5	2005-2015	ERT	68%(2015), 56%(2010), -63%(2005)	TC-Malta-2017-1A3b.xls
1B2av	NMVOC	2005-2015	ERT	7%(2015), 6%(2010), 4%(2005)	TC-Malta-2017-1B2av.xls
3B	NH3	2005-2015	ERT	-36%(2015), -23%(2010), -18%(2005)	TC-Malta-2017-3B.xls
3B	PM2.5	2005-2015	ERT	-62%(2015), -61%(2010), -61%(2005)	TC-Malta-2017-3B.xls
5A	NMVOC	2015	ERT	21%(2015)	TC-Malta-2017-5A.xls
5A	NMVOC	2005, 2010	ERT	13%(2010), 11%(2005)	TC-Malta-2017-5A.xls

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

43. The ERT identified the following cross-cutting issues for improvement in Malta´s inventory:

(a) The ERT recommends Malta to provide a complete time series from 1990 onward.

(b) The ERT encourages Malta to provide more detailed information on emission factors, activity data and methodologies used to calculate emissions in the IIR.

(c) The ERT recommends Malta to apply the methodologies from the 2016 EMEP/EEA Guidebook.

(d) The ERT recommends Malta to use Tier 2 or higher methods for all key categories.

(e) The ERT recommends Malta to undertake a trend assessment in the key category analysis for all pollutants.

(f) The ERT recommends Malta to investigate the relevance of sources currently reported as “NE” and to estimate and report the occurring emissions or to assess the quantitative importance of emissions from these sources, to provide a description of the source in the IIR and to document whether the activity existed in a certain year or not, or under which NFR category it was included.

(g) The ERT recommends Malta to elaborate a QA/QC plan and encourages Malta to include more detailed information on the QA/QC activities and their results in the IIR.

(h) The ERT encourages Malta to perform an uncertainty analysis and to use it as a tool when planning improvements.

44. Recommended improvements relating to specific source categories are presented in the relevant sector sections of this report.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5,}$ Cd, Hg, Pb, PCDD/F, PAH		
Years		1990 – 2015		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A1a	Public electricity and heat production	X		
1A1b	Petroleum refining	X		
1A1c	Manufacture of solid fuels and other energy industries	X		
1A2a	Iron and steel	X		
1A2b	Non-ferrous metals	X		
1A2c	Chemicals	X		
1A2d	Pulp, Paper and Print	X		
1A2e	Food processing, beverages and tobacco	X		
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	X		
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	X		
1A3ei	Pipeline transport	X		
1A3eii	Other	X		
1A4ai	Commercial/institutional: Stationary	X		
1A4bi	Residential: Stationary	X		
1A4ci	Agriculture/Forestry/Fishing: Stationary	X		
1A5a	Other stationary (including military)	X		
1B1a	Fugitive emission from solid fuels: Coal mining and handling	X		
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	X		
1B1c	Other fugitive emissions from solid fuels	X		
1B2ai	Fugitive emissions oil: Exploration, production, transport	X		
1B2aiv	Fugitive emissions oil: Refining / storage	X		
1B2av	Distribution of oil products	X		
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	X		
1B2c	Venting and flaring (oil, gas, combined oil and gas)	X		
1B2d	Other fugitive emissions from energy production	X		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

45. For power plants (NFR 1A1a) the PM_{10} and $PM_{2.5}$ 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. The ERT recommends Malta to apply the same methodology for PM emissions for the whole time series and to report the activities in a consistent way over the time series.

46. The IIR provides brief information about the trends of main pollutants, a table on key categories, information on the completeness of the inventory, and brief information on how emissions are estimated. The ERT recommends Malta to complete this information by providing a table with the selected emission factors and more detailed information on methodologies used in order to enhance the transparency of the inventory.

47. Malta states in its IIR that methodologies form the EMEP/EEA Guidebooks 2013 and 2016 are applied. The ERT recommends applying the methodologies from the most recent EMEP/EEA Guidebook (2016).

Transparency

48. Malta has provided a detailed and generally transparent emission inventory. The estimates are provided at the most detailed level for all energy sectors in the NFR tables. However, the ERT did not find the documentation of the methods used transparent enough and therefore encourages Malta to include more details in the IIR in order to increase transparency, including the methodology on how emissions are calculated and a clear reference on the emission factors used.

49. Malta uses “NO” and “IE” notation keys for NFR categories 1A2f and 1A4ci for selected years and pollutants. The ERT recommends Malta to use notation keys in a consistent way over the time series and encourages Malta to include an explanation in the IIR whether the activity existed in a certain year or not, or under which NFR it was included.

Completeness

50. The ERT considers the energy sector NFR 1A to be almost complete; however, the time series is in some parts not complete.

51. Malta does not report any emissions under the NFR 1B subcategories but uses the notation key “NO” for all categories except for NFR 1B2b (Fugitive emissions from natural gas) where the notation key “NE” is reported. Malta replied to the question raised by the ERT that default emission factors from the 2016 EMEP/EEA Guidebook cannot be applied because in Malta only gas bottling takes place and there are no emission factors available for that activity in the Guidebook. The ERT encourages Malta to develop methodologies and to collect data to be able to estimate these emissions.

52. Malta reports some empty fields and notation keys for emissions and activity data for NFR category 1A1a. The ERT recommends Malta to populate these either

with an emission estimate or values for activity data. No zero values were identified in the reporting template.

Consistency including recalculation and time series

53. Malta has not carried out any recalculations. The ERT recommends Malta to address this issue regarding BC, $PM_{2.5}$ and PM_{10} emissions from NFR 1A1a in order to correct errors.

Comparability

54. Malta uses a simple Tier 1 methodology for all stationary sources applying emission factors from the 2016 EMEP/EEA Guidebook. The emission estimates that are presented are therefore comparable with other countries.

55. Malta does not fully follow the allocation of emissions under the NFR codes and the inventory is therefore not fully comparable with other reporting Parties. Under NFR 1A1a Malta has summed up the values of several heavy metals in one reported value, e.g. the sum of As, Cr and Cu is reported under Pb, The ERT recommends Malta to report the emission values of each pollutant separately under the correct pollutant column in the NFR table.

Accuracy and uncertainties

56. Malta uses a Tier 1 methodology for all energy sources. For instance, NFR 1A2gviii is a key category for NO_x, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene and all these emissions are calculated using a Tier 1 methodology. The ERT encourages Malta to apply a higher Tier methodology to calculate emissions from key categories.

57. Malta has not carried out an uncertainty analysis. The ERT recommends Malta to undertake an 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.

58. The time series of PM_{10} and $PM_{2.5}$ emissions from NFR category 1A2gviii and CO emissions from category NFR 1A4bi are not consistent, e.g. the reported PM_{10} emissions are lower than the reported $PM_{2.5}$ emissions. The ERT recommends Malta to apply the correct emission factor and to report a consistent time series.

Improvement

59. The ERT notes that Malta has not indicated any improvements for the energy sector in the IIR. The ERT recommends Malta to develop an inventory improvement plan for the energy sector and encourages Malta to include it in the IIR.

Potential Technical Corrections

61. The ERT noted that NMVOC emissions from NFR 1B2av are reported as "NE" although methodology is available in the 2016 EMEP/EEA Guidebook. To the question raised on the issue by the ERT Malta responded that this issue will be addressed in a future submission. Because NMVOC emissions from this source would make up to around 7% of Malta's total NMVOC emissions the ERT calculated a technical correction which Malta accepted as a revised estimate. The ERT strongly recommends Malta to include the revised estimate into the next submission.

62. The ERT strongly recommends Malta to review the proposed estimates and to include the estimates or to recalculate its inventory for the source categories and pollutants listed under paragraph 60 as well as to include the new information in the IIR.

63. The technical corrections are presented in Annex 1 of the review report.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.1.a Electricity and Heat Production - PM_{10}, $PM_{2.5}$

64. During the review the ERT noted that Malta is reporting higher $PM_{2.5}$ and PM_{10} emissions for the years 2014 and 2015 than the reported TSP emissions from NFR 1A1a. In the IIR 2017 (p. 20) Malta states that $PM_{2.5}$ and PM_{10} emissions in 2013 to 2015 are calculated by multiplying the Guidebook default emission factors $PM_{2.5}$ to TSP ratio and the PM_{10} to TSP ratio with the TSP emission loads. The ERT asked Malta for clarification on how emissions are calculated as the reported emissions do not reflect the described methodology of the IIR. Malta provided revised estimates for PM_{10} and $PM_{2.5}$ and also corrected TSP emissions stating that an error had occurred in the submission of TSP emissions for 2013 and 2015. The ERT accepts the revised estimates for TSP, $PM_{2.5}$ and PM_{10} emissions from this category and recommends Malta to provide corrected data in its next submission.

