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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:**

**Iceland**

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## INTRODUCTION

1. The mandate and the overall objectives for the emission inventory review process under the LRTAP Convention are 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 – 2009 reflecting current priorities from the 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 Iceland coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 27<sup>th</sup> June to 1<sup>st</sup> July 2011 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 – Anne Wagner (UK), Energy – Nina Holmengen (NO) and Giorgos Mellios (GR), Industry – Sebastian Plickert (DE), Solvents – Ioannis Sempos (GR), Agriculture + Nature – Romain Joya (FR), Waste – Intars Cakaras (LIT).
4. Kevin Hausmann (DE) 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.unece.org/env/documents/2007/eb/ge1/ece.eb.air.ge.1.2007.16.e.pdf>

## **PART A: KEY REVIEW FINDINGS**

5. Iceland provided active support to the ERT during the 2011 centralised stage 3 review replying to questions promptly. The Icelandic inventory partly covers the pollutants and time series required under the UNECE Guidelines. Based on the additional information provided by the Party the ERT was able to review the Icelandic inventory within the specified time period.

### **INVENTORY SUBMISSION**

6. The inventory is partly in line with the EMEP/EEA Inventory Guidebook and UNECE Reporting Guidelines. NFR tables for the year 2009 are not provided.

7. In the 2011 CLRTAP submission, Iceland provided an inventory for SO<sub>x</sub>, NO<sub>x</sub>, NMVOC, CO, Diox and POPs in NFR09 categories for the time series from 1990 to 2008. The ERT encourages Iceland to report emissions for PM<sub>10</sub>, PM<sub>2.5</sub>, TSP, NH<sub>3</sub> and heavy metals in the future for the complete time series, even though the Party did not sign all protocols under the CLRTAP.

8. The ERT notes that Iceland does not submit emission estimates for the year 2009. The ERT encourages the Party to submit the inventory in line with the CLRTAP submission deadline and to cover the complete time series.

9. The ERT commends Iceland for including gridded data for 1990, 1995, 2000 and 2005 in their 2010 LRTAP submission.

10. Further proposals for improvements identified during this review are presented in part B of this report.

### **KEY CATEGORIES**

11. The Icelandic IIR contains a level Key Category Analysis (KCA) consistent with the EMEP/EEA Guidebook for all reported pollutants of 2008 emissions only. The ERT encourages Iceland to present the key sources also by trend assessment as well as with their percentage contribution to the total emissions. To clarify this issue, the ERT recommends that Iceland adds - in the IIR paragraph "1.5 Key Source analysis" - the trend for key sources over the complete time period and that it includes all categories that are identified as key categories in table 1.1.

12. The definition threshold used for KCA is consistent with UNFCCC (95%), which is higher than the specified 80%. The ERT would like to point out that Tier 2 or 3 methodologies should be applied to all sources identified as key categories, thus to all sources listed in table 1.1.

### **QUALITY**

#### ***Transparency***

13. The IIR includes key trends by pollutant over the reported time series. The ERT commends Iceland for providing the trends not only as total emissions but also as gridded emissions in the form of maps.

14. Most of the information in the IIR is provided at aggregated level; however, in each sector more information on assumptions, activity data trends, data sources, emission drivers and the tiers of methods used could be included in the IIR to improve transparency further.

15. The ERT encourages Iceland to provide information in the 'Additional Info' table in the reporting template, and in particular to provide NFR codes for sectors with notation keys, especially 'IE'. Iceland has indicated that this is something they can add in the 2012 IIR.

16. Iceland does not report separate emissions for national and international aviation. The ERT encourages Iceland to report more disaggregated emissions for national and international Landing and Take off (LTO) and Cruise. Emissions from national and international LTO have to be included in the national total.

17. Iceland does not report any emissions from agriculture. The ERT encourages Iceland to report emissions from agriculture.

### ***Completeness***

18. Iceland has reported emissions for SO<sub>x</sub>, NO<sub>x</sub>, NMVOC, CO, PCDD/PCDF (dioxins/ furans) and POPs. The ERT encourages Iceland to report emissions for PM<sub>10</sub>, PM<sub>2.5</sub>, TSP, NH<sub>3</sub> and heavy metals as well in the future. The ERT notes that Iceland has not submitted emission estimates for the year 2009. The ERT encourages the Party to submit the inventory in line with the official CLRTAP deadlines and for the complete time series. Iceland does not submit any projections. However, the ERT encourages Iceland do so in the future.

19. The ERT recognizes the fact that Iceland has ratified the Protocol on Persistent Organic Pollutants only. However, because of the need for environmental assessment, it is a great benefit when coverage of reported data is as complete as possible for all pollutants. The ERT thus encourages Iceland to provide time series for all gases, particles, heavy metals and POPs in the future.

20. Iceland has provided total emissions as well as gridded emissions for the years 1990, 1995, 2000 and 2005 for POPs and PCDD/PCDF (dioxins/ furans).

21. The IIR lists all sources that are not estimated (chapter 1.8) by pollutant. However, no information is provided whether Iceland plans to report emissions from these sources in the future. The ERT encourages Iceland to add more information on why these sources are currently not reported (e.g. lack of activity data, or the source does not exist in Iceland) and whether there are plans to report these in the future.

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

22. The IIR does not provide any explanation on recalculations. However, during the review process clear explanations were provided. The ERT encourages Iceland to provide detailed and complete information on recalculations in the next IIR submissions by pollutant, section and year.

