Review Comments by Experts on First Order Draft of Volume 1 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9708	1	1	1	719	More or less general: Should we somehow adress that there are meanwhile also citties, regions or subnational territorial units working on calculation of GHG emission information. They could be a source of information or user…or…	Michael Strogies	Accepted with modification	Text has been included on how these considerations are relevant in the context of the IPCC Guidelines.
7016	1	1	32	38	I assume that this para will be adjusted for the 2019 Refinments or an additional paragraph will be added	Vitor Gois Ferreira	Accepted with modification	Introduction to the 2019 Refinement was relocated to the Overview chapter.
7658	1	1	32	33	For better understanding by users, it would appropriate to give a number of section and change the current text to the following name: “1.1 Scope and Objectives”. In this case, Chapter 1 will have clear objectives of the 2019 refinementt.	Nataliya Stranadko	Accepted	Subheadings revised.
7660	1	1	38	39	After the line 38, it would appropriate to highlight the main objective of the 2019 refinementt as decision IPCC/XLIV-5 determined it. Thus, the following paragraph might be included: “The main objective of the 2019 refinementt is to provide an updated and sound scientific basis of the 2006 IPCC Guidelines for supporting the preparation and continuous improvement of national greenhouse gas inventories”.	Nataliya Stranadko	Accepted with modification	Discussion of IPCC mandate and background on refinement has been provided in the Overview chapter.
97	1	1	39		a comma should be introduced after "reporting"	Chukwuma Anoruo	Accepted	Text revised.
390	1	1	39	41	copy edit: verbs shoud be singular: "provides only guidance" and "does not provide guidance"	Pauline Midgley	Accepted	Text revised.
4288	1	1	39	39	I suggest that the authors delete "only" because the refinementt will provide methodology to estimate GHG emissions.	Naofumi Kosaka	Accepted	Text revised.
7662	1	1	39	39	To change the word “recognize” to “emphasize”. It would look like “It is important to emphasize…”	Nataliya Stranadko	Accepted	Text revised.
6734	1	1	39	39	Suggest to change the following: "provide only guidance for reporting which refers to the" to "only provides guidance for reporting that refers to the".	Raul Salas Reyes	Accepted with modification	Text revised.
7018	1	1	39	42	I understand that explanations on the scope may be necessary (and maybe some reference to the Wetlands Supplement and the KP Supplement could be made), but I think this paragraph needs rephrasing, because the GL are not only for reporting, rather the preparation of inventories. Regarding accounting, it could be better to indicate that it does not contain information on how to report for any accounting system such as the Kyoto Protocol, although the inventory itself can be used as a basis for such accounting.	Vitor Gois Ferreira	Noted	Text on accounting was removed.

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9704	1	1	39	42	Quotation: …. that the 2019 refinementt provide only guidance for reporting which refers to the presentation of emission… Is that true?? My hope is that the 2019 refinementt provides mostly methodological support for calculation of GHG emissions. This should be included here!	Michael Strogies	Accepted with modification	Purpose of refinement has been addressed in Overview chapter.
6738	1	1	41	41	Suggest to change "but do not provide" to "but does not provide"	Raul Salas Reyes	Accepted	Text revised.
6736	1	1	41	41	Suggest to clarify what does accounting mean. Readers that are familiar with the Paris Agreement might confuse the term accounting with the definition used in Article 4.13, which is different from the meaning used in the IPCC guidelines.	Raul Salas Reyes	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
7664	1	1	42	42	It would be appropriate to write “compliance with country commitments under the UNFCCC”. For first time reader, it is not clear - commitments of whom and compliance under what?	Nataliya Stranadko	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
770	1	1	43		It will be useful if you could also present a summary table listing out the changes or refinementts made in the proposed 2019 National Greenhouse Inventory Guidelines as compared to the 2006 and 1996 National Greenhouse Inventory Guidelines	Karachepone Ninan	Accepted with modification	The summary of refinements are provided in the mapping tables in the Annex to each Volume. Changes refer to the comparison with the 2006 IPCC Guidelines.
7666	1	1	44	44	Renumber sections of Chapter 1 taking into account changes in lines 32-33. Thus, it will be “Sections 1.2 to 1.4 describe the…”	Nataliya Stranadko	Accepted with modification	Subheadings revised.
7668	1	1	45	45	Modify the word combination from “focusing on scope, approach, and structure” to “focusing on concepts, methodological approach, and structure”. Renumber sections of Chapter 1 taking into account changes in lines 32-33. Thus, it will be “Sections 1.5 through 1.6…”.	Nataliya Stranadko	Accepted	Text revised.
7670	1	1	46	46	Add a word “new” to this line because Sections 1.5 through 1.6 provide updated and new guidance. Thus, this line would be look like “present step-by-step new guidance on how to use the 2019 refinementt for compiling a greenhouse gas inventory”.	Nataliya Stranadko	Accepted	Added.
7672	1	1	48	48	Renumber sections of Chapter 1 taking into account changes in lines 32-33. This section provides not just the name of concepts but gives the concept’s definition. Therefore, the name of this section would be “1.2 Concepts and Definitions”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7674	1	1	49	49	Delete this line “Update of Section 1.1 of the 2006 IPCC Guidelines”. Updating the 2006 IPCC Guidelines is one of the objectives of the 2019 refinementt that is stated after the line 38. There is no need to repeat it in each section.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
6742	1	1	50	50	It is not entirely clear what are the "few key concepts" refered to. I suggest to further clarify, as the following paragraph does not seem to connect.	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
6740	1	1	50	50	It is not clear what "This helps to ensure" refers to. I suggest to clarify what is "This" refering to	Raul Salas Reyes	Accepted	Text changed as proposed.
6744	1	1	50	50	I suggest to change "Inventories" with "National inventories" or "National greenhouse gas inventories"	Raul Salas Reyes	Accepted	Editorial: Agree.
5840	1	1	53	57	Explaining this new concept of how to reduce the impacts of natural disturbances on reporting trends is an important concept to discuss in this section, but having it as the second paragraph under “1.1 Concepts” without even a subtitle to introduce it seems a bit abrupt/confusing. It would be preferable if it were inserted under the subheading on “Anthropogenic emissions and removals” (page 1.3, lines 58-64), since it is a part of that concept of how to identify anthropogenic emissions and removals. Additionally, the authors may need to update/remove this text depending on whether the new guidance on removing impacts of natural disturbances on the trends actually makes it into the2019 refinementt AFOLU volume following the review/editing cycles under way and still to come.	Vincent Camobreco	Accepted	Text has been revised and considered in the overall introduction/overview for the 2019 Refinement.
6746	1	1	53	55	Looking at Volume 2 Chapter 4, the only reference to LULUCF emissions is found on the line 2341 of Vol 2 Chapter 4 that says "Emissions of CO2 from charcoal production are considered under Land Use, Land-Use Change and Forestry (LULUCF)". I would like to make two suggestions in this case. The first one, to allign whether the term AFOLU should be standardized throughout the refinementt or if it will be using both AFOLU and LULUCF. If the case is the latter, then I would suggest to clarify why is the reason for this so that relevant parties can understand the difference. My second suggestion is to review whether the volume and chapter refered to in these lines is correct, and if so, clarify why is this.	Raul Salas Reyes	Accepted	AFOLU/LULUCF terminology has been revised and made consistent among the chapters.
7020	1	1	53	57	This is not a concept. Consider moving	Vitor Gois Ferreira	Accepted	Introduction to the 2019 Refinement was relocated to the Overview chapter.

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394	1	1	53	57	this is a very long and hard to understand sentence. I suggest splitting for clarity at line 55 after "volume 4, chapter 2". Beginning the second sentence "XX is intended to reduce the impacts .." Not clear to me what XX should be; I guess "This good practice guidance "	Pauline Midgley	Accepted with modification	Text has been revised and considered in the overall introduction/overview for the 2019 Refinement.
7800	1	1	54	54	This line refers to a LULIUCF reference in the 2006 GLs. But does LULUCF appear in those guidelines? Would a FOLU reference be more correct?	Maya Hunt	Accepted with modification	AFOLU/LULUCF terminology has been revised and made consistent among the chapters.
392	1	1	55	55	copy edit: reverse chapter and volume, i.e. to read "volume 4, chapter 2"	Pauline Midgley	Accepted	The comment has been addressed in SOD.
6100	1	1	62	64	Some managed lands, such as cropland and grassland on upland soils, are CH4 sinks (e.g., Vol1_Chp1_L62-64_SD). However, this sink category is not currently accounted for. This contradicts text stating that 'emissions and removals on managed lands are taken as a proxy for anthropogenic emissions and removals'.	Stephen Del Grosso	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
267	1	1	68	68	8.2.1 of Volume 1 doen's exist	Bruno Kestemont	Noted	This is part of unchanged text from 2006 IPCC Guidelines.
2396	1	1	71	77	While it is important to track trends over time, going all the way back to 1990 causes significant uncertainty to the emissions estimates (and may provide a false sense of emissions improvement). I highly recommend employing 2005 as the base-year. The activity data should be better and therefore the backcasting may be better. Further for methane, the science and understanding of key sources has dramatically improved over the past decade.	Fiji George	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
6084	1	1	82	82	delete "according to, for example, a country's obligations as a Party to the UNFCCC" Country reporting obligations under the UNFCCC are determined by Parties to the Convention and tables for that reporting are specified in decisions made by Parties to the Convention.	William Hohenstein	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4346	1	1	84	95	How about O3? Other chapter mentioned it. It is also useful to discuss the difference in greenhouse effect between ground and satellite measurment.	Kewei Yu	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
6748	1	1	84	105	Would it make sense to include carbonaceous aerosols (eg., black carbon)?	Raul Salas Reyes	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
5760	1	1	85	95	Even though this is in gray it serves as an example of how to improve the first interaction with the " inventory compilers and other stakeholders". Leave the list of gases but change the order so F-gases are clearly understood. "The following greenhouse gases" down to "nitrous oxide" can remain then the next bullet would be "F-gases" with an indentation for the sublisted fluorinated gases that are in teh 2006 Guidelines.	Ann Gallagher	Accepted	the word '*F-gases'* has been placed before the list of actual F-gases which has been put in a sublist.
398	1	1	96	97	shouldn't the most up to date GWPs be referenced not pre-2006?	Pauline Midgley	Accepted with modification	The guidelines are not prescriptive on which GWPs to use. Text will be added to highlight this.

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2398	1	1	96	99	Consider GWPs of 20 years especially to better understand the impacts of SLCPs	Fiji George	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
400	1	1	100	100	unclear what "These gases" refers to; which gases? not all in the above list. Probably this sentence should follow on directly from the one before, not as a new paragraph.	Pauline Midgley	Accepted	Flow of sentences reviewed accordingly.
6702	1	1	107	207	In addition to the lists of sources and links of greenhouse gas emission in line 106 (Sector and Categories), decomposed remains of animal and wild fire (Bush burning) can also cause Carbon emission into the atmosphere.	Onema Adojoh	Accepted with modification	Text added to clarify whether these emissions are counted or not.
396	1	1	110	111	comment is to Footnote 4: could legitimately say "much smaller amounts" here	Pauline Midgley	Rejected	The halogenated gases are typically emitted in smaller amounts than CO2, CH4 and N2O, but may have long atmospheric lifetimes and strong radiative forcing effects.
5842	1	1	119	121	Given that there are significant updates to the HWP guidance being proposed in AFOLU, some update to this text may be necessary.	Vincent Camobreco	Accepted	Comment addressed in Volume 4.
6086	1	1	119	120	more precise to say "account for carbon stored in HWP" rather than include HWP.	William Hohenstein	Rejected	Text is from the 2006 IPCC Guidelines. 'not included' is used for international transport.
9168	1	1	122	124	Here authors note an exception to the usual practice of 'reporting organized according to the sector actually generating the emissions -- the exception is for wood used as energy. The fact that no emissions are recorded at the site of biomass combustion, and only as changes in forest stock, has created policy conditions whereby countries importing biomass choose to completely ignore the emissions associated with burning. While not strictly speaking an IPCC problem, nonetheless as the percentage of Harvested Wood Prodcuts taking the form of biomass feedstocks and wood pellets, it is critical that such emissions have greater 'visibility' within reporting, going beyond just an 'information item'. Otherwise, this "tends to reinforce the assumption that biomass energy is carbon-neutral at the point of use." Simply stated it is time to 'end the exception' that biomass burning not be counted at the site of combustion. Of the goal of these guidelines is CONSISTENCY, then it's time to ensure consistency by requiring that biomass energy emissions be counted for in the energy sector!	Peter Riggs	Accepted with modification	Text has been added to clarify the issue, and ensure consistency among the sectors. The biomass issue is considered in the Overview chapter "Reporting is generally organised according to the sector actually generating emissions or removals. There are some exceptions to this practice, such as CO2 emissions from biomass combustion for energy, which should be estimated and are reported in AFOLU Sector as part of net changes in carbon stocks. CO2 from bioenergy should be estimated in Energy but reported as a memo item to Energy to avoid double counting with reporting under AFOLU. This does not imply that bioenergy is “carbon neutral”. Where CO2 emissions are captured from industrial processes or large combustion sources, emissions should be allocated to the sector generating the CO2 unless it can be shown that the CO2 is stored in properly monitored geological storage sites as set out in Chapter 5 of Volume 2".
7676	1	1	128	128	Renumber sections of Chapter 1 taking into account changes in lines 32-33. This section would be “1.3 Estimation Methods”.	Nataliya Stranadko	Accepted	Text has been revised and sections renumbered.
10152	1	1	133	133	Calculation should be explained properly, as this document does not include any supporting documentation	Malini Nair	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4032	1	1	143	150	Recent research has shown that some "biofuels" are in fact a blend of biogenic and fossil carbon (see Vol5_Chp6_L773-811). A "heads-up" in the form of a footnote would be worthwhile here.	Gregory Peters	Noted	No action can be taken because comment is out of scope of 2019 Refinement.

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7678	1	1	151	151	Term “concepts” is used in this section as well as in the previous section. When it relates to the methods, it may be better to use some other term like “pillars” or “approaches”. It is a little bit confusing because main concepts were explained in the previous section. Term “approaches” instead of “concepts” in this section would be applied reasonably because in lines 207-208 a phrase “a good practice approach” is already used.	Nataliya Stranadko	Accepted	Text revised.
404	1	1	153	153	spelling should be "principles"	Pauline Midgley	Accepted	Revised.
40	1	1	158	160	Here and throughout, the tier 1, 2 and 3 approaches are clearly explained. As national data and modelling capacity improves there should be an increasing move towards tier 2 and some tier 3 for more and more activities. As such, I wonder whether a box clearly explaining how this process occurs and what is required (e.g. an example for, say, UK N2O EFs in agriculture) so that users can better mao a course towards tier 2 and 3 progression.	David Reay	Accepted	Text added to address the issue. Guidance on this is also provided in each sectoral chapter.
7680	1	1	173	173	Renumber sections of Chapter 1 taking into account changes in lines 32-33. This section would be “1.4 Structure of the Guidelines”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
7682	1	1	184	184	Renumber sections of Chapter 1 taking into account changes in lines 32-33. This line would start “detail in Section 1.6”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
4348	1	1	185		QA/QC are not defined before use.	Kewei Yu	Accepted	The comment has been addressed in SOD.
7684	1	1	204	204	Renumber sections of Chapter 1 taking into account changes in lines 32-33. This section would be “1.5 Inventory Quality”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
6730	1	1	205	205	2)Ämend typo in line 205, replace the first “on” with “for”.	Onema Adojoh	Rejected	Text is from the 2006 IPCC Guidelines. No need to change.
9868	1	1	250	522	Section 1.5 includes some useful material but the benefits of the section (which should be clear guidance to assist in delivery of high quality inventories) are diluted by excessive detail (e,g, lists that could be annexes) and the use of confusing terminology that is not explained. It needs to be more concise. Examples follow.	David Glen Thistlethwaite	Accepted	Clarity and context of text has improved.

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10072	1	1	250	264	For this entire new section on national inventory management systems, it would be helpful for the users of this guidance to see a clear list of essential core elements of such a system upfront even though this is not prescriptive. What does the guidance suggest/recommend are some key essential components of such systems - need to list that here before readers get to 1.5.1.	Neelam Singh	Accepted	Bulleted list of core elements added to this section.
9006	1	1	250	251	1.5 NATIONAL "GHG " INVENTORY MANAGEMENT SYSTEMS - Word "GHG" may be added for more clarity about title.	Vishwa Bandhu Pant	Accepted with modification	Refer to Author's note associated with comment ID 7686: National Inventory Arrangements.
9980	1	1	250	522	Recommend compressing content and integrating some general context on NIMS in section 1.6 on steps to compiling an inventory (establishing/updating arrangements, institutional roles to support compilation steps, including establishing a compilation team and that practice and, with review and improvements often guided by broader input from contributing agencies and experts, section 1.5.3). The introductory guidance should focus on facilitating use of these inventory guidelines, in particular considering improving user friendliess of section on how a compiler should walk through this guidance and apply these Guidelines focusing on enhancing section 1.6, etc. This is valuable as the documents are overwhelming to new experts/compilers and the titles, headers are not often indicative of the content in the section, so someone skimming the GL may skip over a relevant section which may contain the content they are seeking. The inclusion of a dedicated section on National Inventory Management Systems seems out of scope as the IPCC Guidelines provide methodological guidance on estimating emissions, not institutional best practices. Further, there is a considerable and significant library of tools and materials from other relevant institutions some referenced, but that could more comprehensively be referenced as part of a more general discussion in inventory compilation steps from UNFCCC, UNFCCC CGE, UNDP (has a full manual on this called "Managing the GHGI process", potentially recently updated) and now the Global Support Program (UNDP-UNEP) also recently released guidance that also discusses this in the context of peer review (released in 2017), in addition to other numerous institutions producing case-studies, examples (e.g. GIZ, WRI, and also US EPA's template workbook/toolkit). These tools could be summarized in a box.	Mausami Desai	Accepted with modification	The mandate from IPCC plenary included request for expanded guidance on national inventory management systems. Specifically: "Provide a better description on how to implement a national inventory management system that manages all parts of Volume 1, implements continuous improvement and leads to the development of mature inventories". SOD does not provide references to existing literature on national inventory systems and tools because there is a large array of different tools and guidance designed for different purposes and different reporting requirements. None of these tools provide adequately generic approaches. Tools and guidance are also continually evolving and listing and therefore endorsing any would be confusing.

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9980 (cont.)					Any examples, if retained should be moved to an Annex so it is very clear they are examples. The proposed overview indicates that this is not intended to be prescriptive, but the content in new sections do carry greater implications if included and further these steps that may not be applicable to all countries, including some of the tables and figures. While section on mandates seems useful as planning/documentation tool and the example table is not necessary to illustrate the point. Also, recommend finding a way to fold in consideration of mandates into a general step on establishing/updating arrangements/roles, etc. Broadly wanted to flag a greater concern, if establishing NIMS is a "good practice" it has implications beyond just serving as guidance but ultimately reporting under the UNFCCC and future agreements under the convention that reference reporting using "good practice" methods under the IPCC. In those frameworks, countries will be assessed against their application of the good practice guidance. Inclusion of this content as currently organized and detailed, could present a barrier to its adoption for future use, as his becomes good practice guidance (including mandates, steering committees, etc.). These GL could be perceived to increase burden, etc. Again, while there is value in noting the importance and consideration of institutional arrangements in a general context, clear roles and responsiblities for compilation, specifiying cross-cutting and sectoral roles, etc. recommend reconsidering approach to integrating this information in this and other sections (i.e. inventory compilation steps, data collection) and referencing other sections where more details are included (e.g. QA/QC already has some good detail on roles, responsiblities).			
10002	1	1	250	522	Vol. 1, Chapter 1 - An element where emphasis might be helpful is documenation, archiving in compilation steps. Information in Chapter 8 could be added here and further could emphasize following sections at the end of category-level guidance on reporting and documentation.	Mausami Desai	Accepted with modification	Text added to subsection 1.5.4.3 addressing documentation and archiving with reference to category-specific guidance on documentation and reporting.

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7686	1	1	250	251	In the name of the section, it would be appropriate to delete a word “management”, and renumber sections of Chapter 1 taking into account changes in lines 32-33. Thus, this section would be “1.6 National Inventory Systems”. The Guideline about national inventory systems should be consistent with the UNFCCC Decision 24/CP.19 “Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention”. According to the Decision 24/CP.19, the national inventory system arrangements include the processes of planning, preparation, and management of inventory activities. In this case, a term “management” relates to archiving all relevant inventory information for the reported time series, including documentation about emission factors and how data have been generated and aggregated for the preparation of the inventory, internal documentation on QA/QC procedures, key categories, and planned inventory improvements. Therefore, management is a part of the national inventory system, and the system itself includes the institutional, legal and procedural arrangements which are actually addressed in the next sections.	Nataliya Stranadko	Accepted with modification	Suggestion has been modified from "National Inventory System" to "National Inventory Arrangements" as outlined in the Decision 24/CP.19.
6750	1	1	252	252	Remove "New guidance in section 1.5 of the 2019 refinementt"	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
7688	1	1	252	252	Delete a sentence “New guidance in section 1.5 of the 2019 refinementt.” Proposed section 1.1 “Scope and Objectives” already states that this section provides step-by-step new guidance.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
7690	1	1	252	254	The sentence is confusing, and it is not clearly expressed of using the double words with the same meaning. Therefore, rewrite current sentence “It provides guidance on the development, improvement and maintenance of national GHG inventory management systems and highlights the importance of such institutional systems in the inventory compilation process” to the next sentence “This section provides guidance on the development, improvement and maintenance of national GHG inventory systems and highlights the importance of institutional arrangements in the inventory compilation process”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
6752	1	1	252	252	Suggest to start paragraph with: "The 2019 refinementt provides guidance on the development, improvement and…"	Raul Salas Reyes	Accepted with modification	Sentence amended as proposed.

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7022	1	1	252	254	It could be good to insert in this paragraph, a broad definition of what the arrangements could be, for example: A national system includes all institutional, legal and procedural arrangements made within a Party included in Annex I for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.	Vitor Gois Ferreira	Accepted with modification	Text has been revised to include these concepts.
6754	1	1	253	253	Remove "of such" to just keep "maintenance of national GHG inventory management systems and highlights the importance of institutional"	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
10074	1	1	253	254	Revise as shown - ….highlights the importance of 'establishing an institutionalized approach to' the inventory compilation process.	Neelam Singh	Accepted	The comment has been addressed in SOD.
10076	1	1	253	253	Though this line talks about highlighting the importance of insitutional systems, or national GHG inventory management systems, this information is missing in the section. Suggest adding a few bullets explaining the benefits of having such a system in place - in row 259 as further elaborated in the next comment.	Neelam Singh	Accepted with modification	Brief discussion of benefits of national inventory systems was revised in section 1.5.
6756	1	1	255	255	Change "which" to "that": "This guidance is not intended to be prescriptive. It instead provides examples that illustrate the typical"	Raul Salas Reyes	Accepted	Done.
7692	1	1	255	256	Rewrite current sentence “It instead provides examples which illustrate the typical components of a management system and practical guidance on tools and approaches” to the next sentence “It instead provides examples which illustrate the typical components of national inventory system and practical guidance for using appropriate inventory tools and approaches”.	Nataliya Stranadko	Rejected	Proposed language does not add technical clarity.
6758	1	1	256	256	Include GHG inventory in "components of a GHG inventory management system and practical fuidance on tools and approaches"	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
7694	1	1	257	258	Rewrite current sentence “It is good practice for the national GHG inventory compilation process to be managed through a recognised, supported, and sustainable institutional system” to the next sentence “It is good practice for the inventory compilation process to be administrated through a recognised, supported, and sustainable national entity with overall responsibility for the national inventory”.	Nataliya Stranadko	Accepted with modification	Introduction to concept of national entity occurs later in chapter. However, the paragraph has been revised for clarity.
6762	1	1	258	258	Remove "Such" to start as: A GHG inventory management system includes the…"	Raul Salas Reyes	Accepted	Editorial: Revised paragraph to clarify.
6760	1	1	258	258	the concepts "recognised, supported, and sustainable" are not defined and come out as unclear/confusing.	Raul Salas Reyes	Accepted with modification	Removed terms "recognised" and "supported".

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7696	1	1	258	259	Delete the sentence “Such a GHG inventory management system includes the processes and expertise involved in the compilation inventory data and reports”.	Nataliya Stranadko	Accepted with modification	The paragraph has been revised.
10078	1	1	258	259	Modify as suggested: Such a GHG inventory management system 'documents' the 'institutional arrangements,' processes, 'methods, data sources, roles and responsibilities,' and expertise involved in the compilation 'of' inventory data and reports. 'It creates a record which can support inventory teams in the development of inventories in subsequent years.'	Neelam Singh	Accepted with modification	Brief discussion of benefits of national inventory systems was revised in section 1.5.
6764	1	1	258	259	The Paragraph from "Such a" to "Inventory data and reports" is confusing. I would suggest to revise to: "A GHG inventory system assists with the compilation of GHG inventory data and reports through established processes and expertise"	Raul Salas Reyes	Accepted with modification	Text has been revised to clarify.
9870	1	1	258	260	Confused text that goes beyond the scope of inventory guidance. Suggest: "A national inventory system should establish clear inventory governance, and roles and responsibilities to enable the Single National Entity to efficiently manage the processes and expertise that are required to deliver a national inventory submission. Such a system may also be extended beyond the scope of national inventory reporting to encompass other national data and reporting requirements such as to facilitate setting and tracking of national mitigation targets, and even to enable policy appraisal of individual mitigation measures."	David Glen Thistlethwaite	Accepted with modification	Captured by revised text.
10080	1	1	259	259	Missing word 'of' as shown here - …involved in the compilation 'of' inventory data and reports	Neelam Singh	Accepted	Fixed.
10082	1	1	259	260	Suggest deleting this sentence - 'It is a tool with which a country can track trends in emissions/removals and understand the performance of mitigation measures.' This sentence applies more to the inventory itself rather than to an inventory management system. The management system enables development and updates to inventory to then enable tracking of trends etc.	Neelam Singh	Accepted	Removed.
7062	1	1	259	259	I believe this sentence is missing an 'of' between 'compilation' and 'inventory'	Amanda Penistone	Accepted	Text has been revised.
1366	1	1	259	259	"of" missing in middle of the line: processes and expertis involved in the compilation "of" inventory data and reports.	Regine Röthlisberger	Accepted with modification	Text has been revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
458	1	1	259	260	It will be helpful if some explanation is included, to justify the fact pointed out in the sentence: "It is a tool with which a country can track trends in emissions/removals and understand the performance of mitigation measures."	Virginia Sena	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9706	1	1	259	259	Could we name it "basic requirement" instead of "tool" ?	Michael Strogies	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
6766	1	1	260	260	include "and" in between "emissions/removals": "emissions and removals"	Raul Salas Reyes	Accepted	Editorial: Revised paragraph to clarify.
7024	1	1	261	264	This is somehow vague. Would recommend to clarify or remove.	Vitor Gois Ferreira	Accepted	Text revised.
7698	1	1	261	264	It would be appropriate to change the current text in these lines to the following text reflected in the UNFCCC Decision 24/CP.19: “National inventory systems are designed and operated in order to: •Ensure the transparency, consistency, comparability, completeness, and accuracy of inventories, as defined in section 1.5 above; •Ensure the quality of inventories through the development, improvement, and maintenance of inventory activities. Inventory activities include collecting data, selecting methods and emission factors appropriately, estimating anthropogenic GHG emissions by sources and removals by sinks, implementing uncertainty assessment and QA/QC activities, and carrying out procedures for the verification of the inventory data at the national level”.	Nataliya Stranadko	Accepted with modification	Text revised to capture the concepts.
6768	1	1	262	262	What does "efficient inventory updates" mean? I suggest to just keep "Inventory updates"	Raul Salas Reyes	Accepted	Text revised and clarified in response to other comments.
6770	1	1	262	264	Would it make sense to include: Understand emission trends in Nationally Determined Contributions, policy making, and meet international obligations?	Raul Salas Reyes	Rejected	IPCC Guidelines cannot reference specific political agreements, but issues are captured in text on mitigation measures.
9008	1	1	262	262	" Ongoing " and / or Efficient inventory - Word "Ongoing" may be added for more clarity.	Vishwa Bandhu Pant	Accepted	Text has been revised to clarify use of "efficient".
9872	1	1	263	263	Suggest the addition of "timeliness": "Increased quality, timeliness and availability of data and reporting.."	David Glen Thistlethwaite	Accepted	Text revised.
1376	1	1	265	369	In my view, the section 1.5.1.5 Organzational structure and 1.5.1.6 Stakeholder roles and responsibilities should be placed right after 1.5.1.1 Scope and mandate, before 1.5.1.2 Single national entity, 1.5.1.3. Inventory agency and 1.5.1.4 Technical steering committee, as SNE, InvAgenc., Steering Comm. are all parts of the organizational structure and are listed as individual stakeholders in Table 1.3. I find it more consistent to provide a brief overview over Organizational structure and stakeholders first and then provide additional information on particular stakeholders.	Regine Röthlisberger	Accepted	Text revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7700	1	1	265	265	Renumber sections of Chapter 1 taking into account changes in lines 32-33. This section would be “1.6.1 Institutional Arrangements”.	Nataliya Stranadko	Accepted	Sections have been renumbered.
9982	1	1	266	329	There is considerable diversity in how countries implement national inventory systems and use of mandates, etc. Depending on national circumstances, arrangements will vary from formal to very informal. In the US, collection of data is mandated and readily available without formal arrangements. These are very clear examples of mechanisms to facilitate compilation, review etc. They support production of a high quality inventory, but the type and extent of necessary arrangements should really be up to the country. Strongly recommend making compressing this content to an example box to complement a very general step of establishing or changing/updating any arrangements to support regular compilation. Table 1.2 is not necessary to explain use of this guidance.	Mausami Desai	Accepted with modification	Text added to address diversity of institutional arrangment approaches.
6772	1	1	267	267	Not clear what the "in keeping with" refers to. I would suggest to rephrase as: "It provides guidance on identifying appropriate components in line with the inventory's intended uses"	Raul Salas Reyes	Accepted	Text revised.
7702	1	1	268	268	Delete word “typical”.	Nataliya Stranadko	Accepted	Text revised.
1368	1	1	270	270	eliminate (s): Institutional arrangements include(s) the interactions	Regine Röthlisberger	Accepted	Text revised.
6774	1	1	270	270	remove plural in "includes" to have "Institutional arrangements include the interactions between…"	Raul Salas Reyes	Accepted	Text revised.
7704	1	1	271	271	Expand the phrase “inventory outputs” to “inventory processes and outputs”. A variety of stakeholders contribute not only to the outputs as a result but in many processes, which lead to the final outputs. National inventory system should not be considered just as a start and outputs. There are many processes between these two points. Some organizations can contribute to the processes but not actually the outputs, which is basically national inventory report to the UNFCCC and CRF tables. Thus, processes should be considered as part of the system.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7026	1	1	274	347	For the sake of transparency, I would recommend some reordering: (1) the overall organizational structure, coming first, would facilitate a general overview (331-337); (2) the inventory agency or team (301-320); (3) the single national entity (294-300); (4) the steering committee (321-329); (5) The mandate and supporting legal mechanisms (275-286 plus 339-345); (6) data suppy agreements (390-416); (7) workplans (441-485); (8) management and archiving (486-504) After that, training and education (430-437 and 505-522),	Vitor Gois Ferreira	Accepted	Text revised.
7706	1	1	274	274	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Comment addressed during final editing.
1728	1	1	274		It's unclear why providing information on mandate is necessary.	Melissa Weitz	Accepted with modification	Revised text to remove term "mandate" and simplified Table 1.1.
9874	1	1	274	293	This whole section on scope and mandate seems unnecessary and confusing, using terminology that is unclear such as "mandate". This detracts from any benefits to inventory stakeholders (compilers, SNE) from including this text in the guidance. Table 1.1 is first of all confusing - what is the guidance trying to say? Is the development of a such a table regarded as a good practice activity? Really? It seems overly complicated and prescriptive. Might it be easier to have a section that simply states that the compilation and reporting of a national inventory can fulfil a range of mandatory and optional national reporting requirements including (...list of examples... UNFCCC submissions, NCs, BURs, reporting against national targets etc.) and that the precise scope of these reporting requirements may vary (gases, territories, bio-carbon or not etc). Put the confusing tables in a supplementary Annex if deemed useful to retain them.	David Glen Thistlethwaite	Accepted with modification	Revised text to remove term "mandate" and simplified Table 1.1.
6776	1	1	275	275	Remove plurarl in "describes" to "…for national GHG inventories describe what is"	Raul Salas Reyes	Accepted	Text revised.
6778	1	1	277	277	Is it possible to include the activities of reporting and review?	Raul Salas Reyes	Accepted	Text revised.
6088	1	1	278	283	Recommend placing Mandate first, then Scope. The Scope is selected to ensure the Mandate can be met. Countries may also consider future uses in establishing the Scope.	William Hohenstein	Accepted	Text revised.
7064	1	1	278	280	I would suggest that scope could also encompass geographical coverage (especially given that you've used the UK as an example, where there are several different geographical coverages for the different mandates)	Amanda Penistone	Accepted	Text revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5844	1	1	278	279	What is stated here is not part of the countries institutional arrangements, all of this is either specified in the IPCC Guidelines or UNFCCC reporting requirements. The information on line 280 would be the unique aspects a country would have in its institutional arrangements	Vincent Camobreco	Accepted with modification	The paragraph has been modified to mention general principles and avoid UNFCCC reporting related aspects.
1370	1	1	280	280	"a" missing: included as well as "a" schedule for …	Regine Röthlisberger	Accepted	Text revised.
402	1	1	284	284	spelling should be "complement"	Pauline Midgley	Accepted	Text revised.
772	1	1	287	Table 1.1	Item listed as "Time Steps' in the table under 'Time Series'. What is this ? Please make it clearer to practitioners. Are you referring to the time schedule of work ?	Karachepone Ninan	Accepted	Clarification text added.
5758	1	1	287	288	F-gases are first introduced. In the text there are specific gases listed that are F-gases but nowhere is the reader told which molecules are F-gases. In cases where the reader is expected to be using the document to ensure his/her country is reporting accurately or the reader is using the document to understand the details of climate change gases, it would be helpful for the report to introduce each item with at least a clue. see comment re: Vol1, Ch1 lines 85-95	Ann Gallagher	Accepted	Clarification text added.
7804	1	1	287	287	Suggest replacing 'LULUCF' with 'FOLU', for consistency?	Maya Hunt	Accepted	Text revised.
10084	1	1	287	288	Insert in Table 1.1 - The cell with text 'Reporting/update' should extend across all columns and in bold - Similar to how it appears in Table 1.2	Neelam Singh	Accepted	Added.
1372	1	1	287	288	Table 1.1: The meaning of "reporting/update" and "frequency" and the difference between the two items is not entirely clear. Would "update frequency" cover the aspect?	Regine Röthlisberger	Accepted with modification	Text revised.
9578	1	1	287	287	The sectors Energy, IPPU, Agriculture, Waste and LULUCF are all in one box. May be there are countries where the responses depending on the mandates are different from one sector to the other. Therefore, I would suggest to separate the sectors in different boxes.	Denise Fussen Yanque	Accepted with modification	Added extra rows in table.
1730	1	1	287		This table seems unnecessary.	Melissa Weitz	Rejected	There is no sufficient grounds to remove table.
7708	1	1	287	287	In Table 1.1, column “Scope”, modify the name of the row “Start and end year” to “Base year and end year”.	Nataliya Stranadko	Rejected	Base year is a specific term with a specific meaning in reporting and accounting.
774	1	1	288	Table 1.1	again item on 'Format' format of what. Please make it clearer for the benefit of pratitioners.	Karachepone Ninan	Accepted	Clarified that it is reporting format.
2034	1	1	289	289	In table 1.2, the crossing cell of column UNFCCC-NDC and row LULUCF conatins a "NO". Since UK is part of the EU NDC the correct answer is "Yes". Please amend it.	Sandro Federici	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5982	1	1	289	289	Table 1.2: the meaning of the format "CRF17" as mentioned in the last row of this table is not clear; does it refer to the format of CRF tables as submitted in the year 2017?	Ana Blondel	Accepted	Footnote reference corrected.
6090	1	1	289	289	Projections are not part of the inventory. Would recommend against adding them here.	William Hohenstein	Accepted	Row for projections deleted.
5846	1	1	289	293	Seems that much of the information being shown in Table 1.2 deals more with accounting (e.g., NDCs, national carbon budgets) issues rather than reporting to the UNFCCC. IPCC Guidelines are for reporting not accounting and shouldn't be included in the IPCC Guidelines. The note on lines 290-293, would be sufficient to provide information to the inventory compiler that they should think about how to integrate other ongoing activities with GHG reporting.	Vincent Camobreco	Accepted with modification	UK example moved to Box.
1374	1	1	290	293	I think that this note should be made more prominent, not just as a Note to the example for Scope and Mandate of the UK. Couldn't it be included in the main text?	Regine Röthlisberger	Accepted with modification	Footnote text moved to box in introduction to chapter.
7710	1	1	294	294	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
299	1	1	294	300	Please add reference to 'Subnational GHG Inventory Development'. The term "Subnational" refers to a state, region, or other jurisdiction that is not a national entity. Subnational jurisdictions follow the same IPCC guidelines (and 2019 refinementt), GHG inventory guidance, and reporting structure as national entities. In addition, Subnational jurisdictions are encouraged to develop appropriate GHG inventory management systems and follow good GHG reporting practices outlined in the 2019 refinementt. Subnational jurisdictions, such as the Under2 Coalition and the Global Covenant of Mayors for Climate & Energy, are setting some of the most ambitious climate and GHG reduction targets, which underscores the increased importance of Subnational GHG inventory efforts on a global scale.	Ryan Radford	Accepted with modification	Box added to address other subnational applications of GHG inventories. However, these Guidelines are explicitly for the purpose of national inventories.
5848	1	1	294	300	It's not necessary to highlight the concept discussed here, it can be integrated into section 1.5.1.3	Vincent Camobreco	Rejected	We want to emphasize the separate roles of the responsible unit and the technically active unit**.**
368	1	1	295	300	While Single National Entity is very important it will be useful if within this entity "a GHG Inventory Officer" should be appointed. This has worked well with "Ozone Officer"	Jamidu Katima	Accepted	The comment has been addressed in SOD.
