UNITED NATIONS

Distr.
GENERAL

CEIP/S3.RR/2020/Switzerland
3/11/2020

ENGLISH ONLY

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

STAGE 3 REVIEW REPORT
SWITZERLAND

CONTENT

CONTENT 2

INTRODUCTION 3

PART A: KEY REVIEW FINDINGS 4

INVENTORY SUBMISSION 5

KEY CATEGORIES 5

QUALITY 6

Transparency 6
Completeness 6
Consistency, including recalculations and time-series 7
Comparability 7
Accuracy and uncertainties 7
Verification and quality assurance/quality control approaches 7
Reporting of Condensable Particulate Matter 8

FOLLOW-UP TO PREVIOUS REVIEWS 8

AREAS FOR IMPROVEMENTS IDENTIFIED BY SWITZERLAND 9

TECHNICAL CORRECTIONS 10

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY 11

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT 11

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT 13

ENERGY 13

TRANSPORT 17

INDUSTRY 22

SOLVENT AND OTHER PRODUCT USE 26

AGRICULTURE 28

WASTE 33

DOCUMENTS PROVIDED TO ERT 37

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW 37

ANNEX I - REVISED ESTIMATES 38

INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Updated methods and procedures for the technical reviews of air pollutant emission inventories reported under the Convention*'[1] – hereafter referred to as the 'Review guidelines 2018'.

2. Under this annual review, all pollutants covered by the LRTAP Convention and its protocols (SOx, NOx, NMVOC, NH_3, plus PM_{10} $PM_{2.5}$, BC, 3 HMs and POPS) have been checked for the time series years 1990 – 2018 reflecting current priorities from EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). HMs and POPs have been reviewed to the extent possible.

3. This report covers the Stage 3 centralised review of the UNECE LRTAP Convention of the EU coordinated by the EMEP Centre on Emission Inventories and Projections (CEIP) acting as review secretariat. The remotely conducted review was performed by the ERT during May and June 2020. The following team of nominated experts from the roster of experts performed the review: Generalists – Risto Saarikivi (CZ), Ben Richmond (UK), Energy – Erik Honig (NL), Marion Pinterits (EU), Garmt Jans Venhuis (NL) and Kristina Jurich (DE), Transport – Giannis Papadimitriou (EU) and Magdalena Zimakowska-Laskowska (PL), IPPU Mirela Poljanac (HR), Juan Luis Martin Ortega (ES), Michaela Titz (AT), Agriculture - Peder Gjølstad Røhnebæk (NO), Hakam Al-Hanbali (SE) and Gwenaëlle Le Borge (FR), Waste – Zuzana Jonacek (SK) and Sabino Del Vento (UK).

4. Kristina Saarinen (FI) was the lead reviewer. The review was coordinated by Katarina Marečková (CEIP).

1 Decision 2018/1 adopted by EB: *Updated methods and procedures for the technical review of air pollutant emission Inventories reported under the Convention*. ECE/EB.AIR/142/Add.1 http://www.unece.org/fileadmin/DAM/env/documents/2002/eb/air/EB%20Decisions/Decision_2018_1.pdf

PART A: KEY REVIEW FINDINGS

5. The ERT recognises the level of effort undertaken by Switzerland in providing an inventory with a sufficient level of detail to enable a detailed review and thanks the Party for providing timely responses to the questions of the ERT during the review that enabled the ERT to give recommendations for the further development of the inventory.

6. Switzerland provided NFR tables for 1990-2018 on 13th February 2020, within the reporting deadline of 15th February. The IIR was submitted on 13th March 2020 within the reporting deadline of 15th March. In 2017, 2018, 2019 and in 2020 Switzerland submitted gridded emissions and LPS data.

7. The 2020 submission shows improvements in a number of issues since the last submission.

8. The ERT found the inventory to be generally transparent. The IIR has been prepared according to the template provided in the Reporting Guidelines' Annex I and includes a key category analysis and an uncertainty analysis.

9. The inventory is generally complete; however, the ERT noted that emissions from some sources were not included and that non-priority heavy metals and PCBs (mobile combustion, cement production) were not reported.

10. The inventory methodologies are in line with the *EMEP EEA Emission Inventory Guidebook* (hereafter Guidebook) and reporting is mostly in line UNECE Reporting Guidelines (hereafter Reporting Guidelines), thus the inventory is comparable with those of other reporting Parties.

11. The use of notation keys does not always follow the definitions in paragraph 12 of the Reporting Guidelines.

12. The Party applies Tier 2 methods to almost all key categories. The ERT did not identify systematic under- or over-estimates.

13. During the review, Switzerland provided revised estimates (REs) for the Energy, Transport and Waste sectors, which the ERT accepted.

14. Transport emissions are calculated on the basis of fuels sold. Switzerland also provides emissions based on fuels used.

15. As a summary of the main findings, a need for further improvement was identified for the following issues:

(a) Transparency: use of notation keys, sector specific information on QA/QC and impact of recalculations

(b) Completeness: some emissions not estimated

INVENTORY SUBMISSION

16. In its 2020 submission, Switzerland has reported emissions for its Protocol base years (1990) and a full time series to 2018 (the latest year) for its Protocol pollutants in the NFR 2019 format. In addition, Switzerland has also provided a full NFR 1990 - 2018 time series for CO and a 1990 - 2018 time series for PM10 and PM2.5, priority heavy metals and POPs. Non-priority heavy metals were not included in the current reporting. Switzerland also submitted a detailed IIR. Activity data were mostly presented in the NFR tables.

17. Emissions are reported by NFR category; however, all emissions from the following categories are reported as included elsewhere (IE): 1A3bvii (automobile road abrasion), 1A4cii (Agriculture/ Forestry/Fishing: National fishing), 2A3 (glass production), 3B4a (manure management – Buffalo).

18. The notation key not estimated (NE) is used for non-priority heavy metals and emissions of PCBs (mobile combustion, cement production) ; additionally, NE is used for the following categories for other pollutants: 1A1c (Manufacture of solid fuels and other energy industries), 2A5a (Quarrying and mining of materials other than coal), 2B5 (Carbide production), 2C7c (Other metal production), 2H2 (Food and beverages industry), 2H3 (Other industrial processes). The reasoning for the use of NE and IE is documented within the IIR.

19. The CLRTAP inventory submitted by Switzerland is of good quality and is in general well documented in the informative inventory report (IIR).

20. National totals in row 141 of NFR19 are reported for the entire territory, and transport emissions are based on fuel sold. In addition, Switzerland also reported national totals for compliance in row 144 based on fuel used.

KEY CATEGORIES

21. Switzerland has compiled and presented in its IIR a level Key Source Category Analysis (KCA) for the following pollutants: NO_X, NMVOC, SO_X, NH_3, PM_{10} and $PM_{2.5}$. All sectors have been included except sector 6, Other. The level assessment is performed for the years 1990 and 2018 for the pollutants mentioned above.

22. The ERT recommends that Switzerland perform the key category analysis for all mandatory pollutants, i.e. that it also includes priority heavy metals Pb, Cd and Hg as well as POP compounds (PCDD/F, PAHs, HCB and PCBs). The ERT encourages Switzerland to perform the KCA also for non-mandatory pollutants should the Party report emissions of the additional heavy metals, TSP and BC.

23. Switzerland has compiled and presented a trend KCA within its IIR for NO_X, NMVOC, SO_X, NH_3, PM_{10} and $PM_{2.5}$, covering the period 1990 to 2018.

24. The ERT notes that Switzerland uses T2 or higher methods for all key categories as requested in paragraph 21 of the Reporting Guidelines.

25. The ERT notes that Switzerland does not specify if it uses the results of the KCA to prioritise the development of the inventory. The ERT recommends that the

Party use the results of the KCA to prioritise actions in line with paragraph 6 of the Reporting Guidelines and report on this in the IIR.

QUALITY

Transparency

26. The ERT recognises the level of effort undertaken by Switzerland in providing an inventory of with a sufficient level of detail to enable a detailed review.

27. The ERT recognises that according to the UNECE Reporting Guidelines (ECE/EB.AIR/125), the Parties should, to improve "Transparency", clearly explain which data sources, assumptions and methodologies are used for an inventory (para 12). The submission of an IIR is strongly encouraged (para 43). As a lack of sufficient documentation in an IIR prevents the ERT from performing a technical review, the Party would need to provide the missing information during the review. For this reason, in this technical review report recommendations are given instead of encouragements in cases where there is a need to improve the documentation of data, methods and assumptions used in the inventory.

28. The ERT notes that the 2020 IIR submission follows the recommended structure in Annex II of the Reporting Guidelines and provides information on emissions, methodology and recalculations at sub-category level. Emission factors and activity data are almost always presented in detail, assumptions and methodologies are clearly documented, references are documented and the time-series are explained.

