World Business Council for Sustainable Development

WORLD RESOURCES INSTITUTE

The Greenhouse Gas Protocol

Product Life Cycle Accounting and Reporting Standard

Comment Template

We are providing this template to streamline public comment submissions. To use this template, please follow the instructions below:

- The Product draft is open for stakeholder comment from November 11, 2009 through December 21, 2009.
- To provide written comments, please use the comment template provided, instead of sending comments in a separate file or e-mail, in order to streamline the comment process.
- When using the comment template, please organize comments by chapter/section and reference page numbers and line numbers.
- If you have questions during the public comment process, please email Holly Lahd at hlahd@wri.org.
- Submit comments as an attached MS Word file by email to Holly Lahd at hlahd@wri.org no later than **Monday, December 21st, 2009**. We appreciate any effort to submit written comments before the deadline.

Feedback from (name):_Paola Kistler

Organization: Rio Tinto

Chapter/Section	Comments
The outline and overall structure of the document	• Within LCA (life cycle assessment ISO 14040). emissions data is gathered in the LCI (life cycle inventory) phase and this step is followed by LCIA (life cycle impact assessment). LCI does not equate to LCIA. Impacts determined in LCIA through referral to scientific databases result in assessments of potential global warming potential, acidification, eutrophication etc. • Text in the draft often confuses LCI and LCIA. The term “impact” should not be used in association with LCI. This confusion of terms exists throughout the draft in several places (some are referenced below). • The document is too long and sometimes difficult to read. • There is a lack of alignment between ISO 14067-1 and this standard. These two standards which are developed in parallel should not be considered as competing documents. Industry has to use them both. Conflicting requirements and different terms for the same concept in

	the different standards cannot be tolerated. • The title "Product Life Cycle Accounting and Reporting Standard" is misleading, because the standard deals only with one impact category. Please write: "Product Life Cycle GHG Accounting and Reporting Standard"
1. Introduction	• 1.2, 1st line. The sentence makes clear that the standard is made for organizations, including companies. It is proposed to use the term "organization" throughout the document (instead of "company"). This is consistent with ISO 14001. • P 7 line 6 Notion of "comparative assertion" on environmental claims regarding products should be clarified further. A producer would like to be able to claim that his /her product at least complies with a new GHG products standard without a direct claim of superiority over another product. This is in line with "public disclosure". This aspect of "labeling" should be allowed otherwise the draft seems out of alignment with P 6 L 39-40 – "Public disclosure providers stakeholders, including customer, with information that may favourably influence their decisions". • Page 7, line 6: Environmental claims can only be made if all environmental impact categories are considered. Please write: "Valid assertions or labeling requires a greater degree of prescriptiveness than is provided in this standard **and the consideration of all relevant environmental impact categories** • Page 9, line 11 : The organization should look for reduction opportunities throughout the life cycle of the product, including the recuction of the energy demand in the use stage and improved end-of-life recycling. Please write "**life cycle**" instead of "supply chain" in the title, in the box and in lines 13 and 19. • Page 9, line 22: Please write "life cycle **GHG** emissions" • Page 9, line 25: The text in the box and the two paragraphs invite for burden shifting. There is the need of a disclaimer. Please add: **However, the organization should make sure that there is no burden shifting from the climate change impact category to other impact categories.** • P9 line 37, Product differentiation: Point supported here that this is about the credentials of the product at hand being available to "respond to customer desires" and not about an assertion or comparison with a competing product. • P 10 line 4-5: LCI is a collation of emissions for the product and does NOT equate to an impact LCIA. LCIA follows the LCI phase and involves the scientific evaluation of a potential impact by reference to scientific literature – it is not an emission number. • Page 10, lines 5 and 6: Stakeholders interested in the environmental impacts of a product expect more than an inventory about just one impact category. Please write "GHG impacts" instead of "environmental impacts" • Page 10, line 13: The organization should also be informed about the end-of-life operations in order to optimize the recyclability of the product and to minimize impacts from land-filling or incineration. Please write: From raw material vendors **through** consumers **to those involved in final disposal and recycling**, product level inventories… • Page 10, line 32: Please write "life cycle" in two words • P11 product differentiation. In order to fulfill "document the GHG