### ***Comparability***

23. The Icelandic inventory is partly comparable with those of other reporting parties. The allocation of source categories follows that of the EMEP/EEA Reporting Guidelines.

24. The ERT encourages Iceland to provide further information on the methodologies used for compiling emissions from aviation for NO<sub>x</sub>, CO, NMVOC and SO<sub>2</sub>. The ERT suggests that Iceland indicates that only LTO emissions (national and international) are included in the national total and that Cruise emissions (national and international) are listed as memo items to enable comparison with other Parties.

### ***CLRTAP/NECD comparability***

25. Iceland does not report emissions under the NEC Directive. Iceland reports the indirect greenhouse gases compiled under the UNFCCC to the CLRTAP. However, these are calculated in line with the UNFCCC Guidelines to comply with the reporting requirements under the UNFCCC. The data on SO<sub>x</sub>, NO<sub>x</sub> and CO are consistent between the UNFCCC and the CLRTAP.

### ***Accuracy and uncertainties***

26. Iceland does not currently perform an uncertainty analysis. The ERT encourages Iceland to provide quantitative uncertainty estimates of emissions in its next CLRTAP submission, especially for key sources.

27. The ERT encourages Iceland to provide further documentation of the trend analysis to verify that identified dips and jumps are not due to over- or underestimation of emissions in certain years.

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

28. Iceland's IIR lists the institutional arrangements, the inventory preparation process and the QA/QC processes. Iceland has elaborated and implemented a wide-ranging quality assurance/quality control (QA/QC) plan in accordance with the EMEP/CORIANIR Guidebook ('QA/QC MANUAL: QUALITY SYSTEM IN THE ICELANDIC AIR EMISSION INVENTORY'). The document describes the general QA/QC procedures (Tier 1) applied to the whole inventory at all times and elements of sector specific procedures (Tier 2). The Party has also defined roles and responsibilities for inventory compilation, improvement and QA/QC.

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

29. The current stage 3 centralised review has used outputs from the stage 1 and stage 2 review processes. The ERT encourages Iceland to refer to these previous reviews when examining this review report, and when updating its improvement plans.

## **AREAS FOR IMPROVEMENT IDENTIFIED BY ICELAND**

30. Iceland does not list any improvements in the IIR. During the stage 3 review Iceland confirmed that improvements made for the GHG inventory (activity data only) had fed through into improvements to the CLRTAP inventory. Internal reviews of the inventory have not taken place.

31. During the centralised stage 3 review and exchange with the ERT, some improvements have been identified by Iceland:

- (a) Consider the need to provide more detail on the notations keys used, especially 'IE',
- (b) Provide more detail on the description of time series and drivers of trends; recalculations and improvements should be reported in future IIR submissions.

32. The ERT recognises the level of effort undertaken by Iceland in providing an inventory to perform a stage 3 review. Any questions issued by the ERT to the Party were addressed promptly and descriptive responses were provided, enabling good communication during the review process.

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

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

33. The ERT identifies the following cross-cutting issues for improvement:
34. The ERT recommends that Iceland reports all pollutants under CLRTAP.
35. The ERT recommends that Iceland provides the complete time series, both historic and projected, in line with the CLRTAP reporting obligations and deadlines. As requested in the CLRTAP Reporting Guidelines for Parties to the Gothenburg Protocol, ERT recommends that Iceland completes furthermore as far as possible emissions of national and international aviation and agriculture.
36. The ERT recommends that Iceland provides, for each sector, more information on assumptions, activity data time series, data sources, emission drivers and tiers of method used.
37. The ERT encourages Iceland to provide more complete and detailed information on recalculations in the 2012 IIR.
38. The ERT encourages Iceland to provide an uncertainty analysis.
39. The ERT recommends that improvements relating to specific source categories are presented in the relevant NFR sector chapters in the IIR.
40. The ERT encourages Iceland to provide information on the notation keys used, especially IE and NE, within the reporting template.
41. The ERT encourages Iceland to include its improvement plan in the IIR, and to highlight how the identified improvements are prioritised, taking into account issues with important impacts in the national emission inventory. The improvement plan should also cover information on missing sources and whether there are any plans to include these in the inventory.
42. The ERT recommends that Iceland reports trends and percentage contributions to the total emissions for all key sources.
43. The ERT encourages Iceland to provide more descriptions of drivers in the IIR when explaining key trends, so as to fully explain significant dips and jumps.

## SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

### ENERGY

#### Review Scope

Pollutants Reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, CO Dioxin, PAH-4		
Years		1990 – 2008		
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	NO		
1.A.1.c	Manufacture of solid fuels and other energy industries	NO		
1.A.2.a	iron and steel	x		x
1.A.2.b	non-ferrous metals	x		x
1.A.2.c	chemicals	NO		
1.A.2.d	pulp, paper and print	NO		
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)			
1 A 3 e	Pipeline compressors?			
1.A.4.a.i	commercial / institutional: stationary	x		
1.A.4.a.ii	commercial / institutional: mobile ?			
1.A.4.b.i	residential plants	x		x
1.A.4.b.ii	household and gardening (mobile)			
1.A.4.c.i	Agriculture/forestry/fishing. stationary	NO		
1.A.4.c.ii	off-road vehicles and other machinery?			
1.A.4.c.iii	national fishing?			
1.A.5.a	other, stationary (including military)	NO		
1.A.5.b	other, mobile (including military, land based and recreational boats)?			
1.B.1.a	coal mining and handling	NO		
1.B.1.b	solid fuel transformation	NO		
1.B.1.c	other fugitive emissions from solid fuels	NO		
1 B 2 a i	Exploration, production, transport	NO		
1 B 2 a iv	Refining / storage	NO		
1 B 2 a v	Distribution of oil products	x		x
1 B 2 b	Natural gas	NO		
1 B 2 c	Venting and flaring	NO		
1 B 3	Other fugitive emissions from geothermal energy production, peat and other energy extraction not included in 1 B 2	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:**