29. The ERT notes that Switzerland uses zero values when reporting Cd emissions based on fuel used for 1A3bi to 1A3biv for all years. Zero emissions are also reported for Pb in category 1A3biii in the years 2010 and before. The ERT recommends that Switzerland use the appropriate notation keys in line with paragraph 12 of the Reporting Guidelines. The ERT recommends that Switzerland ensure that tables A-9 and A-10, where these are documented, are complete and up to date.

Completeness

30. The ERT acknowledges the effort which Switzerland has made to provide estimates of emissions for all sub-sectors and all pollutants reviewed. The inventory for the pollutants reviewed is generally complete regarding the sources and years reviewed and geographical coverage. However, the ERT has identified some missing emissions as explained in detail under Sub-Sector Specific Recommendations:

(a) PCBs from all transport subcategories, for which the Party prepared revised estimates (RE) during the review and which the ERT accepted. The ERT recommends that Switzerland include these revised estimates within their 2021 submission.

(b) Non-priority heavy metals As, Cr, Cu, Ni, Se and Zn emissions are not included in the inventory. The ERT encourages Switzerland to calculate

and report these emissions in line with paragraph 8 of the Reporting Guidelines.

(c) The ERT recommends that the Party performs additional reviews to identify potential gaps in the inventory. The usage of correct notation keys is highly encouraged to support the finding of such gaps. Further sub-sector specific recommendations are provided in Part B of this report.

Consistency, including recalculations and time-series

31. Switzerland has undertaken a number of recalculations for their 2020 submission across all sectors, predominantly for 1990 and 2017 where appropriate. Descriptions of recalculations have been provided on a sub-sector basis, mostly providing the rationale behind the revisions. The Party has provided quantitative information on the impact of recalculations on the emissions in the IIR. The ERT recommends Switzerland to expand the information of the impacts of recalculations or any changes on the emission levels and time series to cover all pollutants in its future IIR submissions.

32. The ERT noted some incorrect units for emission data (e.g. Table 3-6 regarding PCDD/F) and recommends that Switzerland ensure that all tables within the IIR report use the correct and appropriate units, particularly where dioxins are concerned.

Comparability

33. The ERT notes that Switzerland uses methods in accordance with the latest version of the EMEP/EEA Emission Inventory Guidebook and that the allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines (NFR 2019 format) and that the inventory thus is comparable with those of other reporting Parties.

Accuracy and uncertainties

34. The ERT did not identify any systematic under- or over-estimations and notes that the Party uses Tier 2 or higher tier methods for all key categories.

35. Switzerland has compiled detailed, source specific uncertainty estimates for their UNECE submission, for emissions in 1990 and 2018 and for emission factors. The Tier 1 approach is used predominantly, with Tier 2 being used for NH_3 from agriculture. The ERT commends Switzerland on their detailed approach.

36. The ERT was unable to confirm whether the Party uses the results of the uncertainty analysis to prioritise improvements in the inventory or not, and so the ERT recommends that Switzerland state explicitly how the results of the uncertainty analysis are used.

Verification and quality assurance/quality control approaches

37. Switzerland has developed and implemented a quality assurance/quality control (QA/QC) plan in accordance with Guidebook Part A6 (Inventory

Management). This includes general QC procedures (Tier 1) as well as source category-specific procedures (Tier 2) for key categories and for those individual categories in which significant methodological and/or data revisions have occurred.

38. The ERT commends Switzerland on its general quality assurance/quality control (QA/QC) activities. Source category specific QA/QC processes are described in the IIR.

39. The Party does not provide information on the verification of the inventory in the IIR except for the previous CLRTAP reviews. The ERT recommends that in future the Party establishes external and independent data comparisons e.g. with inventory estimates made by other bodies or through alternative methods, and reports on these in the IIR.

Reporting of Condensable Particulate Matter

40. The Party provided sufficient information on whether the condensable component of PM is included within estimates or not for all sectors. The ERT does encourage Switzerland to provide a more detailed breakdown for the NFR codes within the Energy sector to identify sub-sectors contributing to condensable particulate matter, as is currently implied, for example, for 1A3bvi (automobile tyre and brake wear) which does contribute to condensable PM.

FOLLOW-UP TO PREVIOUS REVIEWS

41. Switzerland provided detailed responses to the questions identified in the Stage 2 review.

42. The ERT notes that the Party has implemented the following previous recommendations from the S2 and S3 reviews:

(a) Estimating emissions of Hg from exhaust sources in the road transport sector (1A3bi-iv).

(b) Calculating and reporting NMVOC emissions for sector 3B (manure management).

43. The ERT notes that the Party has not yet implemented the following:

(a) Estimating emissions of Cd from exhaust sources in the road transport sector (1A3bi-iv).

(b) The use of correct notation keys for 2D3b, 2D3c, 2H1 and 2H2.

(c) Separating the reporting of PM and Cd emissions for category 1A3bvii (Automobile road abrasion) from 1A3bvi (Automobile tyre and brake wear).

44. The ERT recommends that the Party address the issues raised during this (2020) and previous (2012 and 2016) reviews.

AREAS FOR IMPROVEMENTS IDENTIFIED BY SWITZERLAND

45. Within the IIR, Switzerland identifies several areas for improvement, which are either already in progress or planned; these include:

(a) Revising the country-specific emission factor model for energy from wood.

(b) Measuring NMVOC emissions from dairy cattle to improve estimates within 3B.

TECHNICAL CORRECTIONS

46. The ERT noted underestimations for which Switzerland provided Revised Estimates during the review. The ERT accepted the Revised Estimates provided by Switzerland for the Energy, Transport and Waste sectors as presented in Table 1 and in Annex I. The ERT recommends that the Party implement the revised estimates in the next submission.

Table 1 Summary of Revised Estimates calculated by Switzerland and accepted by the ERT for Switzerland.

NFR	Pollutant	Years	Calculated by	Potential contribution to national total (%)
1A2f	PCBs	2018, 1990	Switzerland	0.1%(2018), 0.02%(1990)
1A3b	PCBs	1990-2018	Switzerland	0.0% (1990-2018)
1A3b	Cd	1990-2018	Switzerland	0.05%(2018), 0.05%(2015), 0.1%(2010), 0.1%(2005) 0.02%(1990)
1B2c	Cd	1990-2018	Switzerland	1%(2018), 1.6%(2015), 34.2%(2010), 40.6%(2005), 7.3%(1990)
1B2c	Hg	1990-2018	Switzerland	0.3%(2018), 0.4%(2015), 8.5%(2010), 9.4%(2005), 0.7%(1990)
1B2c	Pb	1990-2018	Switzerland	0.1%(2018), 0.1%(2015), 1.7%(2010), 1.5%(2005), 0.1%(1990)
1B2c	NMVOC	1990-2018	Switzerland	0.0%(2018), -0.002%(2015), 0.01%(2010), 9.9%(1990)
1B2c	PM2.5	1990-2018	Switzerland	0.1%(2018), 0.1%(2015), 1.7%(2010), 1.7%(2005), 0.7%(1990)
1B2c	PM10	1990-2018	Switzerland	0.03%(2018), 0.05%(2015), 0.9%(2010), 1%(2005), 0.4%(1990)
1B2c	NOx	1990-2018	Switzerland	-0.003%(2018), -0.1%(2015), -0.1%(2010), -0.3%(2005), -0.1%(1990)
1B2c	SOx	1990-2018	Switzerland	-0.1%(2018), -1.2%(2015), -1.5%(2010), -2.9%(2005), -0.8%(1990)
1B2c	B(a)P	1990-2018	Switzerland	0.5%(2018), 0.6%(2015), 6.7%(2010), 5.5%(2005), 2.1%(1990)
1B2c	B(b)F	1990-2018	Switzerland	0.8%(2018), 1%(2015), 11.5%(2010), 9%(2005), 3.6%(1990)
1B2c	B(k)F	1990-2018	Switzerland	0.6%(2018), 0.9%(2015), 12.1%(2010), 9.5%(2005), 3.9%(1990)
1B2c	I(1,2,3-cd)P	1990-2018	Switzerland	0.7%(2018), 0.9%(2015), 10.8%(2010), 8.8%(2005), 3.4%(1990)
5A	NMVOC	2018, 1990	Switzerland	0.**2**%(2018), 0.**1**%(1990)
5A	PM2.5	2018, 1990	Switzerland	0.**0**%(2018), 0.0%(2015), 0.0%(2010), 0.0%(2005), 0.**0**%(1990)
5C2	Cd	1990-2018	Switzerland	0.1%(2018), 0.1%(2015), 0.2%(2010), 0.2%(2005), 0.1%(1990)
5C2	Pb	1990-2018	Switzerland	0.3´03%(2018), 0.02%(2015), 0.02%(2010), 0.02%(2005), 0.2%(1990)

