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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:

MONTENEGRO

CONTENT

INTRODUCTION

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

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

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

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

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

PART A: KEY REVIEW FINDINGS

5. The ERT acknowledges the effort that Montenegro has taken to provide estimates of the 4 NECD pollutants, particulate matter, CO, HMs and POPs.

6. No IIR has been provided and therefore the ERT encourages Montenegro to provide such a report for all future submissions. This would help provide the level of transparency that is required, and in particular would explain how the emission estimates have been calculated.

7. Due to the absence of an IIR (and hence the absence of information on the methodology and the data used in the inventory compilation) the ERT has been unable to evaluate a number of different aspects regarding this submission. For example, it has not been possible to assess the completeness or accuracy of the inventory.

INVENTORY SUBMISSION

8. In the 2012 submission, Montenegro has reported emissions for its protocol base years (1990) and a full time series up to 2010 (the latest year) for its protocol pollutants in the NFR09 format.

9. Montenegro has not submitted an accompanying IIR that describes the methodology for compiling the emission estimates. The ERT encourages Montenegro to produce such a report in subsequent years (it is not possible to undertake a Stage 3 review without one).

KEY CATEGORIES

10. Montenegro has not submitted any Key Category Analysis information. However, the Stage 2 review undertaken by CEIP suggested that 1A1a was the largest source of NOx emissions (41.3%) followed by A13biii (18.8%). The largest source of SO2 emissions was 1A1a (92.9%) and the largest source of NMVOC emissions was 1A4bi (33.3%). It is recommended that a KCA is included in an IIR and that the results are used to prioritise the inventory improvements.

QUALITY

Transparency

11. The ERT encourages Montenegro to submit an IIR so that the methodology employed to compile each of the sectors in the inventory is transparent. Where emissions do occur but no estimates are made (NE), the ERT recommends that information is provided as to why estimates have not been calculated (lack of data, lack of resources etc.).

12. Montenegro uses zero values in a number of areas in the reporting tables. The ERT encourages Montenegro to use the appropriate notation keys for reporting (e.g. NO where emissions are “Not Occurring”, NE where emissions are “Not Estimated” and IE where emissions are “Included Elsewhere”).

13. The ERT has noted that the use of notation keys is variable across the pollutants and sectors. For example, NO should be used where a source or process does not exist - therefore it is appropriate to apply this notation key across all pollutants for sources that do not exist in Montenegro. In a response to a question from the ERT, Montenegro stated that reporting of zero values arises from the software that is used to complete the NFR tables. The ERT recommends that the use of notation keys is reviewed and revised where necessary, to ensure that no zero values are included in the data submission.

Completeness

14. No IIR has been provided and therefore the review team is unable to assess the completeness of the inventory. The ERT considers it likely that some sources and pollutants are missing from the inventory. Further information is provided in the sector chapters of this report.

Consistency, including recalculations and time-series

15. The ERT encourages Montenegro to provide details on the rationale for any recalculations, as well as on the impacts of the resulting changes on the national estimates and time series in its future IIR submissions. The ERT recommends that time series should be recalculated where appropriate.

16. The NFR data submission does not include activity data. The ERT therefore cannot make an assessment of the consistency of the emission data. The ERT strongly encourages Montenegro to include activity data in the NFR submission in future years.

Comparability

17. It is not possible to assess the comparability of the inventory due the lack of information available on the methods and input data used to compile the inventory. The ERT encourages Montenegro to include both activity data in the NFR submission, as well as an IIR with information on methodologies and EF selection.

CLRTAP/NECD comparability

18. Montenegro does not report an inventory under the National Emission Ceilings Directive, so this comparison is not applicable.

Accuracy and uncertainties

19. Montenegro has not submitted an IIR and therefore no information is provided as to whether an uncertainty analysis has been undertaken. The ERT encourage Montenegro to consider options for undertaking an uncertainty analysis, and include an uncertainty analysis in an IIR for its next annual submission if possible.

Verification and quality assurance/quality control approaches

20. Montenegro has not submitted an IIR and therefore no information is provided as to whether there is a QA / QC system in place. The ERT encourages Montenegro to report on this in their next IIR, and to implement a QA/QC system if one is not already in place.

FOLLOW-UP TO PREVIOUS REVIEWS

21. The CEIP was unable to conduct a Stage 2 review of Montenegro's inventory submission due to activity data not being reported.

AREAS FOR IMPROVEMENT IDENTIFIED BY MONTENEGRO

22. No planned improvements have been mentioned by Montenegro. The ERT notes that a plan may be in place, but that it simply has not been provided to the ERT. Consequently, the ERT recommends that an improvement plan is established (if such a plan does not already exist), and that it is detailed in an IIR and provided with all future submissions.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS-CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

23. As explained in Part A of this report, the ERT strongly recommends that Montenegro submits an IIR as part of its next annual submission to help improve transparency and accuracy of the emissions inventory (and a range of other aspects). The format of the IIR should follow the format provided in Annex VI of ECE/EB.AIR97, Version 30th September 2009.

