Review Comments by Experts on Second 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
760	1		252		there is need to name at least one of those agencies.	Chukwuma Anoruo	Accepted	Figure 1.0 Illustrative example of GHG Inventory institutional arrangements structuring.
762	1		270		make statement readable "classical statistical"	Chukwuma Anoruo	Noted	Not sure where the issue is for the Authors to address.
996	1	1	49	49	This is a minor comment to the 2006 IPCC GL themselves. Pg 1.5 of 2006 GL, in relation to the definition of GWP given therein "...GWP compares the radiative forcing of a tonne of a GHG over a given time ... to a tonne of CO2." This statement is incorrect, because the concept of GWP applies only to anthropogenic emissions, and in fact strictly speaking to atmospheric fractions of those emissions that are left in the atmosphere over time, i.e., above a natural background concentration. It should then read: "GWP compares the radiative forcing of a tonne of a GHG emissions ... to a tonne of CO2 emission, over a given time. SImply apply the GWP definition in the GLOSSARY, lines 25-27.	Francesco Nicola Tubiello	Rejected	Update of GWP concept is out of scope of the 2019 Refinement.
2228	1	1	58	59	This is a very relevant topic for compilers to have clear from the beginning as new guidace. It would be really useful to include a figure/graphic with the cycle of the GHG inventory which is applicable to all countries. A possibility is to improve Figure 1.1 Inventory development cycle from Chapter 1 from 2006 IPCC guidelines. This will help beginners but also those more experienced to structure work. From personal experience working with countries, I noticed that it is very useful material already produced and used by countries under the CGE/UNFCCC. It might be also very relevant to link all this section to the MRV framework, just to connect and be consisten with what is also included in already existing publications. Actually, the IPCC guidelines are key for the MRV framework and move to the ETF.	Rocio Danica Condor Golec	Noted	Chapter addresses broader uses of GHG inventory data in Box 1.0a, and Table 1.6 provides an example workplan that outlines steps in an inventory cycle.
2230	1	1	58	59	It might be useful to include the word "institutional" in the title and the whole new guidance. Proposal: NATIONAL GHG INVENTORY INSTITUTIONAL ARRANGEMENTS. Many of the literature that has been shared with countries use this term.	Rocio Danica Condor Golec	Noted	"institutional" is a part of a broad inventory arrangements, which is introduced in section 1.4.1.
6168	1	1	63	63	Extraneous "it" in this sentence.	Carolyn Maxwell	Accepted	Text corrected.
4658	1	1	63	63	Delete "It" that is repeatable two times in the second sentence. It is better to say "Instead, it provides…"	Nataliya Stranadko	Accepted	Text corrected.
456	1	1	63	64	The second sentence in this line should probably ready: Instead, it provides approaches and examples …	Klaus Radunsky	Accepted	Text rewritten and corrected.
4660	1	1	64	64	"…inventory arrangements that could be useful". Useful for whom? It would be relevant to state the recipients (useful for national governments, GHG inventory experts, etc.).	Nataliya Stranadko	Accepted	Revised text to include the word "users".
7920	1	1	66	66	typo. Should be "…national GHG inventories improve over time…"	Matthew Prescott	Accepted	Text rewritten and corrected.
458	1	1	66	67	It is suggested to change the word order: .. That they can meet reporting requirements and can inform national and international stakeholders on the …	Klaus Radunsky	Accepted with modification	Revised sentence to remove mention of stakeholders and more generally refer to providing useful information.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1890	1	1	72	91	The air pollutant" inventories mentioned in this box appear to be in fact the National Air Emissions Accounts, compiled in many countries separately from the NGHGI—and under legal requirements in the EU. For the latter, it should be mentioned that the international guidelines regulating air emissions accounts are the System of Environmental Economic Accounts Central Framework (SEEA CF) for energy and industry, and the SEEA Agriculture Forestry and Fisheries for AFOLU (https://seea.un.org/ and http://www.fao.org/economic/ess/environment/methodology/en/). The text should mention that bridging tables for classifications and definitions across these processes exist, pointing to them as further example of how to better integrate different reporting processes at national and international level.	Jessica Chan	Accepted with modification	Added text to Box 1.1 on other environmental and sustainability data gathering processes, including environmental accounting efforts and SDGs.
2154	1	1	72	91	The air pollutant" inventories mentioned in this box appear to be in fact the National Air Emissions Accounts, compiled in many countries separately from the NGHGI—and under legal requirements in the EU. For the latter, it should be mentioned that the international guidelines regulating air emissions accounts are the System of Environmental Economic Accounts Central Framework (SEEA CF) for energy and industry, and the SEEA Agriculture Forestry and Fisheries for AFOLU (https://seea.un.org/ and http://www.fao.org/economic/ess/environment/methodology/en/). The text should mention that bridging tables for classifications and definitions across these processes exist, pointing to them as further example of how to better integrate different reporting processes at national and international level.	Julian Chow	Accepted with modification	Added text to Box 1.0a on other environmental and sustainability data gathering processes, including environmental accounting efforts and SDGs.
2232	1	1	72	91	Box 1.1 This box is fine however it is not linked to any content in the document that can help to understand why this information has been included in the box. I assume here we are trying to give elements to reinforce the preparation of a national GHG inventory, therefore, bottom-up or top-down can be more relevant that addressing "subnational GHG inventory compilation" (example that is more pertinent and applicable is a region/province level than cities). Example of countries working in this might be useful to reinforce this section - Mexico or Colombia can be an example and also other AI countries in EU. The second section "GHG and Air Pollutant inventory compilation synergies" also may need more explanation otherwise I might think that countries can get confused. It might be helpful to talk on the UNECE process and provide examples. Probably a NAI country is Chile alerady making this effort.	Rocio Danica Condor Golec	Accepted with modification	Added reference to UNECE in text on air pollutant inventories in Box 1.1. Cross reference to Box was added in text preceeding it. Text on air pollutant inventories revised to improve clarity.
3798	1	1	72	91	The box on linkages of GHG inventory activities with other related data collection and reporting needs should be extended to include air emission accounts as a distinctively seperate, but closely related, colletion and reporting need. Air emission accounts are part of the System of Environmental Economic Accounting adopted by the UN Statistical Commission. Reporting is a legal obligation for European Union Member States (Regulation No 691/2011 on European Environmental Economic Accounts (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1416221752426&uri=CELEX:02011R0691-20140616).	Andrea TILCHE	Accepted with modification	Added text to Box 1.0a on other environmental and sustainability data gathering processes, including environmental accounting efforts and SDGs.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
998	1	1	72	91	The box "Other related data collection and reporting needs" should be broader than the two examples provided. Broader benefits/applications, intended as those aimed, among other things, at improving the timeliness and efficient use of resources (line. 70 of this chapter), should be those benefiting the full national statistical system—beyond the NGHGI. To this end, the 2019 revision of the 20016 IPCC guidelines should mention the major international data reporting processes beyond the UNFCCC, as the ultimate goal is to benefit production of improved national statistics for multiple reporting processes. One of the two examples provided in the Box (air pollutants) already addresses very well the above comment, as it links NGHGI processes to other, non-UNFCCC process of importance internationally, in this case the Air Emissions Accounts compiled in many countries under the aegis of the UN Statistical Commission (see more comments on this next). It is nonetheless suggested that, among non-UNFCCC processes, the Box –or even better, the text linking to the Box--should mention the SDG process.	francesco nicola tubiello	Accepted	Added text to Box 1.0a on national statisical systems, as well as other environmental and sustainability data gathering processes, including environmental accounting efforts and SDGs.
7922	1	1	72	91	It could be useful to include a specific mention of GHG emissions accounts (those following SEEA methodology) in this box, since they rely on most of the same data and are in many was comparable. A useful approach for dealing with this in Canada has been to publish "reconciliation items" with the GHG account to explain to users the differences in the estimates between it and the inventory.	Matthew Prescott	Accepted with modification	Added text to Box 1.0a on other environmental and sustainability data gathering processes, including environmental accounting efforts and SDGs.
1000	1	1	85	91	With reference to the example provided in the Box on Air Pollution data, it is noted that the text points to "successful integration" (between NGHGI and other processes) but never expands on the concept. It is recommended that, in keeping with the previous comment, a bit of text linking to this Box is devoted to explaining what is meant by ''successful integration''. From the point of view of the international statistical community, successful integration of international and national statistical processes should involve serious efforts aiming at harmonizing definitions and classifications across different reporting processes. When this is not possible or not desirable, the provision of bridging maps between different reporting processes is a fundamental tool in facilitating efficiency and timeliness in the production of national statistics. For instance, there are existing bridging tables for air emissions accounts to NGHGIs (SEEA to UNFCCC; published by EUROSTAT); or for FAO/IPCC land use categories, published by the FAO; etc.). It is suggested that it is in the interest of these IPCC guidelines--and thus of national inventory compilers worldwide—to direct some efforts in this direction.	Francesco Nicola Tubiello	Rejected	The SOD text does not use the term "successful integration". Text has been revised to clarify GHG and air pollutant inventories may be done in a cooperative or integrated manner. But it is beyond the scope of the 2019 Refinement, and especially this Box to provide detailed guidance on the harmonization/integration of statistical systems.
8694	1	1	86	88	In fact 'efficiency' is addressed in the last sentence of this paragraph, here I suggest to stress consistncy. Suggest: " This integration can improve consistency across the inventories, as….	Zbigniew Klimont	Accepted with modification	Text in Box 1.0a revised to refer to "quality" instead of "efficiency".

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4662	1	1	92	92	Delete the word "governance". Institutional arrangements and governance are not the same. Governance is a style of governing (processes) that includes many elements (institutions, network, leadership, public participation, etc.), decision-making and policy implementation. Institutional arrangement is just one element (process) of governance. There are many definitions of Governance depends on discipline. However, the most common and cited definition with five propositions (true or false) is given in the Stoker's article.	Nataliya Stranadko	Accepted	Word deleted. The referred article is an academic article on "Governance" that accompanies comment ID 4664. The author proposed Governance is the wrong word for what the text is explaining.
4664	1	1	92	92	Stoker's article (Excel sheet didn't allow to enter the supporting document title in the previous line).	Nataliya Stranadko	Accepted	Word "governance" deleted from section title. See comment ID 4662.
2674	1	1	92		Could the IPCC provide some discussion on the importance of the sustainability of the GHG inventory process? It is important for the IPCC to recognize that not all countries have the basis for establishing the necessary institutional arrangements, and they are very much ad hoc.	Takeshi Enoki	Accepted	Added text to 1.4.1 to address importance of sustainable institutional arrangements.
6170	1	1	95	95	wording missing. Should read it provides some examples OF common concepts…	Carolyn Maxwell	Accepted	"of" added to sentence.
460	1	1	95	95	It is suggested to insert a comma after "examples": …this section provides some examples, common concepts and tools that …	Klaus Radunsky	Accepted with modification	Sentence has been rewritten for clarity.
7924	1	1	95	95	typo. Comma needed after "some examples"	Matthew Prescott	Accepted with modification	Sentence has been rewritten for clarity.
1002	1	1	97	100	The 2006 GLs at least paid some lip service to the role of National Statistical Agencies, or Offices (NSOs) in the design and implementation of functioning national statistical systems. By contrast, this section appears to focus exclusively on systems centered around NGHGI processes, without mentioning that the development and implementation of national statistical systems at large may already be regulated by law, often with NSOs at the center of the system. Conversely, in a manner that is considered unhelpful by this reviewer, the text here gives the impression that institutional arrangements for NGHGI may happen in a vacuum, or worse, that they can take precedence over relevant existing national statistical arrangements. Kindly modify the text to convey the more generic approach to build national statistical systems aimed at serving a variety of reporting processes, one of which is the UNFCCC/IPCC NGHGI process. Kindly consult with the international statistical community, represented by the UN Statistical Commission and serviced by the UNSD, for improving these fundamental concepts throughout this chapter.	Francesco Nicola Tubiello	Accepted	Section 1.4a - introductory text has been augmented with discussion of the importance of cooperation or integration with national statistical systems.
7926	1	1	98	100	Perhaps include transportation ministry or agency in this list	Matthew Prescott	Accepted	Transportation added to list.
462	1	1	99	99	It is suggested to delete a bracket after "agencies": .. And or agencies, academic/research institutions ..	Klaus Radunsky	Accepted	Bracket deleted.

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1888	1	1	101	103	Before countries look at the need for new laws, they should be advised to look at which institutional arrangements already exist in the country and are regulated by Law, to avoid re-inventing the wheel and likely produce overlapping processes that in turn would reduce overall national data efficiency. Rather, these GLs should recommend that NGHGI identify and accommodate into existing national statistical systems, rather than the other way around. In this manner, national statistical processes are improved in support of multiple reporting processes—of which the UNFCCC/IPCC is only a part, considering the quickly growing new demands under the SDG process. The new pages added for this revision seem instead to go in the opposite direction.	Jessica Chan	Accepted	Text added to end of section 1.4.1 referencing that any laws or directives should be considered in the context of existing national statistical systems.
2152	1	1	101	103	Before countries look at the need for new laws, they should be advised to look at which institutional arrangements already exist in the country and are regulated by Law, to avoid re-inventing the wheel and likely produce overlapping processes that in turn would reduce overall national data efficiency. Rather, these GLs should recommend that NGHGI identify and accommodate into existing national statistical systems, rather than the other way around. In this manner, national statistical processes are improved in support of multiple reporting processes—of which the UNFCCC/IPCC is only a part, considering the quickly growing new demands under the SDG process. The new pages added for this revision seem instead to go in the opposite direction.	Julian Chow	Accepted	Text added to end of section 1.4.1 referencing that any laws or directives should be considered in the context of existing national statistical systems.
2234	1	1	101	103	It might be really useful to provide example of law or directives from countries (examples from NAI and AI countries).	Rocio Danica Condor Golec	Rejected	Comment is outside of scope of the 2019 Refinement. The provision of example may imply it is providing legal guidance.
1004	1	1	101	103	Before countries look at the need for new laws, they should be advised to look at which institutional arrangements already exist in the country and are regulated by Law, to avoid re-inventing the wheel and likely produce overlapping processes that in turn would reduce overall national data efficiency. Rather, these GLs should recommend that NGHGI identify and accommodate into existing national statistical systems, rather than the other way around. In this manner, national statistical processes are improved in support of multiple reporting processes—of which the UNFCCC/IPCC is only a part, considering the quickly growing new demands under the SDG process. The new pages added for this revision seem instead to go in the opposite direction.	Francesco Nicola Tubiello	Accepted	Text added to end of section 1.4.1 referencing that any laws or directives should be considered in the context of existing national statistical systems.
464	1	1	106	107	The following wording is suggested: A useful concept to introduce, and use to coordinate and prioritize GHG inventory activities are the countries' monitoring and ..	Klaus Radunsky	Accepted with modification	Text revised for readability.
1892	1	1	106	114	In keeping with a few comments above, it is noted that the appropriate context for this guidance should be set within the larger national statistical, aimed at serving as efficiently as possible many reporting processes--and of which the NGHGI should be an integral part.	Jessica Chan	Accepted	Text added to end of section 1.4.1 referencing that any laws or directives should be considered in the context of existing national statistical systems.
2156	1	1	106	114	In keeping with a few comments above, it is noted that the appropriate context for this guidance should be set within the larger national statistical, aimed at serving as efficiently as possible many reporting processes--and of which the NGHGI should be an integral part.	Julian Chow	Accepted	Text added to end of section 1.4.1 referencing that any laws or directives should be considered in the context of existing national statistical systems.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1008	1	1	106	114	In keeping with a few comments above, it is noted that the appropriate context for this guidance should be set within the larger national statistical, aimed at serving as efficiently as possible many reporting processes--and of which the NGHGI should be an integral part.	Francesco Nicola Tubiello	Accepted	Text added to end of section 1.4.1 referencing that any laws or directives should be considered in the context of existing national statistical systems.
3776	1	1	114	114	This should be Table 1.2, not 1.1	Andrea Tilche	Accepted	Cross references corrected.
7928	1	1	114	114	typo. Should be "...Table 1.2"	Matthew Prescott	Accepted	Cross references corrected.
7536	1	1	115	123	The suggested tables are requesting detailed and another presentation of the national inventory system and responsibilities in the country. However, it is not focused only on the inventory reporting. Number of Parties will have problems to provide such information on this level due to completely different set up of government, institutions, research organisations etc. Please consider, if such requirement would not be additional and not necessary burden on the inventory teams.	Eva Krtkova	Noted	The guidance and tables provided are examples and clearly indicated as not being requirements or prescriptive. New text added to beginning of chapter to reinforce this point.
466	1	1	115		Table 1.1 should become table 1.2.	Klaus Radunsky	Accepted	Cross references corrected.
7930	1	1	119	122	The footnote numbering is off here. 4 and 5 are basically the same description, 6 should be 5, 7 should be 6, and 8 should be 7.	Matthew Prescott	Accepted	Note numbering corrected and extra note deleted.
1894	1	1	123	123	It is recommended to provide an example where SDG processes are also present.	Jessica Chan	Accepted with modification	SDG processes have been referenced in Box 1.0a.
1896	1	1	123	123	For the sake of using a national example to provide guidance that is relevant to all countries, perhaps it should be noted that what is called "national statistics environmental accounts" in the UK is in this context often known as National Air Emissions Accounts and is regulated by the UN Statistical Commission. See e.g. https://seea.un.org/ ; http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts; http://www.fao.org/economic/ess/environment/methodology/en/	Jessica Chan	Noted	Text added to Box 1.0a on linkage with national statistics and environmental accounts. This example is to show a country example of objectives associated with compiling a GHG inventory.
2158	1	1	123	123	It is recommended to provide an example where SDG processes are also present.	Julian Chow	Accepted with modification	SDG processes have been referenced in Box 1.0a.
2160	1	1	123	123	For the sake of using a national example to provide guidance that is relevant to all countries, perhaps it should be noted that what is called "national statistics environmental accounts" in the UK is in this context often known as National Air Emissions Accounts and is regulated by the UN Statistical Commission. See e.g. https://seea.un.org/ ; http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts; http://www.fao.org/economic/ess/environment/methodology/en/	Julian Chow	Noted	Text added to Box 1.0a on linkage with national statistics and environmental accounts. This example is to show a country example of objectives associated with compiling a GHG inventory.
1010	1	1	123	123	It is recommended to provide an example where SDG processes are also present.	Francesco Nicola Tubiello	Accepted with modification	SDG processes have been referenced in Box 1.0a.
1012	1	1	123	123	For the sake of using a national example to provide guidance that is relevant to all countries, perhaps it should be noted that what is called "national statistics environmental accounts" in the UK is in this context often known as National Air Emissions Accounts and is regulated by the UN Statistical Commission. See e.g. https://seea.un.org/ ; http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts; http://www.fao.org/economic/ess/environment/methodology/en/	Francesco Nicola Tubiello	Noted	Text added to Box 1.0a on linkage with national statistics and environmental accounts. This example is to show a country example of objectives associated with compiling a GHG inventory.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2236	1	1	123	124	MRV concept has not been introduced but really useful to do it at the beginning. Please check Table 1.2 frequency of NC and BR are different. In addition, it will be useful to take a case from a NAI country (example south africa). NAI countries do not have reporting formats as AI countries but they can use the IPCC reporting tables if using already 2006 IPCC GL. Reporting for developing countries is a very relevant issues.	Rocio Danica Condor Golec	Accepted with modification	MRV term removed from Table 1.2 and not used elsewhere in chapter. Table revised to separate NC from BUR reporting frequency. It is an illustrative example not a template for all groups of countries.
4666	1	1	130	130	It seems like the name "organizational structure" is the institutional arrangements itself. This chapter provides information about the functional roles of different organizations (institutions) in the national inventory compilation process. In the proposed combination of words, someone may be confused with the suggestion to have such specific organizational structure for a particular organization. "Organizational structure" might be replaced by "the functional structure of institutional arrangements".	Nataliya Stranadko	Accepted with modification	Replaced "organizational structure" with the phrase "Structuring of institutional arrangements".
6172	1	1	130	131	both American and English spelling of word organisational is used. Pick one and be consistent (throughout)	Carolyn Maxwell	Accepted	Corrected.
1898	1	1	136	137	In keeping with several previous comments, it is suggested that the figure provided is unhelpful and confusing. It conveys the wrong impression that a functioning national statistical system needs to be constructed to serve exclusively the NGHGI system. This is counter to every effort that is currently being put in place by the international and national statistical governance in order to meet increasing country needs to efficiently collect data to serve multiple purposes. The terminology "Single National Entity" is also ambiguous and it appears to forget that in most countries there are already functioning National Statistical Offices (NSOs), who have the legal mandate to implement exactly the kind of processes depicted in this diagram. The correct diagram should have a more generic structure, and a dedicated cut-out to NGHGI to indicate they are part of the fuller system. Likewise, IPCC terminology should be limited to that cut-out, with appropriate functions (bridging tables) linking it to the national system.	Jessica Chan	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes. The term SNE is a generic term to indicate the responsible entity for ensuring production of the GHG inventory, which may be a national statistical offices.
2162	1	1	136	137	In keeping with several previous comments, it is suggested that the figure provided is unhelpful and confusing. It conveys the wrong impression that a functioning national statistical system needs to be constructed to serve exclusively the NGHGI system. This is counter to every effort that is currently being put in place by the international and national statistical governance in order to meet increasing country needs to efficiently collect data to serve multiple purposes. The terminology "Single National Entity" is also ambiguous and it appears to forget that in most countries there are already functioning National Statistical Offices (NSOs), who have the legal mandate to implement exactly the kind of processes depicted in this diagram. The correct diagram should have a more generic structure, and a dedicated cut-out to NGHGI to indicate they are part of the fuller system. Likewise, IPCC terminology should be limited to that cut-out, with appropriate functions (bridging tables) linking it to the national system.	Julian Chow	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes. The term SNE is a generic term to indicate the responsible entity for ensuring production of the GHG inventory, which may be a national statistical offices.
2748	1	1	136	137	Figure 1.1 Missing descriptors of abbreviations, IPPU, LULUCF	Poot-Delgado Carlos Antonio	Rejected	Abbreviations are established in Introduction to the 2006 IPCC Guidelines.

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1014	1	1	136	137	In keeping with several previous comments, it is suggested that the figure provided is unhelpful and confusing. It conveys the wrong impression that a functioning national statistical system needs to be constructed to serve exclusively the NGHGI system. This is counter to every effort that is currently being put in place by the international and national statistical governance in order to meet increasing country needs to efficiently collect data to serve multiple purposes. The terminology "Single National Entity" is also ambiguous and it appears to forget that in most countries there are already functioning National Statistical Offices (NSOs), who have the legal mandate to implement exactly the kind of processes depicted in this diagram. The correct diagram should have a more generic structure, and a dedicated cut-out to NGHGI to indicate they are part of the fuller system. Likewise, IPCC terminology should be limited to that cut-out, with appropriate functions (bridging tables) linking it to the national system.	Francesco Nicola Tubiello	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes. The term SNE is a generic term to indicate the responsible entity for ensuring production of the GHG inventory, which may be a national statistical offices.
6174	1	1	137	137	Correct spelling: representatives, outputs, material,	Carolyn Maxwell	Accepted	Spelling corrected.
1900	1	1	138	163	This section is fine, but it needs to be contextualized as a particular sub-function (even with its own governance sub-structure if appropriate to national regulations) of a more general national statistical system.	Jessica Chan	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes. The term SNE is a generic term to indicate the responsible entity for ensuring production of the GHG Inventory.
2164	1	1	138	163	This section is fine, but it needs to be contextualized as a particular sub-function (even with its own governance sub-structure if appropriate to national regulations) of a more general national statistical system.	Julian Chow	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes. The term SNE is a generic term to indicate the responsible entity for ensuring production of the GHG Inventory.
1016	1	1	138	163	This section is fine, but it needs to be contextualized as a particular sub-function (even with its own governance sub-structure if appropriate to national regulations) of a more general national statistical system.	Francesco Nicola Tubiello	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes. The term SNE is a generic term to indicate the responsible entity for ensuring production of the GHG Inventory.

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3800	1	1	138	212	Section 1.5.1.3 presents an overview of the stakeholder roles and responsibilities in the context of institutional arrangements. Three stakeholder types are described in more detail. However, 'Data providers' among which specifically national statistical institutes/the national statistical system deserve a seperate section as well. National statistical institutes/systems have a central role in a country's high quality and reliable data provision. This role should be acknowledged, which could be in the form of a short additional sub-section in either section 1.5.1 institutional arrangements or in section 1.5.2 on datasets and data flows. A mutual beneficial and efficient cooperation between inventory compilers and statisticians will be better ensured when formalising the relationship through official agreements (see Section 5.1 of the Conference of European Statisticians Recommendations on climate change related statistics https://www.unece.org/fileadmin/DAM/stats/publications/2014/CES_CC_Re commendations.pdf). This good practice should be suggested when discussing the role of national statistical systems/institutes. Useful references are; https://unstats.un.org/unsd/dnss/cp/searchcp.aspx, https://unstats.un.org/home/nso_sites/ and for the EU: https://ec.europa.eu/eurostat/documents/747709/753176/20180719_List_ON As_LV.pdf/0e48549e-f3a0-4b86-a1c7-aae7e6468a84	Andrea Tilche	Accepted with modification	Section added under 1.4a on data providers and sentence added regarding role of national statistical agencies.
3778	1	1	139	141	This section does not distinguish between actors and stakeholders, i.e. between organisations having formal roles in the inventory and those that have consultative roles. More clear separation is needed.	Andrea Tilche	Accepted	Replaced "stakeholders" with "actors and stakeholders".
7932	1	1	142	142	Possible typo in top row under "Typical Roles"…should it be "Arranging contracts and…"?	Matthew Prescott	Accepted	Corrected.
7934	1	1	142	142	Include NSA under "Compilation (Sector) Experts and researchers" (fourth row of table)	Matthew Prescott	Accepted with modification	Table does not indicate where each role should reside organizationally. Added content to indicate that sector experts should be familiar with national statistics.
8448	1	1	142	143	Table 1.3: In this table, too many stakeholder types are involved. In my opinion the existence of a "Inventory Agency" that only does Management/Coordinaton and general QA/QC will add extra complexity to the already intense needs for national reporting. Instead, the Management roles should be given to the Single National Entity and the "Inventory Agency" should take on the more technical roles merged with the Experts and Researchers.	Vasiliki Assimakopoulos	Accepted with modification	Removed the term "inventory agency" and titled "Inventory Manager/Coordinator". Text specifies roles but does not suggest who should flll each role or whether multiple roles shall be given to a given actor.
8522	1	1	142	143	Measurement experts should be included in the stakeholders as well as in the QA/QC process to ensure credibility of emission estimates and differentiation between anthropogenic and natural sources.	Vasiliki Assimakopoulos	Rejected	Measurement experts do not need to be explicitly included here. The issue is already addressed in Chapter 2 regarding data provider and collection issues and Chapter 6 as relevant.
7538	1	1	142	143	The responsibilities and roles of different stakeholders varies significantly across Parties due to different institutional arrangements, but also due to different political establishments. IPCC methodology is not supposed to push responsibilities to each part of the system.	Eva Krtkova	Noted	Text in chapter is not prescriptive and is explicitly stated as not being a requirement. No changes in the text.
474	1	1	145	145	The wording "may have, or need" is not a very clear guidance. A better solution might be: "should have"	Klaus Radunsky	Accepted with modification	Text revised to say "may need".

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2242	1	1	165	212	All this section is not connected with what have been provided in Table 3. It would be useful to elaborate and describe each of the stakeholders in a consistent way.	Rocio Danica Condor Golec	Accepted with modification	Section added for data providers and cross references to sections elaborating particular actors added to table 1.3.
1902	1	1	166	167	See several above comments on the topic of national statistical systems. The term SNE is ambiguous and seems to suggest an independent role for NGHGI with respect to the more fully integrated National Statistical System typically under the mandate of National Statistical Offices (NSOs). Kindly consult with the International Statistical community and UNSD to ensure the guidance provided is not in contrast to processes that many countries are implemented following international guidance by the UNSC.UNSC.	Jessica Chan	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes.
2166	1	1	166	167	See several above comments on the topic of national statistical systems. The term SNE is ambiguous and seems to suggest an independent role for NGHGI with respect to the more fully integrated National Statistical System typically under the mandate of National Statistical Offices (NSOs). Kindly consult with the International Statistical community and UNSD to ensure the guidance provided is not in contrast to processes that many countries are implemented following international guidance by the UNSC.UNSC.	Julian Chow	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes.
1018	1	1	166	167	See several above comments on the topic of national statistical systems. The term SNE is ambiguous and seems to suggest an independent role for NGHGI with respect to the more fully integrated National Statistical System typically under the mandate of National Statistical Offices (NSOs). Kindly consult with the International Statistical community and UNSD to ensure the guidance provided is not in contrast to processes that many countries are implemented following international guidance by the UNSC.UNSC.	Francesco Nicola Tubiello	Accepted with modification	Added text in various sections addressing the point that the GHG inventory process should be coordinated or integrated with national statistical processes.
2238	1	1	166	202	It might help to include an example of this new concept of SNE. It look to me that we are refering to the UNFCCC NFP.? I would suggest not to include "The role of SNE is sometimes delegated, via mandates/terms of reference, to climate change, environmental, or statistical agency with the technical capacity to prepare national reports." It is a bit confusing when then you get in secion 1.5.1.5 The inventory agency - It seems then it is more relevant to provide an example, in most cases this role is implemented by statistical (e.i Finland) or environment (e.i. Ghana) agency.	Rocio Danica Condor Golec	Accepted with modification	Added mention of SNE may reside with enviornmental or statistical agency.
7936	1	1	167	167	typo. Should be "county's" rather than "countries"	Matthew Prescott	Accepted	Corrected.
8450	1	1	183	184	The inventory agency could also be a research institute/University/academic institution with proven experience in compilation of emission inventory.	Vasiliki Assimakopoulos	Noted	Text already mentioned universities and research institutes. No changes have been made to the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2240	1	1	189	197	We know that there are arrangements in developed countries with private company due to institutional arrangement. However, I would not include it in these guidelines because in developing countries they are trying to move away from consultancy or consultants. Not a good example to include in the 2019 GL. It is well known that in many developong countries the report of the national communication to the UNFCCC for NC has been done by consultant and this it has turned to be really unsustainable. In developing countries, only those who have moved away from "consultant" path have managed to build the capacity in the countries and keep the role in agencies or ministries.	Rocio Danica Condor Golec	Noted	These guidelines are not intended to be prescriptive, but the text does clearly state that sustainable institutional arrangements are critical, while being neutral on where they reside. No changes have been made to the text.
476	1	1	200	204	It is suggested to start this paragraph with the second sentence and to have afterwards the sentence starting with "Steps …	Klaus Radunsky	Accepted with modification	Paragraph reorganized and edited.
1904	1	1	213	233	It is suggested that these guidelines will provide "bad" advice to countries if they are written independently from existing strong (and getting stronger under the SDG process) international, non-IPCC guidance on building functioning national statistical arrangements. Data flows should not be conveyed to the reader as simply directed from sectors into the NGHGI Agency. This will depend on internal national data flow arrangements, and will most likely include specific overall mandates of the NSOs. This comment applies to follwoing sectoin s as well, 1.5.2.1. 1.5..2.2 etc.	Jessica Chan	Accepted with modification	Added statistical agencies to graphic as an illustrative data provider. It is made clear above that statistical agencies may also serve as the SNE and inventory manager/coordinator.
2168	1	1	213	233	It is suggested that these guidelines will provide "bad" advice to countries if they are written independently from existing strong (and getting stronger under the SDG process) international, non-IPCC guidance on building functioning national statistical arrangements. Data flows should not be conveyed to the reader as simply directed from sectors into the NGHGI Agency. This will depend on internal national data flow arrangements, and will most likely include specific overall mandates of the NSOs. This comment applies to follwoing sectoin s as well, 1.5.2.1. 1.5..2.2 etc.	Julian Chow	Accepted with modification	Added statistical agencies to graphic as an illustrative data provider. It is made clear above that statistical agencies may also serve as the SNE and inventory manager/coordinator.
1020	1	1	213	233	It is suggested that these guidelines will provide "bad" advice to countries if they are written independently from existing strong (and getting stronger under the SDG process) international, non-IPCC guidance on building functioning national statistical arrangements. Data flows should not be conveyed to the reader as simply directed from sectors into the NGHGI Agency. This will depend on internal national data flow arrangements, and will most likely include specific overall mandates of the NSOs. This comment applies to follwoing sectoin s as well, 1.5.2.1. 1.5..2.2 etc.	Francesco Nicola Tubiello	Accepted with modification	Added statistical agencies to graphic as an illustrative data provider. It is made clear above that statistical agencies may also serve as the SNE and inventory manager/coordinator.
2244	1	1	213	279	This section has to be modified with the perspective of "data providers" as Table 3 - which are key for the preparation of a national GHG Inventory.	Rocio Danica Condor Golec	Accepted with modification	Mention of data providers added to text of section.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
4668	1	1	226	226	It is not clear does this sentence refers to the data flow between different stakeholders? If yes, "industrial reporting" is not a stakeholder. This sentence should be rearranged as "The diagram illustrates the data flow from industrial companies, government departments, and other stakeholders". Industrial companies may not be obligated to report the data in some countries. It may happen on the volunteer basis. Thus, in some sense, the industrial companies also provide the data as government departments do. In the next chapter, we call it "the data supplier stakeholder". Supply data and report data have a different meaning. In another case, it should be included a remark that "reporting" is relevant for South Africa example, but may not be relevant for other countries where are no mandatory reporting by the industrial companies, and it is used other form of data supply.	Nataliya Stranadko	Rejected	Example presented is specifically for South Africa. Text added to ensure that it is clearly communicated.
2682	1	1	232	232	Forest should be defined with more details such as, Forest cover and Forest density	Mostafa Jafari	Rejected	Box presents a short summary of the data in South Africa's GHG inventory. It is a general term for the relevant data included. We do not want to go into details of all of the specific variables included.
2246	1	1	237	239	Not sure if this section can help here since there is chapter on data collection. This section should concentrate on institutional arrangements to collect data. One thing is data providers as per Table 3 and something different the data sets need for preparing the GHG Inventory. I would concentrate on data providers mainly.	Rocio Danica Condor Golec	Accepted with modification	Revised introduction to section 1.4.2.1 to more clearly make a logical link between institutional arrangements and datasets.
7540	1	1	239	240	Such requirement is not necessary and additional burden. In the Parties, where the system is working, there is no need to create additional tables, which are not helpful to anyone. Everything is stored in the archiving systems.	Eva Krtkova	Accepted with modification	Text revised to more clearly indicate that the table is only illustrative and that some form of list of datasets is a valuable tool for systematic archiving, but the guidance is not prescriptive or establishing a reporting requirement.
478	1	1	242		Table 1.5: It is suggested to indicate that such tables might also be prepared sector by sector. This disaggregation makes in particular sense if the underlying decisions are made by experts responsible for the sector.	Klaus Radunsky	Accepted	Revised text to indicate lists may be done for overall inventory or at a sectoral basis.
7938	1	1	253	253	Suggest replacing "agreed" with "arranged"	Matthew Prescott	Accepted	Change made in text.
480	1	1	258	259	It is suggested to include some references to suitable DSAs.	Klaus Radunsky	Accepted with modification	There is an existing reference to EPA template for an MOU that serves as a DSA, and footnote added referring to other countries that have developed DSAs.
2756	1	1	279	279	Missing footnote number 3	Poot-Delgado Carlos Antonio	Accepted	Corrected.
2248	1	1	280	280	Compilation experts - how do you differentiate this with the role for instance of environmental agencies? They also have compilation experts? A bit confusing section 1.5.3.	Rocio Danica Condor Golec	Noted	Text is neutral regarding where compilation experts reside organizationally.
482	1	1	282		It is suggested to check the footnote. There is no ffotnote 3 but a footnote 4.	Klaus Radunsky	Accepted	Corrected.
3780	1	1	288	288	Not clear what Table 1.1c is. Should this be Table 1.3?	Andrea Tilche	Accepted	Table, Figure, and section numbering were corrected in editorial process.
6112	1	1	288	288	Table 1.1c is not found. Table 1.3 may be the correct reference.	Naofumi Kosaka	Accepted	Table, Figure, and section numbering were corrected in editorial process.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1906	1	1	290	290	Although it is recognized that the example provided is useful, the writers are advised that general guidelines material indicated to readers from all over the world should strive to be as neutral and comprehensive of national circumstances as possible. TO this end, sources from neutral international agencies should be preferred. The UNFCCC is a suggested source. Additionally, the US statistical system is particularly decentralized and thus provides only a particular example of how such arrangements could be constructed, which may be not appropriate in countries where in fact the NSO has a full mandate on national statistics.	Jessica Chan	Noted	The EPA templates references are not used or designed for use in the USA, but were particularly designed to be generic and internationally applicable. No changes have been made to the text.
2170	1	1	290	290	Although it is recognized that the example provided is useful, the writers are advised that general guidelines material indicated to readers from all over the world should strive to be as neutral and comprehensive of national circumstances as possible. TO this end, sources from neutral international agencies should be preferred. The UNFCCC is a suggested source. Additionally, the US statistical system is particularly decentralized and thus provides only a particular example of how such arrangements could be constructed, which may be not appropriate in countries where in fact the NSO has a full mandate on national statistics.	Julian Chow	Noted	The EPA templates references are not used or designed for use in the USA, but were particularly designed to be generic and internationally applicable. No changes have been made to the text.
1022	1	1	290	290	Although it is recognized that the example provided is useful, the writers are advised that general guidelines material indicated to readers from all over the world should strive to be as neutral and comprehensive of national circumstances as possible. TO this end, sources from neutral international agencies should be preferred. The UNFCCC is a suggested source. Additionally, the US statistical system is particularly decentralized and thus provides only a particular example of how such arrangements could be constructed, which may be not appropriate in countries where in fact the NSO has a full mandate on national statistics.	Francesco Nicola Tubiello	Noted	The EPA templates references are not used or designed for use in the USA, but were particularly designed to be generic and internationally applicable. No changes have been made to the text.
484	1	1	291		It is suggested to check reference to table 1.1c. Should it read table 1.1?	Klaus Radunsky	Accepted	Table, Figure, and section numbering were corrected in editorial process.
486	1	1	292	292	It is suggested to delete "a" in line 292.	Klaus Radunsky	Rejected	An "a" that is grammatically misplaced was not found on this line or surrounding lines.
2250	1	1	301	302	It would be helpful to specify that the access to review or analysis processes for BR or BUR can be done only if experts are part of the Roster of Experts of the UNFCCC and if they have passed specific courses. In addition, it would be really helpful for compilers to refer to the E-learning course which has been specifically developed by FAO to support developing countries in the preparation of the national GHG inventory for the agriculture sector. Many of the lead authors and IPCC itself have been involved in the review of the e-learning. Key issues - it is free access available course to guide compilers that need to star compiling a tier 1 GHG inventory with 2006 IPCC GL, in two languages and provides with a series of exercises to let users apply knowledge and inform on the methodological improvements between the different versions of the IPCC Guidelines.	Rocio Danica Condor Golec	Accepted with modification	Language in the section is intended to be neutral and not refer to any particular UNFCCC or other negotiated process. Section on training is also intended to be neutral. Text revised to mention that courses from national and international sources may be considered by countries.
7940	1	1	311	311	Suggest replacing "generation" with "generating"	Matthew Prescott	Accepted	Corrected.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7942	1	1	314	315	Suggest: "Work plans should accommodate improvement activities and new data collection/analysis."	Matthew Prescott	Accepted with modification	Sentence modified to focus only on point of regular updating of workplan, but removed incomplete list of factors to consider with updating.
488	1	1	314		It is suggested to insert "of" after "generation".	Klaus Radunsky	Accepted with modification	Text revised to correct grammar.
3782	1	1	317	318	In Table 1.6 for the first entry on agreement of scope of work. It would be useful to suggest including a stakeholder consultation	Andrea Tilche	Accepted	Stakeholder added to first row of table.
490	1	1	322		It is suggested to include references to chapter 2 of volume 1 as appropriate in chapter 1.5.4.2	Klaus Radunsky	Accepted	Reference to Chapter 2 added to first paragraph.
7944	1	1	332	332	typo. Comma needed after "Whatever tools are used"	Matthew Prescott	Accepted	Comma added.
1024	1	1	335	336	It is unclear why standard classifications and nomenclatures can only be "national" or "IPCC" specific. Most of the national statistical community follows international standards and classifications approved by countries through the UNSC (see e.g., https://unstats.un.org/unsd/classifications/). Kindly mention this option as well. It is likewise suggested to introduce this concept at the outset of this chapter, as it fits well into the suggested revision from a point of view of functioning national statistical systems beyond the narrow IPCC/UNFCCC view.	Francesco Nicola Tubiello	Accepted	Example added referencing UNSD classifications.
496	1	2	66		It is suggested that a native English speaker helps to improve the language in chapter 2.1 in order to have a similar quality as chapters 2.3.	Klaus Radunsky	Accepted	Paragraphs rewritten.
498	1	2	77		It is suggested to delete "households".	Klaus Radunsky	Accepted	Term deleted.
500	1	2	78		It is suggested to delete the first ",".	Klaus Radunsky	Accepted	"," deleted.
502	1	2	78		It is suggested to further explain what kind of "monitoring stations" the authors had in mind.	Klaus Radunsky	Accepted with modification	Sentence deleted as part of rewriting paragraph.
504	1	2	82	83	What period is the "whole inventory period"? A footnote might be used to explain this term.	Klaus Radunsky	Accepted with modification	Deleted as part of other modifications.
506	1	2	82	91	This paragraph describes how to make best use of limited resources. A reference to chapter 1.5 - which is also part of the refinement - might be a better solution because chapter 1.5 is not limited to datacollection.	Klaus Radunsky	Accepted with modification	Reference made.
508	1	2	68	99	It is suggested to shorten the introduction by explaining the structre of chapter 2 and including reference to subchapters 2.2 and 2.3 when it comes to some guidance.	Klaus Radunsky	Accepted	The introduction was shortened.
510	1	2	106		It is noted that a new concept has been introduced: focus on "key categories that are the largest".hapt If there is broad agreement to keep that concept it would be important to explain it in greater detail (examples?) and to use it also in other chapters, e.g. key category analysis, chapter 1.5).	Klaus Radunsky	Accepted with modification	Deleted.
512	1	2	149	150	It is suggested to include (e.g. in brackets) reference to the "stepwise approach to data collection" as introduced in section 2.2.3.	Klaus Radunsky	Rejected	These are not steps to be followed but a series of options in order of priority.
514	1	2	184		figure 2.2: insert arrow in case "Data is not satisfactory"	Klaus Radunsky	Accepted	Inserted.
516	1	2	193		Insert "better" before "reflect".	Klaus Radunsky	Accepted	Inserted.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
518	1	2	200		It is suggested to use a clearer language in writing: regular updates of data suppliers on the methods that use their data	Klaus Radunsky	Accepted with modification	Text modified.
520	1	2	295	298	This language is rather specific and addresses mainly the situation in EU member countries. It is suggested to introduce a more generic language that speaks to all Parties worldwide. One option: Facility level emission data, e.g. such as that reported in the EU to Pollutant Release and Transfer Registers (PRTR) or to the EU ETS, may sometimes be used	Klaus Radunsky	Accepted with modification	Sentence is revised as following: "Such data as that reported e.g to Pollutant Release and Transfer Registers (PRTR), ..."
522	1	2	319		It is suggested to include a reference for international databases relating to remote sensing data (or a reference to the appropriate chapter in volume 1)	Klaus Radunsky	Accepted	Cross-reference to Ch.6, Vol.1 is added.
524	1	2	571		"Described above" is not very userfriendly given the 17 pages above. A more specific reference might be helpful.	Klaus Radunsky	Accepted	Text revised in line 559. "described above" replaced with described in sections 2.1, 2.2.1 and 2.2.
526	1	2	573		Delete "and".	Klaus Radunsky	Accepted with modification	Text relevant to the comment in line 569 is deleted.
528	1	2	589		Table 2.2: substitute "N2O atmospheric emission reduction technology" by "emission reduction technology of N2O emissions into the atmosphere"	Klaus Radunsky	Accepted with modification	Text revised in Table 2.1a Energy/Industrial processes: a bullet is re-written as "Emission reduction technology of N2O emissions into the atmosphere".
530	1	2	656		Delete "the" because there might be more than one relevant regional research centre.	Klaus Radunsky	Accepted	Deleted.
532	1	2	662		footnote 13: Substitute "sector" by "region".	Klaus Radunsky	Accepted with modification	Corresponding text to footnote is already deleted, so footnote here is deleted.
534	1	2	836		Congratulations to the authors of section 2.3 for providing a very good and clear guidance.	Klaus Radunsky	Noted	Thank you.
536	1	2	962		Insert "minimizing" after "while".	Klaus Radunsky	Accepted with modification	SOD PDF line 962 does not include the word 'while'. Have include 'while reducing…' in lines 943-944.
538	1	2	994	995	The current language is too prescriptive. The following is suggested: …., these reported emissions should be in the form of equation 2.1 in order to be coherent with the IPCC inventory guidelines.	Klaus Radunsky	Noted	Comment has been taken into account in the revision of the text.
540	1	2	1010		It is suggested to delete "product use" as these emissions are usually not included in the inventory of a facility. The emissions of product use and end-of life emissions would be addressed under different categories in the national inventory.	Klaus Radunsky	Accepted with modification	1) Line reference here refers to Word document. 2) Added industrial product use of feedstocks to clarify.
542	1	2	1035		Delete "the" after "from".	Klaus Radunsky	Accepted	1) Line number referenced by reviewer is in line with word document. 2) Modified as recommended.
544	1	2	1060		It is suggested to delete "product use" as these emissions are usually not included in the inventory of a facility. The emissions of product use and end-of life emissions would be addressed under different categories in the national inventory.	Klaus Radunsky	Accepted with modification	1) Line reference here refers to Word document. 2) Added industrial product use of feedstocks to clarify.
546	1	2	1134		The following wording is suggested: if there are confidential data: an explanation of the reason;	Klaus Radunsky	Noted	Text has been revised and the sentence deleted.
548	1	2	1197	1198	It is suggested to delete the reference to the expert meeting but to include the relevant part explicitly in order to enhance user-friendly ness.	Klaus Radunsky	Rejected	It is up to the compiler to consider which elements woud be of help in developing country specific approaches. In addition information in Text Boxes are lonely meant as examples and not guidance.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
550	1	2	1214		Substitute "Inventory" by "inventory".	Klaus Radunsky	Noted	Line number is not correct. Editing has been checked.
552	1	2	1394		Insert "that" after "questionnaires".	Klaus Radunsky	Accepted with modification	It seems the comment related to line 1307. The sentence is revised.
554	1	2	1403		Delete "that" after "historic data".	Klaus Radunsky	Accepted with modification	It seems the comment is related to line 1378. The sentence is revised.
758	1	2	178		check statement for clarity "together with the any"	Chukwuma Anoruo	Accepted	Sentence revised.
1200	1	2	68	68	It is suggested that the first couple of paragraphs could be devoted to national level collection processes regardless of the NHGI system, highlighting that these are usually coordinated in most countries by the NSO. Without such a pening statement, it appears that NGHGI agencies may operate in a vacuum, which is a) incorrect and b) inefficient. I realize there is a dedicated section on this, however it comes much later in the chapter --too late in my opinon.	Francesco Nicola Tubiello	Accepted with modification	To make this applicable to all countries a strong reference to NSO at this stage is too much as not all countries have adequately functioning NSO. Also in some countries legal responsibilities define how this may work. This is general, however it is now stressed that NSO shoud be used where possible.
1202	1	2	68	100	Kindly edit for english	Francesco Nicola Tubiello	Accepted	Text edited for English.
1204	1	2	97	97	Use of Tier 2/3. This is of course what good practice is, however, as indicated by every single figure in these GLs, the use of tier 2/3 is subject to the actual availability of data--hence it depends on a country capability. I think this shoul dbe conveyed as a message throughout teh GLs, becasue the result of this language ofte has been that countries produce no inventory at all rather than starting with Tier 1--since they understand it is not good practice.	Francesco Nicola Tubiello	Noted	The message has been shared with the other chapters/volumes.
1208	1	2	97	97	Also, can it be stated at the outset and clearly, that the very first key category analysis must be performed at Tier 1, by necessity? Hence you need to have a rudimental Tier 1 inventory in place to begin with.	Francesco Nicola Tubiello	Rejected	The text allows two options: tier 1 and KCA to identify key categories or an expert assessment of large sources to use Tier 2 at the outset.
1210	1	2	101	102	'precise the inventory period" Needs editing	Francesco Nicola Tubiello	Accepted with modification	Diagram redrawn.
1212	1	2	106	106	Largest. Largest in terms of absolute emissions? In terms of impact on overall uncertainty? Please clarify	Francesco Nicola Tubiello	Accepted with modification	Deleted.
1214	1	2	101	125	Linking to the first comment for this chapter, there should be a clear protocol that says that all of these activities are fine, but that first the NGHGI staff must check with the NSO in terms of how much of these activities are ongoing, planned etc., for the sake of not duplicating efforts.	Francesco Nicola Tubiello	Rejected	This is something explained in Chapter 1 of Volume 1.
1216	1	2	118	118	'Uncertainty data". I suppose you mean úncertainty information". There is no data (or statistics) on such topic, is there?	Francesco Nicola Tubiello	Rejected	Numerical data on the uncertainty of data should be collected (e.g. +/- 30%).
1218	1	2	145	148	This sentence needs to be re-written. It is barely understandable.	Francesco Nicola Tubiello	Rejected	The sentence is understandable.
1220	1	2	154	154	'...adjust from different classifications." This is a fundamental point and one that would need significant guidanc. Yet these GLs do not provide any, except to say that such conversoins need to be made. What would be useful are tables providing links between existing, internationally endorsed classifications other than IPCC, with maps to IPCC. Although such tables do not have to be exhaustive, they should contain the subset of well knownb cases, for instance land use (FAO), socio-economic sectors (ISIC UNSD), etc.	Francesco Nicola Tubiello	Rejected	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
1222	1	2	159	159	As discussed above, this specific point on NSAs (commonly known in the internatoinal statistical community as NSOs) should be moved upfront--this need for coordination is clearly not to be limited to censuses and surveys.	Francesco Nicola Tubiello	Rejected	The relationship to NSO has been included above, this point is more specific.
1224	1	2	145	148	If this sentence is an attempt to say that invntory compilers should always try to compile a Tier 1 inventory as a first useful tool in their construction of a NGHGI for the first time, this could be stated explicitly here or as part of the sentence starting on line 149. This reviewer very much agrees with that advice, and suggests its insertoin regardless of teh original intentions in this section. And again, how would you know what your key categories are (line 164) if you had not developed an initial draft inventory at tier 1?	Francesco Nicola Tubiello	Noted	The concept is captured in Chapters 1, 2 and 3 of Volume 1.
1226	1	2	169	171	'uncertainty' is a fundamental issue that needs to be resolved starting from the glossary but possibly ending with Vol 1. Is the uncertainty lalluded to here nothing but a confidence interval? A tolerance interval? And error estimation? As noted earlier, this must refer to measurement uncertainty and not to a wider meaning. And even so, what is an "uncertainty distribution"? If this is something well understood, then it needs to go in the glossary as well as defined in this chapter.	Francesco Nicola Tubiello	Noted	Please refer to the Glossary and Chapter 3 of Volume 1.
1228	1	2	175	175	'data supply agreement". It is not clear what this is nor when it was discussed. Was it in Ch.1? Kindly point to a place where this was discussed.	Francesco Nicola Tubiello	Accepted with modification	Text modified. This is not a new definition…
1230	1	2	178	182	Considering that the majority of the functoins mentoined herein (and fig 2.2) are under the mandate of the NSO in most countries, would it not make more sense to advice the NGHGI office to outsource all of these functoins to the NSO, where possible, while saving its time and resopurces for doing teh relevant GHGI part (key category analysis, choice of TIers, estimations, etc.). This furthermore avoids that the NGHG office ends up "picking and chosing" its own range of agencies for data, ending up duplicating at best and creating chaos at worse in the context of a well functoining natoinal statistical system.	Francesco Nicola Tubiello	Rejected	Unfortunately this is not true in all countries, therefore the text should be more general in order to be universal.
1232	1	2	224	231	Again, issues with coordinatoin with a NSO. In the context of official national data (such as those inevitably assocaited to a NGHGI), t is the mandate of the NSO typically to decide which aggregation modalities are acceptable with regards to underlying activity data used as inputs. In fact, this is basicvally what was stated in the original text (lines 232-248). It appears that these additoins are in fact in contrast with the information relayed in the three paragraphs that follow.	Francesco Nicola Tubiello	Accepted with modification	Text revised in response to several comments.
1234	1	2	290	314	Should it not be possible, and useful, to priovide indications of priority? Especially for countries starting the inventory for the first time. Not all of these sources are "equal". Perhaps NSAa and official national sources should have the first priority?	Francesco Nicola Tubiello	Accepted with modification	The priority of data is discussed in sub-section "Choosing between national and international data", but the reference to this discussion is added.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1236	1	2	308	308	Kindly describe more correctly as (i) FAOSTAT Database for agricultural statistics(3a); (ii) "FAOSTAT Emissions Database for AFOLU (3b)." One provides activity data; the other emissons estimates at tier1. The generic link to FAOSTAT of footnote 3 can be used for (3a). A second footnote should be used for the FAOSTAT emissions, as such: "3b http://www.fao.org/faostat/en/#data/GT (Agriculture emissons) and http://www.fao.org/faostat/en/#data/GL (Land Use emissions). Kindly refer to relevant IPCC (2015) report https://www.ipcc-nggip.iges.or.jp/public/mtdocs/pdfiles/1411_FAO-IPCC-IFAD_Rome_AFOLU.pdf for more information.	Francesco Nicola Tubiello	Accepted with modification	All FAO databases are combined under one bullet. Reference to IPCC, FAO, IFAD (2015) is added.
1238	1	2	309	309	Consider organizing this sub-list more logically. List only databases and not institutions. Should models also be listed? "remote sensing data" is hardly an international database.	Francesco Nicola Tubiello	Accepted with modification	This is a list of international organisations which collect and provide databases. The list is revised according to other comments. Databases are listed as examples. Remote sensing is listed separately from international organisations.
1240	1	2	309	309	This is now called IFASTAT --check the new link. It only provides activity data for a specific sub-sector in agriculture (total N applied to soils in synthetic fertilizer).	Francesco Nicola Tubiello	Accepted	Corrected.
1242	1	2	310	310	This is a model and not a database	Francesco Nicola Tubiello	Accepted	Deleted.
1244	1	2	311	311	thisis an institute and not a database.	Francesco Nicola Tubiello	Noted	This is a list of international organisations which collect and provide databases.
1246	1	2	314	314	Likely this is a subset of (v). If so remove	Francesco Nicola Tubiello	Accepted with modification	Remote sensing is listed separately from international organisations.
1248	1	2	351	360	"international data." The text should clarify that there are significant differences among international data. For instance, some notable databases from international agncies, such as FAOSTAT, IEA, UNSD, have the same official status as the GHG data disseminated at UNFCCC, in the sense that they correspond to official international reporting processes for which these agencies have a mandate (i.e., FAO for agriculture and forestry; IEA for energy, etc.--See for instance language used in these GLs in Vol.2 Ch. 2 with regards to UN and IEA energy statistics:' 'Both international organisations collect energy data from the national administrations of their member countries through systems of questionnaires. The data gathered are therefore "official" data. " The same should be written somewhere in Ch. 1, including with reference to FAOSTAT data). Data from industry association are of course useful, but they belong to a second category, etc. A nice description of these flows with respect to FAO reporting processes can be found in IPCC (2015) https://www.ipcc-nggip.iges.or.jp/public/mtdocs/pdfiles/1411_FAO-IPCC-IFAD_Rome_AFOLU.pdf, pg. 4.	Francesco Nicola Tubiello	Rejected	Data collected from countries then are processed according to internal quidelines of particular organisation. So, they are already not "official" from the national point of view. Also, we are not in charge to categorise international organizations.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1250	1	2	360	361	This sentence is unclear. Does it mean that developing countries should check and possibly use the international data if nothing else is available? Why only developing countries? IF this is merely a statement about QA/QV (and verificatoin), obviously all parties do comparisons with IEA energy emissions data as part of a good practice activity, and several developing countries have begun doing it with FAO AFOLU emissions data. It is suggested to elaborate the meaning posisbly providing these or other pertinent examples.	francesco nicola tubiello	Accepted with modification	Sentence is revised taking into account comments ID 1918, 2182, 6606, 1250, 3822.
1262	1	2	446	446	I suppose this section will be expanded in the TOD	Francesco Nicola Tubiello	Accepted with modification	That is editorial mistake. This should be a title of next section 2.2.3.
1264	1	2	556	556	I would modify the last sentence as "it is good practice to develop country specific emission factors, with the goal to improve the accuracy of relevant emissions and removals estimates." Countries often embark in lengthy and expensive capacity development programs just because a consultant has told them they need to do so based on the IPCC GLs. However, there must be a stated goal of doing so to improve accuracy, and it would thus also be good practice to ask them to quantify and document such improvements over the available Tier 1 method.	Francesco Nicola Tubiello	Accepted with modification	Text revised as: "For key categories it is good practice to develop country specific emission factors, with the goal to improve the accuracy of relevant emissions and removals estimates."
1266	1	2	560	562	Please check language throughout. Example: "effecting" should be "affecting"	Francesco Nicola Tubiello	Noted	This comment has been addressed during final editing.
1268	1	2	566	566	It is suggested, based on the comment above, to insert a new point after 6., asking something like "Quantify how the new EF" improves accuracy of estimates in terms of both reduced bias and improved precision"	Francesco Nicola Tubiello	Accepted with modification	Text revised as: "6. Verify that the obtained EF is representative of the national circumstances".
1270	1	2	577	578	Table 2.2. It is unclear in what sense this table is supposed to guide development of Tier 2/3 EFs. Some of the factors that are listed are already known to be a factor for EFs, so this information should not be duplicated. As an example, EF for Manure management differ by MMS. But this is already known at Tier 1, and in fact various Tier 1 coefficients are already provided per each MMS, by region. How does the information provided in Table 2.2 guide a country aiming to improve EFs with this information. Type of AWMS should be removed as a factor. The others for MM are fine. Same thing for "synthetic fertilizers consumption" and "animal manure", listed as factors in agricultural soils. What should be listed in this case instead might be "typology of fertilizer applied and application methods", etc. Kindly apply this same criteria across Table 2.2.	Francesco Nicola Tubiello	Noted	Table 2.1a has been revised with involvement of authors of sectoral volumes.
1272	1	2	584	585	This requirement should be better qualified as "use nationally produced information as much as possible". I think it is a bit far-fetched to think that peer-reviewed national journals exist in every country, and to assume that if they exist, information published therein should always take precedence to, say, a study on the same country published in Nature or Science. If this is a misunderstanding, please change the text accordingly as it is ambiguous.	Francesco Nicola Tubiello	Accepted with modification	Text revised in line 584-585 as "For key categories it is good practice, for countries to use their own, peer-reviewed, published literature relevant to their national circumstances because this should provide the most accurate representation of their country's practices and activities". We included text "relevant to their national circumstances" in above para which replies this comment id.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1274	1	2	582	586	I suppose that the recommendations in points 1-7 in the previous page (in particular point 6 on representativeness, and including the additional point to it suggested above on assessing increased accuracy) still hold as a criteria to decide whether or not a EF taken from the literature can be applied or not. This is because a given peer-reviewed paper with a given EF may have been implemented from specific experiments that may not be representative of the entire country or sector.	Francesco Nicola Tubiello	Accepted with modification	The comment idicates point 6 in line 566. Text revised in point 6 in line 566 as "6. Verify that the obtained EF is representative of the national circumstances". This addresses the comment.
1276	1	2	570	570	This suggestion needs to be further qualified. Clearly international databases that apply Tier 1 (IEA, FAO, EDGAR) are not useful in this context --except perhaps to provide information on how a specific global or regional default EF was associated to a specific country. Either way, kindly edit for additional clarity.	Francesco Nicola Tubiello	Noted	Texts relevant to the comment from line 568-573 are deleted.
1278	1	2	602	603	Table 2.3. It is understood that this table lists information sources useful for choosing nationally-relevant Tier 2/3 EFs, beyond Tier 1. It is then unclear how the additional sources provided (IFA, FAOSTAT, COMTRADE) fit this bill. In retrospect, the same could be said of other sources cited (IPCC, OECD, USEPA, OECD; even UNFCCC) whenever the associated comment mentions that the information provided by that source is at Tier 1. This information is valuable but should be inserted before this sub-section, for which it is instead out of scope. The same applies to "census" and surveys'", -- in the sense that it is unclear which kind of EF useful information (above Tier 1) they could contain. By contrast, there is a useful IPCC-FAO publication that points to data sources useful for deriving Tier2/3 emission factors (and also including Tier 1 sources), which should be listed instead. See: https://www.ipcc-nggip.iges.or.jp/public/mtdocs/pdfiles/1411_FAO-IPCC-IFAD_Rome_AFOLU.pdf	Francesco Nicola Tubiello	Accepted with modification	As per suggestion, cited text related to IFA, FAOSTAT, COMTRADE etc. is deleted whilst links to IFA, FAOSTAT and COMTRADE are still provided in Table 2.2.
1280	1	2	614	614	The definition of "robustness" appears to be rather a definition of "accuracy" in the IPCC sense, i.e., that the estimate provided is without bias and fairly precise.	Francesco Nicola Tubiello	Noted	Comment is related to greyed text from 2006 IPCC Guidelines, definition of 'robustness' has not been changed but a revision has affected other terms such as 'accuracy'.
1282	1	2	643	644	'regional centres conducting GHG measurements … (see Table 2.3)". I cannot find one such Centre in the actual list, and only IRRI and perhaps LUCAS AFRICA in the notes. This goes to further support my previous point that this Table 2.3 needs to be seriously revised.	Francesco Nicola Tubiello	Accepted with modification	Text deleted in lines 643-649.
1284	1	2	698	699	Table 2.4. It is surprising to read that there are no standards currently for measurements of CH4 emissions? Can this be true.	Francesco Nicola Tubiello	Accepted with modification	Text revised, standards are added for CH4 as well as updated for CO2 and N2O.
1286	1	2	712	717	Perhaps a useful clarification to insert here is that not all "international data" are equal. Some are dissemination of national data through non-UNFCCC international reporting of member countries (i.e., FAOSTAT, FRA, UNSD, etc.). Thus data directly received (and flagged accordingly in these databases) are official national data. Even imputed data in such databases have nonetheless the status of "semi-official" data, since countries mandate these agencies with this task when appropriate (unlike the UNFCCC process). SO the first obvious step when "national" data are missing is to go to repositories of "official" and semi-official" national data disseminated by UN agencies. then there are other international databases with lesser "weight" in the above sense.	Francesco Nicola Tubiello	Accepted with modification	The most important with data is its quality, it is the first factor to take into consideration. This is clarified in the paragraph about "Choosing between published national and international data" from section 2.2.1.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1288	1	2	742	742	It should be added--to avoid misunderstandings-- that in most countries, so-called decentralized data collection still functions within a well defined and often legally mandated national statistical system, often led by the NSO.	Francesco Nicola Tubiello	Accepted	A phrase was added to the text explaining this statement.
1290	1	2	789	789	It is recommended to use internationally neutral sources from UN agencies whenever these exist. I suggest to list those before a country-specific source, to avoid giving the impression of favoring a country over another.	Francesco Nicola Tubiello	Noted	The paragraph makes reference to the source that gives general statistical information at first and then it mentiones reference for conducting household surveys in developing and EIT countries in particular.
1292	1	2	817	819	Same as above. Kindly cite UN agencies first and country info second. Does UNSD not have any guidance to this end?	Francesco Nicola Tubiello	Accepted with modification	This paragraph was deleted as data reporting is dealt with in Chapter 1.
1294	1	2	892	893	First row second column. ISIC is the UN endorsed international classification for all countries, and should be listed first. Same applies below in the relevant table bullet point.	Francesco Nicola Tubiello	Accepted	Implemented.
1296	1	2	916	918	I understand that you are referring to National Accounts, or the System of National Accounts (SNA). These are not "national statistical datasets", in the sense that they are referred to in other parts of the GLs. They are more properly called National Accounts, providing national level statistics better known as "Use and Supply Tables" for activities/products in the economy. They are regulated by the SNA international agreed methodology endorsed by the UN Statistical Commission and are in fact the basis for computing national GDP, among other useful indicators. I suggest that you improve text to be a bit more clear. What also should be clear is that the "Accounts" operate exactly like an inventory, with a lot of assumptions and estimations -- hence they do not necessarily represent statistical data collected from a source.	Francesco Nicola Tubiello	Noted	The concepts are similar for certain information. The intention is to be general where possible to ensure that all form of activity data are possible, especially where a 'national' dataset is available for assessment. 'National' in the text, simply mean a representative annual value for a specific activity data/production and not just a system of national accounts.
1298	1	2	916	918	SNAs are not only implemented in developing countries. In fact, they represent for GDP what the UNFCCC represents for GHG data--all countries should compile them, and in fact most do, significantly more in proportion than countries submitting NGHGIs. Check UNSD for a list of available accounts: https://unstats.un.org/unsd/nationalaccount/sna.asp	Francesco Nicola Tubiello	Noted	GDP is not a direct link to GHG emission sources and will be difficult to justify its use other than for a general high level trends analysis. For example the GDP associated with the financial sector can't be used to estimate emission from commerical buildings. In most cases GDP would not be the best choice for use in developing a GHG emission estimates, especially facility by facility level data. Nevertheless, in lack of other data, GDP can be used as a surrogate.
1300	1	2	916	918	Although NSOs are typically coordinating the NSAs, in many countries the actual agency that compiles them is the Central Bank.	Francesco Nicola Tubiello	Noted	Comment has been noted but no specific modification has been made to the text.
1302	1	2	918	919	If we are talking about SNAs, then it should also be noted that in most developed countries --as well as in many developed ones-- countries also compile Air Emissions Accounts, in the context of national environmental-economic accounts, based on the national accounts (https://seea.un.org/). In such cases, coherency between the NGHGI agency and the national accounts is an important goal to achieve as good practice.	Francesco Nicola Tubiello	Noted	Comment has been noted but the concept of consistency between different data sets and among agencies is already included in the revised text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1304	1	2	1197	1197	Box 2.3. It is suggested to also insert a link to UNSD SNA programmes indicated above. These are relevant as they are often those who perform in some countries the bottom up aggregation from facility to national scale.	Francesco Nicola Tubiello	Noted	Reviewer's comment considered and text revised.
1868	1	2	712	717	Perhaps a useful clarification to insert here is that not all "international data" are equal. Some are dissemination of national data through non-UNFCCC international reporting of member countries (i.e., FAOSTAT, FRA, UNSD, etc.). Thus data directly received (and flagged accordingly in these databases) are official national data. Even imputed data in such databases have nonetheless the status of "semi-official" data, since countries mandate these agencies with this task when appropriate (unlike the UNFCCC process). SO the first obvious step when "national" data are missing is to go to repositories of "official" and semi-official" national data disseminated by UN agencies. then there are other international databases with lesser "weight" in the above sense.	Jessica Chan	Accepted with modification	The most important with data is its quality, it is the first factor to take into consideration. This is clarified in the paragraph about "Choosing between national and international data" from section 2.2.1.
1870	1	2	742	742	It should be added--to avoid misunderstandings-- that in most countries, so-called decentralized data collection still functions within a well defined and often legally mandated national statistical system, often led by the NSO.	Jessica Chan	Accepted	A phrase was added to the text explaining this statement.
1872	1	2	789	789	It is recommended to use internationally neutral sources from UN agencies whenever these exist. I suggest to list those before a country-specific source, to avoid giving the impression of favoring a country over another.	Jessica Chan	Noted	The paragraph makes reference to the source that gives general statistical information at first and then it mentions reference for conducting household surveys in developing and EIT countries in particular.
1874	1	2	817	819	Same as above. Kindly cite UN agencies first and country info second. Does UNSD not have any guidance to this end?	Jessica Chan	Accepted with modification	This paragraph was deleted as data reporting is dealt with in Chapter 1.
1876	1	2	892	893	First row second column. ISIC is the UN endorsed international classification for all countries, and should be listed first. Same applies below in the relevant table bullet point.	Jessica Chan	Accepted	Implemented.
1878	1	2	916	918	I understand that you are referring to National Accounts, or the System of National Accounts (SNA). These are not "national statistical datasets", in the sense that they are referred to in other parts of the GLs. They are more properly called National Accounts, providing national level statistics better known as "Use and Supply Tables" for activities/products in the economy. They are regulated by the SNA international agreed methodology endorsed by the UN Statistical Commission and are in fact the basis for computing national GDP, among other useful indicators. I suggest that you improve text to be a bit more clear. What also should be clear is that the "Accounts" operate exactly like an inventory, with a lot of assumptions and estimations -- hence they do not necessarily represent statistical data collected from a source.	Jessica Chan	Noted	The concepts are similar for certain information. The intention is to be general where possible to ensure that all forms of activity data are possible, especially where a 'national' dataset is available for assessment. 'National' in the text, simply mean a representative annual value for a specific activity data/production and not just a system of national accounts.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1880	1	2	916	918	SNAs are not only implemented in developing countries. In fact, they represent for GDP what the UNFCCC represents for GHG data--all countries should compile them, and in fact most do, significantly more in proportion than countries submitting NGHGIs. Check UNSD for a list of available accounts: https://unstats.un.org/unsd/nationalaccount/sna.asp	Jessica Chan	Noted	GDP is not a direct link to GHG emission sources and will be difficult to justify its use other than for a general high level trends analysis. For example the GDP associated with the financial sector can't be used to estimate emission from commerical buildings. In most cases GDP would not be the best choice for use in developing a GHG emission estimates, especially facility by facility level data. Nevertheless, in lack of other data, GDP can be used as a surrogate.
1882	1	2	916	918	Although NSOs are typically coordinating the NSAs, in many countries the actual agency that compiles them is the Central Bank.	Jessica Chan	Noted	Comment has been noted but no specific modification has been made to the text.
1884	1	2	918	919	If we are talking about SNAs, then it should also be noted that in most developed countries --as well as in many developed ones-- countries also compile Air Emissions Accounts, in the context of national environmental-economic accounts, based on the national accounts (https://seea.un.org/). In such cases, coherency between the NGHGI agency and the national accounts is an important goal to achieve as good practice.	Jessica Chan	Noted	Comment has been noted but the concept of consistency between different data sets and among agencies is already included in the revised text.
1886	1	2	1197	1197	Box 2.3. It is suggested to also insert a link to UNSD SNA programmes indicated above. These are relevant as they are often those who perform in some countries the bottom up aggregation from facility to national scale.	Jessica Chan	Noted	Reviewer's comment considered and text has been revised in the revised version of the FD of this chapter.
1918	1	2	360	361	It is unclear what 'check for QA/QC of international data' actually means; please rephrase or elaborate to clarify.	Jessica Chan	Accepted with modification	Sentence is revised taking into account comments 1918, 2182, 6606, 1250, 3822.
1920	1	2	362	407	The more common term for 'surrogate data' in the statistical literature is 'proxy variable'. It would be useful to mention this term, becauses of the availability of guidance on the use of proxy variables from the statistical literature.	Jessica Chan	Noted	We have chosen to stick with the term surrogate data to be in line with Volume 1, Chapter 5 which includes a new table (Table 5.0) giving examples of surrogate data.
1922	1	2	719	815	This section would benefit from describing, as good practice, the interaction with the national statistical agency as interactive and ongoing collaboration. Please compare with the new guidance in Section 2.3.2.2 and Section 2.3.3.1.	Jessica Chan	Accepted with modification	Text has been modified to include this suggestion.
1924	1	2	740	748	A national statistical agency (institute) is usually a single entity. The collective of all entities supplying official statistics (national statistical institute plus other (statistical) agencies and ministry departments) are generally referred to as the national statistical system.	Jessica Chan	Accepted	A phrase was added to the text explaining this statement.
1926	1	2	740	748	Useful repository of country profiles of statistical systems: https://unstats.un.org/unsd/dnss/cp/searchcp.aspx.	Jessica Chan	Accepted	Link added to the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2132	1	2	712	717	Perhaps a useful clarification to insert here is that not all "international data" are equal. Some are dissemination of national data through non-UNFCCC international reporting of member countries (i.e., FAOSTAT, FRA, UNSD, etc.). Thus data directly received (and flagged accordingly in these databases) are official national data. Even imputed data in such databases have nonetheless the status of "semi-official" data, since countries mandate these agencies with this task when appropriate (unlike the UNFCCC process). SO the first obvious step when "national" data are missing is to go to repositories of "official" and semi-official" national data disseminated by UN agencies. then there are other international databases with lesser "weight" in the above sense.	Julian Chow	Accepted	The most important with data is its quality, it is the first factor to take into consideration. This is clarified in the paragraph about "Choosing between published national and international data" from section 2.2.1.
2134	1	2	742	742	It should be added--to avoid misunderstandings-- that in most countries, so-called decentralized data collection still functions within a well defined and often legally mandated national statistical system, often led by the NSO.	Julian Chow	Accepted	A phrase was added to the text explaining this statement.
2136	1	2	789	789	It is recommended to use internationally neutral sources from UN agencies whenever these exist. I suggest to list those before a country-specific source, to avoid giving the impression of favoring a country over another.	Julian Chow	Noted	The paragraph makes reference to the source that gives general statistical information at first and then it mentions reference for conducting household surveys in developing and EIT countries in particular.
2138	1	2	817	819	Same as above. Kindly cite UN agencies first and country info second. Does UNSD not have any guidance to this end?	Julian Chow	Accepted with modification	This paragraph was deleted as data reporting is dealt with in Chapter 1.
2140	1	2	892	893	First row second column. ISIC is the UN endorsed international classification for all countries, and should be listed first. Same applies below in the relevant table bullet point.	Julian Chow	Accepted	Implemented.
2142	1	2	916	918	I understand that you are referring to National Accounts, or the System of National Accounts (SNA). These are not "national statistical datasets", in the sense that they are referred to in other parts of the GLs. They are more properly called National Accounts, providing national level statistics better known as "Use and Supply Tables" for activities/products in the economy. They are regulated by the SNA international agreed methodology endorsed by the UN Statistical Commission and are in fact the basis for computing national GDP, among other useful indicators. I suggest that you improve text to be a bit more clear. What also should be clear is that the "Accounts" operate exactly like an inventory, with a lot of assumptions and estimations -- hence they do not necessarily represent statistical data collected from a source.	Julian Chow	Noted	The concepts are similar for certain information. The intention is to be general where possible to ensure that all forms of activity data are possible, especially where a 'national' dataset is available for assessment. 'National' in the text, simply mean a representative annual value for a specific activity data/production and not just a system of national accounts.
2144	1	2	916	918	SNAs are not only implemented in developing countries. In fact, they represent for GDP what the UNFCCC represents for GHG data--all countries should compile them, and in fact most do, significantly more in proportion than countries submitting NGHGIs. Check UNSD for a list of available accounts: https://unstats.un.org/unsd/nationalaccount/sna.asp	Julian Chow	Noted	GDP is not a direct link to GHG emission sources and will be difficult to justify its use other than for a general high level trends analysis. For example the GDP associated with the financial sector can't be used to estimate emission from commerical buildings. In most cases GDP would not be the best choice for use in developing a GHG emission estimates, especially facility by facility level data. Nevertheless, in lack of other data, GDP can be used as a surrogate.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2146	1	2	916	918	Although NSOs are typically coordinating the NSAs, in many countries the actual agency that compiles them is the Central Bank.	Julian Chow	Noted	Comment has been noted but no specific modification has been made to the text.
2148	1	2	918	919	If we are talking about SNAs, then it should also be noted that in most developed countries --as well as in many developed ones-- countries also compile Air Emissions Accounts, in the context of national environmental-economic accounts, based on the national accounts (https://seea.un.org/). In such cases, coherency between the NGHGI agency and the national accounts is an important goal to achieve as good practice.	Julian Chow	Noted	Comment has been noted but the concept of consistency between different data sets and among agencies is already included in the revised text.
2150	1	2	1197	1197	Box 2.3. It is suggested to also insert a link to UNSD SNA programmes indicated above. These are relevant as they are often those who perform in some countries the bottom up aggregation from facility to national scale.	Julian Chow	Noted	Reviewer's comment considered and text revised.
2182	1	2	360	361	It is unclear what 'check for QA/QC of international data' actually means; please rephrase or elaborate to clarify.	Julian Chow	Noted	Sentence is revised taking into account comments 1918, 2182, 6606, 1250, 3822.
2184	1	2	362	407	The more common term for 'surrogate data' in the statistical literature is 'proxy variable'. It would be useful to mention this term, becauses of the availability of guidance on the use of proxy variables from the statistical literature.	Julian Chow	Noted	We have chosen to stick with the term surrogate data to be in line with Volume 1, Chapter 5 which includes a new table (Table 5.0) giving examples of surrogate data.
2186	1	2	719	815	This section would benefit from describing, as good practice, the interaction with the national statistical agency as interactive and ongoing collaboration. Please compare with the new guidance in Section 2.3.2.2 and Section 2.3.3.1.	Julian Chow	Accepted with modification	Text has been modified.
2188	1	2	740	748	A national statistical agency (institute) is usually a single entity. The collective of all entities supplying official statistics (national statistical institute plus other (statistical) agencies and ministry departments) are generally referred to as the national statistical system.	Julian Chow	Accepted	A phrase was added to the text explaining this statement.
2190	1	2	740	748	Useful repository of country profiles of statistical systems: https://unstats.un.org/unsd/dnss/cp/searchcp.aspx.	Julian Chow	Accepted	Link added to the text.
2252	1	2	307	314	Key source to be shared and is missing here: FAO Global Forest Resources Assessment (FRA). Web site: http://www.fao.org/forest-resources-assessment/en/	Rocio Danica Condor Golec	Accepted	New bullet is added.
2254	1	2	819	819	It might be not useful to include: "UNFCCC software" - not updated information and is refering to old IPCC GL.	Rocio Danica Condor Golec	Accepted with modification	This paragraph was deleted as data reporting is dealt with in Chapter 1.
2256	1	2	916	960	Fine to learn about developed countries, but considering that IPCC is used and will be used for a wider audience which include also developing countries it might be also useful to indicate a mapping excercise of datasets (something was already including in Chapter 1 but is probably more relevant here - section 1.5.2.1). I will also add explicit reference to the different sources of data providers providing real examples. For instance, we know that in the Agriculture sector, most of the time there are two sources of data, in the Ministry of Agriculture and a second one in the National Statistical Offices (NSO) - compilers need to gather for official data to be used for preparing the GHG inventory. In addition, the fact of the official data should be included in the text of this chapter and not as a note (see note 1).	Rocio Danica Condor Golec	Accepted with modification	Modified text to be general. Also deleted text such as 'developed'.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2258	1	2	1427	1427	This link on WCA2020 is not working, please replace: http://www.fao.org/world-census-agriculture/wca2020/en/	Rocio Danica Condor Golec	Accepted	Link updated.
2260	1	2	1427	1427	It would be important to include a paragraph that can talk about the WORLD PROGRAMME FOR THE CENSUS OF AGRICULTURE 2020 VOLUME 1 Programme, concepts and definitions (http://www.fao.org/3/a-i4913e.pdf) since Chapter 8 - Theme 15: Environment/greenhouse gas (GHG) emissions has been explicitly developed to support countries in collecting data for the agriculture sector using the census but also useful for agricultural surveys.	Rocio Danica Condor Golec	Accepted	The reference has been added.
2262	1	2	1470	1477	Please add the following relevant publication "Map Accuracy Assessment and Area Estimation. A practical guide (http://www.fao.org/3/a-i5601e.pdf). Please add the following publication: "Manual for integraded field data collection"(http://www.fao.org/docrep/016/ap152e/ap152e.pdf). Please after the "Voluntary Guidelines on National Forest Monitoring" publication add the following one: "Strengthening National Forest Monitoring Systems for REDD+" (http://www.fao.org/3/CA0525EN/ca0525en.pdf). Please provide separate footnotes for each publication otherwise the links are not able to take to the publications (see first two footnotes under footnote 33). Please check note 33 the following link is not working: http://www.fao.org/icatalog/inter-e.htm. If the catalog of FAO is to be provided then please use the following link: http://www.fao.org/publications/en/	Rocio Danica Condor Golec	Accepted	The reference has been added.
2264	1	2	1478	1484	Please provide the general web site where all tools are available (http://www.openforis.org/). Please also add in the list the following relevant tool that is missing: System for earth observations, data access, processing & analysis for land monitoring, SEPAL (http://www.openforis.org/tools/sepal.html)	Rocio Danica Condor Golec	Accepted	The reference has been added.
2266	1	2	1465	1484	This section on Forest survey deserves to have some guidance and/or indications that can guide compilers to assess the quality of survey data. A scientific paper was submitted for peer review (Birigazzi et al., 2018. Data quality reporting: good practice for transparent estimates from forest and land cover surveys. Environmental Science and Policy.). Initial discussions were presented already during GFOI meeting (GFOI R&D and GOFC-GOLD Land Cover Science Meeting 3rd Expert workshop on lessons learned from Accuracy Assessments in the context of REDD+: Uncertainties of emission factors and biomass maps), info available here: http://www.gofcgold.wur.nl/documents/ThirdAccuracyAssessmentWS_2018/1.7BilbaoAA_Meeting_2018.pdf	Rocio Danica Condor Golec	Rejected	Reference wasn't considered as it was published after the literature cut-off date (25.06.2018).
2464	1	2	1111	1111	Some ETS, i.e., Korean ETS, covers direct emissions from fuel combustion and industrial process and indirect emssions from use of electricity and heat. To avoid double counting in national inventory the indirect emission data can not be used in emission estimation in national inventory.	Mingshan Su	Noted	Comment has been noted. This will depend on the information reported by facility and an inventory data provider. The concept of double counting is already considered in the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2500	1	2	279	280	Referring to the previous inventory reports, I think it is possible to know the countries with sectors in a similar stage of economic development, management practices and/or soil-climatic conditions. To minimize the bias from expert judgement, I would suggest to make a detailed country clusters that can be used by experts.	Pius Nishimwe	Rejected	This is a matter of judgement at the time the inventories are compiled - and will change over time.
2502	1	2	527	536	I understand the need to use Non- calendar year data due to data scarcity for some countries. You have given of the example of using other types of annual year data such as April – March, but I would also suggest to give in detail possible types of annual year data that can be used and that can't be used to prevent/minimize experts bias.	Pius Nishimwe	Rejected	No action can be taken because comment is out of scope of 2019 Refinement.
2504	1	2	577	578	Waste sector, Solid waste category, Waste generation and collection rates are an important parameter for EF	Pius Nishimwe	Accepted with modification	Text and bullets have been revised considering the comments and discussion with authors of sectoral chapters.
2676	1	2	1287		Could the IPCC include a discussion on "collaboration with national statistics data agencies" for developing countries with a view to provide practical guidance to the inventory agencies on developing a program to collect basic statistics that may not exist in the country? The additional information provided is useful, but does not lead to improvement of the domestic data which should be used for inventories.	Takeshi Enoki	Noted	This concept is already reflected in the main text of ch.2 and in the annex as well.
2684	1	2	88	88	Should be added after "forest management", reforestation, afforestation, deforestation, …	Mostafa Jafari	Accepted with modification	The text was modified as follows: "...major fossil fuel consumption, major agriculture activities, forests and major industries".
2686	1	2	1467	1467	Foote note under "national forest monitoring": FAO should facilitate to access national related data provided in international and regional levels by different organizations	Mostafa Jafari	Noted	No action can be taken because IPCC should not give policy prescriptive guidance.
2700	1	2	162	162	It seems paradoxical that 'a last resort' would be 'good practice'. Since line 149 generally covers this item as well, would 'As a last resort, use expert judgement' be enough?	Elsa Hatanaka	Rejected	It is possible to produce a good practice inventory that include expert judgement. The overall aim is for the inventory to follow general good practice as far as it can be judged, hence the text.
2702	1	2	276	276	It should read 'there may be cases when no data is available' instead of 'there may cases when no data is available' (editorial)	Elsa Hatanaka	Accepted	Corrected.
2704	1	2	306	306	It shoud read 'Greenhouse Gas Reporting Program (GHGRP) GHG data' instead of 'The Greenhouse Gas Reporting Program (GHGRP) GHG data', since not all countries have this data. (editorial)	Elsa Hatanaka	Noted	"the Greenhouse Gas Reporting Program (GHGRP) EPA USA" - used as an example in bullet on facility data. The list has been updated in the revised text.
2706	1	2	643	643	mining' should be changed to a more generic word such as 'finding' to be more user friendly/less casual. (editorial)	Elsa Hatanaka	Accepted with modification	Text deleted in line 643-649 and some part of text here is moved in line 555-559.
2708	1	2	645	645	It is unclear as to why an inventory compiler 'should also consider populating the EFDB'. This obscures what is really needed from an inventory compiler, especially in the case of developing countries. Deletion or changing the language to 'inventory compilers are invited' is suggested.	Elsa Hatanaka	Accepted	The sentence has been changed to make the concept clear.
2758	1	2	108	115	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.
2760	1	2	120	125	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2762	1	2	157	160	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.
2764	1	2	195	202	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.
2766	1	2	219	223	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.
2768	1	2	172	172	The letter E in minuscule (e. g.)	Poot-Delgado Carlos Antonio	Accepted	Corrected.
2770	1	2	304	305	It is suggested to use "and" instead of &	Poot-Delgado Carlos Antonio	Accepted with modification	This bullet is deleted.
2772	1	2	308	314	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Corrected.
2774	1	2	333	344	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.
2776	1	2	376	379	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Editing revised.
2778	1	2	569	573	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Texts relevant to the comment from line 568-573 are deleted.
2780	1	2	577	577	It is suggested to use "and" instead of &	Poot-Delgado Carlos Antonio	Accepted with modification	Text revised in Table 2.2, "Oil & gas" is written as "Oil and gas".
2782	1	2	595	598	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted with modification	Text revised in line 595-598 as suggested, first letter as capital.
2784	1	2	664	669	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted with modification	Text revised, small letter replaced with capital letters.
2786	1	2	702	704	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Capital letters were used.
2788	1	2	881	883	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Accepted the use of initial capital letter to all bullets.
2790	1	2	945	950	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Implemented. Consistency across chapters and volumes was ensured.
2792	1	2	968	974	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Implemented. Consistency across chapters and volumes was ensured
2794	1	2	1004	1004	It is suggested to use "and" instead of &	Poot-Delgado Carlos Antonio	Accepted	Modified as requested.
2796	1	2	1111	1116	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Accepted the use of initial capital letter to all bullets.
2798	1	2	1125	1125	The following format is suggested (IPCC, 2011a, b)	Poot-Delgado Carlos Antonio	Accepted	Proposed format implemented.
2800	1	2	1136	1144	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Accepted the use of initial capital letter to all bullets.
2802	1	2	1151	1151	The following format is suggested (IPCC, 2011)	Poot-Delgado Carlos Antonio	Accepted	Accepted the use of initial capital letter to all bullets.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2804	1	2	1177	1188	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Accepted the use of initial capital letter to all bullets.
3510	1	2	313	313	Reference "Smith et al (2012)" missing in list of references at the end of this chapter	Ana Blondel	Accepted with modification	The reference is deleted.
3784	1	2	306	306	It should be noted that this is specific to the USA	Andrea Tilche	Accepted	"the Greenhouse Gas Reporting Program (GHGRP) EPA USA" - used as an example in bullet on facility data.
3786	1	2	342	342	It is not obvious what is meant by methodologies for preparation of emission factors in terms of data requirements. A better explanation would be helpful	Andrea Tilche	Accepted with modification	Elaborated in section 2.2.4 "Emission factors and direct measurement of emissions".
3788	1	2	568	573	Is this list ordered in terms of priority?	Andrea Tilche	Noted	Texts relevant to the comment from lines 568-573 are deleted.
3790	1	2	647	647	What are the criteria for information to be insufficient?	Andrea Tilche	Accepted with modification	Text deleted in lines 643-649.
3792	1	2	903	906	How frequent should such reports be updated?	Andrea Tilche	Accepted with modification	Text modified so as to indicate when facility reports are needed.
3794	1	2	943	944	This sentence is not clearly formulated	Andrea Tilche	Noted	Modified.
3796	1	2	1110	1110	Such knowledge of the inventory compiler would require that the information is reliably and tranparently documented at facility level	Andrea Tilche	Accepted with modification	Included consideration of requiring supporting documentation for transparency and quality assessment when methods differ from specified approach.
3804	1	2			Page 2.5. Last sentence reads that initial estimates of new sources do not contribute to the final inventory totals. This cannot be right. Why would not they? In addition, you cannot have a 'very rough estimate' and at the same time say it is 'good practice' to use Tier 2 or 3 methods to estimate it. This whole paragraph needs revision.	Andrea Tilche	Accepted with modification	Text reworded in light of other comments.
3806	1	2			Figure 2.2 is too complicated. This decision trees makes things even more unclear for inventory compilers and contradict other decision trees for different key sources. For example, when the data is not available, and the activity is a potential source of GHG emissions, the decision tree should ask Parties to start collecting the data and not to use surrogate data or expert judgment. You cannot base your inventory on surrogate data or expert judgment, particularly for larger sources of emissions. The quality of GHG estimates is only as good as the quality of the underpinning activity data.	Andrea Tilche	Rejected	No need to change the figure.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3808	1	2			Page 2.6 There is something odd about the methodological principles of data collection that underpin 'good practice'. Some are shaded when they should not and some are not when they should be. Please ensure the following principles, from the 2006 IPCC Guidelines, are contained in the refinement: 1. Focus on the collection of data needed to improve estimates of key categories which are the largest, have the greatest potential to change, or have the greatest uncertainty. 2. Choose data collection procedures that iteratively improve the quality of the inventory in line with the data quality objectives (e.g. transparency, consistency, comparability, completeness and accuracy). 3. Put in place data collection activities (resource prioritisation, planning, implementation, documentation etc.) that lead to continuous improvement of the data sets used in the inventory. 4. Collect data/information at a level of detail appropriate to the method used, and relevant for the emission factors to be used/reported. 5. Review data collection activities and methodological needs on a regular basis, to guide progressive, and efficient, inventory improvement. 6. Introduce agreements with data suppliers to support consistent and continuing information flows.	Andrea Tilche	Accepted with modification	List changed.
3810	1	2			The introductory chapter of the 2006 IPCC Guidelines also provides an example of the steps needed in a typical inventory cycle, with quality control measures implemented and documented for every step. The 2019 refinement chapter on approaches to data collection should refer to these steps as it provides a good overview of when to start data collection, right after the selection of key source categories and of appropriate methods. For countries starting an inventory for the first time it may be that the identification of key categories would need expert judgement, but once these key sources of emissions have been identified, activity collection systems should be started as soon as possible.	Andrea Tilche	Noted	Comment has been noted but no specific modification has been made to the text.
3812	1	2			Page 2.27 (and any additional reference in other pages of the chapter) the text says that facility data has the potential to be utilized in national inventories. Please remove 'potential'. Facility data has been used for many years in most European countries. It would be better saying 'can be used'.	Andrea Tilche	Accepted with modification	Added 'may be utilized'. Also note that this is not always the case for non European countries and should be generally stated.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3814	1	2			Page 2.27 the text says that national inventory compilers should not assume that facility data is by default an improvement on estimates based on national statistical activity data due to possible biases. However, facility data should normally lead to an improvement in terms of accuracy over statistical data. Facility data improves parameters such as fuel consumption, calorific values, oxidation factors, emission factors and emissions. Why would national data be better than plant specific data? There is also the requirement in the Guidelines to move to higher tiers (to improve accuracy) for key sources. Facility data, assuming the use of this data complies with the scope and methodologies for reporting GHG inventories, should lead to an improvement of the quality of emission estimates.	Andrea Tilche	Noted	Facility data quality will be dependent on the stringency of specified methods and information to be reported (refer to section 2.3.2 for quality goals). When quality information is reported following specified requirements, it is true that facility data is equal to or better than national datasets (since sometime the same information is reported to national statistical agency [for example national energy agency for energy data] and GHG reporting programmes). It is to recognize that facility reported information is not always better via completeness, comparability, transparency etc. with national datasets. Not all facility data will meet transparency and quality requirements to ensure that data is an improvement on national data. It is up to national inventory compilers to assess facility reported data as to determine and justify its use in national inventory.
3816	1	2			Page 2.27 the text says that a higher tier method is not always needed. However, the use of higher tiers is usually (with the exception of CO2 from transport) mandatory for key source categories. Also, in many countries, facility data already exists so countries should be encouraged to use this data, when it improves the quality of GHG estimates.	Andrea Tilche	Noted	It is recongnized that use of facility data directly may not always improve the accuracy of an emission estimates (depending on the stringency of estimation methods facilities are to implement). As noted in the first sentence of the fifth paragraph in 2.3.1, '…should only be considered if the information improves the quality of the inventory'. Sometimes, the scenario exists where the overall quality of the reported data (for a facility) may result in a lower quality estimates as compare to a overal industrial estimation methods taking into consideration operational variation (gathered through one-off studies). This scenario should be assessed by inventory compilers and how best to apply facility reported data.
3818	1	2			Figure 2.4 is too prescriptive and complicates the use of facility data by the countries. Parties are free to choose the data they deem appropriate to estimate emissions in order to meet the TACCC and reporting requirements. The 'facility data' concept in the decision tree is too abstract and could refer to activity data, emission factors and emissions. Facility data can also be used for QA/QC purposes and even to get more accurate information on the non-energy use of fuels. The decision tree as it stands cannot be considered 'good practice'. Countries with long standing inventories using plant-specific data should not feel obliged to implement this decision tree. Countries with no inventories or starting to develop them would find it extremely difficult to implement the decision tree. The different decision trees included in the sectoral chapters already provide guidance on when to use plant-specific data. A general decision tree complicates everything and it is not totally suited to national circumstances.	Andrea Tilche	Accepted with modification	Clarified to users that Figure 2.3 is an example.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3820	1	2			Page 2.36 reads that the reporting facility can be requested to provide estimates using both methods (less advanced and more advanced tiers) for one of more years. This is not always possible and it also increases the burden on countries. It is not clear either who is expected to request this information to the facility. Information that most likely they would not have.	Andrea Tilche	Accepted with modification	Modified text.
3822	1	2	360	361	It is unclear what 'check for QA/QC of international data' actually means; please rephrase or elaborate to clarify.	Andrea Tilche	Accepted with modification	Sentence is revised taking into account comments ID 1918, 2182, 6606, 1250, 3822.
3824	1	2	362	407	The more common term for 'surrogate data' in the statistical literature is 'proxy variable'. It would be useful to mention this term, becauses of the availability of guidance on the use of proxy variables from the statistical literature.	Andrea Tilche	Noted	We have chosen to stick with the term surrogate data to be in line with Volume 1, Chapter 5 which includes a new table (Table 5.0) giving examples of surrogate data.
3826	1	2	719	815	This section would benefit from describing, as good practice, the interaction with the NSA as interactive and ongoing collaboration. Please compare with the new guidance in Section 2.3.2.2 and Section 2.3.3.1.	Andrea Tilche	Accepted with modification	Text has been modified to include this suggestion.
3828	1	2	740	748	A national statistical agency (institute) is usually a single entity. The collective of all entities supplying official statistics (national statistical institute plus other (statistical) agencies and ministry departments) are generally referred to as the national statistical system.	Andrea Tilche	Accepted	A phrase was added to the text explaining this statement.
3830	1	2	740	748	Useful repository of country profiles of statistical systems: https://unstats.un.org/unsd/dnss/cp/searchcp.aspx.	Andrea Tilche	Accepted	Link added to the text.
3832	1	2	740	748	List of national statistical institutes and other national authorities responsible for the development, production and dissemination of European statistics: https://ec.europa.eu/eurostat/documents/747709/753176/20180719_List_ONAs_LV.pdf/0e48549e-f3a0-4b86-a1c7-aae7e6468a84	Andrea Tilche	Accepted	Link added to the text.
3834	1	2	916	918	Please make a reference to the standard governing these 'national statistical datasets with supply and disposition of materials prouced or consumed by economic sectors' to clarify which datasets are meant here. The System of National Accounts, the System of Environmental Economic Accounting?	Andrea Tilche	Rejected	These are not always sources from national statistical approaches. In general, facility energy consumption data reported to statistical agencies are for used in developing energy balances but not primarily for the purpose of national accounts which are usually based on supply and demand data details from the producers (suppliers) and not from consumers.
3836	1	2	1314	1314	Outdated link, please replace by: https://ec.europa.eu/eurostat/data/browse-statistics-by-theme	Andrea Tilche	Accepted with modification	Deleted. This is a repetition of data source list from Annex 2A2 and do not related to surveys. All links in Annex 2A2 are updated.
3838	1	2	1418	1421	Relevant to mention here would also be Eurostat's datasets PRODCOM (production of manufactured goods) and Comext (trade in goods). See https://ec.europa.eu/eurostat/web/prodcom/overview and https://ec.europa.eu/eurostat/web/international-trade-in-goods/overview	Andrea Tilche	Accepted	Reference to PRODCOM included.
3840	1	2	1516	1516	Non-existing link, please replace by: https://ec.europa.eu/eurostat/web/waste/overview	Andrea Tilche	Accepted	Links checked.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
6114	1	2	183	184	I suggest that the authors reconsider the text "Is there a source of this data?" in Figure 2.2. The text was "Is there a published source of this data" in FOD. The meaning become unclear and inconsistent with the description of line 151 by deleting "published".	Naofumi Kosaka	Accepted with modification	Where appropriate FRP and FRD have been incorporated.
7948	1	2	79	81	also consider replacing existing data sources when better ones are identified (this can mean more reliable, affordable, accessible, timely…)	Matthew Prescott	Accepted	Text amended as suggested.
7950	1	2	97	99	the final sentence indicates estimates based on expert judgement not be included in the inventory, but this seems unclear as that would be better to include than no estimate?	Matthew Prescott	Accepted	Sentence has been expanded and clarified.
7952	1	2	106	106	"key categories that are the largest". It would be helpful to expand on this (e.g. "largest emitters" or "largest energy users", or "largest economically in terms of contribution to GDP")	Matthew Prescott	Accepted with modification	Deleted.
7954	1	2	178	179	revision of the first sentence is required as it is unclear: "…should be archived and documented together with the any processing and any assumptions."	Matthew Prescott	Accepted	Text amended as suggested.
7956	1	2	183	183	various typos: "Can the comnpiler", "inverntory compiler", "This may involve and annual inventroy activity", "Perfom final checks"	Matthew Prescott	Accepted	Editing revised and corrections made.
7958	1	2	209	231	It could make sense in this section to include a suggestion on using respondent waivers to allow for the release of their specific data. Also, in some cases, certain officials (e.g. the Chief Statistician) has the authority to allow the discretionary release of certain information.	Matthew Prescott	Accepted with modification	Text modified to talk about national mechanisms for release of data.
7960	1	2	225	225	suggest re-wording of the first sentence, something like: "It may be possible to aggregate emissions from smaller categories into larger ones to in order to avoid disclosing confidential information."	Matthew Prescott	Accepted with modification	Text revised in response to several comments.
7962	1	2	288	314	Perhaps add to this list sub-national or regional statistical agencies (e.g. provincial ministries or municipal governments which may have a mandate to collect relevant data)	Matthew Prescott	Accepted	Additional bullet is added to the list.
7964	1	2	560	560	typo. Delete "which" or add "are" after it	Matthew Prescott	Accepted with modification	Text revised (refer to comment id: 5372).
7966	1	2	561	561	suggest replacing "and effecting" with "that effect"	Matthew Prescott	Accepted with modification	Text revised (refer to comment id: 5372).
7968	1	2	936	936	add "by" after "information"	Matthew Prescott	Accepted	Implemented.
7970	1	2	943	944	add "reducing" after "…is collected while"	Matthew Prescott	Accepted	Text amended as suggested.
7972	1	2	993	993	same section title as 2.3.2.2, this may be confusing if referring to a specific section	Matthew Prescott	Accepted	New title included.
8350	1	2	265	265	should state that this is the US EPA's GHGRP	Pauline Midgley	Accepted	This is mentioned later in the chapter.
3842	1	3			The chapter should clearly say upfront that the main objective of the uncertainty analysis is to provide trust in the national inventory estimates and to prioritise inventory quality improvements. Another key objective of the uncertainty analysis is to verify that uncertainties are reduced over time so that the potential over or under estimates are as narrow as possible.	Andrea Tilche	Noted	The objectives mentioned are covered in lines (108-112), (137-147) in Section 3.1.1 that is already upfront in the chapter. No change made.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1308	1	3	101	105	The need for adding guidance to this chapter is certainly noted and welcome. However, the text that is being added suffers at the outset from a lack of clarity on what is "uncertainty." Recall that in the Glossary, "uncertainty" and "precision" are used interchangeably, even though this is not the case in general in statistical definitions. It is suggested to start with cleaning up the underlying definitions, write them down in the Glossary, and then write a text for this new section that is as consistent with those definitions as possible. In other contexts, "bias" is referred to as structural error, low precision as a random error. The text used often the latter term, but not the former. why?	Francesco Nicola Tubiello	Accepted with modification	Lines mentioned are just the introductory text to the chapter, not touching definitions. A sentence has been added in the following section to clarify the meaning of uncertainty in the context of national GHG inventories.
2820	1	3	1013	1014	Standardize typeface and verify that letters do not overlap (Table sensitivity Chart)	Poot-Delgado Carlos Antonio	Accepted	Implemented.
1310	1	3	108	112	The difinition of "good practice" given is the one that descibes the "accuracy" of a NGHGI in the glossary. Note that that definition follows ISO, in that it defines "accuracy" as 'trueness' (i.e., lack of bias) and precision--as reduction of random errors.	Francesco Nicola Tubiello	Accepted	Definition of accuracy in the Glossary has been modified.
1312	1	3	113	115	The impossibility to reduce "uncertainty" does not follow logically from the "good practice" or accuracy statement.	Francesco Nicola Tubiello	Accepted	Text changed to an independent notion.
1314	1	3	115	115	'knowledge of this uncertainty." If something is uncertain, how do we "know" it?. This points to the fact that was is meant here by "uncertainty" is in fact "measurement uncertainty". And that its" knowledge" is nothing but a quantified measure, for instance a standard error.	Francesco Nicola Tubiello	Accepted	"Knowledge" changed to "evaluation". There is no need to elaborate further on the measures in the given text.
1316	1	3	116	119	Likewise, it does not seem to be a logical consequence of the "good practice" definition that reducing bias should be a priority of NGHGI actions as opposed as to reduce uncertainty. If it is treu that a precise estimate has a limited value if it is biased, the same is true of the contrary.	Francesco Nicola Tubiello	Accepted with modification	Hierarchy between accuracy and precision is imbedded in the definition of good practice but the authors agree that it may not be completely clear. This priority notion is present throughout chapter 3. The figure 3.2 in Chapter 3 of the 2006 IPCC Guidelines clearly shows that unbiased estimate has value even if unprecise (this is particularly true for some categories, as in agriculture, where high variablility leads to high uncertainty (in the sense of precision). Modified eliminating the link with the good practice definition.
1318	1	3	119	119	The use of the terms "accurate" and precise," taken basically from the Glossary, is a problem in itself. In the actual definition of "accuracy" in the Glossary (and in ISO), precision (as the inverse of uncertainty) is a component of accuracy, not something to be judged against it or outside of it.	Francesco Nicola Tubiello	Accepted	Definition of accuracy in the Glossary has been modified.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1320	1	3	120	120	'Knowledge." Now it seems like the GLs are using the term "uncertainty" in its wider sense beyond statistics. Is this correct? Then how can precision be the inverse of uncertainty, as the same Glossary indicates? Something's got to give. In any case, the concept of "calculating" uncertainty as something represented by a "confidence interval" seems to suggest that what is meant by "unceratinty" is really a well-defined, well-know (as in not uncertain at all) statistical quantificatoin problem of getting to a true value (known or unkown) using sample theory.	Francesco Nicola Tubiello	Accepted	Definition of precision has been modified in the Glossary.
8670	1	3	125	125	It is good that here, near the beginning, the chapter makes the point that the estimation of uncertainty is strongly linked to the estimation of emissions and removals. I recommended that the text add an essential related point by including a sentence like "Often, calculation of uncertainty most effectively occurs at the same time as estimation of emissions and removals, which can ensure consistency between the analyses."	Patrick Gonzalez	Accepted with modification	Text added: "The calculation of the uncertainty is most effective when carried out at the same time as estimation of emissions and removals occur".
1322	1	3	134	135	Kindly calrify language to increase understanding. Examples: "independent goal" from what?	Francesco Nicola Tubiello	Accepted	Text changed to increase clarity.
2284	1	3	141	141	Suggest to link this section 3.1.1.a to Chapter 1 as part of the whole GHG inventory cycle for 2009 IPCC GL (see also comment from line 16).	Rocio Danica Condor Golec	Accepted	A reference has been added.
1324	1	3	149	149	verified by a third party". What does this mean? The definitions of "verification" in teh relevant box in Ch. 6 do not seem to include third party functoins different from the QA. NGHGI are not "verified" in the same manner as certified emissions reductoins, for instance.	Francesco Nicola Tubiello	Accepted	Text changed to "submitted to QA procedures and verification".
556	1	3	150		Delete "of the 2006" after "in chapter 4".	Klaus Radunsky	Accepted	Done.
1326	1	3	164	166	Again, "accuracy" and "precisoin" are used as independent terms herein, as per glossary drawing of the 'military target", except that the glossary definition (and ISO definition) of accuracy includes both. In this latter sense, "accuracy" in the IPCC Glossary does not simply mean as low a bias as possible, however it seems to be used in this 9incomplete) sense in this very paragraph.	Francesco Nicola Tubiello	Accepted	Definitions in the Glossary have been changed.
3844	1	3	165	165	Not clear what is meant by "that would have been identified"	Andrea Tilche	Accepted	Changes have been made as appropriate. Text replaced by"reduce biases that have been identified".
2286	1	3	167	167	It would be great if there is any chance to give some explanation of figure 3.1 since it has turned to be very complex and elaborated with respect to the one published in 2006 IPCC GL. Explanation can be incorporated from par. 155	Rocio Danica Condor Golec	Accepted with modification	New language has been inserted in Sections 3.1.1 and 3.1.1a clarifying the role of the uncertainty analysis in the inventory compilation process and helping the reader to understand Figure 3.1. The authors disagree that the figure is very complex, being just more explanatory than the original figure.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8672	1	3	167	193	Figure 3.1 does not seem to properly convey the order of steps or the strong linkage between estimation of emissions and removals and estimation of uncertainty. "Data collection" comes after "Conceptualization" and then leads directly to, in parallel, "Uncertainty assessment" and "Emissions/removals estimation". "Input uncertainty quantification" is a part of "Uncertainty assessment" and should be deleted to streamline the figure. Figure 3.2, charts the sequence of steps more effectively, since it is a decision tree, but it does not convey the strong and parallel linkage to estimation of emissions and removals. Therefore, I recommend editing Figure 3.2 to integrate key steps in the estimation of emissions and removals from Figure 3.1 and then deleting Figure 3.1. In effect, merging the two figures using the decision tree as a base.	Patrick Gonzalez	Rejected	The flow assumed by the expert is not properly correct because data collection not necessarily comes after the conceptualization. However, there has been an overall revision of the text. The relevant text has been deleted.
3846	1	3	174	174	Why is the goal not also to increase the precision?	Andrea Tilche	Accepted with modification	Changes made as appropriate. "Accuracy" changed to "quality".
558	1	3	180		Substitute "show" by "shows".	Klaus Radunsky	Accepted	Done.
1328	1	3	183	183	See several comments above. Reucing bias is certainly worthwhile, but in light of reducing "uncertainty", it is out of scope. Bias and uncertainty are fairly independent in the definitoin of "accuracy" given in the Glossary and coinciding with the ISO definition. In this sense, teh passage in Fig 3.2 from uncertainty assessment to "bias" assessment with a return loop, is not clear.	Francesco Nicola Tubiello	Accepted with modification	Definitions in the Glossary have been changed eliminating the inconsistency between the definitions of uncertainty, accuracy and precision and addressing also this comment.
560	1	3	187		Add clarity by substituting "in the whole inventory" by "of the national total emissions".	Klaus Radunsky	Accepted with modification	Changed to "of the total national net emissions".
1330	1	3	214	214	'when ofcusing efforts to reduce uncertainty, priority should be given to …" Clarifying what is meant by uncertainty?	Francesco Nicola Tubiello	Rejected	Paragraph comes from the 2006 IPCC Guidelines and deals with reducing uncertainty. Definition of uncertainty is in Section 3.1.1.
1334	1	3	249	250	How do we know if the specific Tier 1 EF is biased or not? If this is not known, then moving to a higher Tier method should be considered as aleatory as using Tier 1. If conversely this is always true, then one should not use Tier 1, and if so why are the GLs bothering providing EFs and substantial guidance on how to do exactly that. In any case, this sentence contradicts what stated later in this section, lines 326-329.	Francesco Nicola Tubiello	Accepted with modification	The comment essentially wrong. If not there would be no benefit to move to a Tier 2 method. Tier 2 methods use country specific data that could reduce likely bias and allow for ways of increasing precision. The authors recognize that the message was misunderstood. The section does not touch cost/benefit, just covers ways of reducing uncertainty. Paragraph edited for clarity.
1332	1	3	249	253	'Tier 1 Efs … may be biased." Is this a statemetn of generic validity? If so, are we saying that all Tier 1 inventories are likely to be inaccurate because they are biased? If this is correct, why did we bother developing a Tier 1 method? I thought that, unless proven otherwise (through measurements, or modeling for instance), deafult Tier 1 coefficients allow a compiler at teh beginning of their task to come up with a NGHGI that is "accurate" "as far as can be judged".	Francesco Nicola Tubiello	Accepted with modification	Global defaults are likely to be biased for a particular country. Tier 1 method provides usually a good starting point. Moving to a higher Tier in most of the cases will increase the quality of the inventory, both increasing accuracy and precision. Decision to move to higher tiers is a matter of priority and availability of resources. The section does not deal with cost/benefit. It just provides the ways of reducing uncertainty. Paragraph edited.
1338	1	3	249	253	In light of the above two comments, it is suggested to remove this sentence. One thing is to say that "uncertainty" can be reduced by using higher tier methods. Quite another to say that Tier 1 methods have, "by default", high uncertainty.	Francesco Nicola Tubiello	Rejected	Tier 1 methods are not biased by default. They may be biased, and frequently they are when applied to a particular country. The issue is highlighted as example.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1336	1	3	251	253	Bias reduction or elimination needs to be demonstrated by measurement, in other words knowledge that the simpler approach is biased to be begin with, and if so in which direction and by how much.	Francesco Nicola Tubiello	Rejected	Moving to a higher Tier always depends on availability of data and resources. Using country specific data and better knowledge of the process in a particular country often result in a better quality inventory. As highlighted in Chapter 3 of the 2019 Refinement the uncertainty result may, on occasion, increase when compared with Tier results. This only shows that default uncertainty associated with Tier 1 was underestimated. The decision to move to a Tier 2 is usually linked to the QA/QC discussion in the following paragraph.
1340	1	3	266	289	Box 3.1 is a useful example, however it suffers from lack in clarity of the underlying definitions of "uncertainty highlighted in several comments above. For instance, the first part (moving form Tier 1 to Tier 2 using national-specific stock change factors, ends by stating that the "new emissions factors improved the precision of the estimates". This is appropriate, since "precision" is defined in the glossary as the inverse of "uncertainty". However, looking at the Box figure, did this move from Tier 1 to Tier 2 actually result in a more "accurate" inventory component? Apparently not, since the mean estimate actually went in the opposite direction of what the Tier 3 estimate later arrived at. More in general, this is a fair example but not in line with the language in the preceding section. Although the tier2 estimate was more precise, this did not (and should not) say anything about bias reduction, for instance.	Francesco Nicola Tubiello	Accepted with modification	The terminology has been modified in other sections of the chapter as well as here in the box. The confidence intervals are expected to contain the true value of the C stock change at a 95% confidence interval, and this example shows how moving to higher tiers can constrain the confidence interval and thus reduce uncertainty by incorporating more specific information to the conditions and management impact in a country.
1342	1	3	289	289	What are the plus or minus numbers supposed to be? They appear to be a coefficient of variation, or a relative standard error of the mean. Perhaps Box 3.2 should come before 3.1 --provided that this is a operational definition of "uncertainty"?	Francesco Nicola Tubiello	Accepted with modification	The text has been changed to clarify the meaning of the +/- values included in this section. The words "of the estimate" have been added in the sentence.
1344	1	3	290	290	'the compilers further improved the inventory". It is understood that "improvement" == improved "accuracy", but this cannot be shown t be true for the above example in moving from tier 1 to tier 2. Only precision was improved.	Francesco Nicola Tubiello	Rejected	The inventory can be improved by reducing bias and/or increasing the precision of estimates.
1346	1	3	300	303	'In theory, Tier 3 methods allow compilers to develop a methodology that is more specific to national circumstances, and ultimately an approach meeting good practice that is working towards the goal of neither over nor under-estimating emissions (or removals) as far as can be judged." Yes but: what does this have to do with reducing "uncertainty", which is the other component of a NGHGI "accuracy" as defined in the Glossary and ISO? In other words, how did the use of a far more complex model, requiring as input a host (unspecified) of rather uncertain databases, improve overall "uncertainty"? What it may have done, as also back-up by the text herein on models, was to increase the "confidence" in the methods used, except that "confidence" in this sense has nothing to do with "confidence intervals".	Francesco Nicola Tubiello	Accepted with modification	Firstly, a paragraph has been included in the beginning of the chapter explaining the meaning of uncertainty in the context of national GHG inventories. Secondly, the methods provided in this chapter do provide confidence intervals for the estimates. Those intervals are expected to contain the true value of emissions (or C stock changes) at the specified level of confidence. This example shows how moving to higher tiers by incorporating more specific information about the conditions and impact of management in a country can constrain the confidence intervals, and thus reduce uncertainty.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1348	1	3	312	313	To some extent, this sentence seems to support many of the comments made previously. However, in this case I would disagree. You just said that the compilers assessed the tier 3 model and corrected for biases and precision against an observed set of carbon stock changes. How then did not this result in a more accurate assessment of emissions, considering these are directly linked to carbon stock changes.	Francesco Nicola Tubiello	Accepted	A paragraph has been included in the beginning of the chapter explaining the meaning of uncertainty in the context of national GHG inventories. The sentence has also been deleted in this section.
1350	1	3	315	315	Could you clarify what is meant by "population of emission sources". National total emissions from soil carbon changes are one number. The population might refer to results of individual and independent measurements, assuming these could be made.	Francesco Nicola Tubiello	Accepted with modification	Changed "population emission sources" with "range of cropland fields". The total emissions in the country is one number, but there are a population of fields with different levels of change that lead to the national total. This text is highlighting that the default factors are based on change rates across a much large range of fields than is found in any one country.
1352	1	3	324	324	'accuracy and precision." Once again, the terms used here are not consistent with those indicated in the Glossary.	Francesco Nicola Tubiello	Accepted	"accuracy and precision" changed to "uncertainty".
1354	1	3	326	329	This reviewer is lost as to what is the central message of this box, given this statement. Perhaps one could say that using higher tiers increases the "confidence" that the NGHGI is closer to the (unknown) true value of the emissions? What does this have to do with error bars and confidence intervals?	Francesco Nicola Tubiello	Accepted	The confidence intervals are expected to contain the true value of the change in C stocks at a 95% level of confidence. However, the text at the end of the box is going beyond just discussing the uncertainty and raising other issues related to data collection and model formulation that are covered in other sections and may be confusing here. Therefore we have removed this text. We have checked text for consistency with the new definitions in the Glossary.
3848	1	3	327	327	Why is this "precision" and not "accuracy"?	Andrea Tilche	Noted	The paragraph has been deleted in response to other reviewer comment.
1356	1	3	331	332	Fig Box 3.1 Another important thing to notice is that the three Tier estimates appear not to be statistically different. Certainly one could not say that one is more or less biased than the other (so much for using daycent and the army of refined methods discussed earlier); while the increased "precision" of the tier 3 approach is not based on actual measurements of emissions.	Francesco Nicola Tubiello	Noted	We agree that the three tiers produce results that would not be statistically different, but we disagree that the results are the same in terms of their accuracy and precision. In particular, the Tier 3 model is evaluated with measurements and the difference is used to quantify bias, and moreover to adjust the model results for bias. Based on statistical theory, the confidence intervals are expected to contain the true value of the C stock change at a specified level of confidence. Moving from Tier 1 to Tier 2 and Tier 2 to Tier 3 incorporated more information specific to the conditions and management impacts, leading to more constrained confidence intervals, and thus less uncertainty. No changes in the text to be made.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1358	1	3	352	352	Important: "Ultimately, the measure of uncertainty will be a 95 percent confidence interval around a point estimate for the value'." If this is what uncertainty is in NGHGI, then it is not uncertainty at all. It's nothing but a confidence interval. By the way, uncertainty of what? Note, fundamentally, that the "uncertainty" associated with a interval estimation of a (unknown) true value is not the uncertainty in the true value (which is one and remains unknown), but the uncertainty in knowing that the interval that is being put forward contains or not such true value. At 95% confidence, we can only say that this will happen approximately 95% of the times when we do such as estimation. This is said almost verbatim on lines 362-263. But one should note that that "uncertainty" only refers to the particular sample being measured viz a viz the (unknown) true value --nothing else. Thus it is better indicated as a "measurement uncertainty", not a knowledge uncertainty. Finally, the 95% is not a default value: it needs to be defined in the definition of which confidence interval one is constructing or looking at.	Francesco Nicola Tubiello	Accepted with modification	Following the changes implemented to address the comments above clarifying the terminology and definitions this comment is no longer relevant.
1370	1	3	352	353	It is incorrect to convey that in order to construct confidence intervals a PDF is needed. It is not.	Francesco Nicola Tubiello	Rejected	The existing text provides an operational guidance rather than a statistical definition.
1360	1	3	364	365	Box 3.2. Please simply cite a standard statistical textbook for this, and especially consult it and then revise the text accordingly. Standard deviation of what? Standard error of what? You seem to be thinking of the standard deviation of the mean, but then mix cases where sigma is known or not. Should you not say first that you are specifically concerned with the standard error, defined as the standard deviation of a population of means computed from independent samples of the same (unknown) population.? Even the notations used are confusing, as the small greek letters are typically meant to describe the true, actual mean and standard deviation of a population (typically unknown), whereas the mean and standard deviation intended as descriptors of a population parameters are indicated with capital latin letters, etc.	Francesco Nicola Tubiello	Accepted with modification	A small introductory paragraph has been added before the box clarifying the framework of this application.
1362	1	3	369	369	In keeping consistency with what was already described as a practical approach of describing uncertainty, then uncertainty should be the full confidence interval, not simply the plus minuses.	Francesco Nicola Tubiello	Rejected	The boundaries of the confidence interval are different concept from the uncertainty values, which are expressed as the ratio of the standard deviation and the estimate.
562	1	3	372		box 3.2: Substitute "our" by "the".	Klaus Radunsky	Accepted	Corrected.
564	1	3	373		box 3.2: Substitute "our" by "the".	Klaus Radunsky	Accepted	Corrected.
1364	1	3	377	378	How are "large samples" defined? Which spreadsheet is the box referring to?	Francesco Nicola Tubiello	Noted	No need to elaborate on definition of large samples, as this is well understood in the common scientific use. The reference to the spreadsheet has been deleted.
1366	1	3	380	392	I believe as written this text would cause any decent but dead teacher of statistic turn in their grave! Kindly consult an appropriate statistical textbook to revise it accordingly.	Francesco Nicola Tubiello	Noted	The box uses language specifically adapted for inventory compilers. Moreover it is not easy to change the text without more specific suggestion. Anyway the text has been partially redrafted.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2688	1	3	402	402	Foote note under "forest": Facilitate to identify (preferably through remote sensing techniques) of forest types, kind of species, forest cover, and forest density could assist less uncertainties to estimate forest stock biomass.	Mostafa Jafari	Rejected	Not relevant to the example in the box.
3584	1	3	406	434	These case studies are more confusing than helpful. I think it would be clearer to use very specific case studies rather than the semi-generic examples given	Donna Giltrap	Rejected	The examples provided are sufficiently detailed in relation to the general scope of the box, which is to provide guidance in selecting the appropriate uncertainty estimator.
1368	1	3	418	434	If the data collection is irregular, hence you do not actually know the parameters of the population, how do you know its sigma? See above	Francesco Nicola Tubiello	Accepted	Text has been added better explaning that the population is well characterized in the years of measurements.
3850	1	3	424	424	Change "the value" to "the value is"	Andrea Tilche	Accepted	Done.
2690	1	3	431	431	Foote note under "deforested": In deforested area to reduce uncertainty, estimation should be included addition of two parts: 1- reducing carbon sink which was available in previous calculation, 2- emission carbon by removing forest	Mostafa Jafari	Rejected	Not relevant to the example in the box. The box is focused on providing examples on a range of typologies of uncertainty. It is not concerned with advice on how to reduce those uncertainties which is addressed elsewhere in this volume as well as in the sectoral volumes.
8352	1	3	449	449	Redundant words; please remove	Miriam Levon	Accepted with modification	There has been an overall revision of the text.
8354	1	3	460	493	The approaches listed for assessing activity data uncertainty fail to address data quality when extrapolating from a data subset to national characterization. This is the case when countries have mandatory reporting programs that encompass only a subset of entities, with a size or emission level threshold, and with no clear options for nationwide extension of the reported data.	Miriam Levon	Rejected	The second and third bullet points cover implicitly the issue raised. The issue is also covered in Chapter 2.
1372	1	3	481	482	This statement is absolutely incorrect for census data (full enumeration), but it would be practically in correct also for survey data--in the sense that surveys could suffer from bias, but then they are listed as 'bad survey', i.e., bias is not a regular quality of a well-implemented survey!	Francesco Nicola Tubiello	Rejected	The concept expressed maybe correct in theory hovewer the text is focused on practical application to control ex post the quality of activity data coming from census or surveys implemented by other institutions, and potential for non-responses from specific groups within the population.
1374	1	3	490	491	The new sentence is a gross statistical mischaracterization. Sampling errors being normally distributed is only true for certain estimators (i.e., sample means), and are true only under certain conditions -for instance, independence and randomness of the samples, etc. It is not true in general. To this end, this additional sentence is unhelpful, unnecessary and thus it is suggested to cancel it.	Francesco Nicola Tubiello	Accepted	The sentence was deleted as it does not seem to add useful information respect the previous text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1376	1	3	494	578	It is unclear why this section is being added to the existing GLs. First, the formulas provided are for variance--how does this relate to uncertainty as described in the earlier part of this section? Secondly, what is the point to tell NGHGI compilers how to derive "variance" of samples, when I would argue it is "best practice" to suggest they ask directly the sampling agency and complete bad practice to expect that they themselves exercise in iffy statistical exercises with scant information on the details of the survey/census/activity that originated that data.	Francesco Nicola Tubiello	Accepted with modification	We accept that the variance formulas are not necessary for the compiler, and so they have been deleted, but the context is useful for them to understand the types of data that are available in their country and could be produced with a statistical agency. This guidance is intended to provide context surrounding activity data collection, and providing more illustrations makes the guidance more accessible/understandable to compilers. We have clarified the meaning of variance at the end of this text.
3852	1	3	498	498	This should be 40 instead of 4	Andrea Tilche	Accepted	Corrected.
6116	1	3	498	498	"4" may be "40".	Naofumi Kosaka	Accepted	Corrected.
2652	1	3	498	499	"is multiplied by a weight of 4" should be "is multiplied by a weight of 40".	Xiangzheng Deng	Accepted	Corrected.
2466	1	3	498	499	"is multiplied by a weight of 4"should be "is multiplied by a weight of 40"	Mingshan Su	Accepted	Corrected.
2692	1	3	503	503	Foote note under "forest": Number of sampling should be scientifically acceptable in related to total forest area in monitoring location	Mostafa Jafari	Rejected	This is true, but the point is made in other sections and not needed here.
3854	1	3	513	516	This appears to be a poor example since there will typically be different number of farms per strata	Andrea Tilche	Accepted with modification	The scope of the paragraph is to explain the different possible sample designs with simple examples for compilers. Guidance on how to use variances for propagation of uncertainty through the emissions calculations is provided in Section 3.2.3.
2810	1	3	541	541	Specify the subindice notation th	Poot-Delgado Carlos Antonio	Noted	The formulas have been deleted based on comments from another reviewer.
2812	1	3	551	551	Specify the subindice notation th	Poot-Delgado Carlos Antonio	Noted	The formulas have been deleted based on comments from another reviewer.
2814	1	3	570	570	Specify the subindice notation th	Poot-Delgado Carlos Antonio	Noted	The formulas have been deleted based on comments from another reviewer.
2816	1	3	572	572	Specify the subindice notation nd and th	Poot-Delgado Carlos Antonio	Noted	The formulas have been deleted based on comments from another reviewer.
566	1	3	596		Add clarity by substituting "for the entire inventory" by "of the national total emissions".	Klaus Radunsky	Accepted with modification	Line 589. Changed to "total national net emissions".
1378	1	3	606	606	'Bias should be removed prior to … " How exactly? According to earlier definitions and examples of uncertainty, in fact, uncertainty does not describe bias at all, only random errors. Again, this entire chapter requires a thorough revision, clean up of the definition of what is meant by "uncertainty" in the context of good practice and accuracy, and then that the text applies the terminology correctly and consistently throughout.	Francesco Nicola Tubiello	Accepted with modification	Sentence was deleted and chapter revised.
2818	1	3	608	629	Specify footnote 1 in the text	Poot-Delgado Carlos Antonio	Rejected	Reference to footnote is in line 615.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2288	1	3	614	614	The "Vol1_Ch3_Addendum_SOD" excel sheet is really helpful for countries trying to implement an uncertainty analysis, however, something that might be useful is to provide guidance to countries on which is the minimun level to perform the analysis. The example provided in Table 3.2 suggest to go at least for a 3th level (e.g. 3 AFOLU, 3A Livestock, 3A1 Enteric Fermentation). However, there are many countries that think that they should for the first time perform complex uncertainty analysis that arrive to more levels (e.g. 3A1a Cattle or 3A1ai Dairy cattle). This clarification will be really helpful to indicate both in par. 614 and in par 892.	Rocio Danica Condor Golec	Accepted	Current Table 3.2 does not elaborate about the level of disaggregation. Basic guidance is that disaggregation should be at the level the methodology is applied and EF and AD are calculated, unless correlation between the subcategories exists. A sentence has been added in section 3.2.3.1.
3586	1	3	656	658	Equation 3.1 is incorrectly formatted. The fractions following each U should be a subscript and superscript	Donna Giltrap	Accepted	Corrected.
2468	1	3	656	662	please check the formula	Mingshan Su	Accepted	Corrected.
6118	1	3	658	658	Equation 3.1 in SOD is different from that in the 2006 IPCC Guidelines. I suggest that the authors keep the equation of the 2006 IPCC Guidelines.	Naofumi Kosaka	Accepted	Corrected.
568	1	3	696		Insert "the" after "can be".	Klaus Radunsky	Accepted	Done.
570	1	3	703	704	Add clarity by using the following wording: In these steps the quantitative uncertainties are combined through addition and therefore equation 3.2 should be applied.	Klaus Radunsky	Accepted	Done.
6120	1	3	706	706	Section 3.6.2 is not found in either SOD or the 2006 IPCC Guidelines.	Naofumi Kosaka	Accepted with modification	Appropriate section number is 3.2.3.1. Direct reference to the tool for the implementation of Approach 1 was made.
6122	1	3	763	763	"TAM" seems to be missing in the equation.	Naofumi Kosaka	Rejected	TAM is used to calculate VS. VS=Vsrate*TAM*365/1000
3588	1	3	783	784	Mixing decimal points and commas	Donna Giltrap	Accepted	Corrected.
6124	1	3	791	793	This example shows that the combined uncertainty (35.25%) is less than the uncertainty of each category (U(CH4,pasture)=U(CH4,slurry)=U(CH4,solid)=41.5%). I feel strange.	Naofumi Kosaka	Rejected	That is the natural result if the quantities are uncorrelated.
3590	1	3	841	844	Ex,t and Ex,BY terms not explained in equation 3.2D	Donna Giltrap	Rejected	x is a particular instance of the general variable i. It is not necessary to repeat the definition for x.
3594	1	3	849	855	The equation gives the emissions in category x in year t as a fraction of the total emissions but the description says it is the change in the overall emissions resulting from a 1% increase in emissions from a given category	Donna Giltrap	Rejected	Equation 3.2E is the resulting formula as included in column N of Table 3.2. The authors judged that there is no benefit in including an intermediate equation.
3592	1	3	873	873	It should be the uncertainty in the activity data in the base year and the current year that is independent, not the activity data itself	Donna Giltrap	Rejected	The quantities (AD) themselves are independent or uncorrelated. Unless there is any other specific reason to consider, the uncertainty (values) are assumed to be equal.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2290	1	3	892	892	The "Vol1_Ch3_Addendum_SOD" excel sheet is really helpful for countries trying to implement an uncertainty analysis, however, something that might be useful is to provide guidance also in this section to countries on which is the minimun level to perform the analysis. The example provided in Table 3.2 suggest to go at least for a 3th level (e.g. 3 AFOLU, 3A Livestock, 3A1 Enteric Fermentation). However, there are many countries that think that they should for the first time perform complex uncertainty analysis that arrive to more levels (e.g. 3A1a Cattle or 3A1ai Dairy cattle). This clarification will be really helpful to indicate both in par. 614 and in par 892.	Rocio Danica Condor Golec	Accepted	Current Table 3.2 does not elaborate about the level of disaggregation. Basic guidance is that disaggregation should be at the level the methodology is applied and EF and AD are calculated, unless correlation between the subcategories exists. A sentence has been added in section 3.2.3.1.
3856	1	3	945	945	This table should be numbered Table 3.1	Andrea Tilche	Rejected	The Table 3.2 in the SOD corresponds to the Table 3.2 in the 2006 IPCC Guidelines. Table 3.1 is in the 2006 IPCC Guidelines only.
2292	1	3	978	978	I would like to suggest to include also an example for the LULUCF/FOLU sector using Monte Carlo (from the italian NIR!) - helpful in different contexts [including REDD+]	Rocio Danica Condor Golec	Rejected	The authors have judged that the current number of examples is appropriated.
8356	1	3	982	984	We recommend including a example on how to calculate uncertainties for Oil&Gas facilities. These inventories are quite complex and inventory compilers could benefit from the examples provided. The material is available from the supporting document introduced here, and direct references could be provided in the text. Specific citations include: - APPENDIX F - STATISTICAL CONCEPTS AND CALCULATION METHODS: TUTORIAL - APPENDIX G - UNCERTAINTY ESTIMATION DETAILS FOR AN EXAMPLE ONSHORE OIL FIELD INVENTORY - APPENDIX H = UNCERTAINTY ESTIMATION DETAILS FOR AN EXAMPLE REFINERY INVENTORY	Miriam Levon	Noted	The authors judged that the current number of examples is appropriated. The reference has not been included because it has been judged not relevant in this chapter.
3858	1	3	992	992	The example listed in section 3.6 is confusing, since it does not make consistent use of percent. In some cases the percent refers to emission factors and uncertainties are actually percentage-points. In other cases percent refers to the uncertainty in the estimated emissions.	Andrea Tilche	Accepted	The use of percent was better explained, case by case.
3864	1	4			Page 4.5 of the text suggests that the key category analysis should also include Memo items such as international aviation and CO2 emissions from biomass. This is an interesting idea that has consequences for the determination of the number of key categories when using approach 1 and thus, for the type of methods that should be used (tier 1, 2 or 3). The text should clarify that the 95% contribution to the total should also include these additional Memo items to avoid having contributions exceeding 100% in column E of table 4.2. In addition, a number of existing key categories would become non-key because of the inclusion of the (usually very substantial) emissions from the Memo items in many countries.	Andrea Tilche	Rejected	The text has now been revised to explicitly exclude memo items from the key category analysis. However, text highlights that the memo items should be considered when designing improvement activities.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3866	1	4			Page 4.5 says that if the contribution of a category's uncertainty to the total inventory uncertainty in a particular year or the trend uncertainty is high then the category should be identified as key. This could be further clarified. The contribution should be a weighted average of the uncertainty and the emissions, and not just the uncertainty. It could also be narrowed to the first and the latest reported year and not to any particular year. For the trend, it makes more sense if the trend is increasing and thus ignore high uncertainties for really small and declining emission sources.	Andrea Tilche	Accepted with modification	Text modified to simplify and generalise. Text not added on reducing trends with high uncertainty as these categories should also be flagged if uncertainty is high enough.
3868	1	4			Page 4.6 the text says that the (KC) analysis should be performed at the level of categories or subcategories at which the IPCC methods are applied in the inventory. It would be also important to flag that the KCA should also take into account, not only the methods used, but also the level at which Parties implement their QA/QC. The latter could be linked to the level at which activity data is collected, sometimes from multiple sources, even if the same method is applied.	Andrea Tilche	Rejected	This overly complicates the KCA and is not necessary as methods and assumption granularity will usually be aligned with QA/QC granularity or more detailed. Overly aggregated QA/QC activities will undermine the transparency and effectiveness of the KCA.
3870	1	4			Page 4.6 says that subcategories that contribute together more than 60 percent to the key category should be treated as particularly significant. This needs clarification. Are there any implications from 'particularly significant' categories?	Andrea Tilche	Accepted with modification	Text changed to "Those subcategories that contribute together more than 60 percent to the key category should be treated as particularly significant and possibly disaggregated from the category where they were included".
3872	1	4			One important aspect is the link to the KCA of the European Union. This has been recognised by different reviews and also is included in the conclusions of the third meeting of the lead reviewers on GHG inventories. An inventory compiled on the basis of individual national inventories should consider the categories that are key at the level of the compiled inventory, as well as the contribution of individual national inventories to the total emissions in these key categories. Where estimates of individual national inventories represent a high proportion of emissions in a key category (e.g. if the relative contribution of the estimates of these inventories ranked by level account for 60–75% of emissions in the category), the ERT should assess whether these estimates were prepared using an appropriate (e.g. higher-tier) methods.	Andrea Tilche	Rejected	It is not feasible to include guidance on complex issues such as this. The KCA should focus on national analysis and not on complexities experienced during the UNFCCC review process for one Party to the convention.
572	1	4	100		It is noted that in chapter 3 the term "national total GHG emissions" has been used. It is recommended to use the same term throughout the whole refined 2006 IPCC Inventory Guidelines. Therefore "overall GHG totals" should be substituted by "national total GHG emissions".	Klaus Radunsky	Accepted with modification	Text modified to cover emissions and removals. Used "absolute level of emissions/removals".
574	1	4	125		Substitute "Countries" by "countries".	Klaus Radunsky	Accepted	Modified.
576	1	4	134		Substitute "Categories" by "categories".	Klaus Radunsky	Accepted	Modified.
2710	1	4	134	135	The idea of including memo items in the key category analysis seems excessive, since they are at present for reference sake only and their priority in the national inventory is already set low.	Elsa Hatanaka	Accepted with modification	The text has now been revised to explicitly exclude memo items from the key category analysis. However, text highlights that the memo items should be considered when designing improvement activities.
578	1	4	175		Substitute N2O by N2O with 2 lowered.	Klaus Radunsky	Accepted	Modified.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1856	1	4	183	184	In many countries, the development and implementation of national statistical systems is regulated by law, often with National Statistical Offices (NSOs) playing a integral role. Thus, it would be helpful to put the suggested aggregation levels of analysis for approach in a broader context. There exist international statistical classifications (and adapted national statistical classifications) that NSOs use when reporting national air emission accounts, which follow the international statistical standard of the System of Environmental Economic Accounts Central Framework (SEEA CF) (seea.un.org). Many countries (including all EU countries, as required by law) produce these accounts. The text should mention that bridging tables for classifications and definitions across these processes exist, to facilitate the integration of different reporting processes at national and international levels. The bridging table between SEEA and IPCC categories for AFOLU can be found on pg. 109 of the white cover SEEA Agriculture, Forestry and Fisheries (https://seea.un.org/sites/seea.un.org/files/seea_aff_final_clean_03.pdf). Similarly, the bridging table between SEEA air emission accounts and IPCC reporting can be found on pg. 14 of the EU regulation on envriomental economic accounts (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02011R0691-20140616&from=EN) as well as pg. 51 and 85 of the Eurostat Manual for Air Emissions Accounts (http://ec.europa.eu/eurostat/documents/3859598/7077248/KS-GQ-15-009-EN-N.pdf/ce75a7d2-4f3a-4f04-a4b1-747a6614eeb3).	Jessica Chan	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
2120	1	4	183	184	In many countries, the development and implementation of national statistical systems is regulated by law, often with National Statistical Offices (NSOs) playing a integral role. Thus, it would be helpful to put the suggested aggregation levels of analysis for approach in a broader context. There exist international statistical classifications (and adapted national statistical classifications) that NSOs use when reporting national air emission accounts, which follow the international statistical standard of the System of Environmental Economic Accounts Central Framework (SEEA CF) (seea.un.org). Many countries (including all EU countries, as required by law) produce these accounts. The text should mention that bridging tables for classifications and definitions across these processes exist, to facilitate the integration of different reporting processes at national and international levels. The bridging table between SEEA and IPCC categories for AFOLU can be found on pg. 109 of the white cover SEEA Agriculture, Forestry and Fisheries (https://seea.un.org/sites/seea.un.org/files/seea_aff_final_clean_03.pdf). Similarly, the bridging table between SEEA air emission accounts and IPCC reporting can be found on pg. 14 of the EU regulation on envriomental economic accounts (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02011R0691-20140616&from=EN) as well as pg. 51 and 85 of the Eurostat Manual for Air Emissions Accounts (http://ec.europa.eu/eurostat/documents/3859598/7077248/KS-GQ-15-009-EN-N.pdf/ce75a7d2-4f3a-4f04-a4b1-747a6614eeb3).	Julian Chow	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
6126	1	4	206	206	I suggest that the authors revise "Ei,t" by "|Ei,t|" in the denominator of Equation 4.1 to be consistent with the description in pages 4.15 and 4.16.	Naofumi Kosaka	Accepted	Denominator revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
1858	1	4	244	249	While this text may not be confusing to someone who is familiar with the NGHGI process, the language is actually rather ambiguous. Taken as is, it suggests that categories should be assessed individually, as opposed to cumulatively. For example, "Any category that meets the threshold for the base year...should be identified as key" and "Therefore, for categories between thresholds of 95 and 97 per cent..." suggest that categories are looked at individually. This only appears to be made clear in lines 278 and 279.	Jessica Chan	Accepted with modification	This was not changed from 2006 IPCC Guidelines. Revised text is suggested in this final version.
2122	1	4	244	249	While this text may not be confusing to someone who is familiar with the NGHGI process, the language is actually rather ambiguous. Taken as is, it suggests that categories should be assessed individually, as opposed to cumulatively. For example, "Any category that meets the threshold for the base year...should be identified as key" and "Therefore, for categories between thresholds of 95 and 97 per cent..." suggest that categories are looked at individually. This only appears to be made clear in lines 278 and 279.	Julian Chow	Accepted with modification	This was not changed from 2006 IPCC Guidelines. Revised text is suggested in this final version.
2470	1	4	262	270	please define i in the formula	Mingshan Su	Accepted	The index has been defined.
3860	1	4	278	278	Should these categories be ranked?	Andrea Tilche	Rejected	Categories are sorted not ranked.
3862	1	4	281	281	The unit of column F should be fraction, not percent	Andrea Tilche	Accepted	Unit modified.
6128	1	4	410	419	I suggest that the authors explain which categories in Table 4.6 are newly included and excluded compared to the 2006 IPCC Guidelines due to the change of Equation 4.2 when the change is agreed.	Naofumi Kosaka	Accepted with modification	The whole example has been updated.
2712	1	4	Table 4.1		Categoy aggregation/disaggregation considerations: What is the intention of this sentence 'These categories should be disaggregated according to methods, data sources, assumptions applied and know or likely differences in uncertainty', especially regarding the 'know' part.	Elsa Hatanaka	Accepted with modification	Text redrafted and moved to note "e" under Table 4.1.
2714	1	4	Table 4.1		Order of gases in the 'Gases to be Assessed separately' column need to be in order of CO2, CH4, N2O throught the Table. (editorial)	Elsa Hatanaka	Accepted	Order of gases changed according to the comment.
2716	1	4	Table 4.1		5B: The gases need to be CO2, CH4, N2O, HFCs, PFCs, SF6, and not CO2, N2O, CH4, SF6, PFCs, HCFs. (editorial)	Elsa Hatanaka	Accepted	Order of gases changed according to the comment.
3874	1	5			There is no issue of time series inconsistency even when fluctuations are present in a time series of emission factors. One example of this are the changes related to the contribution of individual member states to the EU GHG inventory. Emission factors for inventories compiled on the basis of national inventories are affected by activity data changes in national inventories, methodological changes or improvements in national inventories affecting national emission factors and the contribution of each national inventory the total compiled inventory. The latter effect is particularly important for explaining changes in trends that are sometimes confused with time series inconsistencies at the level of the compiled inventory.	Andrea Tilche	Noted	The guidance is not focusing on the reasons for inconsistency in the time series but rather attempts to provide guidance on how to fill data gaps when inventory compilers have gaps in time series that is either consistent or inconsistent.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2268	1	5	194	247	It would be helpful after presenting the list of examples and possibilities where there might be an increase and/or decrease due to technological change and other factors there is also a clear connection on how to solve the gap to be included in section 5.3 resolving data gaps or refer to an appropriate Volume and Chapter (Vol 2-5). For example, an example for FOLU is given (par. 230-235), how do you solve this problem?. This will help compilers not only to learn about the possibilities but on how to solve them with specific cross references.	Rocio Danica Condor Golec	Accepted with modification	The current chapter 5 presents a lot of examples for other sectors. For FOLU we added reference linking to section 4.4.2 of the Chapter 4, Volume 4 of the 2019 Refinement to illustrate the treatment of consistency of time series in the FOLU sector.
580	1	5	228	229	The sentence probably lacks clarity. The following wording is suggested: This is particularly relevant to categories in which it is possible now to implement direct sampling and measurement programs but that these new data may not be indicative of conditions in past years.	Klaus Radunsky	Accepted	Text removed as proposed.
2838	1	5	353	354	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2822	1	5	355	355	Footnote 2, the appointment is not in format (GPG2000, IPCC, 2000) must be (GPG, 2000; IPCC, 2000)	Poot-Delgado Carlos Antonio	Accepted	Reference amended as proposed.
2840	1	5	370	371	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2824	1	5	370	373	Change table format, format dissonance is observed	Poot-Delgado Carlos Antonio	Rejected	There is no issue of lack of harmony between the two datasets. The table illustrates two distinct datasets that are linked to the same category, different in the sense that one dataset is based on national dataset (tier 1) whilst another dataset is sourced from coal operators (tier 2).
2826	1	5	381	383	Change table format, format dissonance is observed	Poot-Delgado Carlos Antonio	Rejected	There is no issue of lack of harmony between the two datasets. The table illustrates two distinct datasets that are linked to the same category, different in the sense that one dataset is based on national dataset (Tier 1), whilst another dataset is sourced from coal operators (Tier 2).
1860	1	5	389	390	It should be noted that similar to the System of National Accounts (SNA) measure of gross-domestic product, but closer to the subject matter at hand, are the satellite accounts of the System of Environmental-Economic Accounting (SEEA). In particular, the SEEA Central Framework (https://seea.un.org/content/seea-central-framework) covers measurement of air emission flows, broken down by by the International Standard Industrial Classification (ISIC). Taken as is, this could be used as surrogate data. However, with adjustments to classifications and methodology, the data used for the SEEA could be applied to both the SEEA and NGHGI, given integrated reporting processes.	Jessica Chan	Rejected	The intention of Table 5.1 is to illustrate examples of what parameters could be used as surrogate data. The focus therefore is more on possible parameters but not datasets.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2124	1	5	389	390	It should be noted that similar to the System of National Accounts (SNA) measure of gross-domestic product, but closer to the subject matter at hand, are the satellite accounts of the System of Environmental-Economic Accounting (SEEA). In particular, the SEEA Central Framework (https://seea.un.org/content/seea-central-framework) covers measurement of air emission flows, broken down by by the International Standard Industrial Classification (ISIC). Taken as is, this could be used as surrogate data. However, with adjustments to classifications and methodology, the data used for the SEEA could be applied to both the SEEA and NGHGI, given integrated reporting processes.	Julian Chow	Rejected	The intention of Table 5.1 is to illustrate examples of what parameters could be used as surrogate data. The focus therefore is more on possible parameters but not datasets.
2842	1	5	390	390	Reorder bibliographical citations by year and et al in italics	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2844	1	5	398	398	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2828	1	5	416	417	Change table format, format dissonance is observed	Poot-Delgado Carlos Antonio	Rejected	Our assessment is that there is no issue with the table as it transparently shows the data to be assessed and the data gap that needs to be filled in with an interpolation method.
2846	1	5	425	425	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2830	1	5	430	431	Change table format, format dissonance is observed	Poot-Delgado Carlos Antonio	Noted	Revised in final editing.
2832	1	5	439	440	Change table format, format dissonance is observed	Poot-Delgado Carlos Antonio	Noted	Table formats revised during final editing.
2848	1	5	453	453	et al in italics	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
582	1	5	461	463	… the X2 statistical method would be useful for testing whether a difference is significant from a statistical perspective or not. Such testing ….	Klaus Radunsky	Accepted	Change implemented as suggested.
2850	1	5	479	479	Delete comma in bibliographical citations	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2834	1	5	481	482	Change figure format, format dissonance is observed	Poot-Delgado Carlos Antonio	Rejected	The table and the data used are transparent and easy to follow for the reader.
2836	1	5	483	484	Change table format, format dissonance is observed	Poot-Delgado Carlos Antonio	Rejected	The table and the data used are transparent and easy to follow for the reader.
2852	1	5	496	496	Delete comma in bibliographical citations	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2854	1	5	501	501	et al in italics and put a comma (Henze et al., 2007)	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2856	1	5	508	509	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2858	1	5	542	543	Reorder bibliographical citations by year and et al in italics	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2860	1	5	546	546	et al in italics	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2864	1	5	546	548	2 in subscript	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2862	1	5	546	549	et al in italics	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2866	1	5	550	554	3 in subscript	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2868	1	5	578	578	Delete comma in bibliographical citations	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2870	1	5	581	582	Reorder bibliographical citations by alphabetics	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2872	1	5	616	616	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2874	1	5	630	630	Delete comma in bibliographical citations	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2876	1	5	630	631	Delete comma in bibliographical citations	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2878	1	5	659	659	Reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2880	1	5	676	676	Footnote 4, reorder bibliographical citations by year	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2882	1	5	793	818	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
2884	1	5	906	910	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Noted	Please note that this comment is addressed in Chapter 6.
3876	1	6			The chapter gives a good overview of the techniques available and provides some success stories as well as describes some shortcomings of the inverse modelling technique to verify emission inventory information. Table 6.1 is very useful because it showcases (the limited number of) success stories but also mentions the challenges that still exist before the method can be used for verification. The success stories of UK and Switzerland are interesting but there should be a discussion included to what extent these are representative for other countries in the world. The UK (an island) and Switzerland (surrounded by mountains) have unique geographical characteristics that allow the inverse model setup to constrain well emission estimates from observations.	Andrea Tilche	Accepted	1. Revised 2006 IPCC Guidelines text in parts contradicting recent progress; 2. Relaxed restrictive criteria and barriers, allowing more flexibility in implementation of the verification procedures.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3878	1	6			Figure 6.1, the decision tree is partly misleading and maybe even incorrect. Whether the modelled emission inventory uncertainty is smaller than the reported emission inventory uncertainty is difficult to assess: ☐ The reported emission inventory is often used as input to the atmospheric chemistry model so both uncertainties are correlated. At the same time we talk about two different types of uncertainties. ☐ The emission inventory uncertainty is often a statistical uncertainty, resulting from applying error propagation techniques using the information on uncertainty on parameters used in the inventory calculation. ☐ The modelled emission uncertainty is maybe by definition higher (to be discussed) than the emission inventory uncertainty because you combine the a-priori emission inventory uncertainty, with uncertainty in the atmospheric chemistry model and uncertainty in the measurement data. The above may or not be true in all cases, and therefore more research and/or clarifications are needed before the decision tree shown in figure 6.1 can be applied so as to avoid that inverse modelling studies are required to be applied for the wrong reasons.	Andrea Tilche	Accepted with modification	Figure 6.1 is revised to reflect this and other comments.
3880	1	6			Inverse modelling techniques are very expensive and require technical expertise. Resources and experts are not available in all countries so this could lead to inconsistencies in inventory verification. The costs of setting up verification techniques are rather high. With less budget, the quality of the national inventories can be improved significantly and this could influence the decision tree choice. Preventing the development of excessively expensive techniques, relative to equally effective but cheaper techniques, is a consideration that needs to be taken into account (value for money).	Andrea Tilche	Accepted with modification	Figure 6.1 is revised to reflect this and other comments. The requrements on number of available observations are made more flexible. The question of cost benefit is partially addressed in the introductory part of the section which suggests considering use of this verification approach, and mentions the high costs.
3882	1	6			Inverse modelling techniques are indeed a useful tool to provide additional information on emission trends (especially when countries are not reporting frequently) or to confirm emission inventory data. However, inverse modelling is not always is able to provide information on sectors or to distinguish between natural and anthropogenic emissions. The Guidelines should not give the impression that inverse modelling can replace GHG inventories at this stage.	Andrea Tilche	Noted	The difficulties of making emissions estimates separately for emission sectors, and separating those from natural emissions are cited in the text and have been there since 2006 IPCC Guidelines. Other difficulties, including high costs and uncertainties in the results are also cited. Taking into account also the comment received, there has been a general revision of the text so it is hoped that there is understanding that there no implicit proposition to replace inventory compilation with the inverse modeling.
2274	1	6	113	113	I think there is no need of this phrase (out of the context): "In carbon markets, a formalized version of this type of independent review is referred to as verification."	Rocio Danica Condor Golec	Noted	The insertion of this sentence was in response to a comment asking for authors to provide clarity on the distinction between verification and review. Therefore the text has been kept.
346	1	6	1219	1222	Please update the reference, since the paper has been accepted	Frederic Chevallier	Accepted	Reference updated.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2276	1	6	125	132	I think from par 125 to 132 is not needed: "It is important to distinguish….". As far as the IPCC has already explained what is verification in the context of GHG inventories no need to add confusion with CDM.	Rocio Danica Condor Golec	Noted	The text has been added based on a comment for clarification of verification in the context of the IPCC guidelines versus in other reporting programmes to ensure that inventory compilers follow strictly the IPCC definition of Verification. Therefore, the text has been kept as is.
1864	1	6	208	222	It should be noted that comparisons can also be made to national air emission accounts, as well as national energy accounts, which are produced by National Statistical Offices (NSOs) according to the international statistical standard, the System of Environmental-Economic Accounting (SEEA). SEEA air emission accounts provide information on the generation of air emisssions by resident economic units while SEEA energy accounts provide information on energy stocks and flows between the environment and economy. As the SEEA is a satellite account to the System of National Accounts and is often compiled by economic statisticians, national air emission accounts and national energy accounts are usually compiled independently from IPCC estimates. For more information: https://seea.un.org/ ; http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts; http://www.fao.org/economic/ess/environment/methodology/en/	Jessica Chan	Accepted with modification	Availability of SEEA data mentioned in revised text (section 6.10.1).
2128	1	6	208	222	It should be noted that comparisons can also be made to national air emission accounts, as well as national energy accounts, which are produced by National Statistical Offices (NSOs) according to the international statistical standard, the System of Environmental-Economic Accounting (SEEA). SEEA air emission accounts provide information on the generation of air emisssions by resident economic units while SEEA energy accounts provide information on energy stocks and flows between the environment and economy. As the SEEA is a satellite account to the System of National Accounts and is often compiled by economic statisticians, national air emission accounts and national energy accounts are usually compiled independently from IPCC estimates. For more information: https://seea.un.org/ ; http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts; http://www.fao.org/economic/ess/environment/methodology/en/	Julian Chow	Accepted with modification	Availability of SEEA data mentioned in revised text (section 6.10.1).
3896	1	6	244	759	The updated secton 6.10 provides detailed and well-written guidance on models and observations of various types for model verification. However, it does not deal sufficiently well with the fact that many biogenic emissions (e.g. N2O and CH4) have large inter-annual and seasonal variabilities due to variation in weather. Whereas such variation may and should be captured by observations and comprehensive modelling approaches, they are not in general captured by the more simplistic inventory approaches. The report puts little or no emphasis on how to deal with this interannual variability in the verification.	Andrea Tilche	Accepted with modification	Uncertainty related to seasonal and interannual variation is mentioned in the revised text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2278	1	6	268	269	"As an additional example, since 2014 the EU performs annually a full QA of its EU-28 GHG Inventories for agriculture, using the FAOSTAT emissions estimates for verification": Might be useful to provide and guide compilers with a link. In addition, it might be more pertinent to add this additional example between par. 212-214 and not here (par 268-269) or move to par. 316 (comparison with independently compiled estimates).	Rocio Danica Condor Golec	Noted	The difference between placing this notice here or in line 214 is not essential. No change has been made.
1306	1	6	269	269	Please insert relevant FAOSTAT link (http://www.fao.org/faostat/en/#data/GT). Please add this sentence after "verification." : "This is in line with recommendations made by the IPCC (2015), stating that NGHGI compilers can use the the AFOSTAT emissions estimates for QA/QC and verification." the IPCC 2015 report can be found here: https://www.ipcc-nggip.iges.or.jp/public/mtdocs/pdfiles/1411_FAO-IPCC-IFAD_Rome_AFOLU.pdf.	Francesco Nicola Tubiello	Accepted with modification	Cited report (https://www.ipcc-nggip.iges.or.jp/public/mtdocs/pdfiles/1411_FAO-IPCC-IFAD_Rome_AFOLU.pdf) has a disclaimer "Supporting material prepared for consideration by the Intergovernmental Panel on Climate Change (IPCC). This supporting material has not been subject to formal IPCC review processes", but citing the report as IPCC recommendation does not look proper, as it has not been subject to formal IPCC review process. Reference to FAO has been added.
3898	1	6	306	316	Air emission accounts compiled following the System of Environmental Economic Accounting should be mentioned here as well. See for more information: https://seea.un.org and for EU Member States http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts.	Andrea Tilche	Accepted	Availability of SEEA data mentioned in revised text.
1928	1	6	306	316	Air emission accounts compiled following the System of Environmental Economic Accounting should be mentioned here as well. See for more information: https://seea.un.org and for EU Member States http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts	Jessica Chan	Accepted	Availability of SEEA data mentioned in revised text.
2192	1	6	306	316	Air emission accounts compiled following the System of Environmental Economic Accounting should be mentioned here as well. See for more information: https://seea.un.org and for EU Member States http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emissions-accounts	Julian Chow	Accepted	Availability of SEEA data mentioned in revised text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
922	1	6	307	316	Kindly re-arrange the various sentences to provide a more coherent storyline. First, list the sources for national level estimates of CO2 emissions from fossil fuels. Second, list the CO2 and non-CO2 sources from AFOLU and other sectors (In general, first list databases produced by UN agencies or other recognized international sources, followed by those produced by national agencies and then by data from the private sector. In all cases, please insert a link to the databases mentioned). Importantly, these guidelines in this same paragraph advise compilers against using data that are not independent from teh national data already in the inventory. "Mutatis mutandis," it is then not clear why the WRI database should be listed among the ;isted available independent international sources, when in fact WRI is nothing but a compilation of all of them. Finally, use the quote from Ciais et al 2010 (here, insert a ''e.g.,'' to highlight that the reference is for the part on well-known CO2 sources, rather than in support of the more general first part of the sentence). Suggested edited sentence: "For example, national level CO2 emissions estimates associated with the combustion of fossil fuel are compiled by the International Energy Agency (IEA) (insert link), the Carbon Dioxide Information and Analysis Centre (CDIAC) (insert link), the Emission Database for Global Atmospheric Research (EDGAR) (http://edgar.jrc.ec.europa.eu) and by British Petroleum (BP) (insert link). Likewise, FAO compiles and disseminates national-level CO2 and non-CO2 emissions and removals for AFOLU (http://www.fao.org/faostat), using underlying national statistics as activity data. Estimates of emissions of other gases are available from the EDGAR (link), Regional Emission inventory in Asia (REAS, https://www.nies.go.jp/REAS), and US Environment Protection Agency (EPA) (link). The World Resources Institute (WRI, http://cait.wri.org) combines data from several sources mentioned in this section to provide sector-specific emission estimates. Use of multiple data sources in the comparison is advantageous as the data show differences between datasets, even for relatively well-known emissions of carbon dioxide (e.g., Ciais et al., 2010).	Francesco Nicola Tubiello	Accepted	Revised accordingly.
1386	1	6	315	316	Suggest to modify pointer to AFOSTAT as follows, to update to new product with links to UNFCCC data comparisons. "FAO compiles and disseminates in FAOSTAT national emissions and removals for AFOLU, using the underlying national statistics as activity data and IPCC Tier 1 methodologies. Furtehrmore, the FAOSTAT Tier 1 AFOLU estimates can be downloaded together with the corresponding UNFCCC country data, and differences analyzed in a dedicated "compare" section (http://www.fao.org/faostat/en/#compare).	Francesco Nicola Tubiello	Accepted with modification	Inserted reference to compare section.
8730	1	6	364	365	It is stated that "atmospheric measurements cannot therefore be a standard tool for verification". This too general statement ignoring recent scientific progress. See, e.g., Pison et al, : How a European network may help with estimating methane emissions on the French national scale, Atmos.Chem.Phys.,18,3779-3798, 2018. Also, it is contradicted by the examples later in the paragraph (lines 369-373). Under which assumptions "cannot" ? "Therefore" means which reasons exactly? Suggestion: to rephrase lines 364-365.	Andrea Kaiser-Weiss	Accepted	Revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3884	1	6	371	371	Which conditions can be considered right for measurement modelling? What is the guidance?	Andrea Tilche	Accepted	Revised to point to the guidance provided later in the text.
8732	1	6	379	379	"capture all polution incidents" - is not strictly correct. Instead, the measurements and models together should be able to estimate the national emissions in total.	Andrea Kaiser-Weiss	Noted	2006 IPCC Guidelines wrote this to emphasise the value of continuous GHG concentration observations, should keep, the overall target is same as comment suggests. No modification has been made to the text.
8734	1	6	380	380	"requires highly precise and labour-intensive analysis, which may prevent" - is misleading, as inverse modelling also requires a sufficient number and distribution of measurement locations, proxy data and adequate modelling and computing ressources. From which of these elements a limitation occurs, and would be justified to highlight, this depends on the specific case.	Andrea Kaiser-Weiss	Accepted	Revised accordingly.
8736	1	6	381	382	"flux assessments from inverse modelling includes the effect of natural sources / sinks as well as international transport" - the wording is incorrect, it should say: "anthropogenic emission estimation from inverse modelling has to distinguish between natural and anthropogenic sources/sinks and also has to model the atmospheric transport of trace gases into the area of interest."	Andrea Kaiser-Weiss	Accepted with modification	Revised 2006 IPCC Guidelines text to reflect more detail.
8738	1	6	384	385	"inverse modelling not likely to be frequently applied as a verification tool ... in the near future" - it is bold to make a statement about the future, and this view is probably not shared by the scientific community working on inverse modelling. If this statement is made, its conditions and limitations are to be carefully discussed. How many years exactly are meant by "near future"?	Andrea Kaiser-Weiss	Accepted	Revised.
8740	1	6	385	385	Again, unjustified assumptions about the future (see issue with line 384) . The value of the future satellite data will show together with the advancement of future models. It is out of scope of the IPCC document to dismiss this future development, without any serious scientific investigations backing this claim. "will not fully resolve this problem" - ok, no scientific method can be expected to "fully resolve a problem". Please rephrase less tendentiously.	Andrea Kaiser-Weiss	Accepted	Removed.
4670	1	6	385	387	Please delete the sentence, "Even the availability of satelliet-borne sensors for greenhouse gas concentration measurements (see Bergamaschi et al., 2004) will not fully resolve this problem, due to limitations in spatial, vertical and temporal resolution.", due to the following reasons: - The 2004 report by Bergamaschi et al. is too old. At that time of 2004, SCIAMAHCY on ENVISAT was the only instrument that could measure CO2 and CH4 from space. However, SCIAMACHY was not designed to monitor CO2 and CH4. A peer-reviewed paper on recent satellite monitoring should be referred. Now GOSAT (2009-), OCO-2 (2014-) and TanSat (2016-) have been monitoring greenhouse gases from space. - Recently launched TROPOMI imaging spectrometer onboard Sentinel-5P can cover entire the Earth's surface every day. The peer –reviewed paper by Hu et al. (2018) has shown accuracy of the CH4 monitoring by comparing GOSAT. Satellite observation is not spatially nor temporally sparse any more.	Yukio Haruyama	Accepted	Out of date sentence deleted. Tropomi paper mentioned further in the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8742	1	6	392	396	page 6.12 line 392 "Ultimately, the application of these techniques relies on a comparison of the uncertainties" - this is wrong and the cause of several incorrect conclusions later. Any comparison between two estimates has of course to take into account uncertainties of both estimates to be physically meaningful. Consider an estimate E1=10 with uncertainty of 1. Compared with estimate E2=20 with uncertainty of 5 - this tells us that they cannot be both right. It does not matter that the uncertainty of E2 is larger. If E2 is right, E1 is wrong. The sentence afterwards may try to soften the wrong statement, which is better to be removed than softened.	Andrea Kaiser-Weiss	Accepted	To provide more flexibility for application of the method, the text is revised to reflect the comment.
3886	1	6	430	430	It is unclear what is meant by this guide "will be an up to date guide". Does is already provide such a guide or is it only an intention.	Andrea Tilche	Accepted	Revised accordingly.
586	1	6	481		The following wording is suggested: Such verification of emission estimates needs to be …	Klaus Radunsky	Accepted	Revised (at FD line 480).
348	1	6	501	501	Please correct the spelling of Chevallier (2 'l') and add the reference in the reference list	Frederic Chevallier	Accepted	Revised accordingly.
350	1	6	528	528	Pointing to the national methane estimation of Pison et al. (2018) may be appropriate	Frederic Chevallier	Accepted with modification	In this paragraph, it is not intended to list all methane works on national scale. Otherwise, Pison et al. 2018 was cited elsewhere in the section. Text modified to mention other completed studies.
588	1	6	531		The following wording is suggested: .., and this comparison has resulted in a better agreement.	Klaus Radunsky	Noted	Exact location could not be found. It was therefore difficult to find a place to insert suggested text.
590	1	6	544		The following wording is suggested: .., and a network with more monitoring stations is needed.	Klaus Radunsky	Accepted	Revised accordingly.
592	1	6	559		The last part "including lateral movement of carbon" should be further explained as the translation/meaning might have some ambiguity.	Klaus Radunsky	Accepted	Revised.
352	1	6	581	582	This finding was already in Fortems-Cheiney et al. (2015) and it would be fair to quote this paper	Frederic Chevallier	Accepted with modification	Added mention of other earlier publication. In this guideline, unlike in scientific review we do not need to point to first/pioneering works but to most up-to-date, more comprehensive studies based on wider observation coverage.
2718	1	6	592	593	It reads that 'inventory leakage rates are assumed and not based on measurements.' It is unclear whether this statement applies to Australia alone or to all countries, and if it is for all countries, this may be true for RACs, but may not be true for other applications (such as F-gas production etc)	Elsa Hatanaka	Accepted with modification	Revised (see previous comment).
7980	1	6	6.10.2.1		I subscribe to the proposition that comparisons in the emission of gases in the measurements using the alternative atmospheric method can not be assumed as a standard method, since, although it is true that the atmospheric method is taking a lot of acceptance and is considered a scientific method , no less true is that it is still in the experimental phase. In addition, not all countries have the appropriate measurement instruments, which take into account the high rainfall or low rainfall in highly polluted areas, where the measurements have to generate a lot of uncertainty when it comes to establishing levels of pollution in the same region of a country or between countries.	Alma Vargas	Noted	Its true that there are problems with the application of this method, however there are also some successes. Lack of observations, and other difficulties and limitations of using atmospheric observations are mentioned in several places in the text, and other needed revisions are already in place.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
7982	1	6	6.10.2.4		On the strengths and weaknesses of the atmospheric measurements to determine the Greenhouse Gases (GHG), the problem does not lie in defining strengths and weaknesses, the problem lies in the fact that the variabilities can be so important that generate a level of uncertainty so important that it invalidates the estimates.	Alma Vargas	Noted	Essentially the SOD text and comment address the same problem of observing and interpreting emission signals in atmosphere in presence of noise. It is stated in the criteria of using the emission estimated based atmospheric observation, the uncertainty of the model estimates should be comparable or lower than that of inventory, as mentioned in section 6.10.2.1.
7984	1	6	6.10.2.7		The inverse model for quality controls, despite being established as the best in the field, does not stop worrying about the variations that are usually recorded in their estimates. The production of statistics has a condition that is not negotiable, and that is a high aspiration of the national statistical systems, and is that the data must be accurate and reliable. This indicates that we should focus on exploring alternative methods that yield data with the least degree of uncertainty possible. That way your utility will be optimal.	Alma Vargas	Noted	The comment is about uncertainty of the inverse estimate as compared to uncertainty of inventory based on statistics. It is mentioned in the revised chaper text that inverse methods are only useful when they have low uncertainty and thus may help to improve inventory estimates. So the comment has been taken into consideration in the revised text.
7986	1	6	6.11.4		"One of the great truths that are stated in this document is that a GHG estimation model must be correctly parameterized and calibrated In quantitative statistics measurements, when it comes to estimation, what is sought is to estimate an unknown parameter of the population In this sense, the assertion that there should be a correct parameterization is correct, it should be noted that the GHG estimates is a pending issue in the Dominican Republic. The estimates made are imprecise, since large investments of human resources, equipment and economic resources are needed to apply appropriate models that yield accurate data and that allow establishing the appropriate models, whose estimates are sufficiently reliable and precise, whose methodology allows international comparability. "	Alma Vargas	Noted	No action needed.
7978	1	6	6.7.2.1		After analyzing the content of this chapter, especially the questions that are formulated, I am concerned about the measurement of the emission of gases from internal combustion vehicles, which has accepted the fuel ratio per kilometers traveled. The concern goes in the direction that, in the big cities, in the peak hours, there is a high congestion in traffic, where the vehicles remain hours in a same point, which represents a high emission of gases in the territorial space where congestion occurs, while the distance traveled at that point is zero (0). This translates into a significant underestimation in the measurement technique employed.	Alma Vargas	Noted	In principle, this issue is addressed in road transport accounting models that use road network and statistics on traffic count, start-stop cycles by hour to quantify emission generation rates as a function of time cycles and vehicles types. The guidance provided in section 6.12 on use of models should be followed to better asses such assumptions. In the case of default emission factors, the emission factors are conservative enough to account for all the stages of vehicle travel.
594	1	6	609	611	This citation seems to be outdated given the more recent progress in verification by inverse modelling. It would be useful to updte table 6.1 in light of the progress made since 2005 or 13 years.	Klaus Radunsky	Noted	We have checked the literature, but the basics analysis made in cited papers dated by 2001, 2005 was not repeated or rerun in later publications.
8744	1	6	656	656	Change "Necessary" to "Recommended", see comment below. Good practises should be given, but not prescribed.	Andrea Kaiser-Weiss	Accepted	Revised accordingly.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8746	1	6	667	668	Step 2 is not necessary to demand national inventory data as prior. There are inversion methods not using priors, there might be value in using other inventories than national inventory for sake of independency of verification. There is no benefit to limit the methodology of step2 as is worded now.	Andrea Kaiser-Weiss	Accepted	Revised.
596	1	6	683		table 6.2: Step 4; Example 1 - check the term "sensitivity inversion". Maybe it should read "sensitivity analysis"?	Klaus Radunsky	Accepted	Revised.
598	1	6	727		Delete "a".	Klaus Radunsky	Noted	Checked text, line number likely wrong.
8748	1	6	730	752	Criteria are all much too specific, probably concluded from a limited number of applications (Switzerland, Great Britain) where the problem is particularly hard because complicated topography (Switzerland) and smallness of area (Switzerland) or limited measurement numbers, which are situated unfortunately moatly upwind (Great Britain) wheras more downwind stations would have been needed. Criteria depend on many things. It will not be useful to have over-specified criteria -all what is needed is an uncertainty estimate of the inverse model result. These rather specific criteria worded here may help in some cases or may hinder in other cases to arrive at such.	Andrea Kaiser-Weiss	Accepted with modification	Removed strict limitation to loosen the criterian leaving it up to the modelers to judge the applicability of the inverse estimates depending on situation with available data for a target country.
8750	1	6	740	741	"targting no less than 50% reduction" - this criteria is wrong and can hinder independent validation, if not exactly understanding where it came from and which technical uncertainty term is addressed here. Imagine a traditional emission estimate, complete with an estimate of (too small) uncertainty which misses an important source of uncertainty. No inverse estimate, however perfect, could be used for comparison because of this criteria. The original wording makes sense only in the Bayesian context, where uncertainty is set by the modeller (a technical "model uncertainty" which allows to adjust weight to either observation or or model) and which is NOT the same as the uncertainty reported by the national emission inventory. The correct meaning of this technical model uncertainty is lost during the section, and invites mis-interpretation.	Andrea Kaiser-Weiss	Accepted with modification	Revised to remove numerical restrictions (give flexible recommendations).
8752	1	6	740	750	The Figure 6.1 includes a wrong and hindering element (as discussed above: Consider an estimate E1=10 with uncertainty of 1. Compared with estimate E2=20 with uncertainty of 5 this tells us that they cannot be both right. It does not matter that the uncertainty of E2 is larger. If E2 is right, E1 is wrong.) - remove: "is model emission uncertainty smaller than or comparable to inventory uncertainty"	Andrea Kaiser-Weiss	Accepted with modification	Figure revised, the criteria modified to reflect the comment.
2720	1	6	744	745	It was difficult to capture what the following sentence means: 'Otherwise, high emission inventory uncertainty is often linked to emissions of HFC amd other fugitive compounds.' Should it rather be something such as: 'Effort should be spent on examining HFC emissions where a higher uncertainty is expected in the inventory.'	Elsa Hatanaka	Accepted with modification	Revised HFC example.
8754	1	6	754	754	why "GLOBAL" ? Either remove or use regional/global	Andrea Kaiser-Weiss	Accepted	Revised.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8756	1	6	758	759	In Tabe 6.3: CH4, N2O, HCFCs - here CO2 is missing. Whether it is possible to infer information about CO2 depends on many aspects, e.g., the relative size and distribution of biogenic and anthropogenic sources and sinks, the density of measurements, the availabiliy of tracers, the skill of the models etc., and there might be countries where this is much less difficult than generally implied in this document. Thus, CO2 should not be left out in the general outline for all nations, even if in the two cases discussed (Switzerland, Great Britain) it proved too difficult.	Andrea Kaiser-Weiss	Accepted	Added CO2 to list of gases in Table 6.5.
600	1	6	766		table 6.3; defining target gases and time periods; third line: Substitute "a" by "the".	Klaus Radunsky	Accepted	Change effected as suggested.
602	1	6	771		It is suggested to delete "can".	Klaus Radunsky	Accepted with modification	"can" replaced by "may".
3888	1	6	785	785	The phrase "carry the same emissions burden" could be expanded by explaining that this means that emission rates of an activity is fixed.	Andrea Tilche	Noted	Whilst the units for an activity data in question may be fixed, emission rates might not be fixed. No change has been made to the text.
2654	1	6	786	786	Please check the formula, and I suggest it to be"Emission=(Emission factor)×(Activity data)".	Xiangzheng Deng	Accepted	Change effected as suggested. "E." deleted.
604	1	6	797	799	The current language lacks clarity. The following wording is suggested: Linkages between processes can be much more complicated than in this example. These situations can be captured by more complex models, but the greater the complexity the more reduced gets trandsparency.	Klaus Radunsky	Accepted with modification	Text updated to provide better clarity.
3890	1	6	814	818	A point here is missing, where data requirements of the model cannot be met by available data	Andrea Tilche	Accepted	To account for the scenario presented.
606	1	6	835		It is suggested to substitute "they" by "models".	Klaus Radunsky	Accepted	Change effected as suggested.
610	1	6	838		It is suggested to insert also "identification and explanation of key assumptions".	Klaus Radunsky	Accepted with modification	Text updated to provide more clarity on models developed to better reflect local conditions.
612	1	6	839		It is suggested to request "a description of uncertainty" and not only an estimation of uncertainty.	Klaus Radunsky	Noted	The text refers to uncertainty assessment for which by definition includes a description of uncertainty.
614	1	6	839		It is suggested to substitute "and where this exists" by "and if that information can be found somewhere".	Klaus Radunsky	Rejected	The referencing also relates to place where the information could be archived.
608	1	6	840	840	Not "most" complex models should be well-documented, but rather "all" complex models should be well-documented.	Klaus Radunsky	Noted	In theory that should be the case but the reality is that not all complex models are documented well. The statement is meant to reflect this reality.
1862	1	6	853	866	The checking of model assumptions when developing or adapting a model should be given more prominence. Checking model assumptions, particularly the model residuals, is key for statistical modeling. While important, solely trying to minimize the error in the predictions relative to a set of measures can mask deficiencies with one's models. The checklist should be more explicit on checking for systemic biases as well as checking the distributional assumptions about model residuals and the form of the model, specifically in lines 981 to 984.	Jessica Chan	Noted	The guidance provided in lines 981-984 is meant to be broad to cover all cases where systematic biases are observed.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
2126	1	6	853	866	The checking of model assumptions when developing or adapting a model should be given more prominence. Checking model assumptions, particulary the model residuals, is key for statistical modeling. While important, solely trying to minimize the error in the predictions relative to a set of measures can mask deficiencies with one's models. The checklist should be more explicit on checking for systemic biases as well as checking the distributional assumptions about model residuals and the form of the model, specifically in lines 981 to 984.	Julian Chow	Noted	The guidance provided in lines 981-984 is meant to be broad to cover all cases where systematic biases are observed.
616	1	6	862		It is suggested to substitute "the" by "a".	Klaus Radunsky	Accepted	Change effected as suggested.
618	1	6	865		It is suggested to insert "whether or not" after "This will check".	Klaus Radunsky	Accepted	Change effected as suggested.
620	1	6	875		It is suggested to substitute "material" by "relevant".	Klaus Radunsky	Rejected	The change will change the context of the sentence.
622	1	6	899		It is suggested to substitute "be due to the model better representing the real world" by "reflect that the modell is better representing the real world".	Klaus Radunsky	Accepted	Change effected as suggested.
2270	1	6	90	91	I would like to suggest that there is an explicit reference to Chapter 1- since this is a key step in the whole cycle of the GHG inventory, hopefully also a figure is included in chapter 1 which might facilitate also visually this process for compilers (see also my comment in line 16 of this excel sheet or included in Vol 1 Chapter 1).	Rocio Danica Condor Golec	Accepted	Cross-reference to Chapter 1, Vol.1 inserted.
584	1	6	91		The following wording is suggested: improvements in the estimates of emissions and/or removals;	Klaus Radunsky	Accepted	Change effected as suggested.
2272	1	6	93	93	Not clear what does : "reassessment" means in this context? - at the end all ends in an improvement of the GHG inventory.	Rocio Danica Condor Golec	Noted	The contect is in relation to uncertainty estimates as captured at the end of the sentence.
3892	1	6	970	970	It should be said more clearly that were publications documenting the model is not available, they should be developed	Andrea Tilche	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
3894	1	6	974	974	Change "first order" to "first order kinetics"	Andrea Tilche	Noted	The text was kept in order to keep the language readable and easy to understand.
2722	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 currently 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 with modification	"Not used in national reporting" was removed from CO2 row but in CO2-city scale its still included.
2724	1	6	Table 6.2		Step 1 should be renamed 'Acquisition of concentration measurements on the national GHGs network'; Step 2 should be renamed 'Preparation of gridded prior emission data'; Step 3 should be renamed 'Preparing and operating the inverse modelling', since each step should start with a verb, and also because '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.'	Elsa Hatanaka	Accepted with modification	Revised table entries as suggested. Note: UK RAC model not mentioned in [SOD version of] the table.
2726	1	6	Table 6.2		Step 5 of Example 3 does not include any description on PFCs. It should be included to match the header of the Example.	Elsa Hatanaka	Accepted with modification	Revised table header to match.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8714	1	7	117	120	I do not see here a mention of 'trash burning' or say open burning of municipal solid waste; I believe such burning cannot be classified as incineration. Open burning of MSW will contribute to all of the compounds mentioned but primarily CO and NMVOC (from this list). However, also CH4 will be emitted from this poor and often 'cold' burning.	Zbigniew Klimont	Accepted with modification	Text modified to include the word open burning and incineration.
6130	1	7	286	287	I suggest that the authors delete footnote "(c) Emissions assumed to be biogenic in origin." The footnote is attached with "5. Waste". However, the category "C. Incineration and open burning of waste" under waste sector includes fossil carbon as stated in the corresponding "Explanation" cell. It seems inconsistent.	Naofumi Kosaka	Accepted	Added references to papers discussing required number of observing stations.
6132	1	7	286	287	I suggest that the authors add two rows at the bottom of Table A7.1 in order to accommodate two subcategories "incineration" and "open-burning" under "C. Incineration and open burning of waste". The oxidation factors are 100% for incineration and 71% for open-burning, according to Table 5.2, Chapter 5, Volume 5, the Second Order Draft. It means the status is different between these two subcategories whether CO2 is included in existing category emission estimates.	Naofumi Kosaka	Accepted with modification	Examples added in inverse modelling section.
8708	1	7	61	61	Suggest adding for NOx: "….nitrogen cycle and is an aerosol precursor."	Zbigniew Klimont	Accepted	Text revised as per comment.
8710	1	7	62	63	The importance of NH3 in aersol formation or controibution to ambient particulate matter depends on the region and has been changing recently making many government act on NH3 emissions due to particulate matter. Suggest to modify this sentence to: "Ammonia (NH3) is an aerosol precursor with increasing contribution to ambient particulate matter concentrations in several regions, owing also to decreasing emissions of SO2 and consequently declining role of sulfates."	Zbigniew Klimont	Accepted with modification	Sentence revised to address point.
7988	1	7	7.3.2		In this chapter, the concept of good practice in GHG estimates emerges. The measurements of N2O, NOX and NH3 using appropriate methods is an aspiration of public and private institutions that need accurate and reliable data on their actions. Also, it is of high interest for the governing institutions of the national statistical systems. Good practices should be raised at the level of the philosophical principles of the institutions, and that all the personnel enrolled in the tasks of collection, processing, analysis, dissemination and articulation be guided by this philosophical principle; that must be the compass that marks the north of every process.	Alma Vargas	Noted	Principles of good practice are addressed in Chapter 3 (section 3.1.1), Overview chapter and Glossary. No changes have been made to the text.
8712	1	7	95	97	Suggest revising this para, even though this is the unchangedtext of the 2006 guidelines. To be precise all 3 key NOx formation mechanisms shall be mentioned - Prompt-NOx is missing. Secondly, thermal and fuel NOx are always present with importance varying from fuel to fuel and also type of installation (combustion temperature) and so for example for light fuel oil or gas combustion thermal NOx will be dominant while for heavy fuel oil or pulverized coal combustion (might depend on coal too) fuel NO is typically dominant.	Zbigniew Klimont	Accepted with modification	Added prompt-NOx into sentence indicating another formation pathway. New sentence reads as follows "Depending on the combustion temperature, thermal-NOx and prompt-NOx can also be formed from nitrogen contained in the combustion intake air (e.g., in pulverised coal combustion).

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8836	1	8			As the important roles of non-state actors, especially subnational and local governments, are being raised by UNFCCC and many other international/regional /national initiatives, it is recommended that IPCC provides guidance for sub-national and local governments to report their GHG emissions, or as a starting point, makes reference to existing frameworks such as the Global Protocol for Community-Scale GHG Emission Inventories (GPC) which is currently the most referenced framework by cities that voluntarily report emission to the Carbon Disclosure Project. 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. More details available at www.c40.org/gpc	Mingming Wang	Noted	The mandate for the IPCC is to provide methodological guidance for quantification of emission estimates at national level. No action can be taken because comment is out of scope of 2019 Refinement.
8838	1	8			Further to the comment above, it is strongly recommended that IPCC considers how national inventories can be improved to enable better emissions accounting at sub-national level. At C40 Cities, an international organisation dedicated to help cities tackle climate change, we have helped over 60 large cities 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	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
8842	1	8			Due to increasing regional and international trade, it is recommended that IPCC requires nations to report emissions associated with import, export and consumption-based emissions, and provides relevant guidelines. This will provide more comprehensive evidence base for and a more holistic approach to climate action planning and policy making than just looking at production-based emissions.	Mingming Wang	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
8844	1	8			Further to the comment above, a specific example is emissions embedded in global waste trade. It is recommended that IPCC requires nations to report emissions associated with waste imported and exported.	Mingming Wang	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
8846	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 0.5° 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 comment is out of scope of 2019 Refinement.
8848	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
6134	1	8	133	133	"kP" may be "kPa" (kilopascal). By the way, the definition of NMVOC in SOD seems to be different from the latest guidelines under the Convention on Long-range Transboundary Air Pollution. NMVOC means "all organic compounds of an anthropogenic nature, other than methane, that are capable of producing photochemical oxidants by reaction with nitrogen oxides in the presence of sunlight", according to the guidelines (document ID: ECE/EB.AIR/125, paragraph 7d, Available at https://www.unece.org/environmental-policy/conventions/envlrtapwelcome/guidance-documents-and-other-methodological-materials/emissions-reporting.html)	Naofumi Kosaka	Accepted	Definition implemented as proposed.
3900	1	8	151	165	Consider adding guidance on the (in)appropriateness of combining notation keys for a single inventory data point for which data is not included. Can C and IE be linked to the same data point? Can other notation keys be combined?	Andrea Tilche	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
3902	1	8	165	165	What are other acceptable reasons to use notation key IE, if it is not due to disclosure of confidential data? Should this be explained in the documentation box as well?	Andrea Tilche	Noted	The use of the notation key "IE" applies to cases whereby emissions for a particular category of interest are included in another category because of challenges in disaggregation of data. In cases of what would be considered categories for confidentiality such as military activities, the use of the notation key "C" is not appropriate if the emissions are reported elsewhere because the quantum of both the activity data and emissions wouldn't be known.
2282	1	8	185	186	It would be important to include information on GWP also here to facilitate consistency	Rocio Danica Condor Golec	Accepted with modification	Information on GWPs is already included in section 8.2.2. A sentence is added in section 8.2.2 to highlight the importance of using the same set of GWPs across the time series.
8840	1	8	255	256	It is strongly recommended that the Common Reporting Format (CRF) in Table 8.2 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.
7990	1	8	8.2.6		We see as very positive the mandate to use units of the International System of Units (SI) in the worksheets, sectoral tables and in the summaries; that's excellent, it's an example of good practice. However, this recommendation should go further, since a conversion table of the mass units that are managed in GHG measurements should be prepared. The harmonization in the measurements, will allow the national and international comparability, besides that it will allow to elaborate series of time, and the necessary and convenient trend graphs.	Alma Vargas	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
8552	1	8	91	94	Inventory experts will require guidance on the complex issue of comparing different GHG's by way of their GWP's. GWP's are not country specific, hence a common approach is required. The current text not only is insufficient, but also misleading, as the reference (in footnote 2) to IPCC AR5 contradicts the intention of the authors of that reference – see detailed explanation and suggestions in the attached file	Wilfried Winiwarter	Noted	No action can be taken because comment is out of scope of 2019 Refinement.
2280	1	8	92	92	As commented in line 3 (Volume 1, Overview): It will be fundamental to get a clear clarification and/or indication which GWP countries should use for estimating GHG emissions. This is a very important topic that needs to address since the beginning. There are many countries that are not clear on what to use and this revision can contribute to clarify. Which are the elements for a country to choose between using AR4 or AR5, that will help? Now many countries developing countries are really struggegling with this item therefore good to make it clear in this guidelines. In the 2006 Guidelines section 8.2.2 there was a clear indication to associate with TAR. These guidelines can not leave it open to choose one or another with no orientation. Nowadays, there are countries using 2006 IPCC GL (Ghana, Mongolia, Namibia, Singapoure, Chile) that are using SAR and others that are using TAR.	Rocio Danica Condor Golec	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
6136	1	Annex 8A.	NA	NA	The new category code 2B11 and 2C8 is incorrectly labeled for page T.61, T.67, T.70, T.71 and T.74.	Naofumi Kosaka	Accepted	Labelling corrected.
2806	1	Annexes	1313	1313	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Editing revised.
2808	1	Annexes	1521	1522	It is suggested the use of the initial letar in capital letters or revise the grammatical norm	Poot-Delgado Carlos Antonio	Accepted	Editing revised.
8696	1	2	170	171	Is this the 'shape of the uncertainty distribution'? Or rather we speak of 'probability distribution for a given parameter'?	Zbigniew Klimont	Accepted	Text changed.
8698	1	2	308	309	The links/footnote (3,4) to FAO and IFA do not work. Suggest avpoiding links to pages that are relatively deep in the structure as when web sites are revised the redirect is often not building leading to error/missing link. Maybe a link to the main page is enough in such cases.	Zbigniew Klimont	Accepted with modification	All web links are revised based on current URLs.
8700	1	2	560	560	It should say: "….which need to be developed"	Zbigniew Klimont	Accepted	Change implemented as proposed.
8702	1	2	577	577	With CH4 in mind: One could add in the EF sensitive parameters for Fugitive/coal mining also: (1) depth of the mine (although one could argue this is part of the seam characteristic) and (2) existing mitigtion technology (just like for oil and gas) since in case gas capture and recovery is installed emissions will be significantly different.	Zbigniew Klimont	Accepted with modification	Text revised in Table 2.1a Fugitive emissions/coal mining and handeling, as: 1) Depth of the mine is one of characterictics, so listing all chatracterctics is long list. We wrote it as "Characterstics of seams"which includes depth of mine also. 2) We accept reviewer suggestion and added "Mitigation Technologies".
8704	1	2	577	577	I would suggest to add 'anaerobic digestion' as an example in the AFOLU/Livestock/Manure management/Type iof AWMS	Zbigniew Klimont	Accepted with modification	Text revised in Table 2.1a AFOLU/Livestock/Manure management, as: Type of AWMS (solid storage, anaerobic lagoons, anaerobic digestion, etc.).
8706	1	2	577	577	For solid Waste is says in EF sensiteive para: 'Waste component', should this be "Waste composition"; also shouldn't there be also "Waste management practice"?	Zbigniew Klimont	Accepted with modification	Text revised in Table 2.1a Waste/Solid waste, as: Waste composition, Climatic conditions, Type and management of landfills are added whereas Life of product is deleted.
1908	1	1	335	336	It is unclear why standard classifications and nomenclatures can only be "national" or "IPCC" specific. Most of the national statistical community follows international standards and classifications approved by countries through the UNSC (see e.g., https://unstats.un.org/unsd/classifications/). Kindly mention this option as well. It is likewise suggested to introduce this concept at the outset of this chapter, as it fits well into the suggested revision from a point of view of functioning national statistical systems beyond the narrow IPCC/UNFCCC view.	Jessica Chan	Accepted	Example added referencing UNSD classifications.
2172	1	1	335	336	It is unclear why standard classifications and nomenclatures can only be "national" or "IPCC" specific. Most of the national statistical community follows international standards and classifications approved by countries through the UNSC (see e.g., https://unstats.un.org/unsd/classifications/). Kindly mention this option as well. It is likewise suggested to introduce this concept at the outset of this chapter, as it fits well into the suggested revision from a point of view of functioning national statistical systems beyond the narrow IPCC/UNFCCC view.	Julian Chow	Accepted	Example added referencing UNSD classifications.

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492	1	1	336		It is suggested to substitute "practices" by "practice".	Klaus Radunsky	Accepted	Corrected.
3802	1	1	388	404	This section offers an excellent opportunity to link to sustainable development goal 13, and specifically target 13.3; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.	Andrea Tilche	Noted	No change.
494	1	1	391		It is suggested to substitute "an asset to" by "relevant information for".	Klaus Radunsky	Accepted with modification	Sentence deleted.
7946	1	1	405	405	Add another bullet: "Communicating differences in methodology or publishing bridge table or reconciliation items to explain variation between the inventory and other similar products (e.g. GHG accounts)	Matthew Prescott	Noted	Issue addressed in new section 6.10 in Chapter 6 on verification.
2696	1	1	Fig 1.1		Assuming that there is no difference between Energy, Waste, and IPPU+Agriculture+LULUCF, the lines in the figure going up from IPPU+Agriculture+LULUCF should include Energy and Waste as well. (editorial)	Elsa Hatanaka	Accepted	Figure has been simplified to remove sectoral boxes.
2698	1	1	Table 1.6		This will 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	Noted	Table cross reference already indicated to be example.
3770	1	1			The new guidance could start with a section on the objectives of national GHG inventory arrangements	Andrea Tilche	Accepted	Sentence added to beginning indicating purpose of inventory arrangements.
3772	1	1			There are no references to Decision 19/CMP.1 This Decision does not prevent any Party from considering the applicability of the definitions, objectives, characteristics and functions of national systems, according to different national circumstances. The Decision is flexible and it has proven useful in the development and improvement of the national systems of Annex I Parties. It is important that any IPCC Guidance is consistent, (or at least not inconsistent), with previous Guidelines on national systems that some Parties have been applying for 10 years now.	Andrea Tilche	Noted	IPCC Guidelines do not refer to UNFCCC decisions. No changes have been made to the text.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
3774	1	1			There is a lot of information in this chapter but there are no general principles for establishing an inventory system. At least they do not come out strong, and often they are not even mentioned at all. These are some examples of important principles to be aware of in the context of institutional arrangements: ☐ Formalise the role of the different actors. This is an essential element of a good quality and sustainable GHG inventory, as it provides certainty about the roles and responsibilities of each institution during inventory compilation and review on a continuous basis. ☐ Ensure there are mechanisms at national level to ensure data sharing between agencies producing activity data and other parameters used in GHG emission inventories. ☐ Consider an integrated MRV system of GHG inventories, projections and policies and measures, as the basis for tracking national and international climate change objectives and ensuring transparency. ☐ Seek closer cooperation and collaboration between GHG inventory compilers and data providers for an efficient data collection, improved quality of GHG estimates and better data coherence between different reporting obligations. ☐ Overall, countries should consider a stepwise approach to GHG inventory improvements: GHG inventories cannot be perfect but should show continuous and sustainable quality improvements.	Andrea Tilche	Noted	IPCC Guidelines principles have been already established. New text added stating purpose of inventory arrangements. Points listed in comment are addressed in chapter. No changes have been made to the text.
468	1	1			table 1.1: caption does not match for footnotes 5, 6, 7 and 8	Klaus Radunsky	Accepted	Number on table footnotes corrected.
470	1	1			table 1.3: also this table should be qualified as being "illustrative". The role of stakeholders depends on the governance structure in the country,	Klaus Radunsky	Accepted with modification	Term "common" added.
472	1	1			table 1.3 Under the line addressing compilation experts and researchers also an expert with specific IT knowledge should be added.	Klaus Radunsky	Accepted with modification	"Technical awareness of … IT systems" added.
1006	1	1			The air pollutant" inventories mentioned in this box should be coupled (unless they are the same thing) to the National Air Emissions Accounts, compiled in many countries and with legal requirements in the EU. For the latter, it should be mentioned that the international guidelines regulating air emissions accounts are the System of Environmental Economic Accounts Central Framework (SEEA CF) for energy and industry, and the SEEA Agriculture Forestry and Fisheries for AFOLU (https://seea.un.org/ and http://www.fao.org/economic/ess/environment/methodology/en/)	Francesco Nicola Tubiello	Accepted with modification	Added text to Box 1.1a on other environmental and sustainability data gathering processes, including environmental accounting efforts and SDGs.
8524	2	2	178	178	Minor comment: Delete the word "the" after the expression " together with	Vasiliki Assimakopoulos	Accepted	Copied from Volume 2.
8526	2	2	229	231	But still, even if for confidentiality reasons data are obtained from another source they will still point to the "confidential source". The only solution to this is the one proposed in paragraph 3 (lines 225-228).	Vasiliki Assimakopoulos	Noted	Copied from Volume 2.
8528	2	2	440	441	In table 2.1 must add Requirements for location of monitoring stations in the methodology.	Vasiliki Assimakopoulos	Noted	Copied from Volume 2. This is out of scope of the 2019 Refinement. However, measurement plans are already covered in the table.

Comment ID	Volume	Chapter	From line	To line	Comment	Expert	Response	Authors' note
8530	2	2	555	555	This statement is vague, please be more specific.	Vasiliki Assimakopoulos	Accepted with modification	Copied from Volume 2. Added the text "in Volume 2-5" of these guidelines.
8532	2	2	577	578	Table 2.2: Regarding mobile, fuel combustion sources CO_2 emissions also depend on vehicle type, engine technology	Vasiliki Assimakopoulos	Noted	Copied from Volume 2. CO_2 emissions depend on the carbon content of the fuel. It is CH_4 and N_2O that depends on the engine technology and operating conditions of the combustion device.
764	2		136		make clear the figure draft for readability	Chukwuma Anoruo	Noted	Copied from Volume 2. Difficult to address comment as it is not clear which sections it is intended for.
766	2		313	315	statement seem to convey same information. There is need to make simple this statement by presenting a clear summary of the line.	Chukwuma Anoruo	Noted	Copied from Volume 2. Difficult to address comment as it is not clear which sections it is intended for.