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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  
MOLDOVA**

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## 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*<sup>1)</sup>' – hereafter referred to as the 'Methods and Procedures' document.
2. This annual review, has concentrated on SO<sub>2</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, plus PM<sub>10</sub> & PM<sub>2.5</sub> for the time series years 1990 – 2016 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 Moldova coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 18<sup>th</sup> June 2018 to 21<sup>th</sup> June 2018 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 – Aleksandra N. Krsteska (Macedonia), Energy - Marion Pinterits (EU) and Eva Krtkova (Czech Republic), Transport - Helen Heintalu (Estonia) and Magdalena Zimakowska-Laskowska (Poland), Industry and Solvents - Mirela Poljanac (Croatia), Agriculture & Nature - Jim Web (United Kingdom) and Hakam al Hanbali (Sweden), Waste - Richard Claxton (United Kingdom).
4. Kristina Saarinen (Finland) was the lead reviewer. The review was coordinated by Katarina Marečková, (EMEP Centre on Emission Inventories and Projections - CEIP).

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<sup>1</sup>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/RevGuid\\_ece.eb.air.ge.1.2007.16.e.pdf](http://www.ceip.at/fileadmin/inhalte/emep/review/RevGuid_ece.eb.air.ge.1.2007.16.e.pdf)

## PART A: KEY REVIEW FINDINGS

5. The ERT found the inventory to be generally in line with the EMEP/EEA Inventory Guidebook and the UNECE Reporting Guidelines.
6. The ERT noted that Moldova did not submit an inventory in 2018 and strongly recommends Moldova to submit the inventory every year. The ERT used the inventory data and IIR submitted in 2017 for the review.
7. The ERT commends Moldova for reporting the full time series 1990-2016 in the NFR-2014-2 format.
8. The ERT notes that Moldova used the 2013 Guidebook version, while the Reporting Guidelines request the use of the latest version of the Guidebook, currently 2016. The ERT notes that the Russian translation of the 2016 version of the Guidebook was not available during the preparation of the inventory. The ERT invites Moldova to consider options to use methods and EFs consistent with latest version of Inventory Guidebook .
9. The ERT recommends Moldova to document and justify the methods used to calculate the emissions and to also provide the reference linking to the source of the information, if other methods than the Guidebook are used.
10. The ERT found that there is a need for further effort to enhance the completeness and time series' consistency bearing in mind that activity data were missing for the whole territory for some of the sectors.
11. Moldova did not submit an IIR in 2018. To the question on the reason for not submitting an IIR, no answer was provided by the Party. The ERT strongly recommends Moldova to provide an IIR on annual basis.
12. The ERT used the IIR submitted in 2017 to support the review. The ERT noted that the IIR was partly in line with the requirements set down in Annex II for the revised 2014 Reporting Guidelines. However, the ERT encourages Moldova to use the IIR reported in 2014 as a basis for the preparation of future annual IIRs, due to the fact that the 2014 IIR was completely in line with the requirements set down in Annex II of the reporting guidelines and the provided information was well documented in the 2014 version of the IIR.
13. The ( )ERT notes, that Moldova's participation in the 2018 centralised Stage 3 review was unfortunately limited due to the fact that Moldova only provided responses to the ERT's questions for the energy and transport sectors. The ERT would have needed clarifications for several issues in order to have been able to provide more detailed recommendations for future submissions. The ERT strongly recommends Moldova to engage more in the review process by providing answers during future reviews in order to enable the ERT to review the inventory in detail and to provide useful recommendations to further develop the inventory.
14. Detailed recommendations for sector-specific issues identified during the review are presented in part B of this report.

## INVENTORY SUBMISSION

15. In 2018 Moldova did not submit emission data for the year 2016. The last submission was provided on 10.02.2017, after the reporting deadline of the 2015 data on 15.02.2017. The Party reported the whole time series i.e. 1990-2015 emissions in NFR-2014-2 format.

16. In 2018 Moldova did not submit an IIR. The last IIR was submitted in 2017 and contains the 1990-2014 time series from the energy, transport and agriculture sectors while 2015 activity data were provided for the industry sector. The ERT recommends Moldova to include the whole time series in the next report and to ensure consistency between the NFR tables and the IIR for the emission data reported.

17. Moldova did not submit gridded data, LPS data or projections. The ERT asked Moldova on the status and plans for providing projections, but did not receive a response to the question. The ERT recommends Moldova to report projected emissions for both, with and without measures, scenarios together with the associated social economic data for 2015 and 2020 until 2050 as well as LPS and gridded data in the next submission.

## KEY CATEGORIES

18. Moldova has compiled and presented a level Key Category Analysis (KCA) for the following pollutants in its IIR: NO<sub>x</sub>, CO, NMVOC, SO<sub>x</sub>, NH<sub>3</sub>, TSP, PM<sub>10</sub>, PM<sub>2.5</sub> heavy metals and POP compounds for the year 2014 but taken into account only data from the energy and agriculture sectors. The ERT, however, notes that the key category analysis provided in Moldova's 2014 IIR takes into account all sectors, therefore the ERT recommends Moldova to use that approach for future calculations of the KCA.

19. Furthermore, as Moldova's submission only included emission data for 1990-2015, the ERT could not make a comparison to the KCA carried out by the CEIP, which CEIP had carried out for 2016 data for all countries that reported data in 2016.

## Transparency

20. The ERT recognises the level of effort undertaken by Moldova in providing an IIR which includes information on methods and activity data used in the energy, industry and agriculture sectors. The ERT wants to compliment Moldova for the excellent work done in the IIR for the agriculture sector. However, the ERT also encourages Moldova to complete the IIR by including the missing chapters as outlined in Annex II or the 2014 Reporting Guidelines, such as general chapters related to introduction, trend analysis, uncertainty analysis, projections, and sector-specific chapters for waste and solvents, as already included in the IIR reported in 2014. The ERT asked the Party for additional information and for a possible plan to introduce the missing chapters in future IIRs, but did not receive a response.

21. The ERT noted that Moldova uses empty fields for activity data in the NFR tables for the energy and transport sectors, and for both, activity data and emissions, in the waste sector for the years 1990-2015. The ERT recommends Moldova to use the appropriate notation keys (e.g. "NO" where emissions are "Not Occurring", "NE" where emissions are

“Not Estimated”, “IE” where emissions are “Included Elsewhere” and “NA” where estimates are not available or necessary).

22. The ERT notes that Moldova did not provide an explanation for the use of the notation keys and no reasons were provided for the missing inventory sources in the IIR.

23. According to the IIR an expert judgement was applied for gap-filling several industry categories. The ERT asked Moldova to provide additional information on which methods for gap filings have been used to fill the data gaps in the industry sector, but did not receive a response to the question.

24. Moldova provided limited information in the IIR on QA/QC procedures implemented. The ERT commends Moldova on applying QA/QC checks per sector as indicated in the IIR. However, the ERT notes that no QA/QC plan or a summary of planned improvements is provided in the IIR, and recommends Moldova to add these in the next version of the IIR.

## **Completeness**

25. The inventory is complete regarding the pollutants. However, the geographical coverage is not complete due to the missing data from Transnistria for the energy sector and due to missing data from the Left Bank region for the transport sector. The ERT asked the Party if it plans to estimate these emissions using alternative methods to fill data gaps for the energy sector, but did not receive a response to the question.

26. The ERT commends Moldova for information included in the IIR with regards to data gaps, and plans to improve data completeness in the sectors energy, industry and the solvents and agriculture sector. The ERT noted that Moldova, however, did not provide any information on why the waste sector is not included in the 2017 IIR and if the Party has the intention to include this sector in future IIR submissions, especially due to the fact that the waste sector was included in the 2014 IIR and in the NFR09 tables up to 2013 while no emissions for the waste sector were included in the following submissions.

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

27. The ERT acknowledges the work of Moldova to prepare recalculations for the whole time series as it was recommended in the previous Stage 3 Review Report. The reasons for the recalculations are described in the IIR and have resulted in an improved inventory due to the fact that 2013 EMEP/EEA Guidebook instead of 2009 Guidebook has been used, as well as sectors aggregated in the previous submission were disaggregated between NFRs. Still the ERT encourages Moldova to provide information about the recalculations on the sector level, including information on the impact of the recalculations on the sector emissions.

28. The ERT noted that the Moldavian time series remains inconsistent due to missing activity data and emissions for some years for all sectors. The ERT understands the difficulties in the process of data gathering but encourages the country to continue with the process of gathering missing data and to improve the completeness of the data coverage if possible. Additionally the ERT asked Moldova to provide information on the methodology used for the calculation of the year 2015 emissions, due to the fact that emission data for 2015 were not included in the IIR, with the exception of the industry sector, but did not

receive a response to this question. The ERT also asked for additional information on the dips and jumps in the Cd trend emissions but did not receive a response.

## **Comparability**

29. The inventory of Moldova is comparable with the inventories of other reporting Parties in terms of the reporting format and allocation of source categories as Moldova uses the latest NFR format (2014-02) and the allocation of source categories follows that of the UNECE Reporting Guidelines. However, the methodologies are consistent with the 2013 Guidebook while according to the Reporting Guidelines the latest version of the Guidebook (2016) should be used (see also paragraph 7 above). The ERT notes that the translation of the latest (2016) version of the Guidebook will be finalized only during summer 2018. The ERT recommends Moldova to always update the default EFs according to the latest Guidebook version, or to document and justify other methods and to provide references for these, to increase the comparability of the inventory with other Parties.