24. The ERT recommends that Montenegro improve the consistency and completeness of reported emissions (for detailed findings see Part B of this report).

25. The ERT encourages Montenegro to review their use of the notation keys and make amendments where appropriate.

26. The ERT recommends that Montenegro provide activity data in their CLRTAP submissions. This allows implied emission factors to be generated and compared with other countries, to assess comparability.

27. The ERT encourages Montenegro to submit information on LPS in line with the UNECE Reporting Guidelines.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO_2, NOx, NMVOC, NH_3, PM_{10} & $PM_{2.5}$, POPs, dioxins		
Years		1990 – 2006 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1.A.1.a	public electricity and heat production	X		X
1.A.1.b	petroleum refining	X		
1.A.1.c	Manufacture of solid fuels and other energy industries	X		X
1.A.2.a	iron and steel	X		
1.A.2.b	non-ferrous metals	X		X
1.A.2.c	chemicals	X		X
1.A.2.d	pulp, paper and print	X		X
1.A.2.e	food processing, beverages and tobacco	X		X
1.A.2.f.i	Stationary Combustion in Manufacturing Industries and Construction: Other (Please specify in your IIR)	X		X
1.A.2.f.ii	Mobile Combustion in Manufacturing Industries and Construction: (Please specify in your IIR)	X		X
1 A 3 e	Pipeline compressors ?		X	
1.A.4.a.i	commercial / institutional: stationary	X		
1.A.4.a.ii	commercial / institutional: mobile ?	X		X
1.A.4.b.i	residential plants	X		
1.A.4.b.ii	household and gardening (mobile)	X		
1.A.4.c.i	Agriculture/forestry/fishing. stationary	X		
1.A.4.c.ii	off-road vehicles and other machinery?	X		
1.A.4.c.iii	national fishing?	X		X
1.A.5.a	other, stationary (including military)	X		X
1.A.5.b	other, mobile (including military, land based and recreational boats)?	X		X
1.B.1.a	coal mining and handling	X		
1.B.1.b	solid fuel transformation	X		
1.B.1.c	other fugitive emissions from solid fuels)	X		X
1 B 2 a i	Exploration, production, transport	X		X
1 B 2 a iv	Refining / storage	X		
1 B 2 a v	Distribution of oil products	X		
1 B 2 b	Natural gas	X		X
1 B 2 c	Venting and flaring	X		
1 B 3	Other fugitive emissions from geothermal energy production, peat and other energy extraction not included in 1 B 2	X		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross-cutting issues.

Transparency:

28. As explained in Part A of this report, Montenegro sent no IIR. Consequently, the methodology employed cannot be checked by the ERT. No explanations of the emission trends over time are given. The ERT strongly encourages Montenegro to provide an IIR with all future submissions.

Completeness:

29. Montenegro updated only the 2010 emission estimates. The ERT encourages Montenegro to estimate emissions for the whole period: 1990-2010.

30. The ERT has noted that not all pollutants are estimated in all sub-sectors of the energy sector (e.g. TSP) even if the EMEP EEA Emission Inventory Guidebook 2009 gives EFs. The ERT encourages Montenegro to estimate the missing emissions by using the EFs and methodologies proposed by the EMEP EEA Emission Inventory Guidebook 2009.

Consistency including recalculation and time series:

31. Consistency could not be checked because Montenegro did not provide an IIR or a time series of data.

Comparability:

32. The ERT could not check comparability because there was a lack of information on the sources and methods used by Montenegro. The ERT encourages Montenegro to compile and submit an IIR to address this.

Accuracy and uncertainties:

33. The ERT could not check for accuracy and uncertainties because there is no IIR. The ERT encourages Montenegro to provide an IIR, to undertake an uncertainty analysis and to develop a quality system for the inventory in order to inform the improvement process and to provide an indication of the reliability of the inventory data.

Improvement:

34. Montenegro has not provided an IIR so the ERT cannot determine whether improvements have been made to the inventory.

Sub-sector Specific Recommendations.

Category issue 1: 1.A.1.c Manufacture of solid fuels and other energy industries – NOx, NMVOC, SOx, CO

35. The ERT has noted that there is a jump in the pollutant emissions in 1A1c. The ERT encourages Montenegro to provide some explanations in their IIR.

Category issue 2: 1.A.2.f.ii Mobile combustion in manufacturing industries and construction / NOx

36. The ERT has noted that there is an important dip in the NOx emissions in the 1A2fii sector. The ERT encourages Montenegro to provide some explanations in their IIR.