65. The ERT notes that Malta is applying emission factors for the years prior to 2010 from the Co-ordinated European Programme on Particulate Matter Emission Inventories (CEPMEIP) and that since 2010 data is based on continuous measurements. Malta responded to the ERT's question on the issue that it is planned to calculate emission factors based on the years from 2010 onwards and to use these factors to calculate emissions for the pre 2010 estimates but that availability of staff is a limiting factor in this case. The ERT commends Malta on this planned improvement to ensure the time series consistency.

Category issue 2: 1.A.2.gviii Stationary combustion in manufacturing industries and construction: Other - PM_{10}, $PM_{2.5}$

66. The ERT identified that reported PM_{10} emissions for category 1A2gviii for the years 2000-2009 are lower than reported $PM_{2.5}$ emissions. Malta has indicated that emissions will be corrected as TSP emissions = PM_{10} emissions = $PM_{2.5}$ emissions, given that most of these plants are diesel generators. The ERT recommends Malta to recalculate the emissions in its next submission.

Category issue 3: 1.A.4.b.i Residential: Stationary – CO

67. The ERT noted time series inconsistencies of reported CO emissions in category 1A4bi, e.g. in 2015 activity data increased by 2170% (compared to 2013) but at the same time CO emissions show a decrease of almost -100%. Malta responded to a question raised by the ERT that following the publication of the fuel survey conducted for different economic sectors, which is expected to be published by next November, the residential consumption could be estimated and the time series for this sector will be updated. The ERT recommends Malta to update the time series and to revise CO estimates from NFR category 1A4bi to the next submission.

Category issue 4: 1.A.2.gviii Stationary combustion in manufacturing industries and construction – NO_x, PAH

68. NFR 1A2gviii is a key category for NO_x, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene and Malta has calculated the emissions using a Tier 1 methodology. The ERT encourages Malta to apply a higher Tier methodology according to the 2016 EMEP/EEA Guidebook as emissions from all key categories should be calculated using Tier 2 or higher tier methods.

Category issue 5: 1.A.2.f Stationary combustion in manufacturing industries and construction: Non-metallic minerals – All pollutants except NH_3, HCB, PCBs

69. The ERT identified that Malta reports until 2014 for all pollutants “NO” for NFR category 1A2f, while from 2014 onwards for some pollutants the notation key “IE” (included elsewhere) is reported. In Table 3 of the IIR it is stated that emissions are included under NFR category 1A2gviii. No further description can be found in the IIR on why emissions before 2014 are not included under NFR 1A2gviii. Malta responded to a question raised by the ERT that the next survey will collect data for 2014, 2015 and 2016 and will for the first time include information by 2 digit NACE codes, so that it will be possible to estimate what was consumed by the different NFR sectors making up NFR category 1A2. Hence, this sector will be updated accordingly. The ERT recommends Malta to correct the activity data and to use the notation keys consistently.

Category issue 6: 1.A.4.c.i Agriculture/Forestry/Fishing: Stationary – All pollutants

70. The ERT noted that Malta reports all pollutants from this sector for the years 2014 and 2015 as not occurring (“NO”). Malta responded to a question raised by the ERT on the issue that in 2014 and 2015 this data was included under NFR 1A4cii instead of NFR 1A4ci as previously reported. The outcome of the new fuel survey which will include data based on two digit NACE codes will provide enough information to estimate emissions to clearly differentiate between the two NFR codes. Hence an update is to be expected for the submission based on the results of the new survey. The ERT recommends Malta to correct the activity data and to improve the time series consistency in this category.

Category issue 7: 1.A.1.a Electricity and Heat Production – CO

71. During the review the ERT noted that CO emissions from NFR category 1A1a show time series inconsistencies, e.g. an increase of +123% in CO emissions between 2012 and 2013 although activity data shows a decrease in the same period of time. Malta has indicated that a mistake was discovered in the EF used in 2013 and provided corrected estimates. The ERT encourages Malta to provide information on the methodology in its IIR to increase the transparency and recommends Malta to apply the correct emission factor to ensure time series consistency in its future submission.

Category issue 8: 1.A.1.a Electricity and Heat Production – HMs

72. Malta indicates in the IIR (p. 20) that emissions of As, Cr and Cu from NFR category 1A1a are included in the reported Pb emissions under NFR 1A1a and therefore the notation key “IE” is applied. Malta responded to a question raised by the ERT that until 2011 emission factors for the different heavy metals were applied. From 2012 onwards the results of in stack monitoring were used and these heavy metals are reported together. The ERT notes that it is not in line with the 2016 EMEP/EEA Guidebook to include As, Cr and Cu emissions under Pb emissions and therefore strongly recommends Malta to calculate and report emissions for each pollutant separately in future submissions.

73. Malta indicated in the IIR (p. 21) that emissions of thallium from NFR category 1A1a are included in reported cadmium emissions under NFR 1A1a. Malta responded to a question raised by the ERT that until 2011 emission factors for the different heavy metals were applied and the metals were reported separately. From 2012 onwards the results of stack monitoring were used and that therefore these heavy metals are reported together. The ERT notes that it is not in line with the Reporting Guidelines to report the sum of the emissions from different pollutants as one value and therefore recommends Malta to report emissions for each pollutant separately in future submissions. The ERT also strongly encourages Malta to inform on the checks that are carried out with data reported by the plants and used in the inventory in the IIR.

Category issue 8: 1.A.1.a Electricity and Heat Production – BC

74. Malta describes in its IIR that BC emissions from NFR 1A1a are calculated with a Tier 2 methodology. To a question raised by the ERT on more detailed information of the methodology Malta stated that the emission factors vary on the relative usage of the HFO fired boilers (EF is 5.6% of $PM_{2.5}$), the gas diesel oil fired CCGTs (EF is 33.5% of $PM_{2.5}$) and from 2013 onwards the CI engines running on both HFO and GDO, which replaced some of the HFO fired boilers. For the CI engines a factor was derived using a weighted average for the Tier 1 factor for both HFO and GDO. The party also stated that this issue will have to be extensively investigated. After a follow up question to clarify if the submitted data is correct or if a revision of estimation is planned, Malta provided revised estimates for BC emissions from NFR 1A1a applying an emission factor of 5.6% for the whole time series. The ERT recommends Malta to develop a more comprehensive methodology for applying different emission factors for various types of boilers as mentioned by Malta, and to include the recalculated BC emissions in the next submission.

Category issue 9: 1.A.1.a Electricity and Heat Production – NO_x, Activity Data

75. The ERT noted that Malta is not reporting values for NO_x emissions in 2008 but an empty cell in the NFR template. The ERT recommends Malta to provide the missing value in future submissions to increase the time series consistency.

76. During the review the ERT noted that Malta is reporting activity data for NFR 1A1 in 2011 as not applicable ("NA"). The ERT encourages Malta to provide activity data for the whole time series to ensure the review of the time series consistency and to increase the transparency of the inventory.

Category issue 10: 1.B.2.b Fugitive emissions from natural gas – all pollutants

77. The ERT noted that Malta reports emissions from NFR 1B2b as not estimated ("NE"). Malta replied to the question raised by the ERT that default emission factors from the 2016 EMEP/EEA Guidebook cannot be applied because in Malta only gas bottling takes place and there are no emission factors available for that activity in the Guidebook. The ERT encourages Malta to develop methodologies and to collect data to be able to estimate these emissions.

TRANSPORT

Review Scope

Pollutants Reviewed		All		
Years		1990 – 2015		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A2gvii	Mobile Combustion in manufacturing industries and construction	X		X
1A3ai(i)	International aviation LTO (civil)	X		X
1A3ai(ii)	International aviation cruise (civil)	X		X
1A3aii(i)	Domestic aviation LTO (civil)	X		X
1A3aii(ii)	Domestic aviation cruise (civil)	X		X
1A3bi	Road transport: Passenger cars	X		X
1A3bii	Road transport: Light duty vehicles	X		X
1A3biii	Road transport: Heavy duty vehicles and buses	X		X
1A3biv	Road transport: Mopeds & motorcycles	X		X
1A3bv	Road transport: Gasoline evaporation	X		X
1A3bvi	Road transport: Automobile tyre and brake wear	X		X
1A3bvii	Road transport: Automobile road abrasion	X		X
1A3c	Railways	X		X
1A3di(ii)	International inland waterways	X		X
1A3dii	National navigation (shipping)	X		X
1A4aii	Commercial/institutional: Mobile	X		X
1A4bii	Residential: Household and gardening (mobile)	X		X
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	X		X
1A4ciii	Agriculture/Forestry/Fishing: National fishing	X		X
1A5b	Other, Mobile (including military, land based and recreational boats)	X		X
1A3di(i)	International maritime navigation	X		X
1A3	Transport (fuel used)	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

78. The ERT recommends Malta to improve the transparency of the inventory in the transport sector, in particular the details of the trends of subsectors regardingapplied methodology, data, parameters and emission factors used, and to provide references to the data sources. In particular any changes in methodology should be adequately documented in the IIR, such as the implementation of COPERT 5, for the years 2014 and 2015. The ERT also recommends Malta to justify the use and choice of notation keys.