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

47. The ERT identified the following cross-cutting issues for improvement and recommends that the Party:

(a) Always use notation keys in line with paragraph 12 of the Reporting Guidelines and justify their use in the IIR

(b) Include in the IIR:

- justification for the selection of emission factors and methods, document country-specific methods including references to their information sources
- information on possible changes in the methods, e.g. on methods and EFs that are used for earlier years
- results of a key category analysis for the missing mandatory pollutants, i.e. in addition to the main pollutants, include also priority heavy metals Pb, Cd and Hg and POP compounds (PCDD/F, PAHs, HCB and PCBs).
- quantitative detail on the impacts of recalculations or any changes on the emission levels and time series
- correct and appropriate units in all tables, particularly where dioxins are concerned
- information on how the results of the key category analysis and uncertainty analysis are used to prioritise inventory improvement
- documentation on sub-sector level QA/QC checks and examples of the results

(c) Include all emissions for which there are methods in the Guidebook (see Reporting Guidelines paragraph 7 for mandatory pollutants and paragraph 8 for non-mandatory pollutants) for the whole time series since 1990 (particles since 2000 but preferably since 1990) in the inventory.

(d) Include all revised estimates provided during the 2020 review (Table 1 and Annex I) in the next inventory submission.

(e) Report emissions separately in their default NFR source categories, or if not possible, justify reporting as IE in the IIR e.g. cadmium and particle emissions currently allocated to NFR 1A3bvi (report separately under NFR 1A3bvii).

(f) Perform additional reviews to identify potential gaps in the inventory.

(g) Establish external and independent data comparisons e.g. with inventory estimates made by other bodies or through alternative methods, and report on these in the IIR.

(h) Implement the detailed recommendations as indicated under Sub-Sector Specific Recommendations.

(i) Additionally, the ERT encourages the Party to

- Perform a KCA also for non-mandatory pollutants should the Party report emissions of the additional heavy metals, TSP and BC.
- Provide a more detailed breakdown for the NFR codes within the Energy sector to identify sub-sectors contributing to condensable PM.
- Report separately emissions from National fishing under NFR 1A4ciii (instead of NFR 1A3d where they currently are allocated)

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$, Cd, Hg, Pb, Dioxin, PAH		
Years		1990 – 2018		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A1a	Public electricity and heat production	X		
1A1b	Petroleum refining	X		
1A1c	Manufacture of solid fuels and other energy industries	X		x
1A2a	Iron and steel	X		
1A2b	Non-ferrous metals	X		
1A2c	Chemicals	X		
1A2d	Pulp, Paper and Print	X		
1A2e	Food processing, beverages and tobacco	X		
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	X		x
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	X		
1A3ei	Pipeline transport	X		
1A3eii	Other	-		
1A4ai	Commercial/institutional: Stationary	X		x
1A4bi	Residential: Stationary	X		
1A4ci	Agriculture/Forestry/Fishing: Stationary	X		
1A5a	Other stationary (including military)	-		
1B1a	Fugitive emission from solid fuels: Coal mining and handling	X		
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	X		
1B1c	Other fugitive emissions from solid fuels	-		
1B2ai	Fugitive emissions oil: Exploration, production, transport	X		
1B2aiv	Fugitive emissions oil: Refining / storage	X		
1B2av	Distribution of oil products	X		
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	X		x
1B2c	Venting and flaring (oil, gas, combined oil and gas)	X		
1B2d	Other fugitive emissions from energy production	-		

General recommendations on cross cutting issues

Transparency

48. The ERT considers the inventory to be transparent. Estimates are provided at the most detailed level for all energy sectors. The ERT considers the Party's

methodology and emission factors in the IIR to be transparent and well described in the Energy sector.

49. The Party clarified the choices of some EFs in response to questions raised by the ERT during the review, e.g. regarding NFR 1A4: The choice of EF for Hg is not consistent with the Guidebook. In response to a question about the issue, the Party explained that Table 3-15 (residential boilers burning solid fuel) provides for Hg with 6 g/TJ a lower valu

50. e than Table 3-23 (non-residential sources, automatic boilers burning coal fuels) with 16 g/GJ. The Party states that it is not understandable why the Hg emission factor for other bituminous coal should be higher for non-residential automatic boilers - with advanced coal combustion techniques - than for residential stoves and boilers. Therefore, the Party decided to take the value from Table 3-23 for the Hg emissions from other bituminous coal in 1A4bi as well. The ERT recommends that Switzerland justifies the selection in the IIR and documents the methods with references to the information sources.

Completeness

51. The ERT concludes that the emission estimates are detailed and almost complete regarding sources, pollutants and years covered; however, the ERT notes that the following sources were reported as NE or NA and refers to the recommendations or encouragements under Sector Specific Recommendations:

- NFR 1B2c (Flaring in refineries): NA reported for PM_{10}, $PM_{2.5}$ and priority heavy metals Cd, Hg and Pb
- NFR 1A2f (Stationary combustion in manufacturing industries and construction: Non-metallic minerals) PCBs
- NFR 1A1c (Manufacture of solid fuels and other energy industries): all pollutants
- All NFRs for additional heavy metals (non-mandatory pollutants

Consistency including recalculation and time series

52. The ERT discovered no inconsistencies or strange outliers in the time series and notes that all years are calculated using consistent methods. The ERT commends Switzerland for the extensive explanations included in the IIR.

Comparability

53. The ERT notes that the methods used are consistent with those proposed in the Guidebook and that emissions are reported in the NFR 2019 format and that the inventory thus is comparable with those of other reporting Parties.

Accuracy and uncertainties

54. The ERT did not identify any systematic over- or under-estimations.

55. The ERT notes that Switzerland uses Tier 2 or higher methods for all key categories.

56. The ERT found some issues related to category NFR 1A1c regarding the use of Guidebook methods as explained under Source Specific Recommendations.

57. Switzerland has included a quantitative uncertainty analysis for the Energy sector in the Annex of the IIR.

58. The ERT notes that the QA/QC procedures documented and implemented for the Energy sector are consistent with the Guidebook.

Condensable Particulate Matter

59. Switzerland provides information on the condensable component in particle emissions for NFR 1A4 (1A4bi regarding bonfires and 1A4bi regarding the use of charcoal). For wood combustion, condensable components are estimated but included in the NMVOC emissions.

Improvement

60. The ERT notes that Switzerland provides information on improvements already carried out as well as planned improvements in the IIR. One planned improvement is a revision of the country-specific emission factor model for wood energy. This might concern the EFs of NO_x, NMVOC, SO_x, NH_3, BC (% $PM_{2.5}$) and CO.

Potential Technical Corrections

61. No technical corrections were made during the review.

62. The following revised estimates were calculated by Switzerland during the review with the help of instructions from the ERT. The ERT accepted the revised estimates and recommends that the Party include these in the next submission:

- NFR 1A2f: PCBs
- NFR 1B2c: PM_{10}, $PM_{2.5}$, Pb, Cd, Hg, NO_x, CO, NMVOC, SO_x

Sub-Sector Specific Recommendations

Category issue 1: 1A1c: Artisanal charcoal production

63. Switzerland reported emissions of some pollutants from this category as NE because the only source falling under this category in Switzerland is artisanal charcoal production and because no methods for the activity are provided in the Guidebook. However, the ERT strongly advises setting up a research project for establishing domestic methods to estimate all relevant emissions.

Category issue 2: 1B2c: flaring in refineries

64. Switzerland reported NE for the following pollutants PM_{10}, $PM_{2.5}$, BC, Pb, Cd and Hg in the NFR table. As reporting is mandatory for all of these, except for BC, according to paragraph 7 of the Reporting Guidelines (BC is voluntary, paragraph 8), the Party calculated revised estimates with instructions from the ERT during the review. The ERT accepted the revised estimates and recommends that the Party include the revised emission estimates for the whole series 1990-2019 in the next submission.

65. In addition, emissions of NO_x, CO, NMVOC, SO_x were reported applying Switzerland's own implied emission factors which are not consistent with the Guidebook. During the review, Switzerland recalculated the emissions with the

Guidebook EFs and the emissions then turned out to be a factor of 100 lower. The ERT accepted the revised estimates and recommends that the Party include the recalculated emissions for the whole series 1990-2019 in the next submission. The ERT also encourages the Party to reflect on this large difference in the next submission, and, if possible, to propose methods for sources similar to the Swiss ones for the Guidebook.