Category issue 3: 1.A.1.a Public electricity and heat production / NOx, SOx, PM2.5, PM10, CO, Pb, Cd, Hg, As, Cr, Se, dioxins

37. The ERT noted an important dip in the pollutants emissions in the 1A1a sector for 1995. The ERT encourages Montenegro to provide some explanations in their IIR.

38. The ERT noted an important increase of NOx emissions in 1A1a for 2010. The ERT encourages Montenegro to explain this increase in their IIR.

Category issue 4: 1.A.2.b Stationary combustion in manufacturing industries and construction (non ferrous metals) – all pollutants

39. The ERT has noted that no 1994 emissions have been reported for 1A2b while there are emissions reported for the other years. The ERT encourages Montenegro to give some explanations for this in their IIR.

40. The ERT noted an important dip in the SOx emissions in the 1A2b sector. The ERT encourages Montenegro to give some explanations in their IIR.

41. The ERT noted an important decrease of NOx and SOx emissions in 1A2b between 2008 and 2010. This is due to the fact that only the year 2010 was updated. The ERT encourages Montenegro to explain this decrease in their IIR.

Category issue 5: 1.A.2.d, 1.A.4.a.ii, 1.A.4.b.ii, 1.A.4.c.iii, 1.A.5.a, 1.A.5.b, 1.B.1.c, 1 B.2.a.i – all pollutants

42. The ERT has noted that for some energy sub-sectors (1A2d, 1A4aii, 1A4bii, 1A4cii, 1A5a, 1A5b, 1 B1c) the notation key “NE” is used. The ERT encourages Montenegro to check if these emissions are really not estimated (NE) or if they are included elsewhere (IE) and to explain how the activity data are estimated. During the review, the ERT asked Montenegro to provide an energy balance, but no response was received during the review week.

Category issue 6: 1.A.2.c Stationary combustion in manufacturing industries and construction (chemicals) – all pollutants

43. The ERT has noted that in the NFR table the notation key “NO” is used for 1A2c. The ERT found information that suggested that there were activities in the chemical industry in Montenegro (http://www.diplomatie.gouv.fr/fr/pays-zones-geo/montenegro/presentation-du-montenegro/article/presentation-39034). However, following the review, Montenegro indicated that this information was likely to be out of date, because there has been no chemical industry in Montenegro since the early 1990s. The ERT thanks the Party for this clarification.

Category issue 7: 1.A.2.e Stationary combustion in manufacturing industries and construction (food processing) – all pollutants

44. The ERT has noted that in the NFR table the notation key "IE" is used for 1A2e, but no explanation is given as to where the emissions are included. The ERT encourages Montenegro to give explanations for this in their IIR.

Category issue 8: 1.A.2.f.i Stationary combustion in other manufacturing industries and construction – NOx

45. The ERT noted an important decrease of NOx emissions in 1A2fi. The ERT encourages Montenegro to give some explanations for this decrease in their IIR.

Category issue 9: 1.A.1.a Public electricity and heat production – SOx

46. The ERT noted an important increase of SOx emissions in 1A1a for 2010. This is due to the fact that only the year 2010 was updated. The ERT encourages Montenegro to explain this increase in their IIR.

Category issue 10: 1.B.2.b Natural gas – NMVOC, SOx

47. The ERT has noted that for 1999 the notation key "NO" is used for SOx and NMVOC emissions in 1B2b, but that for the years before 1999 the notation key "NE" is used. The ERT encourages Montenegro to check the notation keys used for this sub-sector, and ensure consistency across the time series.

TRANSPORT

Review Scope

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

General recommendations on cross-cutting issues.

Transparency:

48. Montenegro did not submit an IIR, so the ERT could not understand the methodologies used to estimate transport sector emissions. The ERT recommends that Montenegro write and submit an IIR to improve the transparency of the inventory.

Completeness:

49. The ERT considers the transport sector to be almost complete. But the ERT notes that some "NE" notation keys are used where emissions are expected (e.g. TSP emissions from the whole 1A3b sector). The ERT recommends that Montenegro review the EMEP/EEA Emissions Inventory Guidebook for available EFs, and use them to estimate emissions instead of reporting NE in the NFR tables.

50. The ERT notes that no additional information was provided in the sheet to explain all notation keys used in the NFR table. The ERT recommends that

Montenegro complete at least the NFR “additional info” sheet and also explain the use of notation keys in their IIR.

51. The ERT notes that no activity data were provided. The ERT recommends that Montenegro estimate all required activity data and report them in the NFR table.