	impact of the changes made to the product " an LCIA would need to be conducted not just an LCI. . LCI is where emission numbers are gathered while LCIA is when the impact analysis is completed.
2. Principles of Product GHG Accounting	• Page 12,line 15: Completeness in the context of this standards only means GHG emissions, not other emissions. Please write: …product life cycle **GHG** emissions within…
3. Overview of Product GHG Accounting	• Page 13, line 21: Beer is not typically supplied in PET bottles. Please write: …1000 litres of **a specified beverage** delivered … • P17 line 14-30: Distinction is made here between LCI (say GHG emissions) and LCA (the impact i.e. Global warming potential) • P17 line 29-30 , mention is made of GHS inventory being "often used synonymously with global warming impact or carbon or GHS footprint.". While this may be done by some, it is an incorrect use (ISO 14040) because emission numbers are just that (LCI). These should not be equated to impacts (LCIA) in the proposed standard. To do so, ignores the underpinning objective science that is LCIA and leaves LCI data open to subjective interpretations on the "significance" of an emission. Yes, reductions in GHG emissions will likely cause reductions in impacts but they are not necessarily proportional, as evidenced by the different global warming potentials of the various GHGs. Only science can link and emission number to a potential impact.
4. Establishing the Methodology	• General chapter 4: It is OK to use attributional approach , but it should be clearly stated that also the inventories used should have been done using an attributional approach. • 4.1, after second paragraph: A GHG inventory purely based on an attributional approach may mislead a decision-maker who wants to use it for the business goals as mentioned in chapter 1.3.1. Therefore, a disclaimer is needed which makes him aware of additional consequentional considerations. The sentence on page 20, lines 6-8 is not sufficient. Please add after the second paragraph:**However, under consideration of the business goals of the study, the consequences of a possible decision, e. g. design change, increase or decrease of product supply, should be discussed in the report, based on consequentional scenarios.** • Page 19, line 35: The term "supply chain logic" is confusing. Please delete "…~~following a supply chain logic~~" • Page 19, line 44: The basic ISO standard on LCA, ISO 14044, is based on an attributional approach and does not consider consequentional scenarios as defined here. Please add a fourth bullet: - **Consistent with international standards such as ISO 14044.** • Page 20, line 15: For clarification, please write: …and other ~~product specific~~ considerations**, related to specific product categories**. • Page 20, line 24: Please write "guidance documents" instead of "resources" • Page 20, line 31: This sentence should be consistent with the definition of "consequentional approach" on page 19. Please change to …the consequentional approach focuses on how the total quantity of emissions change **as a consequence in the change of the demand of a given product** • Page 20, line 35: It is not clear what the "*supply chain of one of the life cycle stages"* really is. Please write instead: …whether the process is part of the product system under study.

