Expert Review Comments on the IPCC WGIII AR5 First Order Draft – Annex II

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9919	AnnexII	0				There is no conversion between ppm and GtC. Sometimes people are confused about the relationship between them.	The reason for this comment could not be located as there is no conversion between GtC and ppm inlcuded in Annex II.
9920	AnnexII	0				Distinguish the difference between CO2 and CO2equivalent. For example, how much Co2 equivalent is corresponding to 450ppm CO2.	The discussion between different GHG metrics will be taken care of in chapters 3 and 6 of the report. Currently it is not planned to include additional material intothis annex.
7649	AnnexII	10	24	10	26	There was a recent Special Issue in ESR on "CF and IO", see Wiedmann, T. (2009) Carbon Footprint and Input-Output Analysis - An Introduction. Economic Systems Research, 21(3), 175-186. http://dx.doi.org/10.1080/09535310903541256. This article provides a good overview of examples for applications: Minx, J. C., Wiedmann, T., Wood, R., Peters, G. P., Lenzen, M., Owen, A., Scott, K., Barrett, J., Hubacek, K., Baiocchi, G., Paul, A., Dawkins, E., Briggs, J., Guan, D., Suh, S. and Ackerman, F. (2009) Input-output analysis and carbon footprinting: An overview of applications. Economic Systems Research, 21(3), 187-216. http://dx.doi.org/10.1080/09535310903541298.	A reference to Minx et al. was included. We prefer to focus on peer reviewed publications.
10939	AnnexII	10	31			A relevant reference over several scales is Peters, G.P., 2010. Carbon footprints and embodied carbon at multiple scales. Current Opinion on Environmental Sustainability 2, 245-250.	included
10940	AnnexII	10	36			Footnote 3: There is no methodological reason not to include LUC, it is lack of our ability as analysts. In principle, LUC should be included. I think you should state something to that effect.	The footnote has been modified to say "more data work is needed to address GHG emissions related to land-use change "
7650	AnnexII	10	37	10	37	The current state of the art in MRIO modelling is summarised in: Wiedmann, T., Wilting, H. C., Lenzen, M., Lutter, S. and Palm, V. (2011) Quo Vadis MRIO? Methodological, data and institutional requirements for multi-region input-output analysis. Ecological Economics, 70(11), 1937-1945. http://dx.doi.org/10.1016/j.ecolecon.2011.06.014.	included
6381	AnnexII	10	7		8	The comparator "broader" requires indicating what these traditions are broader than.	Revised
10943	AnnexII	11	14			Perhaps a reference on these points, e.g., Lenzen M, Kanemoto K, Moran D and Geschke A, Mapping the structure of the world economy, Environmental Science & Technology	included
10944	AnnexII	11	34	11	40	LCA global warming impact category only considers long lived GHG and uses a GWP100. Both of these have been citritiqued in the climate literature. This article discusses some alternatives, and it is worth pointing to somehitng like this Peters, G.P., Aamaas, B., T. Lund, M., Solli, C., Fuglestvedt, J.S., 2011. Alternative “Global Warming” Metrics in Life Cycle Assessment: A Case Study with Existing Transportation Data. Environ Sci Technol 45, 8633-8641.	Following sentence has been added: "LCA traditionally focuses only on GHG emissions, often evaluated over a 100 year time horizon. Radiation-based climate metrics (Peters, Aamaas, et al. 2011) and geophysical effects such as albedo changes or indirect climate effects (Bright, Cherubini, and Strømman 2012) have only recently been addressed."