## **CLRTAP/NECD comparability**

30. Moldova is not an EU country and as such does not report emissions under the EU National Emission Ceilings (NEC) Directive.

## **Accuracy and uncertainties**

31. The ERT notes that Moldova did not provide an uncertainty analysis in the last reported IIR (2017) with exception of the agriculture sector where an uncertainty analysis was included, and commends the Party for this effort. According to the last Stage 3 Review Report Moldova indicated a quantitative uncertainty analysis as one of the areas for further improvement. During the review the ERT asked Moldova for more information on those plans but did not receive a response.

32. The ERT notes that for most sectors Tier 1 methodologies and default EFs from Guidebook 2013 are used. Tier 2 methods have only been used for the agriculture sector for NFR 3B4giv - manure management - other animals as well as for most of the animal categories under manure management are estimated using a country-specific methodology (Tier 2) as the manure type for each animal livestock was determined according to the manure management system distribution data. The ERT recommends Moldova to improve its inventory in the other sectors by implementing higher tier methodologies for key categories and to investigate the possibility to develop national EFs also for the other sectors to increase the accuracy of the inventory.

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

32. The ERT notes that Moldova has provided limited information on its general quality assurance/ quality control (QA/QC) activities. Moldova has provided sector-specific information on QA/QC procedures for the energy sector and the agriculture sector. The ERT recommends Moldova to implement QA/QC activities also for the other sectors. The ERT notes that Moldova did not provide information on the question if a QA/QC plan is available in

accordance with the Guidebook and recommends Moldova to prepare such a plan and to report upon it in the following submissions.

33. Moreover, the ERT asked Moldova if it considers ways to implement external verification of the inventory, but did not receive any response to the question.

### **FOLLOW-UP TO PREVIOUS REVIEWS**

34. The ERT commends Moldova for reporting recalculations for the whole time series 1990-2014 and for using the EFs from the 2013 EMEP/EEA Emission Inventory Guidebook.

35. The ERT used the results from the Stage 1 and Stage 2 reviews on the 1990-2015 emissions in this Stage 3 review. The ERT invites Moldova to also refer to these previous reviews when examining this review report and when updating its improvement plans.

### **AREAS FOR IMPROVEMENTS IDENTIFIED BY MOLDOVA**

36. The IIR identifies the following areas for improvement as it is stated in the 2017 version of the Informative Inventory Report. Moldova indicates that it is planning:

- a) to improve its data on emissions from energy sector, to review the activity data, with focus on better coverage for the entire territory of the country.
- b) provide data for the NFR category 1A3a to complete the time series of the Right bank region;
- c) to improve estimations for the NFR category 1A3b by providing more detailed primary data;
- d) to complete the emission data for the NFR category 1A3b-d for the Left bank region;
- e) to collect additional data in order to apply Tier 2 methodology for the category 3B - manure management which is a relevant source of NH<sub>3</sub>, N<sub>2</sub>O, NMVOC and PM emissions in the Republic of Moldova.
- f) to calculate PM emissions coming from the NFR category 3D - crop production and agricultural soils including storage, handling and transport of agricultural products by developing and using technology specific emission factors for the emission calculations,
- g) to collect additional data in order to apply Tier 2 methodology for the NFR category 3F which is a relevant source for CO, SO<sub>x</sub>, POPs and heavy metal emissions.



## TECHNICAL CORRECTIONS CONSIDERED AND OR CALCULATED BY THE ERT

37. The ERT identified gaps and inconsistencies in the inventory and proposed the Party potential technical corrections (PTC) as presented in the table below:

- a) TSP, PM<sub>10</sub> and PM<sub>2.5</sub> emissions from the NFRs 1A3bvi tyre and brake wear and 1A3bvii road abrasion and
- b) TSP and PM<sub>10</sub> emissions from NFR 2D3b road paving with asphalt

38. Detailed information on the technical corrections and revised estimates is provided under the sector specific chapters below and in the file "TC-Moldova\_1A3b\_2\_REVIEW2018".

**Table 1 Summary of potential technical corrections identified by ERT for country**

NFR category (s)	Pollutants	Years	Calculated by country/ ERT/ Not calculated	Potential contribution to national total (%)
1A3bvi	TSP	2010	ERT	13.9% (2010)
1A3bvi	PM <sub>10</sub>	2010	ERT	9.6% (2010)
1A3bvi	PM <sub>2.5</sub>	2010	ERT	11.1% (2010)
1A3bvii	TSP	2010	ERT	13.3% (2010)
1A3bvii	PM <sub>10</sub>	2010	ERT	6.1% (2010)
1A3bvii	PM <sub>2.5</sub>	2010	ERT	7.1% (2010)
2D3b	TSP	2005; 2010; 2015	ERT	20.9% (2015) % 26.1(2010) and 7.8% (2005)
2D3b	PM <sub>10</sub>	2010	ERT	5.1%(2010)

39. The ERT also calculated corrections for 1A3bv gasoline evaporation NMVOC emissions, and PM<sub>10</sub>, PM<sub>2.5</sub> and BC emissions from 2D3b road paving with asphalt, however, the contributions of these corrections to national total emissions are below 5% of national total emissions, therefore these are presented as guidance in the file "TC-Moldova\_1A3b\_2\_REVIEW2018".

## **PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY**

### **CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT**

40. The ERT identifies the following cross-cutting issues for improvement for Moldova:
- (a) to ensure sufficient resources for the inventory work in order to enable the preparation and reporting of emission inventories according to the reporting requirements presented in the Reporting Guidelines and the EMEP/EEA Emission Inventory Guidebook
  - (b) to improve the completeness of the inventory
  - (c) by including missing sources, to report whole time series of emissions since 1990 (except particles since 2000) and an IIR on annual basis;
  - (d) to make efforts to estimate emissions from all activities occurring in the country including all subcategories in the waste and solvent and other product use sectors;
  - (e) to complete the activity data for all sectors in order to improve the emissions coverage of the entire territory of the country and to incorporate emission estimates also from the Left Bank territory in its future submissions;
  - (f) to replace the empty fields in the inventory (with regards to activity data for the waste, energy and transport sector, and emissions for the waste sector and NFR category 1A3ei) with actual values or to use the appropriate notation keys e.g. "NO" where emissions are "Not Occurring", "NE" where emissions are "Not Estimated", "IE" where emissions/activity data are "Included Elsewhere" or "NA" where emissions are not applicable.
41. to improve the accuracy of the inventory by
- (a) applying higher tier methodologies for all key categories;
  - (b) performing and presenting an uncertainty analysis which takes all sectors into account and to use it to as a tool to focus on planned improvements for the key categories;
  - (c) including explanations of emission trends in the IIR;
  - (d) to include information on the reasons for the use of the notation keys;
  - (e) to reduce the use of the notation key "IE" by reporting emissions disaggregated under the relevant NFR categories.
42. to improve the transparency of the inventory by

- (a) preparing an IIR according to the outline and contents presented in Annex II of the 2014 revised Reporting Guidelines (e.g. by utilizing the IIR reported in 2014, which already followed the requested structure);
- (b) completing the IIR by providing more information on activities included, activity data, explanations of emission trends and to improve the completeness and transparency of documentation (as an example the current version of the 2017 IIR chapter for agriculture);
- (c) always updating the default EFs according to the latest Guidebook version; or if other methods are used, to document these, reference their sources and justify the use of these methods;
- (d) carrying out a key category analysis on the level of NFR subcategories for all pollutants.

43. to recalculate emissions due to possible underestimations/ overestimations noted by the ERT as described in detail in the sector chapters:

- 1.A.4.b.i – Residential stationary plants – (all pollutants) – 1990-2013;
- 1.A – Energy sector – (NH<sub>3</sub>) – all years;
- 1.A.3 – Transport sector (SO<sub>x</sub> and BC) – all years;
- 1.A.3.bi-biv – Road transport (PCDD/ PCDF (dioxins/ furans), HCB and PCBs);
- 1.A.3.bv –Road transport: Gasoline evaporation (NMVOC);
- 1.A.3.bvi-vii – Road transport: Automobile tyre and brake wear, Automobile road abrasion – (PM<sub>2.5</sub>, PM<sub>10</sub>, TSP).
- 2.A.1 – Cement production – (TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, BC)
- 3.D.e** – Cultivated crops – (NMVOC and PM<sub>10</sub>) – 2002
- 3.F – Field burning of agricultural residues – (BC) –2002
- 3.F – Field burning of agricultural residues – (NO<sub>x</sub>, SO<sub>2</sub>, NMVOC, NH<sub>3</sub>, PM and HM)

44. replace zero values by using the notation key “NE”, or report the correct emission values :

- 1.A.3.b.iv –Road transport: Automobile tyre and brake wear – (PM<sub>2.5</sub>, PM<sub>10</sub> and TSP);
- 1.A.3.a.ii(i) – Domestic aviation LTO (civil): (HCB and PBCs);
- 1.B.1 – Fugitive emissions from fuels – (all pollutants);
- 1.B.2 – Fugitive emissions from fuels – (all pollutants);
- 2.D.3.a – Domestic solvent use including fungicides – (NMVOC, Hg);
- 2.D.3.d, g, i, h and 2.G – (all pollutants);
- 2.B.7 - Soda ash production – (CO, NH<sub>3</sub>, TSP)
- 2.D.3.b – Road paving with asphalt – (NO<sub>x</sub>, SO<sub>2</sub>, CO, PCDD/F, PAHs, HCB)
- 3.D.f – Use of pesticides – (HCB)
- 3.D.c – Farm-level agricultural operations including storage, handling and transport of agricultural products – (PM)
- 3.D.d – Off-farm storage, handling and transport of bulk agricultural products – (PM)
- 5.B – Biological treatment of waste – (all pollutants);
- 5.C.1 – All waste incineration – (all pollutants);
- 5.C.2 – Open burning of waste – (all pollutants);
- 5.D – All waste water handlings – (NH<sub>3</sub>).