Consistency including recalculation and time series:

52. The ERT believes that Montenegro did not provide a consistent time series. This is because the trend of the time series is not as observed in other countries. For example, CO, NOx, NMVOC emissions increased in 1993, but it is expected that new vehicles will be equipped with catalysts that would reduce emissions. So the ERT believes that the EFs or the methodology used by Montenegro may not be appropriate. The ERT recommends that Montenegro check the EFs and the methodology that have been used, and in particular ensure consistency with the best practice presented in the EMEP/EEA Emissions Inventory Guidebook.

Comparability:

53. Montenegro did not submit an IIR, so the ERT could not determine whether the methodologies that have been used are consistent with the EMEP/EEA Guidebook. The ERT recommends that Montenegro write and submit an IIR that provides enough information to allow comparisons to be made with other countries and best practice guidance.

Accuracy and uncertainties:

54. The ERT notes that there is no uncertainty analysis (because no IIR has been provided). The ERT recommends that Montenegro develop an uncertainty analysis and report it in their IIR.

55. The ERT could not check whether QA/QC procedures are undertaken because no IIR was provided. The ERT recommends that Montenegro develop QA/QC procedures and report them in their IIR.

Improvement:

56. The ERT could not check any improvements as there is no IIR. ERT recommends that Montenegro includes improvements in the IIR.

Sub-sector Specific Recommendations.

Category issue 1: 1A3bi and 1A3bv: NOx, NMVOC, CO, PM2.5, PM10

57. The ERT notes that the pollutant emissions have unexpected trends over time. The introduction of Euro emission standards in the fleet is expected to decrease emissions from road vehicles, but Montenegro’s emissions are increasing or stable across the time series. It is possible that trends are a result of growth in the road transport sector, but this would require a very large increase in fuel consumption. The ERT recommends that Montenegro checks the accuracy of the emission estimates across the time series, and in particular ensures that different EFs are used for

vehicles of different ages. The methodology and the resulting trends should then be explained in an IIR.

Category issue 2: All 1A3: SOx

58. The ERT notes that the pollutant emissions have unexpected trends over time. The emissions of SOx are directly linked to fuel consumption, and the sulphur content of the fuels. It is expected that emissions will decrease with time, due to European fuel legislation associated with the content of S. The Party has explained that their national regulation on sulphur content of fuels is in line with the EU regulation, and entered into force in 1st January 2011. The ERT recommends that Montenegro reviews the calculations that underpin the trends in SOx emissions, and provides an explanation of the observed trends over time.

Category issue 3: All 1A3: TSP

59. The ERT notes that Montenegro did not estimate these emissions. However, the 2009 EMEP/EEA Guidebook provides EFs for TSP. The ERT recommends that Montenegro estimate and report these emissions in their next submission.

INDUSTRIAL PROCESSES

Review Scope

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

General recommendations on cross-cutting issues

Transparency:

60. Montenegro has not provided an IIR where documentation of sources or methods would be available. The ERT recommends that Montenegro provide an IIR with descriptions of the sources included in the inventory as well as descriptions of the methods used to quantify emissions. In cases where the emissions occur but are not estimated (NE), the ERT recommends that Montenegro explain why the emissions have not been calculated.

61. Montenegro uses zero values in the NFR table for some industrial sources. The ERT recommends that Montenegro reports “NA” or “NO” instead of zero values in cases where emissions cannot occur or are negligible/zero.

Completeness:

62. The ERT notes that some sources may be missing from the industrial processes sector inventory and that also some pollutants are not currently included in the emissions from industrial processes. Details are included in the sections below.

Consistency including recalculation and time series:

63. In the NFR tables for most industrial source categories, the use of the notation keys varies between pollutants from the same source. This is explained in more detail in the sections below.

64. The ERT has not been able to estimate the consistency of the emissions due to the lack of a time series. The ERT encourages Montenegro to submit a complete time series.

Comparability:

65. The ERT have not been able to estimate the comparability of the Montenegro inventory due to a lack of information on the sources and methods used in the inventory. The ERT encourages Montenegro to submit an IIR with the required information.

Accuracy and uncertainties:

66. The ERT encourages Montenegro to undertake an uncertainty analysis and to develop a quality system for the inventory in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

Improvement:

67. Montenegro has not provided an IIR, so it is not possible to estimate whether improvements have been made in the inventory. The ERT encourages Montenegro to provide an IIR with the required information.

Sub-sector Specific Recommendations.

Category issue 1: 2A1 Mineral industry categories - All Pollutants

68. Montenegro reports the notation key NO for all pollutants under this sector. The ERT considers it likely that there are activities in Montenegro in this sector causing emissions. Therefore the ERT recommends that Montenegro review this sector to determine whether emissions do exist. The ERT also recommends that supporting information is provided in an IIR.

