INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Special Report on Renewable Energy Sources and Climate Change Mitigation

Government and Expert Review of the Second Order Draft
Jun 21, 2010 – Aug 16, 2010

Chapter 2

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[1] *see <<http://ipcc.ch/pdf/ipcc-principles/ipcc-principles-appendix-a.pdf>>, Section 4.1 and clarification in decision 8 on procedures taken at the 33rd Session of the Panel <<http://www.ipcc.ch/meetings/session33/ipcc_p33_decisions_taken_procedures.pdf>>*

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	(Part 1 of 2 of this comment) The Bioenergy chapter should include the point that logistics (aggregation and transportation) is an important consideration for both the market viability of bioenergy feedstocks as well as finished biofuel products (i.e., ethanol and biodiesel). This appears to be missing from the chapter. Transportation issues - including accessibility, safety, system capacity, etc. are very important considerations for assessing the feasibility of expanded bioenergy markets. For instance, the amount of bioenergy feedstock that can be transported to an electricity generation plant may be limited by how accessible the feedstock is using conventional truck transport. Much discussion is devoted towards the potential for the use of forest residues, ag residues, and other advanced bioenergy feedstocks (i.e., feedstocks beyond corn starch) for bioelectricity and liquid biofuels. However little attention appears to be paid towards whether or not the multimodal transportation systems (highway, rail, waterway and pipeline) are in place to safely and efficiently deliver these feedstocks from their point of origin to the point of processing. On the other end of the supply chain, a number of transport system impediments exist in many nations that would limit the volume of bioenergy resources that could actually be delivered to market. (See next comment for continuation of this thought)	Accepted. Discussion on logistics will be expanded to some extent. However, Chapter 8 is responsible for the integration of the renewable energy sources with the existing and evolving energy systems. It is in that chapter that the discussion of the logistics and multimodal transport are located. There is a well developed case study of ethanol in Brazil with the multimodal system.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	(Part 2 of 2 of this comment - follows previous comment) It is commonly assumed that if affordable bioenergy resources are successfully developed, that the transportation systems necessary would naturally ¿spring up¿ to support the demand for these energy resources. Unfortunately, because existing energy transport infrastructure is geared so much towards conventional petroleum-based fuels, the existing distribution system will require some changes, expansions and adaptations in order to supply significant volumes of biomass-based energy resources and fuels. For instance, rail cars and possibly new rail routes would be needed to meet bioenergy demand. However, rail infrastructure is very capital intensive, and slow to develop. Thus the growth ability of bioenergy is limited by this. This is not to say that critical transport infrastructure would not come online, however market and policy signals must be consistent in order for bioenergy market demand and required transportation infrastructure to grow in concert with each other. (See additional comment for Section 2.3.2)	Accepted. Discussion on logistics will be expanded. However, Chapter 8 is responsible for the integration of the renewable energy sources with the existing and evolving energy systems. It is in that chapter that the discussion of the logistics and multimodal transport are located. There is a well developed case study of ethanol in Brazil with the multimodal system.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	0	-	-	-	-	-	-	As already seen in IPCC SRREN FOD power generation from biomass plays a minor part in IPCC SRREN SOD. Large-scale power plants as currently in operation in Denmark or under development in the UK are not mentioned (only fluidised bed of up to 100 MW with maximum efficiency factors of 40% are dealt with). Chapter 2 Figure 2.4.1 and TS 2.1 list an efficiency for power generation from biomass of 25%.	Accepted. These systems will be highlighted and the cost aspects developed.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	Chapter 2 should highlight that one of the most important issues determining the extent to which bioenergy can contribute to climate mitigation goals is the tradeoff between using land to produce biomass that displaces fossil fuels versus using land to sequester biological carbon. This point is discussed later in the report (section 2.5.3, p. 64), but it is critical to clearly state it upfront--e.g., in the Executive Summary.	Accepted. If space limitation is overcome we will add this aspect already in Section 2.1 Introduction.
Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	Chapter has not gotten yet but needs formatting; examples include p.22, lines 14, 17, 30, 46, etc.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	Chapter needs a thorough English and structure check. While some sections are (very) well written in terms of English and "flow of arguments", others are the opposite. It is clear that different sections have different authors but the level of English and structure should be high for a report of such level - and dissemination.	The final text will be inspected by a professional editor

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Australia (0)	2	0	-	-	-	-	-	-	Chapter Two does not present an overall context for biomass; a more sophisticated presentation would be useful including algae, lignocelluloses, pyrolysis and whole of life cycle emissions of various bioenergy options. Algae, for example presents an area of potential complementarities with fossil-fuel based technologies and an opportunity to utilise waste water and absorb C02. A discussion on co-benefits of the benefits from biomass would be useful - e.g. soil and salinity remediation, dual use of crops. The chapter uses the following terms in discussions on land use change 'iLUC', 'dLUC', '(i) LUC', 'indirect LUC', 'direct LUC' etc. The chapter and entire report should use consistent terminology, and provide a comprehensive description of what these terms mean when they are first raised. There is little discussion in this chapter on 2nd and 3rd biofuels and particularly the relevance of bioenergy to liquid fuels supply. It is also very 'northern hemisphere' focused - examining Australia may provide more data to enable a broader context.	We have limited space to discuss all feedstocks (biomass) and technologies to convert them in energy (biofuels). Thus, we discussed algae but probably not in the depth you would like.. Regarding co-benefits they are included in parts of the text. Regarding terminology it will be unified
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	0	-	-	-	-	-	-	Comments and summary of Chapter 2 seem too general in its message. There are no concrete recommendations of actions for specific regions.	Accepted. We will try to be more conclusive.
Ella Stengler (CEWEP)	2	0	-	-	-	-	-	-	General comment: We consider that in the document the wording "municipal waste" should be used instead of "municipal solid waste". The restriction "solid" is not necessary. In Europe it is common to use the term "municipal waste" and the data gathered by EUROSTAT refer to "municipal waste".	Noted.
Dan McKenney (Great Lakes Forestry Centre)	2	0	-	-	-	-	-	-	I have only been able to give this document a quick review. It was noted the chapter is above the page limit. I think the authors have a challenge on this given the broadness of the topic. They might want to revisit whether each figure and table is necessary for the message(s) they intend. And there may be some redundancies (eg table 2.1.1?; Figure 2.2.2 is a nice map but table 2.2.2 gives the hard numbers). Ultimately I believe it is up to the authors to decide what to cut. Overall I think they do a good job although I believe in the executive summary they could stress the price issue a bit more (eg in the second paragraph of the Executive Summary). If bioenergy is not cost competitive with other energy sources it will not be adopted. This varies considerably around the world. However as economies become more developed they utilize less biomass-based bioenergy. This poses a real challenge. They note the need for carbon taxes/ [prices that could make bioenergy relatively more attractive. I would agree (see the attached paper for a Canadian analysis of purpose grown woody biomass - SSREN_DRAFT2_Review_McKenney_Dan_B&Bpaper_01).	Accepted. Text length will be a major concern. Executive summary will be redrafted
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	0	-	-	-	-	-	-	I personnally think that even if the future technologies are being presented and discussed, biogas and future biogas technologies should have a more prominent part. But since I didnt read the whole chapter on bioenergies maybe it is discussed more detailed elsewhere.	Rejected. Biogas is fully discussed. This will be made more clearly in the new graphics to illustrate what is covered in this chapter. Note that Chapter 8 addresses the integration of renewables with the existing and evolving energy systems. It addresses biogas significantly in its applications for electricity, heating, cooling, and transport. For this reason, this chapter did not elaborate further on these aspects.
Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	I was missing a general introduction to Chapter 2 i.e. a reader's guide on what to expect regarding content, main audience, aim of the chapter, etc. Similarly, some subsections could use introductions (see comments further below).	Section 2.1 was redrafted to include better chapter description. Na u=introduction and a synthesis in each section requires a lot of space. We preferred to include only a synthesis.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Helmut Haberl (Institute of Social Ecology, Vienna)	2	0	-	-	-	-	-	-	In my view, the chapter 2 SOD has been greatly improved over the FOD. However, I still see quite substantial shortcomings in terms of the storyline in particular with reference to the overall message regarding bioenergy potentials. Section 2.2 conducts a careful reviews of possible constraints on global sustainable bioenergy potentials. This is highly appreciated, and in general I find this review largely balanced and up to date(some minor comments below). The conclusion that is then drawn, however, is neither convincing nor very useful. At present the overall message that I got from reading this part is "we can't say how bioenergy can be produced sustainably, but we are more or less sure that the potential is "several hundred EJ/yr". Of course it is difficult to contradict such a message because there is no clear definition of "several". In my reading, the arguments brought forward in section 2.2 would allow a conclusion that, given appropriate policies and technology (dissemination) in agriculture, forestry and food consumption, it seems quite likely that some 100-200 EJ/yr could be produced, and that a technical/sustainable potential might perhaps reach up a bit higher, maybe up to 300 EJ/yr under very favourable circumstances. Technical potentials might be higher, but their environmental and social consequences are highly uncertain. This is contrasted by section 2.8 that is, in my reading, not really in line with section 2.2. It does not use formulation "several hundred EJ/yr", as section 2.2, but instead gives quantitative approximations of bioenergy potentials ("over 400 EJ/yr", also repeated in the Summary for PolicyMakers) in a way that I found to be confusing, instead of convincing.	Thanks for the comment. The information will be made more clear in the chapter and in the TS and SPM supporting the chapter's main messages in a consistent way.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	In the Executive Summary and throughout the report, the blanket assertion that biomass energy achieves 80-90% GHG reductions compared to fossil fuels is unsupported. This estimate appears not to account for land use change, which is a critical component of biomass-related emission, and it also obscures the wide range in GHG performance across biofuels. Any quantitative estimates presented should be clear about the assumptions underlying them (e.g., what fossil fuels are displaced and whether land use emissions are accounted for).	Accepted. We are considering land use changes in the Chapter. Up to Section 2.3 discussion avoids this issue but on Section 2.4 it is fully discussed. Final results about GHGs mitigation of bioenergy includes LUC and iLuc. We will be more clear on that at the Executive Summary.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	It does not appear that Chapter 2 includes a full discussion of Waste-to-Energy biomass opportunities, particular those feedstocks that may be found in co-location with load concentrations (e.g., cites), such as sewage sludge, MSW, agricultural residue, waste wood. And is there extended discussion of the CHP potential of these feedstocks, which can be particularly important as a firm, dispatchable source of RE, with local electricity for microgrids and local thermal energy for heating and cooling districts?	Accepted to a point. However, Chapter 8 is responsible for the integration of the renewable energy sources with the existing and evolving energy systems. They developed the colocation of residues and concentration loads in that chapter for microgrids, local thermal energy for heating and cooling. There was not sufficient space for Chapter 2 to cover these aspects and it would be redundant.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	0	-	-	-	-	-	-	It would be very good to try to establish some links on the interrelations between bioenergy potentials and environmental impacts, in particular GHG emission balance. From new research (see e.g. Searchinger T.D. (2010). Biofuels and the need for additional carbon. Environmental Research Letters, 5, doi:10.1088/1748-9326/5/2/024007. and Melillo et al. 2009 already cited in chapter 2) it is quite clear that GHG emissions per unit of bioenergy depend, among many other things, also on the volume of bioenergy to be produced. The logic is simple: If there are GHG-negative potentials (e.g. high-yielding perennials on degraded land), one might use them first, then one would get to the "zero-carbon" potentials, then one would turn to "low GHG" potentials, and so on, until one reaches the "higher GHG than fossil" potentials (e.g. oil palms on peat land). I.e. one might try to construct a "GHG cost of bioenergy" curve just like the cost supply curves on p 19. I presume that this might give a more conclusive storyline than the one which is now presented in sections 2.2.5 and 2.8.1/2.8.2	Rejected. The idea is quite good and reasonable but IPCC report can't create new studies. On top of that we don't have good quantification of LUC and iLUC effects to all types of biomass. It would be a weak result if we tried to follow the suggestion.
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	0	-	-	-	-	-	-	Just looking at the table of contents of chapter 2 and quickly looking through chapter 2 I think that the TSU and all the authors did amazing work, since the improvements between the zero, first and now second order draft are clearly visible.	Thanks.
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	0	-	-	-	-	-	-	Most of the technologies discussed in the report assume large-scale production of biofuels/bioenergy regarding yields, production processes, production output and potential. It has to be considered that although less in output small-scale production units have their very distinct advantages. Especially if it comes to remote, land-locked areas in developing countries. It is necessary in my opinion to discuss this important matter more clearly.	Rejected. The Bioenergy chapter covers transportation and electricity sectors. Also we have an extensive discussion on traditional bioenergy uses discussing energy use in rural areas. Indeed, the Chapter 2 information is complemented by Chapter 8 which addresses the integration of the bioenergy options with the existing systems and microgrids and land locked systems.

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Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	Most subsections end with a "summary" or "closing remarks". I would suggest to harmonize the wording of these chapters to improve the structure for the reader. Also, please make sure that every subsection has a summary. As far as I see it, e.g. Section 2.3 misses one.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	Referecing is inconsistent in style within text and also in the REFERENCES section. Please check and update.	References will be inspected by a professional editor
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	The authors should avoid making value judgment statements. For example, in the Executive Summary, Line 3 on Page 4, Bioenergy is described as the "most important" renewable energy source. This is not a scientific finding. This should instead say something along the lines of "Bioenergy currently supplies more energy than any other renewable energy form".	Accepted. We will eliminate this statement.
Norway (Climate and Pollution Agency)	2	0	-	-	-	-	-	-	The chapter is very good in addressing a wide range of issues fairly thoroughly. We detect a slight bias toward reviewing those parts of the literature that are more positive in their outlook for bioenergy than those that are critical. The conclusions point out many opporuntities. There are also many opportunities (or better: risks) that bioenergy causes substantial environmental damage. I would urge the IPCC to consider especially the report of the UNEP Resource Panel of biofuels. See: http://www.uneptie.org/scp/rpanel/Biofuels.htm	Based in your comment and several others we are increasing the discussion on bioenergy use risks.
Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	The content of chapter 2 is very descriptive, I was missing an analytical character. I believe it should be one of the main aims of the bioenergy chapter to provide policy makers with ideas on how to tap bioenergy potentials in their countries - in a sustainable manner. In this regard, I partcularly believe the chapter misses to give strong practical suggestion on how bioenergy could be deployed more (or more sustainable) in certain regions.	The regional aspects were removed in the last minute due size limitation. We are adding this aspect to the new version.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	0	-	-	-	-	-	-	The IPCC SRREN SOD offers a good overview of state of the art research in the field of bioenergy. Nevertheless and as already seen in IPCC SRREN FOD, it focuses too much on gaseous and liquid biofuels. In the case of biomass combustion for the production of heat or CHP the highest fuel efficiency factors are reached. Thus, combustion of solid biomass should be discussed in greater detail.	Accepted. We will add these aspects and discuss their economic advantages.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	The page count could be shortened by eliminating the use of introductions and conclusions within subsections. This chapter could have a single introduction and a single section for conclusions.	Rejected. This comment is in conflict with others asking for addition of conclusion on every section.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	0	-	-	-	-	-	-	There is too little or no mention of the fact that co-firing or stand-alone firing in large-scale power plants with over 150 MW capacity have the best efficiencies and lowest investment costs in comparison with other conversion processes. IBCD is currently conducting a study on the basis of target price offers for power plants with fluidised bed and pulverised-fuel firing for the yield class 150 and 300 MW. With an efficiency of up to 43%, high availibility and specific investment costs of 2500¿/KW these key parameters are more favorable than e.g. in the case of gasification.	Accepted. In economic evaluations we will add these large size units.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	This chapter as a whole needs a very thorough edit for grammar. There are many incomplete and run-on sentences that impede understanding of the main points. This type of edit could also substantially reduce the length of the chapter.	Accepted. The final text will be reviewed by a an English-native expert.
United States (U.S. Department of State)	2	0	-	-	-	-	-	-	This chapter is inconsistent in terminology related to carbon capture and storage technologies. At one point "biological capture and storage" is mentioned, in a phrase I have never heard before. The way I typically see it broken down: terrestrial carbon sequestration - storage of carbon in the bioshpere (soils or vegetation) carbon capture and storage - the capture of CO2 from energy production and it's storage in underground geologic formation. This can be referred to as either "Fossil CCS" where the emissions captured come from a fossil fuel or "Bio CCS" where the emissions captured come from a bioenergy feedstock.	Accepted. We will remove biological capture and storage.
Dr. Md. Sirajul Islam (North South University)	2	0	-	-	-	-	-	-	Under Bio-energy part, most of the effort is paid to discuss Bio-fuel, which is mostly used for transport/luxury. However, 40% of global population meets their daily energy demand from Biomass like firewood, tree leaves, etc. Similarly there are huge potential of Biogas, which is almost ignored.	Rejected. The Bioenergy chapter covers transportation and electricity sectors. Also we have an extensive discussion on traditional bioenergy uses discussing energy use in rural areas. Note, however, that hapter 8 addresses the integration of renewables with the existing and evolving energy systems. It addresses biogas significantly in its applications for electricity, heating, cooling, and transport. For this reason, this chapter did not elaborate further on these aspects.

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Patrick Lamers (Ecofys Germany GmbH)	2	0	-	-	-	-	-	-	While some chapters deal with drivers and barriers for bioenergy utilization and trade, I was missing a dedicated chapter on this issue. The chapter should also deal with the fact that drivers and barriers vary between regions/countries and their "development" stage. I.e. OECD countries have different reasons to push bioenergy than non-OECD countries. This issue is somewhat mixed in the chapter now. I believe the inclusion of such a chapter (or the collection of this information from within the existing chapter) could also help improving the overall suggestions and conclusion of the chapter. To stay with the OECD/non-OECD country example: the suggestions should provide policy makers from developing countries - which ultimately consume most bioenergy in inefficient applications - with suggestion on how to bridge the gap towards more efficient applications and thus a more efficient use of biomass. (see also comment in line 2) Suggestion: stronger link to the policy chapter (11) - in particular sub-chapters 11.2 to 11.4.	Rejected. The structure of the text is out of authors 'mandate. It was defined previously than authors were invited to collaborate. Thus, it is impossible to create a special section on drivers and barriers and discuss this issue for different regions.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	1	1	116	-	-	-	-	General Comment: Make a clear distinction in the whole chapter between bio energy and biofuels in adressing issues. Biofuels are part of bio energy, but not all bio energy are biofuels.	Accepted. We will be more careful on terminology.
Ella Stengler (CEWEP)	2	4	6	4	7	-	-	-	"and heat" should be added after "power generation" as not only power but also heat is generated, e.g. from biomass incineration.	Accepted
John Twidell (AMSET Centre)	2	4	6	-	-	-	-	-	...called traditional. ADD SENTENCE HERE 'All society produces wastes, much of which can be considered a biomass resource; consequently wastes are a form of bioenergy.	Waste is listed in the second paragraph of Executive Summary
Brian Titus (Natural Resources Canada)	2	4	45	-	-	-	-	-	¿CCS¿ should be spelled out in full instead of using abbreviation on first use of term. Also, is it really a part of bioenergy, or is it relevant to both fossil fuels and bioenergy, in which case it is less relevant? Once CCS is operational, it will presumably be applied primarily to high energy-dense fossil fuels? (See also P.5 L.18-21 and later section.) If reductions to the text are required then this and the later section on CCS could be dropped ¿ unless there is an aspect of technologies that is unique to bioenergy, in which case it should be expanded upon in the appropriate section.	CCS will be explained in the glossary. CCS for biomass can be simpler than for fossil fuels as in the case of CO2 capture and storage from sugar fermentation. Several reviewers asked for dfurther expansion on the issue.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	4	4	4	4	-	-	-	Add: ¿is traditional biomass for¿ after ¿is the use of¿	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	4	27	4	27	-	-	-	Add: and ¿additional greenhouse gas emissions¿ after ¿can lead to¿	The sentence reads "can lead to significant regional conflicts for food supplies, water resources, biodiversity and even additional GHGs emissions...".
Laura Verduzco (Chevron Corporation)	2	4	9	-	-	-	-	-	Algal biomass is another feedstock type with energy yields superior to plants	We are presenting feedstocks which are already in use.
Sweden (Swedish Environmental Protection Agency)	2	4	6	4	7	-	-	-	Among the modern and bioenergy uses you could also include production of district heat and CHP, and remove industry which is included in CHP.	We added heat after power generation. This means that CHP is implicitly included.
Brian Titus (Natural Resources Canada)	2	4	36	-	-	-	-	-	Change from ¿(e.g., health, poverty, biodiversity) may be positive or negative depending on local conditions and design/implementation of criteria for projects.¿ to ¿(e.g., health, poverty, soil, water, biodiversity) may be positive or negative, depending on local conditions and the design and implementation of projects.¿ [It is the projects, not the criteria, which have the impact].	Accepted
Brian Titus (Natural Resources Canada)	2	4	24	-	-	-	-	-	Change from ¿assuming sustainability and policy frameworks to secure good governance of land-use and improvements in agricultural and livestock management are secured¿ to ¿assuming that sustainability and policy frameworks to ensure good governance of land-use and improvements in forestry, agricultural and livestock management are applied.¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	37	-	-	-	-	-	Change from ¿avoided through synergies with better natural resources management and contributing to rural development¿ to ¿avoided through better natural resources management and rural development¿	We want to emphasize that major advantage is the interlink of better resources management with rural development.
Brian Titus (Natural Resources Canada)	2	4	18	-	-	-	-	-	Change from ¿Between studies the expected medium to longer term deployment of bioenergy differs¿ to ¿The expected medium to longer term deployment of bioenergy differs¿	Accepted

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Brian Titus (Natural Resources Canada)	2	4	15	-	-	-	-	-	Change from ¿Bioenergy system economics and yields vary across world regions and feedstock type/conversion processes, with costs from 5 to 80 US$/GJ for biofuels, from 5 to 20 US$/GJ for electricity, and from 1 to 5 US$/GJ for heat from solid fuels or waste.¿ to ¿Costs and outputs vary across world regions, feedstock types and conversion processes, from 5 to 80 US$/GJ for biofuels, 5 to 20 US$/GJ for electricity, and 1 to 5 US$/GJ for heat from solid fuels or waste.¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	13	-	-	-	-	-	Change from ¿but still may require¿ to ¿but many still require¿	Due the new sentence (see comment above) it is not wise to state "many". More environmental impact reduction was not achieved by many biofuels.
Brian Titus (Natural Resources Canada)	2	4	21	-	-	-	-	-	Change from ¿Current analyses show the upper bound of resource potential by 2050 can amount to up to 400 EJ.¿ to ¿The energy potential may be as high as 400 EJ by 2050. ¿ (Biomass is measured in grams, and energy in joules.)	The figures about biomass potential are being revised
Brian Titus (Natural Resources Canada)	2	4	4	-	-	-	-	-	Change from ¿demand. A major part of biomass use (37 EJ) is the use of charcoal, wood, and manure for cooking, space heating, and lighting generally by¿ to ¿demand; the majority of this (37 EJ) is traditional use of charcoal, wood and manure for cooking, space heating, and lighting, generally by¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	13	-	-	-	-	-	Change from ¿Deployed bioenergy usually provided economic development, including poverty elimination, energy security, environmental improvements, etc.¿ to ¿Bioenergy systems can provide benefits that include... security, and environmental improvements.¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	4	9	-	-	-	-	-	Change from ¿Feedstock types include annual and perennial plants including food crops;¿ to ¿Feedstock types consist of annual and perennial plants (including food crops and fast-growing tree species);¿	The sentence is already clear and we are adding changes required by other reviewers.
Brian Titus (Natural Resources Canada)	2	4	34	-	-	-	-	-	Change from ¿interactions, such as climate change¿ to ¿¿ interactions, including climate change¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	8	-	-	-	-	-	Change from ¿Modern bioenergy chains involve a¿ to ¿Modern bioenergy chains include a¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	6	-	-	-	-	-	Change from ¿Modern bioenergy use (for industry, power generation, or transport fuels) is making a significant 9 EJ contribution and¿ to ¿Modern bioenergy use for industry, power generation, or transportation makes a significant contribution (9 EJ) and¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	11	-	-	-	-	-	Change from ¿Several bioenergy systems can be deployed competitively, most¿ to ¿Several bioenergy systems are now competitive, most¿	Accepted
Brian Titus (Natural Resources Canada)	2	4	34	-	-	-	-	-	Change from ¿society¿ to ¿societal¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	4	22	-	-	-	-	-	Change from ¿This requires sophisticated¿ to ¿This will require sophisticated¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	4	28	4	32	-	-	-	Change sentence ¿Supply potential.. production¿ by ¿If the right policy frameworks are not introduced supply will be constrained to cultivation of bioenergy crops on marginal/degrade and poorly utilized lands and regions and limited to the utilization of residues and organic waste.¿	If your suggestion is accepted we will have to sequencial sentence starting with the same words.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	4	4	4	6	-	-	-	Change sentence to: "A major part of biomass use (37 EJ) is the traditional use of charcoal, wood, and manure for cooking, space heating, and lighting generally by poorer populations in developing countries."	Accepted
United States (U.S. Department of State)	2	4	7	-	-	-	-	-	Clarify if the phrase "its share is growing rapidly" refers to share of bioenergy, renewable energy or all energy.	The sentence refers clearly to "Modern bioenergy".

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Brian Titus (Natural Resources Canada)	2	4	27	4	33	-	-	-	Confusion between ¿biomass¿, ¿biomass supply¿ and ¿bioenergy¿ (or ¿bioenergy production¿): ¿biomass¿ is organic material, ¿supply¿ is that which can be produced, and ¿bioenergy¿ is the actual energy produced from the biomass that can be supplied (or produced). This paragraph could therefore read something like: ¿However, expansion of biomass production can lead to significant regional conflicts for food supplies, water resources and biodiversity if sound policy frameworks are not introduced. If biomass supply is limited to residues and organic waste, or cultivation of bioenergy crops on marginal/degraded and poorly utilized lands, or regions where bioenergy is a cheaper supply option than reference options (e.g., sugar cane ethanol), then bioenergy potential will be limited to ~100 EJ in 2050. The most likely potential is 100-300 EJ, based on current environmental knowledge and social considerations.¿ [Reference to ¿region¿ at the end of the list of conditions allows the use of the more accurate term ¿bioenergy¿ rather than ¿biomass¿, as ¿biomass supply¿ is inferred.]	Care will be taken based in the definition mentioned
Brian Titus (Natural Resources Canada)	2	4	39	-	-	-	-	-	Consider briefer sentence: ¿Policies need to optimize regional sustainable biomass production and use and take the forestry and agricultural sectors into consideration to ensure that good governance of land use and rural development is interlinked with bioenergy development.¿	"forestry"will be added.
Australia (0)	2	4	6	4	6	-	-	-	Delete 'called traditional'.	Accepted
Brian Titus (Natural Resources Canada)	2	4	19	-	-	-	-	-	Delete colon; Change from ¿depends on: sustainable¿ to ¿depends on sustainable¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	4	5	4	6	-	-	-	delete: "generally by poorer population in developing countries" rationale: not true more and more households especially in Nothern Europe using wood again for heating, discriminating, not improtant for summary	That is why we are adding "generally"
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	4	34	4	41	-	-	-	delete: always "environmental " and "climate change" , rationale: the content of this para deals with socio economic impacts only, or add environmental impacts others than climate change impacts	We are discussing socio-economic impacts at the begin of the paragraph. But at the end we state that biomass potential due this factor plus due to environmental (local and global), if not properly managed, is restrict to 100EJ by 2050.
Brian Titus (Natural Resources Canada)	2	4	-	-	-	-	-	-	Executive Summary: This is potentially one of the most important sections in the chapter, and how it is written may determine whether a reader then continues to read the rest of the chapter or not. The current text needs to be carefully edited to ensure maximum impact. Some examples of suggested changes to the Executive Summary are made, but it would be too time consuming to do this for the whole section or chapter without using Track Changes in a Word document. Readers should be reminded (in first or second paragraph) that the chapter addresses the time period 2030-2050.	The text will be reviewed by a professional editor. Several changes are being incorporated due the many reviewers'sugestions . The period of 2030 will be highlighted.
Japan (the Japanese Ministry of Foreign Affairs)	2	4	44	-	46	-	-	-	Here, the premise is "if carbon taxes of 20-30 U$/tonne were deployed" whereas line 3 on page 105 says "50 U$/ton". Therefore the reader is confused which figure and unit is correct.	Values will be harmonized. Check pg 105 for other figure
Kaija Hakala (MTT Agrifood Research)	2	4	-	168	-	-	-	-	I hope the text will be edited carefully, as there are still lots of spelling and grammar mistakes that I haven't pointed out in my comments. Also Reference list is not well organised and contains several faults. In addition, I hope manuscripts will not be referred to in the latest version.	The text will be reviewed by a professional editor. Several changes are being incorporated due the many reviewers'sugestions .
John Twidell (AMSET Centre)	2	4	7	-	-	-	-	-	INTRODUCE A NEW PARAGRAPH FOR AN ESSENTIAL FACT FOR THIS CLIMATE CHANGE 'All significant biomass grows by the absorption of CO2 from the atmosphere in photosynthesis. When this biomass decays or combusts, the same quantity of carbon is released to the atmosphere. Thus bionergy processes are carbon neutral with respect to climate change emissions, but only if equivalent mass of the combusted material regrows.'	This is already well known and that is the reason why sustainable biomass has zero emission when burned.
Ella Stengler (CEWEP)	2	4	8	4	12	-	-	-	Municipal waste includes a biodegradable part (=biomass), and in Europe it is considered that 50% of the energy produced comes from this biodegradable part. This is the "organic streams", However, these streams are not recurrent. Therefore "recurrent" should be deleted. Proposal: Rather than using the terminology "organic", maybe "biodegradable" should be used? At least, this is the terminology used in European legislation (Renewable Energy Sources Directive 2009/28/EC, Art. 2(e)).	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	4	18	4	26	-	-	-	Not in line with section 2.2 but in line with section 2.8, see above. Should be consistent	The figures about biomass potential are being revised
Michael Jack (Scion (NZ Forest Research Institute))	2	4	34	4	41	-	-	-	Paragraph could be improved	Para is being redrafted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	4	38	4	38	-	-	-	Please add after ¿¿projects.¿ ¿Therefore several countries have developed sustainable biofuels policies that take these impacts into accounts, such as the Renewable Energy Directive of the EU and legislation in the US.¿	Sentence will be added subject to space constraint
Patrick Lamers (Ecofys Germany GmbH)	2	4	21	-	-	-	-	-	Please clarify what type of potential this is ("theoretical"?) and whether is it before or after conversion.	The figures about biomass potential are being revised
Patrick Lamers (Ecofys Germany GmbH)	2	4	32	-	-	-	-	-	Please clarify what type of potential this is ("theoretical"?) and whether is it before or after conversion.	We will add the potential qualification
Kaija Hakala (MTT Agrifood Research)	2	4	4	4	7	-	-	-	Refrase e.g.by putting words "traditional use of energy such as" before ".. Charcoal" and delete "by poorer population in developing countries called traditional".	Sentence will be "A major part of biomass use (37 EJ) is the traditional use of charcoal, wood, and manure for cooking, space heating, and lighting generally by poorer populations in developing countries."
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	4	40	-	-	-	-	-	Reinforce the local nature of bioenergy implementation, by using "...regional, local and even site specific¿".	Regional has enough ample means to cover specific areas.
Michael Jack (Scion (NZ Forest Research Institute))	2	4	21	4	21	-	-	-	Sentence should read: "".. by 2050 is 400 EJ.""	The figures about biomass potential are being revised
Michael Jack (Scion (NZ Forest Research Institute))	2	4	18	4	18	-	-	-	Sentence should read: ""The expected medium to longer term deployment of bioenergy differs between studies.""	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	4	27	4	33	-	-	-	shift whole para after line 17, rationale. it is more appropriate to list the advantages and disadvantages in one place	The paragraph on line 27 is explaining the what can be the impact on future potential (starting on line 17) in case wrong approach is foloowed. Thus, the sequence of para looks correct.
Brazil (Ministry of Science and Technology)	2	4	8	4	9	-	-	-	Should read: ""feedstock types include annual, SEMI-PERENNIAL and perennial plants (...)"". It is important as it is the case of sugarcane in Brazil, an important feedstock. It is key to recognize the existence of semi-perennial crops.	Accepted
Canada (Environment Canada)	2	4	18	4	19	-	-	-	Suggest revising to ¿The expected medium to longer term deployment of bioenergy differs between studies.¿	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	4	39	4	40	-	-	-	The followig phrase could be misleading for the reader, since is seemingly contricts the statement in the chapter that international biomass trade is a driver for efficient bioenergy use ("optimal use and performance of biomass production is regional").	Remove "use".
Switzerland (Swiss Federal Office for the Environment)	2	4	-	5	-	-	-	-	the role of prices should be mentioned somewhere in the executive summary, as well as the importance of life cycle assessments regarding Energy use/GHG emissions, and potential competitions between different usage of land, water, and biomass with their potential adverse impacts	Text will be redrafted to mention prices in Executive Summary. Land, water and food competition are already discussed in the text .
Christoph von Stechow (IPCC WGIII TSU)	2	4	23	4	26	-	-	-	The sentence should start with "This biomass potential¿" and end with "livestock management". (Please insert "This" and delete "are secured").	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	4	27	-	-	-	-	-	This line should also include an explicit mention of the need for enforcement instruments. It should read "If the right policy frameworks and enforcement mechanisms¿"	Accepted
United States (U.S. Department of State)	2	4	14	-	-	-	-	-	This line suggests that deployment of bioenergy eliminates poverty. The authors may want to revise to a statement about generally positive societal benefits, including reduction of poverty.	Accepted
Modesto Fernandez Diaz-Silveira (Ministry of Science, Technology and Environment)	2	4	37	-	-	-	-	-	TO include text, after ...for projects: "Most developing countries situation differs from the rest of the world; while RE are very well welcomed and comply with policies regarding substitution of oil-based energy production systems, at the same time there is a concern on the negative effects biofuels could have on food security and food prices."	Rejected. There is not enough literature to allow us the conclusion that RE isn't welcome and that its use isn't promoted in Developed Countries.
Modesto Fernandez Diaz-Silveira (Ministry of Science, Technology and Environment)	2	4	28	-	-	-	-	-	TO include text, after ¿regional: ", national or sub-national"	Regional is very ample. To mention national may require reference to international. Thus, the sentence will be too political to be discussed in a technology chapter
Norway (Climate and Pollution Agency)	2	4	45	4	46	-	-	-	We think substitution of coal based power by bioenergy power should be called mitigation and not sequestration, unless a CCS system is applied to the bio energy power station. Please clearify what is meant here.	Sorry, the sentence doesn't means that we are proposing substitution of biomass for coal.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Helmut Haberl (Institute of Social Ecology, Vienna)	2	4	27	-	-	-	-	-	What are "right" (or, for that matter, "wrong") policy frameworks? Would be useful to spell that out	Para. Starting in line 18 explain that large deployment of biomass depends of several inputs to be successful. This is the right policy framework. Para. Starting on line 27 referes to this framework as the right policy.
Brian Titus (Natural Resources Canada)	2	4	35	-	-	-	-	-	What is ¿climate change feedback¿? Not clear what is meant.	Means ìncluding impacts on feedstocks due climate change. The word is frequently used in literature.
Norway (Climate and Pollution Agency)	2	4	46	4	46	1	-	-	Considder to replace "carbon sequestration" with "reduction of CO2-emissions"	The technology is well known in the literature under this name
Norway (Climate and Pollution Agency)	2	4	13	4	13	1	-	-	The sentence is not logical; environmental impact reductions are important but they have nothing to say for the need for government subsidies. The words "and environmental impact reductions" should be deleted. Eventually this improvement can be mentioned separate eg in the paragraph about "Impacts" further down on page 4.	Sentence changed to "Other biofuels have also undergone cost reduction while reducing environmental mpacts, but still may require government subsidies".
Brazil (Ministry of Science and Technology)	2	4	4	4	6	2	-	-	Could be written as: A major part of biomass, called traditional use (37 EJ) is the use of charcoal, wood, and	Accepted
Brazil (Ministry of Science and Technology)	2	4	45	4	45	2	-	-	should be written: CO2 Capture and Storage - CCS	CCS will be explained in the glossary
Wibke Avenhaus (Potsdam Institute for Climate Impact Research)	2	4	3	7	7	Exectuvie summary	-	-	Annual global primary energy demand: figure (46 EJ) differs from figure on page 7 line 7 (47 EJ)	Accepted
Brian Titus (Natural Resources Canada)	2	4	2	-	-	Exectuvie summary	-	-	Change from ¿Bioenergy today. Chapter 2 discusses biomass, a primary source of fiber, food, fodder and energy¿ to ¿Bioenergy today. Biomass is a primary source of fibre, food, fodder and energy¿.	Accepted
Brian Titus (Natural Resources Canada)	2	4	3	-	-	Exectuvie summary	-	-	Change from ¿energy source, providing about 10% (46 EJ) of annual¿ to ¿energy source and provides about 10% (46 EJ) of the annual¿	Accepted
Elina Vapaavuori (Finnish Forest Research Institute)	2	4	3	46	-	Exectuvie summary	-	-	Correct:Discrepancies in information about current bioenergy: on p. 4, line 3 it is 46 EJ, on p. 7, line 7 it is 47 EJ, on p. 8 in Fig. 2.1.3. the numbers on the left sum up at 44.6 EJ, on p. 13 in Table 2.2.1 it is 50 EJ, and finally on p. 46 it is 48 EJ.	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	4	2	4	7	Exectuvie summary	-	-	It would be beneficial to invent a better dichotomy than "traditional" and "modern", in particular as "modern" is a moving target. Perhaps "simple" and "complex" technology would carry less load of value-judgements?	The use we choose is frequent in literature
Patrick Lamers (Ecofys Germany GmbH)	2	4	2	4	7	Exectuvie summary	-	-	Please indicate whether the amount of biomass use [in EJ] is before or after conversion. (see applies to numbers in Section 2.2).	Acceted
Christoph von Stechow (IPCC WGIII TSU)	2	4	3	4	7	Exectuvie summary	-	-	The numbers mentioned in these lines (46, 37 and 9 EJ) do not match the figures mentioned on p. 46, l. 3-8 (48, 38 and 10 EJ). Please amend these in a consistent way.	Accepted
Australia (0)	2	4	3	4	3	Exectuvie summary	-	-	The phrase 'It is the most important renewable energy source,...' is a subjective judgement, suggest phrase be changed to 'It is an important renewable energy source,...'.	Accepted
Donald Smith (McGill University)	2	4	1	5	35	Exectuvie summary	-	-	Thermo-chemical production of biofuels will produce biochar as a byproduct and this can be applied to marginal soils to improve the yields of biofuel crops, and perhaps also some food crops. However, from a greenhouse gas management perspective, biochar may be the best possible method for long-term sequestration of carbon, in this case in a form beneficial to crop production and with a residency time in the soil of millennia. I note that there is on brief comment on biochar on page 86 of this chapter, but I think the evidence for this is now becoming reasonably strong, so perhaps a bit more commentary would be appropriate.	Space limitation is na issue
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	4	3	4	4	Exectuvie summary	-	-	Verify the bionergy consumption data, they should be in line with the values previously presented in SPM. For instance, in Table SPM 2 is presented 48 EJ.	Accepted
China (China Meteorological Administration)	2	4	3	4	4	Executive Summary	-	-	10% (46 EJ) and (37 EJ) should be consistent with 10% (48 EJ) and (38 EJ) in line 3-4 on page 46.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	4	3	4	3	ExSum	-	-	Suggest adding 'It is the most important CURRENT renewable energy source'	The sentence will be "It is an important renewable energy source,...'.
Sweden (Swedish Environmental Protection Agency)	2	5	27	5	28	-	-	-	I would write "... d words o not pose serious constraints on global feedstock production". The overall effect may not be large, but there is likely to be great variations at regional level, including increases in production in some places and decreases in other places.	We already changed sentence according with previous comment. See above

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Zoltán Somogyi (Hungarian Forest Research Institute)	2	5	22	-	-	-	-	-	"Bioenergy has a significant GHG mitigation potential" - what does "significantly" means? Could any number used here? How certain that number can be? Is it true at all that there are significant potentials?	In the same paragraph we are stating that resources have to be provided sustainably. No way to add a number since it will depends on the amount of sustainable bioenergy used, and the biomass feedstock and technology used. The figure is model dependent. Nevertheless, significant means that, if properly used, it can contribute for climate change mitigation. But in the next sentences we provide a figures for some particular biomass feedstocks.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	5	22	5	23	-	-	-	add after applied. When bioergy supply is not sustainably provided e.g. conversion of forest, grassland to bioenery plant production the GHG balance can be negative. Rationale: see chapter 2.1.1 page 6 - 7	In previous sentence we are stating that resources has to be provided sustainably.
Kaija Hakala (MTT Agrifood Research)	2	5	23	5	23	-	-	-	Add the following text here: Care should be taken that the production of biomass energy on field does not incur greenhouse gas emissions exceeding those caused by energy production from fossil fuel (CO2 equivalents/MJ energy). Not in all parts of the world and not with all production systems are greenhouse gas emissions lowered by using field biomass for energy (Soimakallio et al. 2009b). This is because inputs such as tractor traffic, liming, fertilisation and plant protection measures all cause greehouse gas emissions and if productivity is low, the emissions caused by inputs may end in biomass energy production causing even more greenhouse gas emissions than fossil fuel usage for energy.	In the same paragraph we are stating that resources has to be provided sustainably.
Kaija Hakala (MTT Agrifood Research)	2	5	27	5	28	-	-	-	After "2oC" add for which period (since pre-industrial time?) the increase is calculated. If 2oC increase would take place from the present time, it WOULD have serious consequences for agriculture in low latitudes, if no adaptation measures are taken (IPCC 2007, technical summary, p. 39).	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	5	7	-	-	-	-	-	Are "lignocelluslosic biofuels" equivalent to the "second generation biofuel options" mentioned in line 33? Please consider defining "second-generation biofuels" before introducing the term in the text.	Lignocellulosic biofuel is a share of 2o. Generation biofuels.. 2o. Generation defined in glossary
Christoph von Stechow (IPCC WGIII TSU)	2	5	26	5	30	-	-	-	As agreed during LA3 in Oxford, the section on climate change impacts on the technology specific resource should be placed in the section on the resource potential. Likewise, the sentences here should be moved to the 3rd or 4th paragraph of the Executive Summary.	Accepted
Brian Titus (Natural Resources Canada)	2	5	4	-	-	-	-	-	Change ¿Scandinavia¿ to ¿Nordic countries¿ (and do this for whole document)	Accepted
Australia (0)	2	5	28	5	28	-	-	-	Change 'raise' to 'rise'.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	5	1	5	4	-	-	-	Does technological learning and related cost reductions not apply to perennial crops that are not mentioned here?	We are discussing future expectations based in past results. We don't have past results for perennial biomass.
Richard Plevin (UC Berkeley)	2	5	22	5	23	-	-	-	In light of the prior comment, I would change this statement to include the proviso that bioenergy cropping doesn't displace food or feed, or other uses with highly inelastic demand.	It is difficult to define what are other uses with "highly inelastic demand."If competition shows up the inelastic demand may become more elastic.
Laura Verduzco (Chevron Corporation)	2	5	14	-	-	-	-	-	Interplanting nonfood crops such as switchgrass between the rows of trees of a managed forest is another example of a short-term option that can deliver important long-term synergies	No space to discuss all opportunities
United States (U.S. Department of State)	2	5	18	-	-	-	-	-	Line 18-19 is really poorly worded and does not convey any clear idea.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Daniela Thrän (DBFZ / UFZ)	2	5	9	5	9	-	-	-	oil an carbon prices are relevant driver but biomass prices too	Yes, but we are mentioning some of the price drivers.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	5	25	5	25	-	-	-	Please add after ¿¿baseline.¿ ¿ Biofuels are currently the only energy source in the transport sector that could provide a reduction of GHG in this sector in the short term.¿	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	5	27	5	28	-	-	-	Please consider amending the sentence in the following way: "Climate change impacts on feedstock production exist but do not pose serious contraints as long as temperature raise is limited to 2 °C."	We already changed sentence according with previous comment. See above
Christoph von Stechow (IPCC WGIII TSU)	2	5	14	-	-	-	-	-	Please consider replacing "synergies" with "efficiency gains".	The term Synergism is widely used.
Christoph von Stechow (IPCC WGIII TSU)	2	5	27	-	-	-	-	-	Please consider replacing "there will be" with "is likely to exhibit".	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	5	16	-	-	-	-	-	Please provide some examples of improvement areas.	Sentence removed
United Kingdom (Department of Energy and Climate Change)	2	5	31	-	35	-	-	-	Point to the need to be careful about future changes in precipitation patterns and not to focus just on temperature and CO2 levels. This may result in a change in location for optimal yield which also needs to be taken into account as part of strategic land management.	We changed line 26 to include examples of other climate change impacts.
David Clubb (European Environment Agency)	2	5	22	5	35	-	-	-	Query/omission: In reading this chapter, I am struck by the implicit assumption that bioenergy always provides GHG mitigation. I think that it would be useful to state at the outset of the chapter the assumptions that are being made. For example, on page 9, lines 22-27, the carbon mitigation potential is stated (without reference). This must include some assumptions otherwise these figures will be taken at face value with no consideration of ILUC effects etc	In the same paragraph we are stating that resources has to be provided sustainably.
Brazil (Ministry of Science and Technology)	2	5	30	-	-	-	-	-	Same as above	see above
Michael Jack (Scion (NZ Forest Research Institute))		5	12	5	12	-	-	-	Sentence should read: ""Biomass is the only renewable resources able to provide..""	Good suggestion. The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brazil (Ministry of Science and Technology)	2	5	23	5	24	-	-	-	Should read: ""perennial and SEMI-PERENNIAL croping systems (...)"" It is important as it is the case of sugarcane in Brazil, an important feedstock. It is key to recognize the existence of semi-perennial crops.	Accepted
Canada (Environment Canada)	2	5	27	5	28	-	-	-	Suggest editing text to: "Climate change impacts on feedstock production exist but do not pose serious constraints if temperature rise is limited to 2 °C."	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Rory Gilsenan (Natural Resources Canada)	2	5	22	5	35	-	-	-	Suggest you include some text around the projected increase in natural disturbances (fire, wind, drought, invasive species) due to climate change and the associated increase in the availability of salvage material available for bioenergy purposes. The recent mountain pine beetle outbreak in Western Canada is a prime example, affecting ove 9-million hectares of forest land. Wind events in Europe and fires in the Western United States are also implicated.	We will include temperature increase, rainfall pattern changes, extreme events occurrence.
United Kingdom (Department of Energy and Climate Change)	2	5	14	-	17	-	-	-	The potential contribution of bioelectricity plants should be recognized here as a cost effective method of obtaining carbon reductions from biomass. Work to be published at the BIOTEN conference in the UK in September shows these to be on a par with heating plants and previous work (Thornley et al., "Making bioelectricity economic in the UK", 17th European Biomass Conference, Hamburg, 2009) points to the significant economies of scale for larger biomass combustion compared to smaller plants. For developed countries where there is no established district heating infrastructure and the existing electricity generation is quite high in carbon intensity (like the UK) these can have real benefits. The existence of a natural gas grid is also relevant - these limit the savings that bioenergy heating systems can achieve as the carbon intensity of heating with an efficient gas boiler is already very low.	Accepted
United States (U.S. Department of State)	2	5	15	-	-	-	-	-	The sentence "Significant improvements in other bioenergy is possible" does not make sense. This needs to be made more specific or removed.	Sentence removed
Japan (the Japanese Ministry of Foreign Affairs)	2	5	33	-	-	-	-	-	The sentence does not make clear where consensus exists.	The sentence means that "there are consensus".
Christoph von Stechow (IPCC WGIII TSU)	2	5	25	-	-	-	-	-	The statement that "80-90% GHG reduction" could be achieved with certain bioenergy options is only mentioned in the chapter on page 108, line 19 and on page 116, line 18, without any reference. If no reference will be provided in the chapter to substantiate this statement, it has to be deleted from the Executive Summary and from the chapter text. It the number is based on the literature review, this has to be made explicit!	The figure is from literature and references will be quoted in text. Oil rebounf effect can be small for bioenergy feddstocks with good energy balance.
United Kingdom (Department of Energy and Climate Change)	2	5	1	-	2	-	-	-	There is not clear evidence of this . Little work has been done and the detailed text later in this chapter presents data only for corn and sugarcane to ethanol in addition to an isolated study on Scandananvian wood chiops in CHP. This can in no way be considered representative of prospects for bioenergy generally. For the reasons stated abovem there is limted scope for cost reductions due to technological learning for steam based electricity systems and a similar trend may be the case for many biodiesel systems. It is very important that readers are not misled into believing that costs will reduce when there is no evidence of this.	Text will be redrafted to take into account that some technologies may not support cost reduction. Land, water and food competition are already extensively discussed in the text