45. Detailed recommendations are presented in the relevant sector sections of this report.



## SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

### ENERGY

#### Review Scope

Pollutants Reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> , Cd, Hg, Pb, Dioxin, PAH		
Years		1990 – 2016		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
1A1a	Public electricity and heat production	X		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		X
1A4ci	Agriculture/Forestry/Fishing: Stationary	X		
1A5a	Other stationary (including military)	X		
1B1a	Fugitive emission from solid fuels: Coal mining and handling	X		X
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	X		X
1B1c	Other fugitive emissions from solid fuels	X		X
1B2ai	Fugitive emissions oil: Exploration, production, transport	X		X
1B2aiv	Fugitive emissions oil: Refining / storage	X		X
1B2av	Distribution of oil products	X		X
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	X		X
1B2c	Venting and flaring (oil, gas, combined oil and gas)	X		X
1B2d	Other fugitive emissions from energy production	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**

46. The IIR 2017 presents emission factors and activity data by fuels, or by groups of fuels for all years. The IIR also includes sources of emission factors, i.e. the EMEP/EEA air pollutant emission inventory Guidebook 2013.

47. The ERT noted that in the IIR emission data are presented for the years 1990 – 2014, while in the NFR tables there are values for the years 1990 – 2015. To ERT recommends Moldova to improve the consistency of the NFR tables and the IIR.

48. Moldova reports many of the energy sector source categories as "IE". The ERT recommends Moldova to make an effort to estimate emissions from all subcategories occurring in the country or to include explanations in the IIR on where the emissions are allocated.

49. The IIR 2017 includes general trend descriptions for the main categories. However, the trend explanation does not include information about the reasons for the changes in fuel consumption, e. g. it is not clear what has caused a significant rise of the emissions in 2014 (NMVOC, NH<sub>3</sub>, PM<sub>2.5</sub>, CO). The ERT recommends Moldova to provide reasons for the emissions trends in its future submissions.

50. The ERT notes that the NFR category 1A4ci includes rather high levels of liquid fuel consumption, which could refer to diesel oil used for mobile machinery. On the question raised during the review, Moldova clarified that the values of fuels used for mobile sources and for stationary combustion are used as the sum of fuels and are not considered separately. The ERT recommends Moldova to make an effort to estimate the emissions from these categories separately in its future submissions and to provide the fuel consumptions separately for future IIRs.

### **Completeness**

51. The ERT considers the energy sector 1A to be generally complete and comprehensive. The time series for all reviewed pollutants is complete for the time-series 1990 – 2015.

52. According to the IIR data are not available for the Left Bank of the Nistru River in a consistent way to be used in the inventory for the whole time series. To the question raised during the review Moldova replied, that official statistics are not available for the left-bank region. The ERT notes, that this situation might lead to the underestimation of the inventory in energy sector. The ERT recommends Moldova to continue with the efforts to obtain the relevant data and to include respective emission estimates in its future submissions. If this would not be successful, the ERT encourages Moldova to explain this in the IIR.

53. The ERT notes, that emissions from sector 1B are reported as "NE". No information about these emission sources was presented in the IIR 2017. To the question raised during the review Moldova replied, that calculations in the sector 1B were not carried out, since it would require additional human resources. The ERT notes, that there are no solid fuel mines occurring in Moldova. The ERT further noted, that greenhouse gas emissions from 1B2 were reported in the national inventory report accompanying the 1<sup>st</sup> Biennial Update report of

Moldova for the time series of 1990 – 2013. The ERT recommends Moldova to use available activity data for 1B2 from the greenhouse gas inventory and to estimate emissions also for the LRTAP inventory in its future submissions.

### **Consistency including recalculation and time series**

54. Moldova applied the Tier 1 methodology following the Guidebook 2013. The ERT found the inventory, besides the completeness problems, to be consistent for the available time series 1990 – 2015.

55. Moldova has carried out a number of recalculations in the energy sector. A short description of the recalculations is provided in the IIR 2017. Further, the ERT recommends Moldova to provide information about the recalculations on sectoral level, including the impact of the recalculations on sectoral emissions.

56. In the IIR 2017 the reported planned improvement was to obtain relevant data to cover the whole territory of the country. The ERT welcomes these efforts and recommends Moldova to incorporate emission estimates also from the Left Bank territory in its future submissions. The ERT encourages Moldova to incorporate encouragements and recommendations from the previous reviews, which were not addressed in the inventory submitted in 2017, in the IIR of the next submission.

### **Comparability**

57. Moldova reports emissions from the energy sector using Tier 1 methods from the 2013 Guidebook. As the Reporting Guidelines request the use of the latest version of the Guidebook (i.e. 2016) the ERT recommends Moldova to use that version of the Guidebook, or to document and justify the use of other methods in the IIR.

### **Accuracy and uncertainties**

58. ERT recommends Moldova to develop higher tier methods to estimate emissions from key categories.

59. The ERT encourages Moldova 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.

60. According to the IIR the Party has some basic QA/QC checks in place. The ERT commends Moldova on applying the sectoral QA/QC checks.

61. The IIR does not state, if an independent expert review was performed for the energy sector inventory. The ERT reiterates encouragement from the previous review to perform such a review in order to guarantee the accuracy and quality of the emission estimates.

### **Improvement**

62. In the last inventory cycle Moldova planned to improve statistical data on activity data from the energy sector in order to cover the whole territory of the country better. The ERT recommends Moldova to report on the progress of the issue and implement data from the whole territory when the data becomes available.

63. The ERT encourages the Party to present in the IIR details of improvements carried out in the energy sector since the last submission and also to present planned improvements in its future IIRs.

### **Potential Technical Corrections**

64. Not identified

## **Sub-Sector Specific Recommendations**

### **Category issue 1: 1.A stationary sources - SO<sub>x</sub>**

65. Following the recommendation from the previous review report, SO<sub>x</sub> emissions were estimated using EMEP 2013 Guidebook. The ERT commends Moldova for this improvement. However, Moldova was also recommended to investigate the sulphur content of the solid and liquid fuels used within the country in order to be able to develop country specific emission factors, which would increase the accuracy of the SO<sub>x</sub> emissions. During the review Moldova did not respond to the question on the issue and did not present any results of such efforts. The ERT reiterates recommendation of the previous ERT to investigate sulphur content of solid and liquid fuels used.

### **Category issue 2: 1.B.1 fugitive emissions from fuels – solid fuels – all pollutants**

66. Moldova reports all emission from 1B as “NE” (not estimated). However, the ERT noted, that emissions from 1B1 would most likely not be occurring in Moldova, since no mining areas are in the country’s territory. The ERT recommends Moldova to check the notation key used for NFR 1B1 and to justify the use of all notation keys in the IIR of the next submission.

### **Category issue 3: 1.B.2 fugitive emissions from fuels – oil, natural gas – all pollutants**

67. The ERT noted, that emissions from 1B2 are reported as “NE”. To the question raised during the review, Moldova replied, that emission calculations in the 1B sector were not carried out. However, in the greenhouse gas inventory submitted together with the first Biennial Update Report of Moldova, emissions from 1B2 were estimated. The ERT recommends Moldova to use available activity data e.g. from the greenhouse gas inventory to also estimate air pollutant emissions in its next submission.

### **Category issue 4: 1.A.4.b.i Residential stationary plants – biomass**

68. The ERT noted, that the amount of reported biomass use under NFR 1A4bi significantly increased in 2014. No explanation about this trend was presented in the IIR 2017. Since Moldova has a large rural area, there is a possibility, that biomass consumption is underestimated for the previous years. The ERT recommends Moldova to investigate the completeness of the biomass data reported for the years 1990 – 2013.

69. The ERT encourages Moldova to include appropriate explanation of all emission trends with information on the driving forces of emissions in its next submission.



### **Category issue 5: 1A stationary sources - NH<sub>3</sub>**

70. Following the description in the IIR 2017 the ERT noted, that NH<sub>3</sub> emissions are estimated only from some of the fuels reported, mostly biomass, in some sectors also from hard coal and brown coal. The ERT notes, that this could lead to underestimation of the emissions and recommends Moldova to estimate NH<sub>3</sub> emission from all fuels used in the energy subsectors according to the methods provided in the EMEP/EEA Guidebook.

## 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	
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	
1A5b	Other, Mobile (including military, land based and recreational boats)		X	
1A3di(i)	International maritime navigation		X	
1A3	Transport (fuel used)		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**

71. The Republic of Moldova did not submit an IIR and NFR table for the last year, but the Party has now produced an IIR and NFR table to accompany the 1990-2015 emission data submission. This includes information on the methodologies used to estimate emissions from mobile sources. The ERT commends this improvement and encourages Moldova to continue producing an IIR for future submissions.

72. The ERT noted that in the IIR there is no data from the Left Bank region. The ERT encourages Moldova to try to collect activity data and to estimate emissions for the mobile sources sector for future submissions, when feasible.