79. Regarding the estimation of NMVOC evaporative emissions from road transport (NFR 1A3bv), the Party reports “NE” for the entire time series. To the question of the ERT on the issue Malta answered that emissions from gasoline evaporation were indeed included in the NMVOC total. The ERT notes that in such a case the correct notation key would be “IE” instead of “NE”, and information of where the emissions are included should be provided in the IIR. The ERT recommends Malta to report NMVOC evaporative emissions from road transport separately in the appropriate NFR category 1A3bv and strongly encourages Malta to transparently document the recalculation in the IIR.

80. The ERT noted that the documentation of methods used over the years is not transparently presented in the IIR, and therefore strongly encourages Malta to document the calculation of all years in a comprehensive and transparent way in the IIR.

81. The ERT also strongly encourages Malta to document all recalculations in a transparent way in the IIR.

Completeness

82. Malta reports emissions since 2000. The ERT noted missing values in the time series for air pollutants for which Tier 1 default emission factors are available in the Guidebook. The ERT recommends Malta to complete the time series since 1990 according to the methodology provided in the 2016 EMEP/EEA Guidebook for the next submission.

Consistency including recalculation and time series

83. The ERT noted significant inconsistencies in the time series of emissions regarding the use of notation keys and methods used to calculate emissions over the years. In particular, the inconsistencies relate to the sharp decline of emissions since 2014 regarding aviation and road transport which are not consistent with the trend of activity data and implied emission factors. According to the IIR the calculation of 2014 and 2015 road transport emissions was performed using the COPERT 5 model (Tier 3) and for previous years a customised Tier 2 methodology was applied. The ERT strongly recommends Malta to verify the submitted data for 2014 and 2015 and to consequently revise and update the time series applying methodologies provided in the 2016 EMEP/EEA Guidebook and to transparently document the recalculation in the IIR of the next submission. The ERT strongly recommends Malta to also harmonize the use of the notation keys for the entire transport sector or the next submission.

84. The ERT noted that particulate matter emission estimations show high heterogeneity regarding the completeness and consistency issues. For instance the ratios of PM_{10}/ $PM_{2.5}$ are 1.2, 1.1 and 0.8 for NFRs 1A3bii, 1A3biii and 1A3biv respectively in 2005 while the ratio should be 1.0 as the coarse fraction ($PM_{2.5}$-PM_{10}) is negligible in vehicle exhaust. Inconsistencies also can also be seen for non-exhaust emissions concerning the distribution of the mass fraction of TSP over

different particle size classes. The ERT recommends Malta to check the calculations using the Guidebook's default methods for the next submission.

85. The ERT also noted that zero SO_2 emissions have been reported in the NFR tables under sectors 1A3bi-iv for 2014 and 2015 and that unexplained variations are also detected in liquid fuel consumption. For NFR 1A3bii the increase is about 825% between 2010 and 2011, while liquid fuel consumption has dropped by 53% between 2010 and 2011 for NFR 1A3biii. The ERT recommends Malta to check the calculations using the Guidebook and to provide transparent documentation in the IIR.

Comparability

86. The ERT notes that the transport sector inventory is not fully comparable with other reporting Parties due to the inconsistent use of emission calculation methodologies and the allocation of emissions under the NFR categories. The ERT therefore strongly recommends Malta to harmonize the methodologies applied over the years according to the Guidebook, and also to a correct the allocation of data according to the Reporting Guidelines.

87. The ERT noted inconsistencies in the POP emissions time series. In the IIR Malta states that POP emissions are included in the NMVOC emissions total. The ERT strongly recommends Malta to provide the emissions time series separately for each of the different POP compounds as well as for NMVOC compounds according to the definitions of pollutants in the Reporting Guidelines and to apply the methodologies provided in the latest version of the Guidebook.

Accuracy and uncertainties

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

89. The Party reports in the IIR to have applied some quality checks for the road transport sector. The ERT encourages the Party to fully implement transport sector specific OA/QC procedures and to provide transparent documentation of the QA/QC procedures and their results in the next IIR.

Improvement

90. During the review Malta replied that it is planing the update of the emissions time series for the transport sector inventory. The ERT welcomes this and recommends the Party to implement the planned improvements for the entire time series for the next submission to improve the transparency, consistency, comparability, completeness, and accuracy of the inventory.

Potential Technical Corrections

91. The ERT noted inconsistencies in the reported emissions time series and in the use of notation keys, in particular a sharp decline of emissions since 2014, in

particular for aviation and road transport, not consistent with the trend of activity data and implied emission factors.

92. The ERT noted that Malta has used different versions of the Guidebook to calculate emissions from NFR 1A3b in the time series leading to inconsistencies in reported emission values. The ERT also noted that emissions for all pollutants have not been estimated, although Tier 1 default emission factors are available in the Guidebook. According to the IIR, road transport emissions in 2014 and 2015 were calculated using the COPERT 5 model (Tier 3), and for the previous years, a customised Tier 2 methodology was applied. As response to the questions of the ERT about the inconsistencies, the Party supplied results from the COPERT model for the years 2014 and 2015 for all pollutants, which showed indeed differences in respect to the submitted values.

93. The ERT noted that NMVOC emissions from NFR 1A3bv road transport: gasoline evaporation were not reported, although in the IIR it is stated that the COPERT model was used to estimate emissions and the COPERT model output also includes the evaporative share of total NMVOC emissions. The ERT strongly recommends Malta to review and recalculate the road transport sector emissions time series using the COPERT model. In addition, the ERT encourages Malta to include documentation of the calculations in the IIR.

94. Malta did not provide revised estimates due to the restricted availability of resources to update the estimates. The ERT therefore prepared potential technical corrections for NO_x, NMVOC, SO_x, NH_3 and $PM_{2.5}$ emissions from NFRs 1A3bi-v for 2005, 2010 and 2015 in cooperation with the Technical Expert Review Team (TERT) for the EU In-depth NEC Emission Inventory Technical Review.

95. The ERT strongly recommends Malta to verify the data submitted for 2014 and 2015 and to consequently revise and update the historical time series by applying methodologies provided in the latest version of the EMEP/EEA Guidebook, and strongly encourages Malta to transparently document the recalculation in the IIR, for the next submission.

96. The technical corrections, which are aimed to provide an indication to Malta on likely emission trends and the level of emissions, but should not be taken as an endorsement as a method for future use by the Party, are included in Annex 1 of the review report.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.3.b Road Transport: NMVOC, POPs and Particle emissions

97. According to the IIR emissions of POP compounds were included in the NMVOC emission values. In addition the ERT noted that the emissions time series is inconsistent. The ERT strongly recommends Malta to update and harmonize the

calculation of POP and NMVOC emissions and to report NMVOC and POP emissions separately.

98. The ERT noted that the particulate matter emission estimations show significant inconsistencies regarding the $PM_{10}/PM_{2.5}$ ratios over the years. The ERT strongly recommends Malta to review and recalculate the emissions and to include documentation of the calculation in the IIR of the next submission.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} and $PM_{2.5}$		
Years		1990 – 2015 + (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2A1	Cement production	X		X
2A2	Lime production		X	
2A3	Glass production	X		X
2A5a	Quarrying and mining of minerals other than coal	X		X
2A5b	Construction and demolition	X		X
2A5c	Storage, handling and transport of mineral products		X	
2A6	Other mineral products		X	
2B1	Ammonia production		X	
2B2	Nitric acid production		X	
2B3	Adipic acid production		X	
2B5	Carbide production		X	
2B6	Titanium dioxide production		X	
2B7	Soda ash production		X	
2B10a	Chemical industry: Other		X	
2B10b	Storage, handling and transport of chemical products	X		X
2C1	Iron and steel production	X		X
2C2	Ferroalloys production	X		X
2C3	Aluminium production	X		X
2C4	Magnesium production	X		X
2C5	Lead production	X		X
2C6	Zinc production	X		X
2C7a	Copper production	X		X
2C7b	Nickel production	X		X
2C7c	Other metal production	X		X
2C7d	Storage, handling and transport of metal products	X		X
2D3b	Road paving with asphalt	X		X
2D3c	Asphalt roofing	X		X
2H1	Pulp and paper industry		X	
2H2	Food and beverages industry	X		
2H3	Other industrial processes		X	
2I	Wood processing		X	
2J	Production of POPs		X	
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)		X	
2L	Other production, consumption, storage, transportation or handling of bulk products		X	
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

99. Malta has documented the calculation methodologies only for NFR 2H2 food and beverages industry. However, the ERT recommends that Malta provides more detailed method descriptions as indicated in the relevant sections below.