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	5	22	5	30	-	-	-	This is an incredibly big "if" statement to make (line 28). There is now a great deal of literature on mitigation that would be necessary to hold climate change to 2 degrees and it is not at all clear that this is an achievable goal. The issue of climate change impacts on bioenergy feedstock growth cannot be dismissed so easily - they could very well be a limiting factor in what types and amounts of bioenergy can be produced. In general, the phrasing of this section gives the impression that the authors are more concerned that climate change might limit how much bioenergy is possible, rather than how the deployment of bioenergy might contribute to mitigation efforts that would limit the extent of climate change. That is to say, the authors are more concerned about the bioenergy industry than about climate mitigation science, which might be the wrong tone for an IPCC report.	We are just dicussing the Climate Change impacts on bioenergy production at this paragraph. As such, we are assuming that ïf temperature raies up to 2 degrees, compared with pre-industrial average, no serious consequences for biomass yield will occur.
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	2	5	22	5	35	-	-	-	This paragraph can be included in Chapter 1 or just exlude it as it's already been covered in Chapte 1	The Executive Summary reports what important messages had been presented in the text.
Michael Jack (Scion (NZ Forest Research Institute))	2	5	22	5	35	-	-	-	This section is the most important one I would have put it much earlier in the summary. I think there also needs to be a clear conection between bioenergy potential and potential for GHG reduction. The GHG reduction in tCO2 needs to be stated explicitly not just as a 80-90% reduction.	Exec. Summary is only one page long. I am sure that interested people will read all the page. No way to add a number since it will depends on the amount of sustainable bioenergy used, and the biomass feedstock and technology used. The figure is model dependent. The 80-90% figures refere to one type of biomass feedstock.
Richard Plevin (UC Berkeley)	2	5	23	5	25	-	-	-	This statement is overly optimistic. Perennial cropping systems that displace food or feed probably cannot achieve 80-90% reductions. Also, if the life cycle GHG rating for a biofuel is 80-90% lower than the rating of an incumbent (e.g. petroleum) fuel, this does not imply that use of the biofuel achieves an 80-90% reduction in GHG emissions, owing to the rebound effect in global petroleum markets.	The figure is from literature and references will be quoted in text. Oil rebounf effect can be small for bioenergy feddstocks with good energy balance.
Christoph von Stechow (IPCC WGIII TSU)	2	5	29	-	-	-	-	-	Very little material is provided in the chapter as far as adaptation is concerned. It is therefore questionable if this issue deserves mentioning in the Executive Summary.	Rejected. IPCC Working Group III, the one that prepared this Special Report, doesn't work with climate change adaptation. Nevertheless, our report provides information where biomass could offer an opportunity to combine both adaptation and mitigation which available to other IPCC working groups.
Norway (Climate and Pollution Agency)	2	5	20	5	20	1	-	-	Explain "cascaded" or use other wording	Term is widely used in literature.
Norway (Climate and Pollution Agency)	2	5	27	5	28	1	-	-	Precise that this is the case from a global viewpoint. The regional impacts can be substantial, as mentioned in line 27	Accepted
Norway (Climate and Pollution Agency)	2	5	7	5	8	1	-	-	Specify that this is without pricing of CO2 emissions (if this is the cas)	Accepted
Brazil (Ministry of Science and Technology)	2	5	15	5	15	2	-	-	Should be written: combined heat and power	Accepted
Brazil (Ministry of Science and Technology)	2	5	16	5	17	2	-	-	Should be written: Development of working bioenergy markets and facilitation of	Accepted
Brazil (Ministry of Science and Technology)	2	5	22	5	30	22	-	-	Should not focus only in perenial crops... annual crops could reach high GHG reduction also and offer also the same good opportunities as perennial crops to combine adaptation measures ...	For annual energy crops we have the ILUC issue still under proper quantification.
Brian Titus (Natural Resources Canada)	2	6	3	-	-	-	-	-	¿chemicals¿ does not fit in list of ¿energy products¿.	Accepted
Brian Titus (Natural Resources Canada)	2	6	1	-	-	-	-	-	¿Pattern¿ redundant because of ¿trend¿, so change from ¿Introduction Current Pattern of Bioenergy Use and Trends¿ to ¿Introduction to Current Bioenergy Use and Trends.¿	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	6	5	-	-	-	-	-	Be complete in the list of feedstock, e.g. by putting: "...energy crops, oilseeds and cereals, sugar crops.¿".	The feedstock list will be very complete in the new figure that illustrates feedstocks, conversion processes, and energy products. The alignment between this figure and the remainder of the chapter will make it easier to read.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brazil (Ministry of Science and Technology)	2	6	24	6	25	-	-	-	Black carbon is not a greenhouse gas; as a matter of fact, it is not even a gas. Of the short-lived greenhouse gases, only methane is relevant. Carbon monoxide, NOx, wrc, are so short-lived that they are disregarded in mitigation pilicies.	Black carbon is an aerosol in air emissions and can accelerate climate change both through its heat-absorbing properties in the atmosphere, and by reducing the albedo of cloud, snow and ice surfaces and has a negative effect on radiative forcing.
Frank Behrendt (Institute for Energy Engineering)	2	6	25	-	-	-	-	-	carbon monoxide/CO ist not a GHG	Accepted
Brian Titus (Natural Resources Canada)	2	6	3	-	-	-	-	-	Change from ¿Bioenergy sources include¿ to ¿Bioenergy feedstock sources include¿. As with earlier comments, be clear on meanings of ¿biomass¿, ¿biofuels¿ and ¿bioenergy¿; because the sources are feedstock and not energy, change wording.	Accepted
Laura Verduzco (Chevron Corporation)	2	6	16	6	20	-	-	-	Considere rephrasing to the following: "Sustainable bioenergy systems may help increase biospheric carbon stocks (for example through plantations of degraded lands) and reduce carbon emissions from bioenergy production (for instance through the dissemination of more efficient cook stoves)"	Accepted
Norway (Climate and Pollution Agency)	2	6	1	117	-	-	-	-	Each section should have the same structure; not "final remarks" in one section, summary in another and conclusions in the third. In general a summary in the beginning of each section could be the best solution; it should give the reader an idea what it is about and some of the main figures before drowning in details. Also further	Accepted.
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	6	17	-	-	-	-	-	Emphasize that the development of bioenergy could also result in gains in food security, e.g. by using: "¿co-benefits in terms of local employment, regional economic development and food security¿".	Accepted
Finland (Finniah Meteorological Institute)	2	6	-	8	-	-	-	-	It would be nice to have in this chapter also a figure presenting the shares of current global GHG emissions from various sources (including GHG emissions from LULUCF).	No space
Sampo Soimakallio (VTT Technical Research Centre of Finland)	2	6	-	8	-	-	-	-	It would be nice to have in this chapter also a figure presenting the shares of current global GHG emissions from various sources (including GHG emissions from LULUCF). A figure of the global C cycle could also be helpful (e.g. IPCC, Climate Change 2007 WG I, p. 515, Figure 7.3).	No space
Christoph von Stechow (IPCC WGIII TSU)	2	6	24	6	25	-	-	-	No reference is provided to substantiate the assertion that "advanced bioenergy systems and end-use technologies, can also substantially reduce the emission of black carbon and other short-lived GHGs such as methane and carbon monoxide". (GEA (2010) could be a possible reference point since the study is mentioned in a similar context on page 67, line 39.)	will cross ref to section where the actual refs are.
Christoph von Stechow (IPCC WGIII TSU)	2	6	17	6	18	-	-	-	No reference is provided to substantiate the assertion that bioenergy would "provide large co-benefits in terms of local deployment and regional economic development". (Wicke et al., (2008) could be a possible reference point since the paper is mentioned in a similar context on page 109, line 41.)	will cross ref to section where the actual refs are.
Ella Stengler (CEWEP)	2	6	6	6	11	-	-	-	Please add the following: Municipal waste does not have to go through a pre-treatment process. It can be directly incinerated/used as fuel in WtE plants (incineration with energy recovery) in order to produce energy (electricity, heat, cooling).	we cannot be so specific, the general processes are already noted in the text
Kaija Hakala (MTT Agrifood Research)	2	6	2	6	3	-	-	-	Remove from the end of line 2 words "use as a source" and from the beginning of line 3 word "of".	Accepted
Kaija Hakala (MTT Agrifood Research)	2	6	1	6	1	-	-	-	Remove word "Introduction" for consistency for the rest of the report	Accepted
Australia (0)	2	6	2	6	6	-	-	-	Suggest algae is included in the list of potential feedstocks.	Accepted
Rory Gilsenan (Natural Resources Canada)	2	6	3	6	6	-	-	-	Suggest you include ¿salvage material¿ in this list, as per above comment.	Accepted
Richard Plevin (UC Berkeley)	2	6	16	-	-	-	-	-	The assertion that bioenergy can provide a "substantial contribution to climate change mitigation" has clearly been questioned a lot in recent years. At the very least, I would like to see some citations to support this claim. The phrase is also ambiguous. Does "substantial" relate to (a) the difference in terms of life cycle GHG emissions per unit fuel compared to petrofuels, (b) large reductions in global emissions relative to baseline fuels, which is a function of (a) as well as biofuel resource estimates?	we removed the term substantial
Richard Plevin (UC Berkeley)	2	6	3	6	6	-	-	-	The list of bioenergy sources should include non-herbaceous crops such as maize, soybeans, and rape, as well as sugarcane.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	6	1	-	-	-	-	-	The title adjunct "Current Pattern of Bioenergy Use and Trends" is different to the official outline. Please delete or create an additional subsection (2.1.1.) with this title.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	6	16	-	-	-	-	-	The whole process has to be conceived with the goal of sustainability present. Use: "Sustainably designed, implemented, produced and managed¿".	Accepted
Laura Verduzco (Chevron Corporation)	2	6	16	6	20	-	-	-	This paragraph would be more useful as an introduction to "GHG and Climate Change Impacts" in the Executive Summary on page 5, line 22.	We think it is also necessary here, but will include part of the text in the ES
Richard Plevin (UC Berkeley)	2	6	21	-	-	-	-	-	Use of biofuels doesn't automatically "replace" fossil fuels; this depends on fuel markets. Biofuels certainly displace fossil fuels, but it would be incorrect to assume that displacement results in 100% replacement.	Accepted
Laura Verduzco (Chevron Corporation)	2	6	3	6	6	-	-	-	When describing bioenergy sources, algae should be included regardless of technology maturity.	Accepted
Frank Behrendt (Institute for Energy Engineering)	2	6	9	-	-	-	-	-	why biomethane but not biohydrogen? - methane and hydrogen (and all other terms) work just fine without bio in this clear context	Accepted
Sweden (Swedish Environmental Protection Agency)	2	6	3	6	3	2.1	-	-	Chemicals are not an energy product.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	6	16	7	5	2.1	-	-	I appreciate the 'if done well - if done badly' structure of this paragraph. The message would be even stronger with an introductory sentence upfront indicating that the merits of bioenergy depend on e.g. a complex interplay of policies in different sectors. You might even want to refer to the fierce societal debates on bioenergy that arise every now and then.	Accepted
Norway (Climate and Pollution Agency)	2	6	-	-	-	-	2.1.1	-	Energy crops and annual crops; why are energy wood and preannually grases not included? They are (though slowly) integraed in a biomass based energy production	Accept. The diagrams will be made consistent between the introduction, 2.3 and 2.6 and with the types of biomass that can be converted.
Peter de Haan (Ernst Basler + Partner AG)	2	6	-	-	-	-	2.1.1	-	From the box ""co2 separation"" there is no arrow leading away to any fuel type. In fact, the box ""co2 separation"" should not be at that spot, but be an optional part of the combustion process.	Accept. The diagrams will be made consistent between the introduction, 2.3 and 2.6
Peter de Haan (Ernst Basler + Partner AG)	2	6	-	-	-	-	2.1.1	-	Production of H2 out of biomass is not covered by this figure. This should be discussed somewhere in the caption or text.	Accept. The diagrams will be made consistent between the introduction, 2.3 and 2.6
Peter de Haan (Ernst Basler + Partner AG)	2	6	-	-	-	-	2.1.1	-	Technologies shown in 2.1.1. should be compatible with those shown in fig 2.3.1	Accept. The diagrams will be made consistent between the introduction, 2.3 and 2.6
Richard Plevin (UC Berkeley)	2	6	-	-	-	-	2.1.1	-	The oil pathways should include hydrogenation (e.g., Neste Oil) as well as transesterification. Also, the term "biodiesel" (at least in the US) means specifically fatty-acid methyl ester. A more generic term would be "synthetic diesel" or "renewable diesel".	Diagram will be changed. Distinctions will be made between transesterified biodiesel and hydrogenated renewable diesel.
Peter de Haan (Ernst Basler + Partner AG)	2	6	-	-	-	-	2.1.1	-	Where is the Fischer-Tropsch process to be found in this figure. There should be, within thermo-chemical conversion, a fourth box (on same level as carbonization and gasification and pyrolysis) named ""synthesis gas"", from there an arrow should go to (on same level as catalytic upgrading) a new box ""Fischer-Tropsch synthesis"", from there to liquid fuel.	Accept. The diagrams will be made consistent between the introduction, 2.3 and 2.6
Daniela Thrän (DBFZ / UFZ)	2	6	-	6	-	2.1	2.1.1	-	take the original picture because there are mistakes in the adaptation, i.e. CO2-separation is a dead end (does it mean by-product? - but there are many other by-products in other processes too); in the lowest row, fuel cells are not considered. The original source of the picture ist KALTSCHMITT and Hartmann, Springer (also available in english)	We will use a different diagram that will be consistent between the introduction, Sec 2.3 and 2.6 and include the various feedstocks and conversion pathways
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	6	12	6	14	2.1	2.1.1	-	To what extent is anaerobic fermentation still a developing technology? And in purely technological terms, residues and waste are commercial technology, but in terms of logistical chains and their optimisation, a lot can still be gained. I realise you don't want all topics to be identified blue and red, but you might reconsider this one.	We consider the technology commercial but also developing depending on scale and types of feedstocks treated
Ella Stengler (CEWEP)	2	6	12	6	13	-	2.1.1.	-	Please consider in the figure "municipal waste incineration without pre-treatment". Please see comment (number 1) above.	Diagram will be changed
Laura Verduzco (Chevron Corporation)	2	7	14	7	15	-	-	-	Considere rephrasing, it's not clear. Yes, municipal solid waste includes plastics, but that doesn't change the estimated number of Jules generated from MSW	What changes is the amount that that power that is renewable (what would impact the climate positively). It will be made more clear. Data collection from biomass did not separate renewable from non-renewable MSW but it does now.
Kaija Hakala (MTT Agrifood Research)	2	7	7	7	7	-	-	-	10% of global energy was 46 EJ on p. 4 line 3, here it is 47 EJ. Choose one of these and use that throughout.	There are different definitions of energy accounting from IEA to WEO and EIA. We cannot show figures more recent than 2007 in WEO. To show the rapid increase we used IEA figures. That is the difference.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Wibke Avenhaus (Potsdam Institute for Climate Impact Research)	2	7	6	-	-	-	-	-	78 % of all renewable energy produced: in which year?	Accepted
Shigeki KOBAYASHI (Toyota R&D Labs.)	2	7	6	-	-	-	-	-	78% 77%?	77%
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	7	24	7	24	-	-	-	Addition: "The sources and methods of bioenergy production employed by these countries vary considerably."	Accepted
Jorge Martínez Chamorro (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	7	21	7	24	-	-	-	As it has been used along chapter 1, please use EJ whenever it is possible instead of PetaJoules (PJ). Example 9000 PJ/yr it could be 9 EJ/yr. It is much easier to compare the figures.	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	7	8	-	-	-	-	-	At the beginning of the line change "biofuels" to "bioenergy".	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	7	6	7	7	-	-	-	Change sentence to: "Currently bioenergy is the most important renewable energy source (78% of all renewable energy produced), although the methods by which it is exploited are not always sustainable in the long term. It provides about 10% (47 EJ) of the annual global primary energy demand."	Accepted
Richard Plevin (UC Berkeley)	2	7	2	-	-	-	-	-	I would drop the words "large-scale": even small-scale bioenergy systems, if poorly conceived, can have negative effects on climate.	Accepted
Chengyi Zhang (China meteorological Administration)	2	7	22	7	22	-	-	-	In China, much more than 9000 PJ/yr of biomass as a source of energy is consumed. That value should be revised with a proper one. In order to do that, would the author refer to the web pages for more information about the bioenergy use in China: www.creia.net/html/2008109161753929.html and http://www.newenergy.org.cn/Html/0096/630927697.html	Accepted
Ella Stengler (CEWEP)	2	7	14	7	15	-	-	-	Municipal waste includes a biodegradable part, and in Europe it is considered that 50% of the energy produced by Waste-to-Energy plants (incienration with energy recovery) comes from this biodegradable part. The other part consists of the fossil content of municipal waste (inter alia plastics).	Yes, definition EU and US is the same. Proportions will vary
Christoph von Stechow (IPCC WGIII TSU)	2	7	21	8	2	-	-	-	No reference is provided for the data that is provided. Do they originate from IPCC (2007) or IEA (2008)? Why is Russia counted to the industrialized countries? In a UNFCCC context this is not usual practice.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	7	2	7	5	-	-	-	No reference is provided to substantiate the assertion that increasing bioenergy production micht have "negative consequences for climate and sustainability such as inducing direct and indirect land use changes that can alter surface albedo, release carbon from soils and vegetation, reducing biodiversity or negatively impacting local populations in terms of land tenure or reduced food security, among other effects". In addition to referencing key studies from section 2.5, please consider providing a cross-reference to the same section.	will cross ref to section where the actual refs are.
Patrick Lamers (Ecofys Germany GmbH)	2	7	21	7	24	-	-	-	Quote/Reference is missing. Where is this data from?	Accepted
Gilberto Jannuzzi (University of Campinas)	2	7	25	7	31	-	-	-	REF NEEDED	Accepted
Gilberto Jannuzzi (University of Campinas)	2	7	32	8	2	-	-	-	REF NEEDED	Accepted
Brian Titus (Natural Resources Canada)	2	7	25	7	31	-	-	-	Surprising that there is no mention of Finland and Sweden.	Accepted
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	7	30	7	31	-	-	-	The examples should be extended by "CHP with biogas".	Accepted
Australia (0)	2	7	7	-	-	-	-	-	The figure for global primary energy demand of 47 EJ is inconsistent with that on page 4, line 3.	Accepted
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	7	7	-	-	-	-	-	The global bionergy consumption (47 EJ) is different from other pages. (see comment above)	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Australia (0)	2	7	6	7	7	-	-	-	The use of the phrase 'the most important' is a subjective judgement, suggest the sentence is changed to 'Currently bioenergy is the largest renewable energy source (78% of all renewable energy produced) and provides about 10% (47EJ) of the annual global primary energy demand.'	Accepted
Richard Plevin (UC Berkeley)	2	7	14	-	-	-	-	-	This section should note that whether the use of MSW is climate change mitigating depends on the alternate fate of the waste. The case of combusting plastic is no different than combusting biomass that would have remained undecomposed for decades.	Noted. This will be presented in the LCA studies comparing them with landfilling.
Frank Behrendt (Institute for Energy Engineering)	2	7	21	24	-	-	-	-	why EJ for global data and now PJ for country-specific ones?	same units will be used
Kaija Hakala (MTT Agrifood Research)	2	7	22	7	24	-	-	-	Why not use EJ instead of PJ?	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	7	21	7	24	-	-	-	Why use PJ, rounded to 1000, here? EJ might fit better with the rest of the text and avoid unnecessary 0s.	Accepted
Gilberto Jannuzzi (University of Campinas)	2	7	22	7	22	-	-	-	YEAR ? REF? (IEA 2008?)	Accepted
China (China Meteorological Administration)	2	7	22	7	23	2,1	-	-	Suggest that data source should be added.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	7	11	7	16	2.1	-	-	The figures of 7, 1 and 0.2 EJ don't add up to the 9 EJ for modern bioenergy that is mentioned in the ExSum. Possibly you forgot liquid biofuels for transport.	Rounding problem will be corrected.
Elina Vapaavuori (Finnish Forest Research Institute)	2	7	6	-	-	-	2.1.2.	-	Correct: Discrepancies in information about current bioenergy share of primary energy. On line 6 it is 78%, in the figure it is 77%.	Accepted. It is 78%
Kaija Hakala (MTT Agrifood Research)	2	8	16	8	18	-	-	-	AR4, not 4AR.	Accepted
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	8	24	-	-	-	-	-	CCS:definition missing	Accepted
Michael Jack (Scion (NZ Forest Research Institute))	2	8	10	8	10	-	-	-	estimating not etimate	Accepted
Shigeki KOBAYASHI (Toyota R&D Labs.)	2	8	22	-	-	-	-	-	I think the estimate of 45-85EJ is for 2050, not for 2030. Please check.	Accepted
Michael Jack (Scion (NZ Forest Research Institute))	2	8	34	8	34	-	-	-	integrating not integrate	Accepted
Australia (0)	2	8	14	9	27	-	-	-	Question the value of summarising and including old AR4 data	Required by IPCC outline
Brazil (Ministry of Science and Technology)	2	8	24	8	24	-	-	-	should be written: CO2 Capture and Storage - CCS	Accepted
Daniela Thrän (DBFZ / UFZ)	2	8	17	8	17	2.1.1	-	-	missing word	Accepted
Daniela Thrän (DBFZ / UFZ)	2	8	15	8	18	2.1.1	-	-	No helpful characterisation for a study - please skip	Required by IPCC outline
Helmut Haberl (Institute of Social Ecology, Vienna)	2	8	14	9	27	2.1.1	-	-	This section would need some language editing to make clearer than it now does that it reports on conclusions of AR4. Eg (line 15, p 9) one could replace "The energy potentials in residues from forestry is estimated at 12-74 EJ/yr" with "The energy potential of residues from forestry was estimated in AR4 to be 12-74 EJ/yr", etc.	Accepted
Daniela Thrän (DBFZ / UFZ)	2	8	21	8	21	2.1.1	-	-	use the term "transportation fuel" instead of "fuel"	Accepted
Elina Vapaavuori (Finnish Forest Research Institute)	2	8	14	9	27	2.1.1.	-	-	This section is not necessary	Required by IPCC outline
Peter de Haan (Ernst Basler + Partner AG)	2	8	-	-	-	-	2.1.3	-	in which unit are numbers given? Please enhance caption accordingly.	Accepted
Elina Vapaavuori (Finnish Forest Research Institute)	2	8	-	-	-	-	2.1.3	-	This flow chart could be omitted; not a clear one, old data.	Accepted
Ella Stengler (CEWEP)	2	8	3	-	-	-	2.1.3.	-	WtE plants turn waste directly (pre-treatment is normally not needed) into energy, which is delivered to industry, buildings, households, etc. Please consider this in the figure.	Accepted. Probably figure will be removed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	9	22	9	23	-	-	-	1220 MtCO2eq for the year 2030-is that an aggregate mitigation number? Is this per annum?	will check figure
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	9	4	-	-	-	-	-	At the end of the paragraph add: "Finally, it is important to mention that domestic energy policies were, are, and will continue to be a key driver in expanding bioenergy demand."	Accepted
Laura Verduzco (Chevron Corporation)	2	9	41	9	45	-	-	-	Biomass resource potentials also depend on land ownership, market prices for biomass/bioenergy products and biomass policy. For instance, the definition of renewable biomass in the Energy Independence and Security Act in the US contains the following language: "Planted trees and tree residue from actively managed tree plantations on non-federal land cleared at any time prior to enactment of this sentence, including land belonging to an Indian tribe or an Indian individual, that is held in trust by the United States or subject to a restriction against alienation imposed by the United States." This limits the biomass resource potential.	Section is on technical not real-world potential; and see also p. 10 line 29-33 where socioeconomic conditions are mentioned
Brian Titus (Natural Resources Canada)	2	9	14	-	-	-	-	-	Change from ¿Jathropa¿ to ¿Jatropa¿	Accepted
Brian Titus (Natural Resources Canada)	2	9	7	-	-	-	-	-	Change from ¿nature areas¿ to ¿natural areas¿	Accepted
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	9	23	9	27	-	-	-	CO2: 2 should be as subscript	Accepted
Laura Verduzco (Chevron Corporation)	2	9	13	-	-	-	-	-	Consider providing a more specific example. For instance, "establishment of Jathropa in XXX country has demonstrated to increase carbon storage up to XX % and water rotation at the basin level"	text will be eliminated as we only cite the figures from AR4
Laura Verduzco (Chevron Corporation)	2	9	15	9	21	-	-	-	Consider providing energy potentials for all biomass feedstocks, including dedicated tree plantations and algae or provide a chart with the potential contribution from each feedstock type. References: 1) Exploration of the ranges of the global potential of biomass for energy, Monique Hoogwijk, et al, Biomass and Bioenergy Volume 25, Issue 2, August 2003, Pages 119-133. 2) http://www.nrel.gov/docs/fy08osti/42414.pdf	No space
Helmut Haberl (Institute of Social Ecology, Vienna)	2	9	30	9	32	-	-	-	I think it is a bit confusing to say that bioenergy production can "strengthen conventional food and forestry production". In fact bioenergy production can create income for agriculture and forestry and thereby strengthen the sector of the economy; this might have (indirect) positive effects on food production, but this does not negate the fact that there might be competition for fertile land. One might say that if bioenergy feedstocks can be produced from residue flows that currently have no economic value, this might also have beneficial effects for food production.	improve wording
Laura Verduzco (Chevron Corporation)	2	9	22	9	27	-	-	-	Include a discussion of the carbon neutrality issue of biomass from wood and the inclusion of a temporal factor when calculating emissions. For more information, use the following references: 1)http://www.eeb.org/EEB/index.cfm?LinkServID=8481F382-A488-5532-533788C21A65D484&showMeta=0 and 2) http://www.manomet.org/sites/manomet.org/files/Manomet_Biomass_Report_Full_LoRez.pdf	we are only citing AR4 figures not providing a new analysis in this section
Richard Plevin (UC Berkeley)	2	9	22	27	-	-	-	-	Interpreting these "mitigation potential" values requires knowing the underlying assumptions. Even though this is summarizing from AR4, citations are sorely needed, or deeper explanation of the assumptions.	we will improve the writing but do not have space to explain assumptions. Readers need to refer to AR4

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	9	40	-	-	-	-	-	It is important for the IPCC to clearly distinguish between human food and animal feed uses of land. Approximately ten times more land is used worldwide to produce animal feeds than human foods. This is critical because at least some bioenergy approaches will allow us to coproduce animal feeds and biofuels without using new land. Papers from the Dale group at Michigan State University (see below), among others, should be consulted for their perspectives on these key issues. Dale, B. E., Allen, M. S., Laser, M. and Lynd, L. R. (2009). Protein Feeds Coproduction in Biomass Conversion to Fuels and Chemicals. Biofuels, Bioprod. Bioref. Vol. 3: 219-230. Dale, B. E. (2008). Biofuels: Thinking Clearly about the Issues. J. Agric. Food Chem. 56: 3885-3891. Carolan, J. E., Joshi, S. V. and Dale, B. E. ¿Technical and Financial Feasibility Analysis of Distributed Bioprocessing Using Biomass Pre-processing Centers¿ J. of Agricultural and Food Industrial Organization. Vol. 5, Issue 2, Article 10 (2007) Bals, B., Teachworth, L., Dale, B. E. and Balan, V. ¿Extraction of Proteins from Switchgrass Using Aqueous Ammonia within an Integrated Biorefinery¿ Appl. Biochem. Biotechnol. 143: 187-198 (2007) Weimer, P. J., Mertens, D. R., Ponnampalam, E., Severin, B. F. and Dale, B. E. ¿FIBEX-treated rice straw as a feed ingredient for lactating dairy cows¿ Animal Feed Science and Technology 103, 41-50 (2003) Sendich, E.D. and B. E. Dale. (2009). Environmental and economic analysis of the fully integrated biorefinery. Global Change Biology-Bioenergy. 1: 331-345. Biofuels done right: http://everythingbiomass.org/LinkClick.aspx?link=D2010+EST+(submitted)+-+Biofuels+done+right.pdf Supplemental: http://everythingbiomass.org/LinkClick.aspx?link=D2010+EST+(submitted)+-+Biofuels+done+right+-+supplemental.pdf	will see how to use, here or at a later spot in the section albeit briefly because of space constraints
Laura Verduzco (Chevron Corporation)	2	9	5	9	21	-	-	-	It would be more useful for the reader to have this information in a table format to do a quick visual comparison of 2030 and 2050 potentials.	No space
Richard Plevin (UC Berkeley)	2	9	13	9	-	-	-	-	Jatropha on "marginal" lands was promoted a few years ago as a "miracle" crop but I believe it was found to yield too little to be worth growing. Much depends on the definition of "marginal" land.	Rejected. The comment is correct but we still can use it a potential example. What it means is that there will take longer to develop multiple useful traits together in the same plant.
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	9	39	9	45	-	-	-	Remove the paragraph (shorten the Chapter)	Would prefer to keep. Important to state that the bioenergy potential is to quite some extent determined by proirities and choices made by society. Will check if wording can be improved and possibly combine with the next para
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	9	22	9	22	-	-	-	Replace "Carbon mitigation potencial" in iii) with "Carbon dioxide mitigation potencial". We are not mitigating carbon, we are mitigating the GHG carbon dioxide.	Accepted
Richard Plevin (UC Berkeley)	2	9	8	-	-	-	-	-	Specify whether this 20-400 EJ (per year, I presume) is a technical or economic potential.	will check AR4
United States (U.S. Department of State)	2	9	22	9	27	-	-	-	This paragraph and its implications need to be made clearer.	Accepted
Norway (Climate and Pollution Agency)	2	9	5	9	27	2	-	-	The figures under Biomass energy potentials and Carbon mitigation potential seem to be less consistant; the ranges of energy potential for respectively residues from forestry (12-74 EJ/yr) and agriculture (15-70 EJ/yr)don't seem to be consistant with the figures for Carbon mitigation (Forestry 400 Mt CO2-eq/yr, agriculture 70-1260 Mt CO2-eq/yr,. Maybe this is because of different years 2050 and 2030 and including only residues in the energy potential whilst the CO2-reduction is for 2030. Further confusing is the introduction in between of the figure for mitigation potential for elctrisity generation of 1220 Mt CO2-eq in 2030 Is this all biomass? And are the other figures for agriculture and forestry for electricity or also heat substituting fossil fuels? A suggestion is to present the figures in a table and comment the assumptions and differences in a text.	will re-check the text from AR4
Daniela Thrän (DBFZ / UFZ)	2	9	10	9	14	2.1.1	-	-	social risks for the use of those lands are not mentioned, please add	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	9	29	10	44	2.2.1	-	-	Compliments for this new introduction. Much, much better than the one in V1.	thanks
Michael Jack (Scion (NZ Forest Research Institute))	2	10	4	10	4	-	-	-	(PNAS 2007) is not a proper reference	it is Haberl et al 2007
Frank Behrendt (Institute for Energy Engineering)	2	10	4	-	-	-	-	-	an average of 18 GJ/Mg is pretty high and will not reflect fresh biomass but dried one - what's about the energy neede for drying?	here a rough estimate "on the safe side" is sufificent for the argument; and is consistent with Haberl et al. 2007; we present the number clearly and readers could easily use a smaller number if they wish, eg 16
Michael Jack (Scion (NZ Forest Research Institute))	2	10	8	10	10	-	-	-	Different crops will also presumable increase NPP (e.g. grasslands vs. forest)	will be discussed more elsewhere, currently true only in a few places when annual basis is taken into account (crops may have higher NPP per day, but the season is shorter)
Christoph von Stechow (IPCC WGIII TSU)	2	10	3	-	-	-	-	-	How does the NPP of 1260 EJ/y compare to the upper range of the biomass technical potential of 1500 EJ mentioned in Figure 2.8.3? How can the technical biomass potential be above the NPP, if it "considers limitations of the biomass prodcution practics assumed to be employed, and also restrictions imposed by demand for food, feed, and fiber, and area requirements for human infrastructure"? (from page 11, line 12-14)	We already state that high potentials require an increase of global NPP, will reflect upon that once more in the summary
Brian Titus (Natural Resources Canada)	2	10	1	10	28	-	-	-	Is there a comparison available for NPP from unmanaged vs. managed land?	Is available, but the point here is simply to give a reference for total biosphere production above-ground across all systems, which is the natural theoretical max without additional NPP-enhancing measures
Shigeki KOBAYASHI (Toyota R&D Labs.)	2	10	1	-	-	-	-	-	Is there any estimate including marine biomass?	Global marine biomass initial estimates are very uncertain. We provide ranges that go from: "up to several hundred EJ for microalgae and up to several thousand EJ for macroalgae". It could be distracting to put these numbers with very few studies and substantiation next to the terrestrial numbers.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	10	11	10	17	-	-	-	One might mention here that the total amount of biomass harvested and used by humans globally in the year 2000 had an energy equivalent (gross calorific value) of 225 EJ/yr (data from: Krausmann, Fridolin, Karl-Heinz Erb, Simone Gingrich, Christian Lauk, Helmut Haberl, 2008. Global patterns of socioeconomic biomass flows in the year 2000: A comprehensive assessment of supply, consumption and constraints. Ecological Economics 65(3), 471-487). This might be a useful figure to compare with bioenergy production targets/scenarios or potential estimates.	will check and better explain numbers, all details in new ref Krausmann et al. 2008 Ecol Econ.. It is cited
Laura Verduzco (Chevron Corporation)	2	10	5	-	-	-	-	-	Provide a unit of time (i.e. EJ/year, EJ/day¿)	will do
Australia (0)	2	10	5	-	-	-	-	-	Specify the year that this world primary energy demand figure refers to.	add "current"
Helmut Haberl (Institute of Social Ecology, Vienna)	2	10	4	-	-	-	-	-	The correct citation is (Haberl et al. 2007): Haberl, Helmut, Karl-Heinz Erb, Fridolin Krausmann, Veronika Gaube, Alberte Bondeau, Christoph Plutzar, Simone Gingrich, Wolfgang Lucht, Marina Fischer-Kowalski, 2007. Quantifying and mapping the human appropriation of net primary production in earth¿s terrestrial ecosystems. Proceedings of the National Academy of Sciences of the USA 104, 12942-12947.	update ref
Norway (Climate and Pollution Agency)	2	10	3	10	28	2	-	-	Also here a number of figures that seem to be less consistant with each other or hard to compare; in line 3 35 Pg C or 1260 EJ/yr for NPP and tha in line 13-14 global roundwood production 15-20 EJ/yr, agricultural crops 60 EJ/yr, together 80 EJ/yr or 6-7 % of NPP. This is quite different from line 22; biomass harvest about 20 % of NPP. A possible explanation can be that the traditional use of biomass is not included. If that is the case it should be mentioned and put in a contect. The way it is presented now there are a lot of figures without a contect. An idea could be to present the figures in a table and than have an explaining text.	The interpretation of the reviewer is correct. These numbers give a comparative idea -- the 20 EJ of industrial roundwood and 80 EJ of agriculture are just examples of main products but not the total. It does not include the 50 EJ of bioenergy that have to be added. It does not include fodder from the fields nor other wastes.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	10	5	10	6	2.2.1	-	-	"larger but not huge": I think I know that you're trying to convey and it's a relevant message. But may be 'larger, but not larger by orders of magnitude' is more neutral.	change text as proposed
Donald Smith (McGill University)	2	10	8	10	10	2.2.1	-	-	Biofertilizers, in a wide range of forms, offer interesting potential as low energy inputs for biofuel feedstock production systems. For instance two US companies (EMD Crop Bioscience and Becker-Underwood) are now adding various plant-microbe signal compounds to products that stimulate crop growth.	No more space for technologies

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	11	17	-	-	-	-	-	¿Economic potential¿ is acceptable, although it may be possible to use a shorter definition: ¿Economic potential is the biomass supply that can be harvested at a profit. Implementation potential is the variant that can be realized within a time-frame determined by institutional and social conditions that define the pace of expansion.¿	see above
Brian Titus (Natural Resources Canada)	2	11	11	11	23	-	-	-	Now need a term for competing land use, as it is distinctly different from ecological potential: social potential is largely determined by human need within a cultural context, but ecological potential is largely based on science. Maybe ¿Social potential is the biomass supply that can be harvested or collected once other societal needs (such as food, feed, fibre, and human infrastructure) are taken into account.¿	see above
David Clubb (European Environment Agency)	2	11	4	11	23	-	-	-	Query/omission: Environmentally-compatible potential warrants its own section here (rather than being a sub-section of 'technical' potential). This is something which will be standard practice in resource feasibility in the future (and is considered in many current studies). Without this component, the economic potential is nearly meaningless	may improve wording but not change number of categories; was carefully considered and discussed in team and across chapters; definitions given bs SRREN glossary and a rebinding; note that this type of potential will be defined very differently in different countries depending on priorities in different nations. It is a very vague concept and subject to individual interpretation (as sustainable potential). The EEA study mentioned in the section talking about constraints.
United Kingdom (Department of Energy and Climate Change)	2	11	-	12	-	-	-	-	room for cutting text here - we don't need details of all the resource assessmnets - just minima, maxima and why the differ	wish to keep
Brian Titus (Natural Resources Canada)	2	11	11	11	23	-	-	-	Simplifying this list to three categories of potential does not seem prudent, and is not in keeping with the overall structure of the chapter or with other commonly accepted potentials and their defintions, such as those in Smeets and Faij (2007). For example, current technical potential includes potentials determined by three very different sets of factors: (i) engineering/operations based on equipment design and logistics, (ii) competing societal needs, which has a partially cultural context, and (iii) ecology, based on science. Then, further on in the chapter, ¿technical¿ is used to mean just that (e.g., Section 2.3, Page 25ff.), and does not include societal needs or environmental issues, which are treated separately. The use of terminology needs to align throughout the chapter.	see above
United Kingdom (Department of Energy and Climate Change)	2	11	11	-	23	-	-	-	Suggest there is room for introduction of a fourth concept: the sustaianble potential (Thornely et a., "Sustaianbility constraints on UK bioenergy development", Energy Policy, 2009)	see above
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	11	16	11	16	-	-	-	the term "sustainable potential" should not be used "some times" but always throughout all chapters of the report when applicable	see above
Christoph von Stechow (IPCC WGIII TSU)	2	11	17	11	23	-	-	-	This definition is very similar to the definition of "market potential" according to Verbruggen et al. (2010) (p. 854) as opposed to "economic potential" which is defined differently.	see above
Brian Titus (Natural Resources Canada)	2	11	11	11	23	-	-	-	Try ¿Ecological potential is the biomass supply that can be harvested or collected while ensuring long-term environmental sustainability. It is determined by natural bio-physical conditions and can be increased through sustainable land-management practices. In a practical sense, it is the foundation for all other forms of potential.¿	see above
Brian Titus (Natural Resources Canada)	2	11	24	12	8	-	-	-	Try ¿Most assessments of the biomass resource potential considered in this section are variants of technical/economic potentials employing a food/fibre first principle (e.g., WBGU, 2009 and Smeets and Faaij, 2007) but do not guarantee that a certain level of biomass can be supplied for energy purposes without competing with food or fibre production, or analyse how bioenergy expansion would ¿ or should ¿ interact with these two alternate uses.¿	check language
Brian Titus (Natural Resources Canada)	2	11	11	11	23	-	-	-	Try ¿Technical (or operational) potential is the biomass supply that can physically be harvested or collected, based on equipment and logistics.¿	see above

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	11	11	11	23	-	-	-	Try ¿Theoretical potential is the maximum biomass supply determined by bio-physical conditions and land management practices, without taking the environmental impacts of production or harvesting into consideration.¿ [It is not clear if ¿bio-physical¿, without elaboration, includes environmental considerations or not; an environmentalist could argue that ¿bio-physical¿ includes it, but current context suggests that it is not included. Furthermore, it is not clear if ¿bio-physical¿ includes management inputs or not; again, an environmentalist might argue that it does not, but a forester or agriculturist might argue that it does. This can all be avoided by using the suggested elaboration.]	see above
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	11	5	11	9	2.2.2.	-	-	Please take care of this long, complex and tough-grammar sentence!	will improve wording
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	11	1	85	3	-	2.2.1	-	Although climate change uncertainties points to Biodiversity in the figure, it seems there is no reference to climate change impacts in the figure that will have effect on land areas modifiying yields, suitable areas for crop production and water resources.	will add when figure is re-drawn
Helmut Haberl (Institute of Social Ecology, Vienna)	2	11	-	-	-	-	2.2.1	-	In my view, this figure is quite confusing. I understand that the things included in that figure may influence bioenergy potentials, but I did not get the basic logic of that graph.	Was thoroughly discussed in author team, decision was clearly to keep; bioenergy is an issue of complex embedding, this is shown here
Brian Titus (Natural Resources Canada)	2	12	40	-	-	-	-	-	¿limitations¿ is pejorative, and unnecessary in this case. P.12 L.37-44 could read ¿The wide ranges in Table 2.2.1 are due to different approaches in determining factors which are uncertain: population, economic, and technology development can diverge, and at different paces; environmental requirements are difficult to assess; and land use and climate change can strongly influence the natural biophysical capacity of ecosystems. Furthermore, biomass potentials can not be determined precisely while uncertainty remains about tradeoffs in environmental impacts, intensified pressure on food and fibre production, or potential synergies in land use.¿ Can similar neutral language be used elsewhere?	check language
Brian Titus (Natural Resources Canada)	2	12	29	-	-	-	-	-	¿restrictions connected to environmental and socioeconomic factors¿. This implies a very industrial view of the bioenergy sector because ¿restriction¿ is pejorative. See general review statements on this point.	check wording for risk of bias but will not necessarily change
Brian Titus (Natural Resources Canada)	2	12	1	-	-	-	-	-	¿sawnwood¿ but would ¿roundwood¿ be better? Check document for use of ¿sawnwood¿, which appears more than once.	Sawnwood is used here as one example of forest product demand (together with paper being another forest product). Roundwood would be the resulting raw material demand in the forest sector
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	12	44	12	44	-	-	-	Add after ¿¿in land use. ¿Bio energy should also be placed in the context of agricultural development and changing consumption patterns in general. ¿Driven by population growth and changes in diet, global food production is projected to increase. Projections without major policy changes show growth numbers of between 50 and 65%, compared to 2000, in the period up to 2030 and beyond (FAO, 2006; IAASTD, 2008; Van Vuuren et al., 2008b). Consistent with the range in the literature, global food production increases steadily under the Trend scenario used to indicate the changes without new policies in this report (see Figure 4.1). The increase in production is somewhat slower than in the past, as a result of a slowdown in population growth. Diets are projected to become more meat intensive, with annual per-capita meat consumption increasing, on average, from 90 kg per person per year to over 1o0 kg between 2000 and 2050, in high-income countries, and from around 25 to nearly 45 kg per person per year, in low-income countries during the same period (Figure 4.1). This trend is relevant for land use, since animal products require much more land than crops. On average, the production of beef protein requires several times the amount of land than the production of vegetable proteins, such as cereals (MNP, 2008; Stehfest et al., 2009). While meat currently represents only 15% of the total global human diet, approximately 80% of all the agricultural land is used for animal ranging or the production of feed and fodder for animals (FAO, 2006). (Page 68, Growing within Limits, PBL, 2009).	The aspects mentioned are discussed later in the section. So no further elaboration here.
Christoph von Stechow (IPCC WGIII TSU)	2	12	31	12	36	-	-	-	As agreed during LA3 in Oxford, the studies on the resource potential of bioenergy should be compared with the numbers provided in AR4 and DLR/Ecofys (2009).	will be done in 2.8
Brian Titus (Natural Resources Canada)	2	12	23	-	-	-	-	-	Can be abbreviated to ¿Plants produced for energy, including conventional food/feed/industrial crops, surplus roundwood and new agricultural, forestry or aquatic plants.¿	check wording

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	12	31	-	-	-	-	-	Could be shortened to ¿Table 2.2.1 shows resource potential in 2050 for different types of biomass based on reviews (IEA Bioeernergy 2009 and van Egmond 2008) and selected additional studies (Field¿).¿	choose not to
United States (U.S. Department of State)	2	12	9	-	-	-	-	-	In several places these integrated studies are cited (Melillo et al, van Vuuren et al, Wise et al., etc) however they are never actually discussed. More attention should be given to this as overall the chapter is lacking any integrated views of the bioenergy resource.	here only for reference, no need for discussion, not treated more explicitly because they are more of impact assessments than studies attempting to quantifying potentials. They are treated in section 2.5
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	12	17	-	-	-	-	-	It is a little bit confusing to mention three categories and present six categories in the following table.	Categories in the table are subcategories of the three principal categories stated in the text
Michael Jack (Scion (NZ Forest Research Institute))	2	12	37	12	37	-	-	-	Sentence should read: ""The wide rnages in Table 2.2.1 are due to differences in approaches to considering¿""	check language
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	12	3	12	3	-	-	-	There must be missing words in the phrase: most influential parameters are that affect this potential.	check wording
Brian Titus (Natural Resources Canada)	2	12	37	12	44	-	-	-	Would a graph of past and predicted global population growth be useful, especially if the graph includes a line for global food production and perhaps land use? Note that global population increase is mentioned a number of times throughout the chapter, so a graph would be applicable to several sections.	yes pop growth is a factor, but still reject because of tangent issue and space limitations, can only show leading effects
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	12	32	12	33	2.2.2	-	-	Why this underscore?	was a formatting error
Richard Plevin (UC Berkeley)	2	13	-	-	-	-	2.2.1	-	Indicate whether this table shows theoretical, technical, or economic potential, or (quite possibly) is a mix of all of these.	will do
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	13	-	13	-	-	2.2.1	-	Refs? Mentioned in the text, but please also include in table header.	will do
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	13	-	16	-	2.2.1	2.2.1	-	The order in table 2.2.1. is not consistent with the order of sections 2.2.2.1 to 2.2.2.3. Or the other way around.	will re-order table
Frank Behrendt (Institute for Energy Engineering)	2	13	-	-	-	-	-	2.2.1	A total of < 50 - > 1000 is a more or less meaningless range; the only helpful input for the discussion is a "we don't know"; some shortening in this section would help to achieve the 100 p goal without sacrifying reliable numbers or facts	task is to summarize published assessments, these ranges are found
Daniela Thrän (DBFZ / UFZ)	2	13	-	13	-	-	-	2.2.1	Category 6: collection systems are also a relevant dirver for the availability	add some words to category
Peter de Haan (Ernst Basler + Partner AG)	2	13	-	-	-	-	-	2.2.1	coordinate with table 2.2.2	not directly related to 2.2.2: 2.2.2 is a specific potential analysis (example), 2.2.1 a discussion of published ranges
Sweden (Swedish Environmental Protection Agency)	2	13	-	-	-	-	-	2.2.1	For the first category you write that large biomass potentials require global development towards high yielding agricultural production, but you don¿t mention the effects of diet which is also an important factor.	add some words to category
Canada (Environment Canada)	2	13	-	13	-	-	-	2.2.1	Forest biomass section: Suggest including "standing dead trees following insect attacks or wildfire in extensively managed boreal and montane forests". Such disturbances are natural events that are largely beyond forest management control and are in fact part of the natural ecosystem . However, their scale and frequency may increase in the future, as may be the case with the recent Mountain Pine Beetle epidemic in British Columbia (See Lemprière,T.C., P.Y. Bernier,A.L. Carroll, M.D. Flannigan, R.P. Gilsenan, D.W. McKenney, E.H. Hogg, J.H. Pedlar, and D. Blain. 2008. The Importance of Forest Sector Adaptation to Climate Change. Canadian Forest Service Information Report NOR-X-416E, 57pp., http://nofc.cfs.nrcan.gc.ca/bookstore_pdfs/29154.pdf). Dymond et al. estimate future theoretical potential supply from wildfire wood recovery at 51 ± 17 Tg year-1 (See Dymond, C.C., Titus, B.D., Stinson, G., Kurz, W.A. 2010. Forest Ecology and Management 260: 181-192).	will add some words to table category
Alexander Popp (PIK)	2	13	-	-	-	-	-	2.2.1	please adapt order to of categories to 2.2.2.X and 2.2.4.X	table will be re-ordered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Peter de Haan (Ernst Basler + Partner AG)	2	13	-	-	-	-	-	2.2.1	The potential of any type of biomass should never be zero. Zero does not exist, so to say, even if we assume where hard pressure from the food sector and scarcity of fertile land. Even then, there will not be a single, homogeneous global market, i.e., even then in some remote areas inhabitants will use biomass as an energy source as transportation to other locations is to costly and/or there personal preference is not in line with global market prices (private wood owners, etc.)	Yes it can be zero: the table is for extraction for bioenergy only, and increased demand from other processing sectors could reduce the potential for energy to zweo; table needs to cover all perspectives from the literature
Peter de Haan (Ernst Basler + Partner AG)	2	13	-	-	-	-	-	2.2.1	The total biomass production, at present at 50 EJ/a, can hardly be assumed to drop below, say, 30 EJ/a, in any scenario.	The captions mentions why future biomass use could theoretically be lower than currently due to increased food/fibre competition and degradation
Brian Titus (Natural Resources Canada)	2	14	23	-	-	-	-	-	¿Competing use¿ is pejorative when referring to soil conservation requirements. Try the neutral statement ¿The proportions of biomass flows that are available for energy (i.e., recoverability fractions) are then estimated based on needs for soil conservation or other extractive uses such as animal feed¿¿	Check language
Curbelo Alfredo (Cubaenergia)	2	14	23	14	25	-	-	-	Among competitive bioenergy systems today should be mentioned production of power and heat using biomass waste feedstock based on the experience of the sugar industry in Latin America and of rice husk fueled rice mills in Asia.	Not 2.2, here just general discussion of methods
United States (U.S. Department of State)	2	14	28	-	-	-	-	-	An example of the awkward phrasing that is a problem in this chapter: "currently not used forest growth". The sentence needs to be rephrased to clarify what is actually meant.	Check language
Brian Titus (Natural Resources Canada)	2	14	36	-	-	-	-	-	Change from ¿15-20 EJ/year shows¿ to ¿15-20 EJ/year (energy equivalent) shows¿	Convention used is well established
United States (U.S. Department of State)	2	14	36	-	-	-	-	-	Clarify whether " forest biomass output" refers to forest harvest or to total NPP of forests.	chack language
United States (U.S. Department of State)	2	14	42	-	-	-	-	-	Description "food sector development" is unclear. Specify whether this refers to improvements in crop productivity.	Check wording, may need to qualify: "e.g., diet changes and yield growth"
Curbelo Alfredo (Cubaenergia)	2	14	13	14	15	-	-	-	It should be notice that exist large reserve to improve quality and efficiency of energy services that receive more than billion people around the world from traditional bioenergy, contributing at the same time to Climate Change mitigation.	does not apply to this section
Curbelo Alfredo (Cubaenergia)	2	14	38	14	40	-	-	-	Link of perennial energy crops deployment with reforestation activities is an approach that could provide a variety of positive impacts.	This is already covered
Christoph von Stechow (IPCC WGIII TSU)	2	14	42	14	45	-	-	-	No reference is provided to substantiate the assertions made in this paragraph. Referencing key studies from section 2.5.3 could be considered.	This is meant to be logical reasoning and not assertions.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	14	19	-	-	-	-	-	The studies by Krausmann et al. 2008 (comment 9) and Haberl et al. (2007) (comment 8) contain major sets of harvest indices as well as factors used to generate by-product flows and might be considered here as well.	Can cite these as additional examples since they are already in the ref list
Brian Titus (Natural Resources Canada)	2	14	42	-	-	-	-	-	The term ¿has to consider maintaining¿ is a little clumsy, and weak. Change from ¿Thus, food sector development is a critical aspect to consider when estimating biomass resource potentials. Determining land availability and suitability has to consider maintaining the economic¿¿ to ¿Thus, food sector development is critical when estimating biomass resource potentials. Land availability and suitability must take into consideration the economic¿¿	Check language
United Kingdom (Department of Energy and Climate Change)	2	14	6	-	25	-	-	-	This seems to contradict earlier comments about only being able to apply a very low residue recovery factor to ensure soil/nutrient balances. If that is the case we should not waste space in the document describing resource assessments that overestimate the potential by not doing that.	reviewer misunderstood, earlier comment just states that restrictions limit potential to lower levels, not that they are low
Brian Titus (Natural Resources Canada)	2	14	26	14	37	-	-	-	This should be entitled ¿The contribution from increased forest management and un-utilized forest growth¿, as both could make a significant contribution. The difference is that workers have quantified the latter for bioenergy but not the former. Nonetheless, there is ample traditional forestry literature to indicate how site productivity can be increased through more intensive management, such as reforestation methods, species choice, tree improvement through breeding (genetics), fertilization, vegetation management, etc. A few sentences on this should precede the current paragraph on un-utilized growth. Its omission would likely strike most foresters as surprising.	The place for treating this would be 2.2.4.2, where it is treated briefly.
Norway (Climate and Pollution Agency)	2	14	36	14	37	2	-	-	A higher output might require increased harvest resulting in a decreasing Carbon stock and increased fluc of carbon as CO2 to the atmosphere.	This is handled in 2.5 and the stock C change aspect is also treated later in 2.2

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Rory Gilsenan (Natural Resources Canada)	2	14	-	-	-	2.2.2.1	-	-	Note that in Canada most bioenergy use in the forest sector relies on industrial processing residues ¿ there is little in the way of harvest residues utilized at this point. This represents a huge potential, but we are moving forward cautiously in this area, in order to develop appropriate sustainability criteria.	This comment was rather a piece of interesting informatoin. More details on forest biomass extraction is given later in 2.2
Ella Stengler (CEWEP)	2	14	-	-	-	2.2.2.1.	-	-	The chapter concludes that assessments of the potential contribution from residues, dung, processing by-products and waste sources to the future biomass supply are difficult and interdependent. For municipal waste (incineration) we know that energy production from the biodegradable part is about 50% so we can estimate that about 50% of energy produced by Waste-to-Energy plants comes from biomass. The quantity of waste can also be quite well assesed, so in the case of waste the potential contribution to the biomass feedstock can be easily determined.	The text talks about future potentials, which is uncertain also for the municipal waste category
China (China Meteorological Administration)	2	14	26	14	37	2.2.2.2?	-	-	Suggest that content about ¿China forestry biomass potentials¿ should be added to 2.2.2.2. ¿Mid and Long-term Development Plan for Renewable energy in China¿ published in August, 2008 by China NDRC can be referenced.	Limited space; individual regions not discussed here, just general principles
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	14	40	14	41	2.2.2.3	-	-	"the very high levels of bioenergy supply". Fragment hard to understand. High levels for what?	Check wording
Curbelo Alfredo (Cubaenergia)	2	15	31	15	33	-	-	-	Assertion about differences of intensity of the use of production factors is relevant in the case of energy crop systems.	This is already discussed
Australia (0)	2	15	24	15	24	-	-	-	Change 'would' to 'could'.	Correct text
Richard Plevin (UC Berkeley)	2	15	25	15	28	-	-	-	Citation needed here. A good choice would be Fargione et al, Science, 2008.	this is treated in 2.5
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	15	25	15	28	-	-	-	CO2: 2 should be as subscript	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	15	8	-	-	-	-	-	If the Executive Summary will not introduce the terms "first and second-generation biofuels", they should be explained in this paragraph.	Make sure that this is introduced in the proper place
Helmut Haberl (Institute of Social Ecology, Vienna)	2	15	25	15	26	-	-	-	In fact, such effects could even negate any climate benefits, see e.g. new calculations by Fritsche et al. (Fritsche U.R., Hennenberg K. & Hünecke K. (2010). The 'iLUC Factor' as a Means to Hedge Risks of GHG Emissions from Indirect Land Use Change. In: Öko-Institut e.V., Working Paper, Darmstadt.) and Searchinger (Searchinger T.D. (2010). Biofuels and the need for additional carbon. Environmental Research Letters, 5, doi:10.1088/1748-9326/5/2/024007.)	this is treated in 2.5
Switzerland (Swiss Federal Office for the Environment)	2	15	23	15	30	-	-	-	It should be noted that the favourable GHG balance of bioenergy also depends on GHG emissions from agricultural practices applied, not only on soil-carbon changes. Especially emissions from fertilizer production (CO2 and N2O) and N2O emissions from soils should be considered.	Already treated in 2.3 and 2.5
Helmut Haberl (Institute of Social Ecology, Vienna)	2	15	35	-	-	-	-	-	It would be good to know how this 'land balancing' was done, as this is critical for the results	Add one sentence describing land balancing
Curbelo Alfredo (Cubaenergia)	2	15	44	15	46	-	-	-	Only primary agricultural residues have relation with balance of nutrient in the soil.	We cannot understand the comment; line numbers not existant on that page
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	15	16	15	30	-	-	-	Remove the paragraph (shorten the Chapter). Besides, it is also indicated that the ideas depicted in the paragraph are further discussed in Section 2.5.	this was added here on request from reviewers of the FOD. Want to keep this text.
Curbelo Alfredo (Cubaenergia)	2	15	22	15	22	-	-	-	Role of specialized companies in implementation of bioenergy systems is usually underestimated. Most of bioenergy systems are going to be a small scale facilities in comparison with those based on conventional fuel. This means that any significant penetration of bioenergy into energy systems is going to be based on a large number of technical diverse and geographically dispersed facilities. Implementation and sustainable operation of this energy system, demands a web of small and medium size specialized companies. These companies should take care of project design, engineering works, contracting of supplies, erection and start up, and finally operation and maintenance. Absence of these local companies and lack of interest of similar international companies to offer those services, because small project sizes, is one of the significant barriers to massive biomass energy development to satisfy local energy demand in developing countries.	rather implementation section than here in 2.2