73. The ERT noted that the Party did not complete the NFR “additional info” sheet to explain the use of notation keys in the NFR tables. The ERT recommends Moldova to provide this information for the mobile sources sector in future submissions, or alternatively to provide this information in the IIR.

74. The ERT commends the Party for providing tables of emission factors and activity data used in the IIR, along with references to the source of the data.

75. The ERT noted that there was a dip in the activities and emissions from the transport sector for the years between 1995 and 2002, which was not explained in the IIR. The ERT encourages Moldova to provide explanations for emission trends in the next IIR.

### **Completeness**

76. The ERT considers the transport sector to be nearly complete. However, the ERT notes that the Republic of Moldova has not estimated emissions from the following sources and pollutants:

- SO<sub>x</sub> and BC emissions for 1A3ai(i), 1A3aii(i), 1A3bi, 1A3bii, 1A3biii, 1A3biv, 1A3bv, 1A3bvi, 1A3bvii. During the review, the Party explained that the emissions were not calculate because there are no emission factors for BC for the Tier 1 method in the EMEP-2013 Guidelines and for SO<sub>x</sub> the calculation was not carried out. The ERT recommends Moldova to use the latest version of the 2016 EMEP/EEA Emission Inventory Guidebook to estimate the BC and SOX for the 1A3ai(i), 1A3aii(i), 1A3bi, 1A3bii, 1A3biii, 1A3biv, 1A3bv, 1A3bvi, 1A3bvii for all years. PCDD/F (dioxins/ furans), HCB and PCB emissions for 1A3bi, 1A3bii, 1A3biii, 1A3biv. During the review, the Party explained that the emissions were not calculated because the calculation methods were not studied. However, the 2016 EMEP/EEA Emission Inventory Guidebook states that there are emission factors for this category. So, the Party can report the same values for PCDD/ PCDF (dioxins/ furans), HCB and PCBs for 1A3bi, 1A3bii, 1A3biii, 1A3biv in future submissions.
- NMVOC emissions for 1A3bv. During the review, the Party explained that the emissions were not calculated because the calculation methods were not studied. However, the 2016 EMEP/EEA Emission Inventory Guidebook states that there are emission factors for this category, please see the technical corrections chapter. So, the Party can report the same values for NMVOC for 1A3bv in future submissions.
- PM<sub>2.5</sub>, PM<sub>10</sub> and TSP emissions for 1A3bvi and 1A3bvii. During the review, the Party explained that the emissions were not calculated because the calculation methods were not studied. However, the 2016 EMEP/EEA Emission Inventory Guidebook provides emission factors for this category, which have been used for technical corrections for Moldova. The ERT notes that the same value as presented for TSP can also be used for PM<sub>2.5</sub>, PM<sub>10</sub> and TSP for 1A3bvi and 1A3bvii in future submissions.

- The ERT notes that no emissions are reported from NFRs 1A3bv, 1A3bvi and 1A3bvii categories. The ERT recommends the Party collect activity data and estimate the emissions.

77. The ERT recommends that the Party reports emissions for the sources and pollutants mentioned above for its next submissions.

### **Consistency including recalculation and time series**

78. The ERT noted an inconsistent use of notation keys by the Republic of Moldova for the following sectors in the NFR emission reporting tables:

- A3aii(i): In the NFR tables emissions from A3aii(i) - Domestic aviation LTO (civil) for HCB and PBCs are marked as "NE", but according to the Guidebook 2016 the notation key "NA" would apply. During the review, Moldova confirmed that "NA" should be used.
- 1A3biv, 1A3di(ii), 1A4aii, 1A4bii and 1A4cii: In the NFR tables emissions from 1A3biv - mopeds & motorcycles, 1A3di(ii) - international inland waterways, 1A4aii - commercial/institutional: Mobile, 1A4bii - residential: household and gardening (mobile) and 1A4cii - agriculture/forestry/fishing: off-road vehicles and other machinery are noted as "IE" without an explanation in what category the values are included. The ERT recommends that Moldova documents the category where the emissions are included.

79. The ERT noted that there was a dip in the activities and emissions from the transport sector for the years between 1995 and 2002. The ERT notes that the reason for the dip was not provided in the IIR. The ERT encourages Moldova to explain the dip in the next IIR.

### **Comparability**

80. Moldova uses methods that are consistent with those proposed in the 2013 version of the Guidebook to estimate emissions of pollutants from the transport sector. The ERT notes that the emissions are calculated on the basis of fuels sold.

### **Accuracy and uncertainties**

81. The ERT could not check for uncertainties because no uncertainty analysis was available. The ERT recommends Moldova to provide an uncertainty analysis and to use the results to inform the improvement process.

### **Improvement**

82. The ERT notes that the Party has made no improvements in the transport sector chapter of the IIR since the last Stage 3 review. The ERT recommends the Party to check that the notation keys are used according to the Reporting Guidelines and to include explanations for the use of the notation keys in the IIR, as well as to estimate the missing emissions.

## Potential Technical Corrections

83. The ERT notes that there is an underestimation of particle emissions because Moldova does not report emissions from NFRs 1A3bv, 1A3bvi and 1A3bvii.

84. The ERT prepared technical corrections for NFRs 1A3bvi and 1A3bvii for the years presented in the table below using information from Moldova's IIR and methods from the 2016 EMEP/EEA Guidebook. The technical corrections are presented in details in the file "TC\_Moldova\_Review2018.xlsx". The ERT recommends the Party to include emissions from these sources into the next submission. In the calculation file emissions for the years 2009-2014 are calculated as examples.

NFR	Pollutants	Years	Calculated by country/ ERT Not calculated	Potential contribution to national total (%)
1A3bvi	TSP	2010	ERT	13.3% (2010)
1A3bvi	PM <sub>10</sub>	2010	ERT	6.1% (2010)
1A3bvi	PM <sub>2.5</sub>	2010	ERT	7.1% (2010)
1A3bvii	TSP	2010	ERT	13.3% (2010)
1A3bvii	PM <sub>10</sub>	2010	ERT	6.1% (2010)
1A3bvii	PM <sub>2.5</sub>	2010	ERT	7.1% (2010)

85. The ERT also calculated NMVOC emissions from 1A3bv gasoline evaporation, as these were missing in the inventory. The contributions of these emissions to the national total NMVOC emissions are below 5% and are thus not regarded as technical corrections, but presented to the Party as guidance on how to calculate these emissions in the file "TC\_Moldova\_Review2018.xlsx".

## Sub-Sector Specific Recommendations

### **1A3 Transport – All Pollutants**

86. The ERT notes that Moldova is currently using Tier 1 emission factors from the 2013 Guidebook to estimate emissions for all mobile sources. The ERT recommends that Moldova uses the latest version (2016) of the EMEP/EEA Emission Inventory Guidebook which contains the most up-to-date emission factors for the relevant sources.

### **1A3ai(i) and 1A3aii(i) International aviation LTO – all pollutants**

87. During the review, the Party explained that emissions are not calculated because "the calculation methods were not studied". The ERT notes that the 2016 Guidebook provides emission factors for this category and that activity data are available in the Eurocontrol database. For information the Party can contact [fuelandemissionsinventory@eurocontrol.int](mailto:fuelandemissionsinventory@eurocontrol.int). The ERT recommends that Moldova estimates these emissions to the next submission.

### **1.A.3.b Road transport – All Pollutants**

88. The ERT notes that for the road transport sector (1A3b) the Party used Tier 1 methods. The ERT recommends Moldova to use Tier 2 or a higher tier methodology to estimate emissions for 1A3b, as it is a key source of NO<sub>x</sub>, CO and PM<sub>10</sub>. The ERT also recommends Moldova to use the COPERT V model. The ERT informs that in the latest version of COPERT V there is the possibility to use the Tier 2 method to calculate emissions.

89. The ERT notes that Moldova reports emissions from motorcycles and mopeds (1A3biv) using the notation key "IE". The ERT recommends the Party to calculate emissions from motorcycles and mopeds (1A3biv) separately and not as a part of emissions from passenger cars (1A3bi).

## INDUSTRIAL PROCESSES

### Review Scope

Pollutants Reviewed		All		
Years		1990 – 2015		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
2A1	Cement production	X		X
2A2	Lime production	X		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		X
2A6	Other mineral products	NO		
2B1	Ammonia production	NO		
2B2	Nitric acid production	NO		
2B3	Adipic acid production	NO		
2B5	Carbide production	NO		
2B6	Titanium dioxide production	NO		
2B7	Soda ash production	X		X
2B10a	Chemical industry: Other	X		X
2B10b	Storage, handling and transport of chemical products	NA		X
2C1	Iron and steel production	X		X
2C2	Ferroalloys production	NO		
2C3	Aluminium production	NO		
2C4	Magnesium production	NO		
2C5	Lead production	NO		
2C6	Zinc production	NO		
2C7a	Copper production	NO		
2C7b	Nickel production	NO		
2C7c	Other metal production	NO		
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	NO		
2H2	Food and beverages industry	X		X
2H3	Other industrial processes			
2I	Wood processing	X		X
2J	Production of POPs	NO		
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	X		X
2L	Other production, consumption, storage, transportation or handling of bulk products	NA		
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**

90. The emission inventory for the industrial processes sector was detailed and transparent and the estimates were provided at the most detailed level for most of the sub-sectors. Also, the industrial processes sector was well described with good levels of detail in the methodology descriptions of the IIR. However, the ERT recommends Moldova to include more information on the activity variable evolution and the reasons for existing dips and jumps in trends of the activity data and the corresponding emissions for all emission source categories within the industrial processes sector.