41	1	1	298	300	I suggest this sectence is revised to "The role of SNE is sometimes delegated via nationally appropriate mandates/terms of reference to a relevant climate change or environmental or statistical agency with the powers to prepare official national reports."	Mingshan Su	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6780	1	1	299	299	Suggest to change "a relevant environmental or statistical agency" to "the inventory agency"	Raul Salas Reyes	Rejected	The sentence provides examples of government establishments that can assume the role of the SNE.
1380	1	1	301	369	The inventory agency (1.5.1.3) should also be mentioned in the organizational structure (e.g. Fig 1.1) and in the section on stakeholders (Table 1.3). Otherwise it may be difficult to relate the text to the Figure and Table and the general concept. In my view, the inventory agency covers the "Management/Co-ordination Function" described in Figure 1.1 and in table 1.3. Therefore, I find it useful to make this explicit in the text.	Regine Röthlisberger	Accepted	The comment has been addresed in SOD.
6782	1	1	301	320	Would it make sense to include a clarification that it is also possible to have multiple agencies or hybrid between all the options mentioned?	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
7028	1	1	301	320	In many cases, several different structures exist (mixes of the possible cases shown) for different sectors. It would help to note that possibility.	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
7712	1	1	301	301	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
7714	1	1	304	305	SNE would be taken in parentheses. Thus, it would look like “A government ministry (SNE)”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
1378	1	1	307	307	replace "science" with "agency", eliminate (al): …(e.g. statistics, meteorological, or environment(al) agency).	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
406	1	1	316	316	format of 19 should be superscript as denoting a footnote	Pauline Midgley	Accepted	The comment has been addresed in SOD.
460	1	1	316	316	Number "19" corresponding to the footnote is not showed as superscript.	Virginia Sena	Accepted	The comment has been addressed in SOD.
4822	1	1	316		What is "19"? If typo, please remove it!	Taka Hiraishi	Accepted	The comment has been addressed in SOD.
7066	1	1	316	316	I believe the 19 in this sentence isn't supposed to be there	Amanda Penistone	Accepted	The comment has been addressed in SOD.
4824	1	1	317		Suggest to add "preferably" before "over".	Taka Hiraishi	Accepted	Text revised.
9010	1	1	318	320	Provisions should be in place for the potential transfer of "systems", tools, and knowledge from the contracted organisation to theSNE or new contracting organisation at the end of the contract period. Comment: Here in this statement what is mean by transfer of system? Is it means transfer of IT system?	Vishwa Bandhu Pant	Accepted	Added clarifying text.
9876	1	1	318	320	The text that is only in that third bullet point "Provisions..contract period" surely applies to all three examples in the section 1.5.1.3? I suggest in the first paragraph adding "…Note that for each approach outlined below, it is important that steps are taken to ensure retention of institutional knowledge and capability, in order to ensure that the inventory can continue to be delivered to achieve quality standards into the future. Whether the inventory is managed within Government or by external organisations, provisions should be in place for the potential tranfer of systems, tools and knowledge to a new inventory team, including consideration of adequate training investment."	David Glen Thistlethwaite	Accepted	Added clarifying text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7716	1	1	321	321	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
1732	1	1	321		The GHG Inventory Steering Committee is an approach a country may consider. It may be better to clearly characterize this section as examples of approaches countries are taking.	Melissa Weitz	Accepted with modification	Made the text more generic.
7068	1	1	327	327	The word 'education' is superfluous	Amanda Penistone	Accepted	Text revised.
7718	1	1	330	330	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
462	1	1	334	334	It is written "preform" instead of "perform".	Virginia Sena	Accepted	Text revised.
408	1	1	335	336	comment is to Footnote 19: spelling should be "principles"	Pauline Midgley	Accepted	Text revised.
42	1	1	336	336	The contents of the parentheses in box of "Management/Co-ordination fuction" are incomplete.	Mingshan Su	Accepted	Text revised.
92	1	1	336	337	The 'Figure 1.1 Illustrative GHG inventory or 336 ganizational structure' is in low resolution and has ineligible characters. I suggest replacing a figure with high resolution.	Thiago Metzker	Accepted	Text revised.
464	1	1	336	336	Figure 1.1 is too small and it is not enough legible. Suggest to show it horizontally taking a whole page.	Virginia Sena	Accepted	Implemented.
468	1	1	336	336	Description for chart titled "Management/ Co-ordination Function" is not complete (the sentence is not finished). Besides, it is written "reporting materia" instead of "reporting material"	Virginia Sena	Accepted	Text revised.
470	1	1	336	336	In the second Note at the right of Figure 1.1: a dot is missing before "Sub-divide if expertise is in… ". Besides, it is written "necessay" instead of "as necessary".	Virginia Sena	Accepted	Text revised.
6556	1	1	336		The Figure 1.1 Illustrative GHG inventory or 336 organizational structure" needs to be improved.	Stoécio Maia	Accepted	Text revised.
466	1	1	336	336	Sectors showed in the Figure 1.1 are not the ones for 2006 IPCC Guidelines. I think it is better to include AFOLU instead of Agriculture and LULUCF.	Virginia Sena	Accepted	Proposal accepted and implemented in the SOD.
6784	1	1	336	336	The figure says LULUCF. Shouldn't it say AFOLU instead?. In addition, it says "focal point" but this has not yet been defined above.	Raul Salas Reyes	Accepted with modification	Updated text to intoduce NFP in the SNE section.
7070	1	1	337	337	In the diagram, the words come out a little smudged and small - ideally a higher resolution would be used, and the structure would be rearranged so the whole diagram could be enlarged by say 25%.	Amanda Penistone	Accepted	Suggested editorial change implemented.
7720	1	1	339	339	Delete word “management”. Thus, it would look like “…inventory system…”.	Nataliya Stranadko	Accepted	Done.
4826	1	1	341		"data storage" should be added.	Taka Hiraishi	Accepted	Done.
6092	1	1	344	345	This guidance seems beyond the scope of techncial inventory methodological guidance.	William Hohenstein	Accepted	Text revised.
9556	1	1	344	346	Consider implementation of formal data-sharing agreements between the inventory compiler and data providers.	Matthew Prescott	Accepted with modification	Issue addressed in 1.5.2.2.
4828	1	1	345		"data storage" should be added.	Taka Hiraishi	Accepted	Done.
7722	1	1	345	345	Delete word “management”. Thus, it would look like “…reporting, and quality to formalize…”.	Nataliya Stranadko	Accepted	Done.
6786	1	1	346	346	The acronym QA/QC has not yet been defined.	Raul Salas Reyes	Accepted	Text revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7724	1	1	348	348	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
6094	1	1	348	369	We would not refer to these entities as "stakeholders" these entities are "contributors" Stakeholders would include users and external entities with interests in the outcomes/outputs. See use of the word "stakeholder in section 2.2.1 lines 253-254.	William Hohenstein	Accepted with modification	We would lke to keep this broad term here for stakeholders as it makes it easier to describe all who have an interest in the GHG inventory. The text has been revised including a specification on different types of stakeholders.
7726	1	1	349	349	Expand the phrase “inventory outputs” to “inventory processes and outputs”. See explanation in line 271.	Nataliya Stranadko	Accepted	Text revised.
7728	1	1	351	351	Delete word “management”. Thus, it would look like “…functional national inventory system”.	Nataliya Stranadko	Accepted	Text revised.
472	1	1	352	353	Table 1.3, Row 4, Column1. "Steering committee: Note: …". I suggest to delete "Note:".	Virginia Sena	Accepted	Done.
1382	1	1	352	353	In line "Compilation (Sector) Experts" in column "typical roles": Delete "Identify and propose ways to resolve cross cutting issues". This is covered with "Coordinate with other sector experts to identify and resolve cross sectoral issues".	Regine Röthlisberger	Accepted	Text revised.
1384	1	1	352	353	In line "Data providers" in column "typical roles": "Communication with SNE" should be changed. It is important that communication is not only towards SNE, but potentially also to Sector Experts and the Management/Coordination/QA/QC.	Regine Röthlisberger	Accepted	Text revised.
1386	1	1	352	353	In line "Policy users" in columnt "stakeholder type": I have no clear understanding, what a "policy user" is. Would "policy advisor" be more appropriate?	Regine Röthlisberger	Accepted	Text revised.
6788	1	1	352	353	It is not clear what is the difference between "Formal Submission of GHG inventory" and "technical submission of GHG inventory"	Raul Salas Reyes	Accepted	Text revised.
7030	1	1	352	352	Somehow, I feel that the research part is missing from the list of stakeholders and they could be used to improve the inventory, verificaiton and QA. It may be important to identify their role in this table. Maybe this is what you have in 417-422, but the role of research is not compilers	Vitor Gois Ferreira	Accepted	This has been added to the "Compilation" part of the table 1.3. Authors feel it is aligned with the sector expert role.
1734	1	1	352		Table again makes it appear that the steering committee is a requirement.	Melissa Weitz	Accepted with modification	Whole section has been revised so that it focuses on principles rather than prescripts.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4802	1	1	352	353	In TABLE 1.3 "LIST OF STAKEHOLDER TYPES WITH THEIR GENERAL ROLES AND CAPABILITIES NEEDED TO FUNCTION", the term "Biennial Update Reports (BUR)" is used. However, BUR (and BR for developed country parties) will be superseded by new transparency reporting under the Paris Agreement after 2020 or afterward. Since the 2019 refinementt is expected to be used after 2020 or afterward, the way in using the term "BUR" in this GL should be carefully considered.	Takashi Morimoto	Accepted with modification	Reference to UNFCCC and other specific reporting requirements has been removed.
6792	1	1	352	353	In the compilation (sector) experts, we still have LULUCF. There is a mix in using AFOLU and LULUCF throughout the document that doesn't come up as clear. I suggest alligning or clarifying.	Raul Salas Reyes	Accepted with modification	Terminology consolidated to consistently refer to Agriculture, FOLU, or AFOLU.
474	1	1	352	353	Table 1.3, Row 6, Column1. Sectors are not the ones for 2006 IPCC Guidelines. I think it is better to include AFOLU instead of Agriculture and LULUCF.	Virginia Sena	Accepted with modification	Terminology consolidated to consistently refer to Agriculture, FOLU, or AFOLU.
6790	1	1	352	353	Reporting under the Biennial Reports, and meeting reporting requirements of the ETF under the Paris Agreement could also be included.	Raul Salas Reyes	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
5850	1	1	352	353	An important issue for many countries is the need for external funding (e.g., GEF) to support their inventory development. It may be useful to include in this table information on which stakeholder type should access GEF funding. There may be other locations in the chapter where this might fit better into the flow of the discussion as well.	Vincent Camobreco	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
410	1	1	354	354	copy edit: presumably should read " there are two useful steps "	Pauline Midgley	Accepted	Text revised.
476	1	1	354	354	It is written: "However, there two..." instead of: "However, there are two...".	Virginia Sena	Accepted	Text revised.
1364	1	1	354	354	"are" missing in 2nd sentence: However, there "are" two useful steps for the coordination	Regine Röthlisberger	Accepted	Text revised.
1388	1	1	354	354	"are" missing: However, there "are" two …	Regine Röthlisberger	Accepted	Text revised.
4290	1	1	354	354	I suggest that the authors add "are" after "there".	Naofumi Kosaka	Accepted	Text revised.
5984	1	1	354	354	Word seems to be missing: should it be "there are two useful steps..." instead of "there two useful steps…"?	Ana Blondel	Accepted	Text revised.
6656	1	1	354	369	A verb is missing 'However, there two useful steps...' and it seems that there is only one useful step.	Tarja Tuomainen	Accepted	Text revised.
7730	1	1	354	355	Modify the current sentences to the following two sentences: “The process of stakeholders’ coordination is country-specific. However, there two useful steps to be considered for building this process”.	Nataliya Stranadko	Accepted	Text revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
10086	1	1	354	354	Missing word 'are' as shown inserted here - ….However, there 'are' two useful steps for…..	Neelam Singh	Accepted	Text revised in line with other comments.
43	1	1	354	369	It is stated that in line 354 and 355 "However, there two useful steps 354 for the coordination and management of stakeholders." But only one step is described in 356 to 369. There is no second step in this section.	Mingshan Su	Accepted with modification	Edited text to refer to only one element.
1390	1	1	354	369	In line 354, it is stated that there are two useful steps for the coordination and management of stakeholders. On line 356, the first step is presented. However, the second step seems missing. Either add the second step or change line 354 accordingly to "a useful way for the coordination and management of stakeholders" instead of "two useful steps for ..."	Regine Röthlisberger	Accepted with modification	Edited text to refer to only one element.
9558	1	1	354	355	"However, there two useful steps for…". There appears to be information missing here, and only one "step" (List of Stakeholders) is shown.	Matthew Prescott	Accepted with modification	Edited text to refer to only one element.
5986	1	1	354	369	Line 354 refers to "two useful steps", however the following lines only mention the list of stakeholders, where is the second step?	Ana Blondel	Accepted with modification	Edited text to refer to only one element.
1736	1	1	356		This again seems unnecessary and should again be framed as an approach some countries are taking, but not necessarily should be a requirement.	Melissa Weitz	Accepted	Text modified.
412	1	1	356	356	the first "useful step" is mentioned but the second is not identified as far as I can tell. I am guessing it would be the list of datasets	Pauline Midgley	Accepted with modification	Edited text to refer to only one element.
1392	1	1	363	369	Are "engagements to date" in line 363 "inventory activities" as in line 367? Or what is the meaning of engagements to date?	Regine Röthlisberger	Accepted	Text revised.
7732	1	1	367	367	Delete word “management”.	Nataliya Stranadko	Accepted	Text revised.
6794	1	1	369	369	Remove "etc".	Raul Salas Reyes	Accepted	Text revised.
7734	1	1	369	369	Line 354 states about two steps of the process. However, this section describes only first step – list of stakeholders. The second step is missing here.	Nataliya Stranadko	Accepted with modification	Edited text to refer to only one element.
7736	1	1	370	370	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
9984	1	1	370	375	Figure 1.2 does add much value and is confusing - can be moved to annex or or data collection. If included in an annex then recommend focusing on data flows for a specific category as an example.	Mausami Desai	Rejected	Fig 1.2 is important for highlighting the importance of understanding the data flows for the inventory.
414	1	1	373	373	copy edit; "An" not "And"	Pauline Midgley	Accepted	The comment has been addresed in SOD.
478	1	1	373	373	It is written: "And illustrative..." instead of: "An illustrative...".	Virginia Sena	Accepted	The comment has been addressed in SOD.
1394	1	1	373	373	Correct spelling of inventory compilation. Currently, it reads complication.	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
5988	1	1	373	373	Should be "compilation" instead of "complication", and should be "An" instead of "And"	Ana Blondel	Accepted	The comment has been addressed in SOD.
7072	1	1	373	373	Instead of 'And', use 'An'	Amanda Penistone	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6796	1	1	375	376	Figure 1.2 has many acronyms that might be confusing. I would suggest to keep a simpler language in the figures.	Raul Salas Reyes	Accepted with modification	Editorial: The text has been simplfied accordingly.
7738	1	1	379	379	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
9580	1	1	379	389	The data could also be collected in a table indicating the different aspects in lines 382 - 289. Additionally, an example could be helpful for future users of the guidelines (as the table in line 287).	Denise Fussen Yanque	Accepted	The comment has been addressed in the SOD.
7032	1	1	379	389	This is too much detail and may not be necessary under this guidance	Vitor Gois Ferreira	Accepted with modification	Text revised.
1396	1	1	380	380	Here, the role of GHG invenotry coordinator is introduced. However, in the section above, this role has not been introduced. If this role is used in other chapters, maybe it would be wise to define it (or allocate it to the inventory agency/management and coordination). If GHG inventory coordinator is not used in other chapters, the term should be replaced by e.g. inventory agency or management and coordination entity.	Regine Röthlisberger	Accepted with modification	Revised to "Inventory Agency".
7740	1	1	390	390	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
9560	1	1	390	416	A data supply agreement should also include a provision that the receiving party provide feedback to the supplier in order that continuous improvement of data collection can be achieved.	Matthew Prescott	Noted	Bullet added on feedback provisions that enable the receiving party provide feedback to the supplier to promote continuous improvement of data collection
9710	1	1	398	412	sometimes it is also helpfull to fix the role and the obligation of the data provider for the case of questions or problems during review activities. Could be added as proposal.	Michael Strogies	Accepted	The comment has been addressed in the SOD.
416	1	1	400	400	needs clarification with a word relating "cooperation" and "the data supplier .."	Pauline Midgley	Accepted	The comment has been addressed in SOD.
480	1	1	400	400	I am not sure the syntax of the sentence is correct. Then, the meaning of the sentence is not clear for me.	Virginia Sena	Accepted	The comment has been addressed in SOD.
1398	1	1	400	400	"between" missing: … any co-operation "between" the data supplier…	Regine Röthlisberger	Accepted	The comment has been addresed in SOD.
5990	1	1	400	400	Text not clear, some words may be wrong or missing. Maybe it should be something like "reference to laws/terms of reference and any co-operation between the data supplier and the GHG inventory representatives;"?	Ana Blondel	Accepted	The comment has been addressed in SOD.
7074	1	1	400	400	Suggest inserting 'between' between the words 'co-operation' and 'the'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
7742	1	1	417	417	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
7744	1	1	418	418	Delete the word “management”.	Nataliya Stranadko	Accepted	Text revised.
7746	1	1	419	419	Delete the word “will”. Thus, it would look like “These experts understand the requirements…”.	Nataliya Stranadko	Accepted	Text revised.
7748	1	1	423	423	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7750	1	1	424	424	Modify the current sentence to the following sentence: “Some roles and responsibilities for the GHG inventory team are outlined in…”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
6798	1	1	428	428	I would suggest to include examples on the most common roles and responsabilities, instead of sending the readers to yet another guidance document. For example, discussing the lead inventory, the lead QA/QC, the sectoral experts, etc.	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
370	1	1	429	437	Train of Trainers should be recommended in order to build national training capacity - this will be more sustanable - a roster of traners should be maintained by the Single National Entity	Jamidu Katima	Accepted	The comment has been addressed in SOD.
7752	1	1	429	429	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
7754	1	1	430	430	Delete the word “management”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
6800	1	1	432	437	Include numbering in each key of the three key areas.	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
6802	1	1	432	433	It is not entirely clear what the key area is	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
10088	1	1	432	437	Insert bullets or numbers to distinguish the three key areas listed here	Neelam Singh	Accepted	The comment has been addressed in SOD.
4292	1	1	432	432	I suggest that the authors replace "updated 2006 IPCC Guidelines" by "2019 refinementt".	Naofumi Kosaka	Accepted with modification	Editorial: Agree. Made the text less specific to latest/relevant IPCC guidelines.
6804	1	1	436	436	Is is possible to include the IAR as well?	Raul Salas Reyes	Rejected	We have referred more generally to international review processes. ICA/IAR etc come under this general term.
7756	1	1	438	438	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
10090	1	1	439	440	Suggest rephrasing: Workplans, data management sytems, QA/QC systems, and documentation procedures 'are examples of tools that can be incorporated in inventory management systems to' facilitate the 'compilation of inventory and' delivery of inventory outputs.	Neelam Singh	Accepted	Revised text.
7758	1	1	441	441	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
7034	1	1	441	441	Reference to improvement plans may be missing in this section	Vitor Gois Ferreira	Accepted with modification	Reference to improvement plans has been included in Ch.3, section 3.1.2 of SOD.
7760	1	1	443	443	Not clear what does this sentence mean?	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
7076	1	1	443	443	Suggest 'communicates' rather than 'communicate'	Amanda Penistone	Accepted	Text revised as proposed.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9878	1	1	444	446	Section 1.5 has some good material but I think need consideration of the overall structure and flow of the guidance. The authors need to decide what the guidance is seeking to achieve. The section includes multiple bullet point lists etc could be better to place into an Annex, and the table 1.4 on illustrative annual workplan would be a prime candidate. This table and other sections that follow seem disjointed and lacking in clarity - e.g. who manages and signs off the workplans - the SNE or the IA?. What about parallel inventory improvement projects and workplans / steering groups for that type of activity?	David Glen Thistlethwaite	Accepted with modification	Editorial: Boxes and tables have been used for some of this material. The lists have been further clarified and explained.
6806	1	1	445	446	Is is possible to change the title "Indicative deadlines" with "illustrative deadlines" or "examples of deadlines"?	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
9988	1	1	445	446	Is there a way to combine or integrate this workplan with the existing cycle and within compilation steps section which was not updated (section 1.6)? Seems like a box on activities that a country might undertake to implement a step, generalized to the extent possible and clearly noted as examples could an option to fold in much of the new content using a more streamlined approach?	Mausami Desai	Accepted	The comment has been addressed in SOD.
6808	1	1	445	446	LULUCF is also used here byt I would think AFOLU would be more appropriate	Raul Salas Reyes	Accepted with modification	Terminology consolidated to consistenly refer to Agriculture, FOLU, or AFOLU.
482	1	1	445	446	Table 1.4, Row 5, Column1. Sectors are not the ones for 2006 IPCC Guidelines. I think it is better to include AFOLU instead of Agriculture and LULUCF.	Virginia Sena	Accepted with modification	Terminology consolidated to consistently refer to Agriculture, FOLU, or AFOLU.
1400	1	1	445	446	in columnt "example activity" line "sectoral estimation", agriculture and LULUCF are listed separately. In some other instances, AFOLU is used. It seems as if the updated to the 2006 GLs is using Agriculture and LULUCF, while the existing version of the 2006 GLs is refering to AFOLU. This is inconsistent and should be changed. Presumably, this also applies to other chapters and other volumes.	Regine Röthlisberger	Accepted with modification	Terminology consolidated to consistently refer to Agriculture, FOLU, or AFOLU.
6810	1	1	446	446	Is is possible to include a brief description on review and revision of workplans. For example, when should they be reviewed, when should they be revised, how can these workplans be formalised, who should keep trak on the tasks, and what happens if a deadline is not met.	Raul Salas Reyes	Accepted	Text revised.
372	1	1	447		Need to elaborate on data storage / archaving (with backaup) the problem we are facing in developing countries is that each inventory almost starts from scratch, data of past inventory is hardly tracerable. There should be sime guidance on how data should be stored and archaved for future retreaval and use	Jamidu Katima	Accepted	Text added to emphasize archiving.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7762	1	1	447	447	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
9880	1	1	447	485	The section on data management systems is not clear on its purpose - it strays from talking about different types of models to how to control / manage the full range of models in a national system, and then goes on to cover details that are really applicable to good practice for individual models which would be better presented elsewhere in the guidance (Ch6), such as the bullet-points about colour coding, within-model documentation and so on. Also the list presented under Collation Aggregation and Reporting which is cited as "the minimal information in a standardised data structure for time series data.." (really?) is very prescriptive and would perhaps be better presented as a worked example in an annex?	David Glen Thistlethwaite	Accepted with modification	Table revised to introduce purpose of lists. And prescriptive language removed.
9986	1	1	447	485	Recognize intent, but need to consider in adding this section are we designating these as a good practices. With all newsections included in Chapter 1, this should be considered and the implication for countries following this guidance for reporting. So, have similar concerns with data management systems, could this be again integrated into compilation steps as a box, but very important to convey these are some practical approaches to managing inventory information but it is not comprehensive, etc. This content seems more appropriate for supplementary guidance but not critical to methodol guidance. Is there another format or designation for such guidance? The section also does not note use of worksheets, reporting tables or existing data management/software tools (2006 GL, ALU software, etc.) that facilitate some of these steps and are available when applying tier 1 or some tier 2 approaches included this guidance. Recommend finding a more general way to include this content.	Mausami Desai	Accepted with modification	Table revised to introduce purpose of lists. And prescriptive language removed.
7764	1	1	448	448	Rewrite the current sentence to the following sentence: “The process of GHG inventory preparation involves a large number of datasets compiled using an array of…”.	Nataliya Stranadko	Accepted	Text revised.
6812	1	1	449	449	I would suggest to avoid using negative language, in this case remove the " no GHG inventory has a fully..."	Raul Salas Reyes	Accepted	Text revised.
1402	1	1	452	452	"to" missing: available for users "to" upload data…	Regine Röthlisberger	Accepted	Text revised.
6814	1	1	452	453	It is not clear what the "many" in "Many currently operate..." is refering to.	Raul Salas Reyes	Accepted	Word "country" added.
6816	1	1	452	452	Include "to" in "for users to upload data and operate from remote locations"	Raul Salas Reyes	Accepted	Text revised.
7078	1	1	452	452	Suggest 'to' between 'users' and 'upload'	Amanda Penistone	Accepted	Text revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9562	1	1	452	452	missing "to": "...the internet and available for users to upload…"	Matthew Prescott	Accepted	Text revised.
7766	1	1	454	454	Calculation and estimation are synonyms. It would be appropriate to change a phrase “Calculating GHG Estimates” to “GHG Calculation” or “Calculation of GHG emissions”.	Nataliya Stranadko	Accepted with modification	SOD text changed to also recognize calculation of removal estimates.
6818	1	1	462	463	I would like to suggest to include: Documenting metadata on the first page of each file	Raul Salas Reyes	Noted	The detail can be reduced. The issue is already addressed in second bullet of "Calculating of GHG Estimates" subsection. No change has been made in the text.
7768	1	1	486	486	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
9882	1	1	486	504	Good to have a section that links onward to the QAQC Chapter 6, but surely as the key purpose of section 1.5 is to set out the National System and the institutional framework, then the very thing that ought to be covered here - i.e. which organisation has responsibility for what component of the QAQC system, who should engage / steer / manage / fund the QA Plan and the QA activities etc - is missing from section 1.5.4.3. The text here is a good succinct introduction to QAQC, but the authors need to add some details of good practice as regards the institutional responsibilities, communication and co-ordination (e.g. pointing back to the role of a national steering committee).	David Glen Thistlethwaite	Accepted	Text revised to briefly discuss institutional responsibilities for QA/QC.
10092	1	1	486	504	Placement issue - The guidance on QA/QC pertaining to a GHG inventory management system should be added in appropriate sections in Chapter 6 (Volume 1) itself. Placing it here requires moving back and forth between Chapter 1 and Chapter 6.	Neelam Singh	Accepted	Text revised to briefly discuss institutional responsibilities for QA/QC.
7770	1	1	487	487	Delete the word “management”.	Nataliya Stranadko	Accepted	Text revised.
6820	1	1	498	498	Is it possible to include in the example: improvements from international review processes?	Raul Salas Reyes	Accepted	Text revised.
7772	1	1	505	505	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Section numbering has been revised.
38	1	1	505	522	Nice to see this section included, but it is rather vague at the moment - provision of some exemplars (e.g. US EPA, UK DEFRA, FAO and similar websites that make these data easily accessible would be useful). FAO also provide some very useful educational tools for emissions MRV in the AFOLU sector that could be flagged as exemplars to follow at a national level (e.g. http://www.fao.org/elearning/#/elc/en/course/NGHGI)	David Reay	Accepted with modification	Text revised to clarify text on public access. However box with examples of public communication has not been included because such references are likely to be transient.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9992	1	1	505	522	Recognize intent, but adding this section are we saying that education, awareness etc. is a good practice? With all sections included in Chapter 1, this should be considered and the implication for countries following this guidance for reporting. This could be noted on any outreach materials associated with the refinementt (?). Recommend considering how this can be integrated in a more general way with compilation steps and revising any content to convey neutrality of outputs. Further, rows 515-522 are not clearly listed as example activities (not mandatory or necessary to apply good practice). The guidelines are intended to produce a policy-neutral estimate of emissions and terms/framing here needs to be more sensitive to this. Stakeholder roles in improving data and QA can be discussed in Chapter 2 and 6? Feel it is important to convey here that awareness needs to convey the objective/neutral (?) nature of the estimates that result from application of the guidance and that this information is a tool to inform decision making, input to models, etc.	Mausami Desai	Accepted with modification	Section 1.5.5. has been moved to a Box and emphasized that public outreach is part of a broadly defined national GHG inventory system. Text revised to be more general and clear.
6732	1	1	505	505	3)In addition to line 505, section 1.5.5 – Education, awareness raising and public access to information, “TED videos and Museum exhibition” can also increase educational awareness. General Comment: Overall, the story-line is very comprehensive but some of the sentences seems to be monotonous, perhaps this can be reduced during the final compilation.	Onema Adojoh	Accepted	Text has been further edited for readability.
9564	1	1	505	522	Could include in this section a note that documentation which explains the key methodological differences between the national GHG inventory and other estimates of GHG emissions (e.g. National Statistics Environment Accounts) is useful for data users.	Matthew Prescott	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
10094	1	1	505	522	This section should be as much about education, training and capacity building as about awareness raising and public access to information - especially if it's placed under National Inventory Management Systems. Currently, the section is heavily focused on awareness raising though the section heading talks about other aspects too. Suggest giving adequate attention to other aspects too - some suggested edits below.	Neelam Singh	Accepted	Text revised and futher mention of education made.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5590	1	1	505	522	Awareness raising and communication of results shall be more emphasised, therefore extension of 1.5.5 subchapter may be needed by for example communication platforms, innovative communcation channels which can be useful to decision-makers and national experts	Attila Buzasi	Rejected	Detailed guidance on public outreach is deemed out of scope for refinement and IPCC Guidelines. The section as presented is intended to only recognize that a national inventory system, broadly defined, should consider public outreach issues that will promote the GHG inventory activities and outputs to enhance the sustainability and continuous improvement of the GHG inventory system. But, the IPCC does not intend to provide detailed techincal guidance on this topic.
10096	1	1	507	511	Merge the two paragraphs into 1.	Neelam Singh	Accepted with modification	Text revised.
10098	1	1	509	509	Insert sentence after '..engagement and decisions.': Education-related activities aimed at those in relevant government ministries, departments and agencies can help develop technical capacity, enhance cooperation, and improve knowledge about how the inventory outputs may be utilized in analysis and decision making.	Neelam Singh	Accepted with modification	Suggested text in comment ID 10100 has been used.
10100	1	1	510	510	Insert these phrases as shown here in single quotation marks - Wider use and awareness of the GHG inventory 'and its purpose' can 'strengthen capacity of and' better engage stakeholders to improve data quality….	Neelam Singh	Accepted	The comment has been addressed in SOD.
10102	1	1	512	512	Delete 'also'	Neelam Singh	Accepted	The comment has been addressed in SOD.
7774	1	1	512	512	Change the word “work” to “processes”. Thus, it would look like “…the GHG inventory processes and outputs…”.	Nataliya Stranadko	Accepted	The term "work" has been changed and text revised.
10104	1	1	514	514	Delete 'including:' Insert - 'Some examples of such activities include:'	Neelam Singh	Accepted	The comment has been addressed in SOD.
10106	1	1	515	515	Insert sentence at the end: These can range from technical workshops focused on overall inventory results or on specific sectors to awareness raising events for mass media	Neelam Singh	Accepted	The comment has been addressed in SOD.
7080	1	1	520	520	Suggest 'to' between 'support' and 'the'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
4804	1	1	520	520	The term "BUR" is used in this sentence. However, BUR (and BR for developed country parties) will be superseded by new transparency reporting under the Paris Agreement after 2020 or afterwards. Since the 2019 refinementt is expected to be used after 2020 or afterwards, the way in using the term "BUR" in this GL should be carefully considered.	Takashi Morimoto	Accepted	2019 Refinement cannot reference specific reporting requirements. Text revised to refer to generic international reporting processes.
6822	1	1	520	520	I would suggest to include Biennial Reports (BRs) as well	Raul Salas Reyes	Accepted with modification	Refinement cannot reference specific reporting requirements. Text revised to refer to generic international reporting processes.
7776	1	1	521	522	The sentence “Development of the GHG inventory as a tool to support projections and the quantitative analysis of GHG savings in policies and measures” is nor clear. To support projects of what? What does mean “GHG savings in policies and measures”?	Nataliya Stranadko	Accepted	Text clarified.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7778	1	1	523	523	Renumber sections of Chapter 1 taking into account changes in lines 32-33.	Nataliya Stranadko	Accepted	Revised.
6824	1	1	706	706	Would it make sense to include in the references section the reference for the EPA tables suggested?	Raul Salas Reyes	Accepted	Added.
4842	1	1	Table 1.1		It is unclear as to what 'time steps' means in the left column, although we can guess a little from Table 1.2. Would 'Projections for every 5th year' suffice?	Elsa Hatanaka	Accepted	Footnote added.
4844	1	1	Table 1.4		This might be better expressed by calling it an example from a EU country, since it does not necessarily seem to be a standard schedule even across developed countries.	Elsa Hatanaka	Accepted	Editorial: Agree.
5254	1	1			Due to increasing regional and international trade, it is recommended that IPCC requires nations to report emissions associated with imported/exported goods/services and report consumption-based emissions alongside production-based emissions. This will provide more comprehensive evidence base for a more holistic approach to climate action planning and policy making. IPCC would need to provide relevant account/reporting guidelines too.	Mingming Wang	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
5256	1	1			Considering increasing global waste trade, it is recommended that IPCC requires nations to report emissions associated with waste imported and exported where applicable. This will provide the evidence base for a more holistic approach to climate action planning and international negotiations and policy making.	Mingming Wang	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
8546	1	1			so many places GHG is given. Better if we write as GHGs because on page 4 many gases have been reported	Amanullah Dr.	Accepted	Editorial: Agree. Edited where GHG should refer to GHGs but not where GHG is used in describing the inventory or management systems
8548	1	1			I did not found citation in the whole chapter better if we include new citation in the text.	Amanullah Dr.	Accepted	New citations included in the the SOD.
8550	1	1			In refernces section only few refernces are given and most of them are very old. We must include new literture of 2018, 2017, 2016 and so on.	Amanullah Dr.	Accepted	New references have been considered in the update of the SOD.
9990	1	1			Try to cross-reference where to find information in other chapters, especially if information is already there otherwise appears as if we are increasing the complexity of this guidance.	Mausami Desai	Accepted	More cross-references added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5248	1	1			As being raised by UNFCCC and many other international/regional /national initiatives, non-state actors are critical to addressing climate change, especially cities given that cities account for 70% of global GHG emissions. Therefore it is recommended that IPCC provides guidance for cities and other sub-national governments to report GHG emissions, or at least makes reference to existing reporting frameworks such as the Global Protocol for Community-Scale GHG Emission Inventories (GPC). Launched at COP20, the GPC is an international best practice standard developed by C40 in partnership with ICLEI and WRI with support from World Bank and UN Habitat. The GPC is currently the most referenced framework by cities that voluntarily report emission to the Carbon Disclosure Project. More details available at www.c40.org/gpc	Mingming Wang	Accepted with modification	Box added to address other subnational applications of GHG inventories. However, these Guidelines are explicitly for the purpose of national inventories.
5250	1	1			As cities consume over two-thirds of the world's energy and account for more than 70% of global CO2 emissions, it is strongly recommended that IPCC considers how national inventories can be improved to enable better emissions accounting at city level. At C40 Cities, an international organisation focused on city-level climate actions, we have helped over 60 large cities worldwide develop GHG inventories so far. Based on our experiences and city feedback, cities often do not have access to good quality city-level activity data or emission factors and thus have to scale down national inventories, which leads to low quality of city inventory and policy making. On the other hand, national government often have more access (and sometimes the only access) to data on various levels. Therefore and to overcome the challenges faced by cities, it is recommended that IPCC requires national GHG inventory reports to provide: 1) spatially disaggregated activity data, emission factors and/or emissions data at city level (or other sub-national level), or at least for the sectors where cities struggle most with obtaining local data (i.e. energy industries, fugitive emissions, aviation, IPPU, AFOLU etc.); and 2) a list of large point sources (e.g. industrial facilities, power stations etc.) and data at point source/facility level. This move will also help with vertical integration of climate action planning and policies between different levels of government.	Mingming Wang	Accepted with modification	Box added to address other subnational applications of GHG inventories. However, these Guidelines are explicitly for the purpose of national inventories. Therefore, IPCC does not have mandate to require spatial disaggregation except where it is technical good practice for the purpose of producing TACCC national estimates.
4840	1	1			(General Comment) For Inventory compilation, current draft is extremely difficult to use, because it is partial and does not cover all the required actions. It is advisable to produce complete set of guidelines as amended by merging original relevant guidelines and refinementts, at a later stage. Soft (computer file) package may suffice.	Taka Hiraishi	Rejected	IPCC decided to prepare a “2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories” (2019 Refinement), which do not replace the 2006 IPCC Guidelines but to be used in conjunction with the 2006 IPCC Guidelines. Consolidating all methodological guidance into a single report would require a new IPCC decision. However, guidance has been included in the Overview Chapter on how to use this report in conjunction with the 2006 IPCC Guidelines and other IPCC Methodology Reports.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9540	1	2	1	1297	Add guidance for the development of country-specific emission factors, focusing on developing countries. It was reported in several research papers that global emission estimates based on default emission factors and activity data for some chlorinated compounds do not match observed atmospheric concentration trends (see Fig 1-3, 1-4 in Carpenter et al., 2014). That kind of mismatch is to become evident when national inventory reports are summed up for UNFCCC in the global stock take stage (to be done in 2023, 2028 and further) and compared to actual rate of global average concentration change for those compounds. To avoid discrepancy, adjustment should be made to default emission factors (used in Tier 1 procedures), based on present atmospheric concentration trends and global activity data. Common procedures for data collection presented in Chapter 2, do not yet provide recommendations for use of atmospheric concentration trends for adjusting EFs, we strongly encourage the authors to consider adding such guidance. Some useful context can be found here: http://www.globalcarbonproject.org/reccap/ and here http://www.globalcarbonatlas.org/en/content/welcome-carbon-atlas	Philip DeCola	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4350	1	2	36	37	Upper or lower case letters?	Kewei Yu	Accepted	Typo corrected.
7626	1	2	46	757	In several places throughout Chapter 2, the new refinementt text needs to be better integrated into the old 2006 Guidelines text. Currently, there are sometimes competing organizational schemes and/or redundancies.	Deborah Ottinger	Noted	The SOD text and structure has been revised to remove redundancies across the chapter.
8552	1	2	47		no need of this sentence	Amanullah Dr.	Accepted	Sentence removed.
7852	1	2	47	47	I am guessing these types of sentences are going to be removed in the last version	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
7780	1	2	48	48	Replace a phrase “any system” to “national inventory system”.	Nataliya Stranadko	Accepted	Phrase replaced.