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	15	30	-	-	-	-	-	Since section 2.5 is more than 20 pages long, please consider specifying the subsection that the paragraph is reffering to, which might prove helpful for the reader (2.5.3).	make cross link more exact
United States (U.S. Department of State)	2	15	34	-	-	-	-	-	The "paradigm" referenced assumes that bioenergy is not or cannot be integrated with food/fodder production. However the current corn ethanol industry already coproduces animal feed and biofuels. This model can be applied to second generation biofuels as shown in several publications. This report will be seriously deficient if it does not recognize the huge potential for integrating food/fuel/feed production to their mutual benefit.	this aspect is treated, e.g. in 2.2.4.2 but we should make sure that it is sufficiently clear
Curbelo Alfredo (Cubaenergia)	2	15	7	15	14	-	-	-	Uncertainty of the estimation of potential for large scale deployment of bioenergy linked to factors as sustainability and policy frameworks, is different for each group of feedstock. Influence of these factors on estimations is very low in the case of agroindustry wastes group. Issues related to sustainability of production is the main source of uncertainty in the case of lignocellulosic energy crops group, but positive experiences in this field could be a solid base for its extension. In the case of the group of crops for ethanol and biodiesel production, is where these factors introduce larger uncertainties	this should be treated in the implementation section?
Wibke Avenhaus (Potsdam Institute for Climate Impact Research)	2	15	36	15	39	-	-	-	What are the specific assumptions?	cannot go into details because of space, reader needs to go to original study
Curbelo Alfredo (Cubaenergia)	2	15	28	15	30	-	-	-	While it is true that exploitation of forestry over its regeneration capacity is the most impacting problem in traditional bioenergy, it is also true that in the rest of before mentioned biomass cases arise also many problems that should be alerted. In other case could be fixed impression that it is the only problem to deal with.	Many aspects are already treated
Norway (Climate and Pollution Agency)	2	15	25	15	26	2	-	-	After "drastically reduce" add "or even exceed" if this supported by the litterature. Newer (2010) calculations in Norway show that the carbon loss from forest biomass to the atmosphere by harvesting can exceed the CO2-emission reductions by substituting fossil fuels, especially with a shorter (10-70 years) time horizon.	this is treated in 2.5
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	15	7	15	43	-	2.2.2	-	It is unclear how the amount of available land was calculated. Excluding protected areas and forest is insufficient to avoid overlap with biodiveirsty, as biodiveristy is not contained in certain areas like protected areas. The report by Fischer et al 2009 is not published and not available on the IIASA website.	Report available and from a highly reputable source
Curbelo Alfredo (Cubaenergia)	2	16	18	16	19	-	-	-	Also it should be considered that because raw biomass is commonly available in loose form it make very difficult to standardize its properties like fuel. It is a strong limitation developing a market for solid biofuels. Basic requirements for fuel standardization are homogenization of the form and size of particles and to keep the value of humidity content into some specific range. Densification of raw material is one of the options to achieve that goal.	Biomass pretreatment is discussec in the technology sections, not the right pace here
United Kingdom (Department of Energy and Climate Change)	2	16	16	17	24	-	-	-	As above, have these been taken into acocunt future climate change projections in assessing water resource. If not this urgently needs to be addressed.	see above
Brazil (Ministry of Science and Technology)	2	16	20	-	-	-	-	-	By the other side, perennial or semi ¿perennial crops and proper land management can protect soil from rain run-off and also retain water to replenish underwater reservoir.	will add a few words but cannot be dealt with in depth due to space constraints, see also water discussion on p. 22
Australia (0)	2	16	21	16	21	-	-	-	Change 'forestation' to 'forest establishment'.	But rather change to afforestation, the usually used term
Laura Verduzco (Chevron Corporation)	2	16	16	16	20	-	-	-	Consider also the effects of climate change on water resources for biomass: 1-Winter snowfall has transformed into rain in some areas, while in others droughts have become more prevalent. If the trend continues, wet areas will become wetter, while dry areas will become drier. 2-If global temperatures continue to increase, warmer temperatures and higher evaporation rates will increase the demand for drinking and irrigation water. These are findings from the United States National Academies of Sciences. The report is available at: http://dels-old.nas.edu/climatechange/ecological-impacts.shtml	Issue is complex and discussed later under climate change impacts; issue more complex than summary by reviewer, has to be seen together with CO2 fertilisation effect. The WBGU study discussed on this page actually includes all of these effects and several climate projections; will therefore on briefly be mentioned here (i.e. potential change in water stress under climate change)
Curbelo Alfredo (Cubaenergia)	2	16	39	16	46	-	-	-	Cost analysis made in this paragraph is not relevant: it does not make sense comparison of production costs of ethanol with biodiesel and of solid biomass with liquid biofuel because they are no substitutive products for same application.	comment by reviewer does not refer to the page or section in question
Curbelo Alfredo (Cubaenergia)	2	16	41	16	43	-	-	-	It is not evident what does it means ¿conversion efficiency¿. Assertion, that this efficiency is lower than 50%, do not correspond with the fact that in very known bioenergy technologies their energy efficiency is higher that mentioned figure. It is case of biomass boilers it is more than 90% and of direct combustion of gas produced by biomass gasification technology is higher than 60%.	comment by reviewer does not refer to the page or section in question

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Helmut Haberl (Institute of Social Ecology, Vienna)	2	16	15	-	-	-	-	-	It might be interesting to take new results on board that have explicitly taken interaction between area demand for crops, area demand for grazing/livestock and area availability for bioenergy into account (see Erb, Karl-Heinz, Helmut Haberl, Fridolin Krausmann, Christian Lauk, Christoph Plutzar, Julia K. Steinberger, Christoph Müller, Alberte Bondeau, Katharina Waha, Gudrun Pollack, 2009. Eating the planet: Feeding and fuelling the world sustainably, fairly and humanely ¿ a scoping study. Social Ecology Working Paper No. 116, Vienna, Potsdam. http://www.uni-klu.ac.at/socec/downloads/WP116_WEB.pdf; Three articles based on this study are currently in review with international peer-review journals). Interestingly, this study resulted in a very similar range for the potential to grow dedicated bioenergy crops as the WBGU (2009), despite a completely different methodology.	may add reference here or other appropriate place
Curbelo Alfredo (Cubaenergia)	2	16	28	16	38	-	-	-	It should be made distinction between conversion technologies of biomass feedstock into biofuel and for conversion of biofuels into energy. In the first group of technologies are included for solid biofuels: technologies for wood chips and pellets fabrication; for production of liquid biofuel: fermentation, transterification and pyrolysis; and transformation into gaseous biofuel: biomass gasification and anaerobic digestion technologies. The main conversion technology of biofuels into energy is the combustion technology that is implements in different energy equipment: boilers, furnaces, internal combustion engines, gas turbines, etc. These equipment should be adapted in a different extend to be fueled by biofuels.	comment by reviewer does not refer to the page or section in question
Curbelo Alfredo (Cubaenergia)	2	16	28	16	29	-	-	-	It should be made distinction between conversion technologies of biomass feedstock into biofuel and of biofuels into energy. In the first case are included for solid biofuels: technologies for wood chips and pellets fabrication; for production of liquid biofuel via fermentation, transterification or pyrolysis; and transformation into gaseous biofuel obtained by biomass gasification and anaerobic digestion technologies. The main conversion technology of biofuels into energy is the combustion technology that is implements in different energy equipment: boilers, furnaces, internal combustion engines, gas turbines, etc, that should be adapted in different extend to be fueled using biofuels.	comment by reviewer does not refer to the page or section in question
Curbelo Alfredo (Cubaenergia)	2	16	23	16	26	-	-	-	Jointly with advantage of the charcoal as fuel in comparison with firewood, it cannot be ignore that charcoal production is a very low efficiency energy process. Energy content of charcoal is not more than 20% of the total energy content of the firewood used to produce it, the rest is lost. It is a reason to promote its substitution by other bioenergy solutions.	comment by reviewer does not refer to the page or section in question
Curbelo Alfredo (Cubaenergia)	2	16	39	16	39	-	-	-	Penetration of bioenergy in energy market is going to depend of the innovative capacity to identify market niches. The opportunity is to compete developing innovative energy services based on appropriated technological solutions. An example are some agro industries like sugar producers, rice processing and wood mills that could be transformed into not only selfsufficient energy entities but also into net energy exporters based on their own biomass waste feedstock. While today CHP technologies based on biomass are well developed, it is lacking the development of cogeneration of cold and power or even the trigeneration based on biofuels that is a large opportunity in most developing countries. These technologies could be used not only in small and medium size industries and facilities of the service sector but also for a rural energization supporting a real improving of life conditions and increment of local production. Because most of the technological equipment is today available in the market, the challenge is their integration into innovative solutions.	comment by reviewer does not refer to the page or section in question
Curbelo Alfredo (Cubaenergia)	2	16	3	16	12	-	-	-	Reduction of effects of bioenergy competition with land use for food also can be achived through reforestation activities, development of energy forestry plantations and encouraging the use of degraded lands for energy crops like sugar cane varieties with higher fiber content, jatropha curcas plantations, etc.	not the right place for this topic; comment seems to refer to line numbers somewhere else, can't find where
United States (U.S. Department of State)	2	16	10	-	-	-	-	-	Suggest the report have a figure showing world land use patterns including cropland, pasture, forest and desert, perhaps emphasizing the main agricultural exporting countries of the US, Brazil, Argentina and the EU. Pasture is by definition used to provide animal feed. The report could also indicate how much of "cropland" is used for animal feeding. Taking US use of its corn crop for animal feed as a way of estimating crop use for animal feed will help the readers have a perspective of how much land we actually use for animal feed vs. how much is directly consumed by human beings without going through an animal first.	not an agricultural report, already are discussing food/feed - bioenergy conflicts, strong space limitations

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Curbelo Alfredo (Cubaenergia)	2	16	39	16	39	-	-	-	Technology chain for bioenergy has at least three main components: feedstock production that is much related to forestry and agriculture area, biofuel production that transform feedstock into some solid, liquid or gas biofuel, that could be simple as a chipping machine or so complex as a biomass gasification system and finally end-use technology for biofuels that usually are technology commonly use for conventional fuel adapted to specific characteristic of their bio similar. An integrated approach during implementation of the technology chain associated to bioenergy systems would be a unique guarantee of a successful project. A paradigmatic example of this statement is the well known Brazilian ethanol program. This program deals with all components of the technology chain, for example increasing of agricultural yield in sugar cane plantations, improvement of ethanol production efficiency and development of car especialized engines. Other examples of successful bioenergy system implementation are forestry biomass use for energy in Finland and space heating based on biomass pellets in Germany.	comment by reviewer does not refer to the page or section in question
Curbelo Alfredo (Cubaenergia)	2	16	22	16	23	-	-	-	While densification could be the best solid biomass preparation option for large scale storage and distant transportation, it should be carefully considered to avoid using it if it would be possible. It is the situation in most of the cases of fuel supply to local small scale biomass energy facilities.	comment by reviewer does not refer to the page or section in question
Brian Titus (Natural Resources Canada)	2	17	9	-	-	-	-	-	Change from ¿Potential biomass supply¿ to ¿Potential bioenergy supply¿.	but add wording "primary energy" to make clear this is not converted final energy
United States (U.S. Department of State)	2	17	7	-	-	-	-	-	Does the reduced flooding and likely more uniform water release from forest/perennial grasses balance this somewhat negative view of water implications of bioenergy?	No space here for detailed hydrology discussion, space allows only most prominent point, interesting point though for marginal lands
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	17	28	-	-	-	-	-	Economic potential is the key concept, therefore change to: "The economic potential of bioenergy plants should also be quantified¿".	ok
Curbelo Alfredo (Cubaenergia)	2	17	4	17	6	-	-	-	It is no doubt that bioenergy system can play an important role for satisfying energy demands at local level in many countries. But this role is not only focused on energy services like cooking, heating and lighting, what it is typical for traditional biomass use. Modern bioenergy technologies are able to provide power and heat, meet energy needs of some agro industries and become in net energy exporters, produce locally fuel for transport, etc.	comment by reviewer does not refer to the page or section in question
Christoph von Stechow (IPCC WGIII TSU)	2	17	8	-	-	-	-	-	Since the subsection 2.2.5.3 does not exist, which part of the chapter does this paragraph refer to? 2.5.3.3?	check what needs to be referenced!
Australia (0)	2	17	4	17	6	-	-	-	These lines use the term 'afforestation'. Afforestation has a distinct definition for Kyoto Protocol purposes, and refers to the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land. Consider whether the use of the term 'forest establishment' is more appropriate.	Afforestation is a word that is commonly used also more generally outside of the Kyoto protocoll context
Donald Smith (McGill University)	2	17	1	17	8	2.2.2.3	-	-	If unmanged forest is converted to managed crop production land this will almost certainly mean regular additions of nitrogen fertilizer which will result in at least some increase in nitroux oxide emissions. This applies in other areas where crop intensification is discussed.	already discussed in chapter
Wibke Avenhaus (Potsdam Institute for Climate Impact Research)	2	17	-	-	-	-	-	2.2.2	Beringer & Lucht (2008): Simulation nachhaltger Bioenergiepotentiale (http://www.wbgu.de/wbgu_jg2008_ex01.pdf) in the WGBU-Report 2009 (http://www.wbgu.de/wbgu_jg2008_en.pdf) state that a total of 240-500 Mha are suitable for biomass production for bioenergy (depending how high nature conservation and agricultural land requirement for other uses are assumed) page 116. This would be 34-100 EJ. Why are the figures in the table so much higher?	Beringer and Lucht have particular restrictions on nature conservation and food production that are stronger; this is just an example; qualitative difference not that large
Peter de Haan (Ernst Basler + Partner AG)	2	17	-	-	-	-	-	2.2.2	coordinate with table 2.2.1	not directly related to 2.2.1: here a specific potential analysis, in 2.2.1 a discussion of published ranges
Helmut Haberl (Institute of Social Ecology, Vienna)	2	17	-	-	-	-	-	2.2.2	Last two columns: GJ/ha/yr and EJ/yr	will do
Daniela Thrän (DBFZ / UFZ)	2	17	-	17	-	-	-	2.2.2	Time frame is missing	this is technical potential, no timeframe needed (despite some potential time effects)
Elina Vapaavuori (Finnish Forest Research Institute)	2	18	20	-	-	-	-	-	¿for selected countries¿.'. Question: what are these?	Is obvious from the figure being introduced here
Brian Titus (Natural Resources Canada)	2	18	6	-	-	-	-	-	¿techno-economic¿ ¿ what is this, and how does it relate to terminology on P.11 L.12, etc.?	will improve wording to technological and economic data

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Curbelo Alfredo (Cubaenergia)	2	18	22	18	24	-	-	-	Actually changes in policy context have occurred mainly in relation to production of biomass feedstock for liquid biofuels. Changes of policy environment dealing with other biomass feedstock occur slowly and only some leader countries have moved meaningful in this direction also.	space limitations do not allow to go into all aspects
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	18	20	18	20	-	-	-	add after "to set" "and even more to implement"	unclear what this comment refers to
Helmut Haberl (Institute of Social Ecology, Vienna)	2	18	12	19	4	-	-	-	Both figures are numbered 2.2.5, can't be correct	correct, the first will be rmoved, the second renumbered
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	18	35	19	19	-	-	-	delete whole text, first sentence is a repetition of the first sentence in the para above the rest does not deal with constraints. Another possibility is to change the heading of that chapter and deal first with constraints and secondly with methods to overcome them.	comment by reviewer does not refer to the page or section in question; might refer to page 20, here point of repetition is noted and was an editing error
Curbelo Alfredo (Cubaenergia)	2	18	39	18	39	-	-	-	Evaluation of social and environmental impacts should be considered by each group of feedstock. Group of agro industrial and forestry residues usually has positive impacts because it is a contribution to solve the problem of residual disposal avoiding burning it or leaving them to natural decomposition (bagase, rice husk, saw mill wastes,etc) ; main restrictions of using forestry feedstock are related to reduction of the forest area due to an irrational exploitation and potential negative impacts on biodiversity when are implemented dedicated energy forestry plantations. A well managed forestry energy program could be a powerful tool for promotion of reforestation. Finally, the group of associated feedstock to different kinds of crops concentrates larger concerns about social and environmental impacts of bioenergy. It is the case of energy crops, and crops dedicated for biodiesel and ethanol production. These concerns become relevant when target is not only energy supply at local level, but to develop an international trade of biofuel.	comment by reviewer does not refer to the page or section in question (line numbers given do not exist and different content on this page)
Brian Titus (Natural Resources Canada)	2	18	15	-	-	-	-	-	Figure 2.2.5 caption. Try ¿Global average cost-supply curve for bioenergy plants on abandoned land and rest land in 2050¿. The cost-supply curve for abandoned agricultural land in 2000 (SRES B1 scenario) is also shown. The scenarios A1, A2¿ (Source: Hoogwijk et al. 2008.)¿	Figure will be only shown in Chapter 10 with improved caption. It will be referenced in this chapter
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	18	14	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.3	correct, the first will be rmoved, the second renumbered
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	18	2	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.3	Figure will be removed
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	18	21	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	18	27	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	18	29	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Sweden (Swedish Environmental Protection Agency)	2	18	20	20	2	-	-	-	I find these two paragraphs difficult to read. Some of the figures citations include a letter (a, b etc) but others not.	Check wording

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Youba SOKONA (Sahara and Sahel Observatory)	2	18	2	18	5	-	-	-	Not clear and please revise	Figure discussed here will be removed, but some summary text retained - not clear from comment what needs revision here
Christoph von Stechow (IPCC WGIII TSU)	2	18	9	18	12	-	-	-	Please consider adding a cross-reference to the penultimate sentence to section 2.8 and to chapter 10.	will do
Michael Jack (Scion (NZ Forest Research Institute))	2	18	15	18	15	-	-	-	Reference missing.	Figure will be removed
Australia (0)	2	18	15	-	-	-	-	-	Rest land' is not described (i.e. followed by empty brackets).	Figure will be removed
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	18	21	-	-	-	-	-	Should be Figure 2.2.6 (there are two figures with the same number)	correct, the first will be rmoved, the second renumbered
Christoph von Stechow (IPCC WGIII TSU)	2	18	21	20	1	-	-	-	Since there are two Figure 2.2.5, all references to the "second" Figure 2.2.5 on page 19 have to be altered.	correct, the first will be rmoved, the second renumbered
Brian Titus (Natural Resources Canada)	2	18	20	-	-	-	-	-	Try: ¿Bioenergy potentials for selected countries are illustrated in Fig. 2.2.5 as examples of region/country scale assessments. A scenario was constructed for Europe based on the land area needed to meet food demand in 2030 under specific population growth and economic assumptions ((Fischer et al. 2009); land availability (nature protection and infrastructure development) were also introduced to identify land with the capacity to support¿¿ (Note that this now does not use ¿restrictions¿ (pejorative) with reference to nature protection and infrastructure.)	might revise as suggested
Brian Titus (Natural Resources Canada)	2	18	15	-	-	-	-	-	What is ¿rest land¿? Is it ¿fallow land¿?	Figure will be removed
Brian Titus (Natural Resources Canada)	2	18	24	-	-	-	-	-	What is meant by ¿nature protection¿ ¿ is it ¿conservation of natural areas¿ or is it maintenance of ecosystem function?	revise wording
Elina Vapaavuori (Finnish Forest Research Institute)	2	18	-	-	-	-	2.2.5	-	Correct numbering of the figures! This figure should be 2.2.3.	first figure will be removed, second renumbered
Australia (0)	2	18	14	19	4	-	2.2.5	-	Duplication of Figure numbering i.e. Figure 2.2.5	first figure will be removed, second renumbered
Sweden (Swedish Environmental Protection Agency)	2	18	-	-	-	-	2.2.5	-	I think the figure number should be 2.2.3.	figure will be removed
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	18	-	-	-	-	2.2.5	-	It is missing the definition of ""rest land""	figure will be removed
Norway (Climate and Pollution Agency)	2	18	12	19	6	2	2.2.5	-	Fig 2.2.5 appears on both p 18 and 19, so it is not clear to which figure the text refers. It is also a bit unclear whether it is biomass for heating, electricity or fuel. It could also be made more clear what the cost figures include; production or also harvesting, transport and processing. Further is the figure for European study 2030 Cost supply curves lacking the monetary units for the cost. It will anyhow be difficult to compare with the American study which gives the costs per tonne dry biomass and not GJ. The figures a,b,c,d within fig 2.2.5 on p 19 should be supplied with some explaining text	first figure will be removed, second renumbered; this second figure will be strongly revised for clarity and consistency
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	18	20	20	2	2.2.3	2.2.5	-	The figure and its discussion requires some polishing. E.g. 2.2.5b is discussed in full length as for its methodology; the info that 'the other estimate' (p19 line 16) refers to is unclear, and the methodology behind the US data remains fully unclear. Furthermore, the figure is very info-dense.	The figure will be simplified and the information density will be decreased. It will illustrate multiple cases (Europe, US, and multiple regions of the world).
Peter de Haan (Ernst Basler + Partner AG)	2	18	-	-	-	-	2.2.5 (1. fig)	-	improve resolution of this copy-pasted figure	will be done
Daniela Thrän (DBFZ / UFZ)	2	18	15	18	15	-	-	2.2.5	Empty brackets	figure will be removed
Frank Behrendt (Institute for Energy Engineering)	2	18	15	-	-	-	-	2.2.5	rest land"" () - definition is missing	figure will be removed
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	19	26	19	41	-	-	-	Between these lines there is a duplicated paragraph: Residue recirculation ¿. (starts in line 26 and finishes in line 31. The same paragraph starts again in line 36 and finishes in line 41.	removed, is an editing error

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	19	22	-	-	-	-	-	Does Perlack et al. (2005) explicitly list the sustainability factors, and the rationale behind them? I have not checked for agriculture, but telephoned him to find out why they chose the factors they did for forestry. It turns out that they used the technical (= operable) potential and then just assumed that the logging residue left behind would be OK for sustaining ecosystems but with no rationale for this. (This is not unusual in inventories.) Double-check the original publication to ensure that the current text is accurate. If Perlack et al. are not explicit, then some re-wording may still let the report be cited here, but it would not be reasonable to leave readers with the impression that Perlack et al. actually did an environmental analysis. On the other hand, EEA (2006; in reference section) is the only inventory based on actual spatial analysis of environmental conditions, and should be cited somewhere in the text in this section to acknowledge this. It is less important, but Titus et al. (2009) draw attention to the importance of EEA (2006) as a unique analysis, and suggest a 50% net-down in total potential inventory (at a national or large-scale regional level) for forestry harvesting residue, based on the EEA work.	The 2011 billion ton study does consider additional sustainability factors that the 2005 study did not.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	19	4	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	19	6	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	19	12	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	19	17	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Brian Titus (Natural Resources Canada)	2	19	10	19	12	-	-	-	Pejorative. Avoid use of term ¿restrictions¿ and try something like ¿Biomass potentials were estimated based on arable land availability for bioenergy crops and taking into account the environment and infrastructure.¿	check wording
Laura Verduzco (Chevron Corporation)	2	19	6	20	2	-	-	-	The explanation of the charts is very confusing. We suggest reorganizing the charts (display curves side-by-side using the same supply scale and separate them from bar charts, which can also be compared side-by-side), adding more information in the caption and reorganizing the text.	Figure will be revised to be more transparent, clearer and more consistent between panels
Youba SOKONA (Sahara and Sahel Observatory)	2	19	4	19	5	-	-	-	The source is missing. Numbering of the figure should be 2.2.6 and not 2.2.5	correct, the first will be rmoved, the second renumbered
Christoph von Stechow (IPCC WGIII TSU)	2	19	13	19	14	-	-	-	The statement of the sentence "In the baseline case ¿ were similar" is difficult to understand. Pleas consider rephrasing.	Not clear why difficult to understand
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	19	2	19	5	-	2.2.5	-	As it has been done in the previous chapter, the cost figures need to be converted into 2005 US $ to allow the comparability with other figures. Crop production costs missing in the European cost supply curves. Is it possible to get the same ordinate axis for the European and US study costs?	figure will be considerably revised and improved for clarity and consistency
China (China Meteorological Administration)	2	19	3	19	5	-	2.2.5	-	Clear define ¿dedicated crops¿ in Figure2.2.5-C and add specific items it includes, especially differentiate ¿energy plants¿ and ¿energy crops¿.	figure will be considerably revised and improved for clarity and consistency; but cannot go into more detail
Daniela Thrän (DBFZ / UFZ)	2	19	-	19	-	-	2.2.5	-	Figure is very complex and confusing. (a) includes only some countries and can be skipped - integrate the information in table 2.2.2 (or vice versa); (c): no information about the countries considered in the figure - what is the conclusion of this picutre (technical potential is higher than economic?); (b) and (d): are the cost mentioned FOR EU and US or FOR the world and onoly the studies are done from US and EU scientists (this is what is written there now) - please integrate (b) and (d) into ONE figure or produce comparable figures.	figure will be considerably revised and improved for clarity and consistency; figure was extensively discussed in author team with clear decision to keep
Sweden (Swedish Environmental Protection Agency)	2	19	-	-	-	-	2.2.5	-	From my point of view figures c and d are less interesting and could be excluded. If they are kept, I would like the figure caption to be more informative, e.g. to mention that figure C shows the US biomass potential. CRP in figure c also needs to be explained.	figure will be considerably revised and improved for clarity and consistency; figure was extensively discussed in author team with clear decision to keep

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	19	-	-	-	-	2.2.5	-	It is confusing, I suggest to separate this figure in two, (a+b) and (c+d)	figure will be considerably revised and improved for clarity and consistency; figure was extensively discussed in author team with clear decision to keep
Peter de Haan (Ernst Basler + Partner AG)	2	19	-	-	-	-	2.2.5 (2. fig)	-	Split this figure into ist four components	was discussed and decided against, but figure will be considerably revised and improved for clarity and consistency
Peter de Haan (Ernst Basler + Partner AG)	2	19	-	-	-	-	2.2.5 (2. fig)	-	sub-figure upper left: improve sub-sub-figure ""Europe:¿""	will be done
Elina Vapaavuori (Finnish Forest Research Institute)	2	19	-	-	-	-	2.2.5.	-	This figure should be 2.2.4.	figure will be removed
Alexander Popp (PIK)	2	19	-	-	-	-	-	2.2.5	bad quality of figures - i also suggest to harmonize units on y-axis of b) and d)	figure will be considerably revised for clarity and consistency
Brian Titus (Natural Resources Canada)	2	20	14	-	-	-	-	-	¿Ash recycling¿ is now not as favoured a term amongst soil scientists as ¿nutrient replacement¿, as lack of nutrients that are found in ash rarely leads to reduced growth as compared to nitrogen (which is not found in ash), and ashing only increases growth on organic but not mineral soils. This could read ¿In forests, fertilizer (including wood ash) can be used to replace nutrients removed by intensive harvesting.¿	use this wording
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	20	34	-	-	-	-	-	Add at the end of the paragraph: "¿; which substantially reduces the physical and economic potential availability of these feedstock."	not necessary in our opinion, is clear from text
United States (U.S. Department of State)	2	20	34	-	-	-	-	-	Authors should consider soil conservation options such as cover crops following production of an annual crop. This could build soil carbon, reduce erosion, potentially capture excess nitrogen from the annual crop, provide additional cellulosic biomass for bioenergy and also allow more residue to be removed sustainably. Two relevant citations are given below. Kim, S.; Dale, B. E.; ¿Life cycle assessment of various cropping systems utilized for producing biofuels: Bioethanol and biodiesel¿ Biomass & Bioenergy 29, 426-439, (2005). Kim, H., Kim, S. and Dale, B. E. (2009). Biofuels, Land Use Change and Greenhouse Gas Emissions: Some Unexplored Variables. Environ. Science and Technology. Vol. 43: 961-967.	will check references. The 2009 references was added.
Brazil (Ministry of Science and Technology)	2	20	35	20	41	-	-	-	can be removed because it is repeated on the same page from line 21 to line 31	removed, is an editing error
Jorge Martínez Chamorro (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	20	32	20	32	-	-	-	ceteris paribus should be written in cursive font. Also a footnote could help to understand the latin expression: "all things being equal".	will translate
United States (U.S. Department of State)	2	20	35	20	41	-	-	-	Delete this paragraph. It is a direct duplication of much of the prior paragraph.	removed, is an editing error
Brian Titus (Natural Resources Canada)	2	20	31	-	-	-	-	-	Do not use terms in Latin (ceteris paribus) that are not generally understood. Latin terms are now often not understood by readers without a classical education, who may not be impressed by their use. (There is an old saying in English that ¿a gentleman doesn¿t need to be able to say that he knows Latin; he just needs to be able to say that he has forgotten it.¿)	will translate
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	20	1	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	correct, the first will be rmoved, the second renumbered
Brian Titus (Natural Resources Canada)	2	20	10	-	-	-	-	-	Heading for 2.2.4.1. Delete ¿Constraints on¿	will do
Christoph von Stechow (IPCC WGIII TSU)	2	20	12	20	13	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	Add reference
Christoph von Stechow (IPCC WGIII TSU)	2	20	29	20	31	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	add reference
Brian Titus (Natural Resources Canada)	2	20	4	20	9	-	-	-	Pejorative and repetitive text. This is not necessary, and can be avoided. Try ¿As described briefly above, many studies that quantify biomass resource potential consider a range of factors that reduce technical potentials, and these are further discussed in Section 2.5. However, important factors are discussed below in relation¿¿	Will revisit wording and check for unintended bias
Christoph von Stechow (IPCC WGIII TSU)	2	20	31	20	34	-	-	-	Plese consider adding a cross-reference to the subsection 2.6.2	wii do

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	20	11	-	-	-	-	-	Remove pejorative terms. Try ¿Soil conservation and biodiversity requirements determine environmentally sustainable residue potentials¿¿	check wording
Helmut Haberl (Institute of Social Ecology, Vienna)	2	20	21	20	41	-	-	-	Several lines of text have been inserted twice, can be deleted.	removed, is an editing error
Canada (Environment Canada)	2	20	14	20	15	-	-	-	Should contain information on the harvesting of post-logging forest residues (limbs and tops, maybe even roots) in natural, extensively managed boreal forests. Impact on site nutrition exists, depending on site geochemistry and regenerating species (e.g. Thiffault et al, 2006, Soil Science Society of America Journal, 70: 691-701), but should be far less than in agricultural systems because the harvest occurs only once every rotation (60 to 100 years) in these extensively managed boreal forest stands. In addition, contrary to agricultural systems, extensively managed forest stands in the boreal forest are not fertilised, which has a positive impact on the life cycle analysis of net CO2 emissions from such cropping systems. Also, a significant amount of work already done on setting thresholds for residue harvesting (Thiffault et al, 2010. Forestry Chronicle, 86:36-42).	not enough space for in-depth discussion of particular systems, residues in general are already discussed elsewhere
Brian Titus (Natural Resources Canada)	2	20	3	-	-	-	-	-	The section heading is ¿Analysis of factors influencing¿¿ but there is no quantitative analysis, which is what a reader might expect. Try using simply ¿Factors influencing¿¿	will change as suggested
Norway (Climate and Pollution Agency)	2	20	14	20	15	-	-	-	There are limitations to the strategy of using ash to mitigate the negative effects of intensive harvesting. In most forests, at least boreal forests, the limiting factor is nitrogen compounds, but the ash contains almost nothing of these. This should be acknowledged here.	will add short remark
Christoph von Stechow (IPCC WGIII TSU)	2	20	35	20	42	-	-	-	These lines can be deleted as they are the same as lines 20-21 and 26-30.	removed, is an editing error
Sweden (Swedish Environmental Protection Agency)	2	20	35	20	41	-	-	-	This paragraph could be removed since it repeats what is said in the previous paragraph.	removed, is an editing error
Laura Verduzco (Chevron Corporation)	2	20	35	20	41	-	-	-	We recommend deleting all this text.This information has already been mentioned elsewhere in the text.	removed, is an editing error
Norway (Climate and Pollution Agency)	2	20	14	20	14	2	-	-	Ash don't recycle nitrogen	will add short remark
Norway (Climate and Pollution Agency)	2	20	35	20	41	2	-	-	repeating text line 21-31	removed, is an editing error
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	20	26	20	31	2.2.4.1	-	-	Here and in several other places: please break the over-lengthy sentences	consider breaking up long sentences
Elina Vapaavuori (Finnish Forest Research Institute)	2	20	-	-	-	2.2.4.1	-	-	Suggestion: Add precise information of nutrient losses due to biomass harvesting and how recycling can replace nutrient losses. What are the limitations of recycling?	Cannot go into specific details at this point in text, due to space constraints, and soil topic to be extended in 2.5
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	20	-	-	-	2.2.4.1	-	-	Would you dare to translate this (comprehensive but well-written) discussion on the factors influencing residue availability into a more confined range of residue potential? Or would you, given the considerations in this section, stick to the 15-70 and 0-110 EJ ranges of Table 2.2.1?	table 2.2.1 covers published literature, not our assessment; as can be seen in 2.8, our assessment is smaller and hence implies smaller contributing factors on the basis of our discussion

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Curbelo Alfredo (Cubaenergia)	2	21	32	21	32	-	-	-	Assessment of opportunites for technology improvement and innovation should be provided for every of three main components of the technology chain: At the side of feedstock production its sustainability is the critical subject of attention. It is necessary to increase agricultural yields, develop energy varieties adapted to degraded and arid lands, and improve management of crops: period of rotation, rate of extraction from the field of wastes, optimization of input consumption. Conversion technologies of biomass feedstock to biofuel have reached maturity in many cases. Densification technologies of low density biomass, anaerobic digestion, ethanol production from sucrose products, transesterification technologies are example of solutions that are used on commercial basic today. Conversion of lignocellulosic feedstock into gaseous biofuel via biomass gasification, although shown advances, still need more developments to full take advantages of flexibility of this solution. Another relevant conversion technology that shows advance is ethanol production from lignocellulosic materials. Current development of technologies for biofuel use is enough to support take off of large scale penetration of bioenergy. Biomass boilers are commercially used in many countries; internal combustion engines for gaseous biofuel produced by anaerobic digestion or biomass gasification are in the market. Multifuel engine cars have been successful introduced in the Brazilian car maker business. High tech development occurs in the area of gas turbines and fuel cells fueled by gaseous biofuels.	yes, but does not apply to this general section on technical potentials; technologies are discussed more later int he chapter; other reviewer comments are general and already addressed
United States (U.S. Department of State)	2	21	31	-	-	-	-	-	Awkward sentence that includes the phrase "leading to that biomass plantations". The meaning of this is obscured.	improve wording
Brian Titus (Natural Resources Canada)	2	21	16	21	17	-	-	-	Change from ¿It should be noted that it is not obvious that more comprehensive¿ to ¿However, it does not necessarily follow that more comprehensive¿¿	wii do
Brian Titus (Natural Resources Canada)	2	21	20	-	-	-	-	-	Heading for 2.2.4.2. Delete ¿Constraints on¿	will do
Brian Titus (Natural Resources Canada)	2	21	21	21	26	-	-	-	I am not sure that I follow the logic in this paragraph, which seems to suggest little benefit in increased intensive forest management but then does not clearly move to address short-rotation tree crops (willow and poplar). However, there is still good potential to increase forest growth through intensive forest management, especially in regions of the world with large forest areas that currently practice extensive forest management. In this latter case, intensive management may be focused on forests near mills. There is a danger that different perspectives (European vs. North American?) can slant our understanding of this, so inclusiveness and a global approach would be advisable. I would therefore prefer to see an expanded Section 2.2.2.2 to include some statements on intensive forest management, and a modified paragraph here to better lead into energy plantations. On the latter, is there no literature on the potential for fast-growing willow and poplars globally, or even regionally? A sentence or two hardly seems enough, and the current emphasis seems to be on intensive energy-like plantations but not on willow and poplar. If not dealt with elsewhere, both intensive management for traditional wood products (which increases potential for harvesting logging residue, and increases the potential for wood beyond AAC that could go to energy) and short-rotation woody crops deserve some consideration in the chapter.	not really clear what the reviewer suggests, but will improve wording; we only state that the management options for forests as opposed to short-rotation plantations are not addressed a lot in assessment studies
Christoph von Stechow (IPCC WGIII TSU)	2	21	45	21	46	-	-	-	Is there any more recent literature available than from the years 1999 and 2002?	will check
Alexander Popp (PIK)	2	21	40	-	-	-	-	-	it is Stehfest et al. 2009 I guess	will check
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	21	41	22	10	-	-	-	It might be worthwhile citing Johnston, Foley, Holloway, Kucharik & Monfreda (2009) Resetting global expectations from agricultural biofuels. Environ. Res. Lett. 4 (2009) 014004 here which shows that yields are unlikely to be as high as some studies report.	will check references and possibly add, here or in 2.5
Brian Titus (Natural Resources Canada)	2	21	12	-	-	-	-	-	Naslund-Eriksson and Gustafson (2008) is not in reference section.	will add
Christoph von Stechow (IPCC WGIII TSU)	2	21	1	21	2	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	not an assertion but a logical statement on factors that influence what is available for energy

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Curbelo Alfredo (Cubaenergia)	2	21	33	21	33	-	-	-	Statement should be ended ¿¿. associated to energy crops and crops associated to production of liquid biofuels for transport.¿	not seen as necessary (not sure if this comment really refers to this sentence, this reviewer has misplaced comments elsewhere)
Christoph von Stechow (IPCC WGIII TSU)	2	21	47	-	-	-	-	-	The assertion that the possible consequences of climate change "indicate net global negative impact" conflicts with the assertions made in subsection 2.6.1.3. Moreover, as agreed to during LA3 in Oxford, the issues touched upon in subsection 2.6.1.3 should be moved to the missing last subsection of section 2.2 that should be named "Possible Impact of Climate Change on Resource Potential".	agree about possibly shifting to CC impact section; statement on negative CC impacts on crops on basis of AR4 findings; this is different from the topic in 2.6.1.3, where the biomass increase from CO2 fertilisation is mentioned, which also increases water use efficiency; will balance in statement - CO2 fertilisation occurs under climate change, but is different from the direct impact of altered climate
Curbelo Alfredo (Cubaenergia)	2	21	34	21	45	-	-	-	This paragraph is too general. It should be more explicit about specific crops of interest for bioenergy, for example sugar cane, energy crops, oil seeds, forestry species, etc.	not sure this comment applies to the section given (which is not a para), this section specifically deals with food crops, not energy crops
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	21	20	-	-	2.2.4.2	-	-	Contents on argricIture in this section should be shorten and contents on forestry should be added more	will balance more, and also balanced wrt section 2.5
Helmut Haberl (Institute of Social Ecology, Vienna)	2	21	-	-	-	2.2.4.2	-	-	In my view, feed production for livestock / grazing issues should be discussed more in depth here, as roughly half of the total amount of biomass humanity harvests is fed to livestock, and areas used for grazing (more or less intesively) feature prominently among those areas thought to be available for growing bioenergy crops. The above cited study of Erb et al. (2009) (comment 14) could help here, together with FAO's livestocks long shadow and other studies	will add a sentence on this
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	21	27	23	7	2.2.4.2	-	-	Section on a vital topic for bioenergy, so rightly elaborate. Again, could you indicate how these uncertainties influence agricultural crop potentials? Furthermore, at p23l1, you mention that investing in agri R&D could lead to productivity increases. Personally, I'd put this message a much firmer, stating that increased investments in agr R&D are essential for opening up a significant potential for bioenergy froms crops on agricultural land (and are essential for feeding the world in the first place).	this is already made abundantly clear in several places of the text, not least in the summary of 2.8
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	21	22	-	-	2.2.4.2	-	-	The term 'alien' here tickles my fantasy but probably in the wrong direction. I guess 'exotic', 'foreign' of 'exogeneous' would be more appropriate. Besides, as this is the only paragraph in this section dealing with forestry (the remainder is on agriculture and marginal lands), some critical notes on the impacts of intensification and foreign species introduction to other values of forests might be necessary. The role of the word 'in stead' in line 24 is not entirely clear to me (as is 'on the other hand' in line 27).	"alien species" is usual wording in biodiv discussions; will improve wording, see also 2.5
China (China Meteorological Administration)	2	21	20	23	48	2.2.4.2?	-	-	Reduce part of the content, and balance the contents for agriculture and forestry.	will balance more, and also balanced wrt section 2.5
Brian Titus (Natural Resources Canada)	2	22	26	-	-	-	-	-	I cannot find a journal reference, but see ¿Stricter rules needed on GMOs¿ by He Sheng, published in the China Daily, July 19, 2004. ¿Another experiment in GM poplars, however, has found gene flow between the GM varieties and the natural ones growing beside them in Xinjiang.¿ http://www.asiarice.org/sections/whatsnew/China24%2019%20Jul%2004a.html. See also ¿China¿s GM trees get lost in bureaucracy¿ by Fred Pearce in New Scientist, 20 September 2004 at http://www.newscientist.com/article/dn6402-chinas-gm-trees-get-lost-in-bureaucracy.html	thank you, cannot cite newpaper pieces
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	22	27	22	32	-	-	-	In addition: intensification aiming at farm yield increase needs to go along with a proper operational management on a global scale.	add a few words
United States (U.S. Department of State)	2	22	44	-	-	-	-	-	Is it appropriate to talk about water "productivity"? It might be better to refer to "water use efficiency".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	22	18	22	26	-	-	-	No reference is provided to substantiate the assertions made in the second part of this paragraph.	will add references
Christoph von Stechow (IPCC WGIII TSU)	2	22	9	-	-	-	-	-	Please consider adding "and land use" behind "Water" to make clear that both issues will be discussed in section 2.5.	will do
Christoph von Stechow (IPCC WGIII TSU)	2	22	32	-	-	-	-	-	Since section 2.5 is more than 20 pages long, please consider specifying the subsection that the paragraph is reffering to, which might prove helpful for the reader (2.5.3.3).	will do

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Curbelo Alfredo (Cubaenergia)	2	22	13	22	13	-	-	-	The cost that should be used to compare bioenergy systems with conventional ones is the cost of the final energy service: power, heat or cold. Two component of this cost are of special interest for comparisons: biofuel cost that determines the production cost and the investment cost that has significant influence on the financial cost. Biofuel cost depends very strong at local conditions because its reliance of labor costs, local regulations on land, etc and they can defer from country to country more than threefold. Investment cost depends of equipment costs and of construction and erection costs. Last two mentioned costs are local depending , while equipment cost is not local depending. Only depends of local conditions some incremental costs relate to specific requests that depends of local regulations about safety, automatic level, material quality requirements, etc. For this reason, in the case of bioenergy, international average equipment cost are only a reference one, but not an absolute indicator about of cost of produced energy.	comment does not refer to this para, must be misplaced
Switzerland (Swiss Federal Office for the Environment)	2	22	27	22	42	-	-	-	The fundamental difference between sustainable agriculture which recycles biomass as a fertilizer (and thus has reduced mineral fertilizer inputs) and agriculatural bioenergy production which extracts large amounts of biomass from the fields should be discussed	not required here, as the section discussed increases in food yields to allow for bioenergy planatations on good quality land; limitations to food production increases imply limitations for the bioenergy potential
United States (U.S. Department of State)	2	22	48	-	-	-	-	-	There is no reference to Dale 2008 in the Reference list with respect to this important feed and fuel integration issue. Those references were provided in my comments on Page 9 line 40.	will be added
United States (U.S. Department of State)	2	22	43	22	49	-	-	-	This paragraph appears to be about bioenergy production systems that have co-benefits, or other uses. However, it comes across as two completely independent disjointed sentences. These two thoughts need to be tied together in some way.	will improve
Donald Smith (McGill University)	2	22	43	22	49	2.2.4.2	-	-	It might be useful to mention the opportunities biofuels present for nutrient recycline at this point. This would be particulary effective if sewage was converted into biogas and the P recovered as P limitations will become a very serious limitation to the production of both biofuels and food by the middle of this century if recycling is not commences fairly soon.	cannot go into such details here due to space limitations
Patrick Lamers (Ecofys Germany GmbH)	2	23	47	23	48	-	-	-	A Section 2.2.6 does not exist. Change or delete cross-reference.	will do
United States (U.S. Department of State)	2	23	9	-	-	-	-	-	About half the topsoil has been lost in the state of Iowa over the past 100 years. It is important to keep in mind that bioenergy, done properly, can help restore topsoil which also stored carbon.	this is mentioned in line 28 and in 2.5
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	23	48	-	-	-	-	-	Add at the end of the paragraph: "¿An issue less studied, but which could have significant implications for land use, is the impact that a change in modern diet could have. A small reduction in the intake of animal protein could free significant numbers of hectares, not only in pasture and grasses, but also in cereals and oilseeds..."	will find a place where this aspect is appropriate in this section
Kaija Hakala (MTT Agrifood Research)	2	23	20	23	20	-	-	-	After "low productivity level" add: ", which may require large and expensive inputs in fertilising and possibly liming." After this, as point iii, add: Bioenergy production also requires harvesting and transport machinery and readily usable logistics such as road networks, and vicinity of bioenergy plants, building of which may be exteremely energy consuming. Then change point iii to point iiii.	suggested wording was carefully considered by authors; decision was to not adopt
Christoph von Stechow (IPCC WGIII TSU)	2	23	35	23	39	-	-	-	Are the assertions made in these lines still based on the reference WBGU (2009) or is it necessary to add another reference?	needs references
Christoph von Stechow (IPCC WGIII TSU)	2	23	17	23	22	-	-	-	No reference is provided to substantiate the assertions made in the first part of this paragraph.	need to add a reference
Christoph von Stechow (IPCC WGIII TSU)	2	23	43	23	48	-	-	-	No reference is provided to substantiate the assertions made in these lines. This particularly problematic as the section 2.2.6 does not exist.	need to add references
United Kingdom (Department of Energy and Climate Change)	2	23	8	-	28	-	-	-	Overoptimistic expectations on degarded land are important to highlight. The very concrete example of jatropha could be given, where yields on Indian populations have lagged far behind expectations.	could add citation from "Science" on Jatropha, have to find
Christoph von Stechow (IPCC WGIII TSU)	2	23	36	-	-	-	-	-	Please consider swapping the words "the" and "least" - otherwise the sentence might sound confusing.	will do
Michael Jack (Scion (NZ Forest Research Institute))	2	23	29	-	-	-	-	-	Sentence should read: ""Biodiversity considerations can limit residue extraction and intensification and also ..""	will change

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Michael Jack (Scion (NZ Forest Research Institute))	2	23	47	-	-	-	-	-	Sentence should read: ""This approach is further discussed ..""	will do
Peter de Haan (Ernst Basler + Partner AG)	2	23	8	48	-	-	-	-	shortening potential: these four paragraphs can be reduced in length by at least half.	will consider but are likely to reject, these points are a basis for the assessment of technical potential in section 2.8
Christoph von Stechow (IPCC WGIII TSU)	2	23	44	23	46	-	-	-	The sentence "Biodiversity loss ¿ croplands or pastures elsewhere" is difficult to understand. Please consider rephrasing.	we do not find ot unclear, may consider better wording
Frank Behrendt (Institute for Energy Engineering)	2	23	48	-	-	-	-	-	There is no Section 2.2.6	will be corrected
United States (U.S. Department of State)	2	23	33	-	-	-	-	-	This is insufficiently ambitious or challenging. We need to consider diversity of crops and cropping systems for biofuels as contributing positively to biodiversity.	This passage is only on degraded lands, not diversified agrosystems in general
United States (U.S. Department of State)	2	23	29	23	39	-	-	-	This paragraph is poorly written. The first sentence does not make sense and I was unable to work out the point that the authors intended to make.	improve wording
Laura Verduzco (Chevron Corporation)	2	23	17	23	19	-	-	-	Tillage of degraded lands and addition of inputs (N, P, K, as well as others) are also important issues because they can increase the lifecycle greenhouse gas emissions	add a few words
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	23	8	23	48	2.2.4.2	-	-	Section 2.2.4.2 is quite lengthy. You might consider introducing a 2.2.4.3 specifically on marginal lands.	Good suggestion
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	23	9	23	11	2.2.4.2	-	-	The sentence implies that the same breeding activities both improve yields and improve crop versatility in terms of ability to grow in different physical environments. Usually, these are different directions: either one breeds a high-yielding crop for a well-defined physical environment, or one breeds a robust crop that grows in many physical environments and provides reasonable yields. As far as I know, combining both directions is hard.	need to improve wording to take this into account
Donald Smith (McGill University)	2	23	1	28	35	2.3.1.1	-	-	If a pereninial crop, such as Miscanthus or switchgrass, is harvested after senescence much of the nitrogen and some of the phosphorus will have been remombilized and stored below ground to be used in support of the following season's growth. This can greatly reduce the amount of nitrogen fertilizer required, with can substantially improve the energy balance of the crop. it also decreases the ash content of the resulting biomass.	not sure this comment is not misplaced; cannot go into many details here due to space limitations
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	24	9	24	9	-	-	-	add at the end: "as well as possibly high GHG emission because of conversion of forest and grasslands."	the technical potential does not consider the GHG balance, this will be discussed in 2.5 and is a policy matter. The point will be clearly made in 2.5 and 2.8
Kaija Hakala (MTT Agrifood Research)	2	24	28	24	28	-	-	-	Add text: However, also bioenergy crops need inputs such as fertilisation, especially in case of taking into use abandoned agricultural land, and these inputs may become especially energy-expensive. Also new ways of logistics (e.g. road networks) may have to be built.	this section is about technical potential, not deployment aspects
Daniela Thrän (DBFZ / UFZ)	2	24	38	24	42	-	-	-	Add the remark, that slowly increasing pricesfor food security and competition support the access to the biomass potentials and diminuish risks	this section is about technical potential, not deployment aspects
Alexander Popp (PIK)	2	24	22	-	-	-	-	-	Again: why is it clear?	will improve wording
Patrick Lamers (Ecofys Germany GmbH)	2	24	3	-	-	-	-	-	As above: Please clarify what type of potential this is ("theoretical"?) and whether is it before or after conversion.	will do, it is technical, and that was defined esrlier in this section
Brian Titus (Natural Resources Canada)	2	24	11	-	-	-	-	-	Avoid pejorative term ¿restrictions¿ by re-writing; note that it is not necessary to show direction of impacts, and therefore consider: ¿Additional important factors include¿ (ii) soil, water, biodiversity and nature conservation; (iii)¿¿	will check wording to avoid bias
United States (U.S. Department of State)	2	24	13	-	-	-	-	-	For consistency the reference to "unused" agriculture land should be rephrased as "marginal" (if that is indeed what is meant). As written, it gives the impression that the land is idle, with no current purpose, and that is not accurate.	Unused does not mean marginal, there are unused non-marginal lands in several world regions (eg Africa or Central Asia); may consider better wording; also situation might potentially develop in the future depending on crop productivity increases
Daniela Thrän (DBFZ / UFZ)	2	24	20	24	21	-	-	-	integrate this bullet point in the section in line 13 - 15	will do
Curbelo Alfredo (Cubaenergia)	2	24	16	24	18	-	-	-	Its line statement should be divided in two parts to avoid confusions: a first general part: ¿The recently and rapidly changed policy context in many countries, in particular the development of sustainability criteria and frameworks does drive bioenergy to more sustainable directions.¿ And a second one: ¿ In the case of liquid biofuel for transport, the support for advanced biorefinery and second generation biofuel options, are a serious contribution to this end¿.	reviewer comment does not seem to refer to the paragraph given, probably misplaced
Patrick Lamers (Ecofys Germany GmbH)	2	24	23	24	24	-	-	-	Please clarify which "use" this is: final energy consumption? Term is vague as it is.	will clarify, is primary energy