44. The ERT commends Iceland for rapidly providing clear answers to the questions posed during the review process.

45. The ERT finds that the emissions are reported in a transparent way, and that the notation keys, for the most part, are used appropriately. The ERT has formulated some recommendations concerning the use of notation keys; see sub-sector specific recommendations 2 and 6. The ERT notes that the Icelandic IIR has a good description of trends for dioxins, PAHs, NO<sub>x</sub>, SO<sub>x</sub>, CO and NMVOC.

46. The ERT suggests that the IIR could be improved by the inclusion of additional information about trends in energy use at a sector or sub-sector level. The ERT recommends that information concerning methodologies and emission factors used for the calculation of emissions other than dioxins and PAHs are included in the IIR. This would be especially welcomed for 1B3, which is a key category for SO<sub>x</sub>. The ERT commends Iceland for their plans to include more information about emission factors for PAH emissions within the energy sector in their next IIR. For more details concerning the transparency of the Icelandic inventory, see sub-sector specific recommendations 5 and 7.

#### **Completeness:**

47. The ERT recognizes the fact that Iceland has ratified the Protocol on Persistent Organic Pollutants only. However, because of the need for environmental assessment, it is a great benefit when coverage of reported data is as complete as possible for all pollutants. The ERT thus encourages Iceland to provide time series for all gases, particles, heavy metals and POPs in the future.

48. The ERT considers the inventory to be relatively complete for the energy sector for the pollutants included in the inventory. There are, however, some potential emission sources that are reported as not estimated or not applicable. In particular, there are very few emissions reported in sub-sector 1B, and the emissions of PAH-4 are less complete than the other pollutants. See sub-sector specific recommendations 1, 2, 4, and 6.

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

49. The ERT has found that the Icelandic inventory is relatively consistent throughout the time series and between pollutants. No obvious breaks in the time series have been identified, and the trends for the different pollutants are comparable within each sub-sector. One exception is waste incineration, where the activity data are more unreliable at the beginning of the time series (according to the IIR).

50. There is no information concerning recalculations in the Icelandic IIR. However, recalculations are described in the NIR, and many of these recalculations are valid for LRTAP reporting as well. The ERT encourages Iceland to include information about recalculations in the IIR.

#### **Comparability:**

51. The ERT notes that the methods used are mostly consistent with those proposed in the Guidebook. However, emission factors and methodologies for NO<sub>x</sub>, SO<sub>x</sub>, NMVOC and CO have been taken from the revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual. The ERT encourages Iceland to ensure that the emission factors used are in accordance with the latest EMEP/EEA Guidebook 2009.

52. The ERT welcomes the future inclusion of more thorough descriptions of the emission factors used for PAH emission calculations. No systematic over- or under-estimates were identified during the review process, but the ERT has some concerns regarding available activity data on waste incineration (see sub-sector specific recommendation 3).

#### **Accuracy and uncertainties:**

53. The ERT encourages Iceland 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. Iceland performs general QA/QC checks for the greenhouse gas inventory, which also is valid for CLRTAP reporting. According to the NIR, no source specific QA/QC routines have been implemented for the energy sector. The ERT encourages Iceland to implement QA/QC routines for the energy sector.

#### **Improvement:**

54. No planned improvements are documented in the IIR. However, planned improvements are described in detail in the NIR, and many of these planned improvements are also valid for LRTAP reporting. The ERT recommends that the planned improvements within the stationary energy sector are included in the IIR, and welcomes the planned preparation of a national energy balance for Iceland. This will ensure that the total fuel consumption can be accounted for in the inventory.

#### *Sub-sector Specific Recommendations.*

##### **Category issue 1: 1.B.2.a.v Distribution of oil products - NMVOC**

55. The ERT has noted that Iceland does not estimate emissions of NMVOC from the distribution of oil products (sector 1B2av). Although this is likely to be a small source of NMVOC emissions compared to the national totals, emission factors are provided in the EMEP/EEA Guidebook. The ERT encourages Iceland to apply these default factors and to estimate NMVOC emissions from the distribution of oil products (sector 1B2av) in future submissions.

##### **Category issue 2: 1.A - All Pollutants**

56. According to the NFR tables, combustion of biomass is not occurring in Iceland. Iceland has informed the ERT that a small amount of wood is used for recreational purposes. Although this is likely to be a very small source of emissions (according to Statistics Iceland<sup>2</sup> 535 tonnes of fuel wood and wood charcoal were imported into Iceland in 2008), the ERT suggests that emissions from the use of wood should be calculated in order to improve the completeness of the inventory.