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6382	AnnexII	11	37		38	LCAs do not "provide an estimate of the technical emissions reductions offered by these technologies", though (attributional) LCA results are certainly used this way. Attributional LCA merely counts emissions in a production-use-disposal chain and assigns these to the end product, relying on a range of methods and data that can produce substantially different results. Any reduction results from displacement effects outside the supply chain, about which attributional LCA is ignorant: displacement is simply assumed to occur on a 1:1 functional unit basis.	The sentence has been modified and now reads: "LCA is thus used to provide an estimate for the technical emissions reductions offered by these technologies. "
6390	AnnexII	11	44			Given the substantial parametric and epistemic uncertainty in many LCAs, how is can a reliable 'upper bound' be produced? The subsequent sentence acknowledges the possibly large cutoff error, which (in conjunction with the many other limitations of LCA) suggests that no value produced by an LCA can reliably define an upper bound fo anything.	The reviewer here seems to misinterpret the sentence. The "upper bound" refers to the maximum potential reduciton of emissions due to the introduction of the technology. It is thereby acknowledged that emission reduction may actually be lower given the part of the life cycle omitted due to system boundary issues. Uncertainties in LCA are acknowledged through the use of the word "estimate" and in the subsequent paragraph.
10941	AnnexII	11	6	11	7	Are some refereences missing from here?	A reference has been added
10942	AnnexII	11	9			I have not read the article, but this seems to be an exception to the rule http://onlinelibrary.wiley.com/doi/10.1111/j.1530-9290.2012.00518.x/abstract	Yes, this is a proposal for a marginal rate. Not yet well-established. We have included a sentence here with reference to his paper.
7651	AnnexII	11				Some developments in LCA are also summarised in: Finnveden, G., Hauschild, M. Z., Ekvall, T., Guinée, J., Heijungs, R., Hellweg, S., Koehler, A., Pennington, D. and Suh, S. (2009) Recent developments in Life Cycle Assessment. Journal of Environmental Management, 91(1), 1-21. http://dx.doi.org/10.1016/j.jenvman.2009.06.018.	included
6383	AnnexII	12	1		2	The improved "accuracy" of hybrid LCAs is assumed, but cannot be demonstrated. First of all, accurate for what? Estimating an inventory or estimating GHG reductions? For the prior, perhaps, but not for the latter, since neither method addresses marginal effects. A better wording would be "hybrid LCA can be used to generate a more complete inventory" -- but accuracy is another matter.	The statement has been modified to: "Through their better coverage of the entire product system, hybrid LCAs tend to more accurately represent all inputs to production (Majeau-Bettez, Strømman, and Hertwich 2011)."

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6384	AnnexII	12	15		21	This section is quite dismissive of consequential LCA (CLCA) and implies more accuracy and utility than attributional LCA (ALCA) can deliver. ALCA cannot answer the primary question the Mitigation chapter must ask, which is "Does strategy X mitigate unwanted climate change, and if so, by how much?" This question requires comparison to a baseline and consideration of marginal change, which consequential LCA attempts to do. The difficulty of implementing CLCA does not suggest using instead a method we know does not answer the question. Where ALCA offers false precision with a Type III error (measuring the wrong thing), CLCA offers uncertainty around the correct conceptual answer, which is an appropriate representation of our limited understanding of the actual benefits of some proposed mitigation strategies. Moreover, the "established methods" of ALCA include a variety of approaches to handle co-products that are mostly not representative of environmentally outcomes -- because this cannot be determined in a static analysis -- and which can produce very different results. "Established" doesn't mean correct or accurate. CLCA is presented here as a mere "proposal", yet the US EPA relied on this approach to implement the US Renewable Fuel Standard, and there is a rapidly increasing number of consequential LCAs in the literature.	The section has been amended. A reference has been inserted to a recently published review paper on consequential LCA by some of the method developers, which confirms the statement that CLCA is not yet mature. Note that not all consequential LCAs are about marginal changes and that the role of scenarios in CLCA is increasingly acknowledged by developers of that method, also in the cited review paper. Scenarios are taken up in the subsequent paragraph.
10945	AnnexII	12	2			"real emissions"? What are they? How do you know? Do you have a reference for this?	See response to review comment 6383
10946	AnnexII	12	2			A reference for the cut off issues would be good. Lenzen, JIE?	Several references have been added, including the ones suggested.