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	24	28	-	-	-	-	-	Please consider adding a cross-reference to sub-section 2.5.3.	will be checked
Christoph von Stechow (IPCC WGIII TSU)	2	24	20	24	21	-	-	-	Please consider moving these two lines above (after line 15), since this paragraph also relates to residue extraction.	will do
Christoph von Stechow (IPCC WGIII TSU)	2	24	3	24	4	-	-	-	Please consider rephrasing in the manner of TS p. 25, l. 5/6, since "is is clear that" may sound slightly biased. The same goes for lines 22/3 on the same page and for page 112, lines 9-10.	wii do
Switzerland (Swiss Federal Office for the Environment)	2	24	19	-	-	-	-	-	Problems of competition with local use of marginal land should be mentioned: ""Furthermore, traditional use of degraded land (e.g. extensive grazing) may further reduce the bioenergy potential.""	this was mentioned in the subsection earlier; here only a summary of the main points are given, not everything can be repeated
Daniela Thrän (DBFZ / UFZ)	2	24	16	24	19	-	-	-	take this bullet point in line 13 ff	choose not to, is a separate item
Australia (0)	2	24	22	24	23	-	-	-	The estimate of 'several hundred' EJ per year is broad (e.g. could mean 300 or 900) but also appears to be at the upper end of actual potential, based on the evidence presented in Chapter 2. Suggest a more clearly constrained statement, perhaps described using a range, that is more appropriate to describe the potential where there are 'favourable developments'.	the reviewed literature has several hundred EJ of potential, see table 2.2.1 and Dornburget al. (2008, 2010) and other assessments. We arrive at a lower expert judgement of up to 300 EJ based on the discussion of this section leading to the overall result in 2.8.
United States (U.S. Department of State)	2	24	17	-	-	-	-	-	There needs to be a note here that cellulosic biomass pretreatment/pyrolysis oils are inherently quite flexible in the raw materials, and burning biomass is almost completely flexible in terms of raw materials. If systems are appropriately designed, this flexibility can potentially be used ot support biodiversity.	reviewer seems to imply that woodland biodiversity is better than marginal land biodiversity; bioenergy on marginal lands implies a complete change of ecosystem even if species number increases and is therefore not necessarily in the spirit of ecosystem conservation (e.g. rangeland hares or ground-nesting birds would not live in plantations, other species would). Potential positive effects occur on previously degraded lands. This is mentioned in several places in the chapter.
United States (U.S. Department of State)	2	24	25	24	28	-	-	-	This bullet contains a very inaccurate statement that leads the reader to the conclusion that crop agriculture is continuously releasing large amounts of soil C whereas bioenergy crops would not do so. In reality, much land that has been cropped for long periods does not experience large amounts of soil C loss, and many food crops are increasingly grown under conservation or no tillage systems which in fact increase C in the soil. Authors are advised to delete the entire phrase after the hyphen.	however sentence only refers to certain lands, as is clear from the text. Will improve wording
Alexander Popp (PIK)	2	24	3	-	-	-	-	-	why is it clear that several hundred EJ per year can be provided for energy in the future? table 2.2.1 indicates lower bound values <50. So I do not understand why you conclude that several hundred EJ per year can be provided. Please make more clear what the ranges are.	wii do
Norway (Climate and Pollution Agency)	2	24	22	24	24	2	-	-	l 22-23 repeats the text in line 3-4. Suggest to delete 22-23 and move 23-24 to after "favorable developments in line 4 Eventually also a figure for the total global energy need in the future.	will consider
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	24	3	24	3	2.2.5	-	-	Here you mention several hundreds of EJ, while in the summary you are more explicit by stating 100-300 EJ. Please make consistent.	will do
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	24	22	24	24	2.2.5	-	-	In the summary conclusions it is noted that several hundred EJ per year can be provided. However the reviewed literature suggests much less. Here it should be noted, that quite possibly resource potential can be much less and a range of the above cited studies should be given. Except when certain low figures are unreasonable, and authors decide to discard them. This however would need to be explained.	the reviewed literature has several hundred EJ of potential, see table 2.2.1 and Dornburget al. (2008, 2010) and other assessments. We arrive at a lower expert judgement of up to 300 EJ based on the discussion of this section leading to the overall result in 2.8.
Brian Titus (Natural Resources Canada)	2	25	10	-	-	-	-	-	¿primary¿ and ¿secondary residues¿ should be defined somewhere in text. (Also used in earlier sections; P.8 L.19ff., P.12 L.19, Table 2.2.1, etc.; define on first usage.)	Residues are defined in 2.2.2. Will be passed on to the glossary
Curbelo Alfredo (Cubaenergia)	2	25	10	25	11	-	-	-	Actually this message should be focused on ¿expansion of bioenergy based on energy crops and plantations¿ instead of on "biomass" in general.	Will consider
Brian Titus (Natural Resources Canada)	2	25	22	-	-	-	-	-	Change from ¿fallings¿ to ¿felling¿	Accepted

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Michael Jack (Scion (NZ Forest Research Institute))	2	25	22	-	-	-	-	-	felling not fallings	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	25	22	-	-	-	-	-	I guess you mean "tree fellings" and not "fallings"	Accepted
Kaija Hakala (MTT Agrifood Research)	2	25	17	25	18	-	-	-	In developed countries energy is mostly NOT derived directly from logging of forests, but rather from logging residues, wastewood and side products of wood processing for e.g. pulp and paper. I suggest that you add residues, waste wood and by-products in this sentence (as indicated on Page 7, lines 25-37 and Tables 2.2.1. and 2.3.3.)	Agree. Other sources have been added
Christoph von Stechow (IPCC WGIII TSU)	2	25	15	25	16	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	Reference will be provided
Patrick Lamers (Ecofys Germany GmbH)	2	25	9	-	-	-	-	-	Please define "performance criteria" to better guide the reader by explaning what do you mean with this, why the ones you have chosen are important and critical decision criteria, etc.	The criteria are the Table column's headings, and are self-explanatory
Australia (0)	2	25	17	25	28	-	-	-	These paragraphs note that wood for bioenergy comes from logging both natural (native) and planted forests. The text as drafted does not explain that biomass for bioenergy from forests systems is often sourced from wood waste rather than the felled trees. Using wood waste rather than the felled trees for bioenergy provides sustainability benefits.	Agree. Other sources have been added
Australia (0)	2	25	-	-	-	-	-	2.3.1	Suggest algae is included in the table as a potential (Developing) feedstock. Also suggest that Australia is included as a region suitable for growing short rotation Eucalyptus feedstocks.	Algae is considered a future technology (addressed in 2.6)
Canada (Environment Canada)	2	25	-	27	-	-	-	2.3.1	This table misses activity presently on going in Canada, and probably elsewhere in the boreal domain, on the use of biomass for generating heat, in lieu of oil or electricity. However, this information is not necessarily published in the scientific literature, or even in the grey literature. In the province of Quebec, 10% of total energy needs are met through (mostly forest) biomass (primary and secondary residues), or about 1.7x10^8 Gj per year (http://www.mrnfp.gouv.qc.ca/energie/statistiques/statistiques-consommation-biomasse.jsp). Although most of this use is pulp mills and saw mills, and in homes, institutions (hospitals) in rural areas are increasingly heated using post-processing (e,g, bark) or post-logging (e.g. chipped branches and tops) residues, and their numbers should grow. Even if this replaces hydroelectricity in many cases, surplus hydroelectricity is sold to N-E US which depends to a large extent on coal for generation of electricity.	Canada example is fine but would be too detailed. We cannot include examples that are not documented in the literature.
China (China Meteorological Administration)	2	25	41	27	5	2.3.1.1	-	2.3.1	It is necessary to further review the data in the table, especially cassava, sweet sorghum, jatropha, as well as wheat and corn. At least give the accurate definitions or conditions of "yield" and "Cost".	The data come the literature references and have already been reviewed from the SOD. Definitions of yield and costs will be added.
Curbelo Alfredo (Cubaenergia)	2	26	11	26	13	-	-	-	In the list of the short term options should be added power and heat production based on agriculture and forestry residues options.	Those are already mentioned as being major current commercial options
Curbelo Alfredo (Cubaenergia)	2	26	13	26	14	-	-	-	This message should incorporate the idea that broad development of local bioenergy systems is a guarantee for sustainability of international trading of biofuels based on surplus productions.	It is a necessary element but not necessarily a guarantee of sustainability because of land use change impacts
Curbelo Alfredo (Cubaenergia)	2	26	9	26	11	-	-	-	While it is right that, carbon capture and storage technologies mentioned in the phrase in parenthesis contribute to mitigation of Climate Change, it is not evident that they could be considered like bioenergy technologies	Carbon capture and storage are technologies that can be combined with multiple technologies including biomass options that generate concentrated streams of CO2 as is addressed in Section 2.6 and will be more emphasized
Curbelo Alfredo (Cubaenergia)	2	26	6	26	7	-	-	-	While the content of this message is right for production of liquid biofuels for transport, changes in policy contents are still insufficient for supporting energy use of the rest of biomass feedstock.	Are lines misquoted ?
Frank Behrendt (Institute for Energy Engineering)	2	26	-	-	-	-	-	2.3.1	Column head ""N/P/K"" should be explained in the legend of the figure	Accepted
Daniela Thrän (DBFZ / UFZ)	2	26	-	26	-	-	-	2.3.1	Head: Costs for GJ biomass or GJ biofuel? Soybean is soyoil (?) - Jatropha: the same, Wheat is "Ethanol from wheat" (?); lignocellulosic crops are handled for liquid biofuels or for solid biofuels?; numbers for palm oil and jathropha oil seems to be wrong (Jatropha is too cheap, palm too expensive)	These are costs per GJ of biomass energy content (not end-product). Cost data will be checked

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Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	26	-	26	-	2.3.1.1	-	2.3.1	I haven't checked all numbers, but it strikes me that EU rape seed oil is cheaper than palm and soy oil (the 7.2 $/GJ for rapeseed oil seems extremely low to me). That's not reflected in market prices. One thing: the semi-quantitative scoring of water, nutrient and pesticide use with + symbols is a bit confusing. Is more +'s a good thing? You might stick to a more neutral symbol, such as dots. And what do the - symbols mean at Jathropha? And what do these costs stand for? $ per GJ fuel (as specified in the group header) or $ per GJ crop? or per GJ useful part of the crop? And if it's the first option, the lignocellulosic crops, to what final energy carrier have they been converted?	These particular figures for palm oil and rapeseed oil come from the Bessou et al 2009 review paper. Will be checked and differences explained. The + symbols refer to input requirements, it seems appropriate and is explained in the caption.
Michael Jack (Scion (NZ Forest Research Institute))	2	27	40	-	-	-	-	-	..arable crops as compared to mono-cultures.""	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	27	36	-	-	-	-	-	Add at the end of paragraph: "In a sectoral scale, an expansion of bioenergy could contribute to increase the economic returns to agricultural activities. This could drive additional investments into the sector and contribute to gains in productivity to the whole sector." (De la Torre Ugarte and Hellwinckel, 2010)" Source: De La Torre Ugarte, Daniel G. and Chad Hellwinckel, "The Problem is the Solution: the Role of Biofuels in the Transition to a Regenerative Agriculture", in Biotechnology in Agriculture and Forestry, vol 66, Plant Biotechnology for Sustainable Production of Energy and Co-products, eds P.N. Mascia, J. Scheffran and J.M. Widholm, Springer, New York, 2010.	Reference was added, and argument included.
Michael Jack (Scion (NZ Forest Research Institute))	2	27	28	-	-	-	-	-	chief of which is land	Accepted
Laura Verduzco (Chevron Corporation)	2	27	17	27	19	-	-	-	Current technology can in fact be used to convert lignocellulose into liquid biofuels. However, current technology is expensive and therefore, not suitable for commercial applications.	Statement will be changed to 'commercial technology'
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	27	27	-	-	-	-	-	energy	Accepted
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	27	25	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	Accepted
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	27	21	27	23	-	-	-	Important remark with regard to food-or-fuel discussion in Germany.	Agree
Laura Verduzco (Chevron Corporation)	2	27	37	-	-	-	-	-	In the context that is being treated in this text, agroforestry refers to the production of energy crops in a forest setting, therefore producing wood (not food) and energy feedstocks in the same area of land. Consider rephrasing to "In the context of bioenergy generation, agroforestry systems make it possible to use land for both WOOD PRODUCTION (ie. by growing trees for the construction industry or for the paper industry) and energy purposes."	Actually we meant growing trees in agricultural setting (rows of poplar in a wheat field), but we agree that the option suggested here is also valuable. We therefore added food AND wood.
Sweden (Swedish Environmental Protection Agency)	2	27	15	27	15	-	-	-	Is the plantation and harvest of perennial energy crops really more resource intensive than that of the annual species when compared on an annual basis? You need to consider it at the planting of a perennial energy crop is only done every 10-25 years.	Statement was removed
Laura Verduzco (Chevron Corporation)	2	27	37	27	38	-	-	-	It is important to mention that one of the advantages of agroforestry is that because no additional land is needed to grow energy feedstocks, there is no indirect land-use change.	This argument was added.
Christoph von Stechow (IPCC WGIII TSU)	2	27	25	-	-	-	-	-	Please consider adding a cross-reference to sub-section 2.2.6.	There is no section 2.2.6 (?)
United States (U.S. Department of State)	2	27	17	-	-	-	-	-	Statement that "current technology lignocellulose can only provide heat and power" is inaccurate. Lignocellulose can also currently provide liquid biofuels via gasification, pyrolysis, and Fischer-Tropsch synthesis technology--so called Biomass to liquid fuels. In general, discussion of technology for biomass conversion (throughout the report) is not up to date. (See later comments)	Statement will be changed to 'commercial technology'
Peter de Haan (Ernst Basler + Partner AG)	2	27	8	8	-	-	-	-	The term ""first-generation"" is used here for the first time in chapter 2, before ever having been defined.	There was a reference to section 2.3.3 for definition, was made clearer.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	27	25	27	25	2.3.1.1	-	-	Have the cost-supply curves you refer to included approaches such as opportunity costs for a farmer. I strongly doubt it, would be fair to mention.	The opportunity costs given by Bureau et al. are calculated at farm level and scaled up at regional or country level to obtain cost-supply curves, as exemplified in Figure 2.2.4. We changed the last sentence of this paragraph to make it clearer.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Donald Smith (McGill University)	2	27	12	27	16	2.3.1.1	-	-	Planting of perennials is not always more resource intensive than conventional crops. This would be so for some of the tee species, which are planted as cuttings, and for Miscanthus, which is planted as rhizomes, but other grasses are planted as seed and the effort involved here is about the same as other crops. In addion, annual crops are planted every year while perennials are are planted only every one to several decades, as a stand may persist for that long. When the extra planting effort is averaged over the lifetime of the stand it is less clear that the resources invested for esablishment are higher thatn annual crops.	Statement was removed
Elina Vapaavuori (Finnish Forest Research Institute)	2	27	3	-	-	-	-	2.3.1.	Kärhä et al. 2009 is missing in the list of references.	True, will be added
Michael Jack (Scion (NZ Forest Research Institute))	2	28	19	-	-	-	-	-	..can range from 20 to up to 50%...""	Accepted
Laura Verduzco (Chevron Corporation)	2	28	25	-	-	-	-	-	Consider expanding this point. We suggest the following: "...their own complex supply chains, which include elements of transportation, marketing, distribution, pretreatment, and others)"	Will reword to similar
Helmut Haberl (Institute of Social Ecology, Vienna)	2	28	12	-	-	-	-	-	If I am correct, odt (oven-dry tons) is equivalent to zero moisture content, i.e. identical to "dry matter biomass". As it might be confusing to use different words for the same thing, it would be good to explain this once and for all and after that use just one word throughout.	Table was removed
Peter de Haan (Ernst Basler + Partner AG)	2	28	14	14	-	-	-	-	Introduce a fourth-level heading 2.3.2.1 here	Will have to harmonise with other comments directed to 2.3.2.1 to 2.3.2.3
Christoph von Stechow (IPCC WGIII TSU)	2	28	5	28	6	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	The reference is Dupraz and Liagre (2008), probably misplaced. Was moved to the end of the sentence for clarity.
Laura Verduzco (Chevron Corporation)	2	28	16	-	-	-	-	-	Preprocessing not only improves handling, it also reduces material losses during transportation.	Accepted
Laura Verduzco (Chevron Corporation)	2	28	6	28	9	-	-	-	The text reads: "that revenues generated from growing bioenergy feedstocks may provide access to technologies or inputs enhancing the yields of food crops, provided the benefits are distributed to local communities". If the benefits are distributed to local communities, how can revenues be invested in new technologies?	Sentence was mitigated to 'feedstock benefits'
Brazil (Ministry of Science and Technology)	2	28	5	-	-	2.3.1.2	-	-	Should read: ""perennial and SEMI-PERENNIAL species (...)"". Semi perennial crops (e.g. sugarcane) also create positive externalities such as the ones mentioned in the text (erosion control, improved fertilizer use and others)	OK, sentence will be extended to semi-perennials – but is the distinction between perennials and semi-perennials necessary ?
Daniela Thrän (DBFZ / UFZ)	2	28	-	-	-	-	-	2.3.2	add "wood pellets from sawing residues"; for cattle slurry energy content is wrong (GJ/cattle?)	Table has been removed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	28	10	28	12	-	-	2.3.2	Are the costs indicated in this table real costs or mainly market prices?	Table has been removed
Frank Behrendt (Institute for Energy Engineering)	2	28	-	-	-	-	-	2.3.2	MSW should e explained	Table has been removed
Peter de Haan (Ernst Basler + Partner AG)	2	28	-	-	-	-	-	2.3.2	shortening potential: omit this table, it is not coordinated with fig. 2.3.1	Table has been removed
Ella Stengler (CEWEP)	2	28	10	28	11	-	-	2.3.2.	The unit used in the table GJ/inhab is not common in Europe. Most of the time the unit GJ/Mg is used in reference to the calorific value of waste. The use of the unit GJ/inhab is not practical because comparison with other data in the table is then not possible.	Table has been removed
Michael Jack (Scion (NZ Forest Research Institute))	2	29	31	29	32	-	-	-	..delivered in the mid 70's to less than¿""	Accepted
Brian Titus (Natural Resources Canada)	2	29	32	-	-	-	-	-	Change ¿70-ies¿ to ¿1970s¿	Accepted
Laura Verduzco (Chevron Corporation)	2	29	16	29	19	-	-	-	Does this stage increase or decrease revenues for the farmer?	Will clarify
Sweden (Swedish Environmental Protection Agency)	2	29	41	29	44	-	-	-	Exclude ¿... and related GHG emissions¿ from the sentence since these emissions don¿t influence the energy use.	Accepted
Laura Verduzco (Chevron Corporation)	2	29	4	29	7	-	-	-	Explain why waste treatment resources are often available at a negative value (for instance, a municipality pays bioenergy facilities to process its waste stream)	Addressed
Laura Verduzco (Chevron Corporation)	2	29	16	29	19	-	-	-	Include the importance of the role of policymakers at this stage. This stage usually occurs as a result of bioenergy mandates. Also mention the development of and compliance with sustainability provisions and voluntary sustainability standards.	This topic is addressed in Section 2.4.4

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	29	11	29	13	-	-	-	Increasing average transport distances further improves economies of scale, but increases transportation costs and lifecycle emissions.	Will revisit wording
Laura Verduzco (Chevron Corporation)	2	29	31	29	32	-	-	-	It is not clear what is meant with "delivered halfway the 70-ies"	rephrase
Daniela Thrän (DBFZ / UFZ)	2	29	35	29	35	-	-	-	logistics are a precondition for an overrregional market	revise wording to accommodate comment
Christoph von Stechow (IPCC WGIII TSU)	2	29	29	29	33	-	-	-	No reference is provided to substantiate the assertions made in these lines.	Will revisit and reference as necessary
Christoph von Stechow (IPCC WGIII TSU)	2	29	6	-	-	-	-	-	Please consider replacing the word "value" with the word "price".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	29	40	-	-	-	-	-	Please consider specifying the cross-reference (2.6.2) since the section 2.6 is nearly 20 pages long.	Accepted
Brazil (Ministry of Science and Technology)	2	29	4	29	4	-	-	-	should explain what is it MSW	Defined in the first time MSW is used in the introduction. Also the Europeans use MW (which is also the abbreviation for megawatt).
Sweden (Swedish Environmental Protection Agency)	2	29	45	29	46	-	-	-	This is a new paragraph. What does such organisations refer to?	clarify wording
Ella Stengler (CEWEP)	2	29	4	29	7	-	-	-	Waste-to-Energy is a waste treatment process in its own right and is (and was) not necessarly linked to production facilities.	Will adjust wording
Laura Verduzco (Chevron Corporation)	2	30	14	30	17	-	-	-	Briefly explain what is needed at the port to handle biomass pellets	Accepted
Brian Titus (Natural Resources Canada)	2	30	10	-	-	-	-	-	Change from ¿Bulk delivery of pellets is¿ to ¿Bulk delivery of pellets in Europe is¿	Accepted
Kaija Hakala (MTT Agrifood Research)	2	30	19	31	30	-	-	-	Combine 2.3.2.2 and 2.3.2.3 in one, under title of 2.3.2.2 and delete repetition of charcoal processing	Will have to harmonise with other comments directed to 2.3.2.1 to 2.3.2.3
Kaija Hakala (MTT Agrifood Research)	2	30	21	30	21	-	-	-	Could word "illegally" be replaced by e.g. "outside control of official authorities"?	Accepted
Youba SOKONA (Sahara and Sahel Observatory)	2	30	23	30	27	-	-	-	Could you please give some examples? There is number of cases such as in Senegal where charcoal industry is recognised and legalised but no real fondamental changes occured	Revisit wording and expand with examples
Youba SOKONA (Sahara and Sahel Observatory)	2	30	33	30	39	-	-	-	Could you please give some references here	Accepted
Sweden (Swedish Environmental Protection Agency)	2	30	7	30	9	-	-	-	Do you mean that the upper limit for transportation is shorter for pellets than for raw biomass?	check meaning and rephrase
Patrick Lamers (Ecofys Germany GmbH)	2	30	20	30	32	-	-	-	First two paragraphs contain similar and double information: merge and shorten.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	30	8	30	9	-	-	-	It is difficult to understand why the upper limit for transportation of raw biomass should be higher than for pellets and where these numbers are derived from. Additionally, no reference is provided to substantiate the assertions made in this sentence.	The higher density of pellets enables them to be transported longer distances than chips. References and numbers provided in the revised text.
Laura Verduzco (Chevron Corporation)	2	30	7	30	10	-	-	-	It is unclear whether the 50% corresponds to storage and transportation or only to storage.	only storage
Sweden (Swedish Environmental Protection Agency)	2	30	5	30	7	-	-	-	Long-distance transport by ship does affect the energy balance of the wood pellets, but the effect may be fairly small.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	30	33	30	39	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	30	6	-	-	-	-	-	Please consider providing a reference point, since 17MJ/kg is not easy to grasp as a lay reader.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	30	20	-	-	-	-	-	Please define what you mean with "specific issues". This term could be taken as an insult to developing countries.	Accepted
Laura Verduzco (Chevron Corporation)	2	30	33	30	39	-	-	-	Provide a reference for this paragraph	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	30	10	30	12	-	-	-	The delivery of home heating oil in the form of pellets is not common in many countries. Please specify the region where this system is used. For example: "Bulk delivery of pellets is very similar to a delivery of home heating oil in Russia..."	Europe was specified
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	30	-	-	-	2.3.2	-	-	Strange that pellets are discussed both in 2.3.2.1 and in 2.3.2.3. Same applies to charcoal in 2.3.2.2 and 2.3.2.3. Please consider finding a clearer structure.	Will have to harmonise with other comments directed to 2.3.2.1 to 2.3.2.3
Donald Smith (McGill University)	2	30	9	20	9	2.3.2.1	-	-	Is the feasible transport distance for pellets really less than for raw biomass?	Related to transport costs comments above, address together
China (China Meteorological Administration)	2	30	8	30	9	2.3.2.1?	-	-	Delete the content in brackets.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	31	29	-	-	-	-	-	Assuming that eucalyptus is not grown everywhere, which region of the world does this sentence refer to?	Brazil, sentence rearranged
Patrick Lamers (Ecofys Germany GmbH)	2	31	10	31	12	-	-	-	Back up these characteristics of pellet by references or explain better what you mean e.g. with "uniform" characteristics.	Explain
Brian Titus (Natural Resources Canada)	2	31	38	-	-	-	-	-	Change from ¿present in short rotation wood¿ to ¿present in forest biomass, short rotation wood¿¿	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	31	32	-	-	-	-	-	Change to "require biomass to be processed"	Accepted
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	31	19	-	-	-	-	-	Charcoal discussion in repetition	Corrected
Daniela Thrän (DBFZ / UFZ)	2	31	30	31	30	-	-	-	Discussion of the feedstocks for biogas are missing - pleas add	information available in the section 2.3.3.3
Christoph von Stechow (IPCC WGIII TSU)	2	31	1	31	7	-	-	-	Has there been no scientific development since the publication of Erikson and Prior in 1990?	Check and adjust
Patrick Lamers (Ecofys Germany GmbH)	2	31	12	31	17	-	-	-	Here you speak about cooking and heating applications. It would be beneficial to get a scale of these and to compare them with each other as to the use of pellets and chips.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	31	32	31	41	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Reference will be added
United States (U.S. Department of State)	2	31	47	-	-	-	-	-	P31, line 47: Consider inclusion: ¿¿hydrocarbons in the diesel [and jet fuel] range¿	Included
Christoph von Stechow (IPCC WGIII TSU)	2	31	37	-	-	-	-	-	Please consider rephrasing "break down by enzymes".	Accepted
Sweden (Swedish Environmental Protection Agency)	2	31	33	31	36	-	-	-	Sugar rich feedstocks require the least amount of processing if you compare different ways of producing alcohols, but not otherwise.	Accepted
Laura Verduzco (Chevron Corporation)	2	31	7	-	-	-	-	-	This is an old reference. Is it still valid to say that most briquetting projects have failed? Briquetting.com has a list of projects in other countries.	Similar to prev issue 2 rows above
Rory Gilsenan (Natural Resources Canada)	2	31	42	32	3	-	-	-	This section seems to imply that gasification and pyrolysis are the same process, which they are not.	No, they are not and the differentiation will be made.
Christoph von Stechow (IPCC WGIII TSU)	2	31	12	31	30	-	-	-	To avoid redundancy and to improve the logical order of this subsection, please consider moving subsection 2.3.2.1 on wood pellet logistics and supplies behind line 12 on page 31 and moving 2.3.2.2. behind line 30 on page 31. In the current version, wood pellets and charcoal are adressed twice, leading to redundancies (e.g. lines 21-22 on page 31) that can thus be avoided.	Will have to harmonise with other comments directed to 2.3.2.1 to 2.3.2.3
David Klein (PIK)	2	31	28	-	-	-	-	-	WAS NOT CORRECTED: charcoal in oil-based electric power plants sounds implausible. Reference?	References will be added
David Klein (PIK)	2	31	21	-	-	-	-	-	WAS NOT CORRECTED:""low bulk density"" does not reduce transport costs, it increases them	The issue here is that we are talking about charcoal used in rural areas of developing countries. There, quite often, transportation is done by persons or animals and such low unpacked density facilitates transportation. On the contrary when using motorized vehicles the major constraints is volume instead of weight.
Patrick Lamers (Ecofys Germany GmbH)	2	31	5	-	-	-	-	-	What do you mean with this sentence?	Check and clarify wording

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	31	23	-	-	-	-	-	Why mainly sold to urban households and not rural households? Please justify and provide reference.	References will be added
Patrick Lamers (Ecofys Germany GmbH)	2	31	2	31	4	-	-	-	You claim that "most have failed". Can this be justified? Please provide reference.	May have referred mostly to developing country experiences
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	31	18	31	18	2.3.2.3	-	-	The author´s name is Fagernäs et al., 2006	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	31	42	31	42	2.3.3	-	-	Combustion of which materials requires the least amount of prior processing? Add material(s) or delete sentence. Rationale: Whether combustion the path with the least amount or not, depends on the input material. Combustion of e.g. sewage slugde or synthesis gas obtained by gasification of wood needs a lot of technical devices. Hence, it requires a lot of prior processing.	Yes, the reviewer is correct that the introduction aimed at lignocellulosic but was not considering all the possible waste streams. Will be modified.
United Kingdom (Department of Energy and Climate Change)	2	31	44	31	46	2.3.3	-	-	Here we suggest that bioimass gasification yields an intermediate that resembles syngas while on page 33 section 2.3.3.1 line 30 it is written that biomass gasification yields syngas. Slight consistency issue in my mind.	The statement in this place is correct. The two need to be reconciled. The composition of biomass is deficient in hydrogen and therefore it does not provide the same composition of natural gas (CH4)-derived syngas.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	31	33	31	36	2.3.3	-	-	I would say oild crops require the least processing (only pressing) to make a liquid fuel, not sugar crops. In general, I wonder whether this paragraph (lines 32-41) is essential.	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	31	33	31	36	2.3.3	-	-	The simplest conversion steps with the least amount of processing require vegetable oils, that are used in in combustion engines. Delete the original sentence, or delete "...require the least amount..." and add "...require a low amount...".	Good suggestion
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	31	31	33	7	2.3.3	-	-	This entire subsection is not yet neatly structured and lacking logical flow, and contains some slightly disputable remarks. Please reconsider.	Structure will be improved. The figure intended to separate what was covered in 2.3 and in 2.6.
Sweden (Swedish Environmental Protection Agency)	2	31	44	31	44	-	-		What is immediate severity processes?	Intermediate severity processes are those that take place under conditions less severe than full combustion. For instance, the partial oxidation goes is less severe, pyrolysis can be even less severe. Other thermal processes in solution will be less severe such as pretreatments that decompose the polymer into larger chemical entities like sugars.
Sweden (Swedish Environmental Protection Agency)	2	32	12	32	14	-	-	-	It is not clear what the reasons are in the sentence: ¿ For these reasons¿¿ I would assume that various challenges in acid and enzymatic hydrolysis are the reasons.	Will be clarified
Christoph von Stechow (IPCC WGIII TSU)	2	32	9	32	16	-	-	-	No reference is provided to substantiate the assertions made in this paragraph. Please consider referencing key studies from section 2.6.	References will be cited
United States (U.S. Department of State)	2	32	1	-	-	-	-	-	P32, line 1: Consider inclusion: ¿¿to generate electricity [or propulsion] in diesel [or jet] engines¿	Accepted. Jet fuel will be discussed.
Patrick Lamers (Ecofys Germany GmbH)	2	32	8	-	-	-	-	-	Reference "E4Tech 2008" does not exist in REFERENCES, please include or update	Using Bauen and others (IEA Bioenergy ExCo: 2009)
Norway (Climate and Pollution Agency)	2	32	12	32	16	-	-	-	The combustion of lignocellulosics is commercial available, the utilization through the mentioned technologies require considerable more research. However,the biochemical conversion of lignocelluulosics require the separation of cellulose/hemi-cellulose and lignin; thus open up for two parallel pathways, biochemical AND thermochemical through conversion of sugars. The lignin residue is a valuable feedstock for various conversion methods leading to (among others) aromatics, phenols and BTEX chemicals. These are prime chemical feedstocks.	Will be revised and make the various categories more clear.
Bernd Wittgens (SINTEF Materials and Chemistry)	2	32	12	32	16	-	-	-	The combustion of lignocellulosics is commercial available, the utilization through the mentioned technologies require considerable more research. However,the biochemical conversion of lignocelluulosics require the separation of cellulose/hemi-cellulose and lignin; thus open up for two parallel pathways, biochemical AND thermochemical through conversion of sugars. The lignin residue is a valuable feedstock for various conversion methods leading to (among others) aromatics, phenols and BTEX chemicals. These are prime chemical feedstocks.	The structure of Sec. 2.6 and of previous chapters will make the distinction more clearly and indicate pretreatment technologies more clearly for biochem and for thermochem. Combustion improvements are discussed in Sec. 2.3 as a technology that already exists and continues to improve.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Sweden (Swedish Environmental Protection Agency)	2	32	1	32	2	-	-	-	What do these oils refer to? Many of the compounds mentioned in the previous sentence are not oils.	A sentence was deleted that defined pyrolysis oils.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	32	-	-	-	-	2.3.1	-	Figure Caption: I believe the ref should be IEA Bioenergy (2008), of which E4tech is one of the authors.	Accepted
Norway (Climate and Pollution Agency)	2	32	-	-	-	-	2.3.1	-	First part of Table 2.3.1, Co-firing should be marked as biomass to heat; the transtion between BtH and BtP/CHP seems arbrtiarily. Second part of table, mismatch between colors in table and legend.	Accepted
Bernd Wittgens (SINTEF Materials and Chemistry)	2	32	-	-	-	-	2.3.1	-	First part of Table, Co-firing should be marked as biomass to heat; the transtion between BtH and BtP/CHP seems arbrtiarily. Second part of table, mismatch between colors in table and legend.	Accepted
Daniela Thrän (DBFZ / UFZ)	2	32	-	-	-	-	2.3.1	-	HTC is missing; please add	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	32	-	-	-	-	2.3.1	-	Rename ""diesel-type biofuels"" to ""liquid biofuels"". It is also possible to produce biogasoline in principle, or to mix biogasoline with normal gasoline (blending) as Shell is doing with V-Power in Europe (gas-to-liquid gasoline, not biomass-to-liquid).	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	32	-	-	-	-	2.3.1	-	rename ""Syndiesel"" with ""Synfuel"", as one can in principle also produce biogasoline through this route. That current (qualitatively poor) biofuel is burnt in diesel engines, is due to their higher robustness compared to spark-ignition (gasoline) engines.	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	32	-	-	-	-	2.3.1	-	Technologies shown in 2.3.1. should be compatible with those shown in fig 2.1.1	Accepted
Frank Behrendt (Institute for Energy Engineering)	2	32	-	-	-	-	2.3.1	-	upper part: Combustion as driver for ORC is not really a good idea, because ORC is a process mainly for low-temperature situations (e.g., geothermal etc)	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	32	4	32	4	2.3.3	2.3.1	-	row "combustion", column "Demaonstration": The status for ORC in Germany is commercial. Rationale: In 2009, there were about 80 ORC plants in commercial operation (sector bioenergy).	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	32	8	32	8	2.3.3	2.3.1	-	Technical development in this sector is quickly. Thus, it´s not appropriate to cite sources as old as 2008.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	33	30	33	40	-	-	-	Although this paragraph seems basic knowledge to experts in the field, non-experts might be interested in being provided with a reference to learn more about the subject.	Reference to Faaij et al 2006 textbook will be added
Brian Titus (Natural Resources Canada)	2	33	30	-	-	-	-	-	Change from ¿Biomass Gasification¿ to ¿Biomass gasification¿	Accepted
Brian Titus (Natural Resources Canada)	2	33	38	-	-	-	-	-	Finns also have district heating, so change ¿Scandinavia¿ to ¿Nordic countries¿	sentence was removed
Ella Stengler (CEWEP)	2	33	9	33	14	-	-	-	Incineration of municipal waste produces electricity and/or heat. The waste is directly combusted in the furnace and energy is recovered. With this (mostly grate) technology heterogenous waste can be treated without pre-treatment. This process complies with low emission values. In Europe strict emission limit values are set in the Waste Incineration Directive 2006/76/EC and there is no differentiation between furnace technology, i.e. fluidised bed versus grate furnace. They comply with the same (strict) emission limit values. The SRREN currently only refers to fluidised bed incineration. Grate Waste Incineration should be mentioned as well.	Accepted
United Kingdom (Department of Energy and Climate Change)	2	33	15	-	19	-	-	-	More is needed here -as a minimum the difference between slow and fast (and maybe even intermediate) pyrolysis must be explained. The distinction between promotion of oil as opposed to char for these needs to be mentioend and it is critical to point out that char is often used in hte pyrolysis process itself to provide heat to allow hte reactions to be sustained.	Advanced pyrolysis is addressed in 2.6. Where technologies will be treated will be made more clearly
United States (U.S. Department of State)	2	33	36	-	-	-	-	-	P33, line 36: Consider inclusion of bracketed text: ¿...(FT) diesel [or jet].¿	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	33	21	-	-	-	-	-	Please consider adding "as a by-product of power generation" behind "steam".	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	33	25	33	29	-	-	-	Please revise English and sentence structure.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	33	41	33	42	-	-	-	Please revise English and sentence structure.	Accepted
Laura Verduzco (Chevron Corporation)	2	33	15	33	19	-	-	-	Pyrolysis oil can be used to produce bio hydrocarbons.	This technology is added with references in Table 2.6.2. However, to simplify presentation, information in Tab. 2.6.2 will be added to the current 2.6.3 and this will become clearer. Figures will also be inserted
Norway (Climate and Pollution Agency)	2	33	19	-	-	-	-	-	Pyrolysis oils are a highly complex mixture with rather high water content and numerous acidic components. Acidity of the pyrolysis oils require considerable treatment for utilization as high-energy fuel; further these oils are unstabel if not treated by e.g. hydrotreating to reduce the oxygen content of the oils.	Advanced pyrolysis is addressed in 2.6 Where technologies will be treated will be made more clearly
Bernd Wittgens (SINTEF Materials and Chemistry)	2	33	15	-	19	-	-	-	Pyrolysis oils are a highly complex mixture with rather high water content and numerous acidic components. Acidity of the pyrolysis oils require considerable treatment for utilization as high-energy fuel; further these oils are unstabel if not treated by e.g. hydrotreating to reduce the oxygen content of the oils.	There is a difference between the production of liquid fuels and directly coupled small scale electricity production. For derivation of liquid fuels the stabilization is essential. This will be made more clearly
Brazil (Ministry of Science and Technology)	2	33	20	33	29	-	-	-	Should appear Brazil in the text as an example of using bagasse cane for cogeneration.	This fact is highlighted in Table 2.3.3 for the technology specific chains
Brian Titus (Natural Resources Canada)	2	33	35	-	-	-	-	-	Subscript ¿2¿ in ¿H2¿	Accepted
United Kingdom (Department of Energy and Climate Change)	2	33	20	-	29	-	-	-	The examples are not relevant and should be removed in favour of a description of the technology which is the focus here. It should be noted that steam raising is not necessary for CHP operation e.g. hot water can be provided from the cooling jacket on a reciprocating engine operating on biomass syngas.	Example will be removed
Ella Stengler (CEWEP)	2	33	20	33	29	-	-	-	The majority of the WtE plants in Europe are cogeneration plants. In Scandinavian countries most of the WtE plants are connected to the District Heating systems.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	33	25	33	28	-	-	-	The sentence is difficult to understand since there are to verbs. Please consider rephrasing.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	33	28	-	-	-	-	-	The term "District heating Scandinavian" is incomprehensible. Please consider rephrasing.	sentence was removed
United Kingdom (Department of Energy and Climate Change)	2	33	12	-	-	-	-	-	There is no need to reference FBC here - large scale efficient and clean technologies exist for steam plant. FBC is suitable for certain types of feedstocks and has drawbacks as well as the advantages listed here. At the level of technical detail being given here (where 5 lines covers combustion completely) it is inappropriate to singe out a technology like this.	Detailed technologies will be removed (if cited, the list will be complete)
Patrick Lamers (Ecofys Germany GmbH)	2	33	43	-	-	-	-	-	Very general claim. To which countries does this apply?	India and China
United Kingdom (Department of Energy and Climate Change)	2	33	34	-	35	-	-	-	Why are we talking about biofuels? This technology has a wide range of applications and many do not use catalysts.	The more detailed discussion on catalysts for liquid fuels will move to 2.6 and in 2.3 only the commercial technologies will be discussed.
United Kingdom (Department of Energy and Climate Change)	2	33	38	33	40	2.3,3,1	-	-	Distinction needs to be drawn between the terms syngas and fuel or producer gas. Syngas is a valuable chemical production with a lowish CV - if you were planning to burn the product gas from gasification, then you would choose to yield a gas with a higher CV and hence use a different gasifier. Having said that, it is true that syngas can be burnt in an engine - would you go to all the trouble to make a clean mixture of CO and H2 just to burn it?	Paragraph will be rephrased accordingly to discuss producer gas.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	33	8	33	44	2.3.3.1	-	-	It's a bit strange to mention cogeneration here between basic thermochemical technologies. Cogeneneration is merely a different way of using the heat that is generated by the conversion processes. You might as well consider tranferring pyrolysis to a pretreatment section, together with pelletisation, charcoal production and torrefaction.	Indeed, cogeneration is not a prime thermochemical technology; it is a system integration feature of many commercial technologies. Pyrolysis can be a pretreatment or a final product (when electricity in small scale is the product). Will clarify differences better
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	33	13	33	13	2.3.3.1	-	-	The author´s name is Fagernäs et al., 2006	Accepted
China (China Meteorological Administration)	2	33	20	33	29	2.3.3.1?	-	-	Delete this paragraph.	The purpose of this paragraph is to give a short overview of all currently available technologies. There is no reason to exclude thermo-chemical processes, which are a major group of conversion technologies

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
China (China Meteorological Administration)	2	33	12	33	14	2.3.3.1?	-	-	This paragraph only presents circulating fluidized biomass combustion technology, and it also mentions that it is quite flexible and adaptable for various biomass feedstock. It is suggested that other combustion technologies be added, giving a complete description; or do not mention the specific circulating fluidized or water-cooled vibrating grate combustion technology, just delete these incomplete details and only focusing on the biomass combustion power generation.	Detailed technologies will be removed (if cited, the list will be complete)
Norway (Climate and Pollution Agency)	2	33	20	33	29	3	-	-	2.3.3.1 Thermochemical Processes comprises combustion, pyrolysis and gasification. Cogeneration is not a thermochemical process but more a system or chain and can be based on all 3 processes and even the combustion of the products from chemical and biochemical Processe. Suggest to move it to the end of 2.3.3.1 or even to the introductional part under 2.3.3. conversion technologies.	Good suggestion
Bernd Wittgens (SINTEF Materials and Chemistry)	2	34	21	-	-	-	-	-	10% ethanol in the feementation liquor is a rather high number. Large installation operate in general at 4% for maximum conversion. Htsi number needs confirmation.	The percentage will be checked. In Brazil 7-10% is common. Adding mixtures of molasses and juice can increase the yield.
Norway (Climate and Pollution Agency)	2	34	21	-	-	-	-	-	10% ethanol in the fermentation liquor is a rather high number. Large installation operate in general at 4% for maximum conversion. This number needs confirmation.	The percentage will be checked. In Brazil 7-10% is common. Adding mixtures of molasses and juice can increase the yield.
Norway (Climate and Pollution Agency)	2	34	16	-	-	-	-	-	Butanol should be added as fermentation product	Butanol is covered in 2.6 (future technologies)
Bernd Wittgens (SINTEF Materials and Chemistry)	2	34	16	-	-	-	-	-	butanol should be added as fermentation product	Accept
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	34	24	34	38	-	-	-	Chapter should be supplemented by a remark about high efficiency and potential of biogas feed in into gas grid.	The grid feed option is already mentioned in Table 2.3.3. We take it that high-efficiency implies enrichment, and will be added next to 'upgraded'
Patrick Lamers (Ecofys Germany GmbH)	2	34	8	-	-	-	-	-	Delete "the"	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	34	35	46	1	-	-	-	Despite the difficulties to compare this respectable amount of diverse data, the readers of the SRREN will probably expect a more concise comparison of the data than provided in section 2.3.4	Accepted. A simple set of comparable data will be used in Section 2.7 and Section 2.3 will be simplified.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	34	28	-	-	-	-	-	Exchange the term "segregated waste" by "segregated biomass".	will correct.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	34	33	-	-	-	-	-	Exchange the term "sludge" by "residue".	will correct
Patrick Lamers (Ecofys Germany GmbH)	2	34	4	34	6	-	-	-	Explain esterified biodiesel production shortly but in more detail (feedstock (e.g. rapeseed) crushing i.e. vegetable oil extraction, esterification, blending with fossil diesel if required) since this is different to hydrogenated biodiesel which is explained in the next paragraph.	The details of the technology are in Table 2.3.3
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	34	26	34	27	-	-	-	Methane ranges in biogas from 50% up to 70%.	will correct 50-70%.
Christoph von Stechow (IPCC WGIII TSU)	2	34	12	34	13	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	References will be added
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	34	5	-	-	-	-	-	Not only vegetable oils are used to produce biodiesel. 20% of whole production of biodiesel in Brazil (400 million litres) use animal fats, as tallow or yellow grease from slaughterhouses. This feedstock is cheaper than any other vegetable oil.	Animal fats are included
Daniela Thrän (DBFZ / UFZ)	2	34	34	34	34	-	-	-	sludge from anaerobic digestion can also be sold as fertiliser	will correct
Laura Verduzco (Chevron Corporation)	2	34	46	-	-	-	-	-	The fact that the costs are not normalized, makes them practically useless for comparison purposes. Authors should agree on a technology price index to normalize all the cost figures. If the costs in table 2.3.3 are not in US$2005, this should be explained in the table too by changing the title of column five.	Costs are normalized to $2005 to allow comparability but the financial assumptions (e.g., interest rate) may vary from study to study. The GHG data provided refer to attributional LCA studies. They do not include Land Use Impacts.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	34	39	44	-	-	-	-	This section, while providing a lot of useful information, is in my reading quite complex and inconclusive. Moreover, it is not clear if at all, and if so how, the "%GHG reductions from fossil reference" given in the Tables include LUC and iLUC effects.	The GHG data from the table are attributional lifecycle data (no land use change included). Ranges include multiple methodologies of calculation (with or without coproducts and with the various methodologies for coproduct values). We will replace single examples of well defined studies with ranges
Brian Titus (Natural Resources Canada)	2	34	-	-	-	-	-	-	Used bold on p. 33, Section 2.3.3.1 to introduce new paragraphs, so should do same in Section 2.3.3.2 and 2.3.3.3: transesterification (L.2), hydrogenolysis (L.8), fermentation (L.15), anaerobic digestion (L.24).	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	34	15	34	23	-	-	-	While the biochemical conversion of conventional sugar and starch feedstocks involves yeast, there is a missing description of the cellulosic sugars. You cannot limit the microorganisms to only yeasts if these are considered. Both yeast and bacterial strains are being developed for conversion of cellulosic sugars.	The description of the section will contain only the commercial technologies (sugar and starch). The cellulosic technologies will be discussed in 2.6 as they are not commercially available but are under development. Both bacterial and yeast technologies will be included.
Elina Vapaavuori (Finnish Forest Research Institute)	2	34	45	-	-	-	-	-	You say that '¿no special effort was made to bring all these costs into comparable basis¿'. Why not, and of what use is then the information in Table 2.3.3.?	Costs are normalized to $2005 to allow comparability but the financial assumptions (e.g., interest rate) may vary from study to study. The GHG data provided refer to attributional LCA studies. They do not include Land Use Impacts.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	34	12	34	13	2.3.3.2	-	-	This is the only remark on costs in this section, consider deleting.	As a standalone remark the reviewer is correct. However, costs are given in Table 2.3.3 for all technologies and feedstocks to the extent that they were available in the literature. Will be removed from this specific place.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	34	27	-	-	2.3.3.3	-	-	60-70% methane content is relatively high, depending on the feedstock 50-60% is more in line with the numbers I've come across.	will correct 50-70%.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	34	18	-	-	2.3.3.3	-	-	Ethanol as a by-product of sugar mills? Strange remark.	The sentence was poorly constructed. Indeed, there are sugar mills in which the ethanol is a byproduct of utilization of molasses that are not for production of sugar. In this case, it is a byproduct. However, the sugar and ethanol mills have both sugar and ethanol as products as well as electricity. The sugar, ethanol, and electricity are coupled. The word 'by-products' will be changed to only reflect the by-product situation. This situation is well explained in the technology tables
United Kingdom (Department of Energy and Climate Change)	2	34	27	-	-	2.3.3.3	-	-	methane content of biogas quoted seems a bit high (60-70%), can you check and make sure this is ok.	will correct 50-70%.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	34	-	-	-	2.3.3.3	-	-	No attention for cellulose hydrolysis here, which surprises me. There's only a short remark on it in the intro of 2.3.3, but that seems too little to me	This is a 2nd generation process (2.6.3)
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	34	24	34	27	2.3.3.3	-	-	The methane concentration can reach 50-70%. Example: maize silage (50-55%) or by-products of starch extraction (50-65%). Data source: "Handreichung Biogasgewinnung und -nutzung", author: Fachagentur Nachwachsende Rohstoffe (FNR), Germany, 2006.	The concentration given was for manures anaerobic digestion. The reviewer provide concentrations of methane from waste streams from ethanol production.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	34	45	35	1	2.3.4	-	-	No effort to bring them to a comparable basis, but in table 2.3.3 you do mention that all costs are US$ (2005). How should I interpre this remark then?	The data are given on a US$(2005)/MJ for all cases. In this sense they are all comparable. What may not be comparable are the assumptions of technoeconomic evaluations from different references (a meta-analysis of the references was not conducted). If all of them used the same inside battery limits for capital costs calculations and had the same economic assumptions. The groups of values within the same reference, for instance, reference 4 for Table 2.3.3 ethanol and biodiesel have specified size plant, similar economic conditions, and are comparable (10 cases). Multiple literature sources are provided when available. The quality of the references -- for instance, data from reference 4 is of higher quality than those for China and molasses data from India, Colombia and Thailand for ethanol. On the electricity and power/heat many references are ranges or specific to a country or situation.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	35	9	-	-	-	-	-	"Household or village electricity" is not a common categorization of energy demand. Please use "single/multiple family housing" or "small scale" or capacity numbers.	It will be made more clear throughout the report that it addresses not only developed world uses of modern bioenergy but also developing world uses. In the developing world, a frequent unit is the household that collects solid fuels and uses it for cooking, lighting, and heating. Some of the cases have village cooking activities as well that require larger systems.
Frank Behrendt (Institute for Energy Engineering)	2	35	34	-	-	-	-	-	after stabilization - here should be clearly pointed out, that all bacterial activities have to be stopped in the material before putting it out into the open, otherwise they will continue for a while to produce methane, a potent GHG	Accepted
Gilberto Jannuzzi (University of Campinas)	2	35	9	35	9	-	-	-	and also used for cooking fuels see, e.g. Project Gaia: Commercializing A New Stove And New Fuel In Africa - Wiki | HEDON Household Energy Network: . <http://www.hedon.info/ProjectGaiaCommercializingANewStoveAndNewFuelInAfrica>; Pennise, David, Simone Brant, Seth Mahu Agbeve, Wilhemina Quaye, Firehiwot Mengesha, Wubshet Tadele, e Todd Wofchuck. 2009. Indoor air quality impacts of an improved wood stove in Ghana and an ethanol stove in Ethiopia. Energy for Sustainable Development 13, n. 2: 71-76. doi:10.1016/j.esd.2009.04.003.	Reference will be checked (Gaia network). Issue of gray reference which needs to be addressed as there are several of the Hedon Network cited already in Section 2.4.2. The environmental impacts of cooking stoves is addressed in Section 2.5.5.2 The peer reviewed reference was sent to the Lead Author for inclusion in the appropriate place.
Brian Titus (Natural Resources Canada)	2	35	14	35	15	-	-	-	Not clear what is meant.	Accepted
United States (U.S. Department of State)	2	35	33	-	-	-	-	-	P35, line 33: Sentence beginning ¿The projected¿¿ is confusing¿appears to need editing.	Accepted
Laura Verduzco (Chevron Corporation)	2	35	31	35	36	-	-	-	Rephrase this paragraph. For ease of comparison provide the ethanol costs in these regions.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	35	31	35	36	-	-	-	Revise paragraph (English and structure)	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	35	27	35	28	-	-	-	Revise sentence and put costs for UK bioethanol into comparison with previous ones stated.	Accepted
Brian Titus (Natural Resources Canada)	2	35	42	35	44	-	-	-	Should any comment be made encouraging the most C-efficient use of biomass for bioenergy?	Accepted
Daniela Thrän (DBFZ / UFZ)	2	35	16	35	16	-	-	-	Solid bioFUELS¿ (see terminology standard)	Accepted
Laura Verduzco (Chevron Corporation)	2	35	45	36	7	-	-	-	These paragraphs can be deleted or consolidated into one short sentence	Accepted
Laura Verduzco (Chevron Corporation)	2	35	6	-	-	-	-	-	What is the fossil fuel baseline? Is indirect land-use change included? What type of methodology was used to calculate the lifecycle emissions of the fossil fuel? Is the baseline the same in every case? Can emission reductions be compared across the table?	The GHG data from the table are attributional lifecycle data (no land use change included). Ranges include multiple methodologies of calculation (with or without coproducts and with the various methodologies for coproduct values). We will replace single examples of well defined studies with ranges. The fuel replaced is gasoline or diesel for the liquid fuels. The fossil fuel replaced is of the particular study (either coal or natural gas or petroleum based) for electricity generation. Will make this more clearly. A Figure will be added which does the full comparison for power and heat to the same common baseline from a systematic study. A parallel study in biofuels is not as complete as power.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	35	11	35	12	-	-	-	Why are production costs very similar in the case of Thailand? The cost structure of biodiesel and bioethanol is very distinct i.e. feedstock costs are the most critical influencing factor for biodiesel whereas for bioethanol it is the production technique. Can you back up your claim with numbers and references?	The references used are cited in the Table 2.3.3. The two Thailand costs are for ethanol from molasses and cassava. The molasses data come from the the Government of Thailand provided to the study for the APEC The Future of Liquid Biofuels for APEC Economies by Milbrandt and Overend, 2008 (2007 data provided). This same study provided data for both cassava and molasses which were provided by the same source -- the difference was 17% higher for cassava than molasses and in the two different literature citations, the difference is 18%, identical within the uncertainties of estimates. The Thailand cassava ethanol costs are part of the referenced study of IEA Bioenergy ExCo:2009, which cross compares the data for various countries based on specific technoeconomic evaluations. The ethanol production cost from the Govt of Thailand cannot be broken down into specific cost components. Note that one is a residue of sugar processing and the other is a starch tuber that involves a higher level of processing but not as much as corn ethanol. The difference between cassava and molasses is also due to the high productivity of Thailand's cassava.
Patrick Lamers (Ecofys Germany GmbH)	2	35	16	35	17	-	-	-	Why are the costs lower? Provide explanation (less conversion steps, etc.).	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	35	42	35	44	2.3.4	-	-	direct LUC and indirect LUC has to be taken into calculation of the GHG emissions. If this is not the case in these calculations, it´s necessary to note that. Their amounts are essential for the result. GHG emissions reductions as high as "in the high 90%" are impossible for most of the fuel pathways.	Accepted
United Kingdom (Department of Energy and Climate Change)	2	35	8	35	9	2.3.4	-	-	Is it true that liquid biofuels to generate electricity is only limited to "some developing countries". There are examples in the UK (ref Company Convert2Green).	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	35	37	35	39	2.3.4	-	-	Sentence is correct, if electric efficiency is meant. Then add "electric" in row 38. Sentence is not correct, if (overall) energy efficiency is meant. Rationale: Large scale power plants often lack heat sinks.	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	35	24	35	36	2.3.4	-	-	The data in table 2.3.3 are obviously highly inconsistent in many cases. Thus, it´s hardly possible to compare the fuels, their pathways, costs and GHG reductions. To rank these fuel pathways and to valuate them is nonscientific.	Comparable data will be presented for a few selected commercial chains and fully developed from a technoeconomic perspective. Table 2.3.3 is being improved to cover additional chains for which it is not possible to obtain fully comparable data. To rank them they should all be comparable LCA basis. Some comparable data are presented in Section 2.5.
Daniela Thrän (DBFZ / UFZ)	2	36	26	36	26	-	-	-	Add some explaination to gaseous biofuels, which are also relevant (biomethan)	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	36	2	36	3	-	-	-	Apart from the English and sentence structure, please also provide numeric evidence and references.	Accepted
Japan (the Japanese Ministry of Foreign Affairs)	2	36	20	36	21	-	-	-	Delete "a perennial plant harvested every 5-6 years" as there is a debate whether sugercane is perennial or annual.	Accepted
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	36	0	-	-	-	-	-	In the last section sugar cane is described as a perennial plant harvested every 5-6 years. Please clarify since the rotation period maybe 5 to 7 years but within that period sugar cane can be harvested at least 7 times. It is said as well in the last section that the field residues due to mechanized harvest account for additional fuel production. But generally the residues will be left on the fields and are used there as nutrients for the soil. So please clarify the use of field residues.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	36	15	-	-	-	-	-	Please consider specifying the cross-reference (2.5.3) since the section 2.5 is more than 20 pages long.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	36	17	36	18	-	-	-	Revise sentence	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	36	20	-	-	-	-	-	Sugarcane, a perennial plant harvested annually, with a productive cycle of 5-6 years, ¿	Accepted
Richard Plevin (UC Berkeley)	2	36	17	-	19	-	-	-	This statement is garbled. In any case, The Plevin 2009 paper does not indicate that corn ethanol offers a 35% reduction, unless ILUC is ignored. The paper makes the point that ILUC should not be ignored.	Accepted
Donald Smith (McGill University)	2	36	20	36	20	2.3.4	-	-	Sugar cane is harvested at least once per year. A stand of sugarcane, once established, can persist for up to 5 to 6 years, being ratoon cropped repeatedly during that time. Thus, a given planting can be harvested repeatedly for upto 5 or 6 years, depending on local conditions.	Accepted
Norway (Climate and Pollution Agency)	2	36	17	36	19	3	-	-	Difficult to understand the meaning	Accepted
Norway (Climate and Pollution Agency)	2	36	22	36	24	3	-	-	Sentence difficult to understand (grammar)	Accepted
Norway (Climate and Pollution Agency)	2	36	7	36	7	3	-	-	What is "a lower fossil carbon source"	Accepted
David Klein (PIK)	2	37	-	-	-	-	-	2.3.3	Abbreviations should be explained (even if mentioned in text): DDGS, FASOM	Add as footnote or in a list of acronism
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	37	-	-	-	-	-	2.3.3	Definition of efficiency in first row, fifth column: Energy product energy. Energy is repeated.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	37	-	-	-	-	-	2.3.3	Denition of GMO in second row, seventh column is missing. GMO=Genetically modified crops	Accepted
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	37	-	-	-	-	-	2.3.3	Fifth row, six column. Delete the negative sign in -42	The specific reference of China is negative because of the fertilizers and principally the heavy use of coal for power and heat of the specific plants investigated. This means that compared to gasoline, the use of corn ethanol from a dry milled plant powered by a coal-based electricity and heated also with coal generates more emissions than the fossil case. There are no savings but extra emissions. Additional references will be added which show improvements. Same situation happens in the U.S. when coal fired ethanol plants are used but those are improving with time. Because of concerns, other ethanol routes will be used to highlight the case of China.
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	37	-	-	-	-	-	2.3.3	Fourth row, second column. Delete: 35.4d w/o coproduct revenue.	Accepted
United Kingdom (Department of Energy and Climate Change)	2	37	-	-	-	-	-	2.3.3	information in column 4 is inconsistent. Rather than being titled efficiency and process economics, is this column more of a "comment" column? If it's to remain as efficiency and economics then I think each comment should be consistent with the next so that comparisons can be made? For example, at bottom of page 37, the China comment is very limited and different to the comment on USA above it.	Comments were made to qualify the references since there were no parallel studies with efficiency numbers to the same level of information of the other rows.
Norway (Climate and Pollution Agency)	2	37	-	-	-	-	-	2.3.3	Maybe it is hidden somewhere here, but I do not find any comments on emissions during storage of biomass. I would have expected this under 2.3.2 or maybe somewhere in 2.5 or 2.6.2.	Emissions during storage are part of the LCA and are taken into account in the more sophisticated assessments that take time of storage into consideration.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	37	-	39	-	-	-	2.3.3	Note that the GHG emission reduction percentages given here are chain-based, not taking into account (i)LUC effects. Given the discussion later on, it should be mentioned I think.	Accepted. Called Direct GHG reductions from the chain or attributional.
Peter de Haan (Ernst Basler + Partner AG)	2	37	-	44	-	-	-	2.3.3	reduce level of detail in third column (efficiency and process econ.) by refering to original source of this table.	Other reviewers ask for details shown in table
Peter de Haan (Ernst Basler + Partner AG)	2	37	-	44	-	-	-	2.3.3	reformat from landscape to normal page orientation1	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Peter de Haan (Ernst Basler + Partner AG)	2	37	-	44	-	-	-	2.3.3	right-most column contains forecast/potential figures that differ from what is said in chapter 2.2.	The use of the word potential in this table does not mean resource potential as in the section 2.2. It means technical advances that may be realized with continued development. Poor choice of words. Will be rephrased