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<sup>2</sup> [Statistics on external trade from Statistics Iceland](#)

This is probably most relevant within the sub-sector 1A4bi. However, the ERT understands that this improvement should not have the highest priority, and recommends that the notation key for biomass activity data is changed from NO to NE in relevant sectors until such emissions are calculated.

**Category issue 3: 1.A.1.a Public electricity and heat production - Dioxin**

57. Sub-sector 1A1a is a key category for dioxins. The ERT encourages Iceland to use a higher tier methodology for calculating emissions from key categories, taking combustion technologies into account. Iceland has informed the ERT that dioxin emissions in 1A1a mainly come from waste incineration with energy recovery. The ERT commends Iceland for reporting emissions from waste incineration with energy recovery in 1A1a according to good practice, and would suggest that the IIR is improved by including a more thorough description of the activity data and methodology used for calculating emissions of dioxin from waste incineration with energy recovery. The reported time series for other fuels (waste) is relatively constant for 1996-2005, and the ERT recommends that these activity data are quality assured.

**Category issue 4: 1.A.4.b.i Residential: Stationary plants - PAH**

58. The ERT notes that while the Guidebook provides emission factors for all four PAHs for liquid fuels in 1A4bi, these emissions have not been estimated for Iceland. Iceland has informed the ERT that this is due to limited resources. The ERT understands that priorities have to be made when resources are limited, but will, however, encourage Iceland to report PAH emissions from 1A4bi in the future.

**Category issue 5: 1.A.1.a Public electricity and heat production - Dioxin**

59. The ERT noted that the implied emission factor for dioxin emissions in 1A1a was much lower in 2007 than in the years before and after. Iceland has provided a thorough answer to this question, namely the establishment of a new aluminium plant that needed to be provided with electricity from the distribution system in 2007. The ERT commends Iceland for providing this answer, and regards it to be a very good example of sector specific trend explanation. The ERT encourages Iceland to include more such explanations in its IIR.

**Category issue 6: 1.A.2 Manufacturing industries and construction (combustion) - PAH**

60. In the NFR tables, emissions of all PAHs are reported as NA for sectors 1A2a-1A2e. The 2009 Guidebook provides emission factors for PAH emissions from these sources. The ERT recommends that Iceland calculates PAH emissions from combustion within manufacturing industries and construction, and suggests that the notation key is altered to NE until these emissions are calculated.

**Category issue 7: 1.A.2.f.i Stationary combustion in manufacturing industries and construction: Other - All pollutants**

61. During the review process, Iceland provided the information that emissions from the cement industry and mineral wool production had been reported under 1A2fi. For PAHs, emissions from mineral wool production were NE, and for dioxin, emissions from the cement industry were IE as they had been reported under

industrial processes, 2A1. The ERT wishes to thank Iceland for providing this explanation, and recommends that this information is included in the IIR to improve transparency.

## TRANSPORT

### Review Scope

Pollutants Reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, CO, POPs, activity data		
Years		1990 – 2008		
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		x
1.A.3.a.ii.(i)	civil aviation (domestic, LTO)	x		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		
1.A.3.b.iii	road transport, heavy duty vehicles	x		
1.A.3.b.iv	road transport, mopeds & motorcycles	x		x
1.A.3.b.v	road transport, gasoline evaporation		NE	
1.A.3.b.vi	road transport, automobile tyre and brake wear		NR	
1.A.3.b.vii	road transport, automobile road abrasion		NR	
1.A.3.c	railways		NO	
1.A.3.d.i (ii)	international inland navigation		NO	
1.A.3.d.ii	national navigation	x		
1.A.4.b.ii	household and gardening (mobile)	x		
1.A.4.c	agriculture / forestry / fishing	x		
1.A.4.c.ii	off-road vehicles and other machinery	x		
1.A.4.c.iii	national fishing	x		
1.A.5.b	other, mobile (including military, land based and recreational boats)		NO	
1 A 3 d i (i)	International maritime navigation	x		
1 A 3	Transport (fuel used)	x		

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

### General recommendations on cross-cutting issues.

#### **Transparency:**

62. Iceland has only ratified the Protocol on POPs and therefore they mainly describe POPs in their IIR. The calculation method is described and the relevant EFs for POPs are presented for the main categories. The ERT encourages Iceland to provide descriptions of the calculation method and EFs for the other reported pollutants, i.e. main pollutants and CO.

#### **Completeness:**

63. The ERT considers the transport sector to be generally complete for most of the main pollutants (NO<sub>x</sub>, NMVOC, and SO<sub>x</sub>), CO and POPs. The other pollutants, i.e. NH<sub>3</sub>, particulate matter and heavy metals, are not reported. The ERT encourages Iceland to provide descriptions of plans for estimating these pollutants in the IIR in the future.

64. The ERT has found that non-exhaust sources (fuel evaporation, tyre, brake and road surface wear) are missing in the transport sector. The ERT considers that these sources have little influence on the national total but encourages Iceland to provide the rationale for excluding these sources and/or include descriptions of plans for estimating them in the IIR.

**Consistency including recalculation and time series:**

65. No consistency issues have been identified for the transport sector. Trends in emissions are sufficiently described for the transport sector.

66. Iceland has not recalculated emissions for any of the pollutants reported in the inventory.

**Comparability:**

67. The methods and emission factors used are consistent with an older version of the Guidebook (second edition – Feb 2000). The ERT recommends that Iceland uses the latest Guidebook version available (2009).