91. The ERT noted that Moldova uses the appropriate notation keys for reporting where estimates are not available or necessary.

### **Completeness**

92. The ERT notes that in the 2017 submission Moldova reported emissions and activity data rates for all categories in the scope of the industrial processes sector in NFR14 tables for all historic years, and also provided an IIR. However, as Moldova did not submit an inventory in 2018, neither an IIR nor NFR tables for 1990 – 2016 in 2018, the ERT recommends Moldova to provide its inventory, along with details for the industrial processes sector, on annual basis.

93. The ERT notes that in the 2017 submission, estimates were provided for all categories in the scope of those industrial processes activities that exist in Moldova. The ERT considers the Industrial processes sector to be almost complete and comprehensive.

94. The ERT commends Moldova for including the estimation of black carbon emissions for the whole time series in the relevant industrial sectors.

### **Consistency including recalculation and time series**

95. Moldova has recalculated its inventory for almost all sectors for the 1990-2014 time series. Moldova's IIR 2017 includes all the necessary explanations on recalculations made. The ERT commends Moldova for providing detailed explanations on recalculations, including the rationale, the impact on the sector and the implication on trends for the industrial processes sector in its IIR.

96. The ERT noticed drops and peaks in activity data trends and consequently in the corresponding emissions with no explanations for them (please see sub-sector specific recommendations). The ERT encourages Moldova to include explanations for all outliers that occur in the pollutant emission trends and in activity data trends in its IIR.

### **Comparability**

97. The data in the 2017 submission is comparable with other reporting Parties in terms of the NFR14 reporting format.



98. The ERT also considers the methods used for the emission calculations to be consistent with those presented in the 2013 Guidebook. However, the methods used are not consistent with those proposed in the 2016 version of the Guidebook, and the ERT considers that this may lead to potential overestimation or underestimation of emissions. The ERT recommends Moldova to check the use of methods according to the sub-sector specific recommendations presented below.

### Accuracy and uncertainties

99. The ERT recommends Moldova to undertake an uncertainty analysis for the industrial production sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

100. The ERT recommends Moldova to further develop the QA/QC system for the industrial processes sector.

### Improvement

101. The ERT commends Moldova for its improvement in the industrial processes sector, such as providing source category descriptions and information on methodological issues in the IIR, in addition to the emission factors used and historic trends of activity data. Moldova also provides information on recalculations made and their influence on respective pollutant emissions and activity data cohesion between NIR and IIR. The ERT noted some places for further improvement as explained under the sub-sector specific recommendations below.

### Potential Technical Corrections

102. The ERT noted that in the NFR14 tables in the category 2D3b there is a possible underestimation of TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, BC emissions for the years 2005, 2010, 2015 due to a possible error in the unit conversion. The ERT prepared technical corrections for TSP and PM<sub>10</sub> as presented in the table below using activity data reported by Moldova in the NFR tables, along with default Tier 1 emission factors from the 2016 Guidebook. The technical corrections are presented in detail in the file "TC\_Moldova\_Review2018.xlsx". The ERT recommends the Party to include emissions from these sources into the next submission.

NFR category (s)	Pollutants	Years	Calculated by country/ ERT Not calculated	Potential contribution to national total (%)
2.D.3.b	TSP	2005; 2010; 2015	ERT	20.9% (2015); 26.1% (2010); 7.8% (2005)
2.D.3.b	PM <sub>10</sub>	2010	ERT	5.1 (2010)

103. The contributions of the corrections for the pollutants PM<sub>10</sub> (for other years than 2010), PM<sub>2.5</sub> and BC, presented in the file "TC\_Moldova\_Review2018.xlsx", to the national total emissions are below 5% and these are therefore not proposed as technical corrections but as guidance on how to calculate these emissions.

## Sub-Sector Specific Recommendations

### **Category issue 1: 2.A.1 Cement production - TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, BC**

104. The ERT notes that Moldova states on p.32 of the IIR submitted in 2017, that emissions from cement production were estimated using a Tier 2 methodology according to the 2013 Guidebook. The abatement efficiencies that Moldova is using for the source category 2A1 cement production for the period 1990-2010 are 98% for TSP, 80% for PM<sub>10</sub>, 73% for PM<sub>2.5</sub> and for the period 2011-2014 93% for TSP, 34% for PM<sub>10</sub>, 40% for PM<sub>2.5</sub>. In the table with values of abatement efficiencies on p.33 of Moldova's IIR 2017, Moldova is stating that abatement efficiencies for the period 1990-2010 are 93% for TSP, 34% for PM<sub>10</sub>, 40% for PM<sub>2.5</sub> and for the period 2011-2014 98% for TSP, 80% for PM<sub>10</sub>, 73% for PM<sub>2.5</sub>. The ERT asked Moldova to explain why there is a difference between these tables, and which values for the observed periods are correct. The ERT recommends Moldova to revise and to correct the corresponding data in its IIR.

105. There are several drops and peaks in clinker production and consequently in the corresponding TSP, PM<sub>10</sub>, PM<sub>2.5</sub> and BC emissions (peaks in 1990 and 2008, drops in 1991 and 2009). In the IIR, there is no information on the activity variable evolution and the reasons for these drops and jumps in the trend of the activity data and corresponding emissions. The ERT encourages Moldova to include explanations for all outliers that occur in the pollutant emission trends in its IIR.

### **Category issue 2: 2.A.2 - TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, BC**

106. During the review, the ERT noted that there are several drops and peaks in lime production and consequently in the corresponding TSP, PM<sub>10</sub>, PM<sub>2.5</sub> and BC emissions (peaks in 1990, 1996, 2007, and drops in 1992, 1995, 2003, 2009). In the IIR, there is no information on the activity variable evolution and the reasons for these drops and jumps in the trend of the activity data and corresponding emissions. The ERT encourages Moldova to include explanations for all outliers that occur in the pollutant emission trends in its IIR.

### **Category issue 3: 2.A.3 - all**

107. During the review, the ERT noted that on p.38 of the IIR submitted in 2017, Moldova states that emissions from 2A3 glass production were estimated using Tier 1 method of the 2013 Guidebook. The ERT notes that this source category is a key source of Pb, Cd, As, Ni and Se emissions in 2015. Moreover, the ERT saw that Moldova has stratified glass production by the different technologies (flat glass, container glass and mineral wool) in the IIR. The ERT encourages Moldova to implement the Tier 2 methodology according to the 2016 Guidebook for the emission calculation.

### **Category issue 4: 2.A.5.c - TSP, PM<sub>10</sub>, PM<sub>2.5</sub>**

108. During the review, the ERT noted that Moldova estimates emissions from 2A5c using the Tier 2 method of the EMEP/EEA Guidebook 2013 (p.45 of the Moldova's IIR), in addition to using Tier 2 for 2A1 (p.31), using Tier 1 for 2A2 (p.35), using Tier 1 for 2A3 (p.37), using Tier 1 for 2A.a (p.41) and using Tier 1 for 2A5b (p.44). According to EMEP/EEA Guidebook 2016 (chapter 2.A.5.c) if for the relevant process chapters (such as 2A1) a Tier 1 or 2

methodology is applied, then emissions from storage, handling and transport are already included in the applied emission factors. Therefore, emissions from storage, handling and transport should not be reported separately. In this case, it is good practice to use a Tier 1 approach for this source category and to check the tier methods applied for the other chapters within the mineral industry (sector 2A), to avoid double counting of emissions from storage, handling and transport. If a Tier 2 method is applied for this source category (2A5c), it should be verified that the methods applied in the processes of the mineral industry do not include these emissions. Therefore the ERT recommends Moldova to check that there is no double counting of TSP, PM<sub>10</sub> and PM<sub>2.5</sub> emissions from 2A5c including other 2A source categories.

#### **Category issue 5: 2.B.7 - CO, NH<sub>3</sub>, TSP**

109. During the review, the ERT noted that on p.48 of the IIR 2017, Moldova states that no soda ash or sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>) is produced. However, Moldova calculates CO, NH<sub>3</sub> and TSP emissions from this source category. In the 2016 Guidebook (also in the 2013 Guidebook), a methodology for production of soda is given. The ERT asked Moldova to provide the rationale for CO, NH<sub>3</sub> and TSP emission calculations from soda ash production considering the fact that soda ash or sodium carbonate are not produced in Moldova. The ERT recommends Moldova to use the notation key “NO” (Not occurring) for source category 2B7.

#### **Category issue 6: 2.C.1, 2.C.7.d - TSP, PM<sub>10</sub>, PM<sub>2.5</sub>**

110. During the review, the ERT noted that on p.55 of the IIR submitted in 2017, Moldova states that emissions from iron and steel production were estimated using a Tier 1 methodology according to Guidebook 2013. In the 2016 Guidebook Chapter “2.C.7.d, 3 Methods”: “If in the relevant process chapters (such as 2.C.1 Iron and Steel Production and 2.C.2 Ferroalloys Production) a Tier 1 methodology is applied,(1) the storage, handling and transport is already included in the applied emission factors. In this case an “included elsewhere” (“IE”) notation key should be used for reporting under this NFR category 2.C.7.d to avoid double counting. Where higher tiers are used in the relevant process chapters, a separate estimate for the handling and storage should be made using the methods described below. In Tier 2, general emission factors are provided for emissions from storage, handling and transport of metal products. One should look carefully at the tiers applied in other chapters within subsector 2.C Metal Industry to avoid double counting of emissions from storage, handling and transport.” The ERT recommends Moldova to check that there is no double counting of TSP, PM<sub>10</sub> and PM<sub>2.5</sub> emissions from NFR 2C7d including emissions from the NFR 2C1 source category.