100. The ERT encourages Malta to include information on industrial sources in the IIR, even if no emissions occur.

Completeness

101. The ERT considers that some sources may be missing from the industrial processes sector inventory and also that other pollutants are likely to be emitted from the sources currently included in the inventory. Specific details are given in the sections below. During the review week, Malta responded to some specific questions regarding some missing estimates and explained the reason to be the lack of resources. The ERT recommends that Malta makes more resources available in order to calculate all emissions from the industrial processes sector.

102. As explained in previous sections of this report, and as was also stated in the 2012 CLRTAP Stage 3 in-depth Review Report, Malta has estimated emissions only from the year 2000 onwards. The ERT recommends that Malta estimates emissions also for the years 1990-1999, and preferably from 1980 onwards.

Consistency including recalculation and time series

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

Comparability

104. Malta provides no other explanation on the methods used to calculate emissions than that for NFR 2H2 both default and country specific methods are used. The ERT strongly recommends that Malta provides more detailed information on country specific methods (see the chapters below). However, in general, the inventory is comparable to those of other countries.

Accuracy and uncertainties

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

106. The ERT notes that developing a QA/QC system is still under development and that Malta 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

107. Malta indicated that they are considering to work on improvements for the industrial processes sector. The ERT commends Malta for this development.

Potential Technical Corrections

108. There are no potential technical corrections for the inventory of the industrial processes sector.

Sub-Sector Specific Recommendations

Category issue 1: 2.A.1 Cement production

109. In Table 2 of the IIR illustrating sources reported as Not Estimated ("NE"), Malta states that no activity data is available. In their latest NIR submission, it is stated that this sector does not exist in Malta, and that therefore emissions from this sector are not applicable. During the review week, Malta replied that the notation key "NO" should be reported for cement production and that this will be corrected. The ERT recommends Malta to correct the notation key for the next submission and encourages Malta to document the years when cement production has not occurred in Malta in the IIR.

Category issue 2: 2.A.3 Glass Production

110. In Table 2 of the IIR illustrating sources reported as Not Estimated ("NE"), the Party states that no activity data is available for the source. In the last NIR submission, it is stated that this sector does not exist in Malta, and that therefore emissions from this sector are not applicable. During the review week, Malta confirmed that glass is imported, but that there is some artisanal glass blowing in Malta. This activity is a minor emitter, but the emissions from this source should be accounted for. The ERT recommends Malta to gather activity data and to include emissions from glass blowing in the inventory under this NFR.

Category issue 3: 2.A.5.a Quarrying and Mining of Minerals other than Coal

111. In Table 2 of the IIR illustrating sources reported as Not Estimated ("NE), Malta states that no activity data is available for quarrying and mining of minerals other than coal. A search on the internet showed that some statistical data on quarrying of minerals in Malta is available (e.g. by the USGS), thus a Tier 1 estimate should be possible, following the methods described in the 2016 EMEP/EEA Guidebook. The ERT made a quick calculation which showed that $PM_{2.5}$ emissions from this source to be below the 2% threshold of the national total $PM_{2.5}$ emissions, but to equal 33% of the current incomplete information provided in the IIR of the national total TSP emissions, and to 25% of national total PM_{10} emissions. During the review week, Malta stated that there are no resources available to estimate those emissions. The ERT recommends Malta to make sure enough resources are available to calculate the emissions.

Category issue 4: 2.A.5.b Construction and Demolition

112. In Table 2 of the IIR illustrating sources reported as Not Estimated ("NE"), Malta states that no activity data is available for construction and demolition activities. In the 2016 EMEP/EEA Guidebook, a Tier 1 method, based on statistical parameters is available. During the review week Malta stated that this sector has not been tackled since it is not considered an area of main concerns, and that estimating emissions from this sector remains a task for future work. The ERT commends Malta on this endeavour, and recommends Malta to make resources available in order to calculate emissions from this sector.

Category issue 5: 2.B.10.b Storage, handling and transport of chemical products

113. According to the IIR NMVOC emissions are based on the number of ships, calculated as a scale-down from the emissions in the UK. The data has not been updated since 2004, no emission factors are given, and no background on the methodology is provided. The ERT recommends Malta to update the emissions and encourages Malta to provide more information in the IIR on the basis for the methodology.

Category issue 6: 2.C.2-2.C.7

114. In Table 2 of the IIR illustrating sources reported as Not Estimated ("NE"), the Party states that no emission factors for other pollutants except for TSP, PM_{10}, $PM_{2.5}$ were available and that activity data neither is available. In the NFR tables emissions from ferroalloys, aluminium, magnesium, lead, zinc, copper, nickel and other metal production are reported as Not Occurring ("NO"), except for black carbon (BC), for which the notation key "NE" is reported. In Malta's NIR it is stated that no metal production is occurring in Malta. The ERT recommends that Malta changes the notation key to "NO" for all activities that do not occur in Malta.

Category issue 7: 2.D.3.b Road Paving with Asphalt

115. In Table 2 of the IIR illustrating sources that are reported as Not Estimated ("NE"), Malta states that no emission data is available for this source. However, in Malta's NIR, emissions estimated on the basis of asphalt production and an emission factor from the 2013 EMEP/EEA Guidebook, are provided. The ERT recommends Malta to correct the information in Table 2 and to calculate and report the emissions. The ERT also encourages Malta to provide a description of the method used in the IIR.

Category issue 8: 2.D.3.c Asphalt Roofing

116. In Table 2 of the IIR illustrating sources reported as Not Estimated ("NE"), Malta states that no emission factor is available. However, the 2016 EMEP/EEA Guidebook provides an NMVOC emission factor for this source. The ERT recommends Malta to estimate and report NMVOC emissions from asphalt roofing in the next submission.

SOLVENTS

Review Scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		2000 – 2015		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2D3a	Domestic solvent use including fungicides		NE	X
2D3d	Coating applications		NE	X
2D3e	Degreasing		NO	X
2D3f	Dry cleaning		IE	X
2D3g	Chemical products		IE	X
2D3h	Printing		IE	X
2D3i	Other solvent use		IE	X
2G	Other product use	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

117. Malta uses notation keys in a number of areas in the reporting tables. The ERT recommends Malta to calculate and report all relevant emissions from source categories in the scope of the solvent sector.

118. The ERT noted that Chapter 4 of the IIR 2017 relating to the solvent sector doesn't contain any information about the methodology, activity data, emission factors and assumptions used for the calculations. The ERT encourages Malta to provide the method descriptions as indicated in the relevant sections below.

119. Malta reports emissions from four source categories (NFRs 2D3f dry cleaning, 2D3g chemical products, 2D3h printing and 2D3i other solvent use) in the scope of one category NFR 2G other product use. During the review, Malta responded that NFR 2 emissions have not been updated for many years because the priority was given to other areas. For a better transparency, the ERT recommends that Malta gives sector NFR 2 priority, specifically for emissions from solvent use, in order to estimate and report all emissions in the correct source category.

120. The ERT found that the documentation of methods used to estimate emissions is not transparent and that the use of notation keys is not always correct, as indicated in the sub-sector specific recommendations.

Completeness

121. Malta has not reported emissions for solvent use sources for the period 1990 – 1999. In the IIR information is provided on a general level for one category (NFR 2G). According to the IIR NMVOC emissions were last updated with 2010 data. The ERT

considers the solvent sector not to be complete and notes that the methodology descriptions for key sources are not detailed enough.

122. The ERT noted that no activity data is presented in the IIR 2017 and in the NFR tables. Malta reports activity data only for NFR 2G. The ERT strongly encourages Malta to report all relevant activity data instead of using the notation keys “NE” and “IE”.

123. Malta estimates only NMVOC emissions from solvent use activities. The ERT recommends Malta to calculate emissions for all pollutants for which methodologies are available in the 2016 EMEP/EEA Guidebook, as explained in the chapters below.

Consistency including recalculation and time series

124. Malta has provided no information in the IIR on whether recalculations were performed for source categories in the scope of the solvent Use sector. The ERT recommends Malta to document the justifications for recalculations as well as the methodologies used to calculate emissions and to quantify their impact on emission levels in the next submission.

Comparability

125. The ERT noted that the solvent sector inventory is not comparable with the inventories of other reporting Parties because the solvent sector chapter of Malta’s IIR 2015 has not been updated for a long time and there is no information on the activity data, emission factors used and assumptions made in the estimation of emissions. The ERT strongly encourages Malta to update the chapter regarding the solvent sector and to include clear and detailed information on methods used so that the ERT can assess if the methods used are comparable to other reporting Parties.

126. The ERT noted that Malta has not allocated emissions under the relevant reporting categories and the inventory is thus not comparable with other reporting Parties.

Accuracy and uncertainties

127. The ERT noted that neither a quantitative nor a qualitative uncertainty analysis has been provided in the IIR. The ERT recommends Malta to carry out an uncertainty analysis for the solvent sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

128. The ERT noted that information on QA/QC checks for the solvent sector inventory has not been included in the IIR. The ERT strongly encourages Malta to include some basic QA/QC checks for the solvent sector in the inventory.