6385	AnnexII	12	27		28	ALCA does not "show how much impacts per unit are likely to change as part of the scenario" unless marginal effects are approximated by average effects throughout the product system, and there are no price effects. This section oversells LCA and attributional LCA in particular. Offering policy makers false precision is not helpful.	Scenario-based assessments are precisely attempting to do this. Whether they are called attributional or consequential is a question of preference of the analyst.
6392	AnnexII	12	27		28	This paragraph seems to imply that examining scenarios makes attributional LCA useful for estimating mitigation capacity. In my view, this is probably incorrect, though what exactly is meant by "scenarios" here is left unsaid. The fundamental issue is that ALCA isn't designed to estimate change.	Please note that references have been added to relevant work.
6391	AnnexII	12	3		14	This section soft-pedals the limitations of LCA, making is sound as though the method is fundamentally accurate, but "some" LCAs are less useful. The example presented about biofuels and animal feed seems incorrect in several ways: (i) it is indeed possible in principle for the implementation of a bioenergy system to result in negative emissions relative to a baseline, (ii) systems that show negative emissions tend NOT to be the ones that produce fodder, but cellulosic ethanol systems that assume high soil C sequestration and displacement of fossil-based electricity by excess electricity co-produced by burning lignin, plus 1:1 replacement of gasoline. (Mind you, all of these assumptions are arguable), (iii) the statement about being more appropriate for a corporate context than for assessment of large-scale transitions is generally true for all attributional LCAs because these assume no scale effects or market effects, nor do they descibe change from a baseline.	The paragraph has been deleted and replaced. It is made clear that most LCAs assess products, not decisions. Market effects are hence less relevant. To what degree market effects should be addressed in LCA is controversial.

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6386	AnnexII	12	37		41	This section should also address the macro-economic effects of changing supply and demand. If a bioenergy policy reduces global demand for petroleum, price will decline and more petroleum will be used than in the baseline. Put another way, the biofuel doesn't displace its energy equivalent in petroleum, although this is usually assumed in attributional LCA (and the interpretation thereof). This is critically important, as the purpose of this section is to provide information to policymakers about the efficacy of alternative mitigation strategies. Should we really promote so vigorously a method that ignores economics and almost certainly overestimates GHG reduction benefits, including getting the sign wrong in some cases? We need to be more up-front about these limitations and not describe them so glancingly as is done generally in this section. How about saying clearly that ALCA can get the sign wrong (relative to the question noted above), owing to many exclusions and simplifications, and methodological ambiguity?	This section is not specifically about biofuels. Please note that LCA as a research method is not useful to investigate the question of what happens if petroleum is not used for one purpose; if it will be used for another purpose or stay in the ground. In most mitigation scenarios examined in Ch.6, all conventional oil will be produced and burned independent of the amount of energy efficiency or low-C fuels introduced. So this would be an argument that no mitigation measure reduces oil demand. The question examined by LCA is whether a specific product system requires more or less GHG emissions, land use, other emissions or resource use. Different methods are required to answer the question of substitution. Contrary to the above suggestion of overselling LCA, this paragraph clearly indicates the limitations of LCA.
10947	AnnexII	12	6			A reference to your example is needed. This critique should be mentioned in the appropriate place in the WGIII report.	The section has been replaced so the comment no longer applies.
7652	AnnexII	12				The most recent review on MFA is: Fischer-Kowalski, M., Krausmann, F., Giljum, S., Lutter, S., Mayer, A., Bringezu, S., Moriguchi, Y., Schütz, H., Schandl, H. and Weisz, H. (2011) Methodology and Indicators of Economy-wide Material Flow Accounting. Journal of Industrial Ecology, 15(6), 855-876. http://dx.doi.org/10.1111/j.1530-9290.2011.00366.x.	include
8529	AnnexII	25	15	25	16	Any activity to enhance the sinks of GHGs from the atmosphere should be considered as geo-engineering of CDR type	Could not be located - this document only has 21 pages.