#### **Category issue 7: 2.D.3.b - NO<sub>x</sub>, SO<sub>2</sub>, CO, PCDD/F, PAHs, HCB**

111. During the review, the ERT noted that Moldova uses the notation key “NE” – “Not estimated” for the reporting of NO<sub>x</sub>, SO<sub>2</sub>, CO, PCDD/F, PAHs, HCB emissions. According to the Guidebook 2016 (as well as the Guidebook 2013), Chapter “2.D.3.b”: “Emissions of nitrogen oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>) and carbon monoxide (CO) are expected to originate mainly from combustion and are therefore addressed in chapter 1.A.2.g.viii.” The ERT recommends Moldova to check this issue and to move all emissions, which are

expected to originate mainly from combustion, from NFR 2D3b to the NFR 1A2g<sup>viii</sup> stationary combustion in manufacturing industries and construction: other.

112. There are two peaks in 2D3b road paving with asphalt and consequently in the corresponding emissions (a larger peak in 1990 and a smaller one in 2007). In the IIR, there is no information that would explain these drops and jumps in the trend of the activity data and the corresponding emissions. The ERT encourages Moldova to include explanations for all outliers that occur in the emission trends in its IIR. The ERT recommends Moldova to check if the peak in 1990 and the smaller one in 2007 are related with the construction of big roads in Moldova and to provide information of that in its IIR.

## SOLVENTS

### Review Scope

Pollutants Reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , CO, TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , Cd, Cu, Hg, Ni, Zn, PCDD/F, PAHs		
Years		1990 – 2015		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
2D3a	Domestic solvent use including fungicides	X		X
2D3d	Coating applications	X		X
2D3e	Degreasing	X		X
2D3f	Dry cleaning	IE		X
2D3g	Chemical products	X		X
2D3h	Printing	X		X
2D3i	Other solvent use	X		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**

113. Moldova has provided a transparent emission inventory, considering NFR tables, as estimates are provided for all categories in the scope of the solvent sector. In the IIR, submitted in 2017, the chapter for the solvent sector is, however, missing. Moldova has reported emissions and activity data rates for all categories in the scope of the solvent sector in the NFR tables, but not in the IIR. The ERT was therefore not able to assess transparency between data in the NFR table and in the IIR. The ERT was neither able to assess the rationale for choices of data, methods and other inventory parameters, as well as the reasons for dips and jumps in emission trends.

114. The ERT encourages Moldova to include in its IIR general descriptions of activities falling under the source categories in Moldova as well as descriptions of methodologies, emission factors and activity data used for emission estimation. In addition, information on recalculations and improvements made and planned should be included in the IIR. The ERT recommends Moldova to put this activity in the short time-scale planned improvements in order to achieve transparency, comparability and consistency of the inventory for the solvent Sector and to report an IIR for the solvent sector on an annual basis.

115. Moldova uses appropriate notation keys in its NFR14 tables for the solvent sector. The use of the notation key “IE” where emissions are “Included Elsewhere” is limited, only for one source category (NFR 2D3f Dry cleaning) in the solvent Sector.

#### **Completeness**

116. The ERT consider the Solvent sector to be complete and comprehensive. In the 2017 submission, Moldova has reported emissions for the solvent sector for 1990 - 2015 in the

latest NFR14 format. The ERT commends Moldova for reporting emissions from the solvent sector for all historic years and recommends Moldova to continue the good practise.

### **Consistency including recalculation and time series**

117. Moldova has not reported on recalculations made its inventory for the solvent sector. The ERT encourages Moldova to provide information on recalculations, including the rationale and the impact on the solvent sector and on the implication of recalculations to trends for the solvent sector in its IIR.

118. The ERT noted dips and jumps in historic trends of the activity data and the respective pollutant emissions for NFR categories 2D3d, 2D3g, 2D3h, 2D3i and 2.G. In the IIR submitted in 2017, no information is provided on the fluctuations of the time series. The ERT encourages Moldova to include in its IIR the information on the reasons for fluctuations in the activity rates and emissions along with other missing information as explained under "Transparency".

### **Comparability**

119. The ERT considers that the methods used for the emission calculation are consistent with those proposed in the 2013 Guidebook. To ensure consistency with other reporting Parties, the ERT recommends Moldova to move to the 2016 version of the Guidebook in its next submission when the translation of the 2016 Guidebook into Russian is finalised (scheduled for summer 2018). In case other methods are used than those presented in the Guidebook, the ERT recommends Moldova to document the methods and to provide references to data and information sources used, to increase comparability of the inventory to those of the other reporting Parties.

### **Accuracy and uncertainties**

120. The ERT recommends Moldova to undertake 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.

121. The ERT encourages Moldova to further develop QA/QC procedures and to implement sector specific OA/QC procedures for the solvent sector in order to ensure the accuracy of the inventory.

### **Improvement**

122. The ERT recommends Moldova to include an improvement plan with schedules for the solvent sector to the next submission, and to include in the plan recommendations from the inventory reviews.

### **Potential Technical Corrections**

Not identified.

## Sub-Sector Specific Recommendations

### **Category issue 2: 2.D.3.a, 2.D.3.d, 2.D.3.g, 2.D.3.h, 2.D.3.i, 2.G – all**

123. During the review, the ERT noted that in the IIR submitted in 2017, there is no information for NFR source categories 2D3a, 2D3d, 2D3g, 2D3h, 2D3i and 2G regarding the description of the activities as well as for the description of methodologies, emission factors and activity data used for estimation of emissions. In addition, no information is provided on recalculations and improvements made nor on the planned improvements in the solvent sector. The ERT encourages Moldova to include all this information in its IIR of the next submission.

### **Category issue 1: 2.D.3.a – NMVOC, Hg**

124. During the review, the ERT noted that Moldova reports NMVOC emissions from category 2D3a and for Hg emissions, Moldova uses the notation key “NE” – “Not estimated”. According to the 2016 Guidebook (and also the 2013 version of the Guidebook) activity data for Tier 1 emission calculation is the population rate in the country. The 2016 Guidebook provides a Tier 1 emission factor for Hg (which is the same as for Tier 2). The ERT recommends Moldova to use population data along with the Tier 1 emission factor to calculate Hg emissions from fluorescent tubes and to report these emissions in the NFR tables and to document the calculation in the IIR.

125. In the IIR submitted in 2017, there is no information on the use of the 2013 Guidebook methodology for NMVOC emission calculation. The ERT concludes from the data reported in the NFR tables that Moldova uses Tier 1 methodology. As the source category 2D3a is a key category for NMVOC emissions in almost all countries and also in Moldova, the ERT recommends Moldova to calculate these emissions using a Tier 2 method from the 2016 Guidebook. According to the Reporting Guidelines, emissions from key categories shall be estimated using a Tier 2 or higher method to increase the accuracy of the estimates.

### **Category issue 2: 2.D.3.d, 2.D.3.g, 2.D.3.h, 2.D.3.i, 2.G – all**

126. During the review, the ERT noted dips and jumps in trends of the activity data and the corresponding NMVOC emissions for NFR categories 2D3d, 2D3g, 2D3h, 2D3i and 2G. In the IIR submitted in 2017, no information is provided on the fluctuations of the time series. The ERT recommends Moldova to include in its IIR information on the reasons for fluctuations in the activity rates and emissions.

### **Category issue 3: 2.D.3.f – NMVOC**

127. During the review, the ERT noted that Moldova uses the notation key “IE” – “Included elsewhere” for the source category 2D3f in the NFR tables. The ERT encourages Moldova to provide information in which source category and why the emissions are included, in the IIR of the next submission.

### **Category issue 4: 2.D.3.i, 2.G – all**

128. During the review, the ERT noted that Moldova reports emissions from 2D3i other solvent use and 2G other product use. In the IIR submitted in 2017, there is no information on which activities are included in these two categories. The ERT encourages Moldova to

include information of activities reported under categories 2D3i and 2G in the IIR of the next submission. The ERT recommends Moldova to use the mapping table (ConversionTableReportingCodes\_October2015) available on link: [http://www.ceip.at/ms/ceip\\_home1/ceip\\_home/reporting\\_instructions/](http://www.ceip.at/ms/ceip_home1/ceip_home/reporting_instructions/) for stratification of activities between the categories 2D3i and 2G. According to the mapping table, use of fireworks, tobacco combustion, use of shoes, use of concrete additive, cooling lubricant, lubricant, pesticide, aeroplane de-icing agent are in the scope of NFR 2G other product use. Moreover, emissions from fat and edible oil extraction, glass wool enduction, mineral wool enduction, application of glues and adhesives, preservation of wood, underseal treatment and conservation of vehicles, vehicles dewaxing and other (preservation of seeds etc.) fall under category 2D3i other solvent use.

129. The ERT considers that most of the activities listed under NFR 2G exist in Moldova. The ERT recommends Moldova to collect statistical data for all the activities listed above, to estimate all relevant emissions, and to include all emissions in the NFR tables and to document the calculations in the IIR of the next submission.

130. The ERT considers that most of activities falling under NFR 2D3i exist in Moldova. The ERT recommends Moldova to collect statistical data for all listed activities, to estimate all relevant emissions, and to include the emissions in the NFR tables and to document all calculations in the IIR of the next submission.