68. Based on reported activity data and the Tier 1 emission factors provided in the Guidebook, there seems to be no significant over- or underestimation of emissions for the main pollutants.

**Accuracy and uncertainties:**

69. Iceland has not provided any information on the methodology and/or emission factors used for the estimation of its emissions, with the exception of POPs. Therefore, the accuracy of the reported emissions cannot be assessed sufficiently.

70. Iceland has not provided any uncertainty estimates. The ERT encourages Iceland to undertake uncertainty analysis in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

71. Iceland has performed QA/QC activities which are described in more detail in a separate document. The ERT encourages Iceland to provide sector specific information on QA/QC procedures in future submissions.

**Improvement:**

72. No improvements for the transport sector are mentioned in the IIR.

*Sub-sector Specific Recommendations.*

**Category issue 1: 1.A.3.a Air Transport: All Pollutants**

73. During the review Iceland stated that emissions from aviation had been estimated only as totals and hence LTOs for civil aviation had been included in civil aviation and LTOs for international aviation in international aviation. The ERT recommends that Iceland splits aviation emissions into LTOs and Cruise as described in the Guidebook. Where this is not possible, the notation key "IE" should be used and explained in the NFR tables as well as in the Icelandic IIR.

**Category issue 2: 1.A.3.b Road transport: All Pollutants**

74. During the review Iceland stated that a split between cars and mopeds/motorcycles had not been performed and hence emissions from mopeds/motorcycles had been included in the emissions from passenger cars. The ERT recommends that Iceland splits road passenger transport emissions into passenger cars and mopeds/motorcycles as described in the Guidebook. Where this is not possible, the notation key "IE" should be used and explained in the NFR tables as well as in the Icelandic IIR.

## INDUSTRIAL PROCESSES

### Review Scope

Pollutants Reviewed		NO <sub>x</sub> , NMVOC, SO <sub>2</sub> , CO, PCDD/F, PAH		
Years		1990 – 2008		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
2.A.1	cement production	x		x
2.A.2	lime production		x	
2.A.3	limestone and dolomite use			x
2.A.4	soda ash production and use		x	
2.A.5	asphalt roofing		x	
2.A.6	road paving with asphalt	x		
2.A.7.a	Quarrying and mining of minerals other than coal			x
2.A.7.b	Construction and demolition			x
2.A.7.c	Storage, handling and transport of mineral products			x
2.A.7.d	Other Mineral products (Please specify the sources included/excluded in the notes column to the right)		x	
2.Bb.1	ammonia production		x	
2.B.2	nitric acid production		x	
2.B.3	adipic acid production		x	
2.B.4	carbide production		x	
2.B.5.a	Other chemical industry (Please specify the sources included/excluded in the notes column to the right)		x	
2.B.5.b	Storage, handling and transport of chemical products (Please specify the sources included/excluded in the notes column to the right)		x	
2.C.1	iron and steel production		x	
2.C.2	ferroalloys production	x		
2.C.3	aluminium production	x		
2.C.5.a	Copper Production		x	
2.C.5.b	Lead Production		x	
2.C.5.c	Nickel Production		x	
2.C.5.d	Zinc Production		x	
2.C.5.e	Other metal production (Please specify the sources included/excluded in the notes column to the right)		x	
2.C.5.f	Storage, handling and transport of metal products (Please specify the sources included/excluded in the notes column to the right)		x	
2.D.1	pulp and paper		x	
2.D.2	food and drink		x	
2.D.3	Wood processing		x	
2.E	production of POPs		x	
2.F	consumption of HM and POPs (e.g. electrical and scientific equipment)		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	

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:**

75. Iceland did not provide an IIR in 2011, so the ERT had to revert to the IIR from 2010. This IIR was generally transparent and well organised although some additional detail is recommended below. The ERT encourages Iceland to prepare a similar, well-structured IIR every year.

76. With regard to POP emissions from industrial processes, the description of the methodology is very good, and the trends are also explained very well. The latter also applies to the reporting of mass pollutants (NO<sub>x</sub>, NMVOC, CO, and SO<sub>2</sub>), but no detailed information is provided on methodology. As emissions of NH<sub>3</sub>, particulate matter and heavy metals have not been reported in general, they are not addressed in the IIR either. The ERT encourages Iceland to extend the description of methodologies in the IIR to all pollutants being reported, i.e. actually to include the methodology descriptions for NO<sub>x</sub>, NMVOC, CO, and SO<sub>2</sub>.

77. For transparency purposes, it would be helpful to explain the rationale behind the use of each notation key in the IIR. This applies in particular to the notation key 'IE', as it is not usually evident in which source category the emissions in question have been included.

### **Completeness:**

78. With regard to POP emissions from industrial processes, the ERT considers the reporting on this sector to be rather complete and comprehensive, with good levels of detail in the methodology descriptions. However, emissions of PCB and HCB have not been reported, although there is some information available on these pollutants in the EMEP/CORINAIR Emission Inventory Guidebooks 2006, 2007 and 2009 (see separate chapters for sources of PCB and HCB emissions).

79. The ERT also appreciates that Iceland provides emission data on NO<sub>x</sub>, NMVOC, SO<sub>x</sub> and CO for individual industrial sectors, although Iceland is not a member of the Gothenburg and the HM Protocols. This information is needed for emission modelling in the framework of EMEP. The ERT therefore encourages Iceland to continue and extend reporting on major pollutants (including NH<sub>3</sub>), particulate matter and heavy metals for all relevant sectors.