Improvement

129. The ERT noted that for the solvent sector there is no inventory improvement plan reported in the IIR 2017. The ERT recommends Malta to develop an inventory improvement plan based on the findings included in this report and encourages Malta to include information on this improvement plan in the next IIR submission.

Potential Technical Corrections

130. There are no potential technical corrections for Malta under the solvent use categories.

Sub-Sector Specific Recommendations

Category issue 1: 2.D.3.a Domestic solvent use including fungicides – NMVOC

131. In the NFR tables Malta reports the notation key “NE” for NMVOC emissions from the NFR category 2D3a domestic solvent use including fungicides. During the review week the ERT asked Malta to provide revised estimates for the missing NMVOC emissions using the Tier 1 methodology based on population from the Guidebook. Malta responded that they already estimate these emissions and that they are included under NFR 2G, and that the emissions are estimated assuming that all solvents and solvent containing products are imported to Malta, and that all products are used during the year of import and all NMVOCs in the products evaporate. The ERT recommends Malta to revise the notation key “NE” in the NFR tables (1990-2015) to “IE” and encourages Malta to document where the emissions are included in NFR 2G in the IIR of the next submission.

Category issue 2: 2.D.3.d Coating applications – NMVOC

132. In the NFR tables Malta uses the notation key “NE” for the NFR category 2D3d coating applications . During the review week Malta informed that these emissions already are estimated and included under NFR 2G provided and that all solvents and solvent containing products are imported to Malta and that it is assumed that all products are used during the year of import and that all NMVOCs in the products evaporate. The ERT recommend Malta to revise the notation key “NE” in the NFR tables (1990-2015) to “IE” and to document where the emissions are included in the NFR tables, in the next IIR submission.

Category issue 3: 2.D.3.f Dry Cleaning, 2.D.3.g Chemical products, 2.D.3.h Printing and 2.D.3.i Other solvent use – NMVOC

133. Malta uses the notation key “IE” for NMVOC emissions from NFR categories 2D3f dry cleaning, 2D3g chemical products, 2D3h printing and 2D3i other solvent use instead of reporting emissions. During the review week Malta informed that these emissions are included under NFR 2G. As the IIR does not provide information on where the emissions are included, the ERT recommends to document the allocation of emissions and to provide information on the methods used to quantify the emissions in the IIR.

Category issue 4: 2.G Other product use

134. During the review the ERT noticed that NFR 2G other product use is a key category for NMVOC emissions in Malta for all years (2000-2015) and that in accordance with the EMEP/EEA guidebook, a Tier 2 method should be used for

calculating emissions from key categories. The ERT noted that the methodology for calculation of NMVOC emissions is not clear from the IIR and asked Malta for an explanation. Malta answered that they have a strong suspicion that this is an overestimate since the calculation is based on the amounts of product falling under certain HS[4] codes, which are imported to Malta and assuming that all products are used during the year of import and that all NMVOCs in the product evaporate. Malta also explained that they have not clarified and corrected this, because it would result in a major dip in the time series and that currently they have no data, which could substitute this. The ERT notes that the methodology does not follow the Guidebook and strongly recommends Malta to collect data[5] and to apply the Tier 2 methodology according to Guidebook for the next submission.

135. During the review the ERT noticed an inconsistency in the IIR regarding the high contribution of NFR 2G to the National total of NMVOC emissions and asked Malta to provide an explanation. Malta responded that the emissions reported under NFR 2G are based on the statistics for import of solvent or solvent preparations and have not been updated for many years. The ERT recommends Malta to update all calculations and figures, and the category description in the IIR for the next submission.

136. Malta reports NMVOC emissions only under NFR 2G, but does not provide explanations on the sources of the emissions. The ERT encourages Malta to provide information on sources contributing to the emissions reported under NFR 2G. The ERT considers that at least the following activities exist in Malta: SNAP 060404 fat, edible and non-edible oil extraction, SNAP 060405 application of glues and adhesives, SNAP 060406 preservation of wood, SNAP 060601 use of fireworks, SNAP 060602 use of tobacco, SNAP 060603 use of shoes that exist in almost all countries. According to the Guidebook these activities are sources of NMVOC emissions, while some of them can also be sources of TSP, PM_{10}, $PM_{2.5}$, PAH, PCDD/F, SO_2, CO, NO_x and HM emissions. The ERT recommends Malta to collect data and to use the methodologies provided in the Guidebook to calculate and report all relevant emissions for these activities.

137. The ERT also recommends Malta to check the mapping table linking different reporting codes and categories, available on the CEIP homepage (http://www.ceip.at/ms/ceip_home1/ceip_home/reporting_instructions/) to connect SNAP codes and NFR codes and to divide activities between NFR categories 2D3i and 2G. The ERT notes that these efforts will improve the comparability, consistency and transparency of the inventory.

[4] No information from Malta on what "HS" code stands for.
[5] Data to be collected on the quantities of oil extracted and seeds used. the quantities of adhesives and glues (or solvents in the solvent-based adhesives and glues), the mass production or consumption by industry (for solvent-borne and creosote wood preservatives), or about the mass/volume of wood treated with solvent-borne and creosote wood preservatives, use of fireworks, tobacco combustion and shoes sold and imported.

AGRICULTURE

Review Scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990 – 2015 + (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommen-dation Provided**
3B1a	Dairy cattle	X		X
3B1b	Non-dairy cattle	X		X
3B2	Sheep	X		X
3B3	Swine	X		X
3B4a	Buffalo	X		X
3B4d	Goats	X		X
3B4e	Horses	X		X
3B4f	Mules and asses	X		X
3B4gi	Laying hens	X		X
3B4gii	Broilers	X		X
3B4giii	Turkeys	X		X
3B4giv	Other poultry	X		X
3B4h	Other animals	X		X
3Da1	Inorganic N-fertilizers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	X		X
3Da2b	Sewage sludge applied to soils	X		X
3Da2c	Other organic fertilisers applied to soils (including compost)	X		X
3Da3	Urine and dung deposited by grazing animals	X		X
3Da4	Crop residues applied to soils			
3Db	Indirect emissions from managed soils			
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	X		X
3Dd	Off-farm storage, handling and transport of bulk agricultural products			
3De	Cultivated crops	X		X
3Df	Use of pesticides			
3F	Field burning of agricultural residues	X		X
3I	Agriculture other			
11A	Volcanoes	X		X
11B	Forest fires	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

138. The ERT noted that the inventory covers emissions of NH_3, $PM_{2.5}$, PM_{10} and TSP from the most important livestock categories and NH_3 emissions from the application of inorganic N-fertilisers for the years 2000-2015. NO_x and NMVOC emissions are not covered by the inventory. During the review Malta corrected the emission estimates only for the latest reporting year 2015 but not for the whole time series. The ERT recommends that Malta improves the completeness of the inventory

by including estimates for the full time series for all pollutants for which the 2016 EMEP/EEA Guidebook provides a methodology.

Transparency

139. The ERT noted that the methods used to estimate emissions are not transparently documented in the IIR, more specifically the applied methodologies, emission factors and activity data for the subsectors. The ERT strongly encourages Malta to improve the transparency of the inventory by including more detailed documentation in the IIR on the applied methodologies with clear references to emission factors and also by including activity data time series in the IIR of the next submission.

Completeness

140. The ERT noted that Malta has not provided a full time series of emission estimates for the period 1990-2015. Emissions are reported only for the years 2000-2015. During the review Malta explained that it is difficult to acquire activity data, dating back until 1990 due to limited resources. The ERT notes that Malta has reported livestock numbers and N amounts in inorganic N-fertilizers under the UNFCCC back until 1990. The ERT reiterates the recommendation from the 2012 CLRTAP Stage 3 In-depth Review to collect the activity data and to calculate emission estimates for all years in its next submission by using the approaches outlined in the 2016 EMEP/EEA Guidebook.

141. The ERT noted that Malta does not include NMVOC and NO_x emissions in the inventory and gives recommendations on these under the sub-sector specific recommendations below.

Consistency including recalculation and time series

142. The ERT identified a number of discrepancies between the 2015 data and the previous years (e.g. significant change of IEFs, differences in reported emission sources and changes of notation keys across the time series). Malta reported new emission estimates, revised some methodologies and EFs as well as updated notation keys for 2015 only, but not for the previous years due to limited resources as explained by the Party during the review. Malta also informed the ERT that the improvement of this lack of consistency across the time series is planned for the future. The ERT welcomes this plan and strongly recommends Malta to undertake efforts to update the whole time series accordingly for the next submission although the ERT is aware of the limited resources in the country.

143. The ERT noted that Malta does not use the same animal livestock numbers for reporting under the UNECE and the UNFCCC. During the review Malta explained that the numbers for cattle reported under the UNFCCC are the correct ones and informed the ERT that this will be corrected. The ERT recommends Malta to check all of the activity data reported under UNECE with the activity data reported under the UNFCCC for the whole time series and to implement sector-specific QA/QC procedures for future submissions.