7854	1	2	48	48	Suggest to include "greenhouse gas" where it says "to regularly estimate and report emissions". It will then say "to regularly estimate and report greenhouse gas emissions"	Raul Salas Reyes	Accepted	Text included.
10134	1	2	48	49	Add after ranging from national statistical agencies, "from line ministries, economic sectors including financial and non-financial corporations such as industries, trade, transport, service sectors etc. as well as government, households and others."	Wafa Aboul Hosn	Accepted with modification	Different change made according to all the comments.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7856	1	2	49	50	Sentence "and industry sources to academia will" seems confusing. I suggest to rephrase this sentence to "network of data providers ranging from national statistical agencies, international organizations, trade, academia, and industry sources will be expected to provide information on an annual basis."	Raul Salas Reyes	Accepted with modification	Different change made according to all the comments.
5756	1	2	51	52	This is the key to the document: "Data collection is the first, and possibly the largest interactions between the inventory compilers and other stakeholders". The concept of interaction could be emphasized more through out the rest of the document by writing sentences to include reminders and examples. Reminders related to meaning or implication; examples offering the reader inspiration.	Ann Gallagher	Accepted	Words changed.
7782	1	2	51	51	Expand a phrase “the largest interactions” to “the largest part of interactions”.	Nataliya Stranadko	Accepted	Comment addressed in the SOD. According to lines 73-75 of SOD as follows: "During the data collection for the greenhouse gas inventory, interactions between the inventory compilers and stakeholders will take place, which may require the most time in the compilation process".
10136	1	2	51	51	Add after direct collection of data " from administrative records and from monitoring stations, in coordination with the statisitcal system in place"	Wafa Aboul Hosn	Accepted	Text added.
7860	1	2	51	52	Where it says "Data collection is the first, and possibly the largest interactions between the inventory compilers and other stakeholders". There are interactions with other stakeholders even before data collection, for example, when first establishing a national GHG inventory system, stakeholder consultations are held. Also, the phrase "largest interactions" reads a bit confusing. I would suggest to rephrase this paragraph to keep it more simple. A suggestion would be "Interactions between the Inventory Agency and stakeholders will take place during the data collection for the GHG inventory, which may require the most time in the compilation process".	Raul Salas Reyes	Accepted with modification	Different change made according to all the comments.
7082	1	2	51	51	interaction' rather than 'interactions'	Amanda Penistone	Accepted	Text changed as proposed.
98	1	2	51	52	the statement presented should appear before line 50-51. This will expand the view of inventory compiers.	Chukwuma Anoruo	Rejected	Phrase deleted as it confuses according to some comments. No change was made in the text.
418	1	2	51	51	copy edit: "the largest interactions" should be "the largest of the interactions"	Pauline Midgley	Rejected	Phrase deleted as it confuses according to some comments.
7858	1	2	51	51	I would suggest to change the words "inventory compiler" with "Inventory Agency" to keep an allignment with wording from Volume 1 Chapter 1 section 1.5.1.3	Raul Salas Reyes	Rejected	Phrase deleted as it confuses according to some comments.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1404	1	2	52	52	eliminate (s): … possibly the largest interaction(s)	Regine Röthlisberger	Accepted with modification	Different change made according to all the comments.
2454	1	2	53	65	The development of figure showing process diagram may give more understanding to the reader or compiler.	Pornphimol Winyuchakrit	Accepted	Inserted.
7628	1	2	53	56	Long sentence can be simplified by adding period to end of first line after "inventory," eliminating subsequent "and" and capitalizing "It," adding period after "identified" in line 55, deleting "and then focusing," capitalizing "Resources," and adding "can then be focused" immediately afterward.	Deborah Ottinger	Accepted	Sentence simplified.
1738	1	2	53	55	Perhaps note that such inventory compilers that they should aim for completeness, and for the next inventory focus on improvements?	Melissa Weitz	Accepted with modification	A diagram is added to the chapter.
7862	1	2	53	53	Include "the" between "starting inventory". This then will read to "When starting the inventory compilation"	Raul Salas Reyes	Accepted with modification	Different change made to clarify the issue.
7864	1	2	54	54	Not clear what the phrase "expending too much effort so" means. Also, I would suggest to clarify who will require the effort, why it is not suggested to spend to much effort, and how would it be suggested to do so.	Raul Salas Reyes	Accepted	Clarification added.
5992	1	2	57	58	The list of examples of possible key categories should include "forest management", which is a key category for most countries with established inventories	Ana Blondel	Accepted	Key category added.
5762	1	2	58	59	What is the 'it' in this sentence: "it should be easier with the relationships and processes already established."? Why not change to adding categories should be easier…	Ann Gallagher	Accepted	Phrase added.
1740	1	2	59	59	Should "year" be "inventory cycle" so that this is applicable to all countries developing ghg inventories?	Melissa Weitz	Accepted	Precision about the time frequency was deleted.
5764	1	2	59	60	"However, every year, inventory compilers should always be prepared to consider new data sources should they become available." Of course they should be prepared but what has this document done to let them know what being prepared looks like? Why not add an example or two? While you don't want the document to be budensome to read, it seems awaking the reader to possibilities they might not have considered would make the guidelines more useful.	Ann Gallagher	Accepted	The comment has been addressed in SOD.
1742	1	2	61	65	This guidance should be identical to (or reference) guidance on NE sources.	Melissa Weitz	Accepted	Text included.
7784	1	2	61	61	This section uses a word “sources” with two meanings: data sources and sources of GHG emissions. Therefore, to be clearer, a phrase “new sources or sinks may be identified” should be modified to “new sources of GHG emissions or sinks may be identified”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
7868	1	2	61	61	Include the word "inventory systems" after "In established inventories". This will then read as "In established inventory systems"	Raul Salas Reyes	Accepted	Text included.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5766	1	2	62	63	"In these cases, it is good practice to estimate if the source or sink strength is comparable with key categories in order to assess the effort required." Sure but what does that calculation imply? I assume it is indicating that if a new source or sink is estimated to be on a scale similare to the KEY categories then it should be reported by the country. But the guide does not say that. Maybe it only means the category should to further evaluated and will not contribute to totals reported, yet. But the guide does not say that, either. Which is intended? Please clarify.	Ann Gallagher	Accepted	Added to the text "if a new source or sink is estimated to be on a scale similar to the key categories then it is good practice to use Tier 2 or 3 method".
44	1	2	62	63	"source or sink strength" is difficult to understand. Please add a note to explain it.	Mingshan Su	Accepted with modification	Clarified into the paragraph.
420	1	2	63	63	suggest changing "to assess" to read: "to assess and prioritise", which is what is discussed later in the chapter	Pauline Midgley	Accepted	Text added.
7630	1	2	63	63	Regarding "source or sink strength is comparable with key categories:" It is important to remember that categories can be key due to trend as well as magnitude. May be good to move discussion of key category from lines 68-70 here.	Deborah Ottinger	Accepted	Text moved.
7036	1	2	66	66	Please consider moving "Data1collection is an integral part of developing and updating a greenhouse gas inventory" to 48	Vitor Gois Ferreira	Accepted	Text moved to the beginning of the introduction.
7632	1	2	66	74	This old text is valuable but needs to be better integrated into the new text.	Deborah Ottinger	Accepted	Text moved to the beginning of the introduction.
7866	1	2	66	74	After reading it a couple of times, I believe that this section would read better between lines 52 and 53.	Raul Salas Reyes	Accepted	Text moved to the beginning of the introduction.
422	1	2	69	69	copy edit: should read either "taking into account" or "taking account of"	Pauline Midgley	Accepted with modification	The whole text changed according to all comments.
5768	1	2	69	69	Change "taking account the results of key category analysis" to "taking account of the results of key category analysis"	Ann Gallagher	Accepted with modification	The whole text changed according to all comments.
1406	1	2	76	88	In this list, there are three items refering to data collection activities and inventory improvement (lines 79/80, lines 81/82, lines 86/87). They should be merged into one single item, e.g. "chose and regularly review data collection procedures to guide progressive and efficient inventory improvement". The aspect regarding "methodological needs" in line 86 is covered in line 83.	Regine Röthlisberger	Accepted with modification	Text modified according to all comments.
8900	1	2	76		It would be beneficial to initiate this list with an assessment of what data exist/planned across institutions nationally (e.g. relevant ministries, NSOs, ect).	Roberta Quadrelli	Accepted with modification	Text modified according to all comments.
424	1	2	78	78	copy edit: for consistency with other items in this list, these should be active verbs, i.e. " identify, evaluate and document the available data sources"	Pauline Midgley	Accepted	Text changed.
5770	1	2	78	81	Consider adding a bullet to inspire readers to create data sources that are not currently in existance. A person in a country just getting started recording a new source can outline the way information could be collected thus creating a new source rather than relying only on the available data sources as per the rest of the chapter.	Ann Gallagher	Accepted	Text changed.
7636	1	2	78	78	For consistency with other bullets, recommend changing "ing" endings to imperative, i.e., "identify, evaluate, and document."	Deborah Ottinger	Accepted	Bullet added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7634	1	2	81	86	Lines 81 and 86 appear to be redundant	Deborah Ottinger	Accepted with modification	Text modified according to all comments.
7638	1	2	84	85	For consistency with other bullets, recommend changing to "integrate the collection of uncertainty information into data collection. . ."	Deborah Ottinger	Accepted	Phrase modified.
7786	1	2	84	84	Modify a phrase “the collection of uncertainty information” to “the collection of information about uncertainty”.	Nataliya Stranadko	Accepted	Text adjusted.
426	1	2	84	84	copy edit: for consistency with other items in this list, this should be an active verb, i.e. " collect uncertainty information, which is an integral part of ..."	Pauline Midgley	Accepted with modification	Different change made according to all the comments.
4352	1	2	85		Chapter 3, upper case in all other places.	Kewei Yu	Accepted	Words adjusted.
8904	1	2	88		line 88 could fit under line 78 as relates to same concept	Roberta Quadrelli	Accepted with modification	Different change made according to all the comments.
4354	1	2	101		data sets or datasets, be consistent	Kewei Yu	Accepted	The comment has been addressed in SOD.
7870	1	2	106	106	I would suggest to include a paragraph describing how data supply agreements support the data collection process and when should these be established in the data collection process. This will also assist to have some connection with Volume 1 Chapter 1 section 1.5.2.2 DATA SUPPLY AGREEMENTS	Raul Salas Reyes	Accepted with modification	Is emphasized in the text.
8554	1	2	108		remove text no need	Amanullah Dr.	Accepted	Text removed.
7040	1	2	116	120	These two paras appear to be not relevant here. Consider moving or deleting	Vitor Gois Ferreira	Rejected	These two paragraphs are relevant to the chapter.
7872	1	2	118	118	It is not clear to which guidelines the paragraph is refering to in "Following these guidelines, it should…" does it refer to the 2019 refinementt? If so, I would suggest to rephrase as "Following the 2019 refinementt, it should be possible to provide a…"	Raul Salas Reyes	Accepted	Text changed.
1408	1	2	119	120	I am not sure if I understand the sentence correctly: "In the absence of available activity data, applying these guidelines to activity data will allow estimates based on either surrogate information or expert judgement." How can you "apply these guidelines to activity data", in particular "in the absence of available activity data"? Should it read "In the absence of availabel activity data, applying these guidelines will allow estimates based on either surrogate information or expert judgement."?	Regine Röthlisberger	Accepted with modification	Text clarified.
1744	1	2	119	120	This sentence is unclear. "In the absense of available country-specific emissions data"?	Melissa Weitz	Accepted with modification	Text clarified.
7084	1	2	119	120	Do you mean in the absence of emissions factors?	Amanda Penistone	Accepted with modification	Text clarified.
7640	1	2	119	120	Last sentence is not clear: how can guidelines be applied to activity data in the absence of available activity data?	Deborah Ottinger	Accepted with modification	Text clarified.
428	1	2	122	122	copy edit: "compilers acquire data" should read "compilers to acquire data"	Pauline Midgley	Accepted	"to" inserted.
1410	1	2	122	122	insert "to": compilers "to" acquire data…	Regine Röthlisberger	Accepted	"to" inserted.
5994	1	2	122	122	Missing "to" between "compilers" and "acquire"	Ana Blondel	Accepted	"to" inserted.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7086	1	2	122	122	Suggest 'to' between 'compilers' and 'acquire'	Amanda Penistone	Accepted	"to" inserted.
8902	1	2	123		Similarly to previous comment, it would be benficial to start this list with assessing what data exist/are planned across insitutions	Roberta Quadrelli	Accepted with modification	This paragraph is concerned with the process acquiring the data. Instead, the comment has been considered in the paragraph dealing with establishing a system for continuous improvement.
8906	1	2	124		it may be benficial to rephrase from "ask" to "engage in cooperation" - in some cases, working groups and MoUs may be needed	Roberta Quadrelli	Accepted	Rephrased.
10138	1	2	124	124	2."Establish a coordination mechanism with data providers to obtain "tailored	Wafa Aboul Hosn	Accepted with modification	Different change made according to all the comments.
430	1	2	126	126	copy edit: "form" should be "from"	Pauline Midgley	Accepted	Replaced.
1412	1	2	126	126	correct spelling: "from" instead of "form" at the beinning of the line.	Regine Röthlisberger	Accepted	Replaced.
4356	1	2	126		replace "form" with "from".	Kewei Yu	Accepted	Replaced.
5772	1	2	126	126	Change 'form' to 'from'.	Ann Gallagher	Accepted	Replaced.
5996	1	2	126	126	"from" instead of "form"	Ana Blondel	Accepted	Replaced.
6360	1	2	126	126	it is suggested that 'form' be replaced with 'from'	Emmanuel Jonthan Mpeta	Accepted	Replaced.
7088	1	2	126	126	from' instead of 'form'	Amanda Penistone	Accepted	Replaced.
7874	1	2	126	126	Change word "form" to "from". It will then read as "from financial year to calendar year"	Raul Salas Reyes	Accepted	Replaced.
9566	1	2	126	126	typo: suggest “from financial year to …”	Matthew Prescott	Accepted	Replaced.
8908	1	2	128	131	I do not follow how the logics of point 4 is reflected in the structure of the chapter. To reflect this list, the sectin on Generate new data (2.2.2) should include sections on measurements, census and surveys within it (as listed under points i), ii) and iii)), While following structure is inconsistent with this list.	Roberta Quadrelli	Accepted	The comment has been addressed in SOD.
8910	1	2	128	131	It would be beneficial to also add a point on adapting existing surveys	Roberta Quadrelli	Accepted	Added to the text.
10140	1	2	130	130	Inventories focal points can not do surveys on their own…Change to ii) Use Census and Surveys data iii) Coordinate with National Statistical Offices to undertake new surveys targeting inventories relevant sectors	Wafa Aboul Hosn	Accepted	Text changed.
10142	1	2	131	131	Inventories focal points can not do surveys on their own…Change to ii) Use Census and Surveys data iii) Coordinate with National Statistical Offices to undertake new surveys targeting inventories relevant sectors	Wafa Aboul Hosn	Accepted	Text changed.
4846	1	2	133	133	It seems paradoxical that 'a last resort' would be 'good practice'. Since line 121 generally covers this item as well, would 'As a last resort, use expert judgement' be enough?	Elsa Hatanaka	Accepted	Text adjusted.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7876	1	2	136	136	I would also suggest to include a paragraph on how can the improvements be also included as part of next years' workplan and that the Inventory Agency has to continiously review and update these accordingly"	Raul Salas Reyes	Accepted	Its relevance has been considered and added to the text of the SOD.
5776	1	2	137	137	Change "Is it for a complete calendar year?" to "Does the data represent collection for a complete calendar year?" For some readers, English will not be the first language so precision and clarity should be considered. If possible reduce the use of pronouns; spell out the point of the statement.	Ann Gallagher	Accepted	Phrase changed.
7644	1	2	137	137	Recommend adding "and/or the entire population of sources within the source category" after "territorial area of the inventory."	Deborah Ottinger	Accepted	Changed.
7878	1	2	137	137	Change ":" to a question mark. It will then read as "Is it complete? Does it cover the entire territoral area of the inventory?..."	Raul Salas Reyes	Accepted	Phrase added.
9712	1	2	137	137	add also the test: is it complete - does it cover the entire activity for a source category? (important in case of using ETS data.. There is often a threashold value in place.. so there are only very few categories covered completely by ETS data.	Michael Strogies	Accepted with modification	'and/or the entire population of sources within the source category" was added instead.
5774	1	2	138	138	Change "How can expressed in terms of two standard deviations?" to "Can uncertainty be expressed in terms of two standard deviations?"	Ann Gallagher	Noted	The text has been completely revised.
432	1	2	138	138	copy edit: "How can be expressed" should read "How can this be expressed"	Pauline Midgley	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
484	1	2	138	138	It is written: "How can expressed ..." instead of: "How can be expressed...".	Virginia Sena	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
1414	1	2	138	138	incomplete sentence, insert "it be": … How can "it be" expressed in terms …	Regine Röthlisberger	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
1746	1	2	138	138	This sentence is missing a word.	Melissa Weitz	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
3340	1	2	138	138	Should move from 2 sd (which is defined for known distributions) to IQR or other combination of percentiles to avoid assuming an underlying distribution	Justin Bishop	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
5998	1	2	138	138	Some word is missing; should it be "Can be expressed in terms of two standard deviations?" instead of "How can expressed in terms of two standard deviations?"?	Ana Blondel	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
6362	1	2	138	138	proposed to insert 'it be' between 'can and expressed'	Emmanuel Jonthan Mpeta	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
7090	1	2	138	138	Suggest 'it be' between 'can' and 'expressed'	Amanda Penistone	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
7880	1	2	138	138	The question "How can expressed in terms…" is not clear. I would suggest to clarify what is this referring to or rephrase.	Raul Salas Reyes	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9568	1	2	138	138	typo: "How can expressed in…"	Matthew Prescott	Accepted with modification	Text corrected as "How can this uncertainty be expressed in terms".
9998	1	2	138	138	Somehow important for guidance to recognize that many datasets do not include uncertainty including national datasets and could refer users also to sections relevant to gathering expert judgement while in parallel working with data provider to develop this in future publications of the data. This should also be listed I think last in terms of points checked.	Mausami Desai	Noted	Already considered in the text.
1416	1	2	139	139	insert "s": What assumption"s" underlie the data?	Regine Röthlisberger	Accepted	"s" added.
6364	1	2	139	139	proposed to replace 'E.g.' with 'e.g.'	Emmanuel Jonthan Mpeta	Accepted	Text added.
7642	1	2	139	140	Recommend adding new bullets "What measurement methods are used? Are they reliable?" and "Are time series consistent?"	Deborah Ottinger	Accepted	The "Eg" removed.
7882	1	2	139	139	Remove the "(E.g.)" and just keep the questions. It will then read as What assumption underlie the data? is a survey representative? Is a census complete?	Raul Salas Reyes	Accepted	"s" added.
5778	1	2	139	139	The use of "E.g. is a survey representative? Is a census complete?" is a helpful and sensible contribution to the document.	Ann Gallagher	Accepted	The comment has been addressed in SOD.
7092	1	2	139	139	assumptions' instead of 'assumption'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
7884	1	2	140	140	I would suggest to change the words "inventory compiler" with "Inventory Agency" to keep an allignment with wording from Volume 1 Chapter 1 section 1.5.1.3	Raul Salas Reyes	Accepted	Words changed.
9570	1	2	140	141	Feedback mechanism, to provide comments/questions from the compiler to the data provider, should be formalized in the data supply agreement.	Matthew Prescott	Accepted	Added to the text.
7886	1	2	142	142	It is not clear what "This" is referring to in "This includes the source of the data…"	Raul Salas Reyes	Accepted	Clarified.
7888	1	2	142	143	It is not clear what "any processing" refers to	Raul Salas Reyes	Accepted	Clarified.
7890	1	2	143	143	It is not clear what "This" is referring to in "This will allow…"	Raul Salas Reyes	Accepted	Clarified.
9170	1	2	143	145	Here is the first case (of many) in the text where the absence of a specific category for wood pellets and other biomass fuels can led to bad assumptions about the lifespan of these products. Are we to understand wood pellets for bioenergy as a short- or long-lived product?	Peter Riggs	Rejected	Issues about biofuels are handled in other chapters.
1418	1	2	144	144	insert "s": to reduce the resource"s" required	Regine Röthlisberger	Accepted	"s" inserted.
5780	1	2	144	145	What does this "to reduce the resource required for data collection in subsequent years" mean? Are the collectors/reporters of data reducing the effort required? Perhaps collectors/reporters are reducing the expendature of resources required. Please clarify meaning.	Ann Gallagher	Accepted	Examples added.
7892	1	2	144	144	I would suggest to add examples in the types of resources required where it says "to reduce the resource required". For example, this can be referring to human resources, time resources, financial resources, etc. I feel this can be clearer.	Raul Salas Reyes	Accepted	Text added to highlight the resources required which are mainly human, time and financial resources.
7894	1	2	145	145	I would also suggest to include a paragraph on how data supply agreements can assist.	Raul Salas Reyes	Accepted with modification	Added to the paragraph.
1420	1	2	146	147	Text in 2nd box in first column: replace "existing resources" with "available resources"	Regine Röthlisberger	Accepted	Corrected.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
45	1	2	146	146	There are spelling errors in "Can the inventry provider madify the dat to meet the inventory needs"	Mingshan Su	Accepted with modification	A new diagram is inserted.
434	1	2	146	146	copy edit: there are several typos in the text boxes of the figure - please check carefully	Pauline Midgley	Accepted with modification	A new diagram is inserted.
488	1	2	146	147	Figure 2.1 - In the third square chart, third column, second sentence. Typing errors. It should be written: "This may involve an annual inventory activitiy"	Virginia Sena	Accepted with modification	A new diagram is inserted.
1422	1	2	146	147	Text in 3rd box in second column: spelling of inventory missing an "o" (1st line), modify instead of madify (2nd line), data instead of dat (2nd line)	Regine Röthlisberger	Accepted with modification	A new diagram is inserted.
1424	1	2	146	147	Text in 3rd box in third column: insert "l" in involve, spelling of inventory (3rd line)	Regine Röthlisberger	Accepted with modification	A new diagram is inserted.
1426	1	2	146	147	Text in 1st box in fourth column: Add "n" in understanding (4th line). What is meant by "understanding"? Memoranda of understanding?	Regine Röthlisberger	Accepted with modification	A new diagram is inserted.
1428	1	2	146	147	There is a flaw in the logic of the pattern: If data is satisfactory, complete, with uncertainty information and with reasonable assumptions (top box in second column), it goes to "consider how to establish long-term relationship" (top box in fourth column), only to be checked again for completeness, uncertainty and assumptions. I think, this shoul be by-passed, as already checked at the top.	Regine Röthlisberger	Accepted with modification	A new diagram is inserted.
4294	1	2	146	147	I suggest that the authors reconsider the decision tree because "Check data is complete, has uncertainty information and any assumptions are reasonable" will be done twice if the answer to the first question (Is there a published source of this data?) is yes.	Naofumi Kosaka	Accepted with modification	A new diagram is inserted.
4358	1	2	146		Data Collection - letter case?	Kewei Yu	Accepted with modification	A new diagram is inserted.
4830	1	2	146		Figure 2.1 contains a typo, "madfy", which should rather be "modify".	Taka Hiraishi	Accepted with modification	A new diagram is inserted.
5782	1	2	146	147	Change "inventry" and "invntory" to "inventory".	Ann Gallagher	Accepted with modification	A new diagram is inserted.
5784	1	2	146	147	Change "Modify Data" to "Have the inventory provider modify the data".	Ann Gallagher	Accepted with modification	A new diagram is inserted.
5786	1	2	146	147	Clarify "Consider how to establish long-term relationships with data provider, including possible agreements, understanding, and joint activities". Perhaps "Establish long-term relationships with data providers. Consider the use of agreements, memorandums of understanding, and collaborative activities"	Ann Gallagher	Accepted with modification	A new diagram is inserted.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6000	1	2	146	146	Figure 2.1: This outline and the chapter in general assume that there is always a way to collect data, at least using expert jugement. There might be cases where not even this last resort (expert jugement) is suitable given the lack of relevant knowledge or the extremely high level of uncertainty that this AD may have. This outline should provide an additional path for these special cases, suggesting for example to develop the relevant knowledge within the country on the category/activity in question as resources available permit.	Ana Blondel	Accepted with modification	A new diagram is inserted.
6002	1	2	146	146	Figure 2.1: several typos in this figure should be corrected	Ana Blondel	Accepted with modification	A new diagram is inserted.
6366	1	2	146	147	This is in fig 2.1: it is suggested that these words 'can the inventry provider madify the dat to meet the inventory needs' be replaced with ' can the inventory provider modify the data to meet the inventory needs'	Emmanuel Jonthan Mpeta	Accepted with modification	A new diagram is inserted.
6368	1	2	146	147	This is in fig. 2.1: it is suggested that these words 'consider how to establish long-term data supply. This may invove an annual invnetory activity' be replaced with 'consider how to establish long-term data supply. This may involve an annual inventory activity'	Emmanuel Jonthan Mpeta	Accepted with modification	A new diagram is inserted.
7094	1	2	146	146	several typos in diagram	Amanda Penistone	Accepted with modification	A new diagram is inserted.
7896	1	2	146	146	In figure 2.1 where it says "Is the data satisfactory? Check data is complete…" it is not clear what "uncertainty information" means. I would suggest to clarify this term before the figure so that the readers can have an idea of what type of information with regards to uncertainty is expected.	Raul Salas Reyes	Accepted with modification	A new diagram is inserted.
8912	1	2	146	147	Possible to add a question upfront to assess whether a mapping of all relevant sources exist or need to be done.	Roberta Quadrelli	Accepted with modification	A new diagram is inserted.
8914	1	2	146		Sometimes data exchange may occur even for data that are not yet published or not published at all, if there is an agreement. This could actually help timeliness	Roberta Quadrelli	Accepted with modification	A new diagram is inserted.
8916	1	2	146		Several typos in content of various boxes in flow chart (inventry; invnetory; understading;..). Use of capital letters and punctuation is inconsistent	Roberta Quadrelli	Accepted with modification	A new diagram is inserted.
9996	1	2	146	146	This seems unnecessary and can be confusing to consider in conjunction with decision trees in sectoral chapters, recommend removing.	Mausami Desai	Accepted with modification	A new diagram is inserted.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
486	1	2	146	147	Figure 2.1 - In the third square chart, second column. Typing errors and "compiler" instead of "provider". It should be written: "Can the inventory compiler modify the data to meet the inventory needs?"	Virginia Sena	Accepted	The comment has been addressed in SOD.
5792	1	2	149	165	This section highlights the need for a consistancy of terms. The inventory collector, the data collector, the data provider, inventory compiler, data suppliers, and the invertory reporter need to be defined and used consistantly.	Ann Gallagher	Accepted	The comment has been addressed in SOD.
1430	1	2	150	153	There seem to be duplicated statement. Proposed text for lines 150-153: Delete the first sentence (Oftern working with a … data provider.). Leave the second sentence "It is good practice… subsequent years." Change third sentence as follows: Delete (Data Collection steps and decisions) in line 152.	Regine Röthlisberger	Accepted	Redundancy deleted.
7898	1	2	150	151	Paragraph "It is good practice to establish long151 term relationships with data producers to reduce the resources required for data collection in subsequent years." is repeated with 144-145	Raul Salas Reyes	Accepted with modification	Modified according to other comments.
10000	1	2	150	153	Data sources can change so see benefit to moving the opening content as sub-bullet in the exsting text, or at end of paragraph at line 167.	Mausami Desai	Rejected	Isn't relevant to this content.
9714	1	2	151	151	include after the word "longterm" the passus "and sustainable". This means the data provision should be independent from individual relations.	Michael Strogies	Accepted with modification	Deleted from that line for redundancy and added above.
5788	1	2	151	151	What does this "to reduce the resource required for data collection in subsequent years" mean? Are the collectors/reporters of data reducing the effort required? Perhaps collectors/reporters are reducing the expendature of resources required. Please clarify meaning.	Ann Gallagher	Accepted	Deleted for redundancy and clarified above.
9572	1	2	152	152	typo: "…Data Collection steps and decisions relationships with…"	Matthew Prescott	Accepted	Modification adopted.
5790	1	2	152	153	Change: "Developing long-term Data Collection steps and decisions relationships with data suppliers can lead to mutual benefits. Improved understanding of the data will improve the inventories and may lead to improvements in the original data." is jumbled. Suggested: Codifying data collection decision trees and collection steps with the data suppliers can lead to benefits for everyone. An improved understanding of the data could lead to improved inventories. Original data might be adjusted to reflect reporting needs."	Ann Gallagher	Noted	Removed according to other comments.
7096	1	2	152	152	remove 'decisions' from this sentence	Amanda Penistone	Noted	Removed according to other comments.
2400	1	2	154	155	It is important to consider top-down data scientists as "suppliers". Concerted effort should be undertaken by the IPCC inventory community to better understand work from Saunois et al.	Fiji George	Noted	No action can be taken because comment is out of scope of 2019 Refinement.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
744	1	2	160		The formulation „regular informal updates on the methods that use their data" is very general and uncertain please consider revision of this sentence or add more explanation about the meaning	Lenka Zetochová	Accepted	Changed in text.
8918	1	2	161		NSO could be in list	Roberta Quadrelli	Accepted with modification	Changed in text.
7646	1	2	173	174	"Wherever possible the use of confidential data should be avoided." This statement is overly broad. Often, data that is critical to the development of precise and accurate inventories is confidential at the level of individual facilities or other entities. However, it can still be used with little loss of transparency if it can be aggregated so that the facility-specific data are masked. The old text from the 2006 Guidelines includes good guidance on this point.	Deborah Ottinger	Accepted	Rephrased.
7900	1	2	173	174	I would suggest to rephrase the first paragraph to "It is good practice to avoid using confidential data as this confidential data can lead to an inventory lacking transparency. However, avoiding the use of confidential data may not always be possible and so, it is a good practice that inventory compilers..."	Raul Salas Reyes	Accepted with modification	Text revised.
4848	1	2	175	175	Confidential data are inherently untransparent. Would 'inventory compilers take the following steps to 'minimize' this issue' be better?	Elsa Hatanaka	Noted	The Guidelines intend to encourage taking these steps in order to minimize the issue. No change has been made in the text.
7648	1	2	179	195	The concept of aggregation is mentioned on lines 179, 183, 185, as well as 195. It is not clear what the difference is among these bullets/statements.	Deborah Ottinger	Accepted	Text adjusted.
5794	1	2	181	181	"derive a mutually acceptable data sets" should be "derive mutually acceptable data sets".	Ann Gallagher	Accepted	Adjusted.
5796	1	2	183	190	Note: Lines 525-529 for an excellent model of clarity. The use of "option" make the information highly accessible. Suggested: 2. When confidentiality cannot be avoided ways to aggregate or mask the data should be investigated (see 3). 3. Aggregation of smaller subcategories may be possible to aggregate the emission estimates into a larger category to avoid breaking the confidentiality. Aggregation techniques should be selected to avoid the possibility that the confidential data could be reconstructed using the published inventory. 4. If masking or aggregating data is unsuccessful at preserving confidential data, it may be appropriate to look at other sources of data and avoid the use of confidential data favoring greater transparency of the final inventory. Attention should also be paid to any reporting guidelines (such as those from the UNFCCC) that might apply.	Ann Gallagher	Accepted	"," added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6096	1	2	183	184	Not clear, recommend rewording. Missing a comma? Sentence needs to be clear what is the "this" that could be done? Redundant with lines 198-201	William Hohenstein	Accepted	The comment has been addressed in SOD.
7902	1	2	183	183	Add "," in between "avoided ways". This will then read as "Where the confidentiality cannot be avoided, ways to aggregate or mask the…"	Raul Salas Reyes	Accepted	Suggestion adopted.
4296	1	2	184	184	I suggest that the authors clarify "below". Does it mean "3. For smaller subcategories..."?	Naofumi Kosaka	Accepted	Clarified.
4850	1	2	185	187	It would be useful to add to this 3. that care should also be taken to minimize the aggregation as much as possible so as to be as transparent as possible.	Elsa Hatanaka	Accepted	Text added.
4298	1	2	188	188	I suggest that the authors clarify "above". Does it mean "3. For smaller subcategories..."?	Naofumi Kosaka	Accepted	Clarified.
4852	1	2	189	190	Paying attention to e.g. UNFCCC Guidelines seems universal across all issues in the IPCC Guidelines. Is it necessary to mention it here especially?	Elsa Hatanaka	Accepted	Deleted.
7042	1	2	191	191	Nowadays the issue is not only relevant for NSA, but also for nation-wide inventories related to GHG, such as EU-ETS. These other examples could also be mentioned here, because the issues involved are similar	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
1432	1	2	231	236	The text is partyl duplicated. Proposed text for lines 231-236, delete text in (), insert text in "": While every effort should be made to collect data needed and its associated uncertainties from the approaches discussed below, (there may remain cases when no data is available and then the inventory compiler will need to rely on expert judgement to provide the information. When collecting data,) there may be some exceptional cases when no inventory data is available, and expert judgement must be used. Experts should be asked to estimate the missing data based on their expertise. In order to (indicate) "initiate" such discussions and to provide a starting point for their considerations the following inputs can be used:	Regine Röthlisberger	Accepted	Text adopted.
5798	1	2	231	233	Suggestion: Despite endeavoring to collect all the data and document all of the data's associated uncertainties, there might be cases when no data is available. Then the inventory compiler [collector/reproter?] will need to rely on expert judgement to provide information. Comment: Are you sure you want people to make "every" effort?	Ann Gallagher	Accepted with modification	Adjusted taking into account all comments.
6098	1	2	231	236	These two paragraphs say essentially the same thing. Merge and edit.	William Hohenstein	Accepted with modification	Paragraphs merged and revised.
7904	1	2	231	236	Paragraphs 231-233 and 234-236 are very similar. Would it be possible to merge them to avoid repetition?	Raul Salas Reyes	Accepted with modification	Paragraphs merged.
436	1	2	232	235	these two sentences seem to be duplicates; surely only one is needed?	Pauline Midgley	Accepted with modification	Paragraphs merged.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5800	1	2	234	236	Suggestion: In exceptional case, when no inventory data is available expert judgement must be used. Experts should be asked to estimate the missing data based on their experience. As a starting point for expert estimations consider the following:	Ann Gallagher	Accepted with modification	Redundancy deleted.
7650	1	2	234	235	Redundant with 231-233	Deborah Ottinger	Accepted with modification	Adjusted taking into account all comments.
5802	1	2	237	238	Suggestion: If there are other countries with sectors in a similar stage of economic development, management practices and/or soil-climatic conditions consider extrapolating from the similar country's reports.	Ann Gallagher	Accepted	Text adopted.
7044	1	2	237	244	The purpose of this list under expert judgement is not clear, given 245-246. Maybe, deleting 245-246	Vitor Gois Ferreira	Accepted	Deleted.
5804	1	2	239	239	Suggestion: Experts might be able to infer national data from regional information with uncertainties.	Ann Gallagher	Accepted	Text changed.
9574	1	2	240	240	Surrogate data could include financial flows (national accounts data and price data).	Matthew Prescott	Accepted	Text added.
5806	1	2	240	240	Can someone add examples of statistaclly related or physically related information? By 'parameters needed' do we mean the information gap? "There may be information that is statistically or physically related to the parameters needed."	Ann Gallagher	Accepted	The comment has been addressed in SOD.
7906	1	2	241	241	I would suggest to rephrase this paragraph to simplify. This is my suggestion: "Some industrial sources may not occur in all countries."	Raul Salas Reyes	Accepted with modification	Adjusted taking into account all comments.
5808	1	2	242	242	"...data on trade and product often provide ways to check." Consider changing to "...data on trade and production often provide ways to confirm the existeance of an industry within the country." Are there examples of internation data sites of value? Are UN reports (http://research.un.org/en/docs/reports) a sensible example for the reader to consider? See line 559 Table 2.3 for a tidy chart of sources of information.	Ann Gallagher	Accepted with modification	References have been added to table.
7908	1	2	242	242	I would suggest to clarify what does "product" refers to in the last sentence.	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
1748	1	2	243	244	This needs to be consistent with guidance on NE. And, it needs to be clarified how order of magnitude estimates can be "used." Directly in the GHG Inventory? Or for planning purposes?	Melissa Weitz	Rejected	The chapter doesn't deal with the NE sources.
6004	1	2	245	246	Same as my first comment for Line 146, Figure 2.1	Ana Blondel	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6826	1	2	247	273	Gathering existing data is one of the most crucial requirements for comprehensive study on climate change. Thus, adding database from most 3rd world countries will improve a substantial link to acquiring existing data as most emissions of greenhouse gases are basically linked to the regions. This is because, there are less regulations in controlling greenhouse emission when compared to developed countries, thus more existing data can be sourced from there (line 247-273). It is also, important to expand specific sector for each organization by thinking outside the table (Table 2.2) (Line 532). For instance, shipping companies and abattoir constitute significant of waste into the dis-tributary rivers, streams, ocean, and sea during transportation and animal processing respectively.	Onema Adojoh	Accepted with modification	Reference to regionally specific databases has been considered in many sections of the SOD.
9994	1	2	248	274	Comment is on Volume 1 not Volume 2 - section on gathering existing data. The list combines some national data sets with general types of data. The list should be organized in a more consistent way, so example faciltiy level data sets can be organized like international databases. Place GHGHRP and EU ETS as subset of facility level data as examples, and they are not the only countries/regions with reporting programs (Australia, Canada, etc. include other examples, and maybe even Mexico?)	Mausami Desai	Accepted with modification	The list of databases has been reorganised. Examples on datasets for worldwide, regional and facility-level have been provided.
8920	1	2	249		List should include relevant ministries, e.g. for energy: Ministry of energy; Energy Agencies; etc for other activity data.	Roberta Quadrelli	Accepted with modification	The list has been reorganised taking into account other comments.
348	1	2	251	252	Delete sentence "Note that it is unlikely that this type of data is directly usable in emission inventories." A number of GHG inventories of EU Member States, in fact, (e.g. Croatia, Hungary) directly use ETS data as a source for emissions estimates for the IPPU sector. The text should not result in an invitation not to use this information, in particular for emissions estimates for the IPPU sector, which is verified according to the ETS Directive, provided it is representative of the entire IPCC categories.	Domenico Gaudioso	Accepted with modification	The sentence is modified as the following: "Note that this type of data are not always directly usable in an emission inventory".
6370	1	2	254	254	it is suggested to add 's' at the end of petro-chemical plant	Emmanuel Jonthan Mpeta	Accepted	Added.