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Norway (Climate and Pollution Agency)	2	37	-	-	-	-	-	2.3.3	The title of the table should include that these are first generation biofuels	Add this title on the First 3 Tables. Comments were made to qualify the references since there were no parallel studies with the same level of information of the other rows.
Peter de Haan (Ernst Basler + Partner AG)	2	37	-	44	-	-	-	2.3.3	There are FIVE tables numbered 2.3.3!	They will be split and take and be interspersed
Richard Plevin (UC Berkeley)	2	37	-	-	-	-	-	2.3.3	This table is very hard to read. Too much text in table cells. Maybe this would be better with part as text in main report body, with only the numerical elements in the table. Strike GHG reductions from this table: these values are far too dependent on a wide range of assumptions to include a single value from one randomly chosen study for each fuel. Moreover, the crop-based fuels don't include land use change emissions, giving a false impression of high and certain GHG reductions.	Table will be simplified. Shortage of space does not allow text discussion. Efficiencies can provide a share of the information needed. GHG reduction figures will be provided through a range of values without LUC and in section 2.5 land use changes are discussed and approximate values given.
Bernd Wittgens (SINTEF Materials and Chemistry)	2	37	-	38	-	-	-	2.3.3	Title to table should include that these are first generation biofuels	Only first generation biofuels are commercial. Point is made in the final version
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	37	-	44	-	2.3.4	-	2.3.3	Column "% GHG reduction from fossil reference": direct LUC and indirect LUC has to be taken into calculation of the GHG emissions. If this is not the case in these calculations, it´s necessary to note that. Their amounts are essential for the result.	Add a footnote explaining these are old based data and LUC not accounted. Overlooked to put direct or attributional LCA in the title.
Norway (Climate and Pollution Agency)	2	37	-	44	-	3	-	2.3.3	The table is very difficult to understand. Does the % GHG reduction include the emissions from fertilizer production and use and theC-loss from soils? What means the negative figure - - 42 % for China on p.37? Are the cost figures without taxes, subsidies etc? At p.40 costs are given per GJ and per kWh. The intervalls seem not to be consistant; how could e.g 4.2-10 USD/GJ be consistant with 0.05-12 USD/kWh? Or is ment 0.05-0.12 USD/kWh?	The reference used had coal as a source of heat and electricity. For instance, if the ethanol plant were fired with biogas, the emissions reduction would be of 30%. The correct value is 0.05-0.12 USD/kWh. It was a typo.
China (China Meteorological Administration)	2	37	-	37	-	2.3.4	-	2.3.3.	The last line of the table in Chapter 2 on page 37 regarding the corn ethanol situation in China is inaccurate: in column of Efficiency and process economics, it should read ¿Estimated cost includes about 75%-80% of feedstock cost. A flexible subsidy is implemented by the government based on the raw material cost and oil price fluctuation¿; in column of % GHG reduction from fossil reference, delete ¿-42¿ and change to ¿one ton corn ethanol can reduce 1.07 tons of GHG(0.85kg CO2-equivalent/L)¿. Reference: Global Renewable Fuels Alliance, GHG EMISSION REDUCTIONS FROM WORLD BIOFUEL PRODUCTION AND USE, November 23, 2009.	The figure from S&T will also be quoted but the primary literature data is negative because of the high usage of coal to power these plants. The study quoted by S&T Consultants in Canada is not a primary source of GHG data. The study quoted in the report is a primary LCA study using an adaptation of the GREET model of Argonne National Laboratory for China. Because there are concerns about the study, the final report will show the cassava to ethanol values with anaerobic digestion as a source of energy. These values are from peer reviewed literature.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	39	-	39	-	2.3.4	-	2.3.3	Comparing the production paths of biodiesel from rape seed, Germany and France, the differences in GHG emission reductions (31% and 75%, respectively) are not explicable.	Will use ranges based on literature
United Kingdom (Department of Energy and Climate Change)	2	40	-	-	-	-	-	2.3.3	column 4 at the top - wood residue. Is an efficiency of 40% actually achievable for the woody component in co-firing. Coal I agree can be burnt at 40% but possibly will the wood have a lower efficiency by a little (e.g. Moisture content etc)?	See: Biomass-coal Co-combustion: Opportunity for Affordable Renewable Energy, Larry Baxter, Jaap Koppejan. http://www.ieabcc.nl/ Due to the high steam parameters and technical measures for efficiency improvement available in coal power plants, conversion efficiencies ranging from 30-38 % (higher-heating value basis) can be achieved, easily exceeding efficiencies in dedicated biomass systems and rivaling or exceeding the estimated efficiencies of many future, advanced biomass-based systems. Addition of biomass to a coal-fired boiler does not impact or at worst slightly decrease the overall generation efficiency of a coal-fired power plant. Minor changes in efficiency (either positive or negative) may occur due to more or less energy intensive fuel preparation and handling, while the typically increased moisture content in the fuel will slightly reduce the overall efficiency.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	40	-	-	-	-	-	2.3.3	I doubt whether co-combustion with coal is a conventional option for MSW. Usually this is combusted in separate incineratiors.	Two references are provided where MSW (organic portion) are co-combusted. The IEA Bioenergy Task 32 has a database of the worldwide coal fired plants with biomass and MSW.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Norway (Climate and Pollution Agency)	2	40	-	-	-	-	-	2.3.3	Wood log and residue - direct combustion: A reduction of GHG emissions by 97% compared to the fossil alternative is based on an outdated study that apparently does not properly take into account the the life-cycle emissions associated with harvesting, cutting, transport and storage. We have investigated only small-scale wood compustion for heating, which produces 22 gCO2equ/MJ heat for new, clean burning wood stoves, i.e. a gain of about 80% compared to an oil furnace/stove. Large-scale facilities have lower methan emissions during combustion, but district heat has higher distribution losses compared to an oil furnace. Reference: CS Solli, M Reenaas, AH Strømman, EG Hertwich (2009) Life cycle assessment of wood-based heating in Norway, Int. J. Life Cycle Asses. 14(6):517-528.	The reference uses a hybrid methodology LCA/Input Output combination. All other references use LCA methodology only.
Norway (Climate and Pollution Agency)	2	40	-	-	-	-	-	2.3.3	Wood residue - co-combustion with coal: 10% reduction compared to fossil alternative seems to include the CO2 emissions from the coal facility itself. This may be misleading.	The reduction of emissions is proportional to the amount of biomass present. Will be made more clear
Ella Stengler (CEWEP)	2	40	-	-	-	-	-	2.3.3.	Municipal waste is mentioned only in the context of the co-combustion with coal. However, municipal waste is more often combusted in dedicated waste incineration plants where energy is recovered ¿ Waste-to-Energy (WtE) plants. In Europe where this technology is well established there are 432 WtE plants. In 2008 they treated 69 million tonnes of municipal waste and produced 28 million MWh electricity and 69 million MWh heat (Source: CEWEP). Please see BREF Waste Incineration as reference document describing proven technologies (http://eippcb.jrc.es/reference/wi.html). Please include municipal waste incineration. Co-combustion with coal is rare (at least in Europe) because of corrosion problems. Municipal waste is combusted in WtE plants were the process is controlled and plants are designed to treat a heterogenous fuel such as municipal waste. In Germany, for instance, 24 million tonnes of municpal waste are incinerated in dedicated WtE plants. Only 2 million tonnes of waste are co-incinerated in coal fired power plants after specific high effort pre-treatment. State of the art WtE plants achieve: ca. 20 % electrical efficiency (in single cases, e.g. WtE plant Amsterdam: 30%), 80-90% thermal efficiency and 30-40% efficiency in CHP (in some cases 50-60% if optimum heat delivery is possible). In comparison with coal fired power plants the efficiency of WtE plants is lower for mainly two reasons: WtE plants are equipped with sophisticated flue gas cleaning systems, in order to achieve low emissions and environmentally sound waste treatment dealing with the pollutants in the waste. The second reason is that often WtE plants cannot deliver all energy they produce due to competition with fossil fired energy production.	Accepted; a specific examples of waste to energy will be given with more details
United Kingdom (Department of Energy and Climate Change)	2	41	-	-	-	-	-	2.3.3	heat from solid biomass fuels. Fuelwood. Fuelwood is not only used domestically in developing countries? It is used to generate heat in the UK through specially designed boilers. In these applications, efficiencies I'm sure are higher than 10-20%?	Try to add a reference and a cell for modern fuelwood-based heating systems in use in Developed countries - E.g. well designed fireplaces
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	41	-	-	-	-	-	2.3.3	Last row, first column. Do not use the abreviation of agricultural residues (Ag residues). Use more letters, e.g. Agric. residues	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	44	-	44	-	2.3.4	-	2.3.3	Feedstock OW/AR/AM, EU, GHG emission reduction of 108%: If there was a trend to large scale biogas installations, fed with OW/AR/AM, then a large amount of these residues has to be transported. The energy to mass ratio is low, the energy efforts for transportation are high. Hence, large scale biogas plants do hardly fit with this amount of GHG reduction.	We are quoting literature and assumptions vary from one reference to other. Check the reference source for specific assumptions. Included are both small and larger (because of a combination of resources) units
Ella Stengler (CEWEP)	2	44	-	-	-	-	-	2.3.3.	Municipal waste INCINERATION is not mentioned. Please add this significant source of renewable energy production (see figures on energy production in comment number 14; 50% of the energy produced by WtE plants is considered biodegradable = biomass).	Accepted
Elina Vapaavuori (Finnish Forest Research Institute)	2	45	-	-	-	-	2.3.4.	-	Readability of this table is poor. Improve.	Table will be removed and information moved to other section
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	45	-	-	-	-	-	2.3.4	Lacking references	References were added but space restrictions may eliminate the table
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	45	-	-	-	-	-	2.3.4	Table is difficult to read. What are the key messages you want to convey with it? Try to make them stand out.	Section will finish with a summary of costs and technologies
Sweden (Swedish Environmental Protection Agency)	2	45	-	-	-	-	-	2.3.4	This table is difficult to understand for the reader. Could the data be presented in another way or perhaps the table could be placed in the appendix section?	Table deleted and information will be incorporated in another table

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United Kingdom (Department of Energy and Climate Change)	2	45	-	-	-	-	-	2.3.4	this table is not very clear at all. It also uses too many shortened words. E.g. What does w/8 mean?	w/8 meant with the production of 8%. Lack of space was confusing.
Norway (Climate and Pollution Agency)	2	45	-	45	-	3	-	2.3.4.	Needs some more explanation and chequeing	Table will be eliminated and the information described in the text with more context.
Christoph von Stechow (IPCC WGIII TSU)	2	46	27	46	29	-	-	-	"14.7 EJ higher than in the Reference Scenario" and "The use of biomass in CHP and in electricity-only power plants increases by 67% by 2030, to 7.2 EJ above the level in the Reference Scenario" tells the reader nothing about the absolute level of biomass consumption. Please consider adding this information.	Information will be added
Kaija Hakala (MTT Agrifood Research)	2	46	3	46	3	-	-	-	10% of global energy was 46 EJ on p. 4 line 3, 47 EJ on p. 7, line 7, and here it is 48 EJ. Choose one of these and use that throughout.	Figures refer to different years. Final report will be 2008 (50.3 EJ)
Laura Verduzco (Chevron Corporation)	2	46	3	-	-	-	-	-	According to figure 2.1.2, this number should be 13% instead of 10% and 47 EJ according to page 7, line 7	Accepted
Brazil (Ministry of Science and Technology)	2	46	20	46	20	-	-	-	Bagasse, the residue from sugar cane ethanol production, is largely employed In Brazil for bio-electricity co-generation, used in auto-consumption at the sugar-mill, with the exceeding power being exported to the grid. All together, sugar cane and bagasse (18,1%) constitute the first renewable source of primary energy in Brazil, superseding hydro (15,35%) since 2007. Renewables correspond to 47,3% of the country¿s primary energy matrix (Source: https://ben.epe.gov.br/BENSeriesCompletas.aspx) . Bioelectricity out of sugar cane bagasse, produced in 307 sugar mills, sums up to 5.6 GW, corresponding to 4,75 % of country¿s total electricity installed capacity (Source: http://www.aneel.gov.br , BEN ¿ ¿Balanço Energetico Nacional¿, August 3rd, 2010)	Remark is good, but space limitations are severe; will consider including.
Brian Titus (Natural Resources Canada)	2	46	4	-	-	-	-	-	Change from ¿A major part of this biomass (38 EJ)¿ to ¿A major part of this biomass (38 EJ energy equivalents)¿¿	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	46	16	46	18	-	-	-	Despite an "increase in the use of biofuels in 2007 and 2008" (line 16/17), there is now "an excess of installed capacity and underutilization of facilities" within a matter of two years? Please provide reasons (such as cut of support, decreasing demand due to recession etc.).	Section will be edited
Shigeki KOBAYASHI (Toyota R&D Labs.)	2	46	16	46	17	-	-	-	How about the contribution of Brazil?	Comment not specific, but edits will be made.
Youba SOKONA (Sahara and Sahel Observatory)	2	46	10	46	11	-	-	-	In figure 2.4.1 I wonder if useful energy is here the correct word as this means energy used by the enduse equipement	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	46	9	46	10	-	-	-	Please consider deleting the sentence "Today, biomass¿renewable energy source", since it is redundant.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	46	26	46	29	-	-	-	Please consider relocating "In the 450 Scenario ¿ in the Reference Scenario" behind line 10 on page 47, since these two sentences deal with biomass whereas the rest of the paragraph deals with biofuels. There is then more room for cutting the text (particularly page 46, lines 29/30 and page 47 lines 1/2).	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	46	21	-	-	-	-	-	Please consider replacing ". This" by ", since growth".	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	46	20	-	-	-	-	-	Please explain or delete "for economic development". Are markets growing "due to" economic development and related growing demand? Or is the economy developing faster because of growing biofuel production for international markets?	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	46	25	-	-	-	-	-	Please specify by which year biofuels might contribute as much as noted here.	Section will be edited
Brazil (Ministry of Science and Technology)	2	46	28	46	28	-	-	-	Should be written: combined heat and power	Accepted
Laura Verduzco (Chevron Corporation)	2	46	-	-	-	-	-	-	Since the WEO scenarios have not been explained previously in this document, consider rephrasing: "In EIA' s 450 ppm GHG stabilization scenario... 14.7 EJ higher than in that reference scenario (business as usual)."	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	46	17	46	20	-	-	-	Split sentence	Section will be edited
Australia (0)	2	46	2	-	-	-	-	-	The figure for global primary energy biomass demand of 48 EJ is inconsistent with both chapter 2 pages 4 with EJ 46 and page 7 with EJ 47.	Figures refer to different years. Final report will be 2008 (50.3 EJ)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Helmut Haberl (Institute of Social Ecology, Vienna)	2	46	10	46	15	-	-	-	The figure should explicitly state that the 48 EJ/yr refer only to the biomass used for technical energy provision, not other kinds of energy such as food, feed or muscular power. As noted above (comment 9), humanity consumes 225 EJ/yr plus ca 110 EJ/yr unused byflows of biomass destroyed during harvest. Moreover, the figure reports that liquid biofuel use is 2.9 EJ, while the text (line 15) reports that it is only 1.9 EJ/yr; should be made consistent	Figures refer to different years. Final report will be 2008 (50.3 EJ); similarly, the biofuels numbers refer to two different years. Report will make them consistent and specify years if multiple data are given
Kaija Hakala (MTT Agrifood Research)	2	46	8	46	10	-	-	-	The last sentence repeats what was said on lines 3-4.	Section will be edited
Australia (0)	2	46	3	46	3	-	-	-	The use of the phrase 'the most important' is a subjective judgement, suggest the sentence is changed to 'Biomass is an important renewable energy source, providing about 10% (48EJ) of the annual global primary energy demand.'	Accepted
Youba SOKONA (Sahara and Sahel Observatory)	2	46	8	46	10	-	-	-	This is a repetition of line 3 to line 4	Accepted
Shigeki KOBAYASHI (Toyota R&D Labs.)	2	46	27	-	-	-	-	-	This number is for the primary energy, and numbers for biofuels are of final energy. Please make clear this point, such as ""the primary biomass demand also increase¿""	Section will be edited
Laura Verduzco (Chevron Corporation)	2	46	8	46	10	-	-	-	This paragraph is repetitive. Consider deleting.	Section will be edited
United States (U.S. Department of State)	2	46	27	47	10	-	-	-	This paragraph needs more context. What scenario is being referred to? What are it's conditions and source? Does it include a C price or other mitigation policy? What is the model or system used?	Section will be edited
Daniela Thrän (DBFZ / UFZ)	2	46	26	46	26	-	-	-	what is the 450 scenario?	reference will be made also to section 2.8
Brazil (Ministry of Science and Technology)	2	46	26	46	27	-	-	-	words are missing: 450 ppm of CO2 scenario	Section will be edited
Brazil (Ministry of Science and Technology)	2	46	30	46	30	-	-	-	words are missing: 450 ppm of CO2 scenario	Accepted
China (China Meteorological Administration)	2	46	1	58	26	2,4	-	-	To make Section 2.4 perfect, it is suggested to supplement additional content about biomass energy market.	Biomass energy market information will be added. Nevertheless, there are severe space limitations, so additions are constrained.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	46	1	-	-	2.4	-	-	The content in this section does not match with the title of this secion, such as the content on market seems unsubstantial.	Section will be rewritten including market data
Jürgen Scheffran (University of Hamburg)	2	46	20	46	22	2.4.1	-	-	"The recent surge is not expected to continue in the near term. This depends ..." The clear statement in the first sentence is not consistent with the conditional statement in the second sentence.	Section will be edited
United Kingdom (Department of Energy and Climate Change)	2	46	26	46	27	2.4.1	-	-	the 450 scenario is introduced with no explanation of what it is or where more can be found out. Note also that the paragraph split from line 26 to 27 is erroneous.	Section will be edited
Norway (Climate and Pollution Agency)	2	46	24	46	26	4	-	-	To which year in the future refer these figures?	Section will be edited
Peter de Haan (Ernst Basler + Partner AG)	2	46	-	-	-	-	2.4.1	-	how do these figures relate to fig. 2.4.1?	Comment unclear
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	46	-	-	-	-	-	2.4.1	65% conversion efficiency for biofuels seems rather high. How did you derive that?	comment unclear
Daniela Thrän (DBFZ / UFZ)	2	46	-	-	-	-	-	2.4.1	the lowest fields can be skipped, because they do not fit into the systematic and they are confusing	This is considered useful information; categorization of the table is correct.
Laura Verduzco (Chevron Corporation)	2	47	5	-	-	-	-	-	Reorganize the sequence of the countries: "...followed by Brazil, the European Union and China"	Accepted
Brazil (Ministry of Science and Technology)	2	47	6	47	6	-	-	-	words are missing: 450 ppm of CO2 scenario	Accepted
Sweden (Swedish Environmental Protection Agency)	2	47	-	-	-	-	2.4.3	-	If possible, I think it would be more interesting to present the development of the bioenergy use in the different regions instead of the woodfuel production.	Is desirable, but details not well available

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Jürgen Scheffran (University of Hamburg)	2	47	-	-	-	-	2.4.3	-	Text in the Figure is too small (hard to read)	Will be edited
Sweden (Swedish Environmental Protection Agency)	2	48	13	48	15	-	-	-	Figure 2.4.3 shows the global woodfuel production, but says nothing about the use of improved cooking stoves.	Figures will be revised; cookstoves discussed elsehwere.
Laura Verduzco (Chevron Corporation)	2	48	30	-	-	-	-	-	"Stovetec" and "Envirofit" are not countries. Please provide different examples.	Section will be edited
Frank Behrendt (Institute for Energy Engineering)	2	48	15	48	16	-	-	-	... as shown in Fig. 2.4.3 - the figure has no relation to the number of ICS in operation	Figure was deleted to decrease size
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	48	16	-	-	-	-	-	250 million is too much for China, please check and confirm the datum.	needs to be checked
Sweden (Swedish Environmental Protection Agency)	2	48	5	48	6	-	-	-	As regards the use of solid biomass in pulp and paper plant and sugar mills, the production of process heat is just as important as the electricity production.	Section will be edited
Kaija Hakala (MTT Agrifood Research)	2	48	24	48	40	-	-	-	Could be deleted without effect on this report.	Will be shortened/edited though.
Patrick Lamers (Ecofys Germany GmbH)	2	48	24	48	40	-	-	-	Good information but confusing structure. Improve readibility and work with bullets and paragraphs	Section will be edited
Brian Titus (Natural Resources Canada)	2	48	24	48	40	-	-	-	List as ¿a)¿ but see P. 65 for list as ¿(i)¿, etc. Chapter needs thorough check for consistent style.	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	48	20	48	45	-	-	-	No reference is provided to substantiate the assertions made in these paragraphs.	needs to be checked
Christoph von Stechow (IPCC WGIII TSU)	2	48	5	48	8	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Ref will be sought for (partly in the already quotedmaterial)
Gilberto Jannuzzi (University of Campinas)	2	48	46	48	47	-	-	-	not only households, to my knowledge institutional uses of biogas have had more success in some countries	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	48	21	-	-	-	-	-	Please consider specifying the cross-reference (2.5.3 and 2.5.5) since the section 2.5 is more than 20 pages long.	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	48	19	-	-	-	-	-	Please specify what is implied by "some type of improved cookstove" and what the comparison is made to.	Technologies are discussed in 2.3; will make cross ref
Patrick Lamers (Ecofys Germany GmbH)	2	48	10	48	12	-	-	-	Repetition of information given prior	Section will be edited
Brazil (Ministry of Science and Technology)	2	48	8	48	8	-	-	-	Should appear Brazil in the text as an example in developing countries of using bagasse cane for cogeneration.	Good point, but severe space limitations.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	48	7	-	-	-	-	-	The examples should be extended by "CHP with biogas".	Accepted
Australia (0)	2	48	8	-	-	-	-	-	The figure for 'modern bioenergy use' of 10 EJ is inconsistent with page 4 of EJ9.	Figures will be checked
Brian Titus (Natural Resources Canada)	2	48	8	-	-	-	-	-	What grounds are there for singling out the 3 countries mentioned and not Sweden and Finland?	Will be included; fully correct.
Youba SOKONA (Sahara and Sahel Observatory)	2	48	21	48	23	-	-	-	Which technologies are you refering here? If it is improved cookstoves then how those technologies could use small scale gasification, small scale anaerobic digestion etc.?	See 1208
Gilberto Jannuzzi (University of Campinas)	2	48	15	48	15	-	-	-	wrong figure	Accepted
China (China Meteorological Administration)	2	48	15	48	16	2.4.2	-	-	It is suggested that "China had the major initial success with 250 million improved cookstoves installed." be changed into "By the end of 2009, there are 173 million energy saving stoves in use in China."	Section will be edited
China (China Meteorological Administration)	2	48	47	49	1	2.4.2	-	-	It is suggested that "which reach today 25 million household, the majority in China and India." be changed into "By the end of 2009, there are 35 million household used biodigestors in China, ¿ in India."	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gilberto Jannuzzi (University of Campinas)	2	48	10	49	23	2.4.2	-	-	Several African countries have na extensive experience of successes and failures with ICS. There should be few words at least reporting on these experiences and literature. See for ex Karekezi, Stephen, e Patience Turyareeba. 1995 (I know it is old!). Woodstove dissemination in Eastern Africa - a review. Energy for Sustainable Development 1, n. 6 : 12-19. doi:10.1016/S0973-0826(08)60094-0. Ezzati, Majid, e Daniel M. Kammen. 2002. Evaluating the health benefits of transitions in household energy technologies in Kenya. Energy Policy 30, n. 10 : 815-826. doi:10.1016/S0301-4215(01)00125-2.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	48	-	-	-	2.4.2	-	-	This section contains a lot of information but strongly varies in detail. Please consider whether this material should be here in full length.	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	49	16	49	19	-	-	-	"Insufficient economic mechanisms" and "high costs of technologies" do not constitute legal barriers! Please rephrase.	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	49	34	-	-	-	-	-	"Natural resource efficiency is possible" compared to which technology?	Section will be edited
Japan (the Japanese Ministry of Foreign Affairs)	2	49	4	-	6	-	-	-	"Smaller scale biogas" should be clarified.	also with reference to 2.3
Japan (the Japanese Ministry of Foreign Affairs)	2	49	24	-	-	-	-	-	A definition should be given for "small-scale bioenergy" - whether this is defined by capacity or by place of application (household or industry, etc. c.f. line 29 on page 74).	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	49	10	49	23	-	-	-	No reference is provided to substantiate the assertions made in these paragraphs.	Proper refs to be incuded
STEPHANE POUFFARY (Energies 2050)	2	49	24	-	-	-	-	-	Not relevant to add a sub-chapter	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	49	17	49	23	-	-	-	Only legal barriers are covered here. There are numerous others that should either be covered or at least listed here (technical, economic, etc.).	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	49	20	49	22	-	-	-	Please consider rephrasing the sentence "Many information barriers ¿ digestion systems", since it is unclear.	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	49	24	50	11	-	-	-	shortening potential: omit section 2.4.2.1	Editing will be done aimed for shortening.
Laura Verduzco (Chevron Corporation)	2	50	34	-	-	-	-	-	Explain what is the Harmonized System	Section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	50	4	50	5	-	-	-	No reference is provided to substantiate the assertion made in this sentence.	Proper refs to be incuded
Christoph von Stechow (IPCC WGIII TSU)	2	50	34	-	-	-	-	-	Please consider explainging the role of the Harmonized System.	Accepted
Kaija Hakala (MTT Agrifood Research)	2	50	4	50	5	-	-	-	Text is missing, impossible to understand.	Comment unclear
Christoph von Stechow (IPCC WGIII TSU)	2	50	13	50	15	-	-	-	The first two sentences of the paragraph seemingly contradict each other, since global trade in biomass feedstocks is both "growing rapidly" and "modest"	Section will be edited
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	50	13	50	19	-	-	-	This paragraph is too tentative. E.g. ¿In the longer term, much larger quantities of these products might be traded internationally ¿¿.Change to, e.g.: ¿Trade will be an important component of the sustained growth of the bioenergy sector.¿	Section will be edited
United States (U.S. Department of State)	2	50	34	-	-	-	-	-	What is the "Harmonized System"? This is not referred to anywhere else in the text.	Accepted
Brian Titus (Natural Resources Canada)	2	50	-	51	-	-	-	-	Words in italics works well, but should they be bold to match style on P.33 (and could be on P.34, too)?	Accepted
Jürgen Scheffran (University of Hamburg)	2	50	7	50	7	2.4.2	-	-	What does HH mean here?	Section will be edited
Peter de Haan (Ernst Basler + Partner AG)	2	50	-	-	-	-	-	2.4.1	how do these figures relate to fig. 2.4.1?	Will consider making a link
Brian Titus (Natural Resources Canada)	2	51	8	51	19	-	-	-	Any references for these figures?	Accepted
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	51	45	-	-	-	-	-	Figure 2.2.5 should be changed to Figure 2.2.4	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	51	32	51	34	-	-	-	Grid access can also be a bottleneck for biogas feed-in into gas grid.	Accepted
Youba SOKONA (Sahara and Sahel Observatory)	2	51	42	51	43	-	-	-	I wonder if it is correct to say that in the Near- and Middle East and many African countries, no biomass support policies are currently implemented? For example Senegal has established a Ministry for biofuels, in number of Southern African countries ethanol is used in transport. Please see page 58 and line 22	information comes from recent literature, but that can contain omissions; will be checked or more carefully phrased.
Rory Gilsenan (Natural Resources Canada)	2	51	37	51	39	-	-	-	I would say that the statement about support for the farm sector is also true in the context of the forest sector. In the U.S. significant support has been provided to the forest sector through fuel blending credits.	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	51	21	51	21	-	-	-	introduce a fourth-level heading 2.4.4.1 here	aim is to lower subheadings.
Brazil (Ministry of Science and Technology)	2	51	21	-	-	-	-	-	It should be stated that Proálcool isn¿t in force anymore.	That point is highlighted
Laura Verduzco (Chevron Corporation)	2	51	27	51	28	-	-	-	It would be helpful to include a brief explanation of feed-in tariffs and quota systems	But only brief; space limitations.
Kristin Seyboth (IPCC WG III TSU)	2	51	21	51	23	-	-	-	Listing program names is not helpful to the reader. Instead, describe the TYPE of policy recommended for facilitating increased liquid biofuel deployment, particular considerations specific to liquid biofuels (e.g. transport of the fuel itself) and assure that categories are consistent with those presented in Chapter 11 (11.2)	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	51	8	51	19	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Proper refs to be incuded
Christoph von Stechow (IPCC WGIII TSU)	2	51	45	-	-	-	-	-	Please change the reference to the figure to 2.4.6 (instead of 2.4.5).	Accepted
Kristin Seyboth (IPCC WG III TSU)	2	51	28	51	29	-	-	-	Rather than refer to one source here, refer to full discussion of FITs vs. RPS policies in Chapter 11 (11.5)	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	51	27	51	36	-	-	-	The assertions made in these sentences touch on the realm of chapter 11 and have thus to be discussed with the Ch.11 author team, particularly since the literature on wich the assertions are based are not very recent (van der Linden et al. 2005 and Sawin, 2004).	to b e checked
Patrick Lamers (Ecofys Germany GmbH)	2	51	21	51	23	-	-	-	The CAP was not a direct but rather indirect support for biofuels. Mandates and tax exemptions were directly aimed at biofuels.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	51	2	51	3	-	-	-	The reason for the decline of production is not only external competition. This claim draws an incomplete picture. The critical aspect here is the development of the inner European market and especially the market in Germany which has been the largest producer for biodiesel in Europe until 2010. (By now it is France). You might include information from a recent confidential report from Ecofys to the European Commission: "EU27 biodiesel production rates level off towards 2008. While most MS increased their production volumes, the German biodiesel market shrunk on both the supply and the demand side due to a change in the policy framework phasing out tax exemptions for neat biodiesel at the pump. At the same time exporting biodiesel to other EU MS became less and less feasible for German (and other) producers due to increasing shares of competitively priced biodiesel imports ¿ mainly from the US throughout the period 2006-2008 and increasingly also from Argentina in the years 2008 and 2009. The inner-European biodiesel market has become more competitive and its current overcapacity has already led to the closure of (smaller, less vertically integrated, less efficient, remote, etc.) biodiesel plants in Germany, Austria, and the UK." (Ecofys 2010, Biofuels Baseline Report to the EC, confidential).	Overall remark is good, but reference is unsuited. Statement can be backed otherwise though
Patrick Lamers (Ecofys Germany GmbH)	2	51	28	51	30	-	-	-	While this is generally correct for all renewables - in particular more expensive "newer" technologies such as PV and geothermal, it is not entirely correct for bioenergy - and this should be the focus of this chapter. An example for a very well working quota system reg. bioenergy is the UK ROC scheme (and the resulting activities for solid biomass firing of Drax e.g.).	section will be edited
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	51	22	-	-	2.4.4	-	-	It's seems a bit strange to me to identify the CAP as a key biofuels support policy. It did include a minor energy crop support scheme, but much more important have been the (national) policies of EU member states, in the form of a blending mandate or tax exemptions. On the EU level, the biofuels directive and its succeeding RE directive are worth mentioning.	will be rephrased

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	51	40	-	-	2.4.4	-	-	Ref REN21 (2010) cannot be found in the reference list.	Accepted
Kristin Seyboth (IPCC WG III TSU)	2	51	-	-	-	2.4.4	-	-	This section is well-balanced in general but should be closely coordinated with the policy categories set out in 11.2 (which do NOT match those presented here). The reader misses general policy recommendations specific for bioenergy, i.e. design features particularly recommended for countries wanting to support bioenergy in particular as opposed to other RE technologies. What specific qualities (e.g. supply chain issues) must be considered? This section is where policy-makers will go looking for this answer, and it is currently missing.	Limited space though, but improvments will be made.
Laura Verduzco (Chevron Corporation)	2	52	19	-	-	-	-	-	Explained how energy and fossil fuels contribute to the aforementioned distortions.	Accepted
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	52	4	-	-	-	-	-	Figure 2.4.6 should be changed to Figure 2.4.4	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	52	13	52	13	-	-	-	Please add after ¿¿5.25% (IEA 2009)¿. ¿Addressing these concerns led also to the incorporation of environmental and social sustainability criteria for biofuels in the EU Renewable Energy Directive.¿	Accepted
Youba SOKONA (Sahara and Sahel Observatory)	2	52	2	52	3	-	-	-	The legend of figure 2.4.6 is missing	legend seems to be there…
Australia (0)	2	52	-	-	-	-	2.4.6	-	Figure 2.4.6 requires a key to allow identification of countries which do and don't have feed-in tariffs and blending mandates.	The figure will be deleted and used in Chapter 11 with more details.
Gilberto Jannuzzi (University of Campinas)	2	52	-	-	-	-	2.4.6	-	needs key	The figure will be deleted and used in Chapter 11 with more details.
Peter de Haan (Ernst Basler + Partner AG)	2	52	-	-	-	-	2.4.6	-	shortening potential: omit fig. 2.4.6; data shown here will be outdated by time of publication of SSREN, because these topics are moving very fast at present.	The figure will be deleted and used in Chapter 11 with more details.
Kristin Seyboth (IPCC WG III TSU)	2	52	-	-	-	-	2.4.6	-	There is no key to the figure telling what purple signifies and what grey signifies - this introduces serious room for error in interpretation.	The figure will be deleted and used in Chapter 11 with more details.
Dan McKenney (Great Lakes Forestry Centre)	2	52	-	-	-	2.4.4	2.4.6	-	This figure needs a legend	The figure will be deleted and used in Chapter 11 with more details.
Kristin Seyboth (IPCC WG III TSU)	2	53	-	-	-	-	-	2.4.2	Coordinate categories and policy terminology with that outlined in Chapter 11 (11.2)	Made consistent
Peter de Haan (Ernst Basler + Partner AG)	2	53	-	-	-	-	-	2.4.2	shortening potential: omit table 2.4.2, will be outdated by time of publication of SSREN	potential
Sweden (Swedish Environmental Protection Agency)	2	53	-	-	-	-	-	2.4.2	What do the parentheses around some of the letters refer to?	proposed
Elina Vapaavuori (Finnish Forest Research Institute)	2	53	-	-	-	-	-	2.4.2.	Correct: Table legend is incomplete.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	54	3	54	7	-	-	-	According to agreements reached during LA3 in Oxford, no links shall be provided in the chapter text, but should be removed to the footnotes, if they are indispensible.	Accepted
Sweden (Swedish Environmental Protection Agency)	2	54	45	55	2	-	-	-	Apart from aviation, biofuels may be increasingly used in heavy duty trucks and sea transportation.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	54	16	54	34	-	-	-	Are there bioenergy certification systems that accept forest certification systems as evidence of sustainable forest management for biomass for bioenergy? See Ecologo¿s CCD 003: Renewable Low Impact Electricity, Draft 3.0, June 30, 2010, Page 11: ¿The Canadian Standards Association (CSA), the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI) forest management certification systems are also specifically recognized as sound environmental management systems used to manage forest products provided that their certified products meet these minimum requirements: a) full disclosure of certified content; b) harvest rates do not exceed growth rates unless an ecologically sound reason is provided; c) no new conversion of natural forest to plantations or to non-natural forest land; d) protection of high conservation value forest;¿ http://www.ecologo.org/common/assets//CCD-003%20Final%20Draft%203_0-%20June%2030%202010(1).pdf	This is true AND highlighted in the references quoted.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	54	45	55	1	-	-	-	I suggest to replace ¿Finally¿.. necessary.¿ with ¿For personal transport, a transition to electric vehicles charged from grid power points fits such a strategy. At the same time, transport modes for which electric motorization would probably be more problematic, such as trucks, aeroplanes and ships, could be run either on biofuels or oil-based fuels. (page 52, Growing within Limits, PBL, 2009)¿.	Goes out of mandate for Ch2 because demand is covered elsewhere in SRREN. Chapter 8 addresses the integration issues and the multimodal transport modes discussed. Some aspects will be addressed in Chapter 2.
Sweden (Swedish Environmental Protection Agency)	2	54	33	54	33	-	-	-	I would write sustainable agricultural production instead of sustainable land use production.	Accepted
Richard Plevin (UC Berkeley)	2	54	30	54	31	-	-	-	ILUC is mentioned here as uncertain, without mentioning the problem, i.e., that bioenergy in some cases can be a net GHG source because of market-mediated effects. The phrase about time scales deserves a separate sentence.	cros ref will be made to 2.5 where iLUC is discussed in detail
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	54	16	54	17	-	-	-	It is stated here that there are nearly 70 certification initiatives ongoing to safeguard the sustainability of bioenergy. This is somewhat misleading as most of these certification initiatives have not been specifically designed for bioenergy, but are focused on specific agricultural/forestry commodities in general. As these commodities can be used as bioenergy-feedstocks, these standards can indeed play a role in safeguarding the sustainability of bioenergy. Suggeted text adjustment: "As of a 2010 review, there are nearly 70 ongoing certification initiatives to safeguard the sustainability of agriculture and forestry products used as feedstock for the production of bioenergy."	Thanks for the suggestion which is accepted.
Christoph von Stechow (IPCC WGIII TSU)	2	54	32	-	-	-	-	-	Please consider specifying the cross-reference (2.5.3) since the section 2.5 is more than 20 pages long.	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	54	37	54	40	-	-	-	Repetition of information given prior on p. 51 lines 37ff	Section will be edited
Brazil (Ministry of Science and Technology)	2	54	17	54	22	-	-	-	The BSI certification system also includes social criteria (Principle 2 of its production standard)	Accepted
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	54	4	-	-	-	-	-	The International Energy Agency (IEA) Bioenergy Agreement is an interesting initiative, but IEA is an OCDE agency and do not represents properly all countries interests, that are more broadly analyzed and discussed under the UN framework. It seems very difficult to justify an IPCC recommendation supporting that agreement without to mention other similar programs.	IEA has a broader scope than just member countries, but other programs can be sought for/mentioned such as IRENA
Australia (0)	2	54	41	54	42	-	-	-	The two months chosen for comparison show two price extremes, which result in the 500% increase. It would be more useful to compare annual averages between 1998 and 2008. Since there are wide fluctuations in prices from month to month, a comparison between 2 different months 10 years apart does not show the market trend over the 10 year period.	Section will be edited
Australia (0)	2	54	33	54	34	-	-	-	This sentence is unclear and needs redrafting.	Section will be edited
Richard Plevin (UC Berkeley)	2	54	33	54	34	-	-	-	This sentence is unclear. (What is "sustainable land use production"?)	Accepted
United Kingdom (Department of Energy and Climate Change)	2	54	15	54	15	2.4.4.2 frameworks +standards	-	-	challenges: suggest add 'implementation' to this list, as this is at least as great a challenge as developing the standards and is implied in the reference a little later to the need for good governance.	Accepted
Dan McKenney (Great Lakes Forestry Centre)	2	54	42	-	-	2.4.5	-	-	Is it possible to include a more up to date number for oil prices (i.e. later than March 2008)? This would add strength to the comment about the volatility of oil prices	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	54	-	-	-	2.4.5	-	-	While this is certainly very important, I still believe that this section could be shortened without losing essential information	Section will be edited

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	54	37	55	2	2.4.5	-	-	Why is this paragraph on drivers for bioenergy included here?	Requirement of the section, but edits will be made on this
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	54	-	-	-	2.4.5	-	-	Why is ths entire section on opportunties and barriers for trade included here? Wouldn't it be more logical to integrate it into section 2.6., in which an outlook is given for all aspects of the bioenergy chain?	Requirement of the section; need to include more text on drivers and barriers in general though.
Jürgen Scheffran (University of Hamburg)	2	54	-	54	-	-	2.4.4.2	-	Would be appropriate to mention the International Sustainability and Carbon Certification (ISCC), established by German Law (Biokraftstoff-Nachhaltigkeitsverordnung) and recognized 18 January 2010 by the German Federal Institute for Agriculture and Food (Bundesanstalt fuer Landwirtschaft und Ernaehrung, BLE). See http://www.iscc-system.org.	We make use of a state of the art review of global certification efforts of which ISCC is part
Sweden (Swedish Environmental Protection Agency)	2	55	29	55	29	-	-	-	¿ Some of the issues have been listed below ¿ is very vague while the list below specifically concerns opportunities and drivers for international bioenergy trade.	Comments will be considered. Requirement of the section; need to include more text on drivers and barriers in general though.
Jürgen Scheffran (University of Hamburg)	2	55	-	55	-	-	-	-	Footnote 3: There are three publications Bauen et al. (2009). Which is quoted here?	Wil be cleared.
Christoph von Stechow (IPCC WGIII TSU)	2	55	18	55	29	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Proper refs to be incuded
Christoph von Stechow (IPCC WGIII TSU)	2	55	40	-	-	-	-	-	Please consider rephrasing, since it is not clear how the last four words "and low fuel costs" fit into the structure of the sentence.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	55	2	-	-	-	-	-	Please consider specifying the cross-reference (2.6.3) since the section 2.6 is almost 20 pages long.	Accepted
Laura Verduzco (Chevron Corporation)	2	55	3	55	17	-	-	-	Policy uncertainty has also been a major hindrance for investment. Lack of clarity regarding eligible pathways and market mechanisms is a deterrent to potential investors and technology developers	Good comment will be considered. Requirement of the section; need to include more text on drivers and barriers in general though.
United States (U.S. Department of State)	2	55	4	55	6	-	-	-	The concept of regional biomass processing centers has been proposed to deal with supply side challenges and also to help address social sustainability concerns. The following reference provides some of the details. Carolan, J. E., Joshi, S. V. and Dale, B. E. ¿Technical and Financial Feasibility Analysis of Distributed Bioprocessing Using Biomass Pre-processing Centers¿ J. of Agricultural and Food Industrial Organization. Vol. 5, Issue 2, Article 10 (2007).	can also be backed by other refs, but good suggestion. Reference was added
Australia (0)	2	55	32	55	40	-	-	-	The discussion of biomass push and pull is not illuminating. It would be more appropriate to discuss the drivers behind supplying biomass or bioenergy to the world market and demanding biomass/bioenergy from other countries.	section will be edited
Dan McKenney (Great Lakes Forestry Centre)	2	55	30	55	37	-	-	-	There is a view that the demand for pellets is ""artificially"" driven because policy in Eurpoe to use less GHG intensive fuels¿it is basically an implicit price on carbon	not clear what to modify
Daniela Thrän (DBFZ / UFZ)	2	56	8	56	9	-	-	-	add: integration bioenergy in the development shemes for rural areas	Accepted
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	56	35	57	23	-	-	-	Good and equilibrated analysis on Sustainability criteria and certification systems for bioenergy, it is worth to observe as the active pellet trade seems to be under any scrutiny of sustainability.	statement not true though, but will add text on the matter
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	56	35	57	23	-	-	-	I am missing a more detailed discussion about certification issues than the one provided on page 56/7 focusing on Sustainability criteria and certification systems for biomass and biofuels as trade barriers. The European Union (ISCC and REDCert in Germany for example) and the USA (bioethanol from sugar cane/Brazil is labeled as advanced biofuel) started or have already set up certification schemes in order to guarantee a more sustainable cultivation of energy crops and production of bioenergies.	state of the art ref inncludes those systems; not all can be mentioned here though, but section will be edited.
Brazil (Ministry of Science and Technology)	2	56	38	56	40	-	-	-	It is important to point out the lack of transparency on the development of some methodologies in the EU legislation. Many definitions were not yet finalized, what jeopardizes any certification scheme. Also, the eventual existence of different demands for proving compliance with the criteria for locally produced biomass and imported one is a potential barrier.	Accepted
Brazil (Ministry of Science and Technology)	2	56	35	56	38	-	-	-	It should be noted that is still unclear how this type of policy (demand for certification) would be treated under the WTO rules. It is very likely that it can be challenged.	Remark will be included.
Christoph von Stechow (IPCC WGIII TSU)	2	56	34	-	-	-	-	-	Please provide a useful cross-reference, since the sub-section 2.4.7.8 does not exist (any more?).	will be checked

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	56	19	-	-	-	-	-	Provide an example of where tariffs are 50%	Is backed by the reference; will check example though
Brazil (Ministry of Science and Technology)	2	56	24	56	34	-	-	-	Technical barriers for bioethanol trade also exist. For example, the different demmands on maximum water content have negative impacts on trade.	section will be edited
Christoph von Stechow (IPCC WGIII TSU)	2	56	6	56	8	-	-	-	The assertions made in these sentences touch on the realm of chapter 11 and have thus to be discussed with the Ch.11 author team, particularly since no reference is provided to substantiate the assertions made.	cross ref will be made
Richard Plevin (UC Berkeley)	2	56	42	56	46	-	-	-	The description of EISA is imprecise enough to be misleading. The important point of the performance standard is not that it "discourages" ILUC or use of food crops, but that the regulation includes estimates of these effects. The point is that if a fuel pathway has low enough overall emissions, it can still be a food crop or even induce ILUC. Indeed, USEPA finds corn in 2022 (and everything else, frankly) qualifies under RFS2. What's "discouraged" (by virtue of not being counted toward meeting the volume mandate) are fuels with GHG emissions exceeding a threshold. Also, RFS2 doesn't promote cellulosic fuels "especially"; these represent one of three categories of fuels promoted. Nearly half the program will be corn ethanol, nearly all of which is exempted from meeting performance criteria.	This is especially tackled in 2.5; will make cross ref.
Sweden (Swedish Environmental Protection Agency)	2	56	46	56	46	-	-	-	The sentence ¿ certification topics were discussed above¿ is a bit strange and and it¿s not fully clear to me what it refers to.	Section will be edited
Sweden (Swedish Environmental Protection Agency)	2	56	21	56	23	-	-	-	To me it is unclear if the 1 $/gallon is a subsidy to the biodiesel producer that is only available if the biodiesel is blended with diesel.	comment unclear
Brazil (Ministry of Science and Technology)	2	56	-	-	-	2.4.5.2	-	-	It is extremely important to point out that similar barriers do not apply for conventional fossil fuels.	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	57	13	-	-	-	-	-	¿Implementing binding requirements is limited by WTO rules.¿ This statement needs to be expanded with reference to the difficulties brought by classification under WTO¿s Agreement on Agreement (AoA) and WTO¿s Agreement on Subsidies and Countervailing Measures (SCM). Broadly speaking, the text on barriers for international bioenergy trade does not go beyond referring to numbers regarding tariff barriers. The text could be more analytical.	Requirement of the section; need to include more text on drivers and barriers in general though.
Brian Titus (Natural Resources Canada)	2	57	17	-	-	-	-	-	Change ¿NGO¿s¿ to ¿NGOs¿	Accepted
Brian Titus (Natural Resources Canada)	2	57	3	-	-	-	-	-	Do not need numbers here. Could start paragraphs ¿First, ¿¿, and ¿Secondly, ¿¿	Section will be edited
Brian Titus (Natural Resources Canada)	2	57	14	-	-	-	-	-	Do not need numbers here. Could start paragraphs ¿First, ¿¿, and ¿Secondly, ¿¿	Accepted
Richard Plevin (UC Berkeley)	2	57	46	-	-	-	-	-	End of sentence is missing, as is start of sentence on subsequent page.	Accepted
Australia (0)	2	57	9	-	-	-	-	-	The sentence "Some view such criteria as a form of 'green imperialism'." is unecessary. This paragraph already outlines the potential problems that the criteria could cause for developing countries. Using the term 'green imperialism' detracts from the facutal, objective nature of the rest of the section.	Accepted
United Kingdom (Department of Energy and Climate Change)	2	57	3	-	23	-	-	-	There is a third risk - that production of "uncertified" biofuel feedstocks will continue and will instead enter other markets either of countries with lower standards or for non biofuel applications which do not apply the same standards. The existence of a "two-tier" system woudl result in failure to achieve the safeguards envisaged (particularly for land-use change and socio-eocnomic impacts)	Remark will be included.
Christoph von Stechow (IPCC WGIII TSU)	2	57	20	57	22	-	-	-	This sentence and lines 9-12 in the paragraph above are partly redundant, please consider rephrasing.	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	58	39	-	-	-	-	-	Apart from the positive impacts mentioned here, forest residue harvesting also has quite important negative impacts, including loss of coarse woody debris that provides essential habitat for many forest species and reduction of C sink strength (because a considerable fraction of the C would become embedded in long-lived compounds). These are mentioned in other parts of chapter 2 but not here - should be balanced everywhere.	Make change

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	58	30	58	31	-	-	-	Change from ¿Bioenergy can exacerbate negative impacts already of ¿¿ to ¿Bioenergy can exacerbate current negative impacts of ¿¿	Make change
Brian Titus (Natural Resources Canada)	2	58	28	-	-	-	-	-	Change from ¿Studies have recently highlighted environmental and socio-economic positive and negative effects associated with bioenergy.¿ to ¿Studies have recently highlighted both positive and negative environmental and socio-economic effects associated with bioenergy.¿	Make change
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	58	9	58	19	-	-	-	Confidence in persistent policy and stable policy support is a key fact for the accomplishment of capital investments.	Sentence will be added but capital investment will be qualified. Thus, required infrastructure and conversion capacity will be kept.
Frank Behrendt (Institute for Energy Engineering)	2	58	5	-	-	-	-	-	haver -> have	Accepted
Brian Titus (Natural Resources Canada)	2	58	38	-	-	-	-	-	No need for apostrophes around ¿flash floods¿.	Make change
Christoph von Stechow (IPCC WGIII TSU)	2	58	30	58	34	-	-	-	No reference is provided to substantiate the assertions made in this sentence.	Add reference
Christoph von Stechow (IPCC WGIII TSU)	2	58	41	-	-	-	-	-	Please consider adding a sentence along the lines "This section provides an overview of the relevant literature on the environmental and social impacts." introducing to the paragraph on page 59, lines 9-18 that should be moved here. The paragraph on pages 58/9, lines 42-8 is then well suited to draw the attention to the limitations of the mentioned methodologies.	Make change
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	58	23	58	25	-	-	-	same comment as for page 54 line 16-17	Add the sentence.
Christoph von Stechow (IPCC WGIII TSU)	2	58	11	-	-	-	-	-	The assertion made here has not been touched on in the sub-section and is thus not based on any reference.	Proper refs to be incuded
Richard Plevin (UC Berkeley)	2	58	9	58	11	-	-	-	The billions of dollars in annual subsidies paid for corn ethanol in the US have most likely not achieved GHG reductions, owing to direct GHG emissions, indirect land use change emissions, and the petroleum rebound effect. USEPA's analysis for near-term corn ethanol production (in the final RFS2 analysis) indicates that in the near term, much of the corn ethanol results in increases in GHG emissions -- without considering the petroleum rebound effect. Only in 2022 does corn ethanol meet the meager 20% reduction requirement, and then, only barely. Moreover, the US applies import tariffs to keep cheaper, lower-GHG Brazilian sugarcane ethanol at bay. Suggesting that this "policy support" is a a good thing -- a key factor in building "working markets" without recognizing that these policies have yielded small or negative GHG "benefits" seems inappropriate given the subject of this report. The 70 or so sustainability initiatives are presented mainly as a problem (too many standards) rather than as an indication of the serious, widespread concern about a lack of sustainability.	iLUC is discussed in section 2.5.; cross ref will be made.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	58	28	58	41	-	-	-	The important role of a proper operational management should be underlined (e.g. proper usage of fertilizer, pesticides, ect.).	Make change
Christoph von Stechow (IPCC WGIII TSU)	2	58	-	-	-	-	-	-	The second sentence of the footnote is unclearly phrased.	Make change
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	58	28	58	41	-	-	-	This introduction of section 2.5 lists some of the potential negative and positive impacts of bioenergy. However were the negative impacts are a mix of environmental en social aspects, the positive list only consists of environmental benefits. Eventhough later on in the chapter there is attention given to the potential positive social impacts of bioenergy, the suggestion would be to also give a more balanced immage of the potential benefits in this introduction.	Accepted
China (China Meteorological Administration)	2	58	27	81	42	2,5	-	-	Suggest that section 2.5 should be shortened by 4 pages.	The environmental and social impacts of bioenergy is a broad topic which requires a thorought treatment.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	58	27	-	-	2.5	-	-	The content in this section should be shorten.	The environmental and social impacts of bioenergy is a broad topic which requires a thorought treatment.
Richard Plevin (UC Berkeley)	2	59	9	-	-	-	-	-	Assuming 100% "replacement" ignores price effects. Rather, bioenergy impact assessments should estimate GHG reductions net of the rebound effect, which for petroleum may be quite high. See, e.g., Barker et al 2009 doi:10.1007/s12053-009-9053-y, and Stoft 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1636911	Limitations of classical LCA to be mentioned? Market models needed?