## AGRICULTURE

### Review Scope

Pollutants Reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> , BC, HCB, POPs		
Years		1990 – 2015 + (Protocol Years)		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
3B1a	Dairy cattle	X		
3B1b	Non-dairy cattle	X		
3B2	Sheep	X		
3B3	Swine	X		
3B4a	Buffalo		X	
3B4d	Goats	X		
3B4e	Horses	X		
3B4f	Mules and asses		X	
3B4gi	Laying hens	X		
3B4gii	Broilers	X		
3B4giii	Turkeys	X		X
3B4giv	Other poultry	X		X
3B4h	Other animals	X		
3Da1	Inorganic N-fertilizers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	X		
3Da2b	Sewage sludge applied to soils	X		
3Da2c	Other organic fertilisers applied to soils (including compost)		X	
3Da3	Urine and dung deposited by grazing animals	X		
3Da4	Crop residues applied to soils		X	
3Db	Indirect emissions from managed soils		X	
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	X		
3Dd	Off-farm storage, handling and transport of bulk agricultural products		X	
3De	Cultivated crops	X		X
3Df	Use of pesticides	X		X
3F	Field burning of agricultural residues	X		X
3I	Agriculture other		X	
11A	Volcanoes		X	
11B	Forest fires		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**

131. The Republic of Moldova has provided a relatively detailed and generally transparent emission inventory for the agriculture sector. Emission estimates of NO<sub>x</sub>, NMVOC, NH<sub>3</sub> and PMs from most of the sources within the sector are reported for the time-series 1990-2015. In addition, emissions estimates of HMs and POPs from field burning of agricultural residues (3F) are also given. However, the Party did not report emission estimates for the year 2016. A separate chapter on the agriculture sector in the IIR (submission 2017) is provided. The ERT recommends that the Republic of Moldova includes emissions from the whole time series as requested in the Reporting Guidelines, including emissions for the year 2016 data in the next submission.

132. The ERT considers the methodologies used in the preparation of the agriculture inventory to be well-described in the IIR. The ERT commends the Republic of Moldova for the efforts to make the inventory transparent. However, the ERT encourages the Republic of Moldova to continue enhancing the transparency of the agriculture inventory, by including more details of the national circumstances that impact the emissions in future submissions.

### **Completeness**

133. The ERT considers the agriculture inventory of the Republic of Moldova to be generally complete as it covers many pollutants from the most important emission sources. The ERT commends the Republic of Moldova for the generally complete inventory and the good level of detail for the methodology descriptions. The ERT recommends that the Party uses the correct notation keys to report emissions in the NFR tables, for more details see the sub-sector specific recommendations.

134. However, the Party did not estimate PM emissions from off-farm storage, handling and transport of bulk agricultural products (3Dd) and instead used the notation key “Not occurring” (“NO”). The ERT recommends that the Party uses the correct notation key “Not estimated” (“NE”) instead of “NO” to report PM emissions from this source.

135. Similarly, the ERT also noted that emission of hexachlorobenzene (HCB) from the use of pesticides (3Df) is reported as “NO”, although efforts have been made by the Party to estimate emission from this source as indicated in the IIR.

### **Consistency including recalculation and time series**

136. The Republic of Moldova has used consistent methodologies, i.e. Tier 1 and Tier 2 methods, from the 2013 Guidebook to calculate emissions from manure management for the time series 1990-2015. The Party has indicated in its IIR that emissions from manure management (3B) have been revised using the 2013 Guidebook and an updated set of activity data of animal population. The ERT commends the Party for the efforts to make the inventory consistent and for the latest recalculation work. However, the ERT encourages the Party to further improve the time series consistency by providing more detailed explanations of the recalculations, including the rationale for them, the impact on the emissions of the sector and the implication of the total emission trends in the next annual submission. For details see the sub-sector specific recommendations.

## **Comparability**

137. The ERT notes that the inventory of Moldova is almost comparable with those of other reporting Parties as the methods used for estimating emissions from the agriculture sector are consistent with those proposed in the 2013 Guidebook. The ERT notes that the Reporting Guidelines request the use of the latest version of the Guidebook, currently the 2016 version, however, the translation of the 2016 Guidebook will only be finalized only during summer 2018. If other methods would be used, the ERT therefore recommends the Party to document these in the IIR to enable comparability with other reporting Parties.

138. The ERT notes that emissions from most of the animal categories under 3B have been estimated using a country-specific methodology (Tier 2), as the manure type for each animal livestock was determined according to the manure management system distribution data. The ERT commends the Republic of Moldova for applying Tier 2 methodologies and documenting these in the IIR.

139. The ERT notes that NH<sub>3</sub> emissions from NFR 3D, i.e. 3Da2 (Inorganic N-fertilizers) is a key category and therefore recommends the Party to apply Tier 2 methodologies for estimating these emissions. According to the Reporting Guidelines Tier 2 or higher tier methods should be used to estimate emissions from key categories.

## **Accuracy and uncertainties**

140. The Republic of Moldova has prepared an uncertainty analysis for its agriculture inventory based on the recommended error ranges of emission factors provided in the 2013 Guidebook. The ERT commends the Party for estimating uncertainties for the sector and recommends that the Party uses information on uncertainties from the 2016 Guidebook in its next annual submission.

141. The ERT noted that sector-specific QA/QC procedures are described in the IIR and that detailed QA/QC checks have been performed for the sector. The ERT commends Republic of Moldova for undertaking QA/QC procedures.

## **Improvement**

142. The Republic of Moldova has indicated in its IIR that a number of improvements are planned in the future:

- Category 3B manure management is a key source of NH<sub>3</sub>, N<sub>2</sub>O, NMVOC and PM emissions in the Republic of Moldova. For the next inventory cycle the possibility to collect additional data in order to apply Tier 2 methodology.
- Development of technology specific emission factors for the calculation of PM emissions from 3D crop production and agricultural soils including storage, handling and transport of agricultural products.

143. Category 3F is a relevant source of CO, SO<sub>2</sub>, POPs, heavy metal emissions. For the next inventory cycle the possibility to collect additional data in order to apply Tier 2 methodology.

144. The ERT commends the Party for the improvements in the inventory provided in the submission in 2017. However, the ERT recommends the Party to implement the planned improvements in the next submission in order to enhance the quality of the inventory.

## Potential Technical Corrections

145. None

## Sub-Sector Specific Recommendations

### **Category issue 1: Other poultry (3B4giv) and Turkeys (3B4giii) - NH<sub>3</sub>**

146. The ERT noted that there is a strong dip in the NH<sub>3</sub> emission trend between 2001 and 2003 for other poultry (3B4giv) and a large decline in NH<sub>3</sub> emission trend between 2012 and 2014 for turkeys (3B4giii). No explanation has been given in the IIR. The ERT asked the Party during the review to explain these deviations. The Party did not respond to the question raised by the ERT. The ERT recommends that the Republic of Moldova explains these issues in the next submission to enhance the transparency of its inventory.

### **Category issue 2: Cultivated crops (3De) - NMVOC and PM<sub>10</sub>**

147. The ERT noted that emission estimates for NMVOC and PM<sub>10</sub> in 2002 are very low in relation to the general emission trends of the entire time-series. The ERT asked the Party during the review to explain this issue. The Party did not respond to the question raised by the ERT. The ERT recommends that the Republic of Moldova explains the observed deviation in the emission trend of these two pollutants in the next submission to enhance the transparency of the inventory.

### **Category issue 3: Farm-level agricultural operations including storage, handling and transport of agricultural products (3Dc) and Off-farm storage, handling and transport of bulk agricultural products (3Dd) - PM<sub>10</sub> and PM<sub>2.5</sub>**

148. The Republic of Moldova reported emissions of PM from 3Dc and 3Dd as “NO”. The ERT recommends that the Party uses the correct notation key “NE” (“Not Estimated”) instead of “NO” (“Not Occurring”) to report PM emissions from this source and recommends the Party to collect activity data and to estimate and report these emissions in the next submission.

### **Category issue 4: Use of pesticides (3Df) – HCB**

149. The Republic of Moldova did not estimate HCB emissions from NFR 3Df although efforts have been made to calculate the emission from this source as indicated in the IIR. Emissions of HCB from this category are reported as “NO”. The ERT reminds the Party that the use of pesticides in agriculture can be a source of POP emissions due to the presence of HCB in some pesticides as a contaminant. The ERT recommends that the Party uses the correct notation key “NE” instead of “NO” to report emission of HCB from this source and to study if HCB occurs as an impurity in any of the pesticides used in the country, and to estimate the related emissions.

### **Category issue 5: Field burning of agricultural residues (3F) - NO<sub>x</sub>, SO<sub>2</sub>, NMVOC, NH<sub>3</sub>, PMs and HMs**

150. The ERT noted that the aggregated emission estimates of some air pollutants from NFR 3F are extremely small (e.g., NO<sub>x</sub> 0,000003240999 kt or about 3 kg and PM<sub>2.5</sub> emissions 0.000000719226 kt or about 0.72 kg). The ERT asked the Party during the review to provide an explanation on this issue. The Party did not respond to the question raised by

the ERT. The ERT recommends that the Republic of Moldova checks the units of the activity data, emission factors and in the results of the calculation of emissions, and enhances the use of QA/QC procedures in its inventory to avoid errors, or explains the reason behind the low emission estimates of these pollutants (e.g. the low level of activity) from this source in its next submission.