	• Page 20, line 49: It should be noted that when a process is shared with other product systems, some considerations about such other product systems are necessary. Please write at the end of Box 4-2: **However, in the case of an allocation problem, i. e. when a process is shared with other product systems, see chapter 8, some considerations on such other product systems are necessary**.
5. Defining the Functional Unit	• Page 22, line 10: It should be made clear that the definition of the functional unit is only appropriate for the GHG inventory based on a product life cycle. Please add the sentence: "**The determination of the functional unit is based on the functions of the product in the use stage. Therefore, the functional unit does not apply to cradle-to-gate or gate-to-gate inventories**." • 5.2, 1st paragraph: This paragraph is of key importance and should be placed under 5.1 as first paragraph, just below the title. The first sentence in this paragraph should read: "In order to properly calculate the GHG inventory of a product, **organizations shall describe** the product system that is being analyzed **and clearly specify the functions of the product when used**. Please add at the end of the paragraph: **Additional guidance how to describe the product system is given in Chapter 6**. • Page 22, line 30-38: This paragraph is confusing and misleading. The statement that the functional unit is the primary production of 1 kg of zinc is definitely wrong if zinc as a material product is meant. As long as it as the life cycle of the relevant material product made out of zinc is not known, no functional unit is applicable. Please delete this paragraph or introduce "production of zinc" as a service! • Page 22, line 29: It is not clearly stated that the objective of the functional unit is to allow informed comparisons between different products which fulfill the same functions. Otherwise, it would be sufficient to define the reference flow only. Please add: **The objective of the functional unit is to allow informed comparisons between different products which fulfill the same functions. If, in comparative studies any differences in the functions of the products to be compared still exist which are not covered by the functional unit, this shall be stated.** • Page 23, general: The examples should address product comparisons, based on the same functional unit, in order to be more illustrative. ***Hand drying*** For the service of drying hands, a number of options **of drying systems** are possible. The selected functional unit for a study may be expressed in terms of ~~*the identical number of 1000 pairs of hands dried for the systems studied*~~. For each **drying** system, it is possible to determine the reference flow, e.g. the average number of paper towels **or the amount of electricity of hot air hand-dryer required for ~~one~~ 1000 hand-dryings**. **The reference flows of both product systems to be compared are now related to the same reference flow. However, there might still be functional differences between the systems to be compared, e. g. the time required for one hand-drying, which is typically higher for the hot air system**. ~~. It is also possible to compile an inventory of inputs and outputs on the basis of the reference flows and calculate the associated GHG inventory. At its simplest level, in the case of paper towel, this would be related to the paper consumed. The required elements to be included in the functional unit description for the paper towel product, for example,~~

	~~could be presented as follows:~~ ~~—The paper towel product shall be of sufficient quantity to provide 1,000 individual hand-dryings following washing w ith water 12~~ ~~—Each hand-drying requires 2 — sheets‖ of X x X‖ size of X lb quality; therefore the reference flow is 2,000 sheets 14~~ ~~—The goal of this study is to establish the GHG inventory of typical hand towels under common 15 usage conditions. 16~~ • Page 23, line 26: Also in this example, the comparative aspect should be addressed. Please write: …could be 300 light bulbs **of type A or 200 light bulbs of type B** • P26; End-of life stage: Need to account for both internally recycled materials as well as materials externally sourced for recycling.
6. Boundary Setting	• Title: This chapter mainly deals with the modeling of the life cycle of a product as a product system. Please write "**Modeling of the product system and boundary setting"** • 6.1, first paragraph, first sentence: modeling of product system should be addressed here; "bounds for data collection" is not clear; . Please write**: Modeling the life cycle of a product as a product system and defining the system boundar**y is an important step in performing a roduct inventory, as it defines the **processes for which data should be collected**. • Page 24, line 10: Mapping as a flow chart is only one option how to model a product life cycle as a product system. Alternatively the relevant foreground and background processes could be listed, together with their starting points and their end points. Please write "An organization shall **model** the ….disposal **as a product system.** • Page 24, line 21: A partial inventory is not only cradle-to-gate, it could also be gate-to gate or include downstream processes. Please write (**e. g**. cradle-to-gate) • P 24 line 21: Many LCAs have been done historically as cradle to gate (partial) despite the end-of-life phase being known. Will the proposed standard set out requirements to review such LCAs and make them cradle to grave? • Page 24, line 22: There is no need to exclude end-of-life recycling from a partial inventory. If a company has the necessary information about the end-of-life operations of a product but not the necessary data about the use stage, it might send a partial inventory which only excludes the use stage to the retailer, who may include the data about the use stage, in order to get the complete inventory. Typically the producer has a better access to the end-of-life industry than the retailer. Please write "End-of-life recycling shall not be included in a **cradle-to-gate inventory"** • Page 24, line 23: Best estimates of a product life time, i. e. the duration of the use stage, are always possible. Please delete the last sentence of this paragraph. However, it is not clear how to deal with the duration of methane emissions by specific products in a landfill. This can happen many years after the end-of-life of a product. • Chapter 6.2: Significance test of overhead functions is not addressed here. • Page 25, line 11: Secondary material is not defined. Please use the term "recycled material" • P 25 line 30 Support inclusion of transport phases whether within