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	59	15	-	-	-	-	-	Change from ¿have feedbacks difficult to clearly¿ to ¿have feedbacks that are difficult to clearly¿¿	Make change
Brian Titus (Natural Resources Canada)	2	59	10	-	-	-	-	-	Change from ¿usually based on fossil fuels, but could be based on other primary energy sources¿ to ¿usually fossil fuels, but also other primary energy sources¿	Make change
United States (U.S. Department of State)	2	59	12	-	-	-	-	-	The fact that different studies reach very different conclusions about environmental impacts of bioenergy systems depending on the assumptions and crop management approaches cannot be overemphasized. For example, see the work of Kim et al showing the effect of different management options in the calculated indirect GHG effects--almost eliminating calculated GHG based on assumptions of land management. Kim, H., Kim, S. and Dale, B. E. (2009). Biofuels, Land Use Change and Greenhouse Gas Emissions: Some Unexplored Variables. Environ. Science and Technology. Vol. 43: 961-967.	Add sentence and citation
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	59	-	59	-	-	-	2.5.1	Add a row in the table about "land use change impacts" rationale there is a whole subchapter 2.5.2 on this issue	Will modify this Table to be consistent with only environmental impacts; will also modify Table 2.5.4
Sweden (Swedish Environmental Protection Agency)	2	59	-	-	-	-	-	2.5.1	The table caption would be more clear if it includes the word bioenergy, e.g. Environmental and socioeconomic impact of bioenergy:¿..	Will modify
Rory Gilsenan (Natural Resources Canada)	2	59	-	-	-	-	-	2.5.2	Under ¿Economic and occupational status¿ you might want to note the issue of reallocation of fibre flows ¿ e.g., in the forest industry, many panel makers (e.g., mdf, plywood) are concerned that increased demand for fibre from the bioenergy sector will put them out of business.	Table will be deleted
Brian Titus (Natural Resources Canada)	2	60	18	-	-	-	-	-	Change from ¿A specific methodology for assessing GHG balances of biomass and bioenergy systems has also been developed since the late 90s¿ to ¿A specific methodology for assessing GHG balances of biomass and bioenergy systems has existed since the late 1990s¿¿	Make change
Brian Titus (Natural Resources Canada)	2	60	33	-	-	-	-	-	Change from ¿gasification routes, albeit less studied, and their assessment via the LCA process involves¿ to ¿gasification routes, albeit less studied) and their assessment via LCA involves¿¿	Make change
Brian Titus (Natural Resources Canada)	2	60	6	-	-	-	-	-	Change from ¿general environmental effects rather than for a specific bioenergy project¿ to ¿general environmental effects rather than effects for a specific bioenergy project¿	Make change
Brian Titus (Natural Resources Canada)	2	60	27	-	-	-	-	-	Change from ¿into rivers in Brazil is illustrates the¿ to ¿into rivers in Brazil illustrates the¿	Make change
Brian Titus (Natural Resources Canada)	2	60	43	-	-	-	-	-	Change from ¿Key issues in bioenergy LCAs are system definition including¿ to ¿System definition is a key issue in bioenergy LCAs, including¿¿	Make change
Brian Titus (Natural Resources Canada)	2	60	31	-	-	-	-	-	Change from ¿Most studies have concerned biofuels for transport from conventional¿ to ¿Most studies concern biofuels for transport from conventional¿¿	Make change
Laura Verduzco (Chevron Corporation)	2	60	37	60	42	-	-	-	Confusing text, what is meant by emissions performance technology? Life-cycle emissions?	Clarify
Richard Plevin (UC Berkeley)	2	60	12	-	-	-	-	-	If the question to be answered is "what are the environmental effects of an action or policy?", then attributional LCA doesn't apply: it is a static decomposition. A change-based analysis is required. So to say that consequential (change-based) LCA "involves higher uncertainty" isn't quite right. It's true estimates of the effects of a policy or action are more uncertain than estimates of a static decomposition based on accounting principles that don't reflect actual environmental effects (i.e., co-product allocation by mass or energy.) But if it's the change analysis that we care to estimate, we must use techniques that measure the change. It would be a mistake to treat consequential and attributional LCA as estimating the same phenomenon, but with different levels of uncertainty. (Much of the literature on consequential LCA confirms this, esp. work of Eckvall and Weidema.) The question at hand for this report is whether expanding the use of bioenergy helps mitigate climate change. This is inherently a consequential analysis: what is the state of the climate with and without greater bioenergy utilization? You can't answer correctly by extrapolating from a static attributional LCA. See www.calcasproject.net for excellent critiques of ISO LCA. Put another way, "higher uncertainty" is not best viewed as an attribute of the LCA approach (consequential) but of the problem (predicting consequences).	Will include addiional information about attributional LCA

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	60	30	-	-	-	-	-	In this table, no study is reported for China, but one for India. This is in contradiction to the text.	Make change
United States (U.S. Department of State)	2	60	37	-	-	-	-	-	It would be helpful to specify differences in the systems being modeled; it is the local agricultural practices, climate, soil that will strongly affect estimated environmental effects of bioenergy systems. It is simply not possible to give "generic" impacts with any precision. The work of Kim and Dale is illustrative. Kim, S. and Dale, B. E. (2009). Regional variations in greenhouse gas emissions of biobased products in the United States - corn-based ethanol and soybean oil. Int. J. Life Cycle Assess. Vol. 14, 540¿546. Sendich, E.D. and B. E. Dale. (2009). Environmental and economic analysis of the fully integrated biorefinery. Global Change Biology-Bioenergy. 1: 331-345.	Will clarify in text
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	2	60	1	62	8	-	-	-	Most of the issues covered in these pages have already been addressed in Chapter 1. Consider revising & shorterning.	Partly accepted
Brian Titus (Natural Resources Canada)	2	60	41	-	-	-	-	-	Not clear what ¿when available means¿; maybe ¿as illustrated with available data in Table 2.5.2 for corn and sugarcane ethanol and in Table 2.3.5 for a variety of countries and systems and Table 2.6.3 for developing technologies.¿	Make change
Helmut Haberl (Institute of Social Ecology, Vienna)	2	60	19	-	-	-	-	-	One of the main limitations of LCA in the case of bioenergy is that impacts, including GHG emissions, can depend on the volume of the fuel produced, i.e. any such calculation is only valid with a given set of assumptions on production volumes as well as production volumes and efficiencies (yields) in other sectors such as food-producing agriculture. See e.g. the article by Melillo et al. 2009 cited in the chapter, but also Searchinger (2010), cited above (comment 19) and Fritsche et al. 2010, cited above (comment 12). I think that this should be made clearer here	Make change
Christoph von Stechow (IPCC WGIII TSU)	2	60	19	-	-	-	-	-	Please consider referencing Schlamadinger et al., 2005 in addition to Schlamadinger et al., 1997, since both sources will be mentioned throughout the sub-section.	Make change
Brian Titus (Natural Resources Canada)	2	60	3	-	-	-	-	-	Reduce redundancy. Change from ¿Studies of environmental effects usually employ methodologies generally in line with¿ to ¿Studies of environmental effects usually employ methodologies in line with¿¿	Make change
Laura Verduzco (Chevron Corporation)	2	60	30	60	30	-	-	-	ref. Table 2.3.3 instead of 2.3.2	Make change
Richard Plevin (UC Berkeley)	2	60	35	-	-	-	-	-	Saying "despite following ISO standards" implies that these standards are prescriptive of how to perform an LCA. They are not. For example, they allow a range of co-product handling methods that result in a wide range of results for bioenergy systems. The standards also note that LCA is good for comparative, not absolute, analysis. Comparing across studies that choose different data sets and system boundaries can result in nonsense.	Will clarify in text
Christoph von Stechow (IPCC WGIII TSU)	2	60	41	-	-	-	-	-	Table 2.3.5 does not exist. Please provide a valid cross-reference.	Make change
Sweden (Swedish Environmental Protection Agency)	2	60	41	60	41	-	-	-	Table 2.3.5 that is mentioned in the text does not exist. Do you mean Table 2.3.3?	Make change
Richard Plevin (UC Berkeley)	2	60	10	-	-	-	-	-	The terms "attributional" and "consequential" should be defined, as these have specific meaning in the LCA context.	Add to glossary?
Richard Plevin (UC Berkeley)	2	60	47	61	1	-	-	-	This sentence is unclear. Handling of uncertainty may impact results? There's a long list of papers associated with this statement, but it's not at all clear what the point is. Perhaps the point is that LCA is ultimately subjective, and different analysts make different subjective decisions that result in differing LCA results. This is less a question of uncertainty per se than it is of subjectivity and the basic methodological weakness of LCA.	Will clarify in text
Richard Plevin (UC Berkeley)	2	60	47	-	-	-	-	-	Unclear what is meant by "harmonized data have much less uncertainty". What uncertainty does this refer to? The problem with co-product allocation is one of model uncertainty: static allocation methods do not reflect environmental outcomes. They are arbitrary and "consistently wrong" (Weidema 1993). Reducing the "uncertainty" associated with the choice between arbitrary methods by choosing one of them may improve (specious) precision but it says nothing about accuracy.	Have made the change

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
China (China Meteorological Administration)	2	60	1	61	12	2.5.1?	-	-	Shorten this section to 2-3 sentences, and just make it clear that we adopt LCA to assess environmental effects.	Will be considered.
United States (U.S. Department of State)	2	61	24	61	43	-	-	-	The above point about the dynamics of CO2 emissions also suggests that the ¿carbon payback period¿ could be a useful metric for comparing the climate impact of various bioenergy pathways (in the discussion on metrics on p. 61). It would be helpful for this chapter to present estimates of the payback period for a variety of feedstocks and production systems available from the literature to demonstrate the heterogeneity.	Already treated in text
China (China Meteorological Administration)	2	61	-	-	-	-	-	-	Add content about ¿Impact of present biomass energy development and practice on environment, society and economy and its analysis¿	Addressed in other parts of chapter; space limitations prevent additional information here
Sweden (Swedish Environmental Protection Agency)	2	61	28	61	29	-	-	-	Another useful metric for transportation biofuels that is applied in the section on land use is gram GHG per MJ of delivered biofuel.	Make change
Brian Titus (Natural Resources Canada)	2	61	25	-	-	-	-	-	Change from ¿land management and biomass fuels¿ to ¿land management and biofuels¿. Check for all uses of ¿biomass fuels¿ in chapter and convert to ¿biofuels¿.	Make change
Australia (0)	2	61	19	61	19	-	-	-	Clarify what is meant by 'aerosol emissions associated with forests'.	Will supply reference
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	61	15	-	-	-	-	-	CO2: 2 should be as subscript	Make change
Brian Titus (Natural Resources Canada)	2	61	18	-	-	-	-	-	Finish numbered list: ¿and (iv) aerosol emissions associated with forests.¿	"aerosol emissions associated with forests" is a "non-GHG related climatic forcers"
Helmut Haberl (Institute of Social Ecology, Vienna)	2	61	29	-	-	-	-	-	I did not find Schlamadinger et al. 2005 in the reference list	will be corrected
Christoph von Stechow (IPCC WGIII TSU)	2	61	38	43	-	-	-	-	No reference is provided to substantiate the assertions made towards the end of this paragraph.	We have citations to support this.
Richard Plevin (UC Berkeley)	2	61	20	-	-	-	-	-	Once again "replaced" is incorrect. It's "displaced".	Make change
Christoph von Stechow (IPCC WGIII TSU)	2	61	36	-	-	-	-	-	Please consider inserting "indicator" between "savings" and "per amount".	"emissions savings indicator per amount of land" doesn't make sense, but we will clarify the text
Richard Plevin (UC Berkeley)	2	61	24	-	-	-	-	-	Protection of oil is not an indirect effect of oil use on the same sense that ILUC is an effect of biofuels. This is a geopolitical / economic decision that is obviously driven by many factors. ILUC is also driven by many factors, and modeling to date has attempted to estimate the portion of that driven by an increase in biofuel production. The equivalent here would be the change in GHGs related to supply protection associated with some change in oil use, e.g. the reduction associated with increased use of biofuels. There's little reason to expect US military protection of oil to change in response to a change in oil use of this magnitude. Moreover, the estimate of these emissions by Liska and Perrin is a wild guess relying on estimates of the portion of US emissions attributable to the military and of those, the portion attributable to protecting oil supply. Their approach also misunderstands the global oil market: protection of mideast oil affects the price of all oil globally, not just of middle east oil. Their choice of divisor (US gasoline from imported Persian Gulf oil) is inappropriately small, magnifying the effect. (See http://plevin.berkeley.edu/docs/Unnasch-NFA-Petroleum-Impacts-LCA-2009.pdf for a different take on this.) Frankly, this comparison has no merit. Also, Gorissen et al 2010 is cited but not listed in the bibliography. Quite frankly, holding this up "Viewpoint" piece against the growing literature on ILUC strikes me as inappropriate for an IPCC report.	Will remove Liska reference.
Brian Titus (Natural Resources Canada)	2	61	24	-	-	-	-	-	Punctuation: add period. Change from ¿flow (Liska and Perrin, 2009) ¿ to ¿flow (Liska and Perrin, 2009). ¿	Make change
United States (U.S. Department of State)	2	61	22	-	-	-	-	-	Remove the sentence beginning "However". This is confusing and irrelevant for bioenergy.	Make change
Brazil (Ministry of Science and Technology)	2	61	44	62	8	-	-	-	Should add a comment on EPA's study comparing the GHG reductions relative to gasoline from the sugar cane ethanol in Brazil and the corn ethanol in USA...	Will add the citation
Canada (Environment Canada)	2	61	29	-	-	-	-	-	The Schlamadinger et al. 2005 reference is missing from the list of references.	Make change
Jürgen Scheffran (University of Hamburg)	2	61	12	61	12	-	-	-	There are two publications Soimakallio et al. 2009	Make change

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	61	41	61	43	-	-	-	This is an important but under-developed indicator, and has major ramifications for policy choices regarding sources of biomass. The end of the paragraph touches on this, but elaboration would be helpful. First, Schlamadinger et al. (1995) take into account biosphere carbon fluxes and stores and hence temporal scales, define ¿carbon neutrality¿ such that 1 = C neutral, and then estimate that C neutrality of bioenergy from logging residues in temperate and boreal forests lies between 0.49 and 0.82 after 20 years and between 0.75 and 0.88 after 100 years (B. Schlamadinger, J. Spitzer, G. H. Kohlmaier and M. Lüdeke. 1995. Carbon balance of bioenergy from logging residues. Biomass and Bioenergy 8: 221-234). Secondly, the recent Manomet Center for Conservation Sciences (2010) report (which has touched some raw nerves in the bioenergy sector and the forestry sector) uses the concept of carbon debt and carbon dividend, relative to the use of fossil fuels (Manomet Center for Conservation Sciences. 2010. Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources. Walker, T. (Ed.). Contributors: Cardellichio, P., Colnes, A., Gunn, J., Kittler, B., Perschel, R., Recchia, C., Saah, D., and Walker, T. Natural Capital Initiative Report NCI-2010-03. Brunswick, Maine). The obvious corollaries include that the renewability of bioenergy must be spread over the time that it takes the new crop to regrow, and that bioenergy cannot be C neutral because of the energy needed to create it and because of C impacts of land management (see introduction to Schlamadinger et al. (1995) for fuller list of issues). Finally, Marland and Schlamadinger (1998) compare the use of forests for C sequestration or fossil fuel substitution and discuss the trade-offs (G. Marland and B. Schlamadinger. 1998. Forests for carbon sequestration or fossil fuel substitution? A sensitivity analysis. Bioenergy and Biomass 13: 389-397). The temporal aspect and effects on C neutrality, and trade-offs between C sequestration and fossil fuel substitution, have clear policy implications for bioenergy. These concepts could go here or later in Section 2.5.3. If here, then consider ¿Indicators do not usually address the temporal dimension of biosphere carbon stock changes, which is an important consideration for meeting atmospheric CO2 targets within a given time-frame. Sustainable biomass production systems can create temporary but substantial decreases in biosphere carbon stocks, especially in long-rotation forestry. This carbon debt (relative to fossil fuel alternatives) eventually becomes a carbon dividend as forests mature. The debt payoff time can be as little as 5 years when using forest biomass to replace oil-fired thermal and CHP but over 90 years when replacing electrical generation by natural gas; biomass replacement of coal-fired power plants is thus predicted to produce net benefits after 2050 compared to burning coal, and much longer for natural gas (Manomet Center for Conservation Sciences 2010). Related to this is the notion that bioenergy can ultimately offset or reduce C relative to fossil fuels, but cannot be C neutral within an LCA context. Models suggest that C neutrality of bioenergy from logging residues in temperate and boreal forests lies between 49% and 82% after 20 years and between 75% and 88% after 100 years of full neutrality (Schlamadinger et al. 1995). Temporal dimensions can also be considered when examining trade-offs between C sequestration in forests and fossil fuel substitution (Marland and Schlamadinger 1997).¿ If later, then suggest ending paragraph with something like: ¿(See further consideration in Section 2.5.3 and Figure 2.5.2.)¿	Will update text
Brian Titus (Natural Resources Canada)	2	61	31	61	43	-	-	-	This paragraph would benefit from editing to reduce complexity. Recommend using bold italics to make it clear what the different indicators are, and semi-colons may help to connect ideas with the indicators. Try ¿The fossil Ceq emission displacement indicator is useful and favors the most efficient use of biomass; it also allows external fossil inputs if they enhance biomass use efficiency, and compares outputs (e.g., electricity, heat, transport fuel, material substitution). The emission savings indicator favors biomass conversion processes with low GHG emissions but does not take into account the amount of biomass or land required; unlike the displacement indicator, it cannot compare between different outputs (e.g., electricity and transport fuel). The emission savings per amount of land area used for biomass production favors biomass yield and conversion efficiency, and greater GHG emissions from production may be acceptable if it increases biomass yield; it can compare different outputs. Another commonly used indicator is the amount of primary fossil energy used to create a unit of biofuel energy output, but the renewable credit is often subtracted from the input if the bioenergy chain coproduces electricity. ¿	Will reduce text to clarify

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Australia (0)	2	61	29	62	8	-	-	-	This section which describes methods for determining the overall greenhouse benefit for bioenergy production is disjointed and difficult to understand. Suggest redrafting.	Will review section to improve clarity
Laura Verduzco (Chevron Corporation)	2	61	24	61	24	-	-	-	What is meant by indirect land use impacts such as for ensuring Middle Eastern petroleum flow	Deleted this sentence
Chengyi Zhang (China meteorological Administration)	2	61	13	62	8	2.5.1.2	-	-	In that section, how the land management practices, the bioenergy crops and LUCs affect the GHG balance (net GHG reduction or emission) should be added, in order to thoroughly assess the climate change mitigation effects of bioenergy crops. I recommend two papers for the author(s) to refer. (1) Hillier J., et al. Greenhouse gas emissions from four bioenergy crops in England and Wales: Integrating spatial estimates of yield and soil carbon balance in life cycle analyses. GCB Bioenergy (2009) 1, 267-281. (2) St Clair S. et al., Estimating the pre-harvest greenhouse gas costs of energy crop production. Biomass & Bioenergy (2008) 32, 442-452.	Already treated in text
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	61	17	-	-	2.5.1.2	-	-	You introduce LUC here (and later on dLUC and iLUC without a proper explanation.	Make change
Jürgen Scheffran (University of Hamburg)	2	62	21	62	21	-	-	-	"use of biomass fuels (e.g. bagasse, straw, wood chips)": Why select these as biomass fuels?	Will be rewriting this section and will consider this comment
Christoph von Stechow (IPCC WGIII TSU)	2	62	19	62	22	-	-	-	Are the assertions made here based on the reference provided at the end of the previous paragraph?	Will move Wang citation up
Christoph von Stechow (IPCC WGIII TSU)	2	62	19	62	26	-	-	-	Are these assertions in line with the claims of recent publications (http://www.eeb.org/index.cfm/news-events/news/studies-cast-further-doubt-on-sustainability-of-bioenergy/ and http://www.manomet.org/node/322 and http://www.ewg.org/clearcut-disaster) that biomass used for heat and/or power do not reduce GHG emissions as significantly as anticipated? How does this relate to the high number of 97% of GHG reduction for combustion of wood log mentioned on page 40?	The Manomet policy study was considered for inclusion and the combination of references provided in Chapter 2 include the basis for understanding the conclusions of the Monomet study, and go beyond. There was not sufficient space to illustrate all the nuances of the legislation and calculations used in that policy which have very specific conditions (need to repay the carbon very quickly and the baseline comparisons). If we explained this example in detail, we would also have to explain the examples in detail of the Nordic countries. Some of these countries reach conclusions that are quite different than those of the Manomet study. It was not possible within the space available to delve with the multitude of policy options and how they can be viewed in different locations. The bottom line is actually brought in very well in the text: the use of forest biomass can be sustainable (sustainable forestry) but the carbon benefits are not obtained in short term but are in the 20+ year timeframe. They have a role in the future as they have today for sustainable development.
United States (U.S. Department of State)	2	62	3	-	-	-	-	-	Even in the U.S. Midwest these location specific environmental effects are sufficient to significantly change the results. The term "all biomass is local" has been coined to highlight this fact. See attached references. Sendich, E.D. and B. E. Dale. (2009). Environmental and economic analysis of the fully integrated biorefinery. Global Change Biology-Bioenergy. 1: 331-345. Kim, S. and Dale, B. E. (2009). Regional variations in greenhouse gas emissions of biobased products in the United States¿corn-based ethanol and soybean oil. Int. J. Life Cycle Assess. Vol. 14, 540¿546.	Include these references; these papers are also included in 2.2. Apologies to the reviewers. It was the intent of the authors to include the references but they were overlooked. If there is an errata they will be included.
Laura Verduzco (Chevron Corporation)	2	62	27	62	27	-	-	-	Explain fresh anthropogenic N (is this from fertilizers)?	Will make change
Peter de Haan (Ernst Basler + Partner AG)	2	62	9	62	10	-	-	-	improve title of 2.5.2. with regard to title of 2.5.3	We will consider a title change
Chengyi Zhang (China meteorological Administration)	2	62	9	72	3	-	-	-	In order to clearly and orderly provide the assessment imformation on the environmental effects of bioenergy, I strong recommend the author(s) incorporate the section 2.5.2 ""Climate change effects of bioenergy excluding the effects of land use change"" and section 2.5.2 ""Climate change effects of bioenergy including the effects of land use change"", according to the pre-harvest, harvest and transpotation, conversion process and usage. By doing this, the new section might become shorter than the two current sections.	Comments noted and we will also separate modern and traditional biomass.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	62	19	62	37	-	-	-	N2O:2 should be as subscript	Will be rewriting this section and will consider this comment
Richard Plevin (UC Berkeley)	2	62	16	-	18	-	-	-	Noting that a review exists without summarizing what it says isn't terribly enlightening.	We have said the conclusions of the study elsewhere; we will clarify
Alexander Popp (PIK)	2	62	38	-	-	-	-	-	Please consider also Popp A., Lotze-Campen, H., Leimbach M., Knopf B., Beringer, T., Bauer N., Bodirsky B. (accepted) On sustainability of bio-energy production: integrating co-emissions from agricultural intensification. /Biomass & Bioenergy/, doi:10.1016/j.biombioe.2010.06.014	Will consider including comment. Apologies to the reviewer. We intended to add this reference but it was overlooked.
Christoph von Stechow (IPCC WGIII TSU)	2	62	27	62	39	-	-	-	Please consider moving this paragraph into a footnote.	Will consider this change
Christoph von Stechow (IPCC WGIII TSU)	2	62	12	-	-	-	-	-	Please consider starting a new sentence after the brackets with the word "rapidly".	Will make change
Brian Titus (Natural Resources Canada)	2	62	30	-	-	-	-	-	Punctuation. Change from ¿ Crutzen et al (2007) arise¿ to ¿Crutzen et al. (2007) arise¿¿ Check all use of ¿et al.¿ to ensure full stop is used.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	62	28	-	-	-	-	-	Should ¿tier 1¿ have upper case, and hence ¿IPCC¿s recommended Tier 1 methodology¿¿? If so, confirm all uses in text.	Will be rewriting this section and will consider this comment
Australia (0)	2	62	12	62	12	-	-	-	Start new sentence at 'Rapidly....'	Will modify for clarity
Richard Plevin (UC Berkeley)	2	62	11	-	16	-	-	-	This sentence is garbled.	Will modify for clarity
Richard Plevin (UC Berkeley)	2	62	37	-	39	-	-	-	This sentence is misleading. First, saying "can have" is wrong: N2O emissions do have an important impact, and are often the most important factor in bioenergy GHG balances. Saying "though they are uncertain" implies that uncertainty operates to contradict this statement. Actually, the uncertainty is quite asymmetric; there's greater chance that the default values are underestimates than overestimates. So the uncertainty amplifies, rather than softens the statement. The use of "though" gives the opposite impression.	Will be rewriting this section and will consider this comment
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	62	27	62	39	2.5.2	-	-	I doubt whether it's appropriate to discuss the merits of one specific paper to such length in this review.	Will be rewriting this section and will consider this comment
Sweden (Swedish Environmental Protection Agency)	2	62	19	62	19	2.5.2	-	-	N2O emissions may be minimised by efficient fertilising strategies as well as the use of N fertiliser that has been produced using N2O cleaning.	Will modify to include this point
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	62	11	62	12	2.5.2	-	-	This section extensively discussed the wide range in GHG profiles found for biofuels, but pays no attention to the values found for other (modern and traditional) bioenergy routes. I think they should also be described, although shorter than the biofuels ones as the picture is less complicated	Traditional biofuels are treated seperately in the text.
Peter de Haan (Ernst Basler + Partner AG)	2	63	7	63	8	-	-	-	improve title of 2.5.2. with regard to title of 2.5.3	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	63	7	65	37	-	-	-	It is absolutely necessary to add the range of GHG emissions to the text and clearly spell out what the impact of LUC could be in terms of GHG mitigation. This is managable as figure 2.5.2 results from GHG savings through the use of bioenergy. in chapter 2.5.3.2 GHG are reported as well./// Note further that the LUC definition used in this report deviate from the definition used in the UNFCCC arena(see Desicion 16/CMP.1)	Text will be revised and the ranges of GHG emissions reductions provided. Other comments noted.
Christoph von Stechow (IPCC WGIII TSU)	2	63	9	63	20	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Accepted; references will be cited with text.
Richard Plevin (UC Berkeley)	2	63	15	-	-	-	-	-	The effect here attributed to biofuels is that "pasture management is improved" supporting higher cattle density. On what basis is the improved pasture management a result of biofuel production?	Rewording needed; pasture management practiced was to let land degrade and then move the cattle to another area (no management). The pasture intensification with management indicates that the degraded pasture is recovered and serve for biofuel production while other parts recover the pasture which can increase in density because there is management of the land enabling both cattle and agriculture for biofuels and food to occur simultaneously.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	63	-	-	-	-	2.5.1	-	Clarify if MJ refers to output electricity (CO2/kWh preferred). Suggest converting fuel values to CO2/MJ instead of CO2/km to avoid vehicle efficiency issue. Check data consistency w/ Table 2.3.3. Explain huge variability in coal and oil values.	Accept - new version of the figures will have all the same units. Depends on type of coal and type of oil -- reflect global variation. New set of data will provide specific references used.
Laura Verduzco (Chevron Corporation)	2	63	-	-	-	-	2.5.1	-	Specify type of biomass and replace fossil gas w/ natural gas.	OK
Sweden (Swedish Environmental Protection Agency)	2	63	-	63	-	2.5.2	2.5.1	-	The x-axis includes the category combined heat and power but doesn¿t state what fuel that is assumed.	CHP will be dropped as a category.
Elina Vapaavuori (Finnish Forest Research Institute)	2	63	-	-	-	-	2.5.1.	-	What is the use of this graph? Readability is poor. I do not understand the text in x-axis at all.	X axis contains various cases of technologies for transport, heat, or electricity generation using fossil or bioenergy or combinations. Will be made more clear.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	64	8	64	12	-	-	-	CO2: 2 should be as subscript	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	64	22	64	38	-	-	-	I think this para would profit a lot from taking on board the new paper by Searchinger (2010), see comment 19. I was confused by this para and I think it should be made more precise and compelling	Will be rewriting this section and will consider this comment
Christoph von Stechow (IPCC WGIII TSU)	2	64	13	64	21	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Some references e.g Schlamadinger et al.
Christoph von Stechow (IPCC WGIII TSU)	2	64	28	-	-	-	-	-	Please consider adding the reference Adler et al. (2007) that is mentioned in the same context by chapter 10 (line 40).	Check reference
Christoph von Stechow (IPCC WGIII TSU)	2	64	15	-	-	-	-	-	Please consider inserting a semicolon behind factor.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	64	7	64	12	-	-	-	Please consider moving these sentences into a footnote.	Will consider this comment
Christoph von Stechow (IPCC WGIII TSU)	2	64	2	-	-	-	-	-	Please consider rephrasing "extraction and use for energy" into "extraction for energy use".	Accepted
Jürgen Scheffran (University of Hamburg)	2	64	32	64	34	-	-	-	Sentence not clear.	Language to be improved
Australia (0)	2	64	7	64	8	-	-	-	Some research also shows that very old forests can be a source of emissions due largely to decay, and some old forests are in a steady-state where sequestration is offset by emissions from decay.	Some references and data to be added
Elina Vapaavuori (Finnish Forest Research Institute)	2	64	-	-	-	-	-	-	Text in this page is of poor quality, particularly pg. starting on line 13.	Language to be improved
Richard Plevin (UC Berkeley)	2	64	22	-	24	-	-	-	The statement that "targets suggest" that fossil alternatives can provide GHG reductions makes no sense.	Rewording needed
Australia (0)	2	64	21	64	21	-	-	-	The use of 'current' in this sentence in unclear. Suggest sentence is redrafted to read '... and (iv) prior use of the land (and thus carbon content of the land prior to production of bioenergy feedstock).'	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	64	28	-	-	-	-	-	The word "attention" does not make sense in the current sentence structure. Please consider rephrasing.	Rewording needed
United States (U.S. Department of State)	2	64	22	64	38	-	-	-	This paragraph is poorly worded. The phrase in the first sentence "fossil alternatives can provide near-term net GHG reductions" is not dependent on a 2 deg. target.	Rewording needed
Richard Plevin (UC Berkeley)	2	64	13	-	16	-	-	-	This section almost gets the displacement effect right, but it leaves out the rebound effect on fossil fuel markets. The factors stated affect the equivalence ratio of bio- to fossil fuel, but then price effects must be considered.	Market mechanisms to be added
Christoph von Stechow (IPCC WGIII TSU)	2	64	6	-	-	-	-	-	Why are the effects of converting grasslands and peatlands to other land cover types not specifically mentioned here (see, e.g. page 108, lines 27-29)?	Accepted
Norway (Climate and Pollution Agency)	2	64	32	64	36	5	-	-	The meaning is a bit unclear	Language to be improved
Norway (Climate and Pollution Agency)	2	64	22	64	24	5	-	-	The meaning is a bit unclear; sentence is not complete and what means "fossil alternatives"?	Rewording needed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Norway (Climate and Pollution Agency)	2	64	10	64	12	5	-	-	This sentence is not quite clear; is it the higher CO2-content in the atmosphere that will directly cause the terrestrial biosphere to become a carbon source, or is it the climate change- drought, high temperature etc that comes with higher atmospheric CO2 levels? We suppose it is the last and suggest e rewording of the sentence to make that clear	Needs rewording
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	65	36	65	37	-	-	-	delete	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	65	24	65	35	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	References to be added
Richard Plevin (UC Berkeley)	2	65	9	-	-	-	-	-	The term "dLUC" should be explained. In general, this section needs a better description of direct and indirect LUC, and a clearer separation of the issues pertaining to both. IPCC values are not provided "for use in LCA" as this sentence now reads. Surely, they can be used for that, but it sounds like this was the intended purpose.	Language to be improved
Richard Plevin (UC Berkeley)	2	65	10	-	13	-	-	-	These sentences are almost content-free.	Language to be improved
Richard Plevin (UC Berkeley)	2	65	13	-	23	-	-	-	This discussion of iLUC is very weak. The references cited are not the most important ones. ILUC is presented as a "hypothesis" rather than an obvious result of the function of economic markets. Clearly, the magnitude of the effect is uncertain, but the principles are solidly understood. (How ironic to be making this argument to authors of an IPCC report!) There should be references to the many modeling studies that have estimated non-negligible to high ILUC emissions from biofuel expansion. The statement about more shedding more light and not substantiating claims is very vague, imparting doubt without providing actual information. The call for "better empirical evidence" is rather dismissive, which indicates bias. This is a very important and very contentious issue: it deserves a balanced treatment. (See the attached document, SSREN_Draft2_Review_Plevin_Richard_Material_01.pdf.	Text will be revised and balanced
Richard Plevin (UC Berkeley)	2	65	7	-	9	-	-	-	This statement is true for ILUC but not for direct LUC, in which case the causes are obvious.	should be ILUC or should be rewritten totally
Norway (Climate and Pollution Agency)	2	65	11	65	13	5	-	-	What is "dLUC" and "iLUC" ? Explain, important because of the frequent use of the words in the following pages	Accepted
United States (U.S. Department of State)	2	66	0	-	-	-	-	-	A recent paper from Purdue University should be taken into consideration for this page. The peer reviewed paper by Wallace Tyner and others examines the land use impacts associated with corn ethanol and is available at https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=3288. The results of this work have been presented to the California Air Resources Board for consideration in their Low Carbon Fuel Standard.	Reference included
Brian Titus (Natural Resources Canada)	2	66	46	-	-	-	-	-	Change ¿1st¿ to ¿first¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	66	12	-	-	-	-	-	Change reference "Table 2.5.3" into "Table 2.5.2"	Oversight will be corrected.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	66	29	-	-	-	-	-	Change reference "Table 2.5.3" into "Table 2.5.2"	Oversight will be corrected.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	66	42	-	-	-	-	-	Change reference "Table 2.5.3" into "Table 2.5.2"	Oversight will be corrected.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	66	12	-	-	-	-	-	Change reference "Tables 2.5.3" into "Table 2.5.2"	Oversight will be corrected.
United States (U.S. Department of State)	2	66	46	-	-	-	-	-	Clarify what is meant by "the 1st portion of this analysis".	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	66	1	67	16	-	-	-	delete whole chapter and condense essential part in a box with the haeding: "Land use modelling" rationale: information is interesting but does not touch the core of the chapter	Text will be revised
United States (U.S. Department of State)	2	66	29	-	-	-	-	-	I could not find a Table numbered 2.5.3	Oversight will be corrected.
Jürgen Scheffran (University of Hamburg)	2	66	14	66	28	-	-	-	Paragraph is repeated twice.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	66	22	66	28	-	-	-	Please delete this paragraph since it is redundant.	We will rewrite to reduce redundancy
United States (U.S. Department of State)	2	66	19	-	-	-	-	-	Remove phrasing that modeling approaches "can be viewed as lacking transparency"? Assuming the reference should actually be to Table 2.5.2 (as 2.5.3 does not exist), the models used in the studies reported are all freely available to the public, and widely used in their communities. Since section 2.5.3.1 is specifically about modeling, I would assume that the authors are themselves familiar with models and should take it as a charge to communicate how and where the different modeling methods are valuable for understanding land use change.	We will have further discussion to address this concern. Although the models are available they are complex to the non-modeling communities. To these communities these models are viewed as lacking transparency.
Peter de Haan (Ernst Basler + Partner AG)	2	66	2	66	48	-	-	-	shortening potential: shorten to at max. half, and increase reference to table 2.5.2 instead	Text will be revised
Christoph von Stechow (IPCC WGIII TSU)	2	66	12	66	13	-	-	-	Since there is no table 2.5.3 (although the next table is called 2.5.4), these cross-references probably aim at table 2.5.2.	Oversight will be corrected.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	66	12	66	13	-	-	-	Table 2.5.3 should be change to Table 2.5.2	Oversight will be corrected.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	66	29	-	-	-	-	-	Table 2.5.3 should be change to Table 2.5.2	Oversight will be corrected.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	66	42	-	-	-	-	-	Table 2.5.3 should be change to Table 2.5.2	Oversight will be corrected.
United States (U.S. Department of State)	2	66	2	66	12	-	-	-	The description of methods needs some clear delineation. The authors, in line 7, draw no distinction between economic and biophysical modeling - I would call those separate methods, and even a third method when the two approaches are combined. Then the deterministic methods are a fourth.	We wil do a rewrite of the methodology section. The reviewer is correct.
Christoph von Stechow (IPCC WGIII TSU)	2	66	40	66	41	-	-	-	The explanation provided on page 109, lines 24/25, is more to the point. Please consider rephrasing.	Rewording needed
Christoph von Stechow (IPCC WGIII TSU)	2	66	46	-	-	-	-	-	The expression "1st portion of thes analysis" is not clear and may sound unscientific.	Rewording needed
Christoph von Stechow (IPCC WGIII TSU)	2	66	43	66	45	-	-	-	The references provided on page 109, line 27 (Lapola et al., 2010 and Al-Fiffai et al., 2010) are not provided here.	To be corrected
Richard Plevin (UC Berkeley)	2	66	18	-	21	-	-	-	These sentences are repeated in the next paragraph.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	66	9	66	10	-	-	-	This sentence is unclear; please consider rephrasing.	Text will be revised
Brazil (Ministry of Science and Technology)	2	66	14	56	21	-	-	-	This sentence should be removed once it is repeated in the next paragraph.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Chengyi Zhang (China meteorological Administration)	2	66	1	72	3	-	-	-	When the whole section of 2.5.3 is carefully examined ,the current title of 2.5.3.1 ""Methodologies for land use change modeling"" is obviously suitable to neither the context nor the following two sections: ""2.5.3.2"" and ""2.5.3.3"". It is better to revise it.	Titles will be revised
Laura Verduzco (Chevron Corporation)	2	66	14	28	-	2.5.3.1	-	-	Repetition of words/paragraph. Starting with "Implementation¿."	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Jürgen Scheffran (University of Hamburg)	2	66	-	-	-	-	-	2.5.3	Table 2.5.3 is quoted several times but does not exist	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	67	27	-	-	-	-	-	¿ICS¿ ¿ what is this? Give definition on first use.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	67	15	67	16	-	-	-	Addition: "...understanding of iLUC estimates from different models which show that current global biofuel mandates will probably lead to significant iLUC effects, although the extend.."	Will consider
Brian Titus (Natural Resources Canada)	2	67	29	-	-	-	-	-	Change ¿reletive¿ to ¿relative¿	Editorial comment will be handled by professional editors
Brian Titus (Natural Resources Canada)	2	67	23	-	-	-	-	-	Change from ¿sequestered as biomass re-growth¿ to ¿sequestered as biomass re-grows¿	Accepted
Brian Titus (Natural Resources Canada)	2	67	8	-	-	-	-	-	Change from ¿transparent to potential users¿ to ¿transparent to for potential users¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	67	19	67	38	-	-	-	CO2,CH4: 2 and 4 should be as subscript	Accepted
Richard Plevin (UC Berkeley)	2	67	5	-	6	-	-	-	Dividing ILUC emission over a number of years is a contentious issue that deserves more explanation. First, the arbitrarily-chosen number of years materially affects the g/MJ rating. Second, this approach ignores CO2 residence time. See O'Hare et al (2009) doi: 10.1088/1748-9326/4/2/024001; Levasseur et al (2010) doi: 10.1021/es9030003; Anderson-Teixeira et al (2010) doi: 10.1111/j.1365-2486.2010.02220.x	Will rewrite this section to address this concern; references were added
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	67	17	67	40	-	-	-	give chapter a different number 2.5.4 , rationale 2.5.2 and .3 dealing with modern bioenergy use therefore it is logical that 2.5.4 deals with traditional use	Will consider reorganizing to make discussion more logical
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	67	18	67	26	-	-	-	Good summary of negative effects of poor fuelwood combustion units. However the phrase "traditional open fires and simple low efficiency stoves" is misleading, indicating that the problem is limited to the most primitive devices in Developing Countries. Actually even technically advanced small boilers and stoves for solid biomass have higher emissions of e.g. CO, PM, NMVOC, NOx than devices of the same technical standard for fossil gas or oil. See e.g. UBA Texte Nr. 44/2008 http://www.umweltdaten.de/publikationen/fpdf-l/3677.pdf, Annex A; EMEP/EEA air pollutant emission inventory guidebook - 2009, http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009, Part B, 1.A.4. An old-type wood boiler may have (by means of CH4-emissions) more than twice as high an impact on climate change as an oil boiler, besides high emissions of particles and unoxidised gaseous compounds. (Johansson, Leckner, Gustavsson, Cooper, Tullin, Potter: Emission characteristics of modern and old-type residential boilers fired with wood logs and wood pellets. Atmospheric Environment 38 (2004) pp. 4183-4195)	Agree with the content of the comment, but this section deals with traditional energy
Richard Plevin (UC Berkeley)	2	67	27	-	-	-	-	-	ICS is undefined.	Accepted
Brian Titus (Natural Resources Canada)	2	67	33	67	35	-	-	-	If final part of sentence is interpreted correctly, then could simplify to ¿estimated that dissemination and use of advanced stoves in 150 million houses in a 10-yr program in India (similar to that achieved in China in the early 1990s) could result in a mitigation of 0.5-1 GtonCO2e from non-CO2 GHG alone.¿	Accepted
Brian Titus (Natural Resources Canada)	2	67	21	-	-	-	-	-	If true, then maybe change from ¿air pollution and climate change (Smith et al. 2000). When¿ to ¿air pollution, climate change (Smith et al. 2000) and human health. When¿	Editorial comment will be handled by professional editors

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	67	40	-	-	-	-	-	Maybe change from ¿cookstoves¿ to ¿stoves¿?	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	67	10	67	16	-	-	-	No reference is provided to substantiate the assertions made in these paragraphs.	Will consider including more references
Christoph von Stechow (IPCC WGIII TSU)	2	67	40	-	-	-	-	-	Please consider adding a reference to sub-section 2.4.2.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	67	23	67	26	-	-	-	Please consider rephrasing to: "Worldwide, estimates are that approximately 30% of warming from household-fuel combustion can be attributed to black carbon and carbon monoxide emissions from human sources, about a 15% to ozone-forming chemicals, and a few percent to methane and CO2 emissions (Wilkinson et al., 2009).	Accepted
Brian Titus (Natural Resources Canada)	2	67	5	-	-	-	-	-	Should sentence start with ¿iLUC¿ or ¿Indirect LUC¿?	Editorial comment will be addressed by copy editing
Brian Titus (Natural Resources Canada)	2	67	10	67	12	-	-	-	Simplify. Change from ¿The models have the potential but have not been used, so far, to provide information about how much iLUC could decrease further as a result of (i) large increases in investments to enhance agriculture productivity growth and (ii) implementation of policies to protect C rich ecosystems.¿ to ¿The models have not yet been used to estimate how much iLUC could decrease further as a result of (i) large increases in investments to enhance crop productivity and (ii) implementation of policies to protect C-rich ecosystems.¿	Text will be modified to reflect the literature and simplified
Helmut Haberl (Institute of Social Ecology, Vienna)	2	67	13	67	16	-	-	-	Such sweeping generalizations are, in my view, not supported by the discussions presented in the current draft. Moreover, I believe that the issue that GHG emissions will depend on the volume of bioenergy to be produced should be discussed in this context.	Will be rewriting this section and will consider this comment.
United States (U.S. Department of State)	2	67	23	67	26	-	-	-	The claim that bioenergy used in households is responsible for 30% of global warming is surprising. Can this possibly be true? Or is it 30% of some component of warming? The sentence needs clarification.	30% of black carbon
Richard Plevin (UC Berkeley)	2	67	13	-	16	-	-	-	The claim that there is a trend toward lower ILUC values is false. Most studies of ILUC have appeared only in 2009 and 2010. The work on this subject is just starting; it's far too early to detect trends. (At this point, the differential journal publishing cycles may have more impact than the accumulation of evidence.) I see no such convergence. Rather, I find this section biased.	We will reformulate the text
Daniela Thrän (DBFZ / UFZ)	2	67	40	67	40	-	-	-	the description of the high GHG reduction potential for biogas is missing - please add	It will be highlighted more.
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	2	67	17	67	40	-	-	-	The two tables can best describe ""Climate change effects on traditional bioenergy"". Remove paragraph	accepted
Brazil (Ministry of Science and Technology)	2	67	10	67	12	-	-	-	This statement is partially true. The ""Brazil Low-Carbon Country Case Study"", developed by the Worl Bank Group (2010) has provided some information about decreasing iLUC possibilities as a result of increasing investments to enhance agriculture and pastures productivity. This study could be referenced here.	Will consider including this reference
Brazil (Ministry of Science and Technology)	2	67	7	67	9	-	-	-	Tipper´s paper (also mentioned in Table 2.5.2) has important conceptual mistakes. The study does not consider yield gains of feedstock production when assessing potential indirect land use change impacts of bioenergy production. For that it has been haviliy criticized. It is essential to consider as a parameter the additional area (ha) used to produce a certain amount of bioenergy (and it will vary depending on the feedstock) and not only the production. If it is to be mantained on the text, this fact should be noted.	We feel this reference is substantiated
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	67	10	67	12	2.5.3.1	-	-	I suggest you also introduce a recent IIASA study in this review, in which also sensitivity runs were analysed with additional growth in agricultural productivity, and additional protection of C-rich lands. See http://www.elobio.eu/fileadmin/elobio/user/docs/D5.2_5.3.pdf	Will consider including this reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	67	13	-	15	2.5.3.1	-	-	That's quite an essential, and possibly disputable statement. Can you substantiate it by underlying material?	We will reformulate the text
Laura Verduzco (Chevron Corporation)	2	68	-	-	-	-	-	2.5.2	Should be 2.5.3. Table needs consolidation. Suggest removing bulk of text or showing data in a figure to show ranges. Do we think that the data is all credible?	Table will be deleted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	-	69	-	-	-	2.5.2	unclear how this table fit to the traditional use of bioenergy,very detailed too: delete it. The text in the suggested box on "landuse modelling" should take on board essential information.	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 1 colums 8-11: value in g CO2eq/MJ	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	3	68	3	2.5.3.2	-	2.5.2	row 10: The author´s name is Fehrenbach et al., 2009	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 4 (IFPRI) column 11 (Soya): 74,51 g/MJ (BAU) and 67,01 g/MJ (Trade Liberalization) (w/o peatland effects)	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 4 (IFPRI) description if figures with or without peatland effects is necessary	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 7 (Lywood) column 11 figure for rapeseed must be approx. 160 g/MJ (assumption fuel emission factor 83.8)	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 8 (Tipper) column 11 (Soya): figure for soya available (21 g CO2eq/MJ)	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 8 (Tipper) column 11 (Soya): figure for soya available (21 g CO2eq/MJ)	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	2	68	3	2.5.3.2	-	2.5.2	row 8 (Tipper) column 11 (Soya): figure for soya available (21 g CO2eq/MJ)	Table will be deleted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	68	3	68	3	2.5.3.2	-	2.5.2	row 9: Fritsche et al. Presented a working paper in June 2010: "The iLUC factor as a Means to Hedge Risks of GHG Emissions from Indirect Land Use Change", Oeko-Institut, Darmstadt, Germany. Please consider it.	Table will be deleted
Norway (Climate and Pollution Agency)	2	68	1	69	3	5	-	2.5.2.	The same table number is used for two different tables. Tables difficult to understand. What means; Value in g/MJ, top of colon 3 on p 69?	Table will be deleted
Patrick Lamers (Ecofys Germany GmbH)	2	69	-	-	-	-	-	2.5.2	Table heading is used twice or table is split across two pages. Not clear. Reference on p. 109 to Table 2.5.3 should be updated.	Table will be deleted
United States (U.S. Department of State)	2	70	28	-	-	-	-	-	Aden, et.al. 2002 is used as a citation, but is not included in the references section at the end of the chapter.	Reference added
Brian Titus (Natural Resources Canada)	2	70	18	-	-	-	-	-	Change from ¿integrated in agricultural landscapes as vegetation filters intended to capture nutrients in passing¿ to ¿integrated in agricultural landscapes as vegetation filters to capture nutrients in passing¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	70	30	-	-	-	-	-	Change from ¿substantially by means of process changes and¿ to ¿substantially by process changes and¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	70	20	-	-	-	-	-	Change from ¿The subsequent processing of the feedstock¿ to ¿The subsequent processing of feedstock¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brazil (Ministry of Science and Technology)	2	70	30	70	31	-	-	-	Consider quoting the water reuse index of brazilian ethanol production which is 91% (CTC, Sugarcane Technology Center, 2009 ""Manual de Conservação e Reuso da Agua na Agroindustria Sucroenergética"")	Will consider this reference
Brian Titus (Natural Resources Canada)	2	70	10	70	11	-	-	-	Correct punctuation needed. Change from ¿engines that are not equipped with NOx control catalysts. (e.g., Verhaeven et al., 2005; Yanovitz and McCormick, 2009) ¿ to ¿engines that are not equipped with NOx control catalysts (e.g., Verhaeven et al., 2005; Yanovitz and McCormick, 2009). ¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brazil (Ministry of Science and Technology)	2	70	16	70	17	-	-	-	It should read: ""Perennial herbaceous crops, SEMI PERENNIAL CROPS (SUCH AS SUGARCANE), and short rotation woody crops generally require less agronomic input...""	Sugarcane is considered perennial in this report.
Brian Titus (Natural Resources Canada)	2	70	3	70	8	-	-	-	Maybe change from ¿Pollutant emissions to the air depend on combustion technology, fuel properties, combustion process conditions and emission reduction technologies installed. Compared to coal and oil combustion stationary applications, SO2 and NOx emissions are generally lower than coal and oil combustion in stationary applications. When biofuels replaces gasoline and diesel in the transport sector SO2 emissions are reduced but changes in NOx emissions depend on substitution pattern and technology applied.¿ to ¿Pollutant emissions to the air depend on combustion technology, fuel properties, combustion process conditions and emission reduction technologies. Emissions of SO2 and NOx are generally lower for biomass than coal and oil when combusted in stationary applications. When biofuels replaces gasoline and diesel in the transport sector, SO2 emissions are reduced but changes in NOx emissions depend on substitution pattern and technology applied.¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brazil (Ministry of Science and Technology)	2	70	3	70	11	-	-	-	Mention should be made of the emissions of toxic gases in cokeovens in the fossil baseline	will consider this change
Christoph von Stechow (IPCC WGIII TSU)	2	70	40	70	43	-	-	-	No reference is provided to substantiate the assertions made in this sentence.	will work to incorporate references
Brian Titus (Natural Resources Canada)	2	70	32	70	43	-	-	-	Paragraph needs extensive copy editing. Consider change to ¿Strategies that shift demand to alternative ¿ mainly lignocellulosic ¿ feedstock can lead to decreased water competition. Given that several types of energy crops are perennials woody crops grown in multi-year rotations in arable fields used temporarily as pasture for grazing animals, increasing bioenergy demand may become a driver for land use shifts towards systems with substantially higher water productivity [what is meant by ¿higher water productivity?]. A prolonged growing season may facilitate a redirection of unproductive soil evaporation and runoff to plant transpiration, and crops that provide a continuous cover over the year can also conserve soil by diminishing erosion from precipitation and runoff outside the growing season of annual crops (Berndes, 2008). Marginal lands, pastures and grasslands that are not suitable for conventional food/feed crops could become available for feedstock production under sustainable management practices (if downstream water impacts can be avoided) because a number of crops that are suitable for bioenergy production can be grown on a wider spectrum of land types.¿	Noted. The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	70	46	-	-	-	-	-	Remove redundancy. Change from ¿major driver of biodiversity loss and decline over the next 50 years¿ to ¿major driver of biodiversity loss over the next 50 years¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	70	5	70	7	-	-	-	SO2:2 should be as subscript	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Switzerland (Swiss Federal Office for the Environment)	2	70	32	70	40	-	-	-	The discussion of alternatives should be amended by a discussion of what will happen to the former and replaced usage. Shifts of this usage to other places might cause leakages which reduce the favourability of the alternative usage	Will be g this section and will consider comment
Brazil (Ministry of Science and Technology)	2	70	24	70	25	-	-	-	The last sentence reflects an opinion, not a scientific fact. It should be excluded.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	70	4	70	6	-	-	-	This sentence provides an illogic comparison and needs to be rephrased.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Norway (Climate and Pollution Agency)	2	70	-	71	-	-	-	-	We think that the problem of habitat change could be given some focus. This could be included in the "habitat loss" section, or maybe be added as a new subsection. E.g. when a natural forest is converted to a plantation, most of the heterogeneity in habitats are lost and hence the possibilities to maintain the biodiversity (e.g. when a forest is transferred to even aged stands). The problem increases if there is a change in dominant tree species (as e.g. plantations of Pinus radiata on New Zealand and Picea sitchensis in Europe), and even if new proveniences of a species is introduced, or GMOs are used (as assumed in table 2.6.1). All this will, at least to some extent, influence the habitat and possibilities for other species to maintain viable populations.	Biodiversity/habitat will receive more emphasis
Frank Behrendt (Institute for Energy Engineering)	2	70	6	-	-	-	-	-	When biofuels replaces -> replace	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	70	33	-	-	-	-	-	You could include in the text: "..,can lead to decreased water competition and improve water quality (De La Torre Ugarte et al., 2010)¿". Source: Daniel G. De La Torre Ugarte, Lixia He, Kimberly L. Jensen, Burton C. English, Expanded ethanol production: Implications for agriculture, water demand, and water quality, Biomass and Bioenergy, Volume 34, Issue 11, November 2010, Pages 1586-1596.	Included
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	70	15	70	15	2.5.3.3	-	-	add extra reference: Spranger, Hetterlingh, Slootweg, Posch; Env. Pol. 154(2008) 482-487)	Will consider including this reference
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	70	14	70	14	2.5.3.3	-	-	add: eutrophication of BOTH, TERRESTRIAL AND aquatic¿	Eutrophication added
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	70	12	70	12	2.5.3.3	-	-	add: water resources AND ECOSYSTEMS. Reasoning: vide supra	Noted.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	70	2	70	2	2.5.3.3	-	-	change title to: Impacts on air quality, water resources and ecosystems. Reasoning: One key process driving the loss of biodiversity also in terrestrial ecosystems is the eutrophication caused by the deposition of airborne reactive nitrogen species. The possible intensification of bioenergy production in conventional agriculture systems will exacerbate this negative impact as agriculture is the most important ammonia source. Thus the title of this section should be changed and the discussion presented in chapter 2.5.3.3, page 70 lines 12 to 19 needs also to consider terrestrial ecosystems (vide infra).	Will consider this change
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	70	3	70	11	2.5.3.3	-	-	Incomplete and misleading discussion of impacts on air quality. What is true in "climate change" section 2.5.3.2 (emissions of CO, PM, NMVOC, and others, see also above comment on page 67) must not be neglected in "air quality" section 2.5.3.3, where it is even more relevant. The statement "Compared to [...] oil combustion stationary applications, [...] NOx emissions are generally lower" is not true at least in Germany (see references in comment on page 67). The current text leaves the reader with the impression that combustion of biomass in typical stationary applications, i.e. in stoves and small boilers, is beneficial to air quality when compared with combustion of fossil fuels. On the contrary, it is equally bad when compared with coal, and a change to the worse when compared with light fuel oil or even natural gas. See e.g. UBA Texte Nr. 37/2010, http://www.umweltdaten.de/publikationen/fpdf-l/3787.pdf.	will consider this change
Brazil (Ministry of Science and Technology)	2	70	-	-	-	2.5.3.3	-	-	Should include in this section examples of policies adopted to prevent environmental adverse consequences of the expansion of crops for biofuels. (e.g Agro Ecological Zoning for Sugarcane in Brazil).	Will consider this comment
Laura Verduzco (Chevron Corporation)	2	70	16	19	-	2.5.3.3	-	-	This comment is perhaps a little misleading. It's true that lignocellulosic feedstocks generally have low inputs per unit mass produced. However, high-yielding lignocellulosic feedstocks, which are the most likely to be produced at a large scale, generally have relatively high nutrient inputs per hectare of production - on par with corn in the US.	Will try to incorporate this clarification