8556	1	2	255	265	remove dots at the end of each category	Amanullah Dr.	Accepted	Removed.
350	1	2	257	257	Insert a reference to the EMEP/EEA air pollutant emission inventory guidebook 2016. This document provides country specific information, in particular for European countries, such as emission factors for combustion processes and sources for activity data for chemical processes.	Domenico Gaudioso	Accepted	Reference has been considered and added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7046	1	2	258	273	Some rearranging could be made, because FAO databases could be together with 258	Vitor Gois Ferreira	Accepted	The list has been reorganised taking into account other comments.
438	1	2	265	265	should state that this is US EPA's GHGRP	Pauline Midgley	Accepted	The list has been reorganised taking into account other comments.
1434	1	2	265	265	Shouldn't this be merged with lines 250-252? If not merged, I think it should be moved upwards, directly after line 252, as it is also concerned with facility level data.	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
4854	1	2	265	265	Is the GHGRP referred to here from the USA? If so, this should be mentioned as such, or generalize the term to include all mandatory GHG Reporting programs.	Elsa Hatanaka	Accepted with modification	The list has been reorganised taking into account other comments.
10144	1	2	271	272	Update There are recent satellite imagery and geospatial that are available Earth Observation, Sentinel and many others	Wafa Aboul Hosn	Accepted	Updated by Earth Observation, Sentinel etc.
6372	1	2	272	272	it issuggested 'et al' be replaced with 'et al.,'	Emmanuel Jonthan Mpeta	Accepted	Replaced.
5852	1	2	273	273	More information on what remote sensing databases can be accessed would be useful to provide	Vincent Camobreco	Accepted with modification	The text has been updated taking into account previous comments.
8922	1	2	308		The IEA position is that international data could be used as benchmark, ideally not as sources. It would be relevant to emphasise that international sources could help identifying national sources. Also, the IEA is of course happy to share the data if needed and also receive feedback in case of inconsistency as the overall objective is to enhance national and international data quality through this process.	Roberta Quadrelli	Noted	Thank you for sharing the IEA position. No changes were made to the text.
5854	1	2	318	319	It is unclear to me what this sentence means.	Vincent Camobreco	Accepted	The sentence has been modified.
5810	1	2	319	319	"for QA/QC of international data" spell out Quality Asurance/ Quality Control (QA/QC) for those new to the abreviation.	Ann Gallagher	Accepted	Text is modified.
8924	1	2	320		Should we use "proxy" data instead of "surrogate" data?	Roberta Quadrelli	Rejected	Surrogate data is a term used previously in the 2006 IPCC Guidelines.
8926	1	2	366		As from previous comment, section 2.2.2. should also include generation of new data through census and survey (as listed at line 131)	Roberta Quadrelli	Accepted	Census and surveys have been noted in section 2.2.2, while they are discussed in more details in section 2.2.5 and Annex 2A.2.
3342	1	2	394	394	There are aspects of this chapter so far which are repetitive and don't provide any additional obvious assistance to a competent person compiling an emissions inventory	Justin Bishop	Accepted	Section has been reorganised taking into account oher comments.
5812	1	2	400	400	"provided in Section 2.2.2." is in Section 2.2.2 so seems redundant.	Ann Gallagher	Accepted	Cross checked with the 2006 IPCC Guidelines, this should be section 2.2.4. Corrected.
2148	1	2	401	403	Should there be a reference to Vol 1, Chap 6.11 which treats models and their relationship to data in a more detailed way?	Erik Næsset	Accepted	The reference is provided.
3344	1	2	426	426	program' is used here	Justin Bishop	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
3346	1	2	444	444	programme' is used here	Justin Bishop	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
3348	1	2	452	452	Consider robust statistics, such as median and percentiles, rather than mean and 95 CI	Justin Bishop	Rejected	To maintain consistency along the Guidelines.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6374	1	2	453	453	consider re-arranging these words 'It also is' to' It is also'	Emmanuel Jonthan Mpeta	Accepted	Proposal accepted and change effected.
6376	1	2	455	455	it is suggested these words 'However, the methods' be replaced with 'However, methods'	Emmanuel Jonthan Mpeta	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4360	1	2	476		"good practice" in italic. Seems the case everywhere else.	Kewei Yu	Accepted	The comment has been addressed in SOD.
4362	1	2	477		Chapter 5, uppercase. Check all other similar locations.	Kewei Yu	Accepted	The comment has been addressed in SOD.
6378	1	2	486	486	it is suggested to insert a ';' between documented and this	Emmanuel Jonthan Mpeta	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
7652	1	2	508	522	Lines 508-514 and 515-522 appear to be redundant/competing.	Deborah Ottinger	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
490	1	2	509	522	The same sentence is repeated (509 to 510 and in line 515) regarding development of emission factors. I suggest to merge the steps described from line 512 to 514 and from line 516 to 522.	Virginia Sena	Accepted	Texts deleted.
1436	1	2	509	514	There is a duplication of information. Delete from end of line 509 "It is…" to end of line 514 "… processing the data.". All this is covered in the new text.	Regine Röthlisberger	Accepted	Texts merged.
8562	1	2	512	514	remove dots at the end of each category	Amanullah Dr.	Accepted with modification	Text merged and re-defined.
5856	1	2	516	516	Suggested rewrite of the sentence: “1. Identify EFs that should be prioritized for development;”	Vincent Camobreco	Accepted	Text removed.
5814	1	2	516	516	change "Define EFs which" to "Define Emission Factors (EF) which"	Ann Gallagher	Accepted with modification	Text revised.
7098	1	2	516	516	remove 'in' from this sentence	Amanda Penistone	Accepted with modification	Text re-written.
4300	1	2	522	522	I suggest that the authors reconsider the word "activity data" because this section discusses emission factors. If this word means weights to establish weighted-average emission factors, I suggest that the authors revise so.	Naofumi Kosaka	Accepted	Word “Activity data” deleted.
3350	1	2	523	528	This repeats what was said earlier	Justin Bishop	Accepted	The comment has been addressed in SOD.
5816	1	2	523	523	change "for inventory compilers" to "for inventory compilers to"	Ann Gallagher	Accepted	The comment has been addressed in SOD.
7654	1	2	523	523	"If global default EF is not appropriate" Since this discussion focuses on Tier 2 and 3 EF development (presumably following a key source analysis), recommend deleting this reference to a Tier 1 approach.	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
440	1	2	524	524	copy edit: "acquire data" should read "to acquire data"	Pauline Midgley	Accepted	The comment has been addressed in SOD.
1438	1	2	524	524	insert "to" at the beginning of the line: "to" acquire data following …	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
7100	1	2	524	524	insert 'to' before 'acquire'	Amanda Penistone	Accepted	Text revised.
1750	1	2	530	531	Add "see more detailed guidance on factors impacting emission factors sector-specific guidance chapters"	Melissa Weitz	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
492	1	2	532	533	Table 2.2. There is not information provided for AFOLU. Information on Agriculture is included but not for FOLU. Is it possible to provide guidance on sensitive parameters for the FOLU sector?	Virginia Sena	Accepted	Table 2.2 updated in collaboration with AFOLU experts.
88	1	2	532	533	The table could be more elaborate. As for example, under Industrial processes, technology type/efficiency should be a major EF sensitive parameter too, like CFC free refregerator technology. Similarly, whether it was possible to use another category as forest destruction for firewood/other use and net increase in co2 emission under Agriculture, Forestry and Land use. Again, as per section 1.1 of chapter 1, there should be another category as other (e.g., indirect emissions from nitrogen deposition from non-agriculture sources, etc), which is absent here.	Md. Sirajul Islam	Accepted with modification	The table and parameters have been updated.
1440	1	2	532	533	What is meant by "Life of product" in category "Solid Waste", last bullet?	Regine Röthlisberger	Accepted with modification	Text has been revised.
1752	1	2	532	533	For oil and gas, include extent of lower-emitting measures used, by segment. For manure management, include types of management systems.	Melissa Weitz	Accepted with modification	Text revised.
2036	1	2	532	532	In table 2.2. The list of main variables for agriculture looks quite incomplete and mixed up (e.g. the type of management systems is relevant for the livestock subsector) and N-fixing crops are not anymore a specific sub-category of N2O emissions from maanged soils. Further, why have sensitive parameters for lulucf not been listed?	Sandro Federici	Accepted with modification	The table and parameters have been updated.
5858	1	2	532	533	The information in Table 2.2 is very detailed for a Volume discussing general guidance and reporting issues, and may be best left to the “Choice of emission factors” sections of the sectoral/source-level guidance where a more comprehensive assessment associated with the actual method could be provided.	Vincent Camobreco	Accepted with modification	Table has been revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7656	1	2	532	532	In Table 2.2, the list of EF sensitive parameters for Industrial Processes is incomplete, given the wide array of parameters that can affect emissions in this sector. At the top of the list, recommend inserting "See Volume 3 for process-specific sensitive parameters. These may include, for example: [follow with current bullets as well as the following:] composition of raw materials (e.g., carbon contents), emission reductions technologies and their efficiencies, GHG by-product generation rates, and the frequency and duration of process disturbances (e.g., anode effects in aluminium production)."	Deborah Ottinger	Accepted with modification	The table and parameters have been updated.
2402	1	2	532	Table 2.2	It is recommended to revise the IPCC methodologies to list CO2 from combustion along natural gas systems under the natural gas system sector (IPCC Source Category 1B2b) and similarly for Petroleum Systems. This is highly important as one evaluates the impacts of fuel choices for policies and assess the entire lifecycle assessment. The current system is cumbersome and does not portray the sectoral impact for policy assessment.	Fiji George	Rejected	The IPCC methodological guidance makes distinction between combustion and fugitive emissions.
3352	1	2	537	545	Likewise, this repeats the options set out in lines 523-8 above	Justin Bishop	Accepted with modification	As suggested, Lines 537-545 revised so to avoid the repetitions in Lines 523-528.
5818	1	2	560	560	change "focussing" to "focusing"	Ann Gallagher	Accepted	Typo corrected.
4856	1	2	593	593	mining' should be changed to a more generic word such as 'finding' to be more user friendly. (editorial)	Elsa Hatanaka	Accepted	Text revised.
5820	1	2	593	594	Suggested: "Additionally, developing countries should focus mining of existing emissions data from the regional research centres conducting GHGs measurements to derive emission factors"	Ann Gallagher	Accepted	Text revised as suggested.
1442	1	2	594	594	eliminate (s): who conduct(s) GHGs measurements…	Regine Röthlisberger	Accepted	Text revised.
7102	1	2	594	594	replace 'conducts' with 'conduct'	Amanda Penistone	Accepted	Text revised.
1754	1	2	595	596	Maybe include "in addition to use of the EFDB to find new EF for use by inventory compilers, inventory compilers should also consider populating the EFDB with their country-specificdata so that other countries with similar circumstances may consider it for use in the GHGI or for assessment of their own EF.	Melissa Weitz	Accepted	Revised adding suggested text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8928	1	2	644		As from previous comment, it would be beneficial to state upfront the need to map all relevant data collection performed nationally (e.g. energy statistics); and to link to the relevant stakeholder in charge of tracking energy policies (e.g. Ministry of Energy; NSO; etc). Effort could be made also to understand whether any multiple purpose could be addressed by a data colelction (e.g. for enegry policy tracking and for inventory compilation).	Roberta Quadrelli	Noted	It is already in the text lines 274-284. no changes were made to the text.
10148	1	2	647		remove Cenus I don't think for Invenories couuntries can do censuses The Population and Economic Censues can be used for data sources and for estimating	Wafa Aboul Hosn	Rejected	With sources with small population it is quite feasible to make a census.
8930	1	2	656		Should refer to institutions in charge of tracking enegry policies as well (e.g. Energy Ministries)	Roberta Quadrelli	Accepted	Text is revised.
8564	1	2	662		Information (capital I) for uniformity with previous sections	Amanullah Dr.	Accepted	Corrected.
746	1	2	677	681	In Box 2.2 please consider in a part describing census, that these are irregular and have limited scale. In the most cases, census is performed in a longer time frame and years between are missing	Lenka Zetochová	Accepted with modification	Text in the Box 2.2 is revised.
3354	1	2	683	684	The role of national statistics authorities has been explained in mutliple locations, both here and in Vol 1.	Justin Bishop	Accepted	Text has been revised.
5822	1	2	683	683	Suggested: "In some countries the NSA is a single agency responsible"	Ann Gallagher	Noted	The role of national statistics is very important issue so it is mentioned several times. A check was done to the text to avoid repetition.
4364	1	2	695		Survey - letter case? This word in other places?	Kewei Yu	Accepted	Text is revised.
494	1	2	759	759	I suggest to delete the reference to developing countries in the sentence: "Data reporting requirements pose a challenge to developing countries and require effective data management practices". It will be better to say: "Data reporting require effective data management practices".	Virginia Sena	Accepted with modification	Text is revised combining different comments related to this sentence.
7910	1	2	759	760	The first sentence seems to read to directed to developing countries, while this may be true, there may be developed countries that also have this challenge. I would suggest to rephrase to the following: "Data reporting requirements may present a challenge and require effective data managment practices."	Raul Salas Reyes	Accepted with modification	Text is revised combining different comments related to this sentence.
46	1	2	760	760	It is suggested that "Standard software tools should be used for data management." be revised to "Standard software tools are encouraged to be used for data management".	Mingshan Su	Accepted	Text revised.
7912	1	2	760	760	I would also suggest to clarify what data management practices are.	Raul Salas Reyes	Accepted with modification	The term "data management practice" has been removed from SOD text. Only the term "management practices" was kept in relation to agricultural activities.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
10004	1	2	763	1025	Needs to better address or reference consideration of time-series consistency in addition to completeness - and refer to Ch.5. This is an important consideration and also consideration of changes to the sector/category overtime in updating the time series with integration of this data.	Mausami Desai	Accepted	Linkage to chapter 5 of volume 1 was made.
10108	1	2	763	763	This is a much needed addition to the Guidelines! It will be helpful to include some illustrative examples for some GHG reporting programs highlighting a subcategory or category that's being captured through data from the GHG reporting program or how the reporting program has been designed to collect data in a form that is useful for the national inventory (e.g., Australia program).	Neelam Singh	Accepted	Text referring compilers to other resources of information when considering use of facility data has been added in Box 2.3.
7048	1	2	763	1025	This section is very important, but should be moved as a new section under 2.2 collecting data	Vitor Gois Ferreira	Rejected	This section focuses specifically on facility reported information along with its use in national inventories and not just data collection.
8566	1	2	764		no need of this line	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
7572	1	2	766	766	Suggest deleting "The increasing availability of," and revising sentence to begin "Detailed industrial facility data, increasingly collected for various goals. . ."	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
10110	1	2	766	769	Rephrase as shown in single quotation marks: 'Detailed' industrial facility data…utilized in national inventories. 'It is becoming increasingly available and' when implemented appropriately, this facility specific data may be used to replace 'top-down' activity data and global emission factors....[reason for suggesting replacing aggregated with top-down - Facility specific data will also need to be aggregated to the subsector/sector level but it's bottom-up]	Neelam Singh	Accepted with modification	Modification of text was considered in SOD to put emphasis on multiple uses of facility-level data by inventory compilers.
444	1	2	768	768	copy edit: here and in several other instances in this chapter, "facility specific" should be hyphenated as it is used adjectivally "facility-specific"; also check and hyphenate "plant specific"	Pauline Midgley	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
10112	1	2	768	769	The facility data may also be used to validate national inventory estimates, which in turn improves quality. For example, the US EPA used source level data collected through its mandatory Greenhouse Gas Reporting Program (GHGRP) to evaluate estimates for emissions from the natural gas sector for the 2013 national inventory report (US EPA, 2013). These included estimates for methane emissions from liquids unloading - the process of removing liquids in wet gas wells - and from hydraulically fractured well completions and workovers. The US EPA updated the estimates as the cross-check against GHGRP data supported the direction of the changes. It had proposed using GHGRP data on well completions and workovers with hydraulic fracturing to develop emissions factors for the 2014 national inventory report. See - Overview of Updates to the Natural Gas Sector Emissions Calculations for the Inventory of US Greenhouse Gas Emissions and Sinks 1990–2011- Uploaded here and also available online athttps://www.epa.gov/sites/production/files/2015-12/documents/fact-sheet-oil-and-gas-estimates-in-2013-inventory.pdf	Neelam Singh	Accepted	The comment has been addressed in SOD.
7574	1	2	769	770	Recommend adding a paragraph that lists some of the potential benefits of using facility-specific data, e.g., "Facillity-specific data can increase the precision and accuracy of inventory estimates by providing inputs to emissions calculations at the facility or process level. These may include facility- or process-specific emission factors, fuel or feedstock carbon contents, GHG consumption (e.g., the quantities of F-GHGs used in etching vs. chamber cleaning in semiconductor manufacturing), abatement efficiencies (accounting for both the destruction and removal efficiency of the technology and the uptime of the installed device), and operating parameters (e.g., the frequency and duration of anode effects in primary aluminium production).	Deborah Ottinger	Accepted with modification	Concepts added in other sections.
6212	1	2	770	771	To better reflect meaning of sentence, change "...different from the inventory compilation." to "…different than for inventory compilation"	Frank Neitzert	Accepted	The comment has been addressed in SOD.
7104	1	2	770	770	remove 'the' from in front of 'inventory'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
10114	1	2	771	773	Rephrase as shown in single quotation marks: Data may be collected for air quality monitoring programs, 'emissions trading program,' 'compliance' with Directives or legislation on different aspects related to air pollution', and thus' in some cases data 'may' need to be "adjusted" for inventory use.	Neelam Singh	Accepted	The comment has been addressed in SOD.
4366	1	2	772		Directives - letter case?	Kewei Yu	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5824	1	2	772	772	Does Directives need a capital D?	Ann Gallagher	Accepted	The comment has been addressed in SOD.
6214	1	2	773	774	This new section, '2.3 Use of Facility Data in Inventories' is timely and useful. It is focussed on methods for designing GHG reporting systems to appropriately take into account their use for GHG Inventories. This is very worthwhile, however only at the end is there any discussion on GHG systems not designed for Inventory use. It is suggested that additional text be added near the beginning of 2.3 describing how facility data designed primarily for other purposes might be utilized. This discussion (possibly a text box?) could be placed after the Introduction (i.e after line 773).	Frank Neitzert	Accepted	Modification added to the intruction section.
10118	1	2	774	774	Rephrase as shown in single quotation marks: Designing 'greenhouse gas reporting programs' for inventory use	Neelam Singh	Accepted	The comment has been addressed in SOD.
10116	1	2	774	774	It will be helpful to include some illustrative examples for how the reporting program has been designed to collect data in a form that is useful for the national inventory (e.g., Australia program).	Neelam Singh	Accepted	Text referring compilers to other resources of information when considering use of facility data has been added in Box 2.3.
7576	1	2	775	775	Replace "regulated" with "regulatory"	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
10120	1	2	775	775	Rephrase as shown in single quotation marks: This section presents approaches for the direct integration of facility 'data' from regulated greenhouse gas……..	Neelam Singh	Accepted	The comment has been addressed in SOD.
496	1	2	780	781	Is it a subtitle? It seem to be a regular sentence in the text, but it is in bold.	Virginia Sena	Accepted with modification	The sentence has been presented in bold and italic.
10122	1	2	780	780	Rephrase as shown in single quotation marks: Integrating facility emissions 'data' into an inventory should only be considered	Neelam Singh	Accepted	The comment has been addressed in SOD.
7578	1	2	782	782	Recommend adding "of the reporting program" to the end of this sentence after "design."	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
7580	1	2	783	783	Recommend adding "monitoring and caculation" between "specified" and "methods"	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
7582	1	2	783	783	What is meant by "reporting criteria?" The criteria that determine who reports, e.g., thresholds?	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
442	1	2	783	783	copy edit: here and in numerous other instances in this chapter, "facility reported" should be hyphenated as it is used adjectivally "facility-reported"	Pauline Midgley	Accepted with modification	Text has been revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7584	1	2	786	786	In general, section 2.3 would be enhanced by the addition of more guidance on how to maintain time series consistency as the methods and/or data used for estimating facility-specific emissions change over time. (This is an issue that the U.S. has faced in several different areas in both voluntary and mandatory GHG reporting programs.) One way to ensure time series consistency under these circumstances is to require that all the calculation input data be reported to the Inventory compiler. In that case, the inventory compiler can estimate emissions using both the old and new methods for one or more years and use splicing to achieve time series consistency. If some input data is NOT reported to the inventory compiler, then the reporting facility can be requested or required to provide estimates using both methods for one or more years. The inventory compiler can then perform the splicing. To address this issue here, recommend adding the following after "intended" and before "Elements to consider": "Incorporating provisions to allow splicing of data in the event of methodological changes will help ensure that time series consistency is maintained."	Deborah Ottinger	Accepted	Text revised and concepts included.
1444	1	2	787	787	Reference to Section 2.3.2.1: There is no such section? Reference should be made to Section 2.3.3	Regine Röthlisberger	Accepted with modification	Section 2.3.3 has been updated to Section 2.3.2.1.
6006	1	2	787	787	"Section 2.3.2.1" refered to in this line; not clear where this section can be found. Maybe, it should be "Section 2.3.3" instead?	Ana Blondel	Accepted with modification	The number of sections have been checked and modified appropriately.
7586	1	2	787	787	"Section 2.3.2.1" should be "Section 2.3.3"	Deborah Ottinger	Accepted with modification	Numbering of sections has been revised.
6216	1	2	792	792	This subsection '2.3.3 Facility Specific Data' is really a subheading under 2.3.2 Designing for Inventory Use. Therefore, suggest the title be changed to '2.3.2.1 Facility Specific Data'.	Frank Neitzert	Accepted	The comment has been addressed in SOD.
10124	1	2	792	792	Is this section 2.3.3 or 2.3.2.1 as referred to on line 787	Neelam Singh	Accepted with modification	Subsections have been checked.
1756	1	2	793	799	For the most part, inventory compilers are unlikely to be developing the reporting system. The language should be updated to note that and to encourage inventory compilers to work with groups developing reporting systems so that data can be useful for the GHG inventory. The guidance should note that reporters to such programs may support use of their data in the GHG inventory so that it reflects the information they have put resources into collecting.	Melissa Weitz	Accepted with modification	Content included in the first paragraph of section 2.3.2.
5826	1	2	795	795	Suggested: "of high-quality, industrial, facility-reported data" or introduce FRD to indicate 'facility reported data'.	Ann Gallagher	Accepted	The comment has been addressed in SOD.
7588	1	2	795	795	Insert period after "data" and replace "and to" with "It."	Deborah Ottinger	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1450	1	2	796	799	The sentence starting at the ned of line 796 should be reworded, e.g.: When there is a need to incorporate facility-specific data into the national inventory, the agencies responsible for the national inventory and the relevant agency for the facility-specific reporting should collaborate in order to reduce industrial reporting burden.	Regine Röthlisberger	Accepted with modification	Text has been revised.
446	1	2	797	797	copy edit: subject/verb agreements: "collaboration between agencies is needed when greenhouse gas emissions are reported"	Pauline Midgley	Accepted	The comment has been addressed in SOD.
5828	1	2	797	797	Change to: "greenhouse gas emissions are"	Ann Gallagher	Accepted	The comment has been addressed in SOD.
10126	1	2	797	797	Rephrase as shown in single quotation marks: ...collaboration between agencies 'is' needed when greenhouse gas emissions 'are' reported….	Neelam Singh	Accepted	The comment has been addressed in SOD.
1758	1	2	801	814	This section should also include information on extent of controls and lower-emitting technologies.	Melissa Weitz	Accepted	The comment has been addressed in SOD.
5830	1	2	801	801	Consider using 'FRD' to indicate facility reported data	Ann Gallagher	Accepted	The comment has been addressed in SOD.
1452	1	2	801	802	The sentence should be reworded, e.g.: Even with independent third party verification of facility reported emissions, the use of these data in a national inventory may not be possible due to insufficient information or a lack of transparency, preventing a comprehensive quality assessment of the data.	Regine Röthlisberger	Accepted with modification	Text has been revised.
7590	1	2	802	802	Replace "can lead to an inability to support" and rest of sentence with "may prevent inventory compilers from assessing reported data for potential use."	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
7592	1	2	807	807	For clarity, recommend replacing sentence beginning with "facility reported activity data" with "Compilers must be able to understand or estimate the fraction of national activity accounted for by reporting facilities."	Deborah Ottinger	Accepted with modification	Text revised.
10128	1	2	807	810	Even when the entire sector is not covered, the data can be used if a reliable estimate can be obtained for the missing facilities. This is conveyed later in lines 849-852 but would be helpful to at least note it here as well. Australia is an example where something similar has been done for coal mines.	Neelam Singh	Noted	This statement is intended to be a general statement as to be inclusive of all possibilities. No change has been made to the text.
6010	1	2	815	815	Table 2.5: should say "Activity data, emission estimates are clearly explained and documented" instead of "Activity data, emission estimates transparent"	Ana Blondel	Accepted	The comment has been addressed in SOD.
6012	1	2	815	815	Table 2.5: should say "Emission factors are clearly explained and documented" instead of "Emission factors are transparent"	Ana Blondel	Accepted	The comment has been addressed in SOD.
7594	1	2	815	816	In Table 2.5, in "Comparability" row, recommend inserting a new bullet "Facilities in same industry use similar methods."	Deborah Ottinger	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1760	1	2	815	815	Provide more guidance on "time series demonstrates consistency" What actions can be taken to ensure that the time series will be consistent?	Melissa Weitz	Accepted with modification	Reference to chapter 5 for clarity and examples has been included.
6008	1	2	815	815	Table 2.5: should say "Methodology applied is clearly explained and documented" instead of "Methodology applied is transparent"	Ana Blondel	Accepted with modification	Text has been revised.
7596	1	2	815	816	In Table 2.5, in "Consistency" row, after Time series demonstrates consistency," recommend adding "or if not, provision is made for achieving such consistency."	Deborah Ottinger	Accepted with modification	Text revised.
7598	1	2	815	816	In Table 2.5, in "Accuracy" row, after "Primary emission factors are accurately determined," recommend adding "perhaps based on standardized measurement methods."	Deborah Ottinger	Accepted with modification	Text revised.
7602	1	2	815	816	In Table 2.5, in "Completeness" row, recommend replacing "facilities" with "emissions" in fourth line. It is the fraction of emissions, not facilities, covered that determines the completeness of the reported emissions. In many cases, a high percentage of emissions can be covered even if a relatively low percentage of facilities is covered (the "80/20 rule").	Deborah Ottinger	Accepted with modification	This statement is intended to be inclusive of all reported data (emission factors, fuel quantities, etc.) by facilities, not just emissions. Modification based on comment to enhance context/clarity.
7600	1	2	815	816	In Table 2.5, in "Transparency" row, the statement appears "Activity data, emissions estimates transparent." Because activity data, such as production quantity, is often CBI, recommend qualifying this with "at least to the inventory compiler or verifier of the facility-specific data."	Deborah Ottinger	Rejected	The comment was considered. However, it is expected that relevant data is reported with the understanding that confidentiality is maintained and available only to those with access. No change was made in the text of the SOD.
6218	1	2	816	816	Suggest that another (unnumbered) subtitle be inserted here to introduce the text following line 816. Title could be "Quality Attainment Through Presrcibed Methodologies and Reporting Elements".	Frank Neitzert	Accepted with modification	Subheading checked.
7604	1	2	822	822	Recommend adding "feedstock, and/or production" between "fuel" and "quantities." Precision for feedstocks and/or production can have a direct impact on the precision of emissions estimates.	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
7606	1	2	823	823	After "fuels and feedstock;" recommend adding "standardized methods of measuring emissions of GHGs from vents and correlating these with activity data measurements to establish emission factors."	Deborah Ottinger	Rejected	The intent of the text in this para is a focus on activity data and not on emissions. No changes have been implemented in the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7608	1	2	833	834	The purpose and organization of Table 2.6 are not clear. The bullets under "Methodological Requirements" are sometimes recommendations and sometimes only items. For example, "Specify measurement and sampling methods" appears in the third row while "Source specific methods" appears in the fifth. The distinction between these two bullets is not clear, nor is the reason why they appear in different rows of the table. Recommend organizing the table as follows: (1) Identity of covered industries: [include contents of the sixth row of the table starting "Specify industrial categories"]; (2) Monitoring equipment specifications: [include requirements for flowmeter or scale precision and accuracy, calibration requirements and associated standards]; (3) Monitoring Methods: [include monitoring methods for contents of fuels, process feedstocks, vented emissions]; (4) Calculation Methods: [include guidance relevant to these]; (5) Time Series Consistency: [include guidance on how to maintain time series consistency when the methods or data used by reporting facilities change]. Under "Reporting Elements," for Calculation Methods, include "inputs to equations, including activity data, destruction and removal efficiency and abatement device uptime, process parameters, [etc.]" Note that for some of these categories, for example, monitoring equipment, calibration records, etc. may not need to be reported, but they should be kept as records.	Deborah Ottinger	Accepted with modification	Table revised and concepts included.
7610	1	2	833	834	In Table 2.5, the last row reads "Set reporting de minimis not larger than the uncertainty for each source type." This may not be an appropriate criterion for defining "de minimis." The uncertainty of a source category is often driven by imprecision, not inaccuracy, but leaving out a source will result in a systematic underestimate, albeit in some cases a small one.	Deborah Ottinger	Accepted with modification	Table revised.
374	1	2	834		Majority of Bureau of statistics are not taking statistics on activities that have direct relationship to the economy e.g. polupation, comodity production, imprts and exports. Probably there will be a need to provide guidance on how these bureau of statistics counld be brought on board and the kind of capacity building that may be needed	Jamidu Katima	Accepted	The comment has been addressed in SOD.
6220	1	2	834	834	A) Subheading is numbered incorrectly. B) Suggest this be changed to a (numberless) subtitle with the same text - ie. subtitle under 2.3.2.1 called "Collaboration with National Statistics Data Agencies".	Frank Neitzert	Accepted with modification	Subheading checked.
10130	1	2	834	834	Is this section 2.1.1.1 or something starting with 2.3?	Neelam Singh	Accepted with modification	Subsections have been checked.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
47	1	2	834	834	Please check the title number "2.1.1.1"	Mingshan Su	Accepted	The comment has been addressed in SOD.
498	1	2	834	835	The numbers 2.1.1.1 from the subtitle "Collaboration with National…." is not correct, since it is under section 2.3.3.	Virginia Sena	Accepted	The comment has been addressed in SOD.
1446	1	2	834	834	Numbering of section 2.1.1.1 is flawed. This section is under heading 2.3.3 Facility specific data, so it should start with 2.3.3.	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
6014	1	2	834	992	Problem with numbering of sections/subsections, e.g. "2.1.1.1" in line 834 should be "2.3.3.1"	Ana Blondel	Accepted	The comment has been addressed in SOD.
4368	1	2	840	846	Grenhouse gas, GHG, define first and use	Kewei Yu	Accepted	The comment has been addressed in SOD.
352	1	2	840	840	After the sentence "The national datasets provide complete coverage of a given sector, category or subcategory", insert the following text "although the coverage of the information which is directly collected from the installations may be limited, which means that appropriate methods to achieve full coverage have been used by the statistical agency. A possible problem with the use of the information provided by statistical agencies lies in the protection of confidentiality, which may restrict access or reporting of data from individual plants."	Domenico Gaudioso	Accepted with modification	Confidentiality concerns and access have been discussed in section 2.3.3.1.
5832	1	2	854	854	change to: "over- or underreporting"	Ann Gallagher	Accepted with modification	Sentence reviewed.
8932	1	2	857		This para is very important and its content could be made much more prominent in the chapter. A working group could include experts from NSOs, inventory compilers, and relevant ministries.	Roberta Quadrelli	Accepted with modification	The text has been modified to enhance clarity.
7106	1	2	860	860	remove 'the'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
7914	1	2	868	868	The first sentence seem to indicate that national agencies should not use/collect data from GHG reporting programmes. It is not clear why this is suggested or if this was the intention of this paragraph. I would suggest to rephrase it for it to be clearer. I would suggest the following : "Statistical agencies should review the information available from facilities and GHG reporting programmes to identify possible overlaps; doing so will assist in gaining efficiencies and reducing costs."	Raul Salas Reyes	Accepted with modification	Text has been revised to improve in clarity.
7612	1	2	874	877	Good advice.	Deborah Ottinger	Noted	No action is needed.
4370	1	2	876		greenhouse gas should be GHG	Kewei Yu	Accepted	The comment has been addressed in SOD.
500	1	2	878	878	The numbers 2.1.2. from the subtitle "Integration Approaches…" is not correct, since it is under section 2.3.3.	Virginia Sena	Accepted	The comment has been addressed in SOD.
1448	1	2	878	878	Numbering of section 2.1.2 is flawed. This section is following heading 2.3.3.	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
6222	1	2	878	878	A) Subheading is numbered incorrectly - number should be 2.3.3. B) Suggest the title be changed as well, to better reflect contents. Change to: " 2.3.3 Apporaches for Use of Collected Facility Data".	Frank Neitzert	Accepted with modification	Subheading checked.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6224	1	2	878	879	Suggest the addition of a sub-subheading here to clarify focus of the text: "2.3.3.1 Integration of Facility Data Designed for Inventory Application"	Frank Neitzert	Accepted with modification	Subheading checked.
7622	1	2	878	992	Overall, section 2.1.2 is helpful. However, it would be enhanced by adding guidance regarding the fact that the population of non-reporting facilities may systematically differ from the population of reporting facilities (e.g., in their emission factors or other characteristics), and that compilers should account for this possibility. Guidance regarding this situation and how to address it (e.g., with stratification of reporting facilities into different groups) is available in the TFI Techical Bulletin 1, Use of Facility-Specific Data in National Greenhouse Gas Inventories, in the first column of page 4 and the first column of page 5 (under "Sample Size").	Deborah Ottinger	Accepted with modification	Text has been modified taking into account the comments.
10132	1	2	878	878	Check section number - 2.1.2 or something starting with 2.3?	Neelam Singh	Accepted with modification	Subsections have been checked.
48	1	2	878	878	Please check the title number "2.1.2"	Mingshan Su	Accepted	The comment has been addressed in SOD.
10156	1	2	878	992	Is a good section. However, I do not see how this translates to developing countires such as India	Malini Nair	Accepted	The comment has been addressed in SOD.
354	1	2	879	992	The paragraph provides useful suggestions about how to integrate facility data, but it looks very theoretical; it would be advisable to shorten it and to provide concrete examples, such as how to deal with incomplete data sets due to the use of thresholds (e.g. PRTR, ETS)".	Domenico Gaudioso	Accepted with modification	Paragraph has been modified and clear guidance in such circumstances provided.
7614	1	2	882	882	Not entirely clear what "inventory variables" means. Does it mean "inputs into emissions calculations, e.g., emission factors?" If so, suggest replacing with this text.	Deborah Ottinger	Accepted with modification	Text clarified.
7616	1	2	883	883	Replace "singularly" with "separately."	Deborah Ottinger	Accepted	The comment has been addressed in SOD.
1762	1	2	889	889	Could add "improve trend information by providing additional detail on changes in technologies over time" e.g. controls, equipment types, etc.	Melissa Weitz	Noted	Facility-reported data (if yearly) should reflect operation changes including technology or process change, fuel switching, production shut down, etc. No change has been made.
5834	1	2	890	890	change to: "will be in"	Ann Gallagher	Accepted	The comment has been addressed in SOD.
6226	1	2	892	894	Suggest new title for equation 2.1 (to clarify description): "Emissions Reported By a Facility (For All Emission Categories)"	Frank Neitzert	Accepted with modification	Title has been changed.
6228	1	2	892	894	Suggest change to equation 2.1: use variable E_fac insteand of E_F to correspond to eq 2.3	Frank Neitzert	Accepted with modification	Description of parameters has changed.
6230	1	2	892	894	Suggest change to equation 2.1 to account for all combustion emission categories.	Frank Neitzert	Accepted with modification	Change effected as proposed.
49	1	2	894	894	Eotheri should be Eotherl	Mingshan Su	Accepted	The comment has been addressed in SOD.
7618	1	2	894	894	The notation n1, n2, etc., is somewhat unusual.	Deborah Ottinger	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6232	1	2	895	901	Suggest changes to some of the variable descriptions in equation 2.1 to a) clarify meanings and b) to correspond with text and with equation 2.2	Frank Neitzert	Accepted with modification	Description of parameters has changed.
5836	1	2	899	899	" industrial process emissions process k in the facility (with a total of n3 processes);" could benefit from a slight tweek. Suggested: "industrial process emissions K in the facility (with a total of n3 processes);"	Ann Gallagher	Accepted	The comment has been addressed in SOD.
7620	1	2	912	913	Final sentence is unclear. An example would be helpful.	Deborah Ottinger	Accepted with modification	The sentence was made clear.
6234	1	2	929	931	Suggest new title for equation 2.2 (to clarify description): "Emissions Calculated By a Facility-Specific Emission Factors"	Frank Neitzert	Accepted with modification	Title has been changed.
6236	1	2	929	931	Suggest change to equation 2.2: use variable E_IC_S insteand of E_IC to clarify that it relates to an IPCC subsector	Frank Neitzert	Accepted with modification	Description of parameters has changed.
6238	1	2	933	939	Suggest some changes to variable descriptions in equation 2.2: a) remove 'subcategory', retaining only 'category (to align with text and equations) b) clarify desription in lines 935-936	Frank Neitzert	Accepted with modification	Text has been modified.
5838	1	2	935	935	change: "emission total for a specific" to "emissions total for a specific" or "total emissions for a specific"	Ann Gallagher	Accepted	The comment has been addressed in SOD.
6240	1	2	940	941	For consistent meaning, suggest changing "…for an industrial reporting category can be computed by summing the totals for each of the emission categories." to "…for an industrial classification can be computed by summing the totals for each of the subsectors"	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6248	1	2	943	943	Change "The General Facility Emisssions Integration equation…." to "The Total Facility Emissions equation…" (to correspond with new eqaution 2.3 title suggested for line 955).	Frank Neitzert	Accepted with modification	Text revised.
6242	1	2	955	955	Suggest new title for equation 2.3 (to clarify description): "Total Facility Emissions"	Frank Neitzert	Accepted with modification	Title has been changed.
50	1	2	956	968	Please define n1 and n2	Mingshan Su	Accepted	Context included.