Comparability

144. The ERT noted that the methods used in the inventory are based on the 2013 EMEP/EEA Guidebook and that the reported data between 2000 and 2015 are presented in the 2014 NFR format. The ERT recommends Malta to apply the methods presented in the latest version of the EMEP/EEA Guidebook (2016), and the latest version of the reporting templates (NFR 2014).

Accuracy and uncertainties

145. The ERT noticed that Malta reports in its IIR that emissions from NFR 3B manure management are estimated according to the Tier 1 methodology in the 2013 EMEP/EEA Guidebook. However, the ERT noted that some values differ from the defaults and to a question raised on this issue, an error for horses was detected due to the use of wrong activity data reported in the NFR. The ERT strongly recommends Malta to check the livestock numbers and the EFs applied for the whole time series.

146. Although the Party estimates that 99% of NH_3 emissions arise from agriculture and hence agriculture sub-sectors are key categories for NH_3 emissions, the emissions are calculated using Tier 1 methods. During the review Malta explained that there are no plans for the future to move to a Tier 2 methodology due to lack of resources. The ERT is aware of the limited resources in the country, however, encourages Malta to undertake efforts for the future to gather the required activity data in order to move to Tier 2 methods, at least for all key categories.

147. In the current submission no uncertainty analysis has been undertaken. During the review week Malta explained that there are several areas for improvements but as first priority the update of the entire time series will be considered. However, the ERT recommends Malta to undertake an uncertainty analysis for the agriculture sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data for future submissions.

148. In the current IIR no sector specific QA/QC checks are described. During the review week Malta explained that there are several areas for improvement but as first priority the update of the entire time series will be considered. The ERT further recommends Malta to implement sector specific OA/QC procedures and to include information on these checks and results in the IIR.

Improvement

149. Malta does not present information on planned improvements for the agriculture sector inventory in the IIR. The ERT encourages the Party to include information regarding the planned improvements for future submissions.

Potential Technical Corrections

150. The ERT noted that there are significant inconsistencies for the following sectors and pollutants:

a) NFR 3B manure management (NH_3, PMs): The time series is not consistent regarding IEFs and activity data. PM emissions are only partly estimated.

b) NFR 3Da2a animal manure applied to soils (NH_3): N applied to soils is not estimated.

151. The ERT calculated technical corrections for NFR *3B manure Management* for NH_3, and PMs according to the Tier 1 methodology from the 2016 EMEP/EEA Guidebook (EFs taken from table 3.2 and table 3.5). For NH_3 the Tier 1 Total NH_3 EFs have been applied including emissions from NFR 3Da2a animal manure applied to soils and NFR *3Da3 excreta deposited during grazin*g; separate emission factors for these source categories are also available in the 2016 EMEP/EEA Guidebook. The ERT strongly recommends Malta to review the proposed estimates and to include the estimates or to recalculate its inventory for the source categories and pollutants listed under paragraph 149 as well as to include the new information in the IIR.

152. The technical corrections are presented in Annex 1 of the review report.

Sub-Sector Specific Recommendations

Category issue 1: 3.B Manure management - NH_3 and PM

153. The ERT noted that the methodology description for NH_3 emissions from NFR 3B manure management is not transparently presented in the IIR and the application of NH_3 emission factors for some livestock categories is not clear as some values differ from the defaults. During the review Malta informed the ERT that there is an error in the activity data for horses in the NFR tables that resulted in a wrong IEF. The ERT strongly recommends that Malta checks all livestock numbers and the applied emission factors in order to correct the data for future submissions.

154. The ERT noted that NH_3 emissions are calculated using methods from the 2013 EMEP/EEA Guidebook, which is not the latest available methodology. The ERT recommends Malta to apply methods from the 2016 EMEP/EEA Guidebook.

155. Manure management subcategories (swine, non-dairy cattle, laying hens and dairy cattle) are key categories for NH_3 emissions and Malta estimates the emissions using Tier 1 methodologies. To the question by the ERT on the availability of information of the proportions of livestock sub-categories on different manure management systems in order to move at least to a Tier 2 approach for these key categories, Malta replied that there are no plans for the future to move to Tier 2 due to lack of resources. The ERT recommends Malta to undertake efforts for the future to gather the required information in order to move to Tier 2 methods at least for all key categories.

156. Malta reports emissions from NFR 3B4giii manure management - turkeys as “IE” for the years 2000-2014. For 2015 NH_3 emission values are calculated. During the review Malta explained that most of the turkeys are imported and poultry farms are essentially chicken farms. Malta also informed the ERT that obtaining livestock data for turkeys is difficult. The calculation of emissions from this source category for 2015 was a recent improvement and it is planned to extend the emission estimates across the whole time series. The ERT welcomes these plans and recommends that Malta undertakes further efforts to gather livestock data of turkeys for the years prior to 2015. In the case of data gaps due to non-availability of the activity data, at least the

splicing techniques according to the 2016 EMEP/EEA Guidebook, chapter 4 time series consistency, should be applied in order to form a consistent time series.

157. The ERT noted that Malta reports PM emissions for several livestock categories only for 2015. During the review week Malta explained that due to limited resources the inventory has been revised only for the year 2015 and that it is planned to update the whole time series for future submissions accordingly. The ERT welcomes these plans and strongly recommends Malta to improve its inventory and to include PM emission estimates for the whole time series in a consistent manner.

Category issue 2: 3.B Manure management - NO_x and NMVOC

158. The ERT notes that Malta does not report NO_x and NMVOC emissions from NFR 3B manure management. The ERT calculated a first estimate of these emissions according to the Tier 1 methodology from the 2016 EMEP/EEA Guidebook (EFs taken from table 3.3 and table 3.4). As no information on the feeding situation (silage feeding) is available, the ERT prepared a conservative estimate of NMVOC emissions by applying the EFs with silage feeding as proposal for a starting point for Malta in order to elaborate on its emission estimates for future submissions. The calculation files are attached to Annex 1 of the Review Report.

159. Regarding data needed for the estimation of NMVOC and NO_x emissions, Malta informed the ERT during the review that the Agriculture Department has already been consulted but no data on silage feeding is available at the moment. The ERT recommends Malta to gather information on silage feeding, at least based on expert judgement, in order to apply the Tier 1 methodology for NMVOC emissions from NFR 3B manure management. The ERT also reiterates the recommendation from the 2012 CLRTAP Stage 3 In-depth Review to include NMVOC and NO_x emissions for each of the source categories of the agriculture sector for which emission factors and methodological approaches are presented in the Guidebook.

Category issue 2: 3.D Agricultural Soils - NH_3, NO, NMVOC

160. Malta does not include estimates of NO_x emissions from NFR 3Da1 inorganic fertilizers in the inventory. The ERT strongly recommends Malta to include these estimates as emission factors and methodological approaches are available in the 2016 EMEP/EEA Guidebook.

161. Malta does not include NH_3 and NO_x emissions from NFR 3Da2a animal manure applied to soils although methodology and EFs are available in the 2016 EMEP/EEA Guidebook. For 2014 and prior years, this source category is reported as “NE” and for 2015 as “IE”. During the review week Malta explained that this is due to limited resources in the country. The ERT recommends Malta to include estimates of NH_3 and NO emissions according to the 2016 EMEP/EEA Guidebook for to the next submission.

162. According to the 2016 EMEP/EEA Guidebook methodologies and default EFs are available for calculating NH_3 and NO_x emissions from NFR 2Da2b sewage sludge application to agricultural soils. For 2014 and prior years NO_x is reported as “NA” and emission values are reported for NH_3, whereas for 2015 for both air pollutants the

notation key “NE” is used. In the IIR it is described that no official data exists on the amount of sewage sludge applied to soils and therefore the notation key “NO” was used. During the review week Malta explained that applying sewage sludge to soils is not usual as it is commonly landfilled. Malta plans to update the entire time series if resources are available. The ERT welcomes these plans and recommends Malta to investigate the situation in order to either use the correct notation keys or to provide the respective emission estimates, potentially under the waste sector. Furthermore the ERT recommends Malta to include appropriate descriptions of this source and documentation of the methods used in the IIR.

163. Emissions from NFR 3Da2c other organic fertilisers applied to soils are reported as “NE” in the NFR for 2014 and prior years and as “NO” for 2015. In the IIR it is described that no compost was produced in 2015. The ERT recommends Malta to investigate the situation for the previous years and either to provide the emission estimates or to use the correct notation key.

164. Malta reports emissions from NFR 3Da3 urine and dung deposited by grazing animals as “NO” with the exception of NMVOC emissions, which were reported as “NE”. During the review week Malta explained that no grazing takes place due to lack of pastures and therefore “NO” is the correct notation key for all pollutants across the whole time series. The ERT recommends Malta to investigate the situation carefully as around 1/3 of Malta´s total area is grassland according to the UNFCCC submission in 2017. The usage of the notation key “NO” should be supported at least by an expert judgement and this information should be included in the IIR.