	operation or from operation to marketplace. Products are shipped around the world sometimes just to get them to the next production phase. This next phase may have been possible closer to initial process point perhaps eliminating some long transport lines. How is it planned not to disadvantage those economies (involved with considerable sea mile tonnages) that are export based compared to those that produce and use domestically (with short product miles)? Are long sea miles to be shared? • Page 26, line 3: The production stage does not start with the (ready-to-assemble) components but rather with the processed raw material which is used for the product and its components. Please write: The production process starts with the **processed raw material as needed for the product and/or its components** and ends… • Page 26, line 12: This bullet is confusing, because catalysts and ancillary materials are inputs of the specific foreground processes as mentioned in the other bullets. If e. g. a lubricant is an ancillary material for a rolling process, then we would not name this process "use of lubricant" but rather "rolling". Please delete this bullet. • Page 26, line 22 – 30: The list of foreground processes is much too detailed and does not reflect realty. Please write instead: - **Storage in the warehouse of the distributor;** - **Packaging and transport to the retailor** - **Storage in the warehouse of the retailor** - **Selling to the customer** **If several distributors are involved, the relevant transport and storage processes should be kept separate.** • Page 26. Line 34: please write: … does not **require** energy or **generate** emissions … • Page 26, line 45: We should not introduce the term "stage boundary". Please delete "boundary" • P26; End-of life stage: Need to account for both internally recycled materials as well as materials externally sourced for recycling. • Page 27, line 16: Please write: …to store carbon and to release it into the atmosphere. • Page 27, line 35: The definition should be more general: Please write: …refers to the **direct** conversion **of one land use category into another** • Page 27, line 49: Please write: …what the use **stage** and the end-of-life **stage** of that product… • P 27 Land Use and Change: Land is not only used for crop/biomass production. 'Chemicals" such as minerals and metals also result from changed land use and even solar panels and wind-farms can be considered a changed land use. think there should be a better discussion on other land-use changes than the focus on crop production • Page 28, line 17-19: In the same way as a company gets process data for the upstream processes, it can also get process data from the end-of life processes related to the product under study. Please delete the sentence line 17-19 and write instead after line 25: **Organizations shall define the foreground processes of the end-of-life stage of the product system under study, by direct contact with the companies involved or the relevant industrial associations, as appropriate, as a basis of the subsequent data collection. If not otherwise justified, the processes according to the state-of-the art shall be considered**. **Additional guidance for**

	recycling processes is given in Chapter 8. • Page 28, 6.3.3, last sentence: A best estimate of a life time should always be possible. Please delete the last sentence! • P 28: Intermediate products: Metals are mentioned as intermediates. When would moving beyond a cradle to gate LCA to cradle to grave be justified for intermediate metals products? • Page 29, line 1-3: There is no need to exclude end-of-life recycling from a partial inventory. If a company has the necessary information about the end-of-life operations of a product but not the necessary data about the use stage, it might send a partial inventory which only excludes the use stage to the retailer, who may include the data about the use stage, in order to get the complete inventory. Typically the producer has a better access to the end-of-life industry than the retailer. Please write after the first sentence, **However, it might be appropriate to add information about the end-of-life stage of the product in order to facilitate the finalization of a life cycle based inventory**. • Page 29, line 28/29: Cradle to gate is not a life cycle. Please write: …all GHG emissions from raw material acquisition up through the point of sale to the customer, … • Page 29, line 36/37 A life cycle is always complete. Please write: …all GHG emissions from raw material acquisition through end-of-life operations. • Page 29, line 38: Please write "full inventory" instead of Cradle-to-gate inventory" • Figure 6.3, blue box: please write "raw material acquisition and production of semi-finished products • Figure 6.3, yellow box: oil and lubricants are ancillary materials and no product components, please delete. Please write "semi-finished products" instead of "product components" • Figure 6.3, green boxes: Difference between car manufacturing and car assembly is not clear. Please write "Processing of Product Components" instead of "Car Manufacturing" • Figure 6.3, end-of-life boxes Car dismantling and shredding/sorting is followed by recycling operations: Please write Car Dismantling*, Shredding **and Sorting*** and Disposal and *Recycling ~~of parts~~ is not included in this simplified example • Page 33, line 19: The scope 3 standard uses the term "capital equipment". Please use this term here, as well. Please align the procedure how to treat capital to the procedure as proposed in the Scope 3 standard. • Page 33, line 23: Please write …allocated to **the product under study**… • P 33-34" Background processes: Minerals/metals sector likely to be different to other sectors regarding significance to GWP of these activities – more likely minor. 6.3.3. Temporal boundaries • This chapter needs more consideration about LCA – and temporal? landfills?
7. Collecting Data	• Page 36, step 3: The screening process should also allow to group different processes of minor importance together, e. g. all internal transport processes within a plant. Please add: **Based on the results of the screening, different emission sources of minor importance, e. g. all transports within a plant, may be grouped**