#### **Category issue 6: Field burning of agricultural residues (3F) - BC**

151. The Republic of Moldova has reported emissions of black carbon from NFR 3F. However, the ERT noted that the reported emission estimate for BC in 2002 deviates strongly from the general emission trend in the time series. The ERT asked the Party during the review process to comment on this issue. The Party did not respond to the question raised by the ERT. The ERT encourages the Republic of Moldova to explain the deviation in the emission trend in the next submission in order to promote the transparency of the inventory.

#### **Category issue 7: Inconsistency in the reported emission in the reporting templates (NFR) and IIR - NH<sub>3</sub>, NMVOC, NO<sub>x</sub> and PM<sub>2.5</sub>**

152. The ERT noted that the emission estimates of some pollutants (e.g., NH<sub>3</sub>, NMVOC, NO<sub>x</sub> and PM<sub>2.5</sub>) for 2015 in the NFR tables differ from those provided in the IIR (e.g., NH<sub>3</sub> emission from 3B in the NFR table is 17.59 kt while in the IIR is 16.79 kt (p.70) and NH<sub>3</sub> emission from 3Da1 is 4.2 kt in NFR tables while it is 4.93 kt in the IIR). The ERT asked the Republic of Moldova during the review to explain the observed inconsistency between the IIR and the NFR table. The Party did not respond to the question raised by the ERT. The ERT recommends that the Party enhances the use of QA/QC procedures for its inventory to avoid such errors in the future.

#### **Category issue 8: Inconsistency in reporting NFR codes in IIR**

153. The ERT noted that the Party has used incorrect NFR codes to describe many animal categories in its IIR (Agriculture chapter, page 4), such as 3B2 other cattle, 3B4 sows, 3B5 sheep and also horses, laying hens, broilers, other poultry, goats, fur animals, and mules. The ERT strongly encourages that the Party uses the correct NFR codes in the IIR as in the NFR tables in its next submission.

## WASTE

### Review Scope

Pollutants Reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM, Heavy Metals, POPs		
Years		1990 – 2016 + (Protocol Years)		
Code	Name	Reviewed	Not Reviewed	Recommendation Provided
5A	Solid waste disposal on land	X		X
5B1	Biological treatment of waste – Composting	X		X
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	X		X
5C1a	Municipal waste incineration	X		X
5C1bi	Industrial waste incineration	X		X
5C1bii	Hazardous waste incineration	X		X
5C1biii	Clinical waste incineration	X		X
5C1biv	Sewage sludge incineration	X		X
5C1bv	Cremation	X		X
5C1bvi	Other waste incineration	X		X
5C2	Open burning of waste	X		X
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	X		X
5D3	Other wastewater handling	X		X
5E	Other waste		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

154. Moldova reported emission estimates for some sources and pollutants in its 2013 NFR submission. Since then, including the 2017 submission, Moldova has not included waste sector estimates in its submission. The 2017 IIR does not include information on the waste sector. Moldova has not responded to a request for information on the waste sector as part of the review. The ERT strongly recommends that Moldova reports a complete waste sector emission inventory in its next submission. The ERT encourages Moldova to document the activities included and the methods used to estimate emissions in its next IIR.

### **Transparency, Completeness, Consistency, Comparability and Accuracy**

155. During the review the ERT asked Moldova to provide any available information on past or present emission estimates or any supporting information in the waste sector that may be available. The ERT didn't receive an answer to the question and therefore it was not possible to conduct a thorough review. In order for the ERT to be able to provide any support to Moldova, or to assess the completeness, consistency, comparability and accuracy of the waste sector inventory, Moldova needs to provide waste sector emission estimates and to outline the methods in the IIR.

## **Improvement**

156. Moldova has not provided an overview of the progress made as a result of any previous ERT recommendations. Given the lack of response to the question on the issue, the ERT encourages Moldova to report on improvements already made and to present an inventory improvement plan with schedules in the next IIR submission.

## **Potential Technical Corrections**

157. No potential technical corrections (PTCs) were prepared due to the lack of activity data or emission estimates available for the waste sector. Moldova neither provided response to the ERT on the questions raised during the review. The ERT strongly recommends that Moldova provides estimates of waste sector emissions across sources and pollutants with methodologies included in the Guidebook in its next submission.

## **Sub-Sector Specific Recommendations**

### **Category issue 1: 5A Solid waste disposal on land – All pollutants**

158. The last emission estimates provided by Moldova for this category were made for NMVOC in the 2013 submission. More recent submissions did not include emission estimates and no response was received related to the lack of reporting during the centralized review. The ERT recommends that Moldova includes estimates of NMVOC and NH<sub>3</sub> (where Guidebook methodologies are available) from this category as part of its next inventory.

### **Category issue 2: 5B1 and 5B2 Biological treatment of waste - all pollutants**

159. The ERT notes that Moldova has not provided emission estimates or notation key information in its NFR for categories under the waste sector 5B. The ERT recommends calculating and reporting emissions from these sources in the NFR tables and providing a description of methodology, AD and EFs used in the IIR of the next submission. Alternatively, if the activity does not occur in Moldova, the appropriate notation key “NO” should be applied in Moldova’s next NFR submission.

### **Category issue 3: 5C1 All waste incineration – all pollutants**

160. The last emission estimates provided by Moldova for waste incineration were made for Pb and PCDD/F only for the sub-category 6Ca clinical waste incineration (NFR09 format) in the 2013 submission. More recent submissions did not include estimates and no response was received related to the lack of reporting as part of this centralized review. The ERT recommends that Moldova includes estimates of all applicable pollutants from this sub-category as part of its next inventory, as well as provides emission estimates or appropriate notation keys for all other waste incineration sub-categories in its next NFR submission.

### **Category issue 4: 5C2 Open burning of waste – all pollutants**

161. The last emission estimates provided by Moldova for this category were for NO<sub>x</sub>, SO<sub>x</sub>, TSP and CO only under sub-category 6D other waste (NFR09 format) in the 2013

submission. More recent submissions have not included estimates and no response has been received related to the lack of reporting as part of this centralized review. The ERT recommends that Moldova includes estimates of all applicable pollutants from this sub-category in the current NRF14-02 format as part of its next inventory.

#### **Category issue 5: 5D All waste water handlings – all pollutants**

162. The last emission estimates provided by Moldova for this category were made for NH<sub>3</sub> in the 2013 submission. More recent submissions have not included estimates and no response has been received to the questions related to the lack of reporting as part of this centralized review. The ERT recommends that Moldova includes estimates of NMVOC and NH<sub>3</sub> (where Guidebook methodologies are available) from this category as part of its next inventory.



## **MATERIALS USED BY THE REVIEW TEAM**

1. Annex 1 NFR tables; 1990 – 2015 (Excel document submitted in 2017 )
2. Moldova Stage 2 S&A report
3. Moldova Stage 1 report 2017
4. Moldova IIR 2017
5. Moldova Stage 3 review report 2015
6. 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. Response to preliminary questions raised prior to the review (wiki)
2. Response to questions raised during the review (wiki)

## REFERENCES

- EMEP/EEA, 2016. EMEP/EEA air pollutant emission inventory guidebook – 2016. EEA Technical report No 21/2016. Available at: [www.eea.europa.eu/publications/emep-eea-guidebook-2016](http://www.eea.europa.eu/publications/emep-eea-guidebook-2016)
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# ANNEX I POTENTIAL TECHNICAL CORRECTIONS

FILE TC – Moldova 1A3b\_2\_REVIEW2018.xlsx

## TC | REVISED ESTIMATES

Description	Reference	Pollutant estimates (kt)		
		2015	2010	2005
PM2.5				
National total as reported 2018 (row 141)	CEIP database	10.626	4.483	4.523
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1A3bvi Road vehicle tyre and brake wear		NE	NE	NE
1A3bvii Road abrasion		NE	NE	NE
2D3b Road paving with asphalt		NE	NE	NE
Difference between original estimate and technical correction deemed necessary by the ERT				
1A3bvi Road vehicle tyre and brake wear		NE (2014 instead)	0.500	NE (2014 instead)
1A3bvii Road abrasion		NE (2014 instead)	0.317	NE (2014 instead)
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	NE	5.300	NE
PM10				
National total as reported 2018(row 141)	CEIP database	15.942	9.690	9.864
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1A3bvi Road vehicle tyre and brake wear		NE	NE	NE
1A3bvii Road abrasion		NE	NE	NE
2D3b Road paving with asphalt		NE	NE	NE
Difference between original estimate and technical correction deemed necessary by the ERT				
1A3bvi Road vehicle tyre and brake wear		NE (2014 instead)	0.932	NE (2014 instead)
1A3bvii Road abrasion		NE (2014 instead)	0.587	NE (2014 instead)
2D3b Road paving with asphalt		0.703	0.493	0.153
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	NE	11.703	NE
TSP				
National total as reported 2018 (row 141)	CEIP database	15.684	8.827	9.121
Difference between original estimate and revised estimates provided by Party and accepted by the ERT				
1A3bvi Road vehicle tyre and brake wear		NE	NE	NE
1A3bvii Road abrasion		NE	NE	NE
2D3b Road paving with asphalt		NE	NE	NE
Difference between original estimate and technical correction deemed necessary by the ERT				
1A3bvi Road vehicle tyre and brake wear		NE (2014 instead)	1.228	NE (2014 instead)
1A3bvii Road abrasion		NE (2014 instead)	1.174	NE (2014 instead)
2D3b Road paving with asphalt		3.279	2.301	0.715
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	NE	13.530	NE