6244	1	2	956	956	Suggest change to equation 2.3: use variable E_IC_S insteand of E_IC to align with equation 2.2	Frank Neitzert	Accepted with modification	Description of parameters has changed.
6246	1	2	957	968	Suggest some changes to variable descriptions in equation 2.3: a) remove 'subcategory', retaining only 'category (to align with text and equations) b) clarify desription in lines 960-961	Frank Neitzert	Accepted with modification	Description of parameters has changed.
6250	1	2	970	971	For consistent meaning, suggest changing "…for each of the emission categories and subcatories." to "…for each of the subsectors."	Frank Neitzert	Accepted with modification	Text revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6252	1	2	974	974	Change "The General Facility Emisssions Integration equation…." to "The Total Facility Emissions equation…" (to correspond with new eqaution 2.3 title suggested for line 955).	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6254	1	2	979	979	To clarify, change "…and this should be for transparency…" to "…and this should be the case for transparency…"	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6258	1	2	986	986	To clarify, change "…updated emission factors…" to "…updated inventory emission factors…"	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6256	1	2	986	986	To clarify, suggest adding a new sentence: "Over time, a GHG reporting system may collect substantial emission factor information." This should be inserted before sentence commencing with "Depending on the approach…."	Frank Neitzert	Accepted with modification	Text revised.
6260	1	2	988	989	To remove repetition and add clarity, suggest changing "When there is a break in time series consistency and it is justifiable, such as but not limited to the…" to "When there is a break and it is justifiable, such as for the…"	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6264	1	2	991	992	To clarify, suggest changing "…facility reported data including a discussion on time series consistency" to "…facility reported data, including a discussion on time series consistency, in the inventory."	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6262	1	2	991	991	To clarify, change "…documentation of the explanation is required." to "…an explantion with documentation is required."	Frank Neitzert	Accepted with modification	Modified sentence.
6266	1	2	992	992	Regarding time series consitency, suggest making reference to IPCC Guidelines V1, Ch 5 .	Frank Neitzert	Accepted	Reference added.
6268	1	2	993	993	Suggest changing subheading to sub-subheading, as the subsequent text fits under 2.3.3 (see line 834). Also suggest changing the wording. I.e : change "2.3.4 Other Integration Approaches of Facility Data" to "2.3.3.2 Uses of Facility Data not Originally Designed for Inventory Application".	Frank Neitzert	Accepted with modification	Subheading and title have been checked and revised taking into account the suggested text.
448	1	2	994	994	presumably "More already explained" should be "As already explained"	Pauline Midgley	Accepted	Editorial.
1764	1	2	994	1003	These paragraphs have already been covered, above.	Melissa Weitz	Accepted	Text has been checked.
6270	1	2	994	1024	This is generally good material, but may need to be fleshed out a bit. As suggested before (under line 773), some information on the use of facility data not designed for inventory application should be provided near the beginning of 2.3, likely after 2.3.1. It's recommended that the text for 2.3.3.2 be reconsidered only after text for the earlier discussion has been completed.	Frank Neitzert	Accepted	Text expanded.
7108	1	2	994	996	this paragraph needs proof-reading	Amanda Penistone	Noted	The paragraph was checked for editing.
450	1	2	995	996	sentence incomplete: e.g. "an accurate examination of the purpose and information collected is made"	Pauline Midgley	Accepted	The verb has been added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7788	1	2	1005	1005	Modify a phrase “at plant level” to “at the facility level”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
452	1	2	1011	1016	these two sentences seem to be duplicates; surely only one is needed?	Pauline Midgley	Accepted with modification	Text has been revised to check for duplication, however it is not clear to which sentences the reviewer is referring to.
7624	1	2	1025	1025	Recommend adding a section on ensuring time series consistency. This should include discussions of (1) integrating facility-specific estimates with older estimates based on national datasets and (2) managing changes in the facility-specific reporting itself. There is some discussion of the former issue in the TFI Technical Bulletin 1, Use of Facility-Specific Data in National Greenhouse Gas Inventories. The latter issue could be addressed with a brief paragraph something like "The methods and data that facilities use to estimate their emissions are likely to improve over time. Given this situation, it is important for inventory compilers to maintain time series consistency despite these changes. One way to ensure time series consistency under these circumstances is to require that all the calculation input data be reported under the reporting program. In that case, the inventory compiler can estimate emissions using both the old and new methods for one or more years and use splicing to achieve time series consistency. (See Volume 1, Chapter 5 of the 2006 IPCC Guidellines for guidance on how to splice data sets.) If some input data is NOT reported to the program, then the reporting facility can be requested or required to provide estimates using both methods for one or more years. The inventory compiler can then perform the splicing.	Deborah Ottinger	Accepted	Text on how to ensure time series consistency has been expanded and content from the cited document considered.
6272	1	2	1025	1025	Could a new subheading, say "2.3.4 Other Considerations" be added here? Here some text could be included on QA/QC and Uncertainty. These are important activities related to facility data as well. Ideas could be drawn from TFI Technical Bulletin 1.	Frank Neitzert	Accepted with modification	Text has been expanded. Reference to QA/QC activities added also considering the cited reference.
6274	1	2	1025	1025	Also under the new subheading "Other Considerations" could be included some text on documentation related to facility data. Suggest referring to IPCC report on the Expert Meeting on Use of Models and Facility-Level Data…. (held in 2010).	Frank Neitzert	Accepted with modification	Text on documentation added. Content and reference to the report included.
8568	1	2	1026	1060	profer format for all refernces	Amanullah Dr.	Accepted	References have been presented in the same format.
4372	1	2	1100	1101	double counting or double-counting, be consistent.	Kewei Yu	Accepted	Editorial, check for consistency.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8934	1	2	1101		We should not recommend inventory compilers to develop energy balances, if energy balances are developed already within other institutions for other purposes. The emphasis shold be to work together with the relevant experts to understand how to optimise national work.	Roberta Quadrelli	Noted	Ok with the concept but could not find the line the comment is supposed to refer to. No change has been made in the text.
8936	1	2	1103		The UN have updated their manual on energy statistics by publishing the International Receommendations on Energy Statistics (IRES), approved by the UN Statistical Commission in 2011. The process has engaged international consultation of organisations (interEnerStat) and countries (Oslo City Group) for about a decade or so. We should absolutely include this reference! https://unstats.un.org/UNSD/energy/ires/default.htm and explain much more in detail its scope and relevance. IEA can provide paragraph on this.	Roberta Quadrelli	Accepted	The reference has been included.
742	1	2	1107	1133	Several hypertext links are not functioning for example: rows 1107, 1123, 1130, 1133 (Yearbook) and in references, number 25 hypertext link are not funkctioning	Lenka Zetochová	Accepted	Hyperlinks checked.
6016	1	2	1107	1107	Broken link: "https://unstats.un.org/unsd/pubs/gesgrid.asp?ID=51"	Ana Blondel	Accepted	Hyperlinks have been checked.
8938	1	2	1109		Special Reference to the Energy Accounts and long description of its scope may be confusing here as inconsistent with principles governing the IPCC energy statistics reporting; please move reference to IRES upfront as this is the key reference for energy statistics now.	Roberta Quadrelli	Accepted with modification	IRES reference moved upfront. Rest of the comment refers to unchanged text.
6018	1	2	1123	1123	Broken link: "https://unstats.un.org/unsd/pubs/gesgrid.asp?ID=37"	Ana Blondel	Accepted	Hyperlinks have been checked.
8940	1	2	1124		The Iea is updating is manual, to adjust to the IRES requirements. Placeholder here as the new version is not yet published but it should be by next year.	Roberta Quadrelli	Noted	No change was made in the text as the Authors have to abide by the cut-off dates for consideration of new literature.
8942	1	2	1126		it may be also relevant to include the link to the Methodologies and sources of the IEA World Energy Balances as ther eis a list of data sources on energy by country. Noting that IEA is also welcoming feedback. http://wds.iea.org/wds/pdf/WORLDBAL_Documentation.pdf	Roberta Quadrelli	Accepted	The reference has been included.
6020	1	2	1130	1130	Broken link: "https://unstats.un.org/unsd/pubs/gesgrid.asp?mysearch=energy&sort=title"	Ana Blondel	Accepted	Hyperlinks have been checked.
6022	1	2	1133	1134	Broken link: "UNSD Statistical Yearbook."	Ana Blondel	Accepted	Hyperlinks have been checked.
6024	1	2	1202	1202	Broken link: "http://www.fao.org/world-census-agriculture/wca2020/en/"	Ana Blondel	Accepted	Hyperlinks have been checked.
6026	1	2	1243	1243	Should be "remote sensing" or "remote observation" instead of "r e mo t e"	Ana Blondel	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6028	1	2	1271	1271	Broken link "http://reports.eea.eu.int/technical_report_37/en"	Ana Blondel	Accepted	Hyperlinks have been checked.
10146	1	2	273+	273+	IEA database on Energy Balance "https://www.iea.org/Sankey/#?c=Middle East&s=Balance"	Wafa Aboul Hosn	Accepted	Hyperlinks have been checked.
10154	1	2	all	all	This chapter is highly dense with terminology. Do you intend this to be utilized in a developing country? Then supporting /traning documentation needs to be attached or directed to.	Malini Nair	Accepted with modification	Text and materials have been reorganised in order to be more user-friendly.
7038	1	2	General		The scope of this chapter is sometimes missunderstood as only dealing with activity data. A clarification that also deals with parameters and Efs could be made in the beginning of the chapter	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
8898	1	2	General		Overall, the chapter (e.g. introduction, flow chart; relevant sections) could emphasise more the need for a strategic approach at national level on data collection/sharing. All elements appear in the text at some points, but they could be gathered and strengthened to describe the upfront need for the institution responsible for inventory to understand the national landscape of relevant data (including activity data): to identify the institutions that collect/hold relevant data; engage them in cooperation to share data and to collect missing data, also assessing whether a new data collection may fit multiple purposes - to optimise use of resources at national level. This is very important expecially addressing those countries where a national system still needs to be developed. For example, in our experience (IEA), in some cases environment-related data collections are established without synergy with existing/planned energy data collections, while data strongly overlap and a common activity could fit both purposes. Also, we would not like to develop multiple datasets that are not consistent among each other. Need for such cooepration has also emerged within a recent joint IPCC/IEA data meeting. The IEA can share more of its experience if needed.	Roberta Quadrelli	Accepted	Text amended.
376	1	2			Issue of data acrchaivig and back upshould also be discussed. Experinec has shown after the inventory data is not stored in a way that it can be retreaved	Jamidu Katima	Accepted	The comment has been addressed in SOD.
2506	1	2			Entire chapter needs thorough proof-reading, typos were found throughout. Section 2.3.4 needs attention - some sentences seem incomplete.	Anna Mikis	Accepted	The comment has been addressed in SOD.
8560	1	2		336	(Ganesan et al., 2017; Fadnavis et al., 2016; Tiwari et al, 2014; Tiwari et al., 2011) profer format	Amanullah Dr.	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8570	1	2			very less citaion and lack of new literature in whole chapter	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
8558	1	2		272	et al. (2012).	Amanullah Dr.	Accepted	Editorial.
3474	1	3	1	1	This chapter does not have much on LULC area estimate uncertainty analysis and propagation through emissions calculations. I understand that it is written generally, perhaps to represent the diversity of activity data types. However, the methods of error propagation and monte carlo type sensitivity analysis that are presented are based on data distributions, including means, standard deviations and standard errors, and such methods don't seem applicable to classification-based area estimates. If classification/mapping is to be used to determine total areas for given LULC classes, it is unclear to me how uncertainty in those area estimates, which are a result of classification error, can be incorporated into the given methods. Classifications have accuracy levels and confidence intervals for each class in both errors of commission and omission. I imagine the uncertainty associated with errors of commission would be used to determine the uncertainty bounds for the total area covered by a given class. But these are total areas, not averages with standard deviations so the methods of this chapter don't appear to be appropriate. Should there be text in this section or in Vol 4, Ch 3 that describes how uncertainty in these area estimates per class propagates through estimation of uncertainty in total emissions per class? Also, with respect to land conversions, errors in a map at time 1 and another map at time 2 combine to produce error in the temporal change output. The accuracy of each class in each map represents the probability the assigned class is correct, and thus combining two maps to determine land use conversions/stability must combine the accuracy probability of each in some way to estimate the error of output.	Doug King	Accepted	Additional material has been added to Chapter 3 providing a conceptual basis for the approaches to be described in detail in Volume 4. Subsection "UNCERTAINTIES ASSOCIATED WITH ACTIVITY DATA" of Section 3.2.1.2 " has been refined improving the descriptions of the approaches and including the survey sample variance equations. Land use data can be collected using three approaches, and it is possible to determine the confidence intervals for total area estimates with either of the three approaches. Approach I is a reporting of areas without knowledge of the specific locations. This could be done if land owners report their land uses without references to specific locations, such as in a questionnaire. In essence, this could be a survey if the information is gathered from a sample of land owners, or a census if data are collected from the entire population. Surveys have very well defined statistics for estimating variances given the sample error for the responses, which in this case are areas. In theory, a census does not have sampling error because responses are provided for every element in the population. However, there may be uncertainty due to biases in the classification, non-responses, and problems with coverage (e.g., due to clouds in remote sensing imagery).
3474 (cont.)					For example, overlaying of two maps from time 1 and time 2 in an AND operation requires multiplying the accuracy probabilities for the classes at t1 and t2 - if the maps are independent. They are generally not independent so conditional probabilities come into play. I have only basic knowledge of the methods but there is much literature on this topic, including how to refine/improve class areas estimates using the errors derived from error matrices.			These errors can be quantified. Approach 2 is a survey approach and uncertainty can be quantified using well-established statistical methods for surveys as discussed above. Land use data that are collected from a sample of locations across a country would be an example of Approach 2, and the variance calculations depend on the sample design. Approach 3 is a wall to wall mapping of land use, and as such, is a census. A census can have errors as discussed above. Further guidance has been provided on the methods for quantifying these errors.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2048	1	3	1	606	I wish to apply to uncertainty analysis same logic applied for the key category analysis [see Chapter 4 (149-156): "Emissions and removals:...the analysis should be performed for emissions and removals separately within a given category. For example, the land use categories and the pool estimates can include emissions and removals that may cancel or almost cancel at the aggregated level for the categories presented in Table 4.1 resulting in an aggregated net estimate that does not qualify as a key category despite the components (emissions and removals separately) being significant..."]. Indeed, same problem occurs in the uncertainty analysis when adding large emissions and removals that sum up to a small positive/negative value. This can be easily achieved by using absolute values for each component of the denominator of equation 3.2.	Sandro Federici	Accepted with modification	Footnote added.
1774	1	3	1	606	The Uncertainty guidance never explains how to develop uncertainty for a parameter, only how to combine them. It would be helpful to have a clear section on how to develop confidence bounds, etc. for individual parameters.	Melissa Weitz	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4374	1	3	23	24	with or without "-"?	Kewei Yu	Rejected	The title of the section is the same of the 2006 IPCC Guidelines. No action taken.
10264	1	3	48	553	There is some very good material here, but It is difficult to properly evaluate the Chapter 3 FOD. It appears that portions of the original Guidelines meant to be retained are not included, but it is often not clear what parts are to be retained or where the elaboration will be placed in relation to them. It is recommended that the whole of Chapter be included in the SOD (which the original text appropriately identified).	Frank Neitzert	Accepted	Recommendation implemented in the SOD.
10266	1	3	58	90	Very useful overview of some of the main purposes of inventory uncertainty estimates.	Frank Neitzert	Noted	No action needed.
6998	1	3	59	90	Thank you for this part. It is a good update to the previous version	Vitor Gois Ferreira	Noted	No need for further action.
8572	1	3	59		remove whole line no need	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
10268	1	3	60	60	The first sentence is a compelling, but "at the core of the effort" seems overly-strong. Suggest "an imortant part" or an "integral part".	Frank Neitzert	Accepted	Text changed as proposed.
7110	1	3	62	62	replace 'contain' with 'contains'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
7000	1	3	70	70	Is reference to the 2006 GL relevant here? I assume that the table will stay in the 2019 Refs.	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
7004	1	3	72	75	This part is somehow abstract and appears unrelated to other nomenclature used in the guidelines. Propose to revisit	Vitor Gois Ferreira	Accepted	Third line modified for clarity and consistency with language in the 2006 IPCC Guidelines.
10270	1	3	74	75	This line contains one of several references to the old text in the 2006 Guidelines, from the viewpoint of it being an external document. This is somewhat confusing. Presumably these will be removed in the SOD.	Frank Neitzert	Accepted	Linked to the final structure of the MR.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4376	1	3	74		Chapter, uppercae, check other places.	Kewei Yu	Accepted	Linked to the final structure of the MR.
8994	1	3	76	76	uncertainty dependence: also to the spatio-temporal scales of the desired estimations	Tiwari Yogesh	Accepted	The comment has been addressed in SOD.
7112	1	3	78	78	insert 'the' between 'be' and 'result'	Amanda Penistone	Accepted	Change effected as proposed.
7114	1	3	80	80	replace 'approaches' with 'approach'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
7116	1	3	82	82	replace 'need' with 'needs'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
10272	1	3	82	82	The statement "...every collected data value needs to have an associated uncertainty assessment…" implies the separate evaluation of each element of data, which is often not possible. Suggest the use of terminology such as "…all data collected should have an associated uncertainty assessment..."	Frank Neitzert	Accepted	The comment has been addressed in SOD.
7002	1	3	84	90	This addition to the guidance is very important, but the way it is framed is a bit demotivating for the inventory compiler. Instead of stating that it is not a goal per se, the 2019 Refs could indicate that it should not be prepared as an indepent goal, but to link directly with the last sentences: as a tool, together with KCA, etc	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
7118	1	3	84	84	insert 'point' after 'out'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
8574	1	3	91		3.1.2 move to next page	Amanullah Dr.	Accepted	Proposed edit implemented.
8576	1	3	93		remove whole line no need	Amanullah Dr.	Noted	No action needed.
4326	1	3	94	103	It seems that these descriptions are suitable to be located in Chapter 1 of Volume 1 rather than Chapter 3, because Chapter 1 discusses institutional arrangements. Also, the linkage between the descriptions and uncertainty is weak.	Naofumi Kosaka	Accepted with modification	Figure and text have been made consistent with descriptions and terminology in chapter 1. Both chapter 1 and chapter 3 authors think it is useful to have description here on how the uncertainty analysis fits in the overall process. However consistency and cross-reference between chapters is essential.
7006	1	3	96	117	This information does not appear to fit here and may cause some confusion to new inventory compilers or new Parties. It should be moved, as relevant to Chapter 1	Vitor Gois Ferreira	Accepted with modification	Figure and text have been made consistent with descriptions and terminology in chapter 1.
10274	1	3	98	98	This sentence seems to imply that for each annual inventory, a Party should re-evualate its institutional arrangements. This seems unnecessary, if there have been no changes.	Frank Neitzert	Accepted	Text changed not to discuss institutional arrangements.
1766	1	3	98	105	It's unclear how this relates to uncertainty assessment.	Melissa Weitz	Accepted with modification	Text is modified to increase the focus on how uncertainty fits in the overall picture.
7790	1	3	99	99	It would be appropriate to say “should be revised” instead of “should be revisited”.	Nataliya Stranadko	Rejected	The sentence has been deleted taken into consideration other comments.
786	1	3	100	100	when discussing "verification" and "reviews under the UNFCCC", it would be good to also refer to chapter 6 (QA/QC) of the same volume	Wilfried Winiwarter	Accepted	Reference to chapter 6 has been included.
7120	1	3	118	118	text in diagram is blurry, try to source a higher resolution version	Amanda Penistone	Accepted	The comment has been addressed in SOD.
8578	1	3	120		remove whole line no need	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
8996	1	3	122	123	would also cover increased availabaility of data or additional observational constraints	Tiwari Yogesh	Accepted with modification	Data availability is included in the text.
4378	1	3	123		"focuse on" not "focus of"	Kewei Yu	Accepted	The comment has been addressed in SOD.
7122	1	3	123	123	replace 'of' with 'on'	Amanda Penistone	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7792	1	3	123	124	I would suggest to avoid future tense and using “will”. IPCC produces Guidelines, and present time would be more appropriate to use. Thus, the phrases would be “the improvement focuses” and “the goal includes”.	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
10276	1	3	123	123	The statement "Most frequently, the improvement will focus on getting better data...." seems too strong. Suggest something more like "Often the improvement will focus on getting better data...."	Frank Neitzert	Accepted	The comment has been addressed in SOD.
10278	1	3	124	124	Instead of "The goal will include increasing the accuracy…" suggest "The goal will generally include increasing the accuracy…"	Frank Neitzert	Accepted with modification	Text changed to: "The goal is generally to increase the accuracy of the inventory through a better representation of the emissions/removals processes".
4328	1	3	129	143	It seems that these descriptions and Figure 3.2 are suitable to be located in section 3.2.3 because they are the guidance for the choice of Approaches.	Naofumi Kosaka	Accepted with modification	Figure kept at current place as it describes the steps on the uncertainty analysis and not only the choice of approaches. Title of figure changed to reflect that. Figure is already referred back in section 3.2.3.
1454	1	3	135	135	replace "of" with "or": … assessment for a source "or" sink category…	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
10282	1	3	142	142	At the bottom left hand corner of Figure 3.2 is a sequence of two steps: 'Apply Approach 2 for combining uncertainties' followed by 'Apply Approach 1 for combining uncertainties for QA/QC'. It is not clear what the second step is referring to at this stage of the decision tree.	Frank Neitzert	Accepted	Content of the box has been changed to "Apply Approach 1 too, as a QA/QC tool".
1768	1	3	142	143	Be clearer on what data is collected for uncertainty assessments and how to assess bias. It seems like this figure is a mix of 2 things: 1, the actual uncertainty analysis which results in confidence intervals, etc. and 2. Reducing uncertainty in the GHGI (which is a longer term process). For example, if a compiler was calculating uncertainty for an annual inventory, they would not stop in the middle of the assessment to attempt to eliminate bias in the estimates.	Melissa Weitz	Accepted with modification	Agreed that processes are interlinked as well as performed in sequence. Figure 3.2 has been modified to better show the relations.
10158	1	3	142	143	This is a flow chart, not a decision tree. A decision tree, if it has uncertainities has probabilities attached to it	Malini Nair	Accepted with modification	The chart is a decision tree by the IPCC definition. Title is modified to better describe its content.
10280	1	3	142	142	Figure 3.2, first 'square' of decision tree includes the term 'Data Definition'. This wording is also found in line 123, but the meaning is unclear. Should the wording in the figure be 'Define Data to be Collected'?	Frank Neitzert	Accepted with modification	Content changed to "Data specification".
7124	1	3	143	143	this diagram also comes out a bit pixelated	Amanda Penistone	Accepted	The comment has been addressed in SOD.
8580	1	3	144	147	text missing	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
3988	1	3	144	145	pg. 3.7: It should be made clear in the text that, even if there is no refinementt, the number of this chapter has been changed.	Hans-Dieter Haenel	Accepted	The comment has been addressed in SOD.
3990	1	3	146	147	pg. 3.7: It should be made clear in the text that, even if there is no refinementt, the number of this chapter has been changed.	Hans-Dieter Haenel	Accepted	The comment has been addressed in SOD.
8582	1	3	149		remove whole line no need	Amanullah Dr.	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4790	1	3	150	150	Should be "provides" rather than "provide"	Donna Giltrap	Accepted	The comment has been addressed in SOD.
7794	1	3	150	150	The word “provide” should be changed to “provides”. Section… provides…	Nataliya Stranadko	Accepted	The comment has been addressed in SOD.
7008	1	3	150	150	The reference to the 2006 GL makes unclear if the rows 150 - 167 are additional or not	Vitor Gois Ferreira	Rejected	Mention of the 2006 IPCC Guidelines is just a reference. The text is new.
4380	1	3	153		biases?	Kewei Yu	Accepted	Phrase "bias in general" was used, not particularly biases.
7010	1	3	157	167	These two paras appear to fit better under section 3.1.7	Vitor Gois Ferreira	Accepted	Addressed in section 3.1.6.
10284	1	3	158	159	Comment: Shouldn't an 'investigation-focussed approach to uncertainty' identify more than "the causes of data quality problems"?. Suggest that some other possibilities be mentioned as well.	Frank Neitzert	Accepted with modification	Focus of the paragraph is data quality. "Investigation-focused" may be a too strong language. The paragraph has been edited and "investigation-focused" deleted.
5586	1	3	168	209	A general comment to the subsection: reducing uncertainties can be improved by using mathematical-statistical methods, thus hidden interrelations between indicators can be revealed. Factory analysis, correlation analysis or any other well-usable and defined methodologies may contribute to reduce uncertainties via dimension reduction.	Attila Buzasi	Rejected	The mathematical-statistical methods can help in improving the evaluation of the uncertainty, particularly in the refinement of the parameters used in the assessment as in the Montecarlo analysis. But they do not imply a reduction of the uncertainty.
2106	1	3	183	183	Here the term "systematic error" is introduced while in the preceding text of this chapter the term "bias" has been used. Are they meant to be the same? Please consider consistency in terminology.	Erik Næsset	Noted	Agree that consistency is necessary. The sentence comes from the 2006 IPCC Guidelines. The 2006 IPCC Guidelines use both terms. In Section 3.1.3 of the 2006 IPCC Guidelines, "bias" is defined as "systematic error".
4330	1	3	185	186	I suggest that the authors replace the URLs in the footnotes to References (line 588 through 606).	Naofumi Kosaka	Accepted	Suggestion implemented.
2108	1	3	189	190	Why random sampling in particular? If the point is to have a probabilistic sampling design, then say so and other designs such as systematic may be viable options (my point is: is it the probabilistic nature of the sample that is the point here or even that random sampling is applied; the latter may exclude some probabilistic designs frequently used in sample surveys for GHG inventories, e.g. national forest surveys, which are often systematic with random start).	Erik Næsset	Accepted	The word "Random" was deleted.
2110	1	3	191	191	Comment on "simultaneous sampling": I'm not sure what you mean by this term; perhaps you actually mean "simultaneous observations" for the same sample units?	Erik Næsset	Accepted	The word "Simultaneous observations" was used.
2112	1	3	196	196	The concept dealt with here seems to be random sampling, i.e. a probabilistic sampling method. Now, in inference based on probabilistic sampling (design-based) as well as in non-probabilistic sampling (e.g. when model-based statistical inference is adopted) a particual estimate is not biased; bias is a property of an estimator or procedure. So to the extent that the point here is to make a statement about probabilistic sampling as such, I think some rephraseing is needed to conform to standard statistical language.	Erik Næsset	Accepted with modification	Focus is on "collecting more data that are measured" that can reduce uncertainty regardless of the situation or technique applied. Language has been revised.
7012	1	3	206	209	This part is important. Why not include it in the list above such as "Using more accurate methods"?	Vitor Gois Ferreira	Accepted	Paragraph has been treated as a bullet.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8584	1	3	210	242	(aruthor et al., year) this is proper format	Amanullah Dr.	Accepted	Treatment of references assessed.
2038	1	3	210	246	I would add the following comment to the figure: "Note that the central value of the Tier 2 estimate is within the confidence interval of Tier 1, and that the central value of Tier 3 estimate is within the confidence intervals of Tier 2 and Tier 1. Which means that the three methodological approaches can be judged eqaully valid given the variability of the observed population; although, the uncertainty accoridng to the Tier hierarchy".	Sandro Federici	Accepted with modification	The terminology "is equally valid" is not correct but the three methods are likely to provide unbiased estimates. Text was added to better describe the issue.
4382	1	3	211		"IN AS"?	Kewei Yu	Accepted	Corrected: "in a".
1770	1	3	212	242	It would be helpful to have additional information on how uncertainty was quantified in each instance and how it is known that the updates were improvements. In some cases, better data for the estimates also allow for better quantification of uncertainty and that some times may result in wider uncertainty ranges.	Melissa Weitz	Accepted	More information has been added to explain how the uncertainty was quantified. In brief, a Monte Carlo simulation approach was used for all three methods after developing PDFs (joint probability distributions that address key covariances among quantities). The Tier 3 method also employed an empirically based method to address uncertainty in model structure. It is difficult to know for certain that the improvements produce more accurate estimates because we do not have an ominiscient view of the emissions (if we did, then estimation would be unneccessary). However, incorporating data specific to a country for estimating Tier 2 emission factors will better represent the population of sources in the country for this category (croplands in this example). The Tier 1 factors are based on samples from a larger global population, which has considerably more variation in climates, soils and other variables driving soil organic matter dynamics, and all of this variation is not relevant for the country of interest. Of course, this also depends on the compiler having an adequate sample to derive the Tier 2 emission factors. For the Tier 3 method, the compilers incorporated scientific understanding of soil organic matter dynamics using the Century model, which embodies key processes and structure that influences soil C stock changes.
1770 (cont.)								We rely on scientific studies and findings from peer review literature to develop and/or implement more sophisticated methods. But again, the results do not have to be more precise with a higher tier method, or even accurate in some cases. This depends on the precision of the model inputs, representativeness of the model and/or emissions data, and implementation, and requires sufficient data and testing. The compilers for this inventory did test the model with independent data, which can highlight in our revision and used this testing to propagate additional error through the Monte Carlo analysis (mentioned above). Some of these issues are discussed further in the new Tier 3 methods guidance for this report, but more detail has been added to better convey this case study.
4384	1	3	223		soil types	Kewei Yu	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
10286	1	3	235	238	Overall, the text box seems to provide a good example. However, suggest a caution be placed in relation to the sentence between these 2 lines. If the higher tier data collected is not representative of the whole country or region, the tier 3 method may increase precision, but its ability to reduce uncertinaty will be limited.	Frank Neitzert	Accepted	"In general" changed to "In theory".
3992	1	3	248	249	pg. 3.10: It should be made clear in the text that, even if there is no refinementt, the number of this chapter has been changed.	Hans-Dieter Haenel	Accepted	The comment has been addressed in SOD.
8586	1	3	251		remove whole line no need	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
6944	1	3	251	251	section 3.2: Quantifying uncertainties seems to be a sound approach for climate change prediction, however, an error limit (absolute value and relative data) for each region around the globe should be added for each of the method of quantifying uncertainties outlined in line 359 to 459. This is because, seasonal variation across the various continents could sometimes be inconsistent. Geologists and biologists are very relative in quantifying uncertainties whereas physicists and mathematicians are absolute in predicting uncertainties. There should be an amendment in line 343 to 346 to accommodate this discrepancies in both fields of discipline for an effective quantification of uncertainties in the future.	Onema Adojoh	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4386	1	3	266	267	PDF, and other places	Kewei Yu	Accepted	Corrected.
4388	1	3	272		pdf? Two identifal abbreviations?	Kewei Yu	Accepted	Corrected.
2114	1	3	272	276	Twice in this paragraph it is referred to PDF and confidence intervals for emission factors. However, uncertainty must be characterized for other point estimates as well. For example, in the gain loss method, uncertainty must be assessed for the activity data as well. So this statements must be formulated in a more general way.	Erik Næsset	Accepted	Text is changed including reference to parameters and activity data.
7126	1	3	275	276	"...the confidence interval has a 95 percent probability of enclosing the true but unknown value of the emission factor" is more precisely "in an infinite number of independent experiments 95% of the time the true value of the emission factor would be within the confidence interval"	Amanda Penistone	Noted	A revised definition of confidence interval was provided in the glossary.
3994	1	3	277	285	pg. 3.11: It should be made clear, right at the beginning of the box, that for a normal distribution the factor 2 between Uncertainty and SE is an approximated value.	Hans-Dieter Haenel	Accepted with modification	Value 1.96 used instead of 2.
51	1	3	278	278	Why use "X" between "STANDARD DEVIATION" and "STANDARD ERROR"?	Mingshan Su	Accepted	Title changed to "Difference between Standard Deviation and Standard error".
502	1	3	279	286	It will be helpful to clarify the meaning/definition of parameters "n" and "x"	Virginia Sena	Accepted	Definitions were added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2116	1	3	280	280	Here (and elsewhere - many places) the term "central estimate" is used. In previous parts of the text the term "point estimate" is used. Please consider the need for consistency in terminology.	Erik Næsset	Accepted	"central estimate is changed to "point estimate". The inconsistency exists already in the 2006 IPCC Guidelines. In the vast majority of the cases "point estimate" is used.
2118	1	3	280	286	Is there a need to define x_i and n as well?	Erik Næsset	Accepted	The comment has been addressed in SOD.
2124	1	3	282	282	Use of the term "uncertainty" (here and in box 3.2 in general): please verify that the term uncertainty is used with the same meaning (a confidence interval) in the entire 2019 guidance. Many typically use it to mean standard error. I'm comfortable with anything as long as it is well defined and used consistently.	Erik Næsset	Accepted	Text checked for consistency.
2120	1	3	283	283	I think there is an error here. From our sample we can only produce an estimate (mju-cap). You use mju as a symbol of that estimate, which is uncommon (usually estimates are indicated with cap) but that is OK as long as the symbol is well defined (which is the case). However, sigma is also a sample estimate, and that needs to be stated as well (line 280). Now, since we deal with a sample and sample estimates rather than population parameters, we lose one degree of freedom (mju is an estimate). Consequenlty we need to divide by (n-1) rather than n in line 283.	Erik Næsset	Accepted with modification	Assessment revisited.
4128	1	3	283	283	Why is not the (partly) bias-corrected estimate of standard deviation (using Bessel's correction) used?	Roland Fuß	Accepted with modification	The correct equation has been shown. A comment has been added pointing that n was used in the denominator as an approximation for large n, to be consistent with the spreadsheet.
2040	1	3	288	288	I understand that: "In summary, to calculate the uncertainty of the parameter of concern, the first step is to establish if it derives either from the variability of the population (i.e. how much values of the population are spread), which is measured by the standard deviation; or 2) from the variability of the mean of samples (i.e. how much the mean values of the samples taken from the population are spread), which is a measure by the standard error. Case 1 occurs when using the mean value to estimate an individual of the population (e.g. the average C stock of a forest to infer the C stock a single portion of that forest). Case 2 when using the mean value to estimate the entire population (e.g. the average C stock of a forest to infer the C stock of the entire forest)." I would make such summary before the examples.	Sandro Federici	Accepted with modification	Text has been accepted with slight modification to ensure that there is no misundertanding between the two cases.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2042	1	3	294	294	I would simplify the following sentence "..., but in the mean for individuals of the same type, of the population from which the sample come." I guess you may just directly refer to population, since any sample is just sampling the population to which pertains; I mean, in case there are different strata within a population, a sample taken in a stratum will be used just to estimate that specific stratum. So I would say "..., but in the mean of the population sampled."	Sandro Federici	Accepted with modification	The text has been modified to take into account the comment.
2122	1	3	295	295	Not just for emission factors, but for activity data as well (for example estimation of areas in the AFOLU-sector). This comment pertains to the use of the term "emission factor" in Box 3.2 in general.	Erik Næsset	Accepted	Text has been modified clearly showing that the concepts are valid for AD, emission factors or any parameter. "emission factor" replaced by "parameter" (e.g. emission factor, carbon stock change factor or AD)" as appropriate.
4332	1	3	305	315	I suggest that the authors include heading "Case 1", "Case 2" and "Case 3" before line 305, 312 and 315 respectively so as to improve readability.	Naofumi Kosaka	Accepted	Case 1, 2 and 3 are inserted.
1772	1	3	309	311	This implies that the uncertainty analysis is to cover a number of years. Is that the case, or is it for the most recent year?	Melissa Weitz	Accepted with modification	Text has been modified to increase clarity.
2044	1	3	310	310	Replace "…and changes" which "taken"	Sandro Federici	Accepted with modification	Text modified not exactly as the proposal, but increasing clarity.
2046	1	3	310	311	To enhance the understanding I would replace the following sentence "We are therefore interested in the variability of this factor", with "We are therefore interested in the variability of the mean (i.e. average annual value) of this factor"	Sandro Federici	Accepted with modification	Text changed to " …in the variability of this average annual value".
2126	1	3	320	320	Wording: 1) we do not "measure" standard deviation, but rather "estimate" it. 2) "central value" or "point estimate"? See previous comment on consistency	Erik Næsset	Accepted with modification	Measured by changed to "calculated using". "central value" changed to "point estimate".
2128	1	3	322	322	What do you mean by "population/individuals"? Be precise.	Erik Næsset	Accepted	In row 322 as well in row 289 "population" is used. In row 328 "individuals" looks more appropriate. Further explanation has been added.
2130	1	3	328	328	population/individuals - see previous comment	Erik Næsset	Accepted	In row 322 as well in row 289 "population" is used. In row 328 "individuals" looks more appropriate. Further explanation has been added.
2132	1	3	328	328	case 2): what is this; I cannot see that you have defined a "case 2)"	Erik Næsset	Accepted	Case 1, Case 2, Case 3 inserted.
3996	1	3	328	328	pg. 3.12: What does "as case 2)" refer to?	Hans-Dieter Haenel	Accepted	Case 1, Case 2, Case 3 inserted.
4390	1	3	328		case 2), ??	Kewei Yu	Accepted	Case 1, Case 2, Case 3 inserted.
8588	1	3	331	334	text missing	Amanullah Dr.	Accepted	Place holder. No action needed.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2138	1	3	335	540	All these sub-sections and paragraphs seem to assume that emissions estimates are to be produced by the gain-loss method only (equations demonstrate EFxAD only and the text mentions emission factors and activity data repeatedly). Should there somewhere in this text be made a reference to uncertanity analysis for the stock difference (stock change) method?	Erik Næsset	Accepted with modification	The methods in this section are general for sources across all sectors in the guidelines. The case of the stock difference method is an interesting one because re-sampling the same locations longitudinally across time will almost certainly create strong temporal covariances in the underlying data. In this case, it is recommended that the inventory compiler use Approach 2 for propagating those errors through the estimation. This case may be considered an example where approach 2 is more appropriate. An example of this case has been provided in Box 3.1 in the SOD.
2136	1	3	337	337	Here and elsewhere: the combination of the terms "propagation of error" (approach 1) and "Monte Carlo simulations" (approach 2) is rather awkward, but I guess this is standard IPCC language and difficult to change. Here is my point: Monte Carlo is a simulation technique (as stated), while approach 1 - as opposed to simulation - is an analythical approach. So approach 1 is an analytical approach and approach 2 is a simulation-based approach. They are both techniques used for error propagation!	Erik Næsset	Noted	The comment is technically correct but as stated in the comment itself the current language is used throughout chapter 3 in the 2006 IPCC Guidelines. Clarification of the two approaches has been provided across the whole chapter. No change has been made in the text.