Category issue 3: 1A4: solid fuel combustion for residential boilers

66. The ERT notes that the choice of EF for Hg is not consistent with the Guidebook. As the Party has stated that it is not understandable why the Hg emission factor for other bituminous coal should be higher for non-residential automatic boilers - with advanced coal combustion techniques - than for residential stoves and boilers, the ERT encourages Switzerland to propose better EFs for the Guidebook.

Category issue 4: 1A2f PCB emissions from cement production

67. Switzerland reported NE for PCBs from 1A2f Cement production although a method exists in the Guidebook. During the review, Switzerland provided revised emission estimates for 1990 and 2018. The ERT accepted the revised estimates and recommends that Switzerland report PCB emissions for the whole series 1990-2019 in the next submission.

Category issue 5: All non-priority heavy metals

68. The ERT notes that Switzerland currently does not include non-priority heavy metals in their inventory and notes that as there are EFs provided in the Guidebook, an inclusion of these would be possible to the next submission. The ERT therefore encourages the Party to consider the reporting of additional heavy metals in line with paragraph 8 of the Reporting Guidelines.

TRANSPORT

Review Scope

Pollutants Reviewed		All		
Years		1990 – 2018		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A2gvii	Mobile Combustion in manufacturing industries and construction	x		
1A3ai(i)	International aviation LTO (civil)	x		
1A3ai(ii)	International aviation cruise (civil)	x		
1A3aii(i)	Domestic aviation LTO (civil)	x		
1A3aii(ii)	Domestic aviation cruise (civil)	x		
1A3bi	Road transport: Passenger cars	x		x
1A3bii	Road transport: Light duty vehicles	x		x
1A3biii	Road transport: Heavy duty vehicles and buses	x		x
1A3biv	Road transport: Mopeds & motorcycles	x		x
1A3bv	Road transport: Gasoline evaporation	x		
1A3bvi	Road transport: Automobile tyre and brake wear	x		
1A3bvii	Road transport: Automobile road abrasion	IE		x
1A3c	Railways	x		
1A3di(ii)	International inland waterways	NO		
1A3dii	National navigation (shipping)	x		
1A4aii	Commercial/institutional: Mobile	x		
1A4bii	Residential: Household and gardening (mobile)	x		
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	x		
1A4ciii	Agriculture/Forestry/Fishing: National fishing	IE		x
1A5b	Other, Mobile (including military, land based and recreational boats)	x		
1A3di(i)	International maritime navigation	x		
1A3	Transport (fuel used)	x		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

70. The ERT considers the Transport sector to be transparent and commends the good level of detail in the methodology descriptions for the whole Transport sector. The ERT notes that following recommendations from the previous Stage 3 review

(2016), Switzerland has been continuously improving the description of the methodologies used to estimate emissions. The ERT also noted that an update has been performed in the road transport sector since the previous Stage 3 review (2016) with the usage of an updated road transportation methodology (HBEFA 4.1) and considers the methods to be compatible with the Guidebook.

71. The ERT notes that the Party reports some emissions as “IE”, i.e. aggregated under a source category other than their default NFR source categories as described under Sub-sector Specific Recommendations.

72. The emission estimates are in general detailed and transparent for the various transport sub-sectors. The ERT considers Switzerland’s methodology, activity data and emission factors in the IIR to be transparent and well described.

Completeness

73. The ERT considers the Transport sector of Switzerland’s inventory to be in general complete with sufficient details in the methodology descriptions. However, Switzerland currently reports some pollutants for some categories as NE or NA. Recommendations for improving the completeness of the inventory are discussed below under Sub-sector specific recommendations.

Consistency including recalculation and time series

74. Switzerland performed some recalculations, the most significant ones in the road transport sector using an updated road transportation inventory methodology (HBEFA 4.1). Detailed information, including the impact of these recalculations, is provided in the respective sector chapter 3.2.6.3, as well as in chapter 8.1.1.5 of the IIR. The ERT considers that the update has improved earlier emission estimates as some errors have been corrected and updated emission factors have been used that are consistent with the 2019 version of the Guidebook.

75. No inconsistencies have been identified by the ERT in the time series of the Transport sector.

Comparability

76. The ERT notes that Switzerland uses methodologies in accordance with the 2019 version of the Guidebook for the Transport sector, that the emissions are reported in NFR 2019 format and that the inventory of Switzerland is thus comparable with those of other reporting Parties.

Accuracy and uncertainties

77. The ERT did not identify any over or under estimates in the Transport sector inventory.

78. The Party uses T2 or higher methods for all key categories.

79. The ERT commends Switzerland for the QA/QC procedures implemented and described in chapter 1.6 of the IIR and recommends that the Party include specific examples of QA/QC checks in order to improve the transparency of the IIR. The continuous improvement of the inventory should also into account the

recommendations and encouragements from the previous Stage 3 in-depth review process, and attempts should be made to implement and address these issues.

80. Switzerland has carried out a level uncertainty analysis for 2018 and analysed trend uncertainties for 1990-2018. Details are provided in chapter 1.7 and Annex 5 of the IIR.

Condensable Particulate Matter

81. Switzerland provides a summary on the inclusion of the condensable component in PM emissions in Annex 6 of the IIR. According to this, PM emissions include the condensable component in the NFR categories 1A2gvii, 1A3b-d, 1A4aii/bii/cii, 1A5.

Improvement

82. The ERT commends Switzerland for the improvements implemented since the previous Stage 3 review (2016). These are described in chapter 1.4.1 of the IIR (all inventory sectors), while improvements related to transport are described in the respective sectoral chapters. The most significant improvement in the road transport sector is the implementation of an updated road transportation methodology (HBEFA 4.1).

83. In Switzerland's plan for further improvement, as presented in chapter 8.2 of the IIR, the ERT found no planned improvements for the Transport sector. The ERT recognises that the inventory of Switzerland has already reached a good level of completeness and is transparent and comprehensive and therefore recommends that Switzerland focuses on the issues discussed below under Sub-sector specific recommendations.

Potential Technical Corrections

84. No potential technical corrections were made during the review.

85. The Party sent revised estimates for Road transport Cd and PCB emissions which the ERT accepted as presented in Annex I.

Sub-Sector Specific Recommendations

Category issue 1: 1A3bi-iv – Cd, additional HMs

86. Following up on a question raised during the previous Stage 3 review (2016), the ERT noted that Cd and additional heavy metal emissions from 1A3bi-iv (road transport) were still reported as NA or NE. Studying the IIR, the ERT found no plan for providing these emission estimates. In response to a question about the issue, Switzerland provided emission estimates for cadmium (Cd) using T3 emission factors from the Guidebook.

87. The ERT confirms that the Cd emission calculations from 1A3bi-iv are correct and that the impact on the National Total ranges from 0.019% - 0.071% over the time series; hence, it can be considered very small. Nevertheless, in order to improve the completeness and accuracy of the inventory, the ERT recommends that Switzerland includes these Cd emission calculations in the next submission. The ERT notes that

according to paragraph 7 (g) of the the Reporting Guidelines, Cd is one of the priority heavy metals that have to be reported. The ERT also encourages Switzerland to provide emission estimates of additional (non-priority) heavy metals as defined in paragraph 8 of the Reporting Guidelines.

Category issue 2: 1A3bvii – All PMs, Cd

88. Following up on a question raised during the previous Stage 3 review (2016), the ERT noted that all particulate matter and Cd emissions from 1A3bvii (automobile road abrasion) were still reported as IE and included under 1A3bvi (automobile tyre and brake wear). Studying the IIR, the ERT found no plan for reporting these emission estimates separately. In response to a question about this issue, Switzerland mentioned that this was due to the emission calculation model used. The ERT recommends that Switzerland report these emissions separately in the next submission in order to improve the transparency of the inventory.

Category issue 3: 1A4ciii – All pollutants

89. Following up on a question raised during the previous Stage 3 review (2016), the ERT noted that all pollutant emissions from 1A4ciii (national fishing) were still reported as IE and included under 1A4cii (off-road vehicles and other machinery) according to the IIR. Studying the IIR, the ERT found no plan for reporting these emission estimates separately. In response to a question about the issue, Switzerland mentioned that the information in the IIR about where the emissions from 1A4ciii were included was incorrect and that the correct category was 1A3d (navigation). In addition, Switzerland mentioned that, although information on air pollutant emissions from professional fishing boats is available, corresponding fuel consumption is not available separately and that hence, it had been preferred not to report differently in the air pollutant and greenhouse gas inventories. As a result, fishing boats from 1A4ciii were included under 1A3dii (national navigation (shipping)).