Category issue 3: 2A2 Lime production - All pollutants

69. Montenegro reported $PM_{2.5}$ and PM_{10} particle emissions fractions from lime production. The ERT commends Montenegro for providing these estimates. However, due to a lack of documentation of the method used in the calculation it is not possible to review the quality of the estimates. The ERT recommends that Montenegro provide a description of the source and document the methods used in quantifying emissions in an IIR.

70. Montenegro uses zero values in the NFR table for some pollutants for this source. The ERT recommends that Montenegro uses suitable notation keys (NO, NA, NE) instead of zero values in cases where no emissions occur or where they are negligible.

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

71. Limestone and dolomite use is a source of particle emissions. It is not clear if this source exists in Montenegro or not. In the NFR table all pollutants are reported either as NA or NE. The ERT recommends that Montenegro investigate if the source exists, and estimate possible emissions or revise the notation keys accordingly. The description of the source as well as documentation of the methods used to calculate possible emissions should be provided in an IIR.

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

72. Soda ash production and use is a source of ammonia and particle emissions. From the NFR table it is not clear if the source exists in Montenegro as both of the notation keys NA and NO are used. The ERT recommends that Montenegro investigate if the source exists, and estimate possible emissions or revise the notation keys accordingly. The description of the source as well as documentation of the methods used to calculate possible emissions should be provided in an IIR. Methodologies to estimate emissions are presented in the EMEP/EEA Emission Inventory Guidebook (2009).

Category issue 5: 2A5 Asphalt roofing - All pollutants

73. Asphalt roofing is a source of NMVOC and particle emissions. From the NFR table it is not clear if the source exists in Montenegro as the notation keys NA and NE are used. The ERT recommends that Montenegro collect activity data and use the methodologies presented in the EMEP/EEA Emission Inventory Guidebook (2009) to calculate emissions, and to include relevant information in the IIR.

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

74. Montenegro has estimated NMVOC emissions from NFR 2A6 **for all years** except 2004. The emission value for all years is constant (0.026 kt). It is not possible for the ERT to estimate the quality of the reported values due to the lack of an IIR. However, the ERT recommends that Montenegro collect activity data for each year separately and recalculate the emissions for each year, including 2004. The ERT also recommends that Montenegro provide an IIR with the relevant documentation.

75. NFR 2A6 is also a source of particle and PCDD/F emissions. The ERT recommends that Montenegro estimate these emissions and include relevant documentation in the IIR.

76. Montenegro uses zero values in the NFR table for most of the pollutants from this source. The ERT recommends that Montenegro report NA instead of zero values in cases where no emissions occur or where they are negligible.

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

77. Montenegro reports zero values in the NFR table for the pollutants from this source, with the exception of the notation key NE for TSP. The ERT recommends that Montenegro estimate TSP emissions from this source. Also, the ERT recommends that instead of using zero values, Montenegro use relevant notation keys (NA, NO or NE). The reason for not estimating emissions should be explained in the IIR.

78. Quarrying and mining of minerals is a source of particle emissions. The ERT recommends that Montenegro collect activity data and use the methodologies presented in the EMEP/EEA Emission Inventory Guidebook (2009) to calculate the emissions.

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

79. Construction and demolition is a source of particle emissions. Montenegro does not report emissions from this source but uses instead the notation keys NA and NE. The ERT recommends that Montenegro estimate emissions which are not currently reported. If emissions are not estimated, this should be explained in an IIR, and documentation of the methods used for emissions that are estimated should be provided.

80. The ERT recommends that Montenegro collect activity data and use the methodologies presented in the EMEP/EEA Emission Inventory Guidebook (2009) to calculate the emissions.

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

81. Montenegro uses both the notation keys NA and NE for this source. “Storage, handling and transport of mineral products” is a source of particle emissions. The

ERT recommends that Montenegro collect data to estimate emissions and document the calculation in an IIR.

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

82. Montenegro reports the notation key NE for all pollutants under this sector. Other mineral product manufacturing may be a source of various emissions depending on the industrial activity. For instance, glass manufacturing falls under this category. The ERT recommends that Montenegro investigate sources that could fall under other mineral products, that it estimate relevant emissions from these sources and describe the source and document the methods used for the calculation of the emissions in an IIR.

Category issue 11: 2B1-4 Ammonia, Nitric acid, Adipic acid and Carbide production - All pollutants

83. Montenegro uses both the notation key NO and NA for pollutants from these sources. The ERT recommends that Montenegro changes the NA notation keys to NO for sources that do not occur.

Category issue 11: 2B5a Other chemical industry - All pollutants

84. Montenegro uses the notation key NO for all pollutants from this source. The ERT has not been able to check the accuracy of this, and requests that information is provided in an IIR to justify the use of the NO notation key.