165. Malta did not estimate NMVOC emissions from NFR 3De cultivated crops although methodology and EFs are available in the 2016 EMEP/EEA Guidebook. Malta explained that this is due to lack of resources and that there are several other areas to prioritize first. The ERT recommends Malta to include these emissions in the next submission.

Category issue 4: 3.F Field burning

166. NH_3 emission values from NFR 3F field burning of agricultural residues are reported for 2005 and 2010. In the IIR it is described that for 2015 this source category is reported as “NO” due to lack of data availability. For the other pollutants different notation keys are used across the years, e.g. for $PM_{2.5}$: “NA” for 2005, “NE” for 2010 and “NO” for 2015. During the review week Malta explained that waste is treated by a waste treatment facility and that farmers are allowed to burn green waste (twigs, branches etc.) on site as long as the amounts are < 1t. However, there is no activity data available. The ERT agrees with Malta that the correct notation key should be “NE” and hence recommends to change the notation keys accordingly for the next submission. The ERT also recommends Malta to undertake efforts for acquiring activity data for future submissions.

WASTE

Review Scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PMs, heavy metals and POPs		
Years		1990 – 2015 (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
5A	Solid waste disposal on land	X		X
5B1	Biological treatment of waste - Composting			
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	X		X
5C1a	Municipal waste incineration	X		
5C1bi	Industrial waste incineration	X		
5C1bii	Hazardous waste incineration	X		
5C1biii	Clinical waste incineration	X		
5C1biv	Sewage sludge incineration			
5C1bv	Cremation	X		X
5C1bvi	Other waste incineration			
5C2	Open burning of waste			
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	X		X
5D3	Other wastewater handling			
5E	Other waste	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes please indicate which have and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

167. The ERT commends Malta on the generally transparent overview of the waste sector in the inventory report.

Completeness

168. The ERT notes that Malta has reported emissions only for the period 2000-2015 and reiterates the recommendation from the 2012 CLRTAP Stage 3 in-depth review that Malta provides the whole time series in their next submission.

169. In response to a question on not reporting activity data (see sector specific recommendations, NFR 5A), Malta stated that this is indeed the case and should be corrected but that this requires time and resources. The ERT concludes from this statement that there are apparently insufficient resources available for the inventory team to comply with the guidance regarding the preparation and reporting of the emission inventory under the UNECE CLRTAP and the EU National Emission Ceilings Directive. The ERT recommends Malta to complete the complete time series for activity data.

170. The ERT recommends Malta to make use of alternative sources for obtaining activity data and to use logical reasoning in interpolating and extrapolating these data when there is no activity data available.

Consistency, including recalculation and time series

171. The ERT notes that in its responses to several questions by the ERT Malta added the remark that updating the entire time series is subject to availability of resources. The ERT recommends the Party to ensure sufficient resources for the inventory team to prepare and report the inventory according to the Reporting Guidelines of the UNECE CLRTAP and the EU National Emission Ceilings Directive, and to apply the methodology provided in the EMEP/EEA Guidebook.

172. In the 2012 CLRTAP Stage 3 in-depth review the ERT noted that Malta did not report any information on recalculations and for the 2017 inventory submission the ERT again notes that no information on recalculations is reported. The ERT reiterates the previous recommendation that the Party reports on recalculations in next submissions.

173. In the 2012 CLRTAP Stage 3 in-depth review the ERT noted that the time series of the EFs used to calculate emissions are not the same for every year. Regarding the 2017 submission the ERT notes this still seems to be the case for some sources. The ERT reiterates the recommendation that the Party reports consistent time series for all sources, or justifies reasons for inconsistencies in the IIR of the next submission.

174. The ERT notes that the use of notation keys is not always in line with the Reporting Guidelines. The ERT recommends Malta to conduct a complete assessment of the notation keys used and to correct these where necessary.

Comparability

175. The ERT notes that the IIR provides information on the methodology used to estimate emissions, but that hardly any information regarding the emission sources is given. The ERT notes that this makes it difficult to compare the inventory with the inventories of other Parties. The ERT encourages Malta to provide more elaborate source descriptions in the inventory report of the next submission.

Accuracy and uncertainties

176. In the 2012 CLRTAP Stage 3 in-depth review the ERT noted Malta had started to develop a QA/QC system and encouraged the Party to implement sector specific OA/QC procedures for the waste sector in the next submissions. The ERT notes that in the current inventory report no references are made towards having a QA/QC system in place or towards sector specific QA/QC procedures. The ERT encourages the Party to describe the QA/QC system in the IIR of the next submission and also to describe sector specific QA/QC procedures.

177. In the 2012 CLRTAP Stage 3 in-depth review the ERT noted that no uncertainty analysis was performed and the ERT encouraged the Party to undertake an uncertainty analysis in order to support the improvement process and to give an

indication on the reliability of the inventory data. The ERT notes that in the current submission the Party does not report on uncertainties. The ERT reiterates the previous recommendation to develop an uncertainty analyses and to report on the progress and results in the next submission.

Improvement

178. In the 2012 CLRTAP Stage 3 in-depth review the ERT found that there was no information on planned improvements for the waste sector and encouraged the Party to prepare an inventory improvement plan. The ERT notes that in the 2017 submission there is still no information of planned improvements reported in the waste sector. The ERT reiterates the previous recommendation to develop an inventory improvement plan for the waste sector in the next submission.

Potential Technical Corrections

179. The ERT noted that there is an underestimation of NMVOC for the whole time series from NFR 5A solid waste disposal on land. The ERT therefore proposes to the EMEP a technical correction (TC), which the ERT has calculated for the years 2005, 2010 and 2015. The ERT used methods provided in the 2016 EMEP/EEA Guidebook and as activity data the amount of landfilled municipal solid waste provided by the Party in the NFR-tables for 2010 and 2015, and for 2005 corresponding data from the Eurostat database.

180. The ERT presented the TC to Malta during the review and the Party responded to agree with this technical correction.

181. The ERT strongly recommends Malta to review the proposed estimates and to include the estimates or to recalculate its inventory for the source categories and pollutant listed under paragraph 178 as well as to include the new information in the IIR.

182. The technical corrections are presented in Annex 1 of the review report.

Sub-Sector Specific Recommendations

Category issue 1: 5.A Solid waste disposal on land – Particles

183. The ERT calculated TSP, PM_{10} and $PM_{2.5}$ emissions due to the missing particle emissions from the Party's inventory. The same activity data was used as for the technical correction of NMVOC emissions and EFs were taken from the 2016 EMEP/EEA Guidebook. As the difference to total national emissions for each of the particle size fractions is below 2% of the national total emissions of these particle emissions, the ERT did not propose technical corrections for these pollutants but recommends Malta to calculate and report the emissions in the next submission.

Category issue 2: 5.A Solid waste disposal on land – All pollutants

184. The ERT noted that Malta reports NH_3 emissions from solid waste disposal on land for the complete time series in the NFR tables. Furthermore, the ERT notes that

according to the Party Tier 2 methodologies from the 2016 EMEP/EEA Guidebook are used for the pollutants NMVOC, TSP, PM_{10} and $PM_{2.5}$. The Guidebook does not, however, present a Tier 2 methodology and the described pollutants are not reported in the NRF tables. In response to the question on the issue the Party stated that the reported NH_3 emissions for the whole time series are a mistake and that instead values for NH_3 the notation key "NA" should be reported. The Party furthermore stated, that the following emissions should have been reported: NMVOC (0.42 kt), TSP (1.2e-4 kt), PM_{10} (5.9e-5 kt) and $PM_{2.5}$ (9.03e-6 kt). The ERT recommends Malta to include these emissions in the next submission for the whole time series.

185. The ERT noted that NMVOC and particle emissions are underestimated and calculated technical corrections as presented under the chapter "Potential Technical Corrections".

186. To a question on the methodology used to estimate the above mentioned emissions Malta replied that also animal manure and digestate from biogas production of anaerobic treatment of municipal organic waste are landfilled. The ERT notes that landfilling of animal manure and digestate will lead to a different situation than normal manure management (reported under NFR 3B) and anaerobic digestion (to be reported under NFR 5B2), where only emissions of storage and transport on the farm or process plants are reported. The ERT notes that landfilling is expected to lead to additional emissions of NH_3 and NMVOCs. Therefore, the ERT recommends the Party to improve the inventory by considering the emissions coming from this special situation of landfilling animal manure and digestate.

187. The ERT noted that Malta does not report activity data from NFR 5A for the complete time series. In response to a question on this issue Malta stated that this is indeed the case and should be corrected but that this requires time and resources. The ERT encourages Malta to complete the activity data for the complete time series.