8530	AnnexII	27	10	27	10	The unit must be not “nanometers” but “micrometers”	Could not be located - this document only has 21 pages.
18461	AnnexII	3	13			Though a minor detail - in section A.II.1.3 (Monetary Unit Conversion), the USD2010 is presented with the 2010 in subscript. Will that be the standard, or rather the USD2010 in full size presented in this table?	For consistency with the IPCC SRREN, the variant with subscript will be used in future drafts.
7503	AnnexII	5	30	5	30	Bioethanol. Also need a definition for Biomethanol, gengas, and producer gas.	This comment relates to the glossary (Annex I).
7504	AnnexII	5	39	5	42	Second-generation biofuel. Second-generation biofuel uses non-traditional biochemical and thermochemical conversion processes and feedstock mostly derived from the lignocellulosic fractions of, for example, agricultural and forestry residues, municipal solid waste, etc. The production of methanol (wood alcohol) has been undertaken for centuries. It was the first building block for the organic chemical industry. So it is not a new process. Nor is the production of producer gas/water gas (gengas) a new process.	This comment relates to the glossary (Annex I).

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18462	AnnexII	5				Recognizing that there is an ongoing disucssion on how to compare costs across sector chapters, it is clear that the discussion in this section focuses on energy thus far. Once an agreement has been made, will methodologies for the different sectors also appear here? If so, it would be very useful to clarify which methods are applied in which chapters, and also perhaps to include a brief discussion of the challenges of comparability in this section.	In the process of preparing the SOD, additional cost metrics including levelized costs of conserved energy (LCCE) and macro-economic mitigation costs have been added. The plan is as a next step to also include a discussion of levelized costs of conserved carbon (LCCC) or unit mitigaiton as it is often called if this metric turns out to be useful for comapring costs across several chapters. Once this set is finalized, an introductory text will highlight the challenges of comparability of different cost metrics.
7505	AnnexII	6	11	6	14	“The International Energy Agency (World Energy Outlook 2010) defines traditional biomass as biomass consumption in the residential sector in developing countries that refers to the use of wood, charcoal, agricultural residues and animal dung for cooking and heating. All other biomass use is defined as modern biomass”. This definition is very restrictive and does not make sense. Biomass is used for cooking by the service sector in developing countries and for district heating as well. In developed counties, it is used for household heating and water heating. Industry especially in developing countries, including cottage industries use biomass for heat and stem generation. In my opinion, no distinction should be made between different end uses of biomass. It should all be treated as biomass energy.	This comment relates to the glossary (Annex I).
7506	AnnexII	6	40	6	42	CO2. A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning biomass, of land use changes and of industrial processes. If the biomass is not burnt, it will rot etc. and revert back to CO2! So the way in is turned back to CO2 (the carbon cycle) is irrelevant.	This comment relates to the glossary (Annex I).