Category issue 11: 2B5b Storage, handling and transport of chemical products - All pollutants

85. Montenegro uses the notation key NE for all pollutants from this source. The ERT recommends that Montenegro collects data to estimate emissions from this source and describes the sources and documents the methods used for the calculation of emissions in an IIR.

Category issue 12: 2C1 Iron and steel production - All pollutants

86. Montenegro has reported a comprehensive set of pollutants, including PCDD/F, PAH-4 and HCB from this source, and the time series of emissions appear to be quite consistent. The ERT commends Montenegro for providing this data. However, it is not possible for the ERT to estimate the quality of the values reported due to the lack of an IIR. The ERT recommends that Montenegro provide supporting information in an IIR.

Category issue 13: 2C2 Ferroalloys production - All pollutants

87. Montenegro has reported all pollutants from this source as not occurring (NO). The ERT has not been able to check the accuracy of this, and requests that information is provided in an IIR to support the use of this notation key.

Category issue 14: 2C3 Aluminium production - All pollutants

88. Montenegro has reported a comprehensive set of pollutants from this source, including estimates for PAH-4. The time series of the pollutants are, however, rather inconsistent. The ERT commends Montenegro for providing this data. However, it is not possible for the ERT to estimate the quality of the values reported due to the lack of an IIR. The ERT recommends that Montenegro provide supporting information in an IIR.

89. For certain pollutants from this source Montenegro has reported zero values. The ERT recommends that Montenegro use the notation key NO instead of zero for negligible emissions or where emissions are not occurring.

Category issue 15: 2C5a-d Non-ferrous metals production categories - All pollutants

90. Montenegro has reported all pollutants from these sources as not occurring (NO). The ERT has not been able to check the accuracy of this, and requests that information is provided in an IIR to justify the use of this notation key.

Category issue 16: 2C5e Other metal production - All pollutants

91. Montenegro has reported a comprehensive set of pollutants from this source, including PCDD/F and HCB and the time series seem to be quite consistent. The ERT commends Montenegro for providing this data. However, it is not clear from which activities the emissions originate. Neither is it possible for the ERT to estimate the quality of the values reported, due to the lack of an IIR. The ERT recommends that Montenegro provide supporting information in an IIR.

92. Montenegro uses zero values in the NFR table for certain pollutants from this source. The ERT recommends that Montenegro report NO instead of zero values in cases where no emissions occur or where they are negligible.

Category issue 17: 2C5f Storage, handling and transport of metal products - All pollutants

93. Montenegro has reported all pollutants from these sources as not estimated (NE). The ERT recommends that Montenegro collect data and estimate the emissions and provide relevant information of the sources and methods used in an IIR.

Category issue 13: 2D1 Pulp and paper - All pollutants

94. Montenegro has reported all pollutants from this source as not occurring (NO), or alternatively using the notation key NA. The ERT recommends that Montenegro changes the notation key NA to NO for all pollutants in cases where there is no pulp and paper industry in Montenegro.

Category issue 14: 2D2 Food and drink industry – NMVOC

95. Montenegro has estimated NMVOC emissions from food and drink industries. The emissions fluctuate from year to year. It is not possible for the ERT to estimate

the quality of the NMVOC values reported due to the lack of an IIR. The ERT recommends that Montenegro check the consistency of the activity data used in the calculations and provide an IIR with the relevant supporting information.

96. Montenegro has reported TSP emissions from this source as NE. The ERT recommends that Montenegro estimate emissions and include relevant information in the IIR.

Category issue 15: 2D3 Wood processing – All pollutants

97. Wood processing is a source of NMVOC and particle emissions. Montenegro has reported all pollutants from these sources as not estimated (NE). The ERT recommends that Montenegro collects data and estimates the emissions and provides relevant information of the sources and the methods used in an IIR. The methodology to estimate particle emissions is presented in the EMEP/EEA Emission Inventory Guidebook (2009).

Category issue 16: 2E Production of POPs – All pollutants

98. Montenegro has reported all pollutants from this source as NA or NE. The ERT recommends that Montenegro investigate whether the source exists, estimate possible emissions, and include relevant information in the IIR.

Category issue 17: 2F Consumption of POPs and heavy metals– All pollutants

99. Montenegro has reported TSP and heavy metal emissions from this source as not estimated (NE). The ERT recommends that Montenegro provide a description of the source in the IIR and collect data, estimate emissions, and document the calculations.

Category issue 18: 2G Other - All pollutants

100. Montenegro has reported heavy metal emissions from this source as not estimated (NE). Other industrial activities may be sources of various emissions depending on the industrial activity. Industrial processes like ceramics and bricks (tile) manufacturing fall under this category and are likely to occur in Montenegro. The ERT recommends that Montenegro investigate which industrial sources in the country might fall under this category, provide a description of the sources, collect data and estimate emissions, and that it document the methods used for the calculations in the IIR.