10288	1	3	349	351	Suggest changing "…requires assumptions that are frequently not met, such as lack of significant correlations among the quantities used in the inventories, or uncertainties that are less than +/- 30% of the quantity value." to "…requires assumptions that are frequently not met, such as lack of significant correlations among the quantities used in the inventories, uncertainties that are less than +/- 30% of the quantity value, or uncertainties that are symetrically distributed."	Frank Neitzert	Accepted	Language included.
2134	1	3	370	371	Somewhat strange to use a reference from physics (Bevington and Robinson 1992) in this general text. The generality of this text lies within statistics, not physics. There should be boatloads of fundamental statistical texts that could be used as reference (if Mandel 1984 is insufficent to appear alone).	Erik Næsset	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
4334	1	3	389	392	I suggest that the authors include "(see also page 3.32, 3.61 and 3.62 of the 2006 IPCC Guidelines Volume 1)" at the end of line 392. These pages discuss how to deal with asymmetric uncertainty in Approach 1.	Naofumi Kosaka	Accepted	Language added referring to the Section 3.7.3 of the 2006 IPCC Guidelines.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3998	1	3	390	392	pg. 3.13: Make unmistakably clear that in case of asymmetrical distributions the "greater half" of the 95 % confidence interval has to be used in Approach 1. The current version of the text seems to offer, in the example provided, the option to take 10 instead of 20.	Hans-Dieter Haenel	Accepted	Language corrected.
10160	1	3	398	444	I have not seen anyone use this method of aggregation of uncertainities, in statistics. Has this been statistically proven. Are you underestimating /overestimating?	Malini Nair	Rejected	Approach is the same of the 2006 IPCC Guidelines. Formulas using percentage uncertainties are derived from the error propagation equations using the variance of the quantities involved. Original formulas are explained in the Annex of the GPG 2000.
7916	1	3	420	420	Clarify the difference between xi and Ui. It may be confusing to some to understand the difference between the quantities and the percentage uncertainties.	Raul Salas Reyes	Accepted	Definitions have been separated.
2176	1	3	428	459	Variance formula (box Eq 3.3) and text: there is guidance provided for the two extreme cases of uncorrelated variables (r=0 between EF and AD) and full correlation (r2=1) but not for cases with 0<r2<1. Why is that? It is stated (lines 430-431) that " it will be a reasonable assumption that these values are uncorrlated". I'm not sure that is true, and especially not in light of the request from IPCC for new or extended guidance on use of biomass maps and remotely sensed data in the AFOLU sector (Vol 4). So please consider to offer guidance for correlated variables as well. -And it is simple! A first-order Taylor series approximation of the variance for the product of two correlated random variables would be var(ADxEF)=EF*EF*var(AD)+2*AD*EF*cov(AD,EF)+AD*AD*var(EF).	Erik Næsset	Rejected	A footnote is included making reference to the Annex 1 of the GPG 2000 "Conceptual basis for uncertainty analysis" where the equations for consideration of partial correlations are presented. In the GPG 2000 and the 2006 IPCC Guidelines the option was not to include partial correlations in Approach 1 to keep it simple. This still should be the case in the MR2019. The Taylor expansion including covariances has already been described in the Annex 1 of the GPG 2000 "Conceptual basis for uncertainty analysis". It was not included in the main body of both GPG and 2006 IPCC Guidelines because the idea was to keep approach 1 simple and also because of the decision to use the percentage uncertainties and not the variances.
9610	1	3	459	459	I propose to add the guidance for dealing with different disaggregation of uncertainties between emission factors and activity data after line 459. Please find attached document for further detail.	Naofumi Kosaka	Rejected	The method proposed does not work in every situation (e.g. with removals) and is prescriptive as it assumes uncorrelation between the subcategories. The authors concluded there are not a set of equations that would work in every situation and it would not be worth to increase the complexity of an approach that was developed to be simple. In general, when information is lacking, in order to apply the approach 1 pre-processing is necessary, by expert judgement of the individual values or by aggregation.
8590	1	3	487	490	no need of dots at the end, uniformity important in some place ; is given in such cases.	Amanullah Dr.	Noted	In 2019 Refinement text in bullets is formatted as follows: - When used with sentences - capital letters and full stops, - Otherwise, small letters, semi-colons, and full stop at end are used for one sentence". Considered during final copy-editing.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4336	1	3	498	499	The proposed description may conflict with the description in page 3.32 of the 2006 IPCC Guidelines. The proposed one is very simple but may be somewhat statistically inaccurate. The description in page 3.32 is accurate when the PDF is lognormal but this is not applicable when the PDF is other than lognormal.	Naofumi Kosaka	Accepted with modification	A reference to Section 3.7.3 is included in Section 3.2.3.1.
4338	1	3	541	541	I support the addition of columns H and J in Table 3.1 because the addition makes the calculation process of trend uncertainty clearer.	Naofumi Kosaka	Accepted	The comment has been addressed in SOD.
4340	1	3	556	556	I propose to add an equation and a table at the end of section 3.2.3.1. Please find attached document for further detail.	Naofumi Kosaka	Rejected	As shown in Figure 3.9 in the 2006 IPCC Guidelines, Uhigh and Ulow are calculated pairwise given Uc. So they are not independent. We can say that Uhigh is a function of Ulow. So the equation is not true for any given values of Uhigh and Ulow. Even the factor of two example (Uc =73% replacing the confidence interval (-50%, +100%) is an approximation. More precisely, Uc=73% corresponds to (-53%, +88%). A reference to Section 3.7.3 is included in Section 3.2.3.1.
10162	1	3	all	all	I feel that this chapter is unnecessriliy complilcating confidence intervals. Could have given a citation of any average statistics textbook	Malini Nair	Rejected	No clear proposal of what should be deleted. Idea is to provide simple explanations to the inventory compiler.
7014	1	3	General		It appears that this chapter is under development, with parts missing and references to the 2006 GL. Additional comments may be made for the SOD	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
2508	1	3			Chapter needs proof-reading.	Anna Mikis	Accepted	The comment has been addressed in SOD.
4392	1	4	27	28	key category, letter case consistency.	Kewei Yu	Accepted	The comment has been addressed in SOD.
8594	1	4	31	34	remove bold	Amanullah Dr.	Accepted with modification	Revised to "substantial".
8596	1	4	48		no need of the whole line	Amanullah Dr.	Accepted	Editorial: Agree.
6984	1	4	49	59	The following part is, apparently, removed form the current version: "It is good practice for each country to identify its national key categories in a systematic and objective manner as presented in this chapter. Consequently, it is good practice to use results of key category analysis as a basis for methodological choice." I am unaware that this is somehow covered under section 4.1.2, but para 78 in that chapter somehow changes the meaning of this important "good pratice for KCA". Reference to KCA and methods is in para 78 only related to improvements, while the previous good pratice was more general.	Vitor Gois Ferreira	Accepted with modification	Addressed with revised text to include "It is good practice for each country to identify its national key categories in a systematic and objective manner" and additional edits.
8598	1	4	61		no need of the whole line	Amanullah Dr.	Accepted	Editorial: Agree.
8600	1	4	68		no need of the whole line	Amanullah Dr.	Accepted	Editorial: Agree.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5860	1	4	70	72	Not sure the word “maintained” is most appropriate. Seems like the emphasis should be on “prioritizing” the improvement of methods, activity data and EFs for key categories. The word maintained just implies keeping thing the same.	Vincent Camobreco	Accepted with modification	Revised to "Regular Update".
4394	1	4	74	75	QA/QC are not defined before use.	Kewei Yu	Accepted	For definition refer to chapter 6.
1776	1	4	101	102	Decreasing trends may also be important, as explained later in the chapter	Melissa Weitz	Accepted with modification	Added "or decreasing emissions or removal".
5862	1	4	115	115	insert “categories to” before “prioritise”.	Vincent Camobreco	Accepted	The comment has been addressed in SOD.
7128	1	4	115	115	replace 'prioritise' with 'priorities'	Amanda Penistone	Accepted with modification	Replaced with "Priorities".
6030	1	4	115	115	Text not clear, possible typo: should be "priorities" instead of "prioritise"?	Ana Blondel	Accepted with modification	Replaced with "Priorities".
1456	1	4	120	163	Add paragraph providing guidance regarding key category analysis for indirect CO2 emissions. If indirect CO2 emissions are reported in the sector where the precursors are emitted, indirect CO2 emissions should be treated like a separate gas. If indirect CO2 emissions are reported as an individual source category, this category should be added to the key category analysis.	Regine Röthlisberger	Accepted with Modification	This has been included as a qualitative assessment.
5864	1	4	123	123	Replace “identification” with “analysis”	Vincent Camobreco	Accepted	The comment has been addressed in SOD.
6986	1	4	137	137	It could be more clear that instead of referring to "when performing the key category analysis", erring to the 'level of disaggregation"	Vitor Gois Ferreira	Accepted with modification	Changed to "when considering category aggregation".
7060	1	4	137	137	It could be more clear that instead of referring to "when performing the key category analysis", referring to the 'level of disaggregation"	Vitor Gois Ferreira	Accepted with modification	Changed to "when considering category aggregation".
6988	1	4	144	145	The example is ambiguous and the rule unclear, between N2O and CH4 not all of the following is different: methods, assumptions, emission 145 factor data sources and related uncertainties differ for each gas. The methods are basically the same. I cannot see how HFP is that different since uncertainties could be different, assumptions too, etc. Guidance on this important issue should be improved.	Vitor Gois Ferreira	Accepted with modification	Text has been revised to improve clarity.
6990	1	4	149	156	What about pools? How far should they be disagregated?	Vitor Gois Ferreira	Rejected	Emphasis is on categories.
504	1	4	155	155	It is written "1." before the sentence "Similar considerations may apply…" that does not has sense.	Virginia Sena	Accepted with modification	Number deleted.
2140	1	4	158	158	I guess it is unecessary to define AFOLU here.	Erik Næsset	Noted	No change implemented.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
332	1	4	163	179	Some countries calculate GHG emission inventories as the sum of regions with (partly) independent assumptions, parameters, uncertainties, methods. This introduces a further dimension. In such cases, disaggregation of a source category which needs to be split should first be disaggregated by region and only for those regions where the flow diagram still identifies the need for disaggregation into sub-categories. If there are many regions, a feedback on the choice of the parameters p_1 and p_2 could be considered.	Adrian Leip	Accepted with modification	We agree with the general case of identifying regional disaggregation where appropriate. Text added to highlight the possibility for Countries to subdivide by region in the category group column in exceptional cases where regional differences in methods applied are significant.
4834	1	4	163	179	"Disaggregation" will have profound impacts on the KCA results. Creation of excessively small disaggregated sub-sectors might automatically remove such sub-catetorries from KCA. More straightforward and reasoned listing of sub-categories is recommended. (Lines 127-130 agree to this.)	Taka Hiraishi	Accepted with modification	Some considerations have been elaborated on the level of aggregation/disaggregation of categories.
330	1	4	163	179	Table 4.1 currently suggest a pre-defined disaggregation of the source categories and indicates possible further aggregation or disaggregation as a function of the assumptions and uncertainties used in the inventory. This approach should ensure that a reasonable 'number' of source categories are used in the analysis: if disaggregation goes too far, uncertain AD or parameters which reasonably should be considered as 'key' will be hidden in several source categories, some of them possibly not identified as a key category. If the aggregation level is too large, the informative power of the assessment diminishes as it remains unclear which AD or parameter should be focused on for improving the inventory. I therefore propose a transparent procedure rather than a selection of source categories. Such a procedure will also ensure that the key source assessment is independent from choices made by the inventory compiler. Please see supporting document Vol1_Ch4_L163_179_AL_a.docx with an illustration of the routine.	Adrian Leip	Rejected	Thank you for this suggestion. However we feel it is too complex and rigid while we are proposing a system of disaggregation which builds on results and takes into account changes in methodologies over time.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
334	1	4	163	179	For the disaggregation of N2O emissions from manure management and cultivation of managed soils I suggest to consider emissions from manure management together with direct and indirect N2O emissions from soils application/deposition of manure, but differentiated by animal type. Only when a further disaggregation is required emissions from manure management and direct and indirect emissions from soils should be differentiated. Motivation is that their uncertainty might be strongly correlated through the N excretion rate. This 'weakens' the importance of downstream parameters, such as e.g. FracLEACH. However, those parameters are commonly much more difficult and costly to improve while the improvement of the N excretion rate in the time series for important animal types more feasible. Please see supporting document Vol1_Ch4_L163_179_AL_a.docx with a proposal for the text in the relevant cells of Table 4.1.	Adrian Leip	Rejected	Thank you for this suggestion. However this aggregation is only appropriate in cases where the mass balance approach is used. In all other cases it is not so useful to have this aggregation.
506	1	4	166	166	It is written "Gasses" instead of "Gases".	Virginia Sena	Accepted	The comment has been addressed in SOD.
1458	1	4	166	166	eliminate (s): … Gas(s)es can be aggregated…	Regine Röthlisberger	Accepted	The comment has been addressed SOD.
4396	1	4	174		GWPs not defined before use.	Kewei Yu	Accepted	This has been updated.
4832	1	4	174	176	"GWP" should be changed to "GWP or any other CO2-equivalent values". Footnote 3 needs to be modifed on the similar line.	Taka Hiraishi	Noted	Text has been modified and reference to GWP removed. But no change has been implemented to footnote 3 because the derivation of the threshold was based on GWP values.
1460	1	4	176	177	Footnote 3 regarding GWP: In the footnote, reference is made to GWPs in IPCC Thrid Assessment Report (TAR). However, I think it would be reasonable to update to at least the fourth if not the fifth assessment report for the most recent GWP.	Regine Röthlisberger	Rejected	The development of the threshold used the IPCC 2AR so this will be kept as is. The methodology is applicable for other weightings should they become the standard in reporting. The IPCC Guidelines are not meant to prescribe any set of GWPs. GWPs instead are used to illustrate their applications in various examples across the Volumes of the IPCC guidelines. For the examples in Section 4.5 CO2-equivalent values were calculated using the GWPs from SAR
2050	1	4	177	178	In footnote d of table 4.1 replace "...conversion of forestland..." with "...conversion of forest (deforestation)…"	Sandro Federici	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5866	1	4	177	179	The revisions to Table 4.1 for AFOLU need to be re-assessed. The guidance in the previous version of 4.1 was much more appropriate for AFOLU. For example, combining enteric fermentation and manure management into a single key category analysis if the same methods are used makes no sense. The methods for enteric and manure are different at all Tier levels. Additionally, these two sources can often individually be key categories for many countries and combining them into a single key category analysis loses the ability to assess where the focus should be on improvements. Also the approach described for the land use categories (e.g., Forest Land Remaining Forest Land, Land Converted Forest Land, Cropland Remaining Cropland…) where the guidance is to “assess emissions, removal and carbon stock change separately” is not useful advice. For countries using the stock change approach, which is a higher level approach than the growth—loss approach, the method does not result in separate emission and removal estimates, only a single net stock change number. From my review of the AFOLU portion of this table, I believe the previous version in the 2006 Guidelines provided much better guidance on how to perform a key category analysis for AFOLU. Also, this table will need to take into account new methods that may come from the 2019 refinementt process. For example, if the new methods for reservoirs in flooded lands remaining flooded lands and land converted to flooded lands are included then at minimum the methane emissions from that will need to be brought into the key category assessment guidance, currently it only deals with CO2.	Vincent Camobreco	Accepted with modification	Ammended text to include "Where possible, assess emissions, removal and carbon stock change separately".
6992	1	4	177	177	Table 4.1 changes may impact significantly on the KCA prepared by countries (e.g. the separation by fuels is much less requested, no longer consideration of significant animal tyoes, more flexibility on carbon pools). This should be considered very carefully, because of the impact on the inventories and the effort inventory teams are placing in specific categories. This may change significantly.	Vitor Gois Ferreira	Accepted with modification	Further clarifications have been added to the guidance text in Table 4.1 with disaggregation by fuel, animal type, pools suggested.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6994	1	4	177	177	The criteria for 3A1 and 3A2 is ambiguous, and should be made clearer: If different methods are used to estimate emissions for enteric fermentation and manure management, then it is best to disaggregate enteric fermentation and manure management. If there are also differences in the data sources, assumptions applied and uncertainties for the different animal numbers and or management practices then these should also be disaggregated. If a common approach (e.g. carbon/nitrogen balance approach) is used across enteric fermentation and manure management then the categories should be disaggregated according to the key uncertainties in activity data, assumptions, emission factors etc.	Vitor Gois Ferreira	Accepted with modification	Separated enteric fermentation and manure management.
6032	1	4	178	179	Table 4.1, row "3C1": given that the UNFCCC reporting guidelines (CRF tables) allow countries to report CO2 emissions from biomass burning separately from those associated to carbon stock changes if the available AD data andmethod used allow to do so, a note should be added in this row to consider that some countries may wish to include CO2 emissions from biomass burning under 3C1 depending on its approach to report these emissions .	Ana Blondel	Accepted	The comment has been addressed in SOD.
1462	1	4	178	179	Add line for indirect CO2 in the table	Regine Röthlisberger	Noted	Indirect CO2 emissions have not been included in the table because inventory compilers can choose to include or not to include them in the totals.
8602	1	4	182		no need of the whole line	Amanullah Dr.	Accepted	Removed.
6996	1	4	184	251	No much changes were made to this part. For the sake of transparency, the parts unchanged should be shaded.	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
8604	1	4	184		no need of the whole line	Amanullah Dr.	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2144	1	4	185	204	Here and many places elsewhere in the entire guidance (most likely several of the sectoral volumes) I feel that there is a lack of consistency in the way "models" are treated. In the current text, changes in satellite technology is used as an example of potential creation of inconsistecies in time series. However, a land cover map from satellite imagery is basically the result of a model prediction/classification based on the digital numbers of the image (the reflectance) - a satellite does not measure land cover. In Vol 1, Chap 2, Sect 2.2.2 (lines 402-403) the relationship between models and data is clarified. It is stated stated that "models are a means of data transformation and do not remove the need for data to drive them". Translated to the current context, that means that if good practice is followed, no inconsistency will be introduced by shifting from one satellite to another because both datasets will be equally well calibrated with relevant data. So in other words, it is simply not good practice to use a land cover map from satellite if it is not properly calibrated with appropriate data. Finally, the term "land cover" in this example should perhaps be replaced with "land use" because land use is appropriate IPCC language, land cover is not.	Erik Næsset	Accepted with modification	The reference to models has been refined and made consistent with other chapters.
9582	1	4	189	189	As for the uncertainty analysis, I would suggest also to provide an Excel-spreadsheet for the KCA - this would support the countries to elaborate the analysis and permit the same appraoch by the countries	Denise Fussen Yanque	Noted	Tables and examples have been updated so that it is easy for the inventory compiler to follow and reproduce the calculation. An excel spreadsheet has not been provided since the assessement is simpler than the one for uncertainty.
6650	1	4	198	208	Equation 4.1. Isn't the total contribution a sum of absolute values of Ext, is there a need to use index y? If y is used, please explain it.	Tarja Tuomainen	Accepted with modification	Corrected equation. "y" was used instead of "t" and "x".
1464	1	4	213	213	In Table 4.2 Column C should refer to the value of emissions or removal, not the absolute value of emission or removal. Therefore, $\|Ex,t\|$ should be changed to Ex,t (remove vertical bars before and after Ex,t).	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
6652	1	4	213	214	Table 4.2. There is an error in the column title C, should be emission or removal in the inventory year, not the abslute value.	Tarja Tuomainen	Accepted	Editorial: Agree.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9172	1	4	216	220	The Inventory of Quality is incomplete. If the authors acknowledge that 'use of harvested woody biomass for energy purposes does not belong to a defined and reported carbon pool,' then what are the 'relevant categories' for biomass energy? How can biomass for energy be made into a more relevant category given its increased prominence in renewable energy strategies and international trade?	Peter Riggs	Noted	Comment transferred to Volume 2. No action can be taken because comment is out of scope of 2019 Refinement.
4302	1	4	257	259	I suggest that the authors reconsider the equation. Lines 269 and 270 state that "dividing by the absolute value of the overall difference between the base year (year 0) and the target year (year t) total inventories (the inventory trend)". However, it seems Equation 4.2 does not reflect this sentence.	Naofumi Kosaka	Accepted with modification	Reconsidered and revised.
4304	1	4	257	259	Equation 4.2 of FOD is different from Equation 4.2 of the 2006 IPCC Guidelines and Equation 7.2 of IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. I suggest that the authors describe the reason of the change of the equation because I am not sure how the change influences the result of trend analysis.	Naofumi Kosaka	Accepted with modification	An improved explanation has been provided for this equation 4.2.
508	1	4	257	266	In Equation 4.2 the denominator is missing: the absolute value of overall difference between the estimates for the base year and the target year of the total inventory.	Virginia Sena	Rejected	We checked this and the denominator is not needed as the results Tx,t are normalized and ordered in table 4.3 for the final identification of key categories.
510	1	4	275	276	It will help better understanding to include in Table 4.3 the notations for the Total estimates for base (Eo, total) and target year (Et, total). It is the Totals of columns C and D that are used in the Equation to calculate the Trend (column E).	Virginia Sena	Accepted	Added.
6654	1	4	288	289	The explanation for column G is incorrect.	Tarja Tuomainen	Accepted	Corrected.
4398	1	4	291	292	column, be consistent in letter case.	Kewei Yu	Accepted with modification	Revised to section 4.5.
1466	1	4	300	300	Reference to section 4.6: there is no section 4.6	Regine Röthlisberger	Accepted	Corrected.
4308	1	4	327	328	It seems that there is a grammatical error.	Naofumi Kosaka	Accepted	Corrected.
2142	1	4	348	348	substantial or statistically "significant"? (perhaps "significant" should be reserved for the statistical meaning of the term).	Erik Næsset	Accepted with modification	Revised to "substantial".
512	1	4	391	400	Parameters in Equation 4.3 are not clearly defined or not defined at all. The Iceland example presented in Table 4.4.a clearly shows the procedure, but I could not link the Equation´s rationale with the same for the example.	Virginia Sena	Accepted	This section on ranking has been removed.
4306	1	4	393	400	I suggest that the authors clarify "x", "a" and "n" in Equation 4.3.	Naofumi Kosaka	Accepted	This section on ranking has been removed.
2510	1	4			Chapter needs proof-reading.	Anna Mikis	Accepted	chapter proof-read and updated in the SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4400	1	4			In table 4.11, nitric acid and adipic acid production (adipic acid production probably more common)	Kewei Yu	Accepted	The comment has been addressed in SOD.
8606	1	4			In refernces section only few refernces are given and most of them are very old. We must include new literture of 2018, 2017, 2016 and so on.	Amanullah Dr.	Accepted	Additional references have been included in the SOD.
4402	1	5	32		Godonia, upper case	Kewei Yu	Accepted	Change effected as proposed.
6380	1	5	32	32	godonia' should be 'Godonia'	Emmanuel Jonthan Mpeta	Accepted	Change effected as proposed.
8608	1	5	38	43	text missing	Amanullah Dr.	Rejected	The text in section 5.1 "introduction" is left deliberately as it is not subject to the refinement.
7050	1	5	85	95	This is a very important paragraph, but it may be very difficult for the inventory compiler to implement without help from the IPCC Guidelines. It is of-course realistic to believe that the new default in the 2019 GL represents a more recent situation than those in the 2006 GL or the 1996 Revised GL. However, it may be very difficult for the inventory compiler and expert reviewers to know if that is the case, unless the 2019 refinementts state that. For pratical reasons, for other situations not explicitly indicated in the 2019 Refs, it would be preferably not to accept in-consistent time-series based on the use of defaults of IPCC EFs published at different moments.	Vitor Gois Ferreira	Accepted	The issue of emission factors (EFs) changing over time whilst maintaining consistency was addressed in new guidance provided in lines 220-237.
6520	1	5	95	95	It's better to add one sentence to the end of paragraf like "The date of the changes in emission rates should be written in the metadata file."	Serhat Sensoy	Accepted	Change effected as proposed.
6972	1	5	103	129	I could not identify any changes; I believe that this part should be shaded.	Vitor Gois Ferreira	Accepted	Box 5.1 shaded accordingly.
2052	1	5	117	117	The current text says: "...extrapolation for years after the last year with measured data available may be most appropriate."; I would enahnce it as follows: "…extrapolation for years external to the available time series of data may be the most appropriate method to apply, possibly using a proxy"	Sandro Federici	Accepted	Change effected as proposed.
4858	1	5	125	126	Is it rather 'Time series consistency must be applied to the modelling work as well' ? (possibly editorial)	Elsa Hatanaka	Accepted	Change effected as proposed.
8610	1	5	130		5.2.2 move to next page	Amanullah Dr.	Accepted	Change effected as proposed.
6382	1	5	156	156	for reasons for not ' suggested to replace with 'for reasons of not '	Emmanuel Jonthan Mpeta	Accepted	Change effected as proposed.
8612	1	5	161		no need of the whole sentence	Amanullah Dr.	Rejected	The sentence is an introductory sentence indicating the type of refinement (in this case - elaboration) performed within section 5.2.3.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6384	1	5	171	171	should so far as possible' proposes to read 'should as far as possible'	Emmanuel Jonthan Mpeta	Accepted	Change effected as proposed.
6386	1	5	176	176	factor, This' proposes to replace with 'factor. This'	Emmanuel Jonthan Mpeta	Accepted	Change effected as proposed.
6974	1	5	203	205	The following part is not necessary here, because it is discussed elsewhere: Therefore, the inventory compiler has to apply appropriate data extrapolation methods to ensure that such 204 inconsistencies are limited as far as feasible.	Vitor Gois Ferreira	Accepted	Change effected as proposed.
7052	1	5	203	205	The following part is not necessary here, because it is discussed elsewhere: Therefore, the inventory compiler has to apply appropriate data extrapolation methods to ensure that such 204 inconsistencies are limited as far as feasible.	Vitor Gois Ferreira	Accepted	Change effected as proposed.
2054	1	5	204	204	I would say "practicable" instead of "feasible"	Sandro Federici	Accepted	The proposed change is no longer relevant since the sentence that contains this phrase has been removed.
1804	1	5	205	211	In the case of CH4 capture and flaring, it is now the case that countries may have good data to develop distinct emission factors for activities with and without capture/flaring that do represent the best available data and methods for those sources. Applying the method specified here would involve back-calculating CH4 generation from net emissions data, when clearly it would be prefered to use the net emissions data directly.	Melissa Weitz	Accepted with modification	Text added to address cases where separate emissions factors are used for activities taking place with and without mitigation.
3476	1	5	213	213	Section 5.3: Should regression methods be discussed with the data overlap techniques given? Should splines (especially local splines that do not suffer from the limitations of global ploynomial functions) be discussed for non-linear interpolation?	Doug King	Accepted with modification	Regression methods are generally complex and might introduce complexity to the guidance for this chapter. This does not mean that inventory compilers cannot apply them. The intention is to introduce simple data gap filling methods that Inventory compilers can apply readily by following the criteria stipulated in section 5.3.3.7. An example of application on non-linear methods was provided in Box 5.5 of the SOD.
6976	1	5	237	238	Box 2 could better fit in section 5.3.3 because it would be closer to the discussion on the techniques to resolve gaps.	Vitor Gois Ferreira	Rejected	Our view is that Box 5.2 is best suited were it is at the moment (section 5.3.1) because this section deals with issues of data gaps and the reasons which by implications affects time series consistency. The chapter is written in such a way that it flows sequentially from unpacking issues and circumstances that result in time series inconsistencies and then providing guidance on how to address data gaps and other inconsistencies using splicing techniques.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6978	1	5	239	277	This is an important box, and more information on how actually the inventory could use the methodology in more recent years to previous years (e.g. calculation of IEFs, surrogate data) could be very helpful.	Vitor Gois Ferreira	Rejected	The observation is correct but the appropriateness of the data gap filling methodology to be used will be determined by the nature and form of the data available. Therefore it is not possible to suggest how such data gaps can be filled unless the inventory compilers apply the gap filling methodologies and criteria described in section 5.3.3.7.
2056	1	5	251	251	I would say "practicable" instead of "feasible"	Sandro Federici	Accepted	The sentence that contains this phrase has been removed.
514	1	5	261	261	It is written "practises" instead of "practices".	Virginia Sena	Accepted	Change effected as proposed.
8614	1	5	279		text missing	Amanullah Dr.	Rejected	This is deliberate as there is no refinement that was performed for this section.
7056	1	5	281	419	Giving that there is a new section on non-linear trend analysis, why there is no section on linear trend/regression analysis? (apart from a small reference under eq. 5.2). This could be something to improve in the guidelines.	Vitor Gois Ferreira	Accepted with modification	A new section has been added 'non-linear trend analysis'.
7054	1	5	281	400	The 2006 GL assumes that the calculation of interporlation and extrapolation is straightforward, but I believe that sometimes there is some sort of ambiguity between interpolation/extrapolation and linear regression analysis. For that reason, some equations indicating how interpolation and extrapolation work could improve transparency.	Vitor Gois Ferreira	Rejected	Methodologies provided in this chapter are meant specifically to provide guidance on interpolation/extrapolation methodologies that are simple for inventory compilers. Inventory compilers are encouraged to apply sophisticated statistical methods for filling data gaps provided that such methods are statistically sound.
516	1	5	320	321	It is not necessary (and repetitive) to inlcude the title inside the Figure.	Virginia Sena	Accepted	Change effected as proposed.
518	1	5	322	323	It is not necessary (and repetitive) to inlcude the title inside the Figure.	Virginia Sena	Accepted	Change effected as proposed.
6980	1	5	329	345	Presentation of the correction factor, in accordance with equation 5.1, could help clarity. The example uses eq 5.1 in essence, but departs from the equation in terms of numemclature. Cross reference could improve transparency.	Vitor Gois Ferreira	Accepted	Change effected as proposed.
4124	1	5	337	339	This should give more guidance on when variability can be considered "low variability". That might necessitate construction of a confidence interval. Also, variability should be considered in relation to the deviation from 1. In this example, there is a 7 % +- 3 % reduction.	Roland Fuß	Noted	Our view is that it would be extremely difficult to provide guidance on considerations how low variability is assessed. That is because there are many available methods to make the assessment. This should be at the discretion of the inventory compiler. Our proposal is to change the guidance to be more qualitative, providing broad guidance that allows for flexibility for inventory compilers. The example in Box 5.3 demonstrates an example of low variability and considering the standard threshold of 80% for best fit in statistical correlation. No action was made in the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4126	1	5	339	339	Why is not the (partly) bias-corrected estimate of standard deviation (using Bessel's correction: SD = 0.0296) used?	Roland Fuß	Noted	Our view is that it would be extremely difficult to provide guidance on considerations how low variability is assessed. That is because there are many available methods to make the assessment. This should be at the discretion of the inventory compiler. Our proposal is to change the guidance to be more qualitative, providing broad guidance that allows for flexibility for inventory compilers. The example in Box 5.3 demonstrates an example of low variability and considering the standard threshold of 80% for best fit in statistical correlation. no action was made in the text.
6982	1	5	348	348	This section was not considered, but some list of possible surrogate data for each sector could help inventory compilers	Vitor Gois Ferreira	Accepted	This has been considered in the revised version of this chapter. The proposed table has described a list of indicative proxy parameters by Sector as opposed to specific categories.
7308	1	5	350	398	Detailed statistics interpolation between the detailed estimates requires more than one method - line 362. Only linear interpolation may not achieve these objectives. This is because enormous data from water and soil around the world are not the same. Hence, to obtain quality interpolation, more methods are required. General trends or underlying parameters would need surrogation, preferably it will be a good practice to compare interpolated estimates with surrogate data using other methods such: 1) Cubic, smoothed or locally weighted splines; 2) Linear or higher order polynomial regression.	Onema Adojoh	Noted	The idea is to provide simple methods. Inventory compilers are encouraged to use much more sophisticated methods as long as the methods are scientifically sound. No change has been made in the SOD text.
520	1	5	362	363	It is not necessary (and repetitive) to inlcude the title inside the Figure.	Virginia Sena	Accepted	Change effected as proposed.
1802	1	5	365	365	Here and in other examples, it might make sense to walk through why other options were not used. For example, would it not make sense to first see if the emissions track national oil production or refinery throughput, and if so, develop EF for this source on a per-production or per-throughput basis and then interpolate between the 2003 and 2007 EFs and apply them to the annual AD on oil production or refinery throughput (surrogate approach?).	Melissa Weitz	Rejected	Section 5.3.3.7 and in particular table 5.1 is devoted to providing guidance on the criteria for selection of splicing techniques. Inventory compilers are encouraged to use more sophisticated splicing techniques provided such methods are scientifically sound.
1800	1	5	367	367	If fossil water incineration is not a source included in the IPCC GL, it is confusing to note it here. Perhaps change the example?	Melissa Weitz	Accepted	Change "fossil water" to fossil liquid".
2460	1	5	367	367	Word water should be replaced with word waste in the heading	Päivi Lindh	Accepted	change "fossil water" to fossil liquid".

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1778	1	5	377	380	Specify what should be done if there is a factor that impacts the emissions and for which data are available, like quantity of liquid fossil fuels incinerated. In that case, should they not interpolate between the factors from 2003 and 2007 and apply the interpolated factors to annual AD?	Melissa Weitz	Noted	The interpolation/extrapolation methodologies described here can be applied to any parameter associated with the emission estimation methodology. The example quoted is based on interpolating/extrapolating emission results. No change has been made on the text.
6522	1	5	400	400	There are no refinementt on trend extrapolation, but it is better to describe it as linear interpolation is done in Box 5.4.	Serhat Sensoy	Accepted	Change effected as proposed.
2146	1	5	401	419	Non-linear trends can indeed be important to capture and model. This entire text seems relevant, but is much more "scientifc" in level of complexity/need for special knowledge than all previous chapters of Vol 1. This is a dilemma. It would probably not be possible for many countries to implement these procedures without consulting special expertise - the scientifc citations provided would not be sufficient. Perhaps an even more elaborated example with reference to relevant open source software would be useful (i.e. a few more details than currently in box 5.5. - which is a nice example, by the way)? Perhaps also provide some illustrative examples of a chi-square analysis, as indicated in the text.	Erik Næsset	Noted	As reflected in the comment, the idea is to provide simple guidance that can be applied by inventory compilers. Therefore, this example is meant to provide guidance by applying a simple non-linear interpolation technique. It is indeed true that the text contained in section 5.3.3.5 is relatively complex but non-linear methods are generally complex and the authors believe that the example provided in this sections provides simple guidance for inventory compilers to follow.
6390	1	5	415	415	imputing' proposes to replace with inputing'	Emmanuel Jonthan Mpeta	Rejected	The word “impute” is deliberately used here for its statistical meaning rather than a mistake.
6388	1	5	419	419	impute' proposes to replace with 'input'	Emmanuel Jonthan Mpeta	Rejected	The word “impute”is deliberately used here for its statistical meaning rather than a mistake.
1796	1	5	423	424	Provide more information on where this example came from. Be clearer that the requirement is not a requirement of the inventory, but of the IPCC/UNFCCC. Because the word "accounting" is used, is this guidance specific to Kyoto accounting?	Melissa Weitz	Accepted with modification	Text has been changed accordingly.
1798	1	5	440	440	Be clearer in this example why a non-linear trend is the prefered option. Linear interpolation results in 14.44 (compared to 14.49), which would seem to be reasonable, given uncertainties, and is far less complicated. Perhaps an example with more years of additional data would be clearer.	Melissa Weitz	Noted	Example has been chosen for simplicity reason.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7058	1	5	445	445	In some cases, it may be difficult to extrapolate for the future, because there is uncertainty that the driver for the pattern is sustainable or it continues. This situation may be quite common in inventories. There are other possible methods (average, carry on) that could be used, but there is no reference to them.	Vitor Gois Ferreira	Accepted with modification	It would be difficult to provide examples for such scenarios but text highlighting such challenges has been reflected in the guidance so that inventory compilers can exercise caution.
10166	1	5	all	all	This chapter is highly complicated and not understandable by even a regular Agriculture PhD. How are people in developing countries going to understand it?	Malini Nair	Noted	This guidance is considered simple and examples are provided to demonstrate how data gap filling methods could be applied. No change has been made to the text.
4860	1	5	Box 5.2	general	One other issue when applying e.g. facility level data is that the QC of the data is in the hands of the facility, and no longer in the hands of the statistical department or idustry association or compiler, etc. It is odd if the compiler does not have at least a grip on how the facility generally does its QC.	Elsa Hatanaka	Accepted	Text added in the chapter to provide clarity that compiler should request information on how the industry does its QC on the data it has submitted.
4404	1	5			data sets or datasets, be consistent	Kewei Yu	Accepted	Changed the text to data sets to be consistent with original guidance.
8616	1	5			all figures need proper title or foot notes	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
8618	1	5			In refernces section only few refernces are given and most of them are very old. We must include new literture of 2018, 2017, 2016 and so on.	Amanullah Dr.	Accepted	References updated and new literature is considered.
319	1	6	0	586	General comment: the text the whole volume "Uncertainty " is provided in a chaotic way and it is clear that it is a compilation of several texts using different terms (or terms are associated to different meaning) and the same things are mentioned several time in different wording. mixing point estimates and interval estimates is misleading. It requires a substantial rewriting. It is a guideline (not a scientific article i.e. it is to be short and concise.	Milos Tichy	Accepted	The comment has been addressed in SOD.
4406	1	6	46		Guidance, letter case?	YU KEWEI	Accepted	Revised accordingly

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9866	1	6	79	110	Box 6.1 is very welcome to help clarify the IPCC definitions, but should be extended to encompass terminology often used around the use of models (be they databases, spreadsheets, code) in performing calculations, and then to pick these up in the new section later in Chapter 6 on use of models. Good practice requires (i) MODEL VERIFICATION - i.e. checks to ensure that the model calculation engine is performing as intended at the model testing/commissiong stage, i.e. through testing of the model calculations against the model specification (e.g. through performing parallel calculations in another model, or unit testing of individual sectuions of code), and (ii) MODEL VALIDATION - i.e. checks on model outputs during annual inventory compilation, to make sure the model is outputing sensible, correct data (e.g. checks on IEFs against IPCC defaults, time-series consistency checks, checks on the data derived for the latest year - is it consistent with recent years, and so on). It would be helpful for the IPCC guidance to address these good practice steps for models, and establish the IPCC terminology for such activities (which may not be "VERIFICATION" and "VALIDATION", as I have used).	David Glen Thistlethwaite	Accepted	The comment has been addressed in SOD.