	together. • Box 7.1, after first paragraph: Care is needed not to invite for burden shifting: Please add: **However, it has to be made sure that no burden shifting occurs to subsequent stages of the life cycle, e. g. the use stage or the end-of-life stage.** • P 37 line 11: Measured site data (primary) for emissions should be stated as the clearly preferred approach compared to all other data whether extrapolated, estimated or proxy. All non-measured data should be referenced. All data needs to be traceable so that where an emission has been reduced the associated LCA can be updated, Otherwise LCAs are soon not relevant or useful. • P 38: line 36: Need to differentiate between internal estimated data and externally estimated data. Externally sourced emission estimated factors may rely on non-relevant factors to the site in question because of different conditions. • P 39 Collecting Secondary Data line 11: The questions here refer to LCI data (emission data) and not LCIA data (impact data). Aside form the 9 questions posed in Box 7-2 for LCI data, life cycle software providers must be able to reference the sources of all data including , the ranges of sources of their scientific literature on which the impact assessments rest • P40 Box 8-3: line 13: Associating a monetary value directly to an emission again leaves behind the impact of the emission. Suggest the association should be with the derived impact not with the emission release number to be meaningful • Page 43, first chapter: Before working with end-of-life scenarios, the company should determine average recovery rates and other end-of-life data by contacting the relevant companies involved in end-of-life operations or their industrial associations. Please add after line 4: **However, before calculating different scenarios as a sensitivity analysis, the company should try to identify the best available data related to the end-of-life operations of the product under study, including recovery rates from collecting, dismantling, shredding, sorting and remelting operations, as applicable**. • Page 44, line 3: There is an increasing tendency to recover material, mainly metals from incineration ash. This should be considered in the standard, as well. Please write: …incineration without energy recovery **and incineration with metal recovery from the incineration ash.** • Page 44, line 35: Please add a new bullet: - **Incineration with metal recovery** ○ **Percentage of metal recycled after incineration** • Box 7-4, proposal for further development: It should be stated that it is common practice to determine the emissions of specific components of a complex product just by selection of specific components without an initial hot spot analysis. This means that the component, e. g. the door of a house or the body-in-white of a car, is considered as a final product and the emissions of the use stage of the complex product have to be allocated to the component under study. In this case, the original equipment manufacturer (OEM) can be considered as a customer who decides between different options of components. Such decision should not be based on cradle-to-gate information but based on the full life cycle. • Complex products: Here something should be mentioned about other issues: problem to look only at GHG, other steps may be much more