SOLVENTS

Review Scope

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

General recommendations on cross-cutting issues

Completeness:

101. Since no IIR has been submitted, the ERT cannot properly assess the completeness of the inventory of the solvents sector. The ERT strongly recommends that Montenegro submit an IIR. In the IIR, Montenegro should provide an explanation of why the categories 3B2, 3C and 3D3 for NMVOC emissions have been reported as NE, and describe the efforts that the Party is making to provide an estimation of emissions from these sectors. In the EMEP/EEA Air Pollutant Emission Inventory Guidebook, there are simple-to-apply Tier 1 methods for each of these categories. Moreover, the Party should specify in the IIR which SNAP categories have been reported under 3A1, 3A2, 3B1, 3D1 and 3D2 / NMVOC emissions, in order to enable the ERT to assess the completeness of the sector.

102. Montenegro reported PAHs emissions from the 3C and 3D3 source categories as NE. PAHs are emitted from asphalt blowing and wood preservation when creosote preservatives are used. In the EMEP/EEA Air Pollutant Emission Inventory Guidebook there is a simple-to-apply Tier 2 method for estimating these emissions by using the produced asphalt as activity data. Emission factors are provided for other pollutant emissions from asphalt blowing as well (NMVOC, TSP, heavy metals). For 3D3 a method is also provided in the Guidebook. The ERT recommends that Montenegro apply these methods, estimate emissions for the above mentioned categories and pollutants and report accordingly in the next submission.

Transparency:

103. The ERT has noted that the estimates of the emissions of the solvents sector are not reported transparently, since no IIR has been submitted that contains information about the methods, data sources and assumptions used for the emissions estimation. Moreover, the NFR tables do not include the activity data used for the emission calculations. In order to improve transparency of reporting and enable the ERT to assess the solvents sector, the ERT recommends that Montenegro provide, in a comprehensive way with a good level of detail, the above mentioned information per SNAP category in the IIR and NFR tables of its next submission.

Accuracy and uncertainties:

104. The ERT recommends that Montenegro include, in future IIRs, an uncertainty analysis of the solvents sector (at least for the key categories). The ERT recommends that information is also provided on how the uncertainty analysis is used to prioritise further improvements of the solvents sector inventory. The ERT also encourages Montenegro to include in the IIR the specific QA/QC procedures applied for the solvents sector.

Comparability:

105. Since no IIR has been submitted, the ERT cannot properly assess the comparability of the solvents sector. The ERT recommends that Montenegro include, in future submissions, an IIR that includes a good level of detail in activity data and methodology description.

106. The ERT has noted that the index of per capita NMVOC emissions for Montenegro from the 3A2 category is too high compared to other neighbouring countries. For example, it is about 6.5 times higher than the respective index of Croatia and 2.5 times higher than that of Austria. The ERT has also noted that the index of per capita NMVOC emissions for Montenegro from the 3D1 category is too low compared to other neighbouring countries. For example, it is about 4-5 times lower than the respective indices of Serbia and Austria. These observations may be indications of over- or underestimations of emissions of this category. The ERT recommends that Montenegro examine the emission estimations of these categories, as well as the completeness of the SNAP activities that were considered, and report accordingly in the next submission.

Consistency including recalculation and time series:

107. The ERT has noted that no recalculations have been performed for the 2012 submission.

108. The ERT has noted that the time series of the reported NMVOC emissions includes some peculiar peaks and drops. For 3A2 (key category), the NMVOC emissions time series presents a peculiar profile for the last reported years, i.e. a sharp increase in 2006, followed by a peak in 2008 and a significant decrease of emissions in 2010 and 2009 compared to 2008. For 3D1, which is also a key

category for NMVOCs, the emissions present a peak in 2004 (75% increase compared to 2003) followed by a minimum for the whole time series in 2005. The ERT recommends that Montenegro investigate the activity data, EFs, methodologies and assumptions used for the emission estimations in order to improve time series consistency.

Improvement:

109. The ERT encourages Montenegro to develop an improvement plan for the solvents sector, focusing on the improvement of transparency, completeness and time-series consistency. The improvement plan could be based on the findings included in this report and any other QA/QC procedure developed and performed by Montenegro. The ERT encourages Montenegro to include the results of this work in the next IIR.

AGRICULTURE

Review Scope:

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

General recommendations on cross-cutting issues

Transparency:

110. Montenegro includes estimates of NH_3, $PM_{2.5}$ and PM_{10} for the majority of the sub-sectors of agriculture in its NFR. However, no information is provided with respect to the activity data or methodological approaches employed. The ERT could therefore not fully review the agriculture sector. The ERT encourages Montenegro to provide information on methodological choices, the emission factors used and the activity data employed in an IIR as part of future submissions.