90. The ERT encourages Switzerland to report these emissions separately in the next submission in order to improve the transparency of the inventory. At least they can be included in the IIR if they are available, overcoming the consistency problem with greenhouse gas and air pollutant inventories. In any case, the information in the IIR should be corrected, stating where the emissions from 1A4ciii are included.

Category issue 4: All transport – PCBs

91. The ERT noticed that PCBs from all sub categories in the Transport sector were reported as NE. Studying the IIR, the ERT found no plan for providing these emission estimates, only a statement on a "lack of data". In response to a question raised during the review, Switzerland provided PCB emission estimates from 1A3bi-iv using emission factors from the Tier 3 methodology of the Guidebook.

92. The ERT confirms that the emission calculations are correct and that the impact on the national total ranges from 0.000018% - 0.000042% over the time series; hence, it can be considered negligible. Nevertheless, in order to improve the completeness and accuracy of the inventory, the ERT recommends that Switzerland includes these PCB emission calculations from 1A3bi-iv in the next submission. For

non-road subsectors for which PCB emission factors and methodology do not exist, the ERT recommends that the notation key is changed to NA.

Category issue 5: 1A3bvii – Issue related to biomass

93. The ERT noticed the usage of the notation key IE for biomass activity data from 1A3bvii (automobile road abrasion). On p. 327 of the IIR it is mentioned that it is included under NFRs 1A3bi,1A3biii (passenger cars, heavy duty vehicles and buses). The ERT believes that this is an inappropriate use of notation keys, since there is no physical allocation of the data, and that it should be NO (similarly to other activity data of 1A3bvii). In its response, Switzerland confirmed the inappropriate use of the notation key, stating that it should be NO like for all fossil fuels (and IE for 'other activity data').

94. The ERT recommends that Switzerland uses the correct notation key (NO) for biomass for sub-sector 1A3bvii in the next submission. The ERT agrees on the usage of IE for 'other activity data' and its inclusion under 1A3bvi (automobile tyre and brake wear), but recommends that Switzerland reports vehicle-kilometres under 'other activity data' of 1A3bvi because currently NA is used here; otherwise, the usage of IE in 1A3bvii will have no meaning.

INDUSTRY

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10}, $PM_{2.5}$		
Years		1990 – 2018 (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2A1	Cement production	x		
2A2	Lime production	x		
2A3	Glass production			
2A5a	Quarrying and mining of minerals other than coal	x		
2A5b	Construction and demolition	x		x
2A5c	Storage, handling and transport of mineral products	NO		
2A6	Other mineral products	NO		
2B1	Ammonia production	x		
2B2	Nitric acid production	x		
2B3	Adipic acid production	NO		
2B5	Carbide production	X		
2B6	Titanium dioxide production	NO		
2B7	Soda ash production	NO		
2B10a	Chemical industry: Other	x		
2B10b	Storage, handling and transport of chemical products	NO		
2C1	Iron and steel production	x		
2C2	Ferroalloys production	NO		
2C3	Aluminium production	NO		
2C4	Magnesium production	NO		
2C5	Lead production	NO		
2C6	Zinc production	NO		
2C7a	Copper production	x		
2C7b	Nickel production	NO		
2C7c	Other metal production			
2C7d	Storage, handling and transport of metal products	x		
2D3b	Road paving with asphalt	x		x
2D3c	Asphalt roofing	x		x
2H1	Pulp and paper industry	x		x
2H2	Food and beverages industry	x		x
2H3	Other industrial processes	x		
2I	Wood processing	x		
2J	Production of POPs			
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	x		
2L	Other production, consumption, storage, transportation or handling of bulk products	x		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

95. The ERT considers that the Industrial Processes sector inventory shows a high level of detail in the methodology and emission trend descriptions in the IIR which is generally transparent.

96. The ERT notes that the Party does not fully follow the definitions of notation keys presented in paragraph 12 of the Reporting Guidelines , for example:

- For activities where only emissions of certain pollutants are reported, the notation key “NA” is used for all other pollutants, no matter whether a method is available in the Guidebook. The ERT notes that “NA” should only be used for pollutants that are not expected from the activity or for which there are no methods in the Guidebook. The ERT recommends that Switzerland report emissions for which methods are available in the Guidebook. In cases of not reporting emissions, the ERT recommends that the Party use the appropriate notation keys in line with paragraph 12 (d) including the related explanation in the IIR.
- The ERT notes that according to paragraph 12(b), the notation key “IE” (included elsewhere) is to be used where emissions of the pollutant in question are reported under another NFR activity. The ERT recommends that in these cases the Party states in the IIR under which NFR code the emissions are actually reported.
- The ERT notes that the notation key “NE” is to be used for pollutants from an existing emission source from which emissions occur but are not reported (paragraph 12(a)).
- The notation key “NO” (not occurring) is to be used only when the source does not exist in the country (paragraph 12(e)), not for emissions that are not estimated, e.g. $PM_{2.5}$, PM_{10} and TSP from 2A5b, 2A5c, 2B10b and 2C7d for which there are EFs in the Guidebook.

97. The ERT noted that there were minor inconsistencies between NFR and IIR as explained in detail under Sector Specific Recommendations e.g. 2D3b Road paving with asphalt.

Completeness

98. The ERT considers the industrial processes sector to be almost complete with regard to all activities for which estimation methods are presented in the Guidebook. However, the ERT notes that there are pollutants missing from the inventory and

(a) recommends that the Party include the missing emissions in line with paragraph 7 of the Reporting Guidelines: $PM_{2.5}$ and PM_{10} emissions from 2A5c, 2B10b, 2C7d

(b) encourages the Party to include missing pollutants according to paragraph 8 of the Reporting Guidelines: TSP emissions from, 2A5c, 2B10b, 2C7d and non-priority heavy metals, BC and CO from all categories in the Industrial Processes sector, where methods exist in the Guidebook

Consistency including recalculation and time series

99. The ERT found the time-series in the Industrial Processes sector to be consistent regarding emissions, categories and methodologies.

100. The ERT notes that recalculations have been carried out for individual industrial sub-sectors and pollutants, and that this is clearly described in the IIR including justifications on the recalculations and impacts of the recalculations on emission trends.

Comparability

101. The methods used by Switzerland for the Industrial Processes sector are consistent with the Guidebook and country-specific methods are sufficiently described in the IIR and the emissions are reported in the NFR 2019 format. The ERT considers the inventory to be comparable with those of other reporting Parties.

Accuracy and uncertainties

102. The ERT did not identify any systematic over- or under-estimates and notes that the quality work in the Industrial Processes sector is of high quality and well described in the IIR. The ERT notes that no information on sector specific QA/QC procedures or examples of results of the QA/QC checks are provided for the Industry sector and recommends that the Party include these details in the IIR.

103. The Party used T2 or higher methods for all key categories.

104. The ERT notes that Switzerland has carried out a Tier 1 uncertainty analysis for the main pollutants and particulate matter for the current submission, and that this also includes the emissions from industrial processes.

Condensable Particulate Matter

105. The Party provided no explanatory information on the inclusion or exclusion of the condensable component of particulate matter on category level. In Annex 6 it is stated that the condensable component of particulate matter is, in general, excluded from IPPU emissions. The ERT recommends that the Party provide more detailed information on the inclusion or exclusion of the condensable component of particulate matter by sub-category in the next submissions.

Improvement

106. The IIR contains an inventory improvement plan for the Industrial Processes sector, according to which Switzerland does not plan improvements in the IP sector for the next submission.

Potential Technical Corrections

107. No technical corrections were made in the Industrial Processes sector.

Sub-Sector Specific Recommendations

Category issue 1: 2A5b Construction and demolition- TSP, PM_{10}, $PM_{2.5}$

108. In response to a question raised about the issue during the review, the Party stated that TSP, PM_{10} and $PM_{2.5}$ emissions from construction and demolition were included in source category 1A2gvii Mobile combustion in manufacturing industries and construction. The ERT recommends that the Party change the notation key in the next submission from NO to IE and add information on the allocation of emissions, on the level of detail provided during the review, in the IIR 2021.

Category issue 2: 2D3b Road paving with asphalt –NMVOC, TSP, PM_{10}, $PM_{2.5}$

109. During the review the use of notation keys was discussed; however, as the Guidebook has EFs only for NMVOC, $PM_{2.5}$, PM_{10}, TSP and BC, the ERT recommends that the Party calculate and report the first three (mandatory pollutants) and encourages the Party to report the TSP and BC (non-mandatory pollutants). For all other emissions the notation key NA should be used because there is no method in the Guidebook. The ERT noted inconsistencies between NFR and IIR (table 4-27) and recommends that the Party correct these in in the IIR 2020.