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brazil (Ministry of Science and Technology)	2	71	44	-	-	-	-	-	Another phrase should be included: ""IT IS IMPORTANT TO NOTE, HOWEVER, THAT EVEN WITH SOME LEVEL OF RESIDUE HARVESTING, SOME BIOENERGY CROPS COULD STILL LEAVE MORE RESIDUES PROTECTING THE SOIL THAN PREVIOUS LAND USES MEANING THAT POSITIVE IMPACTS COULD ALSO OCCUR""	Accepted
Brian Titus (Natural Resources Canada)	2	71	16	71	20	-	-	-	Change from ¿Bioenergy plantations can be located in the agricultural landscape so as to provide ecological corridors that provide a route through which plants and animals can move between different spatially separated natural and semi-natural ecosystems. This way they can reduce the barrier effect of agricultural lands. For example, a larger component of willow in the cultivated supports cervids, foxes, hares, and wild fowl.¿ to ¿Bioenergy plantations can be located in the agricultural landscape to provide ecological corridors through which plants and animals can move between different spatially separated natural and semi-natural ecosystems. This can reduce the barrier effect of agricultural lands. For example, cultivated willow supports cervids, foxes, hares, and wild fowl.¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	71	33	71	36	-	-	-	Change from ¿contributed to extensive deforestation in parts of South-East Asia (UNEP, 2008). Since biomass feedstocks can generally be produced most efficiently in tropical regions, there are strong economic incentives to replace tropical natural ecosystems ¿ many of which host high biodiversity values. (Doornbosch and Steenblik, 2007). However forest clearing is most influenced¿ to ¿contributed to extensive deforestation in parts of South-East Asia (UNEP, 2008). There are strong economic incentives to replace tropical natural ecosystems because biomass feedstocks can generally be produced most efficiently in tropical regions, but many have high biodiversity values (Doornbosch and Steenblik, 2007). However forest clearing is most influenced¿	We could not understand the proposal of the reviewer
Brian Titus (Natural Resources Canada)	2	71	2	-	-	-	-	-	Change from ¿habitat loss with resulting biodiversity decline¿ to ¿habitat loss and resulting biodiversity decline¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	71	45	71	46	-	-	-	Change from ¿If energy crop plantations are established on abandoned agricultural or degraded land, levels of soil erosion could be decreased because of increased soil cover. This would be especially¿ to ¿Levels of soil erosion could be decreased because of increased soil cover if energy crop plantations are established on abandoned agricultural or degraded land. This would be especially¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	71	8	71	10	-	-	-	Change from ¿impacts due from pesticide and nutrient loading can be an expected outcome of bioenergy expansion. On the other hand, bioenergy expansion can lead to positive outcomes for biodiversity. Establishment of perennial herbaceous plants¿ to ¿impacts from pesticide and nutrient loading can be an expected outcome of bioenergy expansion. On the other hand, establishment of perennial herbaceous plants¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	71	39	71	41	-	-	-	Change from ¿Increased biofuel production based on conventional annual crops may result in changed rates of soil erosion, soil carbon oxidation and nutrient leaching owing to the increased need for tillage depending on the crop used and replaced (UNEP 2008). For instance, wheat, rapeseed¿ to ¿Increased biofuel production based on some conventional annual crops may result in changed rates of soil erosion, soil carbon oxidation and nutrient leaching because of an increased need for tillage (UNEP 2008). For instance, wheat, rapeseed¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	71	21	71	24	-	-	-	Change from ¿nearby natural forests. A study from Orissa, India, showed that with the introduction of village plantations biomass consumption increased (as a consequence of increased availability) and the pressure on the surrounding natural forests decreased (Köhling, Ostwald 2001; Edinger et al. 2005).¿ to ¿Properly located biomass plantations can also protect biodiversity by reducing the pressure on nearby natural forests. A study from Orissa, India, showed that the introduction of village plantations biomass use and decreased pressure on the surrounding natural forests (Köhling, Ostwald 2001; Edinger et al. 2005).¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	71	25	71	26	-	-	-	Change from ¿When crops are grown on degraded or abandoned land, such as previously deforested areas or degraded crop- and grasslands, the production of feedstocks for biofuels could potentially have¿ to ¿Crops grown on degraded or abandoned land, such as previously deforested areas or degraded crop- and grasslands, can potentially have¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	71	1	71	5	-	-	-	Change sentence to: "While bioenergy can reduce global warming - which is expected to be a major driver behind habitat loss with with resulting biodiversity decline - biodiversity will be negatively affected by conversion of natural ecosystems into bioenergy plantations or changed forest management to increase biomass output for energy."	Text will be revised
United States (U.S. Department of State)	2	71	7	71	20	-	-	-	Consider combining into one paragraph as it all is discussing the positive/negative potential effects of bioenergy plantations on cultivated lands.	will be rewriting this section
Brazil (Ministry of Science and Technology)	2	71	10	71	11	-	-	-	It should read: ""Establishment of perennial herbaceous crops, SEMI PERENNIAL CROPS , and short rotation woody crops in agricultural landscapes has been found...""	Semiperennial is not used. Sugarcane is considered perennial.
Brazil (Ministry of Science and Technology)	2	71	33	71	35	-	-	-	It should read: ""Since biomass feedstocks can generally be produced most effciently in tropical regions there MIGHT BE HIGHER economic incentives to replace tropical natural ecosystems THAN OTHER NATURAL ECOSYSTEMS.""	This point is made in the conclusion of iLUC section comparing studies that question whether carbon pricing would be sufficient or whether this would not be a sufficient economic incentive.
Laura Verduzco (Chevron Corporation)	2	71	18	71	30	-	-	-	Need references for willow habitat claims and degraded Indian wastelands study	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	71	25	71	30	-	-	-	No reference is provided to substantiate the assertions made in this paragraph (cf. to page 112, lines 30-4).	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	71	16	71	20	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Accepted
Youba SOKONA (Sahara and Sahel Observatory)	2	71	22	71	24	-	-	-	Not clear	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	71	6	71	6	-	-	-	Please also include examples on the negative impacts of habitat and biodiversity loss based on bioenergy and agricultural developments in general. Biodiversity loss of some energy crops should be described. I suggest to include after 6: ¿Biodiversity and Habitat loss should also be seen in the broader context of conversion of forests and other natural habitats for agricultural purpose, including bioenergy.¿ the following passage: ¿Our analysis suggests that the conversion of primary forests and logged forests to oil palm plantations decreases species richness of forest butterflies by 83% and 79%, respectively (Figure 2). Further studies of other groups of species clearly are needed to assess fully the biodiversity impacts of oil palm agriculture compared to other land uses in Southeast Asia. In particular, more empirical research is needed to quantify the biodiversity value of oil palm plantations relative to primary and secondary forests, as has been conducted in other tropical regions (e.g., Barlow et al. 2007a, 2007b, 2007c; Gardner et al. 2007). Nevertheless, our findings strongly suggest that the conversion of either primary forests or secondary forests to oil palm plantations has detrimental impacts on Southeast Asia¿s biodiversity. (page 4, Is oil palm agriculture really destroying tropical biodiversity? Lian Pin Koh1 & David S. Wilcove1,2 1 Department of Ecology and Evolutionary Biology, Princeton University, 106A Guyot Hall, Princeton, New Jersey 08544, USA. 2 Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, NJ 08544, USA, 2008).¿	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	71	38	-	-	-	-	-	please avoid numbered fifth-level headings; convert to fourth-level heading or to non-numbered bold heading	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
United States (U.S. Department of State)	2	71	1	-	-	-	-	-	Suggest replacing "reduce" with "mitigate".	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Australia (0)	2	71	19	71	20	-	-	-	This example should be linked to a particular country where willows and the animal species mentioned improve biodiversity. Willows, foxes and hares adversely impact on Australia's biodiversity.	Accepted
Brazil (Ministry of Science and Technology)	2	71	4	71	6	-	-	-	This last sentence is too simplistic. This issue is much better discussed on 2.5.3.1. Therefore the sentence should be replaced by a reference to that item.	Accepted
United States (U.S. Department of State)	2	71	41	-	-	-	-	-	This section ignores the fact that in many areas intensive tillage systems are being replaced with conservation and no till systems. A recent paper has an in depth assessment of residue removal consequences for soil C and I encourage the authors to review it: Gregg JS, Izaurralde RC (2010). Effect of crop residue harvest on long-term crop yield, soil erosion and nutrient balance: trade-offs for a sustainable bioenergy feedstock. Biofuels 1:69-83	will address

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Kaija Hakala (MTT Agrifood Research)	2	71	31	71	32	-	-	-	Words missing form the end of this sentence?	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Norway (Climate and Pollution Agency)	2	71	31	71	32	5	-	-	cheque sentence for meaning	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Norway (Climate and Pollution Agency)	2	71	23	71	23	5	-	-	replace "and" with "but"	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
United States (U.S. Department of State)	2	72	7	-	-	-	-	-	A word is missing after "considerable"	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Frank Behrendt (Institute for Energy Engineering)	2	72	22	-	-	-	-	-	Acknowledgement that that	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Kaija Hakala (MTT Agrifood Research)	2	72	7	72	7	-	-	-	After "considerable" a word or words are missing?	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	6	72	11	-	-	-	Change from ¿Currently, the crops used in fuel ethanol manufacturing are the same as those used as traditional feed sources (e.g. corn, soy, canola and wheat). However, there is considerable in new crops, with characteristics that either enhance fuel ethanol production (e.g. high-starch corn), or are not traditional food or feed crops (e.g., switchgrass). These crops, developed for industrial processing, may necessitate a pre-market assessment of their acceptability in feed prior to their use in fuel ethanol production, if the resultant distillers¿ grains (DGs)¿ to ¿The crops currently used in fuel ethanol manufacturing are the same as those used as traditional feed sources (e.g., corn, soy, canola and wheat). However, there is considerable interest in new crops with characteristics that either enhance fuel ethanol production (e.g., high-starch corn), or are not traditional food or feed crops (e.g., switchgrass). These crops may need a pre-market assessment of their acceptability in feed prior to their use in fuel ethanol production if the resultant distillers¿ grains (DGs)¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	28	72	29	-	-	-	Change from ¿include rapid growth, high water-use efficiency, and long canopy duration. It is feared that should such crops be introduced they could become invasive and displace indigenous species and result in¿ to ¿include rapid growth, high water-use efficiency, and long canopy duration. It is feared that if these crops are introduced then they could become invasive and displace indigenous species and result in¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	13	-	-	-	-	-	Change from ¿organism, the energy-designed crop may raise¿ to ¿organism, energy-designed crops may raise¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	41	-	-	-	-	-	Change from ¿to control risks to very low levels¿ to ¿to reduce risks to very low levels¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	39	-	-	-	-	-	Change from ¿used in many industries for many years¿ to ¿used in industry for many years¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	32	72	36	-	-	-	Ensure that all Latin genus/species names are in italics	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Frank Behrendt (Institute for Energy Engineering)	2	72	7	-	-	-	-	-	However there is considerable ... ->something is missing here (interest?)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brazil (Ministry of Science and Technology)	2	72	1	-	-	-	-	-	It should read: ""This would be especially true with perennial AND SEMI PERENNIAL species."" Semi perennial species (e.g. sugarcane in Brazil) when established on abandoned agricultural or degraded land could also contribute to decrease levels of soil erosion because of increased soil cover.	Semiperennial is not used. Sugarcane is considered perennial.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	72	16	72	25	-	-	-	List format is awkward, and minor editing would improve readability. Change to ¿Genetically engineered (GE) crops have been in use in the U.S. since 1996 and the first assessment of their impact has now been published by the National Academy of Sciences (NAS, 2010). GE crops are currently responsible for 80 percent of corn, soya, and cotton, production and represent nearly 35 percent of the entire cropped area of the USA. Assessment highlights include (i) benefits to the farmers, including increased safety, flexibility in farm management, and lower production costs because of a decline in the use of insecticides; (ii) anticipation that water quality improvements will prove to be the largest benefit; (iii) acknowledgement that more work needs to be done, particularly related to installing infrastructure to measure water quality impacts, developing weed management practices, and addressing the needs of nearby (?) farmers whose markets depend on an absence of GE traits.¿ [For this last point, it is obviously not the GE farmers who have needs, but how best to describe them?]	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	72	7	-	-	-	-	-	Missing word (variation?) after ¿ there is considerable..¿.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	72	33	72	36	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	references will be added
Laura Verduzco (Chevron Corporation)	2	72	-	-	-	-	-	-	Soy and canola are not used to make ethanol. Concern w/ GE crops over invasiveness. Do we have evidence that GE crops lead to improvement in water quality? Roundup Ready soybeans may lead to worse water quality because of herbicide overuse	The NRC report on GMOs provides evidence of improvement of water quality and recommends following through with systematic measurements of that. Please check the report. Soy and canola are used to make biodiesel
Christoph von Stechow (IPCC WGIII TSU)	2	72	19	-	-	-	-	-	The word "highlights" might seem unscientific.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
United Kingdom (Department of Energy and Climate Change)	2	72	16	-	25	-	-	-	There is evidence in Argentina of GE crops resulting in increased levels of agrochemcial use, which could have negative ecological impacts	Accepted
United States (U.S. Department of State)	2	72	13	-	-	-	-	-	This is a very awkward transition - this paragraph doesn't seem to bear any relation to the previous one.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	72	43	-	-	-	-	-	What is meant by ¿their typology¿?	"the classification of types" -- the study of or systematic classification of
Sweden (Swedish Environmental Protection Agency)	2	72	-	-	-	2.5.4.1	-	-	There are certainly many technical and environmental benefits of GE crops, but there are also economic risks for the farmer (in addition to environmental risks). To my knowledge the farmers become dependent on seeds from a few multinational companies.	Accepted and highlighted
Switzerland (Swiss Federal Office for the Environment)	2	73	22	73	24	-	-	-	A short discussion of important socio-economic aspects which go beyond project level might be appropriate - e.g. community, regional, national, international policies	will be mentioned but there is no space for detailed analysis
Brian Titus (Natural Resources Canada)	2	73	1	73	2	-	-	-	Change from ¿As new technologies (see Section 2.6) are developed the literature highlights areas for further evaluation (e.g.,¿ to ¿The literature highlights areas for further evaluation as new technologies (see Section 2.6) are developed (e.g., ¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	73	15	-	-	-	-	-	Change from ¿in the same air and/or water shed¿ to ¿in the same air- and/or watershed¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Sweden (Swedish Environmental Protection Agency)	2	73	25	73	25	-	-	-	I would add production, i.e. ¿ ..benefits of bioenergy production and use¿¿	Accepted
Brian Titus (Natural Resources Canada)	2	73	-	81	-	-	-	-	Needs extensive copy editing. Some examples from this section give some idea of amount of change that would help readability.	Accepted
Brazil (Ministry of Science and Technology)	2	73	27	73	29	-	-	-	Other big issues such as mitigating carbon emissions, ensuring wider environmental protection, and providing a secure energy supply are not just ""an added bonus for local communities"". In some countries, they are also significant drivers for increased bionergy production.	Text will be revised
Wibke Avenhaus (Potsdam Institute for Climate Impact Research)	2	73	25	73	27	-	-	-	Please give a source for the socio-economic benefits	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	73	4	73	15	-	-	-	Style is inconsistent with rest of chapter. Consider format in which points begin in lower case and end with semi-colon. Other edits also included: ¿Examples include (i) health risk to workers using engineered micro-organisms in biofuel production, or their metabolites; (ii) potential ecosystem effects from the release of engineered micro-organisms; (iii) impact to workers, biofuel consumers, or the environment of pesticides and mycotoxins accumulation in processing intermediates, residues, or products (e.g., spent grains, spent oil seeds); (iv) risks to biofuel workers of infectious agents that can contaminate feedstocks in production facilities; (v) exposure to toxic substances, particularly workers at biomass thermochemical processing facilities different than those routes practiced by the current fossil fuels industry; (vi) fugitive air emissions and site run-off impacts on public health, air quality, water quality, and ecosystems exposure to toxic substances, particularly if such production facilities become as commonplace as landfill sites or natural gas-fired electricity generating stations; and (vii) estimates of the cumulative environmental impacts accruing¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	73	17	73	35	-	-	-	The usage of the words "mostly positive" (l. 21/22) "large perceived socio-economic benefits" (l. 25) and the sentence "Benefits will result in increased social cohesion and conditions for greater social stability" (l. 29/30) might be too normative for a neutral assessment report, particularly since no reference is provided on which these assertions could be based on. If these paragraphs are meant to be the introduction of an analysis to come, this should be made clear. One possible reference for lines 25-28 is van Dam 2008 and 2009 that is mentioned on page 110, line 9 in that context.	Text will be revised
Christoph von Stechow (IPCC WGIII TSU)	2	74	5	-	-	-	-	-	By whom are these "economic criteria" "most commonly reported"? Please consider specifying studies/papers.	Text will be revised
Brazil (Ministry of Science and Technology)	2	74	25	74	26	-	-	-	Criteria related to cost-effectiveness and financial sustainability of bioenergy systems are not addressed in Table 2.5.4, as opposed to what is mentioned in this sentence. Please review.	Text will be revised
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	74	20	74	20	-	-	-	Please add after ¿¿ (iv) rural ¿ reduction.¿¿and respect of land rights and property and use, including customary use¿. I suggest to reflect this addition also in Table 2.5.4.	Text will be revised
Christoph von Stechow (IPCC WGIII TSU)	2	74	29	74	30	-	-	-	Please consider rephrasing into "Socio-economic impacts of bioenergy systems are addressed in the recent literature on household applications (small-scale) and larger scale systems for industry, electricity generation, and transport, as will be presented below."	Accepted
Norway (Climate and Pollution Agency)	2	74	32	75	6	-	-	-	Some text is repeated	Accepted
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	74	26	74	27	-	-	-	Table 2.5.4 should be change to Table 2.5.3	Accepted
Brazil (Ministry of Science and Technology)	2	74	32	75	1	-	-	-	This sentence should be removed once it is similar to the next one.	Accepted
Brazil (Ministry of Science and Technology)	2	74	18	-	-	-	-	-	This sentence should be removed. Road traffic resulting from biomass transportation is not likely to be an issue at the macro-economic level.	Text will be revised
Patrick Lamers (Ecofys Germany GmbH)	2	74	-	-	-	-	-	2.5.4	Where is Table 2.5.3? Or update Table number	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Sweden (Swedish Environmental Protection Agency)	2	75	1	75	1	-	-	-	I would skip ¿¿ which effects in particular women and children during cooking¿ since this is also stated four lines further down.	Accepted
United States (U.S. Department of State)	2	75	22	-	-	-	-	-	Define "ICS" in the text.	Accepted
Frank Behrendt (Institute for Energy Engineering)	2	75	23	-	-	-	-	-	Figure 2.5.7 should be Figure 2.5.4	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	75	39	75	40	-	-	-	No reference is provided to substantiate the assertions made in this sentence.	A ref was added
Youba SOKONA (Sahara and Sahel Observatory)	2	75	12	76	15	-	-	-	Not clear as exposures can not be higher that WHO guidelines	Exposures CAN be higher as there is no practical way to enforce WHO standards

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Youba SOKONA (Sahara and Sahel Observatory)	2	75	7	75	8	-	-	-	Please be consistent with figures as it is stated on page 48 lines 12 and 13 that 2.5 billion rely on biomass for cooking and here it is stated 4 billion	Accepted
Youba SOKONA (Sahara and Sahel Observatory)	2	75	23	-	-	-	-	-	Please check the number of the figure	Accepted
Laura Verduzco (Chevron Corporation)	2	75	4	75	5	-	-	-	repeat of text just above	Accepted
United States (U.S. Department of State)	2	75	1	-	-	-	-	-	The sentence beginning "The inefficient use..." is a duplicate of the previous sentence.	Accepted
Norway (Climate and Pollution Agency)	2	75	20	75	20	5	-	-	Malaria and tbc combined or each?	Accepted
United Kingdom (Department of Energy and Climate Change)	2	76	20	77	19	-	-	-	As above the level of agricultural jbos needs to be compared to what woudl otherwise have gone on and for perennial crops there is a net decrease in agricultural jobs supported per ha when swithcing to perennial energy crops (Thornley et al, "Quantification of employment from biomass power plants", Renewable Energy, 2008	The whole section on socioeconomic impacts will be revised, new text and refs will be added
United States (U.S. Department of State)	2	76	23	-	-	-	-	-	Clarify normative term "best".	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	76	25	76	28	-	-	-	Data regarding employment generation of ethanol using corn or sugarcane does not reflect the figure of sugarcane ethanol in Brazil, the biggest producer of this feedstock. The referenced study (APEC 2010) only considers Asian-Pacific Economies. Brazilian figure is higher and should be mentioned (Reference: Dias de Moraes et. al. 2010. ""O etanol como fator de interiorização da riqueza"" In SOUSA e MACEDO (org) 2010. ""Etanol e Bioeletricidade: A Cana-de-Açúcar no Futuro da Matriz Energética"").	Will try to include Brazil refs
Rory Gilsenan (Natural Resources Canada)	2	76	14	77	19	-	-	-	Increased demand for agricultural and forestry waste materials (i.e., residues) can supplement farmers'/foresters' income, particularly if the wastes were previously burnt or landfilled.	Accepted
Brazil (Ministry of Science and Technology)	2	76	12	-	-	-	-	-	It should read: ""The controversy makes clear that THERE MAY HAVE both advantages and disadvantages to the further development of large-scale bioenergy systems, DEPENDING ON THEIR CHARACTERISTICS, LOCAL CONDITIONS AND IMPLEMENTATION PRACTICES"".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	76	15	76	19	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Youba SOKONA (Sahara and Sahel Observatory)	2	76	15	76	17	-	-	-	Please give reference	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brian Titus (Natural Resources Canada)	2	76	25	76	27	-	-	-	Use proper SI units and format: ML y-1 (or ML/y), PJ -1 (or PJ/y)	Accepted
Sweden (Swedish Environmental Protection Agency)	2	76	15	77	19	2.5.5.3	-	-	When reading this section you get the feeling that it is advantageous if the bioenergy system/technology requires a lot of labour. High labour intensity may however also be a problem since it implies higher costs and could mean that it is not competitive compared to fossil energy. Increased labour productivity is therefore important for the competitiveness of bioenergy.	The whole section on socioeconomic impacts will be revised, new text and refs will be added.
Sweden (Swedish Environmental Protection Agency)	2	76	-	-	-	-	2.5.4	-	Shouldn¿t the category Improved stoves rather be Poor/inefficient stoves in order to comply with the other categories on the x-axis.	The comparison is of interventions -- so they are apples to apples. Other interventions are netting, vaccination, etc.
Brian Titus (Natural Resources Canada)	2	77	11	77	14	-	-	-	¿Analysis also shows that there are some tradeoffs ¿ for instance, bioenergy options promoted as agricultural options oriented to liquid biofuels create more employment, but forest-based options oriented to electricity and heat production produce more climate benefits.¿ Given the objectives of the IPCC, this is a very important statement comparing agriculture with forestry; it should appear in the final summary, if not the Executive Summary as well.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	77	37	-	-	-	-	-	After the sentence ending with ""2000 and 2007"", the introduction of the following sentence is proposed: ""Nevertheless, more recent analyses have shown that concerns about the responsibility of increasing biofuels demand for rising food prices have been to a large part exaggerated"". Source: OECD-FAO Agricultural Outlook 2009-2018, p. 102.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	77	1	-	-	-	-	-	For better comparison, the numbers of jobs per Mwe and per plant should be converted to PJ.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Richard Plevin (UC Berkeley)	2	77	23	-	-	-	-	-	Lignocellulose doesn't inherently avoid food competition. It may be grown on cropland, displacing food production. The use of residues, waste, and (perhaps) marginal land, avoids food competition, but not because these are cellulosic feedstocks: it's because they aren't competing with food.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	77	21	77	25	-	-	-	No reference is provided to substantiate the assertions made in this paragraph. One reference that should be mentioned here is Chakravorty, Ujjayant & Magné, Bertrand & Moreaux, Michel, 2008. "A dynamic model of food and clean energy," Journal of Economic Dynamics and Control, Elsevier, vol. 32(4), pages 1181-1203, April. A review on the economic literature on the topic is provided by Chakravorty et al. (2009) Fuel versus Food, Annual Review of Resource Economics, vol. 1:645-663.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	77	11	77	14	-	-	-	No reference is provided to substantiate the assertions made in this sentence. Which "analysis" is this sentence referring to?	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	77	35	77	37	-	-	-	Please consider adding the references 'Robles, Miguel, Maximo Torero, and Joachim von Braun, 2009, "When speculation matters," International Food Policy Research Institute (IFPRI), Issue briefs 57' and 'Wright, Brian, 2009, ¿International gain reserves and other instruments to address volatility in grain markets,¿ World Bank, Policy Research Working Paper 5028, August 2009' which consider the question in how far speculation on commidity markets has contributed to food price spikes and how this relates to bioenergy (particularly biofuels).	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	77	29	-	-	-	-	-	Please consider replacing "expected biofuels increases" by "expected price increases due to biofuel production".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	77	25	-	-	-	-	-	Please consider replacing the word "will" by "may".	Accepted
Australia (0)	2	77	23	77	24	-	-	-	Reword sentence: 'Lignocellulosic biomass biofuels can reduce, but not eliminate, competition.'	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	77	43	-	-	-	-	-	Specify if the evidence refers specifically to developing countries.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	77	27	77	39	-	-	-	The conclusions of the references mentioned in this section (OECD-FAO abd IFPRI 2008) regarding biofuel production and food prices were questioned in more recent studies. This paragraph should be reformulated and updated with more recent analysys. (Reference: Fundação Getúlio Vargas. ""Food Price Determining Factors: The Impact of Biofuels"", November, 2008.).	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Rainer Walz (Fraunhofer Systems and Innovation Research)	2	77	6	77	11	-	-	-	The results of Nusser et al. 2007, who analysed the employment effect of biofuels for Germany, also point towards the importance of imports from other countries, which reduce the positive employment impact within the country which pushes for deployment of biofuels. See: Nusser, M. et al. 2007: Makroökonomische Effekte von nachwachsenden Rohstoffen. In: Agrarwirtschaft, Vol. 56 (2007), No. 5/6, pp. 238-248.	Please provide Ref in English
Kaija Hakala (MTT Agrifood Research)	2	77	41	77	42	-	-	-	The sentence beginning with "The poor" can be omitted.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	77	42	77	44	-	-	-	The sentence starting with ""On balance"" and ending with ""farmers"" should be removed, as it is not supported by the two articles cited. The article by ""Ivanic and Martin"" makes no reference to the connection between food prices and bioenergy. The article by ""Zezza et al"" is much more nuanced than the sentence mentioned, and contains the important caveat that it doesn't incorporate wage effects, which are an important poverty reduction consequence of the development of bioenergy.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	77	21	77	25	-	-	-	This paragraph is too simplistic and should be removed. The production of liquid biofuels does not necessarily "place additional pressure on natural resources such as land and water and thus raise food commodity prices". The use of degraded or abandoned land; yeald increases; and the production of bioenergy from residues are some factors that must also be considered to analyse the possible influence of bioenergy in food prices.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Australia (0)	2	78	17	78	20	-	-	-	A small projected increase in arable land is not evidence that competition between food and fuel will not be a serious issue. It is still likely that significant competition could arise between food and fuel within a limited area of arable land, as food crops can be switched to fuel production purposes.	The whole section on socioeconomic impacts will be revised, new text and refs will be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	78	25	-	-	-	-	-	Add at the end of the paragraph: "¿On the other hand higher commodity prices would likely attract more investments into agriculture, which properly directed could result in an overall gain in terms of productivity, environmental performance and socioeconomic impacts" (De La Torre Ugarte and Hellwinckel, 2010). Source: De La Torre Ugarte, Daniel G. and Chad Hellwinckel, "The Problem is the Solution: the Role of Biofuels in the Transition to a Regenerative Agriculture", in Biotechnology in Agriculture and Forestry, vol 66, Plant Biotechnology for Sustainable Production of Energy and Co-products, eds P.N. Mascia, J. Scheffran and J.M. Widholm, Springer, New York, 2010.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	78	3	78	4	-	-	-	Add statistics on commodity dependent countries. See papers already mentioned above which provide reference to UNCTAD statistics. See the background papers posted prepared by UNCTAD¿s Special Unit on Commodities, available at: http://www.unctad.info/en/Special-Unit-on-Commodities/Events-and-Meetings/Multi-Year-Expert-Meeting/.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	78	23	-	-	-	-	-	After the expression ending with ""improving food security"", the following sentences should be introduced: ""bearing in mind that 70 percent of the poor live in rural areas. Overall, the development of bioenergy could lead to a global renaissance of agriculture and a revitalisation of rural areas"". Source: Schmidhuber 2007, pp. 27-28.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	78	19	-	-	-	-	-	An increase in arable land by 4% is not reported in the study by Bruinsma. Bruinsma reports an increase of 12.4%. This is not an FAO study, but a study prepared for FAO.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	78	37	78	38	-	-	-	Bioenergy may reduce dependence on fossil fuel imports and increase energy supply security, although the BENEFITS ARE NOT LIKELY TO BE LARGE"". There is data that contradicts this conclusion: in Brazil, bioenergy represents 28% of the national energy matrix.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	78	19	71	20	-	-	-	Change sentence to: "Given this limited increase, at global scale, competition between food and fuel may be a serious issue."	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Helmut Haberl (Institute of Social Ecology, Vienna)	2	78	19	78	20	-	-	-	Drawing the conclusion that "competition between food and fuel may not be a serious issue" from the FAO scenarios suggesting that increases of arable land are assumed to be low until 2050 is in my view not sound. First, such statements should be made in clear reference to bioenergy production volumes, without that they are more or less meaningless. Second, this completely neglects that there might be a need for more grazing lands. Moroever, the current draft already contains a lot of information that is not consistent with such a sweeping statement.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
United States (U.S. Department of State)	2	78	16	-	-	-	-	-	Food prices are already affected by energy. This fact needs to be pointed out.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brian Titus (Natural Resources Canada)	2	78	17	78	20	-	-	-	Is it really possible that we could increase global food production by 70% by 2050 and yet only increase arable land by 4%? I would have thought that, logically, this would have created great competition between food and fuel. Is it possible that a typo has led to a mistake? ¿Meeting the food demands of the world¿s growing population will require an increase in global food production of 70 percent by 2050 (Bruinsma, 2009). This FAO study also estimates that the increase in arable land between 2005/07 and 2050 will be just 4 percent. Given this limited increase, at global scale, competition between food and fuel may [delete ¿not¿?] be a serious issue.¿	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	78	27	78	34	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	78	40	78	45	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	78	3	78	6	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	78	38	78	39	-	-	-	Please consider relocating this sentence into a footnote.	The whole section on socioeconomic impacts will be revised, new text and refs will be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Daniela Thrän (DBFZ / UFZ)	2	78	25	78	25	-	-	-	point out that the risks for food securita are a problem of the support instruments and not of the technologies or technical systems	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	78	40	-	-	-	-	-	separate ofThe	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	78	17	78	25	-	-	-	The arguments that are provided in this paragraph are not well connected to each other. Please consider inserting some linking words, such as "however" between "production" and "could" in line 21.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	78	7	78	11	-	-	-	The assertion made here that "agricultural prices are very volatile" is a valid one. It is not sufficient, however, to quote price movements during one year. A much longer time horizon is needed in order to derive robust findings. This paragraph should thus be replaced by an assessment of more substantial literature on the topic.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	78	7	-	-	-	-	-	The following wording is proposed for the start of this paragraph: ""Contrary to the projections mentioned earlier ¿""	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Switzerland (Swiss Federal Office for the Environment)	2	78	17	78	20	-	-	-	The logic behind the conclusion that competition may not be a serious issue is not comprehensible. Considering an additional demand for 70% of food production, an only very limited increase in arable land will lead to more competition, not to less.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	78	20	78	22	-	-	-	The sentence starting with ""Increased biofuels"" and ending with ""feedstocks"" doesn't reflect the article by Bruinsma, to which it purports to refer. It should be replaced by two sentences along the following lines: ""Likewise, water resources are more than sufficient globally. At a regional level an increasing number of countries suffer from severe water shortages, but it should be noted that there are ample opportunities to increase water use efficiency and thereby mitigate such shortages"".	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	78	14	78	16	-	-	-	The three sentences contained in these lines are not supported by the article by Schmidhuber, cited earlier in the same paragraph. Unless they are referred to peer-reviewed literature, they should be removed.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Brazil (Ministry of Science and Technology)	2	78	3	78	6	-	-	-	These sentences make no reference to any scientific study. Unless they are referred to peer-reviewed literature, they should be removed.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Youba SOKONA (Sahara and Sahel Observatory)	2	78	18	78	22	-	-	-	Which FAO study? How a modest increase in arable land will not affect competition between food and biofuel?	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	78	20	-	-	2.5.5.4	-	-	I suspect the 'not' in this sentence is a text gremlin. The arguments indicate that food-fuel competition may be a serious issue indeed.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	78	22	-	-	2.5.5.4	-	-	Why are biofuels feedstocks here referred to a cash crops? They may just as well become low-margin bulk crops like most other argi commodities.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Norway (Climate and Pollution Agency)	2	78	20	78	20	5	-	-	"not" should be deleted to give the sentence the supposed meaning	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Norway (Climate and Pollution Agency)	2	78	42	78	45	5	-	-	Could the meaning of this sentence be explained a bit more?	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Switzerland (Swiss Federal Office for the Environment)	2	79	19	79	24	-	-	-	a more systematic assessment of economic aspects and of price dynamics in connection to increasing bioenergy use is suggested	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	79	11	79	15	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	79	31	79	37	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Christoph von Stechow (IPCC WGIII TSU)	2	79	19	79	24	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Rory Gilsenan (Natural Resources Canada)	2	79	22	79	24	-	-	-	Note that predictions in Canada point to an increase in such salvage material due to the impacts of climate change (fire, drought, pests).	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Laura Verduzco (Chevron Corporation)	2	79	-	-	-	-	-	-	Outgrower approach? Explain meaning of this.	Term replaced by the meaning (means contracting 3rd parties to grow feedstocks)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	79	41	81	45	-	-	-	The conclusion are too long and not really conclusions.for instance the part on modells could be summarised: "several models are available they are lacking on ¿. and improvements in the following directions are necessary. Data are completely missing they should be added..	Will modify for clarity and brevity
Brian Titus (Natural Resources Canada)	2	79	22	79	24	-	-	-	The supply of MPB-killed wood is very well known, and BC has taken this into account in its estimates of AAC over the coming century. It is predicted that MPB will kill over 80% of what is expected to die by 2015, leveling off around 2020 and with little change from then until 2025 (see final graph in series at http://www.for.gov.bc.ca/hre/bcmpb/cumulative/Summary.htm). Depending on soil moisture (which affects speed of root decomposition and hence tree falldown), trees may stand for 10-15 years after death; they decompose rapidly once on the ground. See Kurz et al. (2008) for an estimate of a total of 270 Mt C in mountain pine beetle-killed stands in BC (Kurz et al. 2008. Nature 452: 987-990). See Dymond et al. (2009) for a discussion of the predictability of salvaging after insect attack. Therefore consider something like: ¿The long-term supply must also be assessed. For example, beetle-killed timber in British Columbia, Canada, is a large source of feedstock for pellets for the European market (270 Mt C equivalent; Kurz et al. 2008) but the epidemic will level off around 2020 and dead trees can remain standing for another 10-15 years. There is therefore a limit to this supply, although other salvage opportunities in Canada are predicted to produce annually 2.5 times as much biomass as harvesting residue (Dymond et al. 2009, which includes discussion of uncertainty of salvage opportunities).¿	The whole section on socioeconomic impacts will be revised, new text and refs will be added. The point indicated is covered. References suggested have been included
Australia (0)	2	79	13	79	15	-	-	-	This idea that higher agricultural prices are beneficial for developing countries conflicts with Section 2.5.5.4. It should also be noted in this section that the benefits of higher prices for agricultural producers will be offset to some extent by higher food prices.	The whole section on socioeconomic impacts will be revised, new text and refs will be added
United States (U.S. Department of State)	2	79	9	-	-	-	-	-	What does the term "pro-poor" mean? That it helps reduce poverty or create it?	The whole section on socioeconomic impacts will be revised, new text and refs will be added
Norway (Climate and Pollution Agency)	2	79	44	81	42	5	-	-	The summary is partly difficult to understand and is lacking clear and helpful conclusions. Language needs improvement and sentences should be shortened and simplified.	Will modify for clarity and brevity
Richard Plevin (UC Berkeley)	2	80	10	-	20	-	-	-	In my view, this is a misreading of the LCA literature on biofuels, for the many reasons stated in my prior comments. Even if attributional LCA results were "known in depth", they don't measure what we care about, which is the net change in climate forcing owing to expansion of biofuels. We must not confuse specious precision with certainty. (Again, line 16: "replaces" is incorrect: "displaces" is more realistic.)	Will be rewriting this section
Kaija Hakala (MTT Agrifood Research)	2	80	10	81	42	-	-	-	Unbelievably loose text for a SUMMARY of chapter 2.5. Could be halved or more.	Will modify for clarity and brevity
Helmut Haberl (Institute of Social Ecology, Vienna)	2	80	-	-	-	-	2.5.5	-	In my view, this figure still needs some work - in ist present version it is not very elucidating (at least to me)	Will be updating figure
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	2	80	7	80	9	2.5.5.6	2.5.5	-	Comment by Simon Allen, Science Officer WGI TSU, University of Bern: note: caption incorrect, should read - 'submitted by¿'	Will make change
Simon Allen (IPCC WGI TSU, University of Bern)	2	80	7	80	9	2.5.5.6	2.5.5	-	note: caption incorrect, should read - 'submitted by¿'	Will make change
Peter de Haan (Ernst Basler + Partner AG)	2	80	-	-	-	-	-	2.5.5	micro-biodiversity and macro-scale biodiversity should be present in the text in Section 2.5.3.3 or elsewhere	Biodiversity/habitat will receive more emphasis
Helmut Haberl (Institute of Social Ecology, Vienna)	2	81	35	-	-	-	-	-	"Bioenergy is a component of the much larger agriculture and forestry systems of the world". This is not even entirely convincing for the present situation, if one considers that we currently use some 45-50 EJ/yr of biomass to produce bioenergy, and that humanity harvests some 225 EJ/yr of biomass, including feed for livestock. If bioenergy should be a major component of global energy systems, delivering "several hundred EJ" as they authors seem to believe to be feasible, this would be simply wrong.	The sentence means exactly the opposite you understood. Bioenergy is small and part of the larger agricultural/forestry system.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	81	10	81	10	-	-	-	Add after "¿multi-year rations": "The performance in GHG emissions reductions strongly depends on the direct or indirect initial land conversion. In case of peatland conversion into oil palm plantations the GHG payback time amounts to up to a thousand years"	We are talking about bioenergy using the right system. The discussion about oil palm is already presented in another part of the Chapter.
Brian Titus (Natural Resources Canada)	2	81	26	-	-	-	-	-	Any reference for the Finnish forestry example?	Reference will be added
Japan (the Japanese Ministry of Foreign Affairs)	2	81	7	81	10	-	-	-	Delete "as sugercane managed with multi-year ratoons" as there is a debate whether sugercane is perennial or annual.	Sugarcane is considered a perennial.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	81	-	-	-	-	-	-	Examples of methane from biomass (manure, MSW?)	Methane from biomass is not a future technology. It is covered in section 2.3 (more specifically in Table 2.3.3.). However, it is also covered in developing technologies recognizing major advances that can still be made.
Christoph von Stechow (IPCC WGIII TSU)	2	81	44	-	-	-	-	-	Please consider inserting "literature on" between "overview of" and "potential performance".	OK, was done
Christoph von Stechow (IPCC WGIII TSU)	2	81	38	81	41	-	-	-	Please consider replacing "diversity goals" by "employment" and adding food security and biodiversity in line 40.	Accepted
Richard Plevin (UC Berkeley)	2	81	1	-	5	-	-	-	This sentence is garbled.	Sentence redrafted
Christoph von Stechow (IPCC WGIII TSU)	2	81	13	81	14	-	-	-	Which agreement does the text refert to?	Sentence removed
China (China Meteorological Administration)	2	81	43	97	8	2,6	-	-	In the appropriate position of 2.6, supplement content about ¿international cooperation for biomass energy technology, including technology communication, transfer and personnel training and so on.¿	This section covers physical aspects of technology improvements. We have no space to discuss intellectual and technology transfer actions in the text.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	81	1	81	30	2.5.6	-	-	An illustrative elaboration of a specific country doesn't seem appropriate to me in a summary section.	There are no reviewers'consensus on that. Many ask for regional description.
China (China Meteorological Administration)	2	81	43	116	-	2.6-2.8	-	-	Suggest that section 2.6-2.8 should be shortened by 5 pages.	Table 2.6.2 will be removed, and associated text shortened. Table 2.6.1. will be compacted (to save 1,5 p. in 2.6). It will be hard to save more space, though. Please, provide more specific quidance.
Norway (Climate and Pollution Agency)	2	81	17	81	17	5	-	-	economic or food system?	Food system is part of the economic system.
Norway (Climate and Pollution Agency)	2	81	1	81	5	5	-	-	Example of difficult sentence with strange wording. Could be split in 2-3 sentences	Sentence redrafted
Norway (Climate and Pollution Agency)	2	81	38	81	38	5	-	-	replace "climate mitigation" with "climate change mitigation"	Accepted
Norway (Climate and Pollution Agency)	2	81	11	81	13	5	-	-	The sentence " even more in cases where methane emissions would otherwise occur" could indicate the case of biogass generation from domestic waste and manure. If so, this should be expressed clearly.	The examples will be added.
Norway (Climate and Pollution Agency)	2	81	13	81	14	5	-	-	Unclear meaning	Sentence removed
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	82	10	82	12	-	-	-	Important remark with regard to food-or-fuel discussion in Germany.	Agree
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	82	18	82	20	-	-	-	The report here acknowledges the environmental impact of strong agricultural intensification. The implications in terms of choices regarding development models need to be brought into the discussion.	This chapter is not about the future of agriculture as a whole, which is clearly out of scope. However, it is true that lessons learned from food-oriented agriculture may be useful when designing bioenergy systems.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	82	1	83	19	2.6.1.1	-	-	In greneral, this section, discussion one of the most vital elements of the future of bioenergy, is not very neatly structured. Personally, I'd clearer separate the different (bottom-up technical) options that are proposed to increase productivity (and an individual discussion of their merits) from the few projections that try to indicate overall yield increases given these underlying factors. And again, I'd conclude with mentioning that R&D policy, agricultural, trade and other policies can can strongly influence these developments.	This section is essentially bottom-up, but you're right to point out some confusion with the spatially-aggregated studies. The distinction will be made clearer in 2.6.1.1.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	82	-	-	-	2.6.1.1	-	-	It would be relevant to repeat here, as you mentioned earlier in the document, that improvement of all agricultural crops, particularly also food crops, is relevant for bioenergy, not only productivity increases in bioenergy crops. It's only a bit implicitly in the first sentence now.	First sentence was made more explicit to support that view