111. The ERT has found that Montenegro has used the notation keys inappropriately throughout the agriculture sector. A zero value is reported for a number of pollutants (for example: priority metals, other heavy metals and POPs) for a number of sub-sectors. Where the sub-sector(s) is/are not a source of emissions, estimates are not required or where methodological approaches do not exist, Montenegro is encouraged to use the appropriate notations keys in future submissions and provide a description of their use in an IIR.

112. A number of significant dips and jumps are evident in 4B4, 4B6, 4B8, 4B9a, 4B9b, 4D1a and 4F throughout the time series 1990-2010., For example in 4B4, emissions of NH_3 show an increase in 2006 by 25.7 per cent and subsequently a decrease by 43.2 per cent in 2007. During the review, the Party provided some information on the agricultural sector, and some observed trends can be explained. However, the ERT encourages Montenegro to fully explain all significant dips and jumps in their emission estimates and the associated activity data in an IIR as part of future submissions.

113. The ERT has found that Montenegro has reported zero values for a number of pollutants in sector 11B. The ERT encourages Montenegro to replace these zero values with the appropriate notation keys in its next annual submission and to provide a description of their use in an IIR.

Completeness:

114. Montenegro reports zero values for a number of pollutants (e.g. NOx, NMVOC) in sector 4G and utilises notation keys for other pollutants (e.g. TSP and HCH). The ERT encourages Montenegro to review reporting of emission estimates for this source category and to use the appropriate notation keys where required.

115. Montenegro does not currently include estimates of NMVOC emissions from the agriculture sector. The ERT encourages Montenegro to include estimates of NMVOC emissions for each of the source categories in agriculture for which emission factors and methodological approaches can be found in the latest EMEP/EEA Emission Inventory Guidebook.

116. Montenegro does not currently include estimates of NO emissions from the agriculture sector. The ERT encourages Montenegro to include estimates of NO emissions for each of the source categories in agriculture for which emission factors and methodological approaches can be found in the latest EMEP/EEA Emission Inventory Guidebook.

117. Montenegro uses the notation key “NE” in its NFR for emissions of NH_3, $PM_{2.5}$, PM_{10} and TSP for 4B7, 4B9c, 4B9d, 4B13 and 4D2c. The ERT encourages Montenegro to investigate whether emissions in these sub-sectors do actually occur. In cases where emissions do not occur, the correct notation key should be used.

WASTE

Review Scope:

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

General recommendations on cross-cutting issues

Introduction

118. Montenegro has submitted a CLRTAP emission inventory in the NFR 2009 format for the whole time series, but has not submitted an IIR. They only submitted an IIR in 2008. As a result, it was not possible for the ERT to carry out a proper and complete review.

119. Some recommendations are given here only on “Completeness” and “Consistency including recalculation and time series”. The other subjects are discussed in the general part of this report.

Completeness:

120. In a pilot project for compliance with EU reporting obligations an Informative Inventory Report of Montenegro was produced in 2008 (emissions from 2006).

121. According to this IIR there are no key sources for the main pollutants in the waste sector in Montenegro. For the waste sector only “Solid Waste Disposal on Land” is an existing source in Montenegro.

122. However, for other sources NE is primarily reported. In response to questions from the ERT, Montenegro explained that there are no incineration plants in the country, but that small-scale waste burning sites do exist. However, no data on small-scale waste burning sites are available.

123. The ERT recommends that Montenegro change the notation keys NE to NO for sources which do not occur, and give an explanation for the use of the other NEs in the “additional information” sheet of the NFR tables in their next submission.

124. Furthermore, the ERT noted that for the NFR code 6A most of the emission cells are filled in with “0”. The ERT strongly recommends that Montenegro use the relevant notation keys instead of using zero values, and explain the use of the notation keys in the “additional info” sheet in their next submission.

125. The ERT noted that no activity data were reported in the NFR tables.

126. In response to questions from the ERT, Montenegro sent a table with the amount of waste disposed of in landfills for the whole time series and the ERT commends the Party for this.

127. The ERT recommends that Montenegro include these activity data in the next data submission.

Consistency including recalculation and time series:

128. Montenegro reported a complete time series for NMVOC and NH3 for “Solid Waste Disposal on Land”. The ERT noted that both pollutants have no large dips and jumps in the time series. The ERT therefore considers these data to be consistent.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. The ERT raised questions prior to and during the review, as indicated below. Montenegro responded to some of the questions, but not to all of them.
   - Energy questions Q1 - 17
   - Transport questions Q1 - 6
   - Industrial Processes questions Q1 - 2
   - Solvents questions Q1 - 9
   - Agriculture questions Q1
   - Waste questions Q1 - 4

2. Montenegro Stage 2 S&A report
3. Montenegro Stage 1 report 2010