356	1	6	90	97	The current definition of Quality Assurance (QA) emphasises that it should be planned and apply to the entire inventory. It should be somewhat revised to take into account that current practices concerning QA activities mostly refer to cooperations between Parties for the review of specific sectors of the inventory.	Domenico Gaudioso	Accepted with modification	The definition has been reviewed to make the process of QA more explicit.
302	1	6	94	97	Delete, already mentioned elsewhere	Milos Tichy	Accepted	The comment has been addressed in SOD.
5594	1	6	98		Here it would be a very good place to exemplify the verification term with the newly used top-down tool for verification (together with a reference to the section 6.10.2).	Stefan Reimann	Accepted	The comment has been addressed in SOD.
4000	1	6	104	104	pg. 6.5: Delete "in" from "…in under…".	Hans-Dieter Haenel	Accepted	The comment has been addressed in SOD.
8620	1	6	119	145	need improvement	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
303	1	6	126	128	It is not very comfortable for a reader to read in paralell two wersions of the text. The text is to be full without quatations except refferences. It appears also further.	Milos Tichy	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9012	1	6	129	130	No refinementt is proposed for section 6.5 QA/QC PLAN under which BOX 6.2 provides the information about various ISO STANDARDS RELATED TO QUALITY MANAGEMENT SYSTEMS. Comment: ISO continouslly reviews, updates, confirm and releases the revised edition/version of standard - which is indicated by year of release and confirmation of being current. Since the publication of 2006 IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories many ISO standard has been reviewed, revised and confirmed. Thus keeping this fact into the consideration standard mentioned in the BOX 6.2 shoulDetails d be updated to reflect the cuurent applicable ISO standards. Below rows provide the information about current edition/version of ISO standards, which are mentioned in BOX 6.2.	Vishwa Bandhu Pant	Accepted	The comment has been addressed in SOD.
9014	1	6	129	130	ISO 14064-1:2006 Greenhouse gases – Part 1: Specification with guidance at the organisation level for quantification (Note - This standard was last reviewed and confirmed in 2009. Therefore this version remains current.)	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9016	1	6	129	130	ISO 14064-2:2006 Greenhouse gases -- Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements (Note - This standard was last reviewed and confirmed in 2009. Therefore this version remains current.)	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9018	1	6	129	130	ISO 14064-3:2006 Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions (Note - This standard was last reviewed and confirmed in 2009. Therefore this version remains current.)	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9020	1	6	129	130	ISO 9000:2000 Quality management systems – Fundamentals and vocabulary has been revised by ISO 9000:2015 Quality management systems - Fundamentals and vocabulary	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9022	1	6	129	130	ISO 9001:2000 Quality management systems – Requirements has been revised by ISO 9001:2015 Quality management systems - Requirements	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9024	1	6	129	130	ISO 9004:2000 Quality management systems – Guidelines for performance improvements has been revised by ISO 9004:2009 Managing for the sustained success of an organization - A quality management approach	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9026	1	6	129	130	ISO 10005:2005 Quality management systems -- Guidelines for quality plans (Note - This standard was last reviewed and confirmed in 2009. Therefore this version remains current.)	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9028	1	6	129	130	ISO/TR 10013:2001 Guidelines for quality management system documentation (Note - This standard was last reviewed and confirmed in 2007. Therefore this version remains current.)	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9030	1	6	129	130	ISO 19011:2002 Guidelines for quality and/or environmental management systems auditing has been revised by ISO 19011:2011 Guidelines for auditing management systems	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9032	1	6	129	130	ISO/IEC 17020:1998 General criteria for the operation of various types of bodies performing inspection has been revised by ISO/IEC 17020:2012 Conformity assessment -- Requirements for the operation of various types of bodies performing inspection	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
9034	1	6	129	130	Sector-specific applications of ISO 9001 - ISO/TS 29001:2010 Petroleum, petrochemical and natural gas industries -- Sector-specific quality management systems -- Requirements for product and service supply organizations (Note - This standard was last reviewed and confirmed in 2014. Therefore this version remains current). This standard defines the quality management system for product and service supply organizations for the petroleum, petrochemical and natural gas industries. Comment: This stanandard may be added in BOX 6.2 of 6.5 QA/QC PLAN. This will facilitate the QA/QC of Petroleum, petrochemical and natural gas industries .	Vishwa Bandhu Pant	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
304	1	6	142	143	Fig. 3.2 Rhombus: Approach 1 and Approach 2 are mentioned, explanation what does it mean is missing.	Milos Tichy	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
305	1	6	150	156	Surprisingly the term "error" is ntroduced without any explanation. "Random error" is probably missprint; "random uncertainty" is probably ment. Error is comething wrong which is to be corrected, somehow eqiovalent to bias.	Milos Tichy	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
306	1	6	157	167	Hard to understand, but probably a simple and obvious: errors are to be found and corrected.	Milos Tichy	Accepted	The comment has been addressed in SOD.
310	1	6	179	205	All items mentioned are formulated as estimation of emission is a scientific problem, but comparativene of data from differnt countrie requres keeping of the same guidelines more than scientificalu based method. Moreover most of data are from statistical surveys (at least activity data) and ther a possible bias can be avoided by an analisis of survey compelenes checked by relative data (activity per capita), international comparison of emission factors a time series.	Milos Tichy	Accepted	The comment has been addressed in SOD.
307	1	6	179	180	Sentence "Improving the inclusiveness of the structural assumptions chosen can reduce uncertainties." is hard to understand without any explanation.	Milos Tichy	Accepted with modification	The sentence has been modified.
308	1	6	182	183	Sentence may be interpreted in differnt ways especially "as well as reductions in these causes of uncertainty."	Milos Tichy	Accepted	The comment has been addressed in SOD.
309	1	6	184	191	The paragraph is to be divided into two because one can hardly imagine CEMS in agriculture and forestry	Milos Tichy	Accepted	The comment has been addressed in SOD.
311	1	6	206	209	It is necessary to note that using higher (more detailed) Tier may sometime lead to biased results because emission factors can be wrong and activity not fully covered. Energy is an example: summing activity per source may be less complete in comparison of energy balance because it is evaluated by experienced people who are using advance cross checks. As depicted in the following picture higher Tier may produce less random uncertainty but may contain a bias.	Milos Tichy	Accepted	The comment has been addressed in SOD.
8622	1	6	213	222	need improvement	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
4408	1	6	254	255	Add adipic acid production with nitric acid production. Both contribute to N2O production. Adipic acid production may be more important.	Kewei Yu	Accepted	The comment has been addressed in SOD.
312	1	6	279	286	This part "defines" its own nomenclature different from the one used in physical sciences. Uncertainty is mostly used for standard deviation or variance and nor for the span of confidential interval. The two formulas substantially differs, the only the second could be used; multiplier 2.09 or 2.1 should be used. SE is usually called standard deviation od the mean; "standard error" is misleading. Preferably is to be rewriten including definitions or reference to a glossary.	Milos Tichy	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
788	1	6	280	280	options	Wilfried Winiwarter	Accepted	The comment has been addressed in SOD.
313	1	6	287	330	This part is rather chaotic as it contains some well known items expressed by different ways; recommendation: delete	Milos Tichy	Accepted	The comment has been addressed in SOD.
522	1	6	295	295	It is written " ...as they may be are able to accommodate…" instead of " … as they may be able to accommodate…"	Virginia Sena	Accepted	The comment has been addressed in SOD.
790	1	6	295	295	… as they may accommodate …	Wilfried Winiwarter	Accepted	The comment has been addressed in SOD.
1468	1	6	295	295	eliminate (are): …more reliable as they may be (are) able to …	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
4792	1	6	295	295	"may be are able" should be "may be able"	Donna Giltrap	Accepted	The comment has been addressed in SOD.
6392	1	6	295	295	as they may be are' needs clarification	Emmanuel Jonthan Mpeta	Accepted	The comment has been addressed in SOD.
7130	1	6	295	295	remove 'are'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
16	1	6	316	604	The chapter needs further editing to avoid parasite capital letters and a mixture between British and US spelling	Frédéric Chevallier	Accepted	Revised, set to British.
9512	1	6	316	604	Current draft provides brief review of the recent efforts to augment the national inventory reporting with research results on national emission estimates of greenhouse gases based on atmospheric measurements. However, the number of references to research publications is large and is likely to complicate understanding of the text by inventory compilers. While the citations are necessary and helpful to the community, it will be even more helpful with the addition of a bit more explanation on what has been done and how.	Philip DeCola	Accepted	In revised draft, effort is made, whenever possible, to reduce distraction to reader caused by referring to specialized literature.
9516	1	6	316	604	Since IPCC scoping meeting, that defined the extent of the refinementts, substantial progress was made in, for example, EU, China, and other parts of the world towards establishing new large-scale research programs (in EU: CHE, VERIFY) and deployment of surface atmospheric observation networks (eg ICOS). This progress provides opportunity of utilizing newly developed expertise (such as reflecting recent progress in N2O emission estimates) by involvement of research community as contributing authors.	Philip DeCola	Accepted	Contact with community is being strengthened by inviting contributing authors.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9520	1	6	316	604	For CO2, current draft focusses on the use of atmospheric measurements in relation to fossil fuel emissions. National and local scale atmospheric studies will be extremely useful for refining inventory-based methods for AFOLU CO2 budgets which may be based on limited data with large uncertainties. For example, New Zealand is working towards national and local scale atmospheric observations to refine pasture, managed forest and urban AFOLU CO2 budgets. The initial work is documented by Steinkamp et al., 2017, although as noted above, inclusion of references may be distracting.	Philip DeCola	Accepted	Useful suggestion, pointing out that progress in AFOLU is being actively sought dispite difficulties. In the case mentioned, they used advantage of a clean background CO2 in Southern Hemisphere.
9528	1	6	316	604	We suggest adding a reference to the Integrated Global Greenhouse Gas Information System (IG3IS) Implementation Plan (IP) which already is in a nearly final draft form and will be published in the literature and in WMO report form prior to the IPCC TFI 2019 refinementt deadline for literature references. The link to the current IP draft is discoverable through the WMO IG3IS web page : http://www.wmo.int/pages/prog/arep/gaw/ghg/IG3IS-info.html and the new IG3IS web page will be made available to your lead authors very soon and will be hosting the final draft and other valuable references and we will hope that a reference to this web page will also be in the 2019 refinementt.	Philip DeCola	Accepted	IG3IS plan reference currently points to WMO bulletin article, reference updated after the IG3IS document was released.
9514	1	6	316	604	We understand that the authors do not have mandate to completely replace 2016 Guidelines, but due to progress made in national emission estimates, the spirit of the section can be changed from cautious introduction of available techniques to promoting the use of the emission estimates based on atmospheric observations where it is technically justified and financially feasible.	Philip DeCola	Accepted with modification	Numerous number of cases has been presented in the SOD using the atmospheric observations for support of national inventory reporting.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9518	1	6	316	604	While atmospheric measurement based approaches are indeed not for free, neither is any other enterprise, such as collecting data for building inventories from activity data and emission factors. A key point that needs to be made is that many "developed" countries such as France, Germany, Netherlands, USA, Japan, Korea and others already have in place a large number of high quality atmospheric measurement stations as well as the skilled people who know how to interpret and analyze the measurements for the resulting benefit toward improved emission estimates, yet the relationships between the research and inventory building and reporting agencies do not exist yet and need to be encouraged. The UK and Swiss are the two best examples to date (Australia also but to a more limited extent) in countries like France, Netherlands, and others where the measurements and the inverse modeling expertise already exists all that is left is to build the relationships and the trust and partnerships to yield the added value to the inventory building and reporting agencies. The big investments have already been made and it is wasteful not to take advantage of this. IPCC TFI could help by making such a statement in this report. Also, please note that the UNFCCC SBSTA language from COP23 has made such a statement in Agenda Item 8 Sub-item 12 and its footnote, see at link: http://unfccc.int/resource/docs/2017/sbsta/eng/l21.pdf Also, in developing countries with limited data collection capabilities for IPCC TFI activity data and emission factor based approaches base line knowledge on national totals may be available from analysis of atmospheric measurements already available from satellite measurements and deploying low-cost sensor networks through capacity building.	Philip DeCola	Accepted with modification	Agree with first part, available measurements should be used efficiently for support of QC/QA. This concurs with other comments encouraging better use of observations, and the draft as whole makes effort to accommodate best those comments. New paragraph on Collaboration was added.
4810	1	6	318	604	There are a number of references to the approach taken by Australia in the verification of HFC emissions using atmospheric observations and inverse modelling in its inventory (in particular, the examples provided in table 6.2). The authors may like to consider further work undertaken by Australia which will be included in the next inventory submission in relation to the use of inverse modelling to make adjustments to annual SF6 EFs from electricity supply and distribution. The supporting document provides more details of the approach undertaken.	Mark Hunstone	Accepted	Mention of SF6 emission estimates in Australia added to Table 6.2.
9506	1	6	318	319	Consider rephrasing title to say ".....emission estimates including the use of atmospheric concentration measurements" because in most cases the estimates are not derived solely with atmospheric concentration measurements but also include good prior knowledge based on activity data and emission factors.	Philip DeCola	Accepted with modification	Good suggestion, but to keep the title both brief and informative, modified as "INTRODUCTION TO EMISSION ESTIMATES BASED ON ATMOSPHERIC CONCENTRATION MEASUREMENTS".

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5948	1	6	320	320	Change the sentence from … the state of science and its applications to estimating national emissions to … the state of science for atmospheric measurements and their application to verifying national emissions.	Vincent Camobreco	Accepted	Corrected as suggested.
17	1	6	325	325	"labor-intensive" is not a proper explanation. Reasons are mainly 1/ systematic errors in all models and in some of the measurements, 2/ the difficulty to separate between an administrative area and the surrounding areas with atmospheric measurements, and 3/ the difficulty to separate between flux types (e.g., between LULUCF and other vegetation fluxes).	Frédéric Chevallier	Noted	Cost and labour-intensive mentioned here refers to running operationally a whole system, including observational program, producing gridded inventory and modelling. This text has nevertheless been removed and emphasis of the paragraph is now on methodology than on the administrative process to run the models. This is important given that the Inventory compilers do not have to run the models that generate verification estimates.
5596	1	6	325		In many cases…	Stefan Reimann	Noted	Clarified the statement mentioning difficulties that obstruct practical application of the atmospheric measurements in many countries.
5598	1	6	325		This statement is somehow contradictory to the following section starting with “nevertheless,…	Stefan Reimann	Accepted	Clarified the statement mentioning difficulties that obstruct practical application of the atmospheric measurements in many countries.
5600	1	6	325		I would suggest that this sentence starting with “in many cases… is deleted. Methods have been improved a lot in the last decade and then they can be used (with a hopefully improving quality) in the future (for which this guideline is written.	Stefan Reimann	Accepted with modification	The sentence is modified from 'many cases' to 'some cases', to reflect reality.
9510	1	6	328	328	The word "verification" needs to be defined. There use of verification to some readers implies that there is a truth or a version of truth that is being used to "verify" an estimate. Advances in the use of atmospheric measurements in many cases has shown great value in helping to better constrain emission estimates by adding a new constraint to the fundamental use of activity data and emission factors and can help to fine tune or reduce uncertainty and/or adjust emission factors, and emission totals for national totals and in some cases for sectors.	Philip DeCola	Accepted	Good suggestion to separate verification and improvement, to extend utility of atmospheric observation from verification to improvements in inventory.
3752	1	6	329	330	It is suggested to use a more general language. The reason being that it is primarily the task of those experts with specific modelling and measuring skills that are in a position to use inverse modelling for verification as already indicated in the paragraph above. Such wording might be: ... and thus it may be considered to take advantage of this form of verification.	Guenther Schmidt	Accepted with modification	Right suggestion to use wording as 'form of verification', but sentence has been revised, and it is not easy to fit 'form of verification' now.
4410	1	6	333	339	GHG, define before use.	Kewei Yu	Accepted	Corrected.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9526	1	6	333	333	The word "independent" needs clarification and perhaps even being replaced with other words. Of course the atmospheric measurements are independent from the data used to determnine activity data for inventory building, but they are both intimately a part of most inverse model analsyses as described in 6.10.2. So the word "independent" in this context is a bit misleading. If our goal is to encourage those who are able to do so from a resourse and skill perspective to use all available statistical activity data and atmosperic measurements for the most complete and useful constraints on emission inventories, then we should find other ways of describing then "independent" or just use more words to be clear.	Philip DeCola	Accepted with modification	In the current text, the issue is addressed by saying "largely independent from inventories", so hopefully the understanding is that full independence is not assumed.
5602	1	6	339		long-term monitoring sites	Stefan Reimann	Accepted	Added 'long-term' to text.
5950	1	6	339	343	The beginning of this paragraph briefly outlines atmospheric measurement and inverse modeling approach, should it also include a mention that assumed baseline (gridded) emission estimates are also needed	Vincent Camobreco	Accepted	Added "gridded emission inventory" to the sentence.
18	1	6	342	342	"with an atmospheric transport model" ... and with some prior information. Or the reader cannot understand what is said in the following page.	Frédéric Chevallier	Accepted	Added "gridded emission inventory" to the list of ingredients.
4862	1	6	343	343	Is it normal to use 'We' in IPCC inventory guidelines?	Elsa Hatanaka	Accepted	Corrected to harmonize with rest of the 2019 Refinement.
5604	1	6	345		better: atmospheric transport from country to country	Stefan Reimann	Accepted	The comment has been addressed in SOD.
5952	1	6	348	348	Change sentence … more dense observation networks in future … to … more dense observation networks in the future …	Vincent Camobreco	Accepted	Revised as suggested.
9530	1	6	348	348	it is not just more dense observations but should also mention "more measurements of isotopic species and the better use of covarying species such as CO and others."	Philip DeCola	Accepted with modification	Revised by adding "complemented by observations of isotopic ratios, atmospheric potential oxygen (APO), and covarying tracers, such as carbon monoxide".
3754	1	6	354	354	The following language is suggested in order to avoid that scarce resources from inventory compilers are stranded in such excercise: Despite the availability of inverse modelling tools, specialized experts are required to apply them	Guenther Schmidt	Accepted with modification	Revised by adding 'It should be noted that, despite the availability of inverse modelling tools, experienced modelers are required to apply them'.
5606	1	6	358		at the end of the section it would be an ideal place to say that continuous verification systems already exist in UK and Switzerland, where emission inventories are verified annually and numbers are reported in the National Inventory Report (NIR) to the UNFCCC. A further system is also in place in Australia, however, data are not reported annually.	Stefan Reimann	Accepted	Revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6724	1	6	359	363	Provide more information about the use of basin- and site-level measurements for verification. For example, Zavala-Araiza et al 2015 and Zavala-Araiza et al 2017 found agreement between Barnett Shale emission estimates based on basin-level and site-level data, but report that well pad emission rates based on site-level measurements were 50% higher than modeled, component-level emissions, which indidates that the traditional, component-level inventory appraoch was underestimating emissions. Similar approaches could be used to adjust emission inventories based on empirical site- or basin-level data.	David Lyon	Accepted with modification	A study by Zavala-Araiza et al. 2015 in suggested context was mentioned in other part (see Line 362 in FOD).
9532	1	6	359	363	We suggest adding references to city-scale examples from LA, Paris, Indianapolis and other city examples. Also examples of non-Inverse modeling uses of atmospheric measurements (direct detection) such as mass-balance airborne measurements should be mentioned. See references in Section 4 on City-Scale GHG monitoring in the IG3IS Implementation Plan as well as these potential references (but there may be other better ones to be referenced in the IG3IS IP) https://collections.elementascience.org/quantification-of-urban-greenhouse-gas-emissions/ and https://www.atmos-chem-phys.net/17/8313/2017/ and https://www.atmos-chem-phys.net/15/1707/2015/acp-15-1707-2015.pdf	Philip DeCola	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
2404	1	6	362	363	Please add more recent studies- Schweitzke et al (2017), Vaughn et al. (2017), Zimmerle et al. (2017), Bell et al. (2017)	Fiji George	Accepted with modification	Suggested references rely more on facility scale measurements rather than larger scale.
19	1	6	363	363	The sentence highlights updating emission factors, but this topic does not seem to be directly addressed in two of the cited publications (McKain et al. 2015, Viatte et al 2017). Referring to Yver-Kwok et al (2015, doi:10.5194/amt-8-2853-2015) would be more appropriate (and fairer). If the intend of the sentence is more general, the phrasing could be improved and non-US references, in addition to Yver-Kwok et al could be usefully added (e.g., Breon et al., 2015, doi:10.5194/acp-15-1707-2015).	Frédéric Chevallier	Accepted	Revised to reflect suggestion.
4342	1	6	363	363	I suggest that the authors add a figure for the outline of inverse modelling. As readers may be unfamiliar with inverse modelling, the addition will facilitate the readers' further understanding toward it.	Naofumi Kosaka	Accepted with modification	Text has been modified to make it easy for readers to understand the basic principles of inverse modelling.
4864	1	6	364	364	Should this section rather be named as 'Elements needed for GHG Emission Inventory Verification Using Atmospheric Measurements'? It is hard to understand as is.	Elsa Hatanaka	Accepted	Revised to 'components needed'.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9524	1	6	364	393	The atmospheric measurement section 6.10.2.2, as well as the overall section 6.10.2, is strongly focused on atmospheric inversion methodologies, rightly recognizing that atmospheric inversions are complex and require specialized skills. Yet atmospheric measurements alone (without complex modelling) can be extremely useful in evaluating and refining inventory methods, particularly for non-CO2 gases. For example, emission rates at the regional and urban scales for a host of non-CO2 gases can be determined from the ratio of fossil fuel CO2 to each gas at that location (Miller et al., 2012, Turnbull et al., 2011) as well as other references such as the work of Zavala et al, PNAS 2015 December, 112 (51) 15597 15602. https://doi.org/10.1073/pnas.1522126112	Philip DeCola	Noted	Omission of the tracer correlation approach is rightfully pointed out. However, this section deals with national scale, while proposed references are referring to sub-national scale estimates, thus alternative references for Swiss and Australia national estimates fit better here. No change was made in the SOD text.
4412	1	6	370		Atmospheric, letter case	Kewei Yu	Accepted	Corrected.
20	1	6	371	372	Why would the guidelines restrict inverse modelling to "established networks of GHG monitoring stations" ? It seems counter-productive to exclude new independent initiatives, as long as they meet high quality standards for the current purpose.	Frédéric Chevallier	Accepted	Reworded.
314	1	6	371	372	The statement about correlation "If correlations exist, then either the correlation can be included explicitly or data can be aggregated to an appropriate level such that correlations become less important. " is not true. If correlations exist other approaches should be used. One can hardly imagine that correlations may disappear when the data are aggregated.	Milos Tichy	Accepted	The comment has been addressed in SOD.
21	1	6	373	373	"calibration correction against international standards" is a bonus but not a requirement. The assimilated data need to be well intercalibrated with each other, but it does not matter for the purpose of inventory QA if there is an unknown offset with other (unassimilated) data.	Frédéric Chevallier	Noted	Current practice involves using data from several national networks, that need to be intercalibrated.
22	1	6	373	374	"submission to global databases such as WDCGG" is not a requirement for inventory QA. The text is very confusing here. Basically, it imposes that the (costly) data is made freely accessible to all, which implies a specific, debatable, economic model.	Frédéric Chevallier	Accepted with modification	The text has been changed and language smoothed to make clear that this is not a requirement.
23	1	6	377	378	Are the specifications established for climate purpose by GAW and AGAGE fit for inventory QA? We could think that some of them can be relaxed to some extent (see the discussion in Wu et al., 2016, doi:10.5194/acp-16-7743-2016).	Frédéric Chevallier	Rejected	As there are no specific guidelines proven in applications on to what extent the requirements can be relaxed, it is better to refer to regular practice. No change was made in the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5880	1	6	379		For the paragraph starting on line 379, there could be some more information on the potential of satellite retrievals as there are some features that aren't there for in-situ observations. Most notably, satellite observations provide globally consistent coverage and the data are freely available taking away the need to setup your own network. Future instruments will provide orders of magnitude more data than currently available. One example could be TROPOMI, which already launched.	Vincent Camobreco	Accepted	Added mention of TROPOMI.
6114	1	6	383	383	(adding the following sentence after "planned for carbon dioxide.") The study by Turner used the data from GOSAT wihch was launched in 2009 by JAXA. The data is open and free and various data sets are available at JAXA, NASA, NIES websites.	Akihiko Kuze	Accepted with modification	Turner et al., 2015 is already cited in line 383, 462. The corresponding product covering fixed time period is available from NASA site, but NASA does not reveal a plan to continue its production, so it is of limited value for emission verification in long term.
7164	1	6	383	383	Add info or reference on availabity of and developments to date on global GHG datasets and research using GOSAT.	Masami Onoda	Accepted with modification	A reference to a review by Matsunaga et al. 2018, which is more focused on emission estimates using GHG observation from Space has been included.
24	1	6	384	384	"backed by participation of the modelling community". Who is the modelling community? This requirement may be read as a attempt from a few scientists to keep control on what happens in their domain. A more constructive requirement would be that the work presentation is detailed enough so that it can be reviewed. For this, a detailed description of the inversion set-up needs to be available (atmospheric transport model, uncertainty model for the prior fluxes and for the measurements, including cross-correlated terms). The prior and posterior misfits to measurements (not necessarily the measurements themselves, if they are confidential) also need to be available.	Frédéric Chevallier	Accepted	Revised to "by participation of the expert inverse model users and developers".
4414	1	6	384		Modelling or Modeling, letter case? Other places	Kewei Yu	Accepted	Corrected to lowercase, converted to modelling in other places too.
5882	1	6	384		For the paragraph starting on line 384, discussion of models should include GEOS-Chem and it's adjoint (from Wecht et al. [2014])	Vincent Camobreco	Accepted with modification	Reference to GEOS-Chem added as Henze et al. 2007.
25	1	6	385	386	The PYVAR inversion framework (Chevallier et al. 2005, doi:10.1029/2005JD006390) can be added. It is distributed freely on simple request to LSCE.	Frédéric Chevallier	Accepted	Reference added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
315	1	6	388	389	Sentemce "Uncertainty of the inputs will represent a 95 percent confidence interval expressed as a percentage of the central estimate of the input (e.g. ± 20%)." is hard to be understood and can be interpreted in different ways. Concept of dependent variable i.e. correlated variables is not explained (it is not obvious).	Milos Tichy	Accepted	The comment has been addressed in SOD.
5884	1	6	388		For the paragraph starting on line 388, recommend including a statement on how using a poor prior inventory can bias the inverse modeling results. It currently only mentions EDGAR may not be up-to-date, that's not the main issue. As the atmospheric data only gives information on the total methane flux, errors in the prior distribution of the different source types can lead to a wrong interpretation of inversion results. For example, work over the US has showed that the interpretation of inversions using the EDGAR inventory has been biased by the errors in spatial patterns in oil/gas emissions (Maasakkers et al., 2017). Prior errors could also lead to errors in the attribution between anthropogenic and natural emissions.	Vincent Camobreco	Accepted	Revised to show difference. Dependence on prior inventory is checked by applying sensitivity tests in multiple studies.
6726	1	6	388	393	Elaborate on how gridded inventories can be used for verification. For example, Barkley et al 2017 used the Maasakkers et al 2016 gridded US EPA inventory as a prior in their inverse modeling of NE Pennsylvania O&G methane emissions.	David Lyon	Accepted with modification	Use of the gridded inventory in inversion is elaborated in other parts of the text, here the focus is on gridded inventory itself.
5954	1	6	389	391	Clarify this discussion do references refer to different types of gridded emissions?	Vincent Camobreco	Accepted	Clarified.
26	1	6	391	393	The role of EDGAR here is not clear and not well introduced. This should be rephrased in a more pedagogical way.	Frédéric Chevallier	Accepted	Revised EDGAR part.
2406	1	6	393		Consider adding the Conley et al. technique for verification. Conley et al employs Gausian Theorem and has been successfully employed in the US	Fiji George	Accepted with modification	Conley et al., 2017 applied more advanced type of mass-balance type approach, which has been already mentioned, as Zavala-Araiza, 2015 provided a comprehensive report on multiple mass-balance studies. Reference added anyway.
4866	1	6	394	394	A title such as 'Examples of emission estimates' would suit this section better.	Elsa Hatanaka	Accepted	Revised.
5886	1	6	398	398	I think that it is not just the emission factors but also capturing all emitting processes and activity data. Inverse modeling can help indicate these gaps as it quantifies total emissions.	Vincent Camobreco	Accepted	Revised.
5608	1	6	400		For Switzerland Henne et al., 2015 could be mentioned	Stefan Reimann	Accepted with modification	Henne et al., 2016 cited further in Table 6.2.
8624	1	6	407		move carbon dioxide to next page	Amanullah Dr.	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1780	1	6	408	408	Uncertainties of "inventory estimates of" anthropogenic emissions of…..	Melissa Weitz	Accepted	Revised.
27	1	6	409	409	Please add Breon et al. (2015, doi:10.5194/acp-15-1707-2015) to avoid a bias towards US studies.	Frédéric Chevallier	Accepted	Revised.
6394	1	6	409	409	et al, 2016' replace with 'et al.,'	Emmanuel Jonthan Mpeta	Accepted	Corrected.
8626	1	6	413		ciation is wrong no need of comma before brackets, please	Amanullah Dr.	Accepted	Corrected.
5956	1	6	414	414	Change sentence … concentration data and inverse and an inventory … to … concentration data and inverse modeling and an inventory …	Vincent Camobreco	Accepted	Corrected.
792	1	6	423	423	(see Box 6.3)	Wilfried Winiwarter	Accepted	Corrected.
6396	1	6	434	434	et al.' replace with et al.,'	Emmanuel Jonthan Mpeta	Accepted	Corrected.
6398	1	6	440	440	et al.' replace with et al.,'	Emmanuel Jonthan Mpeta	Accepted	Corrected.
28	1	6	440	441	Fortems-Cheiney et al. (2012, doi:10.1002/jgrd.50544) for HCFC-22 and Fortems-Cheiney et al. (2015, doi:10.1002/2015JD023741) for HFC-134a should be added. They have presented corrections to inventory estimates for USA, Europe, Japan and China.	Frédéric Chevallier	Rejected	Proposed references point to studies made with global model, operating at lower resolution, than typically used for national emission estimates. More detailed analysis of the study results is needed. No change was made in the text.
316	1	6	445	447	Repetition of previous statement in lines 393-397; delete.	Milos Tichy	Accepted	The comment has been addressed in SOD.
9884	1	6	445	446	Inaccurate text - needs revision. Suggest: "Inverse modelling to estimate UK emissions of HFC-134a (see Box 6.5) indicated a discrepancy when compared to national inventory estimates, and this evidence prompted a review of the assumptions applied within the UK inventory estimation model as part of the national inventory improvement plan." I also note that a further example of good practice could be added here, as the UK inventory and inverse modelling team have worked together historically to improve the calibration of the INTEM model, through the collection of more temporally resolved emission estimates (especially for N2O emissions from NA and AA production plant in the UK). This is especially useful where a small number of installations are high emitters of a given GHG, and the access to good quality spatial and temporal data enables the verification modelling to be significantly improved through better calibration.	David Glen Thistlethwaite	Accepted	Revised, added the text on good practice to section 6.10.2.2.
6400	1	6	449	452	Sentence not complete	Emmanuel Jonthan Mpeta	Accepted	Revised.
4868	1	6	450	451	Does the 'emission inventory' referred to here mean the inventory used to validate the atmospheric monitoring, and not the GHG emission inventory? If so, this could be clarified.	Elsa Hatanaka	Accepted	Revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
317	1	6	455	456	Sentence "Approach 1 has limitations to the consideration of correlation as it only allows for full correlation or independency between the variables." is in contradiction with the previous text.	Milos Tichy	Accepted	The comment has been addressed in SOD.
8628	1	6	455		ciation is wrong no need of comma before brackets, please	Amanullah Dr.	Accepted	Revised.
524	1	6	456	457	Table 6.1. Row CO2 City-scale. Column Strengths/ Successes: Number "2" corresponding to the footnote 2 is not showed as superscript.	Virginia Sena	Accepted	Revised.
526	1	6	456	457	Table 6.1. Row CH4. Column Future Development/ Possibilities: it is written "Reginal" instead of "Regional".	Virginia Sena	Accepted	Revised.
1470	1	6	456	457	HFCs verification based on atmospheric measurements is also reported for Switzerland, although with a simplified approach, not a full inversion. (see National Inventory Report, Annex 5.1)	Regine Röthlisberger	Accepted	Revised.
5610	1	6	456		CH (Switzerland) also reports HFC emissions (as UK and Australia)	Stefan Reimann	Accepted	Revised.
9534	1	6	456	456	The focus is not on natural but on total fossil fuel and natural fluxes, due to the limited ability to use measurements to separate the two. More isotopic (radiocarbon) and atmospheric potential oxygen (APO) measurements and analyses are needed to be able to separate natural from fossil fuel CO2 emissions.	Philip DeCola	Accepted	Revised.
9886	1	6	456	457	The entry in table 6.1 for the UK HFC "strengths" column is misleading and should be revised. The UK model was recalibrated there was not an EF "correction". Suggest the text be changed to "Revised EF" or "Recalibration of national model".	David Glen Thistlethwaite	Accepted	Revised.
29	1	6	456	456	For coherence, the row about HFCs should have a footnote with proper references.	Frédéric Chevallier	Accepted with modification	Footnote added, pointing to section 6.10.2.2 for text.
30	1	6	456	456	Please add Breon et al. (2015, doi:10.5194/acp-15-1707-2015) in footnote 2. Also note that the "2" in the table should be superscripted.	Frédéric Chevallier	Accepted with modification	Referred to more recent paper by Staufer et al., 2017 (in same group).

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1782	1	6	456	457	I would not characterize Miller et al. as a success for U.S. emission estimates of CH4, but instead something that highlights important considerations for using atmospheric measurements to compare with national GHG inventory estimates. The Miller et al. work compared to the EDGAR mapping of CH4 in the U.S., and found that livestock emissions are underestimated. However, when the U.S. methane emissions were mapped based on the GHG Inventory report, results were different. Using the Miller et al. results to update the US GHG inventory would not have improved estimates. Please see Maasakkers et al. http://pubs.acs.org/doi/full/10.1021/acs.est.6b02878.	Melissa Weitz	Accepted with modification	Agree that Miller et al., 2013 revealed a number of problems, without fixing them. Moved references to point to section 6.10.2.2 to avoid duplication of citations.
1784	1	6	456	457	There is no citation for national emissions estimates for U.S. for N2O and HFCs.	Melissa Weitz	Accepted with modification	Citations available in section 6.10.2.2, footnote modified.
9046	1	6	458	479	Although it is more challenging than CH4, CO2 emission estimates using satellite data such as GOSAT and OCO-2 have been conducted. Such activities should be clearly mentioned in this section.	Tsuneo Matsunaga	Accepted	Mention of CO2 studies added.
9166	1	6	458	479	It should be mentioned thay Japan, US, China, and Europe have short-term and long-term plans for GHG satellite observation and the satellite data continuity is becoming secure.	Tsuneo Matsunaga	Accepted with modification	New missions are mentioned.
318	1	6	460	482	To quantify uncertainty of trend is a quite complicated task due to correlations and non-linearity in formulas which are unavoidable and and cannot be quantified by a simplified way as Approach 1 for uncertainties of emissions. Moreove mentioned sensitivities A abd B mentioned are hard to understand and of unclear use. Recommendation: delete the whole part.	Milos Tichy	Accepted	The comment has been addressed in SOD.
7166	1	6	460	479	May add use of satellite data e.g.GOSAT for CO2 verification, especially in localized target areas. (or under section 6.10.2.3)	Masami Onoda	Accepted	Mention of CO2 studies added.
5888	1	6	460		For the paragraph starting on line 460, it may be useful to describe a full analytical inversion framework as well, in addition to the hot spot and linear regression method.	Vincent Camobreco	Accepted with modification	Added text separating analytical inversion from hot spot data analysis.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
96	1	6	461	479	OCO-2 has a high spatial resolution of 1.29 km 9 2.25 km so that it can be a feasible alternative for monitoring local target. It becomes possible to observe the amount of carbon emission from downtown facilities such as buildings and traffic facilities that could be identified in a high resolution of 1 km or less. UAV (Unmanned Aerial Vehicle) data can realistically measure carbon density at the level of almost field-survey standpoint.	Jung-Sup Um	Accepted	Mention of OCO-2 and work by (Nassar et al. 2017) added.
1786	1	6	461	461	Consider adding a description of GOSAT.	Melissa Weitz	Accepted with modification	Revised, review by Matsunaga et al. 2018 has been mentioned in the SOD.
8504	1	6	461	461	(adding the following senteces before "Satellite observations by GOSAT … ") Multiple GHG observing satellites are currently on orbit in operation. Their coverage extended to whole globe and temporal resolution is also improved since the world first satellite dedicated to GHG monitoring, GOSAT was launched in 2009. GOSAT covers whole globe by 54,000 obsrvatoin points every 3 days. GHG obsrvation from space has been advanced since the previous guidelines in 2006.	Osamu Ochiai	Accepted with modification	Mentioned review by Matsunaga et al. 2018.
8630	1	6	462		ciation is wrong no need of comma before brackets, please	Amanullah Dr.	Accepted	Corrected.
9044	1	6	472		(Matsunaga et al. 2018) is not listed in References. As it is a web (online) document, its URL (http://www.nies.go.jp/soc/en/documents/guidebook/) should be included in References.	Tsuneo Matsunaga	Accepted	Reference and URL have been included at final copy-editing stage.
31	1	6	474	476	"can be estimated using a simple regression model" is misleading. The prospects are good, but it would be misleading to write that we are there yet.	Frédéric Chevallier	Accepted	(Janardanan et al. 2016) did use a regression to fit model to observations. Revised to avoid [false] impression of simplicity.