Category issue 4: 2H1 Pulp and paper industry –NO_x, SO_x, CO, NMVOC, TSP, PM_{10}, $PM_{2.5}$

110. During the review the use of notation keys was discussed; however, as the Guidebook has EFs only for NO_x, SO_x, CO, NMVOC, $PM_{2.5}$, PM_{10}, TSP and BC, the ERT recommends that the Party calculate and report the first six (mandatory pollutants) and encourages the Party to report TSP and BC (non-mandatory pollutants). For all other emissions the ERT recommends that the Party use the notation key NA because there are no methods available in the Guidebook.

Category issue 5: 2H2 Food and beverages industry–NMVOC, PM_{10}

111. During the review the use of notation keys was discussed; however, as the Guidebook has EFs only for NMVOC and PM_{10}, the ERT recommends that the Party calculate and report both of these mandatory pollutants. For all other emissions the notation key NA should be used because there is no method in the Guidebook.

SOLVENT AND OTHER PRODUCT USE

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10}, $PM_{2.5}$		
Years		1990 – 2018 (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2D3a	Domestic solvent use including fungicides	x		
2D3d	Coating applications	x		
2D3e	Degreasing	x		
2D3f	Dry cleaning	x		
2D3g	Chemical products	x		
2D3h	Printing	x		
2D3i	Other solvent use	x		
2G	Other product use	x		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

112. The ERT notes that the Solvent and Other Product Use sector is generally transparent, activity data and emission factors are transparently presented in the IIR, and the emissions trends are explained. However, the ERT recommends that the Party provide more information on changes in methods as explained in the Sector-Specific Recommendations chapter.

Completeness

113. The ERT considers the product use emissions inventory to be complete regarding pollutants, sources and years reported.

Consistency including recalculation and time series

114. The time series is consistent regarding emissions, sources and methods used and the recalculations are carried out consistently throughout the time series and transparently explained and justified in the IIR. Impacts of the recalculations on the trends are not described. The ERT recommends that the Party include quantitative information on the changes to the last submission (e.g. -0.02 kt NMVOC in 2017) on sector specific level.

115. The ERT considers the Solvent and Other Product Use sector to be comparable with those of other reporting Parties. The allocation of emissions is in line with the Reporting Guidelines and the methods used to calculate emissions are in accordance with the Guidebook and sufficiently documented in the IIR.

116. Switzerland calculates all key categories and also other emissions following Tier 2 methods. The ERT notes that EFs are provided in a table only for the most

recent years and therefore recommends that Switzerland include more information in their IIR on the EFs used throughout the time series, in order to allow an easier comparison of the development of emission levels over time.

Accuracy and uncertainties

117. The ERT did not identify any systematic over- or under-estimates. The ERT notes that no information on sector specific QA/QC procedures or examples of results of the QA/QC checks are provided the Solvent and Other Product Use sector and recommends that the Party include these details in the IIR.

118. The Party used T2 or higher methods for all key categories.

119. The ERT notes that Switzerland has carried out a Tier 1 uncertainty analysis for the main pollutants and particulate matter for the current submission, and that this also includes the emissions from IPPU .

Condensable Particulate Matter

120. The Party provided no explanatory information on the condensable component of particulate matter on category level. In Annex 6 it is stated that the condensable component of particulate matter is in general excluded from IPPU sector emissions. The ERT recommends that the Party provide information on the inclusion or exclusion of the condensable component of particulate matter in the Solvent and Other Product Use sector separately for each NFR category in line with Reporting Guidelines Annex II.

Improvement

121. Switzerland does not mention any planned improvements in the Product Use sector inventory. The ERT recommends that the Party include an inventory improvement plan with clear tasks and schedules in the IIR and update it annually.

Potential Technical Corrections

122. No technical corrections were made in the Solvent and Other Product Use sector.

Sub-Sector Specific Recommendations

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

123. The ERT has found that changes in methodology are clearly explained or referred to in the IIR, but that the EFs are only presented from 2013 onwards. The ERT recommends that Switzerland include a list of the EFs used over the years.

AGRICULTURE

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10}, $PM_{2.5}$		
Years		1990 – 2018 + (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
3B1a	Dairy cattle	X		X (NMVOC)
3B1b	Non-dairy cattle	X		X (NMVOC)
3B2	Sheep	X		X (NMVOC)
3B3	Swine	X		X (NMVOC)
3B4a	Buffalo	X		X (NMVOC)
3B4d	Goats	X		X (NMVOC)
3B4e	Horses	X		X (NMVOC)
3B4f	Mules and asses	X		X (NMVOC)
3B4gi	Laying hens	X		X (NMVOC)
3B4gii	Broilers	X		X (NMVOC)
3B4giii	Turkeys	X		X (NMVOC)
3B4giv	Other poultry	X		X (NMVOC)
3B4h	Other animals	X		X (NMVOC)
3Da1	Inorganic N fertilisers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	X		X
3Da2b	Sewage sludge applied to soils	X		
3Da2c	Other organic fertilisers applied to soils (including compost)	X		X
3Da3	Urine and dung deposited by grazing animals	X		
3Da4	Crop residues applied to soils	X		
3Db	Indirect emissions from managed soils	X		
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	X		
3Dd	Off-farm storage, handling and transport of bulk agricultural products	X		
3De	Cultivated crops	X		
3Df	Use of pesticides	X		X
3F	Field burning of agricultural residues	X		X
3I	Agriculture other	X		
11A	Volcanoes		X	
11B	Forest fires		X	
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency

124. Switzerland has provided a detailed and generally transparent emissions inventory. Switzerland uses a combination of country specific methodologies and national methodologies based on the Guidebook 2019, for example a Tier 3 country specific approach for nitrogen flux calculations, a Tier 2 method for particle emissions using country specific emission factors based on literature data and a Tier 1 method for NMVOC emissions using default Tier 1 emission factors.

125. The ERT noted some need for further improving the transparency of the inventory as detailed below and recommend that the Party implement these in the next inventory submission:

(a) Present more details regarding the country specific EFs as well as a comparison of the national EFs and the Guidebook EFs with a rationale for the discrepancies.

(b) Include more details on the following: evolution of manure management systems (MMS) distribution for nitrogen and on the methodology for estimating emissions from spreading digestates. During the review, Switzerland provided a file “Data liquid solid CH sub2020” with detailed information on manure management distribution for nitrogen which could be added to the next submission.

Completeness

126. The ERT considers the Agriculture sector to be complete in terms of sources, pollutants and years included in the inventory.

Consistency including recalculation and time series

127. The ERT did not identify any outliers.

128. The ERT notes that Switzerland uses consistent methods over the time series and has provided a detailed explanation of all recalculations of emissions under NFRs 3.B and 3.D in its IIR, including the rationale behind and the impact on emission levels and time series.

Comparability

129. The ERT notes that the allocation of emissions is in line with the Reporting Guidelines and the methods used to calculate emissions are in accordance with the latest version of the Guidebook and the inventory is thus comparable with those of other reporting Parties.

Accuracy and uncertainties

130. The ERT did not find systematic under- or overestimates.

131. Switzerland uses Tier 2 or higher methods for all key categories in line with Reporting Guidelines paragraph 21 with the exception of NMVOC emissions from 3B.

132. Switzerland has not provided a separate uncertainty analysis for the Agriculture sector; however, sources in agriculture are included in the general

uncertainty assessment. For NH_3 emissions, new uncertainty results from a national study of 2017 have been used for each livestock category.

133. For NFR 3B a new uncertainty analysis for NH_3 emissions from livestock husbandry and manure management will be available for the submission 2022 as well as for NFRs 3Da2a and 3Da3.

134. The ERT encourages Switzerland to provide uncertainty estimates separately for the Agriculture sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

135. The IIR does not provide information on specific QA/QC checks in place in the Agriculture sector. The ERT recommends that Switzerland implement and document sector specific OA/QC procedures and their results in the IIR of the next submission.

Condensable Particulate Matter

136. Switzerland did not provide explanatory information on the condensable component of particle emissions. In the IIR Switzerland states that the condensable component is not applicable (NA) for $PM_{2.5}$ emissions from agriculture. The ERT recommends that the Party include more information in the next submission to justify NA.

Improvement

137. Switzerland intends to develop national methodologies for several categories, such as a Tier 2 method for NMVOC emissions from NFRs 3B, and to improve the transparency of the inventory for its next submission including detailed explanations of the national EFs that are obtained with national surveys and the model AGRAMMON, as well as the rationale behind their selection. In addition, for NFRs 3B, 3Da2a, 3Da3, a comparison of the country-specific Tier 3 NH_3 emission factors with Tier 2 emission factors according to the Guidebook 2019 is planned. The ERT welcomes this development.