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

80. As the trends are explained very well in the IIR, the ERT considers all times series to be consistent.

81. No recalculations are stated in the IIR. The time series for industrial emissions are consistent.

### **Comparability:**

82. As far as the methodology is described in the IIR (i.e. for POP emissions), the methods used are consistent with those proposed in the Guidebook. The figures for

main pollutants are identical to the emissions reported under the UNFCCC, as both are based on the same activity data.

#### **Accuracy and uncertainties:**

83. According to the IIR, Iceland has implemented a QA/QC system including quality objectives, responsibilities, accuracy checks, uncertainty estimations, archiving, reporting etc. This system - primarily established for the annual greenhouse gas inventory - is described in detail in the 'QA/QC Manual - Quality manual for the Icelandic air emission inventory'. However, although source category specific QC measures are mentioned in the IIR, they are not described in the QA/QC Manual, and the outcome of these checks is not mentioned in the IIR. The ERT encourages Iceland to include a concise description of the QA/QC system as well as relevant findings of the QA/QC procedures in the IIR, in particular where sector specific QA/QC procedures have been carried out.

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

#### **Improvement:**

85. No sectoral improvements are planned or mentioned in the IIR.

#### **Sub-sector Specific Recommendations.**

##### **Category issue 1: 2.A.1 Cement production**

86. For sector 2.A.1 only PCDD/F emissions have been reported and SO<sub>2</sub> emissions are indicated as 'IE', although cement production is generally supposed to cause relevant emissions of NO<sub>x</sub>, SO<sub>2</sub>, NH<sub>3</sub> and heavy metals.

87. The ERT encourages Iceland to complete the emissions reported for the sector 2.A.1, in particular with regard to NO<sub>x</sub>, SO<sub>2</sub>, NH<sub>3</sub> and heavy metal emissions. Additionally, please specify why and in which source category the SO<sub>2</sub> emissions from 2.A.1 have been included.

##### **Category issue 2: 2.A.3 Limestone and dolomite use**

88. In the NFR tables an activity for 2.A.3 Limestone and dolomite use has been reported, but no corresponding emissions. This source category has not been addressed in the IIR either. Bearing in mind the special character of this source category, as well as the low activity level that was reported (1.08 kt compared to e.g. 110.24 kt for 2.A.1 Cement production), it may be justified to report 'NA' or 'IE'. Nevertheless, it would be helpful to specify in the IIR which activities are covered in this source category, and to explain what is reported here (e.g. the choice of notation keys).

##### **Category issue 3: 2.A.7 Other mineral industry**

89. No activity data and emissions have been reported for the source categories 2.A.7.a (Quarrying and mining of minerals other than coal), 2.A.7.b (Construction and demolition) and 2.A.7.c (Storage, handling and transport of mineral products), although these activities are supposed to be carried out. E.g. cement, mineral wool,

aluminium and ferro-silicon are supposed to be produced from domestic minerals- hence these minerals would need to be quarried or mined. The ERT encourages Iceland to complete reporting on these source categories and to include some information on them in the IIR.

## SOLVENTS

### Review Scope

<b>Pollutants Reviewed</b>		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> , Heavy Metals, PAHs		
<b>Years</b>		1990 – 2008		
<b>NFR Code</b>	<b>CRF_NFR Name</b>	<b>Reviewed</b>	<b>Not Reviewed</b>	<b>Recommendation Provided</b>
3.A.1	Decorative coating application	x		x
3.A.2	Industrial coating application	x		x
3.A.3	Other coating application (Please specify the sources included/excluded in the notes column to the right)	x		x
3.B.1	Degreasing	x		x
3.B.2	Dry cleaning	x		x
3.C	Chemical products	x		x
3.D.1	Printing	x		x
3.D.2	Domestic solvent use including fungicides	x		x
3.D.3	Other product use	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 & Completeness:**

90. The ERT notes that Iceland did not report emissions for the year 2009. Moreover, since the information provided in the IIR about the activity data and the methods / emission factors / assumptions used for the estimation of emissions from the solvents sector is limited, the ERT cannot assess the completeness of the inventory of the solvents sector, although the notation key NE does not frequently appear in the inventory. The ERT encourages Iceland to provide the emissions estimates for the year 2009 and comprehensive (with good levels of detail) activity data and methodology descriptions in the next submission.

91. The ERT notes that the notation key IE is frequently used for NMVOC emissions in the CLRTAP reporting template, e.g. for the emissions of the source categories 3A1, 3A2, 3B1, 3C, 3D1 and 3D2. Nevertheless, it is not indicated by Iceland where these emissions are reported (included). During the review, Iceland informed the ERT that the emissions in the categories 3A1 and 3A2 are reported under 3A3, that 3B1 is included in 3B2 and that 3C, 3D1 and 3D2 are included in 3D3. The ERT recommends that Iceland provides this information in the next submission. Furthermore, the ERT encourages Iceland to reallocate these emissions to the proper source categories.

92. The ERT also encourages Iceland to fill in the worksheet entitled “Additional info” of the CLRTAP NFR template (where the use of NE and IE notation keys is explained) for next year’s submission.