	significant for other issues?
8. Allocation	• P 40 Text misplaced?? Box 8-3 appears on P 40 after Box 7-2 yet Section 8 Allocation commences on P 47??? • Move P 47 – 58 to match up misplaced text ? • P 41: Suggest that identified data gaps need to be prioritized before being filled, preferably with primary or measured data. This is more robust than seeking to fill all gaps through non-measured data. • P42: line 50: End of life may also be a significant GHG credit point for a product where it is recycled and not disposed of. • P 44 line14: Landfill: The logistics of recycling also needs to be considered. Rubber at a remote mine site could be land filled, burned or returned to a recycling centre at a large population centre. Energy expended in recycling in such cases will be large compared to city-based recycling of light vehicle tyres. • P44: line 38: Minerals and metals often have complex and broad supply and customer spreads e.g., a metals smelter can have many feedstock ores and many customers. In these cases a sector approach, based on "averages" rather than a company approach based on a specific value chain may be preferred. A focus on known value chain emission hot spots (Box 7-4) may be one practical way ahead in complex value chains. • P47 Allocation; Yes, allocation is required for multi input and output processes covering subject products and co-products. Need to account here not only for materials sourced from the subject system (internal) and also outside the system (external). Allocation of transport impacts between those in the value chain also needs to be completed especially where large sea miles are involved. • Page 49, line 7: The common process in the case of recycling and reuse should be specified more clearly, according to ISO 14044: Please add after the first sentence: **In the case of recycling, the virgin material extraction and processing is the common process to be shared between the product under study and the subsequent products for which the recycled material is used**. The following sentences can be deleted. • Figure 8-3.: This figure is not necessary here , as it occurs, slightly modified again as Figure 8-5. Please delete! • Table 8.1 and the text under page 51, line 17 are saying the same with different words. Please delete table 8-1 and insert the following text below line 17: When addressing common processes, users should avoid allocation, i. e. partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems. Under special circumstnces, this can be done by - *Process Subdivision*: Dividing the common process into sub-processes in order to eliminate the need for allocation. - *System Expansion*: Inclusion of the functions of the co-products in the functional unit When allocation cannot be avoided, preference should be given for sharing the common process by a factor based on natural science. This can be done by - *the determination of a physical allocation factor*: Partioning the emissions of the common process between the different product systems based on an underlying physical relationship between them. This is relevant if the quantity of the co-products can be varied

	independently - *substitution*: Estimate the emissions of the co-product by determining the emissions from an alternative product that comprises the same functional unit as the co-product. Charge the whole amount of emissions to the product under study, but subtract the emissions of the co-product (substitution credits) This is relevant if it can be shown that the substitution of this alternative product by the co-product is a reality and not one of different possible scenarios. If allocation based on natural science is not possible, then allocation should be based on other scientific approaches, international conventions or market information. - *market value allocation*: Partioning the emissions of the common process between the different product systems based on the market value of each product at the exit of the process. Value choices or the selection of arbitrary factors are the least preferred basis for allocation decisions which should only be applied if the options mentioned above are not possible or feasible. - *value choice/arbitrary*: Use of allocation factors (e.g., mass, energy, volume, etc.) based on value choice or arbitrary factors, e. g. 50%:50% Figure 8-4, boxes dealing with market value allocation: Please write in the left box: **Are market prices of the co-products available, based on a free market?** And in the right box: **Are the relationships between the market prices of the co-products sufficiently stable?** Page56, line 4: The copper-gold example should rater be formulated as an example of economic allocation. An example for arbitrary allocation is not necessary. The example can be formulated as follows: A copper smelter produces metallic copper, gold, silver, nickel and sulphuric acid from sulphide ore which contains, besides copper, traces of those other metals. Sulphuric acid is a by-product in the roasting process, whereas gold, silver and nickel follow the process and are recovered during the electrolytic refining process. The company wants to determine the cradle-to-gate environmental burdens for each of these co-products separately. This first part of the allocation problem only deals with the main product, the metals fraction leaving the roasting process and the sulphuric acid as a by-product. As a first step, it has to be made sure that the roasting process and the electrolytic refining process are treated as separate processes, because the electrolytic refining process is only a common process for the different metals, but not for the sulphuric acid. Only the roasting process and the relevant upstream processes are to be shared between the sulphuric acid and the metal fraction. Allocation cannot be avoided by further process subdivision, as all by-products are output of the same unit process. A system expansion which included all the different co-products in one system is not possible, either. The determination of a physical allocation factor is not possible, because the quantities of the co-products cannot be varied independently. The use of the substitution method for the metals/sulphuric acid allocation problem would mean that an average data set “production of sulphuric acid” should be taken from a data provider and subtracted from the data of the common process. This is not appropriate, because the copper smelter wants to report own data on sulphuric acid and not global averages. Therefore, it is recommended to solve the allocation problem by economic allocation. This means that the market value of the metal