4870	1	6	475	475	Is it 'large regions 'in' like the US or temperate Asia' instead of 'large regions like the US or temperate Asia' ?	Elsa Hatanaka	Accepted	One study cite used such large regions, other, more recent ones, target even smaller regions, e.g. in US.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6728	1	6	477	479	In reference to “With the expected availability of methane observations from new satellite sensors, the problem of observation numbers will be relaxed, and national scale emission estimates by hot-spot emission data analysis are expected to become possible", the former part of the sentence is vague. We suggest rephrasing to: "With the expected availability of increased methane observations in space-time". Specify some new/upcoming satellite missions- e.g. TROPOMI, GOSAT-2, GeoCARB). Recent and near-future global polar orbiting satellites (e.g. TROPOMI, GOSAT-2) have coarse spatial resolution of the order 50-100 km2 pixel resolution. A significant fraction of these relatively coarse pixels will be subject to cloud contamination, leading to a reduced sample size across both space and time. Thus, there is a need to have finer resolution satellite sensors, which would helping in enhancing the robustness of national-scale emission estimates.	David Lyon	Accepted	Revised.
1788	1	6	478	479	It is not immediately apparent how national scale emission estimates by hot-spot emissions data analysis will be possible. Please elaborate.	Melissa Weitz	Accepted	The comment has been addressed in SOD.
9522	1	6	480	492	The section GLOBAL TRENDS, ISOTOPIC COMPOSITION, AND TRACER CORRELATIONS omits any mention of radiocarbon (14C) measurements which provide a direct constraint of recently added fossil fuel CO2. These measurements allow partitioning into fossil fuel and biogenic fluxes that can be, at the local scale, used to evaluate AFOLU CO2. Likewise, there should be mention of the use of atmospheric potential oxygen (APO) measurements and analyses for these purposes. Correlations between enhancements in halocarbons and enhancements in CO are also used in the Swiss inventory report.	Philip DeCola	Accepted	Added 14C and APO to urban scale part.
1790	1	6	482	492	Cite new work on fires and Ch4 trends? https://www.nature.com/articles/s41467-017-02246-0.pdf?origin=ppub	Melissa Weitz	Rejected	Global trends are important part of science but loosely connected to national inventory, so the discussion would look too technical.
5890	1	6	487		This paragraph should probably address the uncertainties in the isotopic methods and the influence of the global sink as pointed out by Turner et al. (2017).	Vincent Camobreco	Rejected	Global trends are important part of science but loosely connected to national inventory, so the discussion would look too technical.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
32	1	6	491	491	Some or all of these correlations may actually depend on some variables (e.g., atmospheric temperature or technology factors) in an unknown way. See the analysis of measurements made in Paris, France, by Ammoura et al. (2014, doi:10.5194/acp-14-12871-2014) and Ammoura et al. (2016, doi:10.5194/acp-16-15653-2016).	Frédéric Chevallier	Accepted	To date, correlations were applied to tracers not affected by complicated processes. We have included text in the SOD to highlight such circumstances .
794	1	6	511	513	Inverse modelling is a very useful technique, good that it finds room here. However very few countries will be able to organize this themselves, and the overall weight it gets (by sheer length) seems out of proportion. Recommendation: move much of the material to an annex. As a minimum change, it would be worthwhile to acknowledge the benefits of centralized approaches as follows in the text of lines 511-513: "With several working examples (Manning …) of inverse modelling used for national reports, still the use of data products (global inverse models will be able to break down results and make them accessible to individual countries) in general may be the method of choice. If however a country is able to develop their own inverse model, they may take advantage of existing approaches. Several key steps ..."	Wilfried Winiwarter	Accepted with modification	Accepted suggestion on mention available alternatives, but decided to keep the subsection text in main body, to maintaining the text integrity.
33	1	6	515	515	The coverage should be sufficient for the sources within the country, rather than for the country as a whole.	Frédéric Chevallier	Accepted	Revised.
9536	1	6	529	574	We strongly suggest that another call out box such as this one is developed for the Swiss methane example of Henne et al. and that both this UK box and the Swiss box to be developed discuss the relationship between the inventory agencies and the inverse modeling agencies. In countries like France, Netherlands, and others where the measurements and the inverse modeling expertise already exists all that is left is to build the relationships and the trust and partnerships to yield the added value to the inventory building and reporting agencies. The big investments have already been made and it is wasteful not to take advantage of this. IPCC TFI could help by making such a statement in this report. Also, please note that the UNFCCC SBSTA language from COP23 has made such a statement in Agenda Item 8 Sub-item 12 and its footnote, see at link: http://unfccc.int/resource/docs/2017/sbsta/eng/l21.pdf	Philip DeCola	Accepted with modification	Added a paragraph on Collaboration between inverse modelers and inventory compilers in section 6.10.2.2. A box with a Swiss example was added.
7132	1	6	532	532	Replace 'The UK's government' with 'the UK government's'	Amanda Penistone	Accepted	Revised.
7134	1	6	535	535	The UK' instead of 'UK'	Amanda Penistone	Accepted	Revised.
796	1	6	537	537	(replaced by Bilsdale …	Wilfried Winiwarter	Accepted	Revised.
7136	1	6	537	537	Remove 'to'	Amanda Penistone	Accepted	Revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9888	1	6	558	559	The text in box 6.3 is a useful example but this wording goes far beyond the role of a guidance manual and the assertion regarding UK not achieving its Kyoto commitment by the same amount as estimated in the inventory does not present a balanced view given the large uncertainties in the inverse modelling. This statement is not needed - the point that the inverse modelling does nto present the same trend has already been made. Also note that the UK NIR presents the up to date situatioan annually - these statements of a comparison at one point in time should not be established into a guidance document. The guidance should be timeless text.	David Glen Thistlethwaite	Accepted	Text was revised, updated based on UK 2016 NIR, added notice of being year and country specific.
9538	1	6	563	565	The description of the comparison needs to be changed for accuracy. The inverse modeling result for methane is flat from 1990 till today and the early years are 3 year averages due to limitation of one measurement site and are one year averages in more recent years with more measurement sites. The error bars (uncertainty) are not the issue of not showing a downward trend. They show no trend within their uncertainty and the inventory converges to this value over time. Please correct the explanation.	Philip DeCola	Accepted	Revised, removed notice of the trend mismatch.
9890	1	6	569	573	Again the guidance text is going far beyond its remit here and making statements that infer errors in the UK inventory. In no way should this be cited in a guidance document. The text "assessment of missing / under-represented sources" and the two bullet points that follow should be deleted. Replace with more generic text that states that these differences in the modelling versus inventory data are reflected in the UK inventory uncertainty assessment, and contributes to the UK inventory improvement programme by escalating review of current UK methane emission estimates.	David Glen Thistlethwaite	Accepted	Revised, updated based on UK 2016 NIR.
7138	1	6	571	572	To avoid this report being out of date before it is released, please refer to the UK's 2018 inventory when this is available in spring 2018	Amanda Penistone	Accepted with modification	Revised, updated based on UK 2016 NIR, submitted in 2018
4872	1	6	575	577	A title name such as 'Criteria for Applying Inverse Model Estimates for Comparison with National Inventories' would be more simple.	Elsa Hatanaka	Accepted	Revised.
4422	1	6	583		Three-Four, letter case.	Kewei Yu	Accepted	Revised.
7140	1	6	583	583	it's not clear what 'Three-Four' means - this could be 'Three to four', 'Three - four' or 'Three/four'	Amanda Penistone	Accepted	Revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
34	1	6	584	585	National-scale inverse modelling cannot be made with a single site (to a useful precision). There needs to be a way to distinguish what comes from the rest of the world from what comes from within: we need at least two sites.	Frédéric Chevallier	Noted	In practice, this limitation is relaxed due to change in wind direction, there are days whereby the site sees the country's emissions and other days what comes from outside world (in Cape Grim, for Australia or Jungfraujoch for Switzerland). The main reason for using just one site is that maintaining sophisticated insitu continuous halocarbon observations is difficult. Text remains unchanged.
5612	1	6	585		UK and Switzerland	Stefan Reimann	Accepted	Revised.
798	1	6	588	588	… or lower than those of the the GHG inventory.	Wilfried Winiwarter	Accepted	Revised.
4874	1	6	588	592	Having the sentence 'For example, high emission inventory uncertainty is known for HFC emissions and many other fugitive emissions, while uncertainty of carbon dioxide emissions from fuel use is low.' between line 588 and line 590-592 obscures the point trying to be made, because it mentions the case of high uncertainty (HFC emissions) first. It might work better to put it behind lines 590-592.	Elsa Hatanaka	Accepted with modification	Text has been revised taking into account the comment.
1792	1	6	603	604	Would be helpful here to note the importance of the gridded inventory. With the steps in this table, a national comparison could be made, but if there are discrepancies, there isn't really a way to estimate what is causing the discrepancy. Or if there is good agreement, it isn't possible to know if it's resulting from combined over- and under-estimates.	Melissa Weitz	Accepted	Revised, prior inventory, and uncertainty included.
4016	1	6	603	604	In order to avoid mis-understandings that these observations can make GHG invenotories, please add the column "Region", Inverse model can not identify the emission sources, can indentify the region of some emission source, such as factories and vehicles. And also notes, the models data are limited for time series, ex 1990s. There are technical difficulty to compare with trend from 1990.	Hiroshi Ito	Accepted with modification	The introductory sentence on top of Table 6.3 is modified to more specifically state the temporal and spatial scope of the comparison, limiting is to whole country total and to the years when both inventory and inverse model products are available.
2154	1	6	605	886	Chapter 6.11 is an extremely well formualted piece of text!!! It is simple in wording, but yet scientifcally complete and precise. Well done. The challenge now is for all the sectoral volumes to be well in line with this general guidance on models - and particual so because much new guidance in the sectoral volumes has been provided with limited opportunity for cross-referencing. (Just a comment)	Erik Næsset	Accepted	The comment has been addressed in SOD.
4424	1	6	608	609	"good practice" in italic. Seems the case everywhere else.	Kewei Yu	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9892	1	6	614	622	This section of text is confused and largely unnecessary. It is over-complicated. Why not simply say that "higher tier methods using models that enable better representation of national circumstances are useful for reducing uncertainty in key categories and can also be designed to help provide better data resolution (such as temporal and spatial), which can be helpful for sub-national inventories and mitigation action tracking." Some of the statements in this section are neither accurate nor helpful: "Model development relies on data from measurements" (line 620) - really? This isn't always the case.; "models are used to estimate those emissions or removals that cannot easily be otherwise obtained" (line 620-621) - this statement may not be true (e.g. plenty of examples where Tier 1 or Tier 2 methods could be used instead) and if there are instances where it IS true there is no sttempt to justify this statement.	David Glen Thistlethwaite	Accepted with modification	Text clarified based on this comment.
9894	1	6	623	663	As the QA manager for the UK inventory, I have to say that I think this section needs a lot of work and I would be very happy to help the authors to develop something better than the current section. There are some good messages in here and I agree with what the section is trying to say, but it is not well-structured and does not provide clear guidance. It also includes some fairly trite or absurd statements: "models add value to original data" - this sort of statement isn't helpful, it doesn't provide any guidance. In my view this section needs to provide a simple introduction that draws out some of the key messages (such as the fact that the quality of model outputs are defined by the quality of the model inputs - data and assumptions). I support the statement that the use of models "do not remove the need for the original data to drive them". Then the section ought to fully focus on providing practical good practice guidance. I urge the authors to look at the guidance developed by the UK's Single National Entity, BEIS: https://www.gov.uk/government/publications/quality-assurance-guidance-for-models . I advocate a structured approach to presenting "good practice" that covers: (1) Data and assumptions - use of the best available country-specific data and assumptions, documenting their origin, and conducting checks on the transposition of the data and assumptions within the models; (2) structure and data flows - designing models to be clearly structured with a logical data flow through the model and ideally with separate sections of the model for data input, calculations, data outputs;	David Glen Thistlethwaite	Accepted with modification	This is too policy prescriptive - we cannot prescribe a UK specific approach. However the numbered points are valid and are included in the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
9894 (cont.)					(3) documentation of the model scope, the key equations that are applied, a user guide (which could be within-model comments or a separate document), and a clear location for documenting any issues that are identified in the model by users and for documenting the outcomes of quality checks; (4) conducting model verification checks at the point of model commissioning (testing the veracity of the model calculations) and documenting these (which could include the outcomes of formal peer reviews); (5) conducting checks on the model outputs during annual inventory compilation, to validate that the model is delivering accurate outputs, including (for example) time-series consistency checks, checks on IEFs against IPCC defaults, checks on the data for the latest year in the time series (is it broadly consistent with earlier years - if not, is this justified?), checks on recalculations since the previous inventory cycle.			
1794	1	6	629	630	The meaning of these sentences is unclear.	Melissa Weitz	Accepted	Text adjusted.
7142	1	6	630	630	Replace 'on the average' with 'on average'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
8632	1	6	670		(IPCC, 2010) comma improtant in such cases	Amanullah Dr.	Noted	EndNote "Environmental conservation" style was used to format references and citations.
528	1	6	677	678	Figure 6.2. It is written " Assess uncertianties" instead of " Assess uncertainties".	Virginia Sena	Accepted	The comment has been addressed in SOD.
530	1	6	677	678	Figure 6.2. It is written "Independant data needed to evaluation the full model" instead of "Independant data needed to evaluate the full model" or " Independant data needed to the full model evaluation".	Virginia Sena	Accepted	The comment has been addressed in SOD.
7144	1	6	684	684	suggest 'for use in an' inserted between 'selected' and 'inventory'	Amanda Penistone	Accepted with modification	The word "inventory" was deleted.
2152	1	6	753	753	error propagation: I understand that this term seems to have been adopted in the guidance, but isnt it an analythical estimate as opposed to simulations (Monte Carlo) that is meant here? They are both means to perform error propagation.	Erik Næsset	Rejected	These are the terms in the guidelines - in fact the error propagation method is not trully analytical due to the large errors.
532	1	6	764	764	It has to be a third "dot" under the sentence from 759 to 760.	Virginia Sena	Accepted	The comment has been addressed in SOD.
2150	1	6	774	774	Just "emissions"? GHG inventories are about sinks as well as sources.	Erik Næsset	Accepted with modification	"GHG Inventories" has been used.
534	1	6	776	777	"…should be made.." is repeated in the sentence. It may be: : "… (noting that references should be made to existing model documentation wherever possible):"	Virginia Sena	Accepted	The comment has been addressed in SOD.
800	1	6	777	777	delete one of two occurrences of "should be made"	Wilfried Winiwarter	Accepted	The comment has been addressed in SOD.
7146	1	6	777	777	remove the second 'should be made'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
1472	1	6	777	777	eliminate (should be made) at the beginning of the line: (should be made) to existing model documentation should be made wherever possible.	Regine Röthlisberger	Accepted with modification	Text revised.
4426	1	6	826	831	"Calibration and Checks", "model checks", letter case?	Kewei Yu	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
536	1	6	829	829	It is written "...optimization that at empts to derive…" instead of "...optimization that attempts to derive…".	Virginia Sena	Accepted	The comment has been addressed in SOD.
4344	1	6	829	829	"at empts" may be "attempts".	Naofumi Kosaka	Accepted	The comment has been addressed in SOD.
4428	1	6	873	874	"from" not "form"	Kewei Yu	Accepted	The comment has been addressed in SOD.
7148	1	6	873	874	use 'from' instead of 'form' in both these lines	Amanda Penistone	Accepted	The comment has been addressed in SOD.
8634	1	6	887	893	need improvement	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
7150	1	6	1129	1129	remove 'according'	Amanda Penistone	Accepted	The comment has been addressed in SOD.
4876	1	6	Table 6.1		It is unclear why 'Not used in national reporting' qualifies as a weakness. The Table is mixing what capabilities atmosperic measurements offer with whether or not they are used. It is better sorted by keeping it to strengths and weakness, and communicate the national examples etc in a different way. Also, the Table heading does not match the column headings.	Elsa Hatanaka	Accepted	The comment has been addressed in SOD.
4878	1	6	Table 6.1		What is the difference between 'National reporting' and 'National emission estimates' in column 'Strengths/Successes'?	Elsa Hatanaka	Accepted	The correct term is "national emission estimates".
4880	1	6	Table 6.2		Step 2: Gridded prior emissions data,' together with descriptions such as 'UK RAC Model' gives the impression that the the 'UK RAC Model' etc are gridded. 'Based on UK RAC Model' etc would be better.	Elsa Hatanaka	Accepted	The comment has been addressed in SOD.
5892	1	6	Table 6.2		Under Table 6.2, it could be useful to provide a satellite-based example here.	Vincent Camobreco	Accepted with modification	More text providing clarity has been added.
5894	1	6	Table 6.3		Beyond just looking at the national totals, the spatial distribution of fluxes can indicate weaknesses in the inventory. That aspect is missing here as it's very focused on national totals. I think inverse modeling can be a great tool to help guide improvements in the bottom-up in addition to verifying the final results.	Vincent Camobreco	Accepted	The comment has been addressed in SOD.
4882	1	6	Table 6.3		Under 'Using multiple products' - Is it normail to use 'recommend' in IPCC inventory guidelines?	Elsa Hatanaka	Accepted with modification	Text revised, "best practice".
4416	1	6			data sets or datasets, be consistent	Kewei Yu	Accepted	The comment has been addressed in SOD.
4418	1	6			nitrous oxide or N2O, methane or CH4?	Kewei Yu	Accepted	Text reviewed accordingly.
4420	1	6			Table 6.2, Quality Assurance/Qualtiy Control, letter case	Kewei Yu	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6116	1	6			(Proposal for an additional Box article) GOSAT is the first satellite to measure solar light penetrating into the Earth's surface and reflecting back to space with high spectral resolution using Fourier-Transform Spectrometer technology (Kuze et al., 2009). Onboard spectrometer can measure carbon dioxide (CO2) and methane (CH4) column density by differential optical absorption spectroscopy. Solar light-path modification by thin cloud and aerosol can be corrected using simultaneous measured absorption by oxygen, which is much more constant than CO2 and CH4. These robust analytical methods have overcome gradual performance change on orbit and provided accurate and precise long-term and global data with a single instrument remotely from space. Several working groups have derived CO2 and CH4 density routinely using their own algorithm and processors and each products are inter-compared. (Butz et al., 2011; Parker et al., 2011, Crisp et al., 2012, Yoshida et al., 2013, Buchwitz et al. 2017). Since its launch, measured data have been calibrated by frequent international campaigns and retrieved results have been validated from global ground network such as TCCON (Kuze et. al., 2016, Wunch et. al., 2011).	Akihiko Kuze	Accepted	Referred to A. Kuze et al.
6116 (cont.)					GOSAT is a pathfinder for subsequent missions such as OCO-2 in 2014 (Crisp et al., 2004), TanSat in 2016 (Liu et al., 2013), TROPOspheric Monitoring Instrument (TROPOMI) on Sentinel 5P in 2017 (Veefkind et al., 2013). Between OCO-2 and GOSAT, intercomparison has been performed in different levels: prelaunch calibration by exchanging each radiometric standard, radiance spectra on orbit, and retrieved CO2 density and these results agree within the allocated error budget (Sukuma et al, 2009, Kataoka et al, 2017). International collaboration on calibration, validation and data analysis has demonstrated long-term uniform quality and reliability of greenhouse gases remote sensing from space.			

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8502	1	6			Proposal for an additional Box article in 6.10.2.1 A series of GHG monitoring satellites have been launched and have since been providing global CO2 and other GHGs observations for the past decade. These observations and data are freely available to the public. Space agencies shared the significant advances in GHG monitoring from space in recent years and discussed steps for potential Space Agency's contributions to stakeholders. In the forum of the Committee on Earth Observation Satellites (CEOS), Space agencies discuss how satellite GHG data can best support improving the accuracy of National GHG inventories. Plans from space agencies are also in place to ensure the continuity of the future GHG satellite missions in the next decade as of COP-23. Recognizing the longevity of the GHG monitoring datasets from space, high quality GHG information will be essential for tracking progress toward the achievement of Nationally Determined Contributions (NDCs) and for stocktaking. Furthermore, integrating this information with ground-based measurements and modeling is important for a monitoring and verification system. In this context, CEOS and the Coordination Group for Meteorological Satellites (CGMS) have started an activity to define an optimum constellation of satellites to meet the requirement of such a monitoring and verification system since 2017. Further engagement of partnerships and collaborations between the relevant international entities includes: the relationship between CEOS and CGMS on the space component aspects, the partnership with the World Meteorological Organization (WMO) and the Group on Earth Observations (GEO) on the broader framework, and finally the relationships with the Global Climate Observing System (GCOS), UNFCCC, and IPCC TFI to better defining the role for space-based observations in the process of updating the inventory guidelines.	Osamu Ochiai	Noted	Our view is that this chapter provides the simplest methods to address data gaps and achieving time series consistency. No change has been made in the SOD text.
6948	1	7	24	24	Consider changing the title of the chaper to "Percursors and Indirect N2O indirect emissions" because CO2 is not covered as indirect. Otherwise see comment Vol1_Chp7_L103_181	Vitor Gois Ferreira	Rejected	Title should remain generic.
6616	1	7	26	102	Experts' guidance to authors from the Minsk and Wollongong meeting specified refinementts only to Section 7.2.1.5 and text box 7.2.	Frank Neitzert	Accepted	The comment has been addressed in SOD.
8636	1	7	27		no need of the sentence	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
6950	1	7	28	36	This paragraph is important, because it addresses issues related to the calculation of weighted added emissions using common metrics. However, it may be more general than this chapter and could be moved to chapter 1 in a more prominent position.	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4310	1	7	28	28	I suggest that the authors reconsider the word "Global warming potential-weighted greenhouse gas". IPCC Fifth Assessment Reports (Working Group 1, Chapter 8, Appendix 8.A) provide the GWP even for CFCs, HCFCs, NOx, NMVOC, CO and SO2. Some options are "The greenhouse gases covered in the 2006 IPCC Guidelines" (it is a similar word with the 2006 IPCC Guidelines, Vol.1, page 1.5) or "Well-mixed greenhouse gases except for ozone-depleting halocarbons".	Naofumi Kosaka	Rejected	Wording uses the phraseology of the 2006 IPCC Guidelines.
4430	1	7	29		Volumes? Letter case	Kewei Yu	Accepted	The comment has been addressed in SOD.
4432	1	7	32		global temperature is not commonly used.	Kewei Yu	Accepted	The comment has been addressed in SOD.
6618	1	7	32	35	Delete mention of GTP metric. Minsk guidance to authors "Avoid mention of specific metrics but could warn on implicantions of different types…".	Frank Neitzert	Noted	The discussion on GTP metrics is out of the scope of the 2019 Refinement.
4434	1	7	38		nitrogen oxides	Kewei Yu	Accepted	The comment has been addressed in SOD.
4436	1	7	39		CO and NOx, do not repeat the definitions, letter case. It happens in other places.	Kewei Yu	Accepted	The comment has been addressed in SOD.
4438	1	7	42		Earth	Kewei Yu	Accepted	The comment has been addressed in SOD.
8638	1	7	65	68	need improvement	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
378	1	7	97	102	What about the issue of open burning	Jamidu Katima	Accepted	The comment has been addressed in SOD.
6952	1	7	103	181	Some relevant current reporting guidelines (e.g. UNFCCC's new CRF tables, adopted by dec. 13/CP.20) include reported for indirect CO2 from the atmospheric oxidation of CH4, CO and NMVOCs, and enhanced explanations on this part is quite important (some countries should some difficulties in separating direct and indirect CO2 emissions, from instance). Altough, in principle the informaiton and methodology in box 7.1 (actually box 7.2) is very relevant and could be part of a self standing section, it may have to remain in a box since reporting of indirect CO2 is not mandatory. Othewise, the placement of this part could fit better section 3, if that would cover indirect emissions from CO2.	Vitor Gois Ferreira	Accepted with modification	Box 7.2 removed but the structure of the chapter was not changed. The intention is, not to prejudge any reporting requirements under the UNFCCC.
6648	1	7	103	181	It is recommended that section 7.2.1.5 be edited to be more concise and clear and maintain the authors' instructions	Frank Neitzert	Accepted	Comment too generic to trigger specific amendments. But section has been revised.
6620	1	7	105	108	Minsk guidance to authors: need to 'make clear that a sufficient inventory contains only emissions in Volumes 2-5'. The elaboratons do not make that clear and the detailed information provided later on seems to imply otherwise.	Frank Neitzert	Accepted with modification	This is is properly dealt with in Chapter 8. As such, chapter 8 was refined to provide greater clarity about the changes made across all the sectoral volumes.
6622	1	7	107	108	Need appropriate context about the current GWP with regards to CH4 oxidation, if Boucher et al. reference is to be used.	Frank Neitzert	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
6624	1	7	108	108	Correct text to read 'Box 7.2' and not 'Box 7.1'	Frank Neitzert	Accepted	The comment has been addressed in final editing.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6626	1	7	108	109	Missing second paragraph in Section 7.2.1.5 from the 2006 IPCC Guideline. This paragraph has relevant context on the sources and contribution of direct GHG relative to non-CO2 gases.	Frank Neitzert	Accepted	However, the contents has been addressed in box 7.2 in FOD. The text in box 7.2 is changed for the SOD to become guidance text.
6628	1	7	109	109	Correct text to read 'Box 7.2' and not 'Box 7.1'	Frank Neitzert	Noted	Corrected during final editing.
6630	1	7	110	110	Edit heading to make it more specific to indirect CO2. Suggest the following 'Calculating oxidation of CO, CH and NMVOC in the atmosphere from carbon-containing compounds'.	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6632	1	7	113	114	What are the two groups? What GHG emissions sources are missing, if compilers are only required to include those identified in Volume 2 to 5? Suggestion 1) specify the two groups, following with additional context and 2) be specific/clear as to what's needed (direct GHGs) and not in the inventory.	Frank Neitzert	Accepted	The comment has been addressed in SOD.
4312	1	7	114	114	It seems some words are missing between "are" and "(Gilenwater 2008)".	Naofumi Kosaka	Accepted	The comment has been addressed in SOD.
6954	1	7	117	120	An additional explanation that this is also the result that the oxidation factor is 1, could be useful in this chapter	Vitor Gois Ferreira	Accepted	Clarification added in main text and footnote 5 and 6.
4314	1	7	118	123	I propose to replace the sentences "IPCC default carbon content … category 1A." by "default carbon oxidation factor (100 percent) assumes all carbon in the fuel is oxidized to CO2 in the atmosphere. It means these inputs of CO2 from fossil fuel combustion related emissions of CH4, CO, and NMVOCs are already accounted for under the Energy sector category 1A. Countries may use country-specific carbon oxidation factors with less than 100 percent, assuming the small fraction of carbon remaining as un-oxidized solids, for example soot or ash (IPCC, 2000, 2006; IPCC/UNEP/OECD/IEA, 1997). It is considered that CO2 emissions from the atmospheric oxidation of CH4, CO, and NMVOCs are not included in the current inventories, if countries use country-specific carbon oxidation factors with less than 100 percent and countries use a direct measurement method to estimate CO2 emissions from fuel combustion."	Naofumi Kosaka	Accepted	The comment has been addressed in SOD.
6634	1	7	119	121	This statement 'except the small fraction of carbon remaining as unoxidized solids…' contradicts the text leading up to it, if the default IPCC emission factors for fuel combustion include the oxidizatin of all carbon in the fuel.	Frank Neitzert	Rejected	Text is a true statement. The 2006 IPCC Guidelines for simplicity assumes 100% oxidation for default CO2 emission factors.
6956	1	7	124	124	CO2 from biological sources; please check	Vitor Gois Ferreira	Accepted	Expression "biogenic carbon" (based on Glossary of 2006 IPCC Guidelines) used instead.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6636	1	7	132	137	The statement in line 133 to 137 is incorrect. The 2006 IPCC fugitive methods are not based on 'fuel consumption statistics' as noted. In general, fugitive estimates are based on production statistics (raw volumes).	Frank Neitzert	Accepted	The comment has been addressed in SOD.
2352	1	7	132	132	‘Methane' should be 'CH4'	Changliang Shao	Accepted with modification	(Starting a sentence with a formula).
2354	1	7	148	149	‘methane (CH4), carbon monoxide (CO)’ should be 'CH4, CO'	Changliang Shao	Accepted	The comment has been addressed in SOD.
2356	1	7	153	153	Methane, carbon monoxide (CO)' should be 'CH4, CO'	Changliang Shao	Accepted	The comment has been addressed in SOD.
2358	1	7	155	155	‘methane' should be 'CH4'	Changliang Shao	Rejected	Disagree (Starting sentence with a formula?).
4316	1	7	159	159	I suggest that the authors replace "0.6" by "0.6 for solvent use and 0.85 for other source categories" in order to be consistent with the description of lines 175 through 181.	Naofumi Kosaka	Accepted	Text revised accordingly.
6638	1	7	164	164	Some information in Table A7.1 is contradictory to earlier statements made in line 115 to 123. For example, in Table A7.1, column 'Already accounted for in the inventory', lines A. Fuel Combustion Activities and 2.d. Flaring, 'No' has been used to indicate indirect sources. This contradicts 'the IPCC default carbon content for Co2 emission factors assume all carbon in the fuel is oxidized to CO2....'. Correct 'No' to 'Yes'.	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6640	1	7	166	169	This paragraph is new and should not be shaded grey.	Frank Neitzert	Accepted	The comment has been addressed in SOD.
6958	1	7	166	169	This paragraph does not appear to be part of the 2006 Guidelines (unless I am not using the most updated version with errata). If not, please remove shaded	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
4318	1	7	179	181	I suggest that the authors describe the reason or reference of average carbon content of 85 percent.	Naofumi Kosaka	Accepted	The comment has been addressed in SOD.
4442	1	7	181		better use 85%	Kewei Yu	Rejected	Text instead of percentage symbol is used to be consistent with the rest of the chapter and other chapters in this volume.
8640	1	7	182	188	need improvement	Amanullah Dr.	Noted	Text not amended because of lack of specificity.
8642	1	7	189		move to next page	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
6962	1	7	190	195	(and also the introduction part of 7.3 in the original 2006 GL) Countries, when preparing their inventories, show some level of uncertainty regarding calculation of indirect N2O emissions from the waste sector, in particular wastewater. Current section 6.3 in V5_C5, provides methods for indirect N2O emissions from leaching of wastewater, and some clarity in chapter v1_c7 that these indirect emissions are covered could improve hte general understanding of inventories. In addition, if the inventory estimates NOx or NH3 emissions from SWD, wastewater or open-burning, it is not very clear if these emissions could be also calculated based on the methodology under 7.3.1	Vitor Gois Ferreira	Rejected	Authors of Volume 5, Chapter 5 came to the conclusion that it would be appropriate to REMOVE the term DIRECT or INDIRECT emissions in the context of waste water treatment.
2360	1	7	194	194	Emissions' should be 'emissions'	Changliang Shao	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6642	1	7	230	232	Experts' guidance to authors from the Minsk and Wollongong meeting specified refinementts only to Section 7.2.1.5 and text box 7.2.	Frank Neitzert	Accepted	Text has been deleted.
6960	1	7	230	232	This part is also important and could be made more clear, by indication of what sources and tables and specifying that the current UNFCCC guidelines are those adopted by decisions 13/CP.20 and 6/CMP.9	Vitor Gois Ferreira	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
1474	1	7	248	249	I don't quite understand the entries in column "Already accounted for in inventory?". It seems as if the logic is inverted. For example line "A. Fuel combustion activities", it is stated "No", however, the explanation provided in the main text and in column "Explanation" states, that if calculated using the carbon content of fuels as emission factor, emissions are tipically included. This is a contradiction. For Coal mining or venting of natural gas, on the other hand, the answer in column "Already accounted for in inventory?* is yes, but I consider these emissions as not accounted for.	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
1476	1	7	248	249	footnote (d) in the table needs rewording. As it is now, I don't understand it.	Regine Röthlisberger	Accepted	The comment has been addressed in SOD.
4324	1	7	248	249	I suggest that the authors replace the column title "Already accounted for in inventory?" by "Already accounted for in Tier 1 methodologies?". Then, Yes in that column should be No, vice versa.	Naofumi Kosaka	Accepted	The comment has been addressed in SOD.
6964	1	7	248	248	The reference "Already included in the inventory" is unclear. Does it mean, as direct emissions? Together with direct emissions (in which case No for Fuel combustion activities could be incorrect	Vitor Gois Ferreira	Accepted	Column title revised to enhance clarity.
4320	1	7	248	249	I suggest that the authors replace "carbon content factors" by "default carbon oxidation factor" under "Explanation" column of "Fuel Combustion Activities" and "Incineration and open burning of waste" in order to be consistent with the 2006 IPCC Guidelines, Vol.2, Ch. 1, Table 1.4 and Vol.5, Ch.5, Section 5.4.1.3.	Naofumi Kosaka	Accepted with modification	"Oxidation factors" have been added under fuel combustion.
4322	1	7	248	249	I suggest that the authors reconfirm the default emission factors of fugitive emissions from fuels take into account the CO2 from atmospheric oxidation of CH4, CO and NMVOCs, because the emission factors will be refined in the 2019 refinementt (see Volume 2, Section 4.2.2.3).	Naofumi Kosaka	Noted	Emission factors included in Volume 2, section 4.2.2.3 do not and will not address oxidation to CO2 in the atmosphere. No change has been made to the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6966	1	7	250	250	AFOLU, forests in particular, may be responsible for biogenic emissions. The title of this table could clarify that these are non-biogenic NMVOCs	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.
6644	1	7	250	250	Minsk guidance to authors indicated that 'there is no intention to include additional gases or emission factors.' These splits appear to be emission factors used to split the portion of NMVOCs by activities. Furthermore, this is based on data from Finland and would not necessarily be representative for other countries, considering that NMVOCs are process- and technology-dependent. In addition, it should be clarified that fuel combustion estimates based on default values assume that all carbon is combusted and released as CO2, thus indirect CO2 emisisons from NMVOC are already accounted for (including those from) flaring. This is also true for CO, and CH4 from fuel combustion and flaring.	Frank Neitzert	Noted	Split of NMVOC is noted; has been based on survey of NMVOC speciation emission data; it is assumed that it is a robust assumption that similar products have similar composition in different countries. The table has been corrected to reflect that combustion estimates based on default factors account already for indirect CO2 emissions. Table A7.1 also stipulates that for combustion activites, a complete oxidation factor is assumed.
4018	1	7	250	251	Would you make a default carbon contents by sources? 0.6 for all sources seems smaller.	Hiroshi Ito	Rejected	Suggestion is not coherent with literature from (Seinfeld and Pandis, 1998) and (Boucher et al, 2009).
6646	1	7	253	253	Minsk guidance to authors indicated that 'there is no intention to include additional gases or emission factors.' Percent carbon information in Table A7.3 appear to be intended for use as emission factors or to derive emission factors.	Frank Neitzert	Accepted	Clarifying text added.
6968	1	7	253	253	I can't find a comprehensive source for these values, but would not be expected that the carbon content of these susbatnces is known, or at least a good estimate could result from chemical composition? Why the need to make reference to countries' inventories? The use of country references frequently raises questions concerning the applicability of values in the IPCC to other countries, and this ambiguity should be avoided.	Vitor Gois Ferreira	Accepted	Clarifying text added.
4440	1	7			CO. A sentence should not be started with an abbreviation.	Kewei Yu	Accepted	The comment has been addressed in SOD.
4836	1	7			Reporting guidance of indirect gases should be included in this refinementts..	Taka Hiraishi	Noted	No action can be taken because comment is out of scope of 2019 Refinement.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
5624	1	8			It is recommended that IPCC requires nations to also report black carbon. Black carbon is a climate forcing agent and has huge direct health impacts. Some nations act more strongly on air pollution and black carbon than climate actions, so including black carbon in national GHG inventories but could help align climate actions and air pollution actions, making stronger case for both and maximising impact of efforts. In addition, nations often already have good data available on black carbon so there should be little extra burden on data collection. In fact, we are seeing some cities already doing so. For example, Mexico City has been producing integrated inventories to cover both GHGs and black carbon.	Mingming Wang	Noted	No action can be taken because comment is out of scope of 2019 Refinement. Methods for estimating emissions of black carbon are outside of the scope of the 2019 Refinement.
9716	1	8			It is strongly recommended that the Common Reporting Format (CRF) split the reporting of fuels (and emissions) from heat production and electricity production, to enable calculation of country specific emission factors for grid electricity.	Mingming Wang	Noted	No action can be taken because comment is out of scope of 2019 Refinement. CRF is not an IPCC Product. It is a product based on a decision made by the Parties to the UNFCCC.
9744	1	8			It is recommended that IPCC requires nations to use latest versions of GWP values in order to increase comparability between nations. It is also strongly recommended that IPCC requires (or strongly recommends) nations to use GWP20 values instead of GWP100 for short-lived pollutants such as CH4 emissions to properly reflect their impacts. As a demonstration, we analysed inventories from 12 large cities across the globe, and noticed that their total emissions would increase by up to 83.8% (with an average increase of 30.64%) when using GWP20 for CH4 instead of GWP100. The biggest impacts were observed in the Waste sector, where emissions increased by 62% ~ 200%. As increased climate action is becoming despairingly urgent, we need to emphasize the impacts of methane - especially over the medium-term, a timeframe of growing concern to scientists and decision makers. Aggressive action to reduce methane across all sectors can deliver a 0.5º in temperature reduction by 2050. Waste sector can contribute to at least 25% of those reductions, and nations, cities and private sectors tend to have more power and influence on waste sector. Therefore it would be a huge concern and a big missed opportunity if the impacts of methane emissions are not fully realised and misled by the use of GWP100.	Mingming Wang	Noted	No action can be taken because IPCC should not give policy prescriptive guidance. The IPCC guidance for national inventories provides methods for estimating emissions (and removals as appropriate) of each gas, irrespective of their GWP values. The greenhouse gas "accounting" framework should be discussed and decided by the Conference of the Parties to the UNFCCC, not by the IPCC. Decision on the GWP values to be used under the UNFCCC reporting/accounting should be made by the UNFCCC.
4444	1	Annexes	21		Chapter 7, letter case	Kewei Yu	Accepted	The comment has been addressed in SOD.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7850	1	Appendices	D	D	Change title of column D "Gas" to "Greenhouse Gas". This change will also have to be made on Volume 1 Chapter 3 line 490 and table 3.1 from the same document	Raul Salas Reyes	Accepted	The comment has been addressed in SOD.
8592	1				In refernces section only few refernces are given and most of them are very old. We must include new literture of 2018, 2017, 2016 and so on.	Amanullah Dr.	Accepted	The comment has been addressed in SOD.
6946	1				As a general comment, the additions and refinementts to volume 1 appear to be very well advanced, transparent and improving the understanding of the inventories.	Vitor Gois Ferreira	Accepted	The comment has been addressed in SOD.