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

93. The ERT notes that the time series of reported NMVOC emissions from the 3D3 source category shows an unusual behaviour, i.e. a lot of minimums / maximums / outliers. The ERT encourages Iceland to investigate further the activity data and EFs used for the emissions estimations of the 3D3 source category in order to improve time series consistency for this category in the next submission.

94. The ERT notes that no recalculations have been reported.

#### **Comparability:**

95. The ERT notes that neither the activity data nor the methods / emission factors / assumptions used for the estimations of emissions are described in the IIR. The ERT encourages Iceland to include comprehensive (with good levels of detail) activity data and methodology descriptions in next year's IIR.

#### **Accuracy and uncertainties:**

96. The ERT notes that no uncertainty analysis has been performed by Iceland for the solvents sector and concerning the CLRTAP emissions. The ERT encourages Iceland to undertake an uncertainty analysis for the solvents sector in order to prioritize improvement actions and to provide an indication of the reliability of the inventory data.

97. Iceland performs general QA/QC procedures according to the GHG QA/QC plan. Iceland responded, during the review week, that it does not carry out any specific QC procedures for the solvents sector. Nor does it carry out any other QA/verification procedure. Nevertheless, EA specialists of Iceland have started a project on updating the methodology for the solvents balance, employing specialists not involved in the inventory preparation for the solvents sector. The ERT commends Iceland for this improvement and encourages Iceland to report the outcomes of this project in the next submission. Moreover, the ERT encourages Iceland to implement sector specific OA/QC procedures for the NMVOC emissions of the solvents sector.

#### **Improvement:**

98. The ERT has noted that no specific improvements for the solvents sector have been reported in the IIR. However, during the review, Iceland responded that its EA specialists had started a project on updating the methodology for the solvents balance based on the "consumption-based" method to increase the quality of these emission estimates. The ERT commends Iceland for this improvement and encourages Iceland to report the outcomes of this project in the next submission.

#### **Sub-sector Specific Recommendations.**

##### **Category issue 1: 3.A Paints and Coatings – NMVOC**

99. The ERT has identified a possible overestimation of the NMVOC emissions from the 3A source category, since the respective emissions per capita are considerably higher compared to other countries such as for example the UK, Ireland, Norway and Sweden. Iceland responded that the emissions are based on data obtained from the national statistics (division of external trade of goods) which are related to the total consumption (i.e. sales) of solvents, paints etc. used in these applications. The ERT encourages Iceland to investigate further the emissions

estimates of this source category and to report any findings / improvements in the next submission.

**Category issue 2: 3.C Chemical products – NMVOC, TSP, heavy metals & PAHs**

100. The ERT notes that Iceland has not reported NMVOC, TSP, heavy metals and PAHs emissions from the 3C source category. However, these pollutants are emitted from the asphalt blowing activity. In the EMEP/EEA Air Pollutant Emission Inventory Guidebook there is a simple-to-apply Tier 2 method for estimating these emissions by using asphalt produced as activity data. Iceland is encouraged to estimate these emissions and report them in the next submission.

**Category issue 3: 3.D.3 Other product use – NMVOC, PM<sub>10</sub> & PM<sub>2.5</sub>, Heavy metals, PAHs**

101. The ERT notes that the time series of the reported NMVOC emissions from the 3D3 source category shows an unusual behaviour, i.e. a lot of minimums / maximums / outliers. The ERT has also noted that the NMVOC emissions estimates from the 3D3 source category were down in 2008 by 86% compared to 2007. This source category was a key source during the years 1990-2007, but not in 2008. During the review, Iceland responded that this decrease was due to a decrease in white spirit use. The ERT encourages Iceland to investigate further the activity data and EFs used for the emissions estimations of the 3D3 source category in order to improve reporting and the time series consistency of this category in the next submission.

102. The ERT notes that Iceland reported NO<sub>x</sub>, PM<sub>10</sub> & PM<sub>2.5</sub>, heavy metals, PAHs emissions from the 3D3 source category as NE. These pollutants are emitted from fat, edible and non edible oil extraction / preservation of wood by creosote preservatives / tobacco combustion. During the review, Iceland responded that creosote preservatives had been used in Iceland, but that it was unsure if they were still being used. The ERT encourages Iceland to gather activity data on these activities, apply the Tier 2 methodologies provided in the 2009 Guidebook and to report the above mentioned emissions in the next submission.

## AGRICULTURE

### Review Scope:

Pollutants Reviewed		No emissions reported		
Years				
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
4 B 1 a	Cattle dairy		NR	
4 B 1 b	Cattle non-dairy		NR	
4 B 2	Buffalo		NR	
4 B 3	Sheep		NR	
4 B 4	Goats		NR	
4 B 6	Horses		NR	
4 B 7	Mules and asses		NR	
4 B 8	Swine		NR	
4 B 9 a	Laying hens		NR	
4 B 9 b	Broilers		NR	
4 B 9 c	Turkeys		NR	
4 B 9 d	Other poultry		NR	
4 B 13	4 B 13 Other		NR	
4 D 1 a	Synthetic N fertilizers		NR	
4 D 2 a	Farm-level agricultural operations including storage, handling and transport of agricultural products		NR	
4 D 2 a	Off-farm storage, handling and transport of bulk agricultural products		NR	
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)		NR	
4 F	Field burning of agricultural wastes		NR	
4 G	Agriculture other(c)		NR	
11 A	(11 08 Volcanoes)		x	
11 B	Forest fires		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:**

103. Iceland has supplied activity data for the 4B NFR sector. However, Iceland does not provide emission estimates for the main pollutants from the agriculture sector (NH<sub>3</sub>, PM, NO<sub>x</sub>, NMVOC) because Iceland has only ratified the Aarhus Protocol on Persistent Organic Pollutants (POPs).