Potential Technical Corrections

138. No technical corrections were made for the Agriculture sector.

Sub-Sector Specific Recommendations

Category issue 1: 3.B Manure management – NMVOC, Transparency

139. The ERT noted that the use of the Tier 1 methodology for NMVOC emissions from 3B, which is a key category, was not clearly justified in the IIR. During the review Switzerland acknowledged this, stating that it would consider revising the description in its next submission and explained that a Tier 2 method could be carried out; however, according to a national study (Bühler and Kupper 2018), the default values are not reliable because for dairy cattle Tier 2 emission factors would be almost twice as high as the Tier 1 values. The authors concluded that both tier methodologies provided in the 2016 version of the Guidebook include questionable or erroneous assumptions and that they could not recommend that either of them

should be applied. Hence, they suggested postponing the derivation of NMVOC EFs and the reporting of NMVOC emissions from source category 3B Manure management either until more reliable data is published, or conducting measurements to provide a basis for country specific emission factors.

140. The ERT commends the efforts to obtain country specific emission factors. However, the ERT recommends that Switzerland provide a clear justification for using a Tier 1 method for this key category including (1) that the values of the Tier 1 emission factors yield reasonable NMVOC emissions until country-specific emission factors are available (presumably for submission 2022) and that (2) Switzerland has launched a national study in order to measure NMVOC emissions from dairy cattle with and without silage feeding in experimental housing during summer, winter and transitional seasons. The ERT points out that this information should be included in the IIR section of NFR 3B as a short justification on the use of the Tier 1 method, and in more detail in section 8.2 “Planned Improvements”. The ERT recommends that the Party undertake a revision of the description of the methodology for future submissions.

Category issue 2: 3Da2c - NH_3,Transparency

141. The ERT noted that the NH_3 EFs for calculating emissions from the field application of other organic fertilisers (3Da2c) were not clearly referenced. During the review, Switzerland stated that a Tier 2 method was used with a country specific NH_3 emission factor (Kupper et al. 2018, chapter 7.11.2). The EFs used were 60% of TAN for liquid residues and 80% of TAN for solid residues. The ERT recommends that Switzerland provide explanations of the methodology for calculating NH_3 from NFR 3Da2c in IIR chapter 5.3.2, with references to the information sources of the EFs.

Category issue 3: 3.D.f Use of Pesticides - all pollutants, Transparency

142. The ERT notes that Switzerland reports ‘NO’ in the category ‘Use of pesticides’ and that the issue was raised in the 2016 Stage 3 review. Switzerland explained that there had not been any use of these compounds in any year of the time series: since the 1970s, the application of HCB has been prohibited in Switzerland. The ERT recommends that Switzerland include a short explanation for the rationale behind the notation key “NO” in the Agriculture chapter of the IIR in its next submission.

Category issue 4: 3.F Field burning of agricultural residues - All pollutants, Transparency

143. The ERT notes that Switzerland reports the emissions from NFR 3F - Field burning of agricultural residues as “NO” for all pollutants and that the estimation of these emissions was raised in the 2016 Stage 3 review. In response to a question about the issue, Switzerland has informed the ERT that the emissions formerly included under NFR 3F are currently included under the Waste sector (NFR 5C2) following a recommendation of the Expert Panel on Agriculture and Nature (CLRTAP, TFEIP). The ERT recommends that Switzerland include a short explanation of the rationale behind the use of “NO” and the re-allocation of the emissions to the Waste sector under NFR 5C2 in its next submission.

Category issue 5: 3Da2a and 3Da2c – NH_3, Transparency

144. The ERT recommends that Switzerland provide detailed information on the T2 methodology from Guidebook 2019 and the activity data used. During the review, Switzerland sent a national study (Schleiss 2017) which provides the amount of composted residues from 1980 to 2015. Furthermore, Switzerland confirmed that emissions coming from "manure digestate" are reported under NFR 3Da2a and that emissions from "other organic waste" and "energy crops" are reported under 3Da2c. The ERT recommends including this explanation (3Da2a and 3Da2c) in the IIR to improve transparency.

WASTE

Review Scope

Pollutants Reviewed		SO_x, NO_x, NMVOC, NH_3, PM_{10}, $PM_{2.5}$		
Years		1990 – 2018 + (Protocol Years)		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
5A	Solid waste disposal on land	X		
5B1	Biological treatment of waste - Composting	X		
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	X		
5C1a	Municipal waste incineration	X		
5C1bi	Industrial waste incineration	X		
5C1bii	Hazardous waste incineration	X		
5C1biii	Clinical waste incineration	X		
5C1biv	Sewage sludge incineration	X		
5C1bv	Cremation	X		
5C1bvi	Other waste incineration	NA		
5C2	Open burning of waste	X		
5D1	Domestic wastewater handling	X		
5D2	Industrial wastewater handling	X		
5D3	Other wastewater handling	NA		
5E	Other waste	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

145. Switzerland has provided a detailed emissions inventory; however, the Waste sector documentation in the IIR is not completely transparent. Some of the methodologies and emission factors for the Waste sector, described in the IIR, would benefit from a more thorough explanation of the underlying assumptions to enhance transparency. The ERT recommends that Switzerland include the answers that were provided to questions raised by the ERT during the review week in future submissions.

Completeness

146. The ERT considers the Waste sector inventory to be complete regarding the activities, pollutants and years included.

147. The ERT notes that emissions of Cd and Pb, which are mandatory pollutants (Reporting Guidelines paragraph 7) have not been estimated for source category 5C2 as explained under Sub-Sector Specific Recommendations.

148. The ERT notes that for categories 5C1a, 5C1biv, 5C1bv the notation key “NA” is used for emissions of As, Cr, Cu, Ni and Se (except for 5C1a), despite a method being provided in the Guidebook. The ERT encourages Switzerland to report these emissions in the next submission in line with paragraph 8 of the Reporting Guidelines.

Consistency, including recalculation and time series

149. The ERT considers the Waste sector time series to be internally consistent or all the reported years.

150. Switzerland has recalculated its inventory for several source categories in the Waste sector (5A, 5B1, 5C1bii, 5C1biiI, 5D1 and 5E). Switzerland has included all the necessary explanations, including the rationale, and the impact of the recalculations on trends in the Waste Sector in its IIR.

Comparability

151. Switzerland’s inventory is comparable with inventories of other reporting Parties. Switzerland’s Waste sector relies on many country-specific EFs; however, the methods used by Switzerland in the inventory are consistent with the 2019 Guidebook and the emissions are reported in the latest NFR format.

Accuracy and uncertainties

152. The ERT did not find any systematic under- or over-estimates.

153. The Party uses Tier 2 methods for category 5C1a, which is the only key category in the Waste sector.

154. The ERT notes that Switzerland has undertaken a quantitative uncertainty analysis for the main pollutants and particulate matter in the Waste sector. The ERT recommends that Switzerland include all pollutants in the uncertainty analysis in line with paragraph 31 of the Reporting Guidelines.

155. Switzerland has a solid QA/QC system in place, as described in the IIR, although no sector specific OA/QC procedures have been described. The ERT recommends that the Party document sector specific QA/QC procedures for the Waste sector in the IIR for the next submission.

Condensable Particulate Matter

156. Switzerland provided explanatory information on the condensable component of particle emissions from Waste sector categories. According to the information in Annex 6 of the IIR, the condensable component of particulate matter in the waste is excluded. The ERT recommends that Switzerland include such information in the next submission.

Improvement

157. The ERT notes that no planned improvements are documented for the Waste sector in the IIR.

Potential Technical Corrections

158. No technical corrections were prepared during the review.

159. The Party sent revised estimates during the review which the ERT accepted (see Annex I).

Sub-Sector Specific Recommendations

Category issue 1: 5A Landfills – NMVOC and $PM_{2.5}$

160. The ERT notes that the notation key "NA" has been used for NMVOC and $PM_{2.5}$ from source category 5A. In response to a question about the issue, Switzerland provided revised estimates for NMVOC during the review using the emissions factor from the Guidebook. Switzerland also stated that further consideration had to be given to this issue before implementing the changes to the inventory. The ERT recommends that Switzerland includes this in the next submission or develops better estimates and documents the calculation in the IIR. If better methods are not available for the next submission, the ERT recommends that Switzerland put the issue in its inventory improvement plan with clear steps and schedules and that it report on progress in the next submissions.

Category issue 2: 5C1a – Heavy metals

161. The ERT notes that EFs for heavy metals (Pb, Hg, Cd) in Table 6-11 of the IIR are reported using incorrect units, mg/t instead of g/t, although the emission estimates in the NFR are correct. During the review, Switzerland indicated that this would be amended in the next submission. The ERT recommends that the Party do this.