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Canada (Environment Canada)	2	82	-	-	-	2.6.1.1	-	-	There is a wealth of research on the improvement of forest productivity, through genetics, silviculture, as well as species selection. In some regions of Canada, intensification of silvicultural practices are intensively practiced or sought with the goal of generating higher commercial yields. Much of this work, however, falls under industrial or operational programmes whose results do not make it into the scientific literature. An example of such program is the Mixedwood Management Association who have banded together to improve the overall productivity of mixed wood forests in Alberta (Grover and Fast, 2007. Forestry Chronicle 83: 714-718). Improved commercial yields means shorter rotations or larger volumes at harvest, both of which mean increased post-logging residues.	Reference and suggested improvement avenues will be added
Canada (Environment Canada)	2	82	-	83	-	-	-	2.6.1	A likely route of improvement in Canada for forest biomass yield for bionenergy is not ash recycling but rather the development of the local demand for this fuel type. The economics of biomass harvest, processing and transport relative to alternative energy costs limit the provisioning radius to about 50-100km, and the legislative framework inherited from past development paradigms is often not supportive of biomass harvesting and use for bioenergy. Lack of district heating and a cheap fossil fuel energy sources have to date limited demand, but this is rapidly changing as bioenergy provisioning is seen as part of the solution to the current crisis in the forest sector, and as local institutions such as schools and hospitals in remote communities are investing in bioenergy heating systems (Canbio, 2009. Canadian Report on Bioenergy 2009. http://www.canbio.ca/documents/publications/canadacountryreport2009.pdf).	Suggested avenue will be added.
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	82	22	83	3	-	-	2.6.1	Not clear the relationship between potential yield increase in 2030 and yield trend in those regions with no figures such as maize in subtropics region; how much it is an increase of 60% without a reference of the yield trend? How are those figures obtained?	The figures come from the references cited in the rightmost column. Current yields (references) are those reported in Table 2.3.1.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	82	-	-	-	-	-	2.6.1	Strange that no FAO publications are used here. Or are they 'behind' the authors' names? And no refs for miscanthus and switchgrass?	Reference for miscanthus and switchgrass is number 3 – has been added in Table. Data will be cross-checked with FAO 2008b reference.
Norway (Climate and Pollution Agency)	2	82	-	-	-	-	-	2.6.1	The assumptions in table 2.6.1 look quite optimistic. 30% increase in European forests by traditional breeding techniques before 2030? It is not even a rotation period¿ 25% increase based on ash recycling, in particular in areas where N is limiting (above)? And 35% increase in maize in North America? I thought this was as irrigated as it can be, and how much more intensive can the breeding be? The UNEP Resource Panel assessment of biofuels is much more critical of the potential to increase yields. This work should be considered here.	The 30% increase results from CO2 fertilization effects, as monitored in France by Dupouey et al, 2006, over the past 30 years. The rate for maize will be cross-checked with the UNEP reference.
Sweden (Swedish Environmental Protection Agency)	2	82	-	-	-	-	-	2.6.1	According to the table, a 50% yield increase is possible for wheat in Europe through new energy oriented varieties. New varieties are not mentioned for the subtropics where I assume they would have similar impact on yields?	Genotype optimization' was a synonym for new energy-orientated varieties. Wording was homogenized
Sweden (Swedish Environmental Protection Agency)	2	83	19	83	20	-	-	-	repetition of previous sentence.	Corrected
Sweden (Swedish Environmental Protection Agency)	2	83	27	83	27	-	-	-	What are fungible biofuels?	Those that can use the same infrastructure of petroleum derived fuels. It refers to the ease with which two fuels can be blended together without raising concerns about how the blended fuel will behave in pipelines, tanks and engines. Two fuels with similar chemical components are likely to be fungible with each other, while two fuels with different functionalities (e.g., alcohols and hydrocarbons) are less likely to be fungible.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	83	14	-	-	-	-	-	I guess you mean "drought" and not "draught"	Corrected
Christoph von Stechow (IPCC WGIII TSU)	2	83	6	83	11	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	Reference will be sought or sentence removed
Sweden (Swedish Environmental Protection Agency)	2	83	22	83	22	-	-	-	Perhaps also give an example of micro-algae ?	Will add Chlorella and Spirulina (there are many others)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Kaija Hakala (MTT Agrifood Research)	2	83	19	83	20	-	-	-	Repetition of previous sentence. Omit.	Corrected
Laura Verduzco (Chevron Corporation)	2	83	-	-	-	-	-	-	Section is too detailed. Suggest condensing & moving to Sec. 2.3.1	Section 2.3 refers to commercial technologies for feedstocks and conversion processes.
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	83	4	83	20	-	-	-	The text should allocate equal space to the discussion on a) biotechnologies and conventional plant breeding and b) sustainable farming practices. The current treatment could appear to be imbalanced and does not provide sufficient evidence in favour of sustainable farming practices. See: UNEP and UNCTAD 2008, Organic agriculture and food security in Africa. Available at: http://www.unctad.org/en/docs/ditcted200715_en.pdf.	The balance will be revised by adding a few sentences on sustainable practices (although it is outside the scope of this report to discuss sustainable agricultural practices in general).
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	83	17	-	19	2.6.1.1	-	-	Sentence repetition.	Corrected
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	83	22	84	49	2.6.1.2 ?	-	-	This chapter on aquatic biomass seems to be a bit too prominent for its actual stage of development. It is rather a 3rd generation then a 2nd generation bioenergy. The other potential biofuels (gasification, synfuels) that maybe a bit sooner available at industrial scale are less elaborated.	Will balance the technologies and consolidate the discussion of the improvements in gasification and pyrolysis technologies
Norway (Climate and Pollution Agency)	2	83	21	84	49	6	-	-	Is there literature about multiple benefits from harvesting aquatic biomass for bioenergy purposes: the removing of plants and algae could improve plant clogged recipients or remove nutrients and thereby mitigate eutrophication. The combined benefits could reduce the costs.	Ok, we will investigate the available literature along these lines
Peter de Haan (Ernst Basler + Partner AG)	2	84	21	84	22	-	-	-	bring this figures into table 2.2.1	Will be directed to the Resources Section Lead Author's attention.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	84	29	84	32	-	-	-	I did not find Figure 2.5.2 alluded to here and also did not understand that sentence	It was Fig. 2.5.1
Norway (Climate and Pollution Agency)	2	84	18	84	20	-	-	-	It is relevant to raise the question about macroalgae cultivation and a possible conflict with fisheries and leisure. But this is not seen as a real hurdle for macroalgae cultivation. It needs to be handled carefully just like the case with fish farming and offshore wind parks.	Yes, the reviewer has a good point. It is relevant to raise the water-use conflicts regarding macroalgae cultivation, especially in the context of bioenergy production. Algal productivity is a primarily a function of available light and nutrients, with a positive correlative relationship between area and yield and a inversely proportional relationship between depth of water and yield (Towle et al., 1973).
Christoph von Stechow (IPCC WGIII TSU)	2	84	2	84	5	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	Reference is cited and will be repeated at that point. References to conversion mentioned.
Norway (Climate and Pollution Agency)	2	84	29	-	-	-	-	-	Should it be figure 2.5.1 instead of 2.5.2 since emission reduction potential is discussed?	Thanks
Bernd Wittgens (SINTEF Materials and Chemistry)	2	84	29	-	-	-	-	-	Should it be figure 2.51 instead of 2.5.2 since emission reduction potential is discussed	Yes
Sweden (Swedish Environmental Protection Agency)	2	84	48	84	49	-	-	-	What about water consumption? Does the production of algae require a lot of water? If so, it may be difficult to place the ponds in dry areas.	Water consumption is expected to be one of the major determinants for algae cultivation, and offer one of the most intriguing challenge areas where new technologies and innovations can make the biggest impact in algal biofuels sustainability. There are a number of mitigation strategies being pursued in the US, including the feasibility of using oil-gas produced water, brackish aquifer water, and testing new pond and photobioreactor designs that lessen evaporation and recycle system water.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	84	10	84	11	2.6.1.2	-	-	add a sentence after "¿production of algal biomass.": Compared to open ponds, the closed photobioreactor systems facilitate higher yields by more stable production conditions.	Added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Sweden (Swedish Environmental Protection Agency)	2	85	14	85	16	-	-	-	It is not clear to me why the fertilisation effect levels off due to enhanced growth and increased water use efficiency.	It will be explained by adding another sentence
Jorge Martínez Chamorro (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	85	41	85	42	-	-	-	As it has been done in the previous chapter, the cost figures need to be converted into 2005 US $ to allow the comparability with other figures.	Costs will be presented in 2005 US$
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	2	85	1	85	17	-	-	-	Biomass/Bioenergy effects in relation to CC seem to be reflected everywhere - consider removing thi paragraph or combining them with earlier sections relating to climate change.	This subsection was added in response to reviewers' comments on previous drafts. It is not clear that CC impacts are reflected everywhere. Please be more specific on these earlier sections. - question asked of Goran of whether this will be reflected in the new 2.5
Laura Verduzco (Chevron Corporation)	2	85	2	85	17	-	-	-	Climate change: precipitation changes, crop water use and water availability will be key issues in warmer world (i.e. not just an impact of elevated CO2)	At the begin of paradraph we will add: " Climate change (temperature increases, precipitation changes, crop water availability, extreme wheater occurrences) is expected...".
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	85	2	85	14	-	-	-	CO2: 2 should be as subscript	Accepted
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	85	22	85	25	-	-	-	I haven't checked data on crop yield increases but I am not sure that the increases in Asia are historically higher then in South America (Africa probably). Especially if you look at the rapid increases in the sugar cane crop I would really be surprised if the rice yield increases were significantly higher. Especially if it comes down to volume. The increases in sugar cane yield per hectar are around 30 tons within the last 30 years (annual agroenergy statistic 2009, MAPA Brasil) .	The yield increase in sugar cane in Brazil has been modest (0.7%/yr as a compound value for the period 1975-2005.
Peter de Haan (Ernst Basler + Partner AG)	2	85	11	85	17	-	-	-	introduce more references to literature for the statement that ""most current biogeochemical models¿""	Refernces will be added
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	85	34	-	47	2.6.1.4	-	-	Strange that earlier mentioned studies like Hoogwijk, De Wit, etc, which also indicate future biomass production cost-supply curves (fig 2.2.5), are not mentioned here.	We will add the reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	85	19	-	33	2.6.1.4	-	-	This paragraph contains new info compared to 2.6.1.1, and is not really a synthesis yet.	title will be changed, and summary-type sentences removed (not relevant here)
Brian Titus (Natural Resources Canada)	2	86	2	86	8	-	-	-	Add a phrase that indicates that this is true for agriculture and forestry.	added
Jorge Martínez Chamorro (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	86	28	86	28	-	-	-	As it has been done in the previous chapter, the cost figure needs to be converted into 2005 US $ to allow the comparability with other figures.	Figure is in 2005$
Christoph von Stechow (IPCC WGIII TSU)	2	86	17	86	21	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	To add references. To check availability. Badger reference is cited.
Norway (Climate and Pollution Agency)	2	86	27	-	-	-	-	-	Pyrolysis oils have only limited applicability in e.g. internal combustion machines: advantages; since compared to liquid fuels should be stated more precisely	Yes, other pyrolysis activities directly with biofuels are treated later in 2.6.3
Bernd Wittgens (SINTEF Materials and Chemistry)	2	86	27	-	-	-	-	-	Pyrolysis oils have only limited applicability in e.g. internal combustion machines: advantages; since compared to liquid fuels should be stated more precisely	Yes, other pyrolysis activities directly with biofuels are treated later in 2.6.3
Christoph von Stechow (IPCC WGIII TSU)	2	86	12	86	14	-	-	-	The stated "ability to absorb moisture" (line 12) of torrefied wood seemingly contradicts the assertion that "moisture uptake of torrefied wood is very limited" (line 14). Please clarify.	Sentence was rephrased. What remains intact are physical and mechanical properties -- not chemical composition. The torrefied wood does not absorb moisture as biomass does.
United States (U.S. Department of State)	2	86	0	-	-	-	-	-	There are at least two additional pretreatment technologies for fermentation biofuels that should be included in this discussion that can potentially provide pelletized, dense feedstocks for further conversion. These include the ammonia fiber expansion (AFEX) process and the steam explosion process. For the thermochemical conversion platform, pyrolysis bio-oils and biochar are relatively energy dense materials for subsequent biofuel production.	More technologies will be considered. Steam explosion, biooil pyrolysis and biochar are old technologies and shall be discussed in Section 2.3

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Bernd Wittgens (SINTEF Materials and Chemistry)	2	86	15	-	-	-	-	-	Torrefaction changes primarily the water content, a change in chemical composition is not perforemd. Further seasonal variations in quality can not be counteracted.	OK thanks. What remains intact are physical and mechanical properties -- not chemical composition. The torrefied wood does not absorb moisture as biomass does.
Norway (Climate and Pollution Agency)	2	86	15	-	-	-	-	-	Torrefaction changes primarily the water content, a change in chemical composition is not performed. Further seasonal variations in quality can not be counteracted.	OK thanks. What remains intact are physical and mechanical properties -- not chemical composition. The torrefied wood does not absorb moisture as biomass does.
Norway (Climate and Pollution Agency)	2	86	12	-	14	-	-	-	Torrified wood can absorb less water than green wood! The ability to absorb water is therefore considerably chaned during torrefaction	OK thanks. What remains intact are physical and mechanical properties -- not chemical composition. The torrefied wood does not absorb moisture as biomass does.
Bernd Wittgens (SINTEF Materials and Chemistry)	2	86	12	-	14	-	-	-	Torrified wood can absorb less water than green wood! The ability to absorb water is therefore considerably chaned during torrefaction	Sentence will be rephrased. What remains intact are physical and mechanical properties -- not chemical composition. The torrefied wood does not absorb moisture as biomass does.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	86	24	-	-	2.6.2	-	-	"Although toxic in nature and stabilization of the oil is needed for longer 25 term storage¿" seems like a grammar glitch to me.	To clarify text
United Kingdom (Department of Energy and Climate Change)	2	86	29	86	29	2.6.2	-	-	As well as containing the nutrients from the biomass, an important aspect is that the issues surrounding ash agglomeration/clinkering can be minimised by pyrolysis since the ashes are generally contained within the char.	OK thanks
United Kingdom (Department of Energy and Climate Change)	2	86	10	86	21	2.6.2	-	-	is it possible to provide an estimated production cost as has been presented for liquid pryolysis oil?	To check availability of the figures
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	86	10	-	21	2.6.2	-	-	It's not entirely clear at which temperatures torrefaction takes place. The remark that temps up to 160 C leave the material basically intact is a bit confusing in this sense.	Sentence will be rephrased. What remains intact are physical and mechanical properties -- not chemical composition. The torrefied wood does not absorb moisture as biomass does.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	86	40	-	45	2.6.2	-	-	Sensible remarks, but I doubt whether they should be placed here or somewhere in 2.6.1	Will consider the revision
United Kingdom (Department of Energy and Climate Change)	2	86	28	-	-	2.6.2	-	-	The estimated production cost for pyrolysis oil appears very low at $6.5/GJ. This has been previously reviewed ruesulting with a range of 6.3-15.7 £/GJ.	OK thanks. Could you provide the conditions for the assessment? What year are the costs provided? The 6.5 $ are 2005$.
Jürgen Scheffran (University of Hamburg)	2	86	-	-	-	2.6.2	-	-	The issue of transportation in optimal supply chain management would deserve more attention. See for instance: Kang, S., H. Önal, Y. Ouyang, J. Scheffran, D. Tursun (2010): Optimizing the Biofuels Infrastructure: Transportation Networks and Biorefinery Locations in Illinois, in: M. Khanna, J. Scheffran, D. Zilberman, Handbook of Bioenergy Economics and Policy, Springer, 151-173. Ileleji, K.E., S.A. Sokhansanj, J.S. Cundiff (2010): Farm-Gate to Plant-Gate Delivery of Lignocellulosic Feedstocks from Plant Biomass for Biofuel Production, in: H.P. Blaschek, T.C. Ezeji, J. Scheffran, eds., Biofuels from Agricultural Wastes and Byproducts, Blackwell, 117-160.	Thanks, will look at the suggested sources
Norway (Climate and Pollution Agency)	2	86	32	86	32	6	-	-	Consider if the litterature allows to add after"fertility." a new sentence; "This will in case take CO2 out of the atmosphere, similar to CCS from biomass and necessary to achieve the lower CO2 -levels - 330-440 ppm". Could this also be mentioned in the Executive Summary?	This is clear understood as the main target for biochar production. We have no space to add issues that are well known
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	87	10	-	18	-	-	-	A but strongly chemistry-based consideration of wht to do with biomass; please consider making it more accessible for non-chemists. Furthermore, in my opinion, the key difference between biomass and fossil hydrocarbons is that apart from thermochemical conversion routes the wide variety of biochemical processes is at one's disposal.	We will make it more clear with figures and tables that both routes can lead to biofuels with the same properties that are hydrocarbons as the regular petroleum fuels.
Frank Behrendt (Institute for Energy Engineering)	2	87	13	-	-	-	-	-	Biomass conversion have -> has	Accepted
United States (U.S. Department of State)	2	87	8	-	-	-	-	-	P87, line 8: It is factual that the technologies are not ¿commercial¿ yet; it may be inaccurate to say that they are not yet ¿cost competitive¿¿this hasn¿t been verified and some conceivably will be cost competitive when commercial production begins.	The reviewer is correct -- better language is that they are still under development and when they reach commercialization some could be cost effective. The difficulty of this statement is that the costs or cost projections are not public.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	87	9	-	-	-	-	-	P87, line 9: Note that beyond the mentioned aviation tests, commercial aviation is making rapid progress on other fronts. Fuel standards/approvals are being established with estimated early 2011 approval for jet biofuels blended at 50%. Also airlines, military fuel buyers and potential fuel suppliers are in current discussions for fuel purchasing agreements. This is to say that early commercialization of jet biofuels may be very near at hand.	Yes, these advances are occurring and will be highlighted.
Christoph von Stechow (IPCC WGIII TSU)	2	87	24	-	-	-	-	-	The wording "as easy as assemblin a computer" is not adequate in a scientific context.	Will go to less levels of detail and simplify the language
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	87	2	-	9	2.6.3	-	-	A bit strange to mention jet fuel and military applications as the key drivers for R&D in advanced biofuels. In my opinion, the prime driver is the ambition to convert low-grade biomass (lignocellulosic material, residues) into hig-quality liquid fuels which have the highest added value. These kind of fuels can also substantially relieve the critical sustainability issues that conventional biofuels are facing today. Next to that, one could mention that indeed increasing the energy density is critical for two segments of the transportation market in which liquid biofuels may have the best long-term prospects: aviation and long-distance heavy trucking. In e.g. passenger transport, biofuels will more strongly face competition from (battery or hydrogen-fueled) electric vehicles.	Table will be removed and new information passed on to Table 2.6.3.
United Kingdom (Department of Energy and Climate Change)	2	87	2	87	4	2.6.3	-	-	Isn't thre also significant research in developing oxygenated fuels such as biobutanol - not just hydrocarbon fuels. Too much focus in this paragraph on jet fuels which is only part of the story. For example, diesel fuels are also needed for heavy lift applications. Issue as some see it is that it's easier and probably cheaper to convert biomass into ethanol than hydrocarbons so how are we going to develop HC fuels economically.	Table will be removed and new information passed on to Table 2.6.3.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	88	1	-	-	-	-	-	"Developing" should be in marked in black	Accepted
Frank Behrendt (Institute for Energy Engineering)	2	88	-	-	-	-	-	2.6.2	last line: what is the link between sugars/starch as feedstock and biodiesel?	Will rephrase. Sugars used by certain algae (in the dark) to express tryacylglycerides that can be converted into biodiesel or renewable diesel
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	88	-	-	-	-	-	2.6.2	The fifth row on algal biomass doesn't seem to add much to the info in the second one. In general, there seems quite some overlap between tables 2.6.2 and 2.6.3. Consider integrating. If 2.6.2 remains, you might also consider ordering the lines in development stage, from demo/pilot to fundamental R&D phase.	Will delete 2.6.2
Peter de Haan (Ernst Basler + Partner AG)	2	88	-	-	-	-	-	2.6.2	the naming of fuels and of technologies in this table differes from previous tables and figures in chapter 2	Will reconcile. US and European names used
Norway (Climate and Pollution Agency)	2	88	-	-	-	-	-	2.6.2	The table contains biomass-to-liquid; ethnaol and butanol are liquids to, these can be produced by second generation technologies from lignocellulosics. It is not evident why these components are not included in the table.	The table is titled liquid hydrocarbons. Ethanol and butanol are alcohols. Indeed, the next table 2.6.3 does indeed list those. However, to simplify the two tables will be merged.
Bernd Wittgens (SINTEF Materials and Chemistry)	2	88	-	-	-	-	-	2.6.2	The table contains biomass-to-liquid; ethnaol and butanol are liquids to, these can be produced by second generation technologies from lignocellulosics. It is not evident why these components are not included in the table.	The table was modified to show only hydrocarbon biofuels production by a variety of methods. The alcohols are listed on table 2.6.3 along with some of the hydrocarbon fuels that have public data that can be reviewed. However, the two tables will be merged.
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	88	-	91	-	-	-	2.6.2 and 2.6.3	Table 2.6.2 and Table 2.6.3 seem to both list possible future technologies. I do not understand why those technologies and tables are seperated. Furthermore Table 2.6.3 is named ¿State of the Art¿ of the main chains. But isn't ¿State-of-the-art¿ rather the existing and current industrial technologies (the latest and most modern but still those who are in use, not those ones who maybe will be developed?) On page 91 CHP is listed within all the other future technologies. Why? (Combined Heat and Power plants are already operated worldwide. In Germany Bio-Natural Gas has already been established for at least 2 years).	Availability of detailed cost information was the divider between the two tables and Table 2.6.2 concentrates on hydrocarbon fuels. However, because of the confusion, the information that is not in Table 2.6.3 from 2.6.2 will be added. The definition of commercial is penetrating markets -- not at first or second commercial plant which we call early commercial (Fig 2.3.1). Good point -- we retitled table 2.6.3. We were using state-of-the-art of the science and technology of the developing processes. Indeed, CHP are available worldwide and are listed with the commercial plants on Table 2.3.3. However, methanation technology is not commercial by our definition. Biogas, on the other hand, is commercial and is on table 2.3.3 too.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Michael Jack (Scion (NZ Forest Research Institute))	2	88	-	-	-	-	-	2.6.6	Could not find some of the references to this table in the back.	Must be 2.6.3; references have been added
Jorge Martínez Chamorro (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	89	-	91	-	-	-	2.6.3	As it has been done in the previous chapter, the cost figures of the table need to be converted into 2005 US $ to allow the comparability with other figures.	The costs are in 2005 dollars. Caption was corrected to indicate it.
United Kingdom (Department of Energy and Climate Change)	2	89	-	-	-	-	-	2.6.3	efficiency of FT plant seems a bit high in column 4 at 0.5 to 0.52. Also, cap cost seems low.	Numbers given from the references quoted. Will consult other references.
Norway (Climate and Pollution Agency)	2	89	-	-	-	-	-	2.6.3	Some of the references given beneath the tabel are not in the reference list	Have been added
Bernd Wittgens (SINTEF Materials and Chemistry)	2	89	-	-	-	-	-	2.6.3	Some of the references given beneath the tabel are not in the reference list	Have been added
Laura Verduzco (Chevron Corporation)	2	89	-	91	-	-	-	2.6.3	Suggest consolidating table to simplify. What is meant by Technical Advances? Is that what is needed to make the technology competitive? Suggest revising to "Potential Advances and Challenges"	Good comment
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	89	-	-	-	-	-	2.6.3	Table still needs quite some polishing. E.g. why is FT in the US and FT in the EU in separate rows? Note that FT is Fischer-Tropsch, by the way. Why is CHP in the list (p91)?	Agree that table needs polishing. Good suggestion to simplify. CHP is involved because the table addresses future technologies and gasification technologies in IGCC are not commercial. Retitled the table to be more clear. Thanks
Peter de Haan (Ernst Basler + Partner AG)	2	89	-	-	-	-	-	2.6.3	why is this table in this section; potential has been discussed in previous sections of chapter 2	Comment not understood. This table addresses technological potential to make additional fuels. Sec. 2.3 addresses commercial. Separation will be made more clear.
China (China Meteorological Administration)	2	89	-	91	-	2.6.3?	-	2.6.3	Add relevant content about ¿forestry plant fruits and oily fruits as biomass energy¿ in last line in second column of Table 2.6.3.	ok
United Kingdom (Department of Energy and Climate Change)	2	90	-	-	-	-	-	2.6.3	renewable diesel/jet fuel at top: column 6. Given that the main GHG emitter for veg oils is fertiliser, would expect that the GHG reduction for renewable diesel or jet fuel will be similar to that for fame at about 50%. Therefore think that the 63-130% reduction quoted is too high and recommend looking at a wider range of references. NESTE oil's figures also show lower numbers.	Will add more references considering a wider range of sources
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	90	-	90	-	2.6.3	-	2.6.3	last row in page 90 (Methane, heat, power or transport): technical status of gasification/methanation in Germany is early commercial. 2 plants are under construction in Geislingen and Senden/Iller (Germany). Another plant, in Güssing/Austria, operates since 2001.	Will add the early commercial
United States (U.S. Department of State)	2	92	18	-	-	-	-	-	BCCS is unclear - is this carbon sequestration in the biosphere (soils & vegetation) or bioenergy combined with geologic capture and storage? Or something else?	Will standardize nomenclature.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	92	13	92	20	-	-	-	CO2: 2 should be as subscript	Accepted
Norway (Climate and Pollution Agency)	2	92	28	-	-	-	-	-	Hemicellulose compounds which are sub-sequently hydrolyzed to mono-saccharides.	This means "cellulose and hemicellulose derived sugars".
Bernd Wittgens (SINTEF Materials and Chemistry)	2	92	28	-	-	-	-	-	hemicellulose compounds which are sub-sequently hydrolyzed to mono-saccharides.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	92	17	-	-	-	-	-	Please consider inserting "capture and" after between "carbon" and "sequestration".	Will standardize nomenclature.
Christoph von Stechow (IPCC WGIII TSU)	2	92	18	92	24	-	-	-	Please consider relocating this information to section 2.6.3.3 that is very brief.	L.12-24 will move to 6.3.3.
Norway (Climate and Pollution Agency)	2	92	2	-	4	-	-	-	These three lines are not connected to the following text which is on biochemical conversion. Should be moved to line 38	Accepted
Bernd Wittgens (SINTEF Materials and Chemistry)	2	92	2	-	4	-	-	-	These three lines are not connected to the following text which is on biochemical conversion. Should be moved to line 38	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	92	27	-	-	-	-	-	This is a completely inadequate summary of pretreatment technology. The authors could benefit by providing a summary from this paper. Sousa, L. D., Chundawat, S., Balan, V. and Dale, B. (2009). Cradle to Grave Assessment of Existing Lignocellulose Pretreatment Technologies. Current Opinions in Biotech. 20: 339-347.	we will do and also add it in the cost figures of the table. Reference added
Laura Verduzco (Chevron Corporation)	2	92	-	-	-	-	-	-	We question the validity of the statement "it could reduce the life-cycle GHG emissions of ethanol by 70% at the expense of degrading its energy balance by only 3.5%" For corn ethanol, CO2 from the fermenter only accounts for 30% of input carbon.	The text refers to Table 2.3.4 and not 2.5.2 and the percentages refer to the comparative bioenergy output in kg GHG eq/GJ (goes from 54 to 12) relative to the energy ratio expressed as primary fossil energy-renewable credit/biofuel energy output (that goes from 0.7 to 0.6).
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	92	-	-	-	2.6.3.1	-	-	This section is still quite ill-structured: lots of information, but no real logical flow yet. Also some remarks are made on CCS, which gets more attention in 2.6.3.3.	L.12-24 will move to 6.3.3.
Laura Verduzco (Chevron Corporation)	2	93	23	-	23	-	-	-	Explain fluorescence in situ hybridisation	Will do or reword
Brian Titus (Natural Resources Canada)	2	93	-	-	-	-	-	-	Footnote does not need brackets.	Accepted
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	93	23	93	35	-	-	-	Increase in efficiency leads to a smaller amount of needed raw materials and hence to a decrease of land consumption.	The increased rates mean a smaller footprint of the reactor through which a higher amount of organic materials can be processed. The reviewer is right it does also mean less biomass may be needed.
Sweden (Swedish Environmental Protection Agency)	2	93	3	93	4	-	-	-	It is not clear to me what is causing the high intrinsic cost of the processes.	sentence will be rephrased; the number of unit operations and the need to deal with solids and integrate all the various processes.
Laura Verduzco (Chevron Corporation)	2	93	-	-	-	-	-	-	MFC should be included in conversion technologies and uses solid or liquid fuel	Fuel cells are discussed in the integration of renewables with existing and developing energy systems in Chapter 8. Fuel cells are discussed there. We treat microbial fuel cells for electricity and processes that make fuels for fuel cells.
Bernd Wittgens (SINTEF Materials and Chemistry)	2	93	36	-	40	-	-	-	More inforamtion on Microbial fuel cells should be added.	Accepted; examples of demonstration scale testing
Norway (Climate and Pollution Agency)	2	93	36	-	40	-	-	-	More information on Microbial fuel cells should be added.	Accepted; examples of demonstration scale testing
United States (U.S. Department of State)	2	93	13	-	-	-	-	-	Most of the newer biochemical pathways have not received "near commercial demonstration", so I dont know what is being discussed here. I think the authors are mistaken in this statement and would recommend that it be stricken or greatly revised. Foust may be referring to the dilute acid pretreatment technology, for which this statement is true but it is certainly not true for other pretreatments such as lime, alkaline peroxide, ammonia fiber expansion, etc. The paper by Wang and Wyman is a good review of pretreatment technologies.	The sentence will be clarified. It compared only lignocellulosic biomass to ethanol routes by either biochemical or thermochemical conversion. It was not referring to other sugar to hydrocarbon routes that are under more recent RD&D
Christoph von Stechow (IPCC WGIII TSU)	2	93	1	93	7	-	-	-	No reference is provided to substantiate the assertions made in these sentences.	references will be added
Sweden (Swedish Environmental Protection Agency)	2	94	6	94	7	-	-	-	Does medium calorific value gas needs to be explained?	Will explain the heat content
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	94	29	95	41	-	-	-	Aren't the bio-based products those kind of products that are being generated in biorefineries? Why is there an extra chapter on biorefineries then?	Commercial biorefineries (e.g., pulp and paper and corn refineries) currently make products and chemicals. What is being discussed is to amplify the types of products that are made so that the biomass refineries that are developing will provide the polymers and chemicals that currently are made from petroleum (or make new products with properties that are superior to today's products).

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United Kingdom (Department of Energy and Climate Change)	2	94	9	-	15	-	-	-	Bio-CCS needs a much more detailed exploration than this. The UK government is assuming it will be viable in its 2050 scenarios - that requires substantial technical development and this document should be pointing the way for that - ETI are doing work on this and may be in a position to comment further.	Will expand within the limits of the space
Laura Verduzco (Chevron Corporation)	2	94	1	-	7	-	-	-	Biomass gasification is commercially available (e.g. FosterWheeler, Carbona)	Yes. This is acknowledged and the amount of electricity/heat produced is provided.
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	94	8	-	-	-	-	-	CO2: 2 should be as subscript	Accepted
United Kingdom (Department of Energy and Climate Change)	2	94	1	-	7	-	-	-	Given the potential for syngas (mentioned earlier in the report) to act as a platform to provide many demand options there is a need to include much more here on the technical issues. The European thermalnet project provided state of the art reviews of gasification and pyrolysis technologies, identifying key research needs.	Text will include both European and US programs conclusions and needs in a succint way as there are space restrictions
Christoph von Stechow (IPCC WGIII TSU)	2	94	39	95	12	-	-	-	No reference is provided to substantiate the assertions made in these paragraphs.	References were eliminated when the text was chopped. Will be put back
Laura Verduzco (Chevron Corporation)	2	94	-	95	-	-	-	-	Suggest removing Sec. 2.6.3.5 since it doesn't deal with bioenergy	It deals with high energy content products that also derive from petroleum and natural gas today. These products, like in the chemical industry, can provide value added options for the biomass refineries
Peter de Haan (Ernst Basler + Partner AG)	2	94	-	-	-	2.6.3.3	-	-	a difficult topic, here two issues are merged that are not strictly related. CSS can be done with any process where large CO2 concentration levels are reached in outlet gases etc. It would be more logic to do it at other, larger sites than biofuel sites.	Many studies (IPCC, National Research Academies, and others) indicate that use of the biomass CO2 for capture and storage is sequestration of renewable carbon and can offset fossil carbon emissions more as they are part of the short term cycled carbon. Bio-CCS is important technology for GHG mitigation.
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	94	8	94	15	2.6.3.3	-	-	it should be noted that biomass-CCS does not necessarily lead to negative emissions in a life cycle assessment. It's geographical distribution should not only be determined by economic optimization as the final sentence of the section suggests.	We will add "economic and environmenta optimizationl"
Peter de Haan (Ernst Basler + Partner AG)	2	94	-	-	-	2.6.3.3	-	-	shortening potential: omit section 2.6.3.3	CCS is important technology for GHG mitigation of fermentation and thermal processes.
United Kingdom (Department of Energy and Climate Change)	2	94	28	95	95	2.6.3.5	-	-	Is there mentioned anywhere the possibility of interlinking supply chains and using biobased materials at end of life as biomass resources? This would increase landuse/figures (lines 26/27 on page 95)?	This is called cascading uses of biomass and design for environment in other disciplines.
Brian Titus (Natural Resources Canada)	2	95	9	-	-	-	-	-	Could it really be ¿carbon neutral¿? See Schlamadinger et al. (1995) for just some of the factors that need to be considered when looking at C neutrality. (B. Schlamadinger, J. Spitzer, G. H. Kohlmaier and M. Lüdeke. 1995. Carbon balance of bioenergy from logging residues. Biomass and Bioenergy 8: 221-234)	Reference cited and the reviewer is correct.
Christoph von Stechow (IPCC WGIII TSU)	2	95	33	95	41	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Accepted
Sweden (Swedish Environmental Protection Agency)	2	95	19	95	20	-	-	-	Replace low fossil fuel process with low fossil fuel prices.	Accepted
Norway (Climate and Pollution Agency)	2	95	23	-	24	-	-	-	The sentence is unclear, we do not understand what the percentual change (40 and 67%) are refering to	Accepted
Bernd Wittgens (SINTEF Materials and Chemistry)	2	95	23	-	24	-	-	-	The sentence is unclear, we do not understand what the percentual change (40 and 67%) are refering to	Accepted
United States (U.S. Department of State)	2	95	6	95	12	-	-	-	This paragraph is poorly written. Is this report really claiming that biomass will completely replace fossil fuels? That seems like a stretch - if that is indeed the claim then some time frame needs to be presented. Also, what does the phrase "cleaner grid power" mean?	Will be rewritten; biomass cannot replace fossil fuels completely as the resource analysis demonstrates. Only a portion of it.
Sweden (Swedish Environmental Protection Agency)	2	96	3	96	6	-	-	-	The sudden focus on sugars in the second sentence and onwards is a bit confusing since many of the options in Table 2.6.3, which is referred to in the previous sentence, don¿t concern sugars.	The table information will be made more clear. Indeed, the sugar routes were highlighted in Table 2.6.2 because they are newer. Since this was not clear to the reviewers, we will merge 2.6.2 and 2.6.3.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	96	7	-	-	-	-	-	"help" overcome	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	96	32	-	-	-	-	-	"While science and technology"	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	96	37	96	38	-	-	-	Not every bioenergy technology will neccessarily become competitive. Please make sure that this paragraph will not be misunderstood in a way that it could be read as being policy-prescriptive (e.g. "These efforts are expensive but required").	Suggestions accepted and thanks for highlighting them.
Christoph von Stechow (IPCC WGIII TSU)	2	96	37	-	-	-	-	-	Please insert "might be" between "expensive but" and "be required for the development", since it might otherwise sound policy prescriptive.	Suggestions accepted and thanks for highlighting them.
Christoph von Stechow (IPCC WGIII TSU)	2	96	24	96	25	-	-	-	The assertions made here are not mentioned in the section and should thus not appear in the conclusion.	Should have been in the logistical section - will be added
Jürgen Scheffran (University of Hamburg)	2	96	32	96	32	37	-	-	Beginning of paragraph inadequate (e.g. repetitive use of demonstration/demonstrated)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	97	11	98	5	-	-	-	No reference is provided to substantiate the assertions made in these paragraphs.	Will be included
Australia (0)	2	97	4	97	8	-	-	-	The caption for table 2.7.1 is unclear. The table should indicate what units the values represent.	Accepted
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	97	10	100	-	2.7.1	-	-	As it has been done in the previous chapter, the cost figures of the text and the tables need to be converted into 2005 US $ to allow the comparability with other figures.	To be checked
Sweden (Swedish Environmental Protection Agency)	2	97	-	-	-	-	-	2.7.1	Replace the sign > with <.	Accepted. Table will be redrafted
Laura Verduzco (Chevron Corporation)	2	97	-	-	-	-	-	2.7.1	clarify units in table (GJ available?)	Accepted. Table will be redrafted
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	97	4	97	8	-	-	2.7.1	Has been taken into account for the ellaboration of this table the future climate change impacts such as water resource scarcity or soil degradation in the different regions of the world? If not, it should be indicated in the text of the table.	Reference does indeed do this. Climate change impacts will get more attention in 2.2/2.5
Peter de Haan (Ernst Basler + Partner AG)	2	97	-	-	-	-	-	2.7.1	in which unit are numbers in table 2.7.1 given? Please enhance caption accordingly	Accepted. Table will be redrafted
Norway (Climate and Pollution Agency)	2	97	4	97	8	7	-	2.7.1.	Explain what units are displayed in the table;	Accepted. Table will be redrafted
Sweden (Swedish Environmental Protection Agency)	2	98	25	99	4	-	-	-	Concerning ¿ Based on these analysis a sizeable part of the technical biomass potential in the long term could lie in a cost range around $2.4/GJ¿ Is it possible to be that specific? Wouldn't it be better to give an actual range, say 2-4 $/GJ?	Language can be adapted
Brian Titus (Natural Resources Canada)	2	98	14	-	-	-	-	-	Subsidies for wood pellets in Ontario, Canada, have skewed chip costs, thus affecting the pulp and paper sector. Is there any data on the impact of forest bioenergy on costs and on traditional forest product markets, and is it relevant here?	No ref available and too specific for this section
Oluf Ulseth (Statkraft AS)	2	98	11	-	12	-	-	-	The sentence is incomplete in line 11/12. It would be an advantage to compare the different technologies with a cost graph, and include what the different is (investment costs, O&M, fuel). This would give the reader a better understanding of the range within the technology.	Cost figures are dealt with in detail in 2.3 and 2.6
Sweden (Swedish Environmental Protection Agency)	2	98	-	-	-	-	2.7.1	-	The production costs in this figure seem very low if considering a growing demand for food in the future something that will still over into increased land rental costs.	land rental was explicitly included in the reference
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	98	25	99	5	2.7.2	-	2.7.1	Is Hoogwijk still the only source for mid- to long-term feedstock cost projections? I do believe there are some more that could be included here.	It is the only soruce that gives such information with regional breakdowns; also acknowledged in chapter 10
Christoph von Stechow (IPCC WGIII TSU)	2	99	11	99	13	-	-	-	This sentence and the beginning of section 2.7.1 are redundant.	Section will be edited

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	99	18	99	19	-	-	-	Why only literature "reporting" and no analysis? Can you justify this? A report of this importance has to provide at least some critical review of existing literature or state why this was not deemed necessary.	Thorough analysis has been done based on sota literature on bioenergy systems in their specific settings. It was decided with strong arguments to avoid an artifical harmonisation of cost calculations for bioenergy that would give misleading results from region to region
Laura Verduzco (Chevron Corporation)	2	99	-	-	-	-	-	2.7.2	consistency in units	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Luiz A. Horta Nogueira (Instituto de Recursos Naturais)	2	99	-	-	-	-	-	2.7.2	It is lacking kWh for organic wastes	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Ella Stengler (CEWEP)	2	99	-	-	-	-	-	2.7.2.	Municipal waste incineration in state of the art WtE plants are relevant for both categories: heat and electricity. Prices in Europe for electricity 3-7 ¿cent/kWh	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	100	-	168	-	-	-	-	Line numbers missing from this page to the end of the chapter.	Section will be edited
Patrick Lamers (Ecofys Germany GmbH)	2	100	-	168	-	-	-	-	No more line numbers	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	101	1	-	-	-	-	-	Line numbers are missing in this part of the draft downloaded in its entirety.	Accepted
Herbert Wade (none)	2	101	-	103	-	-	-	-	No mention of the development of algae as a source of biofuel though there is a reference shown. Algae has the potential to provide biofuel without the issues of ""food or fuel"" and can be developed in land areas that are not suitable for crops.	Status of algue evaluated in 2.6; commercial highly unclear and thus uncertain.
Christoph von Stechow (IPCC WGIII TSU)	2	101	13	-	-	-	-	-	This cross-reference does not make sense, since Table 2.5.1 lists impact categories as opposed to ethanol systems. Are you referring to Table 2.3.3 or 2.6.3?	Typing error
Christoph von Stechow (IPCC WGIII TSU)	2	102	13	-	-	-	-	-	Again, Table 2.5.1 is the wrong cross-reference. Are you referring to Table 2.3.3 or 2.6.3?	Typing error
United States (U.S. Department of State)	2	102	0	-	-	-	-	-	What is a "ratoon" system? Please define.	Accepted
Peter de Haan (Ernst Basler + Partner AG)	2	102	-	-	-	-	2.7.2	-	Enhance caption: mention both extrapolations to 2020 and explain difference between them	Accepted
Frank Behrendt (Institute for Energy Engineering)	2	103	14	-	-	-	-	-	... the introduction of specific and automation and control technologies - ??	Language will be improved.
David Klein (PIK)	2	103	22	-	29	-	-	-	Currency already was in Dollars in FOD now is not. When transforming back to Dollars please check if values still fit to values displayed in Fig 2.7.2. (this was not the case in FOD)	will be checked.
Laura Verduzco (Chevron Corporation)	2	103	-	-	-	-	-	-	Does "excludes the cost of capital" refer to cost of capital equipment or cost of borrowing money?	will be clarified
Brazil (Ministry of Science and Technology)	2	103	19	103	31	-	-	-	It¿s not clear in these 2 paragraphs that price estimations were produced using different approaches. Corn ethanol seems to have better price than sugarcane ethanol, which contradicts other studies presented in this report. Better clarify this point.	Difficult issue with exchange rates obscures those results; language will be checked again.
Christoph von Stechow (IPCC WGIII TSU)	2	103	2	103	10	-	-	-	No reference is provided to substantiate the assertions made in this paragraph.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	103	33	-	-	-	-	-	Please convert these numbers into 2005US$/GJ.	Will be checked
Jorge Martínez Chamorro (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	2	103	-	104	-	2.7.3	-	-	As it has been done in the previous chapter, the cost figures of the text and the table need to be converted into 2005 US $ to allow the comparability with other figures.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	104	13	-	-	-	-	-	It is not clear to me how the work of Laser, et al, has been factored into this analysis. Theirs is the most up to date analysis of economics of cellulosic ("second generation") biofuels and should be carefully considered here. This paper provides the overview and context of their analysis. Published online in Wiley InterScience (www.interscience.wiley.com); DOI: 10.1002/bbb.131 Biofuels, Bioprod. Bioref. 3:231¿246 (2009) It is strongly recommended that Figure 6a in another of their papers summarizing their results be reproduced in this IPCC report; it is very illuminating. Here is the reference. Published online in Wiley InterScience (www.interscience.wiley.com); DOI: 10.1002/bbb.136 Biofuels, Bioprod. Bioref. 3:247¿270 (2009)	More refs (besides laser) can be mentioned, but the IEA ref is an authorative source, linked to the WEO projections; will assess how other refs fit the statement; key is availability of learning curves. Laser et al. are cited and have been factored in.
United Kingdom (Department of Energy and Climate Change)	2	104	-	-	-	-	-	-	Last 2 lines: There is no evidence of this presented in the text.	more refs will be included.
Christoph von Stechow (IPCC WGIII TSU)	2	104	27	-	-	-	-	-	Please consider inserting the word "still" between "over time but" and "require government subsidies".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	104	11	-	-	-	-	-	Please replace the word "projects" with "suggests" or the like to avoid confusion with the noun "project".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	104	4	104	6	-	-	-	This is only complex in policy terms, if the text mentioned the link between public technology support and learning.	Accepted
Japan (the Japanese Ministry of Foreign Affairs)	2	105	2	-	4	-	-	-	" (or CCS)" does not make sense.	Language will be improved.
Christoph von Stechow (IPCC WGIII TSU)	2	105	38	105	44	-	-	-	According to agreements reached during LA3 in Oxford, the opening section should establish a clear link between technology deployment and near and long-term potential for carbon emissions mitigation depending on the resource/technology. Additionally, this opening section should report on potential growth over time, based on the previous sections' assessment. This currently not the case!	Will be added, but was removed due to page limitations
Brian Titus (Natural Resources Canada)	2	105	23	105	36	-	-	-	If reductions in text are necessary then this section could probably be omitted, given that the chapter is on bioenergy and not bioproducts (nor CCS, unless its application in bioenergy is unique).	Explicit decision taken to include those options in SRREN.
Christoph von Stechow (IPCC WGIII TSU)	2	105	22	-	-	-	-	-	Please consider cross-referencing the sub-section on food security 2.5.5.4.	Accepted
Brian Titus (Natural Resources Canada)	2	105	37	-	-	-	-	-	Structurally, the title ¿Potential Deployment¿ for Section 2.8 seems much less appropriate than something that indicates that this is primarily a summary section that then makes the assumption that readers will understand that ¿potential deployment¿ means ¿summary¿. Can the title be changed? Or can the introductory paragraph make it clear that this is a summary chapter? The flow of ideas is currently rather disjointed, flowing from a brief introductory paragraph (L.38-44) on deployment into a review (Section 2.8.1), a synthesis (Section 2.8.2), a review of limitations (Section 2.8.3), key messages and policy (2.8.4; why is a section needed for two contrasting scenarios? A better title would be something like ¿Two contrasting scenarios¿), and key messages from the whole chapter (Section 2.8.5). The content and organization is fine ¿ it is just the title for Section 2.8 and the opening paragraph that do not seem to fit well because they do not set the reader up for what the chapter actually contains. It is essential that the title be accurate (¿Conclusions¿ or ¿Conclusions and Deployment¿?) and that the first paragraph let readers know that this is a summary chapter.	Section will see serious editing, especially in line with the synthesis sections of 2.2 and 2.5. Title and set-up are required for SRREN
Christoph von Stechow (IPCC WGIII TSU)	2	105	32	-	-	-	-	-	The section 2.3.5 does not exist. Please consider cross-referencing sub-section 2.6.3.3 and 2.6.3.5.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	105	3	-	-	-	-	-	This number here (50 US$/ton) is in stark contrast to the number provided on page 4, line 45 (20-30US$/ton). Which literature are these assertion based on, since section 2.7 does not seem to cover CO2 mitigation costs? Please amend the numbers in a consistent way and make the literature references more explicit.	Will reconsider the use of those costs
Christoph von Stechow (IPCC WGIII TSU)	2	105	33	-	-	-	-	-	Which "recent scenario analyses" is the text here referring to? This has not become clear from the previous chapter text. Please discuss with chapter 10 if a cross-reference would make sense.	will include refs
Christoph von Stechow (IPCC WGIII TSU)	2	106	14	106	18	-	-	-	Please give examples for the harmonization studies mentioned.	will be rephrased

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	106	0	-	-	-	-	-	The sentence beginning "High quality data..." makes no sense. Suggest rewrite.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	106	5	106	6	-	-	-	Why are the TPES reported for the 25-75% quantiles and the FE figures are not?	based on chapter 10 terminology; cross ref probably best solution
Sweden (Swedish Environmental Protection Agency)	2	106	-	-	-	-	2.8.1	-	What do category I-IV refer to?	Editorial and crosslink Ch. 10
John Twidell (AMSET Centre)	2	106	-	-	-	-	2.8.1	-	Caption should say '¿.that target ATMOSPHERIC CO2 CONCENTRATIONS OF¿¿.'	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Richard Plevin (UC Berkeley)	2	107	-	-	-	-	-	-	Line numbering is missing. Conflicts with land are not limited to first generation biofuels. Crop-based 2nd generation biofuel feedstocks that compete with food for land have the same problem.	Partly correct, partly not; lignocellulosic materials make the conflicts less severe (see text); some additions will be made.
Laura Verduzco (Chevron Corporation)	2	107	-	-	-	-	-	-	Material in section 2.8.2 seems to be a summary of chapter 2 and has little connection to Ch. 10. Suggest condensing and avoiding any repetition from other parts of Ch. 2	More material on Ch10 was available in longer version of SOD; will partly be retrieved.
Christoph von Stechow (IPCC WGIII TSU)	2	107	13	-	-	-	-	-	Which studies is the text referring to?	Refs will be included (also link to 2.2.)
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	107	-	-	-	2.8.2	-	-	First paragraph, you could include: "Given the regional / local / site specific nature of the interaction between bioenergy production activities and natural and social resources, there is an increased need for bottom-up studies to better understand the impacts of expanding bioenergy activities."	Excellent suggestion
Australia (0)	2	107	0	114	-	2.8.2	-	-	The statement on page 110 (lines 20 and 21) that "...the most likely range is between 100 and 300 EJ for penetration by 2050..." does not appear to reconcile with the statement on page 112 (lines 10 and 11)(also made on page 24): "But it is clear that several hundred EJ per year can be provided for energy in the future, given favourable developments." Suggest revisiting to present consistent and clear statements on bioenergy potential.	We will adhere to the 100-300 range in the revised text
John Twidell (AMSET Centre)	2	107	-	-	-	-	2.8.2	-	Caption should say '¿.that target ATMOSPHERIC CO2 CONCENTRATIONS OF¿¿.'	Editorial
Patrick Lamers (Ecofys Germany GmbH)	2	108	-	-	-	-	-	-	1st paragraph: revise English and formating	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	108	-	-	-	-	-	-	2nd para, penultimate line: What is a "positive GHG balance"? I guess you mean lower GHG emissions than the fossil-fuel baseline?	will be rephrased
Patrick Lamers (Ecofys Germany GmbH)	2	108	-	-	-	-	-	-	3rd paragraph, 3rd line: "extreme" is used twice and should be replaced by ranges for different iLUC effects	Accepted
Helmut Haberl (Institute of Social Ecology, Vienna)	2	108	7	-	-	-	-	-	Agricultural production includes livestock by definition, therefore it is confusing to write "agricultural production (as well as livestock)"	It is very important to keep clear that the land base concerned also includes pasture lands
Brian Titus (Natural Resources Canada)	2	108	7	-	-	-	-	-	Change from ¿agricultural production (as well as livestock). In case¿ to ¿agricultural production (including livestock); forest use is less controversial. In case¿	But see also 1810
Brazil (Ministry of Science and Technology)	2	108	30	-	-	-	-	-	iLUC is controversial and has no empirical past data supporting it, once, due to its complexity, works on this issue are made with future scenarios.	iLUC is and will be dealt with in length in section 2.5; we do stress the value of the studies as well as the key uncertainties and shortcomings of the concept; this will be rephrased in section 2.8 as well.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Richard Plevin (UC Berkeley)	2	108	-	-	-	-	-	-	Line numbering is missing. I don't agree with this summary. The fact is that we don't know how much climate change mitigation is achieved with biofuels owing to many uncertainties. See, for example, Delucchi, 2010 doi: 10.1111/j.1749-6632.2010.05457.x, who says "calculating the climate impact of biofuels is so complex, and our understanding is so incomplete, that we can make only general qualitative statements about the overall impact of biofuels on climate." Saying biofuels have "positive" GHG balances is unclear: use the terms net sequestration and net emissions to avoid ambiguity.	The statement in the comment that ''it is a fact that we don't know…'' is most certainly not correct. Of many bioenergy systems the GHG performance is well understood, as well as the GHG balances of basically all chains (see e.g. Hoefnagels et al., 2010). This includes direct changes in C-stocks, N2O emissions and allocation options. The key issue that is uncertain is iLUC and related C-impacts, which is still heavily debated (partly controversial, also in line with other review comments on SOD) on the one hand and on the other so far little attention has been paid in this recent debate on how to mitigate iLUC. This key point (e.g. by rationalizing agricultural management and REDD, proper zoning and proper crop/soil combinations) is gaining momentum as well. Many insights are available in practice and in reality how to achieve the better GHG performance of bioenergy options. A key element of the chapter is that the balance between those different viewpoints needs to be incorporated, not just one.
United States (U.S. Department of State)	2	108	0	-	-	-	-	-	The sentence in the first paragraph beginning "In case biomass production...." also makes no sense. Rewrite.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	108	-	-	-	-	-	-	The terms ""LUC"" and ""iLUC"" are used in this section interchangeably and apparently inconsistently. I si ti correct that ""most biofuel production systems have positive GHG balances, if no iLUC effects are to be incorporated."" Is this true, considering that direkt LUC can have considerable GHG emission implications? Do most biofuel production systems have positive GHG balances when direct LUC are incorported?	Answer is basically yes, but some more refs and rephrasing will be included. Also cross link to 2.5.
Christoph von Stechow (IPCC WGIII TSU)	2	108	1	108	5	-	-	-	This paragraph and the lines 10-14 on page 110 are redundant. Please consider rephrasing.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Patrick Lamers (Ecofys Germany GmbH)	2	109	-	-	-	-	-	-	3rd paragraph: revise referencing	Accepted
Patrick Lamers (Ecofys Germany GmbH)	2	109	-	-	-	-	-	-	3rd paragrph, 1st line: Table 2.5.3 does not exist. I assume you mean 2.5.2 (or update numbers)	Accepted
Elina Vapaavuori (Finnish Forest Research Institute)	2	109	-	-	-	-	-	-	3rd pg, line 7: Lapola et al. 2010 is missing in the reference list.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	109	27	109	28	-	-	-	Add after (Al-Fiffai et al., 2010): "show that current global biofuel mandates probably lead to ILUC-effects in this lower but still significant order of magnitude but also suggest that these iLUC effects strongly¿"	For current biofuel production without further sustaianbility requirements possibly true (see uncertainty in many iLUC studies), but can also be mitigated in the future.
Richard Plevin (UC Berkeley)	2	109	-	-	-	-	-	-	ILUC pops up here again. All the discussion of ILUC should be consolidated so the arguments about how to estimate it and whether to include it can be seen in one place. However, as I wrote earlier, I disagree with this reading of the literature. Searchinger 2008 did not assume 1:1 land displacement. First, the ratio is not an assumption, but an output of the FAPRI economic model. Second, it was not 1:1 but 0.8:1. More recent modeling by USEPA (also with FAPRI) shows similarly high net displacement in the near term as well. Models vary in their estimates of land displacement but not because they are "newer" as implied here. Partial and general equilibrium models have different assumptions and reflect different time frames, and thus incorporate more or less adjustment. Also, more adjustment generally means more price-induced reduction in food consumption, which, in GHG terms is treated as a "benefit".	Wording will be revised and linked to improvements in section 2.5. However new references AND review of iLUC studies by the author team do reveal that over time the more advanced approaches tend to have lower iLUC factors and simultaneously give insight in the very high senstitivies of the outcomes for underlying assumptions and data.
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	109	11	109	18	-	-	-	These examples do not refer to biodiversity (as suggested by the first sentence in the paragraph), but to environmental impacts of bioenergy production.	Comment not fully clear, but wording will be sharpened.
Patrick Lamers (Ecofys Germany GmbH)	2	110	-	-	-	-	-	-	1st and 2nd paragraph: doubling of sentences/statements regarding the potential positive and negative effects of bioenergy.	Editorial
Helmut Haberl (Institute of Social Ecology, Vienna)	2	110	-	-	-	-	-	-	3rd para: GEA, 2010 is missing in the reference list	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Helmut Haberl (Institute of Social Ecology, Vienna)	2	110	-	-	-	-	-	-	4th para: Arguing with learning curves in that way does not seem sound to me. If you start using a limited potential, you may make progress rapidly in the beginning, as soon as essential technological hurdles have been overcome. Only then, if the volume increases, limitations stemming from the fact that the total potential is limited kick in. This will then slow down progress, except if you find technologies that push the limits to higher levels. To what extent this can be done will remain to be seen.	comment unclear; do not find the word learnng curve on page 110; general notion of the comment OK; will be considered in rephrasing.
Patrick