104. While CLRTAP inventories are used to check if the parties fulfil their engagements under the protocol, they are also used for environmental assessments as input for long-range transport models. Thus, the ERT encourages Iceland to provide emission estimates for the agriculture sector and reminds Iceland that the EMEP / EEA 2009 Guidebook offers the possibility to calculate Tier 1 estimates as a starting point.

## WASTE

### Review Scope:

<b>Pollutants Reviewed</b>		All pollutants		
<b>Years</b>		1990-2008		
<b>NFR Code</b>	<b>CRF_NFR Name</b>	<b>Reviewed</b>	<b>Not Reviewed</b>	<b>Recommendation Provided</b>
6.A	solid waste disposal on land			x
6.B	waste-water handling			x
6 C a	6 C a Clinical waste incineration (d)	x		x
6 C b	Industrial waste incineration (d)	x		x
6 C c	Municipal waste incineration (d)	x		x
6 C d	Cremation			x
6 C e	Small-scale waste burning			
6.D	other waste (e)			x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

### General recommendations on cross-cutting issues

#### **Transparency:**

105. For waste, the Icelandic IIR shows some aspects of transparency (methodological description, activity data and EFs are provided). To improve the transparency of the report, the ERT encourages Iceland to specify in its IIR the precise references of the applied EFs and activity data (including the relevant version of the EMEP EEA Guidebook or other methodological sources). ERT encourages describing the methodology for activity data estimation as shown in Iceland's IIR 2010 Table 3.4. Iceland is also encouraged to provide an explanation in the IIR about the notification key IE (included elsewhere) for clinical and industrial wastes.

#### **Completeness:**

106. The ERT encourages Iceland to review NFR 6, and to include missing sources in its inventory (solid waste disposal, wastewater treatment and cremation). Where sources are not included, the ERT encourages Iceland to indicate the reasons for such exclusions in the IIR (activity data availability etc.).

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

107. Municipal waste incineration emissions have decreased consistently from 1990 onwards, according to activity data changes.

108. No recalculations were performed by Iceland in the last submission (2010).

#### **Comparability:**

109. Iceland has reported emissions only from municipal waste incineration. These emissions are comparable with the data provided by other countries. From the IIR it is not clear which types of incinerated waste are included in the energy sector (with energy recovery) and the waste sector (without energy recovery). The ERT recommends providing a more detailed explanation in the IIR.

### **Accuracy and uncertainties:**

110. Iceland does not provide an uncertainty analysis in the IIR. The ERT encourages Iceland to estimate uncertainties for the activity data and EF which have been used for the emissions calculations.

### **Improvement:**

111. No improvements are mentioned in Iceland's IIR. Emission calculations from solid waste disposal, waste water handling and cremation could be added to inventory.

### **Sub-sector Specific Recommendations.**

#### **Category issue 1: 6.A Solid waste disposal on land**

112. The ERT recommends that Iceland estimates air pollutants emitted from landfills (especially NMVOC), either by using 2009 EMEP/EEA NMVOC default EFs or by using information concerning landfill gas composition if available (from field measurement data or bibliographic analysis). A pollutant to CH<sub>4</sub> ratio could be applied to the estimated CH<sub>4</sub> emissions (available from the UNFCCC).

#### **Category issue 2: 6.B Waste-water handling - NH<sub>3</sub> & NMVOC**

113. Iceland does not estimate emissions from wastewater handling. The ERT encourages Iceland to estimate the fraction of the population using latrines, and to estimate the associated NH<sub>3</sub> emissions. The ERT also encourages Iceland to consider estimating NH<sub>3</sub> emissions from waste-water treatment plants. Where it is not possible to make reliable estimates, the ERT encourages Iceland to explain the reasons for such exclusions in the IIR.

#### **Category issue 3: 6.C.a Clinical waste incineration**

114. ERT encourages explaining the IE notification key for clinical wastes.

#### **Category issue 4: 6.C.b Industrial waste incineration**

115. ERT encourages explaining the IE notification key for industrial wastes.

#### **Category issue 5: 6.C.c Municipal waste incineration**

116. ERT recommends estimating emissions for all pollutants for which EF are available in the 2009 EMEP/EEA Guidebook.

#### **Category issue 6: 6.C.d - Cremation**

117. Iceland has not calculated emissions from cremation. ERT recommends finding possibilities to get data for this activity, since the 2009 EMEP/EEA Guidebook provides default emission factors. Moreover, the ERT encourages Iceland to calculate emissions for all pollutants which are included in this version of the Guidebook.

#### **Category issue 7: 6.D - Other waste**

118. If there are no activities in this sector, the notation key NO is to be used instead of NA. If notification key NA is used, an explanation should be provided in the IIR.

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

1. QA/QC MANUAL: QUALITY SYSTEM IN THE ICELANDIC AIR EMISSION INVENTORY (note: The link to this document in the IIR does not work, but it is retrievable on the [www.ust.is](http://www.ust.is) website)