Category issue 3: 5C1bi – Hg and Cd

162. The ERT notes that the EFs in Table 6-11 of the IIR have been mixed up for Hg and Cd (incinerating of cables insulation material), which are reported under source category 5C1bi – Industrial waste incineration. During the review, Switzerland confirmed that the correct EFs, as listed in SAEFL (2000), section 'Kabelabbrand, would be used to estimate emissions of Cd and Pb for this source category in the next submission.

Category issue 4: 5C1biv – All pollutants

163. The ERT notes that, for source category 5C1biv – Sewage sludge incineration, the EFs in Table 6-11 of the IIR do not match hose of the original reference in SAEFL (2000), section 'Klärschlammverbrennung[2]'. During the review, Switzerland explained that as a result of emission measurements from three sewage sludge incineration plants, country-specific EFs had been used from 2002 onwards, while linear interpolation was applied between the years 1990 and 2002. The ERT recommend that Switzerland include this explanation in the IIR.

[2] Sewage Sludge Incineration

Category issue 5: 5C2 – All pollutants

164. The ERT notes that in the IIR it is stated that the emission factors for 5C2 'Open burning of agricultural and private gardening waste' were taken from the Guidebook (2019) for main air pollutants, particulate matter and PAHs. However, it is no clear whether a Tier 1 or a Tier 2 approach has been applied and which EFs are used. During the review, Switzerland explained that in 2014 it conducted a study to estimate the activity data and emission factors for the incineration of natural residues in forestry, agriculture and private gardens. The EFs used for this source category have been selected based on the recommendations from that study. Switzerland confirmed that the study, Infras (2014), and the other sources of EFs would be referenced in the IIR in chapter 6.4.2 in the next submission. The ERT recommends that Switzerland include in the IIR additional information based on the response it provided during the review.

Category issue 6: 5C2 – Cd and Pb

165. The ERT notes that the notation key "NE" has been used for emissions of Cd and Pb from source category 5C2, despite the fact that default emission factors are available in the Guidebook (2019) for both pollutants. In response to a question about the issue, Switzerland provided revised estimates for emissions of Cd and Pb for this source category and confirmed that these would be reported in the next submission. The ERT accepted the revised estimates (presented in Annex I of this report).

Category issue 7: 5E – NH_3

166. The ERT notes that the notation key "NA" has been used for NH_3 emissions from sludge spreading. During the review, Switzerland explained that this process is not occurring. The majority (70 - 80 %) of the dehydrated sewage sludge is incinerated in municipal waste incineration plants or in dedicated sewage sludge incineration plants, while the remaining 20 - 30 % is incinerated and used for cement production. The ERT recommend that Switzerland change the notation key to NO in line with paragraph 12 of the Reporting Guidelines and that it provide more information on sewage sludge treatment in its IIR for the next submission.

DOCUMENTS PROVIDED TO ERT

1. Switzerland's IIR 2020 (pdf)
2. Switzerland Annex 1 NFR tables 1990 – 2018
3. Switzerland Stage 1 report 2020
4. Switzerland Stage 2 S&A report 2020
5. Results of extended checks

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

6. Responses to questions prior to the S3 review 2020 (online excel)
7. Responses to questions raised during the S3 review 2020 (online excel)
8. File "Roadtransport_7423a_Rough_Estimate_Cd-ex_PCB.xlsx" related to Category Issues 1 and 4
9. Revised emission estimates for 1A3bi-iv – Cd and PCBs
10. Confidential Activity data for the Sector IPPU: CHE_IIR tables_CONFIDENTIAL_2020_sector INDUSTRY.xlsx
11. Confidential Study on Domestic solvent use: VOC-Emissionen HH_Hubschmid_FHNW_2014.pdf
12. File "Data liquid solid CH sub2020" (sent by e-mail to Lead Reviewer) and File "Schleiss_2017_Kompostierung-CH" related to Categories issues 3 and 5.
13. Distribution for nitrogen and nitrogen amount applied from digestate
14. Infras 2014 - Verbrennung-natürlicher-Abfälle
15. Lemie SAEFL 2000 - Handbuch Emissionsfaktoren Stationäre Quellenux et al 2003 - Variables Affecting Emissions of PCDDFs from Uncontrolled Combustion of Household Waste in Barrels
16. US EPA 1995 - Emission factors for open burning of municipal refuse
17. Wevers et al 2004 - Effect of backyard burning on dioxin deposition and air concentrations

ANNEX I - REVISED ESTIMATES

167. Revised estimates have been proposed by the Party during the review and detailed related information is provided separately in the MSExcel file: *CH - RE - Energy Transport Waste - 2020.xlsx*

TC|REVISED ESTIMATES

Description	Reference	Pollutant estimates (kt)				
		2018	2015	2010	2005	1990
Cd						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**1.162**	**1.124**	**1.149**	**1.036**	**3.685**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.012	0.018	0.392	0.421	0.270
1A3b Road transport		0.001	0.001	0.001	0.001	0.001
5C2 Open burning of waste		0.002	0.001	0.002	0.002	0.003
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**1.176**	**1.144**	**1.544**	**1.459**	**3.958**
Hg						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**0.667**	**0.69**	**0.766**	**0.759**	**6.371**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.002	0.003	0.065	0.072	0.046
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.669**	**0.693**	**0.831**	**0.831**	**6.417**
Pb						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**15.250**	**15.015**	**16.640**	**20.043**	**378.688**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.009	0.013	0.288	0.309	0.198
5C2 Open burning of waste		0.004	0.004	0.004	0.004	0.007
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**15.263**	**15.032**	**16.932**	**20.357**	**378.893**

TC| REVISED ESTIMATES

Description	Reference	Pollutant estimates (kt)				
		2018	2015	2010	2005	1990
NMVOC						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**79.545**	**83.206**	**98.074**	**113.751**	**305.804**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.000	-0.002	0.010	0.002	0.000
5A Solid waste disposal on land		0.157				0.400
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**79.589**	**83.204**	**98.084**	**113.753**	**305.915**
PM2.5						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**6.825**	**7.338**	**9.131**	**10.226**	**16.184**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.005	0.007	0.159	0.171	0.110
5A Solid waste disposal on land		**0.000**				**0.00003**
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**6.830**	**7.345**	**9.290**	**10.397**	**16.293**
PM10						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**14.795**	**15.136**	**16.898**	**17.631**	**24.796**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.005	0.007	0.159	0.171	0.110
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**14.800**	**15.143**	**17.057**	**17.802**	**24.906**
SOx						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**5.126**	**5.780**	**10.488**	**13.985**	**36.673**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		-0.003	-0.071	-0.161	-0.407	-0.301
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**5.123**	**5.709**	**10.327**	**13.578**	**36.372**

TC|REVISED ESTIMATES

Description	Reference	Pollutant estimates (kt) 2018	2015	2010	2005	1990
NOx						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**66.079**	**73.940**	**85.450**	**93.875**	**144.608**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		-0.002	-0.050	-0.108	-0.280	-0.207
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**66.077**	**73.890**	**85.342**	**93.595**	**144.401**
B(a)P						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**0.774**	**0.897**	**1.794**	**2.359**	**3.891**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.004	0.005	0.120	0.129	0.083
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.778**	**0.902**	**1.914**	**2.488**	**3.974**
B(b)F						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**0.821**	**0.943**	**1.779**	**2.423**	**3.935**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.006	0.009	0.204	0.219	0.140
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.827**	**0.952**	**1.983**	**2.642**	**4.075**

TC|REVISED ESTIMATES

Description	Reference	Pollutant estimates (kt)				
		2018	2015	2010	2005	1990
B(k)F						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**0.542**	**0.606**	**0.933**	**1.279**	**1.975**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.003	0.005	0.113	0.121	0.078
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.545**	**0.611**	**1.046**	**1.400**	**2.053**
I(1,2,3-cd)P						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**0.484**	**0.545**	**1.048**	**1.374**	**2.261**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1B2c Venting and flaring		0.003	0.005	0.113	0.121	0.078
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**0.487**	**0.550**	**1.161**	**1.495**	**2.339**
PCBs						
National total as reported 2020 (row 141)	**Annex I, 13/02/2020**	**480.481**	**599.259**	**826.686**	**1 269.855**	**2 331.114**
Difference between original estimate and revised estimates provided by the Party and accepted by the ERT						
1A2f Stationary combustion in manufacturing industries and construction: Non-metallic minerals		0.334				0.495
1A3b Road transport		0.00016	0.00022	0.00035	0.00037	0.00041
Difference between original estimate and technical correction deemed necessary by the ERT						
National total (row 141) including revised estimates and technical corrections accepted by MS	Calculated using data above	**480.815**	**599.259**	**826.686**	**1 269.855**	**2 331.609**