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8847	AnnexII	7	1	7	17	While the FOD does state that "there seems to be a clear understanding that LCOE are not intended to be a defintive guide to actual electricity generation investment decisions", Branker et. al (2011) argue that the method "is deceptively straightforward and there is lack of clarity of reporting assumptions, justifications showing understanding of the assumptions and degree of completeness, which produces widely varying results". Branker et al. cite a wide range of LCOEs fo solar from REN21 (2010), Doty et al (2010), Yang (2010), Black and Veatch Corportation (2010), Velosa (2010), REN21 (2008), Bandyopadhyay et al. (2008), Grana(2010), NEB (2006), Walden (2006), and Wiser et al. 2009. [P. Bandyopadhyay, A. Groo, M. Hartley, J. LeBrun, A. Moazed, Renewable Energy for BHP Billiton, University of Michigan, Master's Thesis (2008).] [Black and Veatch Corporation, Renewable Energy Transmission Initiative Phase 2B: Draft Report. Sacramento, CA: RETI Stakeholder Steering Committee, 2010, pp 1-109.] [K . Branker, M. J.M. Pathak, J. M. Pearce, "A Review of Solar Photovoltaic Levelized Cost of Electricity",Renewable & Sustainable Energy Reviews 15, pp.4470-4482 (2011). http://dx.doi.org/10.1016/j.rser.2011.07.104] [G. N. Doty, D. L. McCree, J. M. Doty, F. D. Doty, Deployment Prospects for Proposed Sustainable Energy Alternatives in 2020, ASME Conf. Proc. 2010, 171 (2010), 171-182.] [P. Grana, Demystifying LCOE, RenewableEnergyWorld.com, August 18, 2010,http://www.renewableenergyworld.com/rea/blog/post/2010/08/demystifying-lcoe] [National Energy Board (NEB), Emerging Technologies in Electricity Generation, A Market Assessment Report, March 2006, pp.1-113.] [Renewable Energy Policy network for the 21st century (REN21), Renewables 2007 Global Status Report, Paris, 2008, pp. 1-54] [Renewable Energy Policy Network for the 21st century (REN21), Renewables 2010 Global Status Report, Paris, 2010, pp. 1-80.] [A. Velosa III, What is Inside your LCOE assumptions? SEMI PV Group – The Grid, April 2010, http://www.pvgroup.org/NewsArchive/ctr_036226] [T. Walden, Relative Costs of Electricity Generation Technologies, Canadian Energy Research Institute, for Canadian Nuclear Association, September 2006, pp. 1-8.] [R.Wiser R, G. Barbose, C. Peterman, N. Darghouth, Tracking the Sun – II: Installed costs of PV in the US from 1998–2008, US Department of Energy, Lawrence Livermore Berkley Laboratory, 2009, pp.1-50.] [C. Yang, Reconsidering solar grid parity, Energy Policy 38 (2010) 3270-3273.]	Branker et al. 2011 now is included in the paragraph on the range of LCOE.
8848	AnnexII	7	1	7	17	Darling et al. (2011) suggest that transparency could be improved calculating LCOE as a distribytion, constructed using input pararmeter distributions, rather than a single number. [Darling, S.B., You, F., Veselka, T., Velosa, A., 2011. Assumptions and the levelized cost of energy for photovoltaics. Energy Environ. Sci. 4, 3133–3139.]	Taken into account - citation added.
8849	AnnexII	7	1	7	17	While noting that system and installation costs vary widely, Branker et al (2011) document significant variations in the underlying assumptions that go into calculating LCOE for PV, with many analysts not taking into account recent cost reductions or the technological advancements that means modern panels have a much smaller drop in productivity (now 0.1 to 0.2% annually compared to the 1% used in many cost analyses). [K. Branker, M.J.M Pathak , J.M. Pearce, "A review of photovoltaic levelized cost of electricity", Renenwbale and Sustainable Energy Reviews, Volume 15, Issue 9, December 2011, pp 4470-4482.]	Taken into account - text added.
10938	AnnexII	9				This section is quite useful and relevant. I think it should perhaps appear in Chapter 1?	Chapter 1 does not discuss LCA, carbon footprinting and material flow analysis at present. In any case, the discussion provided in this annex will be far too extensive for the introductory chapter.

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18463	AnnexII	9				This section is a very clear deliniation of methods, but the reader is left wondering how exactly these three methods are applied in the AR5, e.g. to which chapters? Which of these methods can and can not be applied to the different sectors? Is there an integrating element across sectors? Recognizing that this process is still ongoing, it may be too early to include this in the FOD, but it could be a useful direction for the next draft.	We now list the chapters but not sections. We do not give an explanation of what appears where. This sentence can be expanded to a paragraph making this identifications, but for that we would need access to the SOD, as most chapters are over the limit and will probably cut material, so basing this on the FOD is not practical.