188. The ERT notes that Malta uses the Tier 1 methodology for this source and reports the notation key "NE" for particulate matter, priority heavy metals, additional heavy metals and POPs. However, the 2016 EMEP/EEA Guidebook (Chapter 5A, table 3-1) states that, with the exception for CO and Hg, the notation key "NA" should be used for these pollutants. The ERT recommends Malta to correct these for the whole time series in the next submission.

Category issue 3: 5.B.2 Anaerobic digestion at biogas facilities - All pollutants

189. The ERT notes that Malta uses a Tier 1 methodology for NH_3 emissions from this source. However, for most pollutants Malta reports the notation key "NA". The ERT notes that this is not in line with the notation keys provided in the Guidebook Table 3.1, and recommends the Party to correct these for the whole time series in the next submission.

190. Before 2015 NH_3 emissions from the source have been reported as "IE". In the IIR Malta provides the methodology for calculating emissions coming from anaerobic digestion for the year 2015 and states that "future submissions will consider an update of the entire time series based on the above methodology". The ERT commends the

Party for calculating emissions from this source and recommends that Malta calculates the emissions from this source consistent for the complete time series.

191. The ERT notes that in addition to describing the methodology used to calculate emissions, also information of the sector should be included to enable understanding the generation of emissions, as well as the activity data and the N-content used in the calculations. The ERT encourages Malta to include this information in the IIR of the next submission.

Category issue 4: 5.C.1 Waste incineration - All pollutants

192. The ERT notes that Malta has since 2011 included emissions from NFRs 5C1a, 5C1bi and 5C1biii under NFR 5C1bv. Furthermore, the ERT notes that before the year 2011 emissions from these NFR sectors were reported as "NO" or also were included somewhere else than under NFR 5C1bv, as this sector was reported as "IE". The ERT notes that emissions should be reported consistent over the whole time series. To a question on this Malta responded that "An update of the entire time series is being considered for future submissions". The ERT recommends that an update of the whole time series is made and reported in the next submission using the correct allocation of emissions under the different NFR codes.

193. The ERT notes that Malta reports all waste incineration emissions under NFR 5C1bv cremation. Furthermore, the ERT notes that NH_3 emissions from waste incineration are reported as "IE" for the time series 2000-2010 and that the emissions in 2011 are substantially higher than for 2012-2015. In response to a question on the issue Malta responded that recalculations of the complete time series are only possible when activity data is made available. The ERT notes that on the website of the Marsa Thermal Treatment Facility data can be found as of 2009. This data consists of average concentrations of pollutants emitted to air. The ERT recommends Malta to calculate the emissions for the whole time series in consultation with the Marsa Thermal Treatment Facility.

Category issue 5: 5.D waste water handling – NMVOC

194. Malta reports emissions of domestic and industrial waste water handling under the NFR 5D2. The ERT notes that NMVOC emissions from waste water handling are calculated only for 2015. The ERT recommends Malta to calculate the complete time series and to report these in the next submission.

195. The ERT notes that for the complete time series the use of notation keys for the industrial waste water handling sector is not in line with the 2016 EMEP/EEA Guidebook (Tables 3-1 and 3-3) and recommends that Malta corrects these to the next submission.

Category issue 6: 5.E Other waste – NH_3

196. The ERT noted that Malta reported NH_3 emissions from other waste (NFR 5E) over the period of 2000-2006 and that for 2007-2015 no NH_3 emissions are reported. As the IIR does not provide any explanation for the source category, the source of NH_3 emission is unclear. The ERT encourages Malta to provide a clear description of this source in the IIR of the next submission.

197. Malta states in the IIR that for 2015 no incineration of sewage sludge took place. From this the ERT concludes that incineration of sewage sludge was apparently a practice in former years. Before incineration the sewage sludge has to be dried. In case the sewage sludge is dried by spreading NH_3 emissions are generated. The ERT notes that no description of activities included under other waste is provided in the IIR and that it is unclear whether this source occurs in Malta. The ERT encourages the Party to explain in the IIR, if and how the sewage sludge is dried and to report this in the IIR of the next submission.

MATERIALS USED BY THE REVIEW TEAM

1. Malta's Inventory: Annex I 2000-2015 (Excel file)
2. Malta Stage 2 S&A report 2017
3. Malta Stage 1 report 2017
4. Previous Stage 3 Review Report of Malta
5. Data and tools developed by CEIP (http://unece-stage3.wikidot.com/data-analysis)

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Revised Annex 1 2000-2015 by 11.05.2017 (Excel file)
2. Response to preliminary questions raised prior to the review (wiki)
3. Response to questions raised during the review (wiki)
4. Informative_inventory report_for_2015 from 29.5.2017, (pdf)
5. Revised estimates of PM_{10} and $PM_{2.5}$ for Energy; 1A1a (Excel file) - (wiki)

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ANNEX I REVISED ESTIMATES AND POTENTIAL TECHNICAL CORRECTIONS

Summary Table Energy 1A

Description	Reference	Pollutant estimates (kt)		
		2015	2010	2005
PM2.5				
National total as reported 2017(row 141)	**Annex I, 31/01/2017**	**0.239**	**0.74**	**1.347**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1A1a Electricity and Heat production		**-0.100**	**0**	**0**
Difference between original estimate and technical correction deemed necessary by the ERT				
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.139**	**0.745**	**1.347**
PM10				
National total as reported 2017(row 141)	**Annex I, 31/01/2017**	**0.376**	**1.295**	**2.159**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1A1a Electricity and Heat production		**-0.175**	**0**	**0**
Difference between original estimate and technical correction deemed necessary by the ERT				
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.201**	**1.295**	**2.159**

Summary Table Energy 1B

Description	Reference	Pollutant estimates (kt)		
		2015	2010	2005
NMVOC				
National total as reproted 2017(row 141)	**Annex I, 31/01/2017**	**2.063**	**2.597**	**3.343**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
Difference between original estimate and technical correction deemed necessary by the ERT				
1B2av (Distribution of oil products)		0.152	0.146	0.138
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.152**	**0.146**	**0.138**

Summary Table Transport

Description	Reference	Pollutant estimates (kt)		
		2015	2010	2005
NO_X				
National total as reported 2017(row 141)		**2.853**	**8.114**	**9.347**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1.A.3.b Road transport				
Difference between original estimate and technical correction deemed necessary by the ERT				
1.A.3.b Road transport		1.971	0.614	0.102
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**4.825**	**8.728**	**9.449**

NMVOC				
National total as reported 2017(row 141)		**2.063**	**2.597**	**3.343**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1.A.3.b Road transport				
Difference between original estimate and technical correction deemed necessary by the ERT				
1.A.3.b Road transport		1.114	0.383	0.055
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**3.177**	**2.980**	**3.398**

SO_2				
National total as reported 2017(row 141)		**3.329**	**8.090**	**11.390**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1.A.3.b Road transport				
Difference between original estimate and technical correction deemed necessary by the ERT				
1.A.3.b Road transport		0.003	0.001	-0.008
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**3.332**	**8.091**	**11.382**

NH_3				
National total as reported 2017(row 141)		**1.455**	**1.579**	**1.605**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1.A.3.b Road transport				
Difference between original estimate and technical correction deemed necessary by the ERT				
1.A.3.b Road transport		0.088	0.032	0.051
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**1.543**	**1.610**	**1.656**

$PM_{2.5}$				
National total as reported 2017(row 141)		**0.239**	**0.745**	**1.347**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1.A.3.b Road transport				
Difference between original estimate and technical correction deemed necessary by the ERT				
1.A.3.b Road transport		0.162	-0.416	-0.847
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.400**	**0.328**	**0.500**

Summary Table Agriculture

Description	Reference	Pollutant estimates (kt)		
		2015	2010	2005
NH3				
National total as reported 2017(row 141)		**1.4600**	**1.5800**	**1.600**
Difference between original estimate and technical correction deemed necessary by the ERT				
3.B Manure Management (Difference Submission/TC)		-0.5151	-0.3437	-0.2817
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.9449**	**1.2363**	**1.3183**

PM2.5				
National total as reported 2017(row 141)		**0.2390**	**0.7400**	**1.3500**
Difference between original estimate and technical correction deemed necessary by the ERT				
3.B Manure Management (Difference Submission/TC)		-0.0118	-0.0120	-0.0144
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.2272**	**0.7280**	**1.3356**

Summary Table Waste

Description	Reference	Pollutant estimates (kt)		
		2015	2010	2005
NMVOC				
National total as reported 2017(row 141)	**Annex I, 31/01/2017**	**2.063**	**2.597**	**3.343**
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
5A Solid waste disposal on land	MT-5A-2017-0001	0.427		
Difference between original estimate and technical correction deemed necessary by the ERT				
5A Solid waste disposal on land	MT-5A-2017-0002		0.350	0.357
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**2.490**	**2.947**	**3.700**