	fraction and the sulphuric acid, when leaving the roasting process, have to be determined. This can be done by determining the market price of these products and subtracting the costs downstream the roasting process from the market price. If under these circumstances the market value of the sulphuric acid is zero, then all environmental burdens have to be allocated to the metal fraction. However, the environmental burdens downstream processes which are specific for the sulphuric acid, e. g. transport and packaging, have to be added. The same considerations apply when it comes to the task to solve the second part of the allocation problem of which leads to the copper, gold, silver and nickel fractions which are output of the metal refining process. In this case, the environmental burdens of all upstream processes, including the electrolytic refining process, have to shared. Again, the same considerations as for the sulphuric acid allocation problem apply. It is recommended to apply economic allocation, i.e. to determine the market value of the different metals and share the upstream processes accordingly. The market prices of gold, nickel and silver should be determined in relation to copper as averages during one year. Typically, these relative values are fluctuating less than the absolute market prices. • P 51: line 20: Process subdivision: Shipping or transport impacts seem to be omitted and would be best shared equally between supplier and customer as their processes would be linked but distinct. Suggest revise Figure 8-4. Allocation of shipping impacts from exported bulk commodities down value chains should be shared between sequentially-located stakeholders. • Page 56, line 32. This sentence I not clear. Please rewrite: A closed-loop recycling system **occurs where a material A which occurs as fabrication scrap or end-of-life scrap from a product B is recycled into the same type of product, e. g. the scrap of an aluminium can to be recycled into another aluminium can.** • Page 56, line 47: Please write “100 kg of **primary** material” instead of “100 kg of raw material” • Page 56, line 54: recycling rates are well-established figures which can be obtained by the recycling industry or industrial associations. They are fact-based values and not assumed values. Please write: - **The recycling rate has been determined** • Page 56, after line 54: It should be made clear that a company which purchases recycled material with the same inherent properties as primary material has to carry the take into account the emissions of the primary production. Please add a sentence: **This means that a company which purchases recycled material with the same inherent properties as primary material is charged with the emissions of the primary production of that material** • Figure 8-4: The end-of-life stage consists of shredding, sorting and separation processes where waste for disposal and materials for recycling are involved. The recycled material processing starts when the different recycled material fractions are separated from each other and from the waste fractions. Please add a box “*shredding, sorting and separation*” after “*Production, distribution and use*”. From this box two boxes “*final disposal*” and “*Recycled material processing*” should leave.

	• Page 57, after page 21: The ISO rules how to deal with open-loop recycling should be formulated more clearly. Please add: In open-loop recycling, the common processes, i.e. the production of the raw material from natural resources and its final disposal, has to be shared between the product system under study and the subsequent product systems which use the recycled material. According to ISO 14044, three options are offered — physical properties (e.g. mass); — economic value (e.g. market value of the scrap material or recycled material in relation to market value of primary material); or — the number of subsequent uses of the recycled material The first option, allocation based on physical properties, needs justification, because a physical relationship between the product system under study and the (usually unknown) subsequent product system is not evident. If the first option cannot be justified, then an allocation factor according to the second or the third should be identified. The second option can be used, if global market price relations between recycled materials and primary materials exist. If the recycled material has the same market value as primary material, then the allocation factor is 1,0, even if the inherent properties differ from those of the primary material. If the recycled material is given away free of charge, then the allocation factor is zero. (Please add text of line 25 – 30 here, without opening a new chapter 8.3.4) • P 57 Recycling: Metals recycling may occur many times since a metal cannot be destroyed but rather dispersed to limit recycling rates. Repeated recycling brings with it allocation issues because of complexity so that a sectoral approach may be required. • P 58 Line 6; Suggest that metals recycling be included here in 8.3.5 as an example.
9. Assessing Data Quality and Uncertainty	• P 59 line 4: Declaring the per cent of data derived from different quantification methods and methods described here for data quality assessment are requirements that are supported. • P 60 line 8: It will be important that methods used for measurement of GHG emissions are scientifically sound and referenced. Technical soundness of measurements is important before data is assessed for technological, temporal, geographic representativeness etc. Where data used is not measured data the sources of the data should be referenced to ensure traceability and therefore review. • P 66 line 2: Uncertainty can be partly addressed by ensuring all measurement methods and sources of estimated data are referenced and subject to review..
10. Calculating GHG Emissions	• P 66 line 6: GWP is an impact term (LCIA) not an emission term (LCI) and is reported as CO2 kg / functional unit equivalents. . Should section 10 be retitled as 'Calculating GHG Impacts " if the intent is that emissions data is converted into impacts data? • Page 68, line 36 : The term "reference flow" has been introduced in chapter 5 tor this concept. Please write ...converted to a consistent

	reference flow • Page 68, after line 43. It is a pity that, for some reasons, the widely used term "carbon footprint" see e. g. ISO 14067, is not used in this standard. However, a link to this term should appear in this document. Please write: **The total GHG emissions of a product system, i. e. cradle to grave, is often termed "Carbon Footprint of the product (CFP)"**
11. Assurance	•
12. Reporting	• P 83 Table 12-1: under Study Results: The unit described for Total GHG Inventory (LCI) is gram base unit CO2e per function unit. **This is not an Inventory unit (as this would be tonnes of CO2 or kg). It is instead a unit of Impact (LCIA) ie, GWP or Global Warming Potential. LCI numbers do not equate to LCIA numbers because LCIA takes into account the scientifically-established properties of each GHG gas in the atmosphere for global warming potential. LCI is only the mass of the gas emitted.** • P 84 Table 12-2: Also confuses an emission number as an impact. • P 87 Table 12-3: Audiences of a publicly disclosed GHG Inventory Report need to understand whether the report reflects emission masses (LCI) or in fact emission impacts (LCIA), LCIA reflects the behavior/ impacts of the mass of emission based on objective science. • P 91 Summary Table: Total GHG Inventory results should be in mass of CO2 or other GHG gas. The unit kg CO2 equivalent / functional unit is a impact unit not an emission unit. • P 92 Use of results: Again, it is wrongly inferred that the unit kg CO2e/fu is an emission number.
Appendix A: Data Management Plan	• All about emissions data i.e., masses (LCI) and not impacts data (LCIA) or CO2e/fu.
Appendix B: Additional Guidance on Collecting and Calculating Data	• Need to consider land use for renewable energy collection, production and use.
Appendix E: Glossary	• Please include the following term and definition: ***supply chain*****:** Organizations involved, through upstream and downstream linkages, in processes and activities delivering value in the form of products to the user • The term "activity data" is widely used and should be defined here. • ***Avoided burden***: This term is introduced in a footnote on page 52 but not used in the text. Please delete from the glossary. • ***Calculated data***: This definition is confusing. Please delete or improve. • ***Cradle-to-grave assessment***: The life cycle of a product always ends with final disposal. Please delete: …~~or end use by the end consumer~~ • ***Estimated data:*** This definition is misleading. No special definition needed, use common language. Please delete. • ***Final product:*** Please simplify**: Products that enter the use stage without further transformation** • ***Measured data***: This definition would mean that the measured electricity consumption of a process would not be a measured data. Is this intended? • ***product system*****:** Please write: **system of processes which**

	<u>models the life cycle of a product</u> • ***Production stage:*** The production stage does not only include the assembling of pre-fabricated components. It always starts with processed raw material. Please replace "~~product components~~" by **<u>processed raw materials</u>** • P 108 Glossary: Definition of product level inventory given here is "Compilation and evaluation of inputs, outputs and potential GHG impacts of a product system throughout its life cycle". This is incorrect as inventory compilation does not involve evaluation of impacts (see ISO .14040) ISO 14040 confIrms as LCA as a 4 step process, with LC impact assessment (LCIA) following inventory collation (LCI). Section 5.2.1 states that "Inventory analysis involves data collection and calculation procedure to quantify relevant input and outputs of a product system". Section 5.3: states that "The impact assessment phase of LCA is aimed at evaluation of the significance of potential environmental impacts using the results of the life cycle inventory. This process involves associating inventory data with specific environmental impacts and attempting to understand those impacts".
Any other general comments or feedback	• Please resolve the apparent confusion in the draft between inventory (or emissions) collation and impact assessment. The two are not the same with the former about emissions masses and the latter about a scientific evaluation of the impacts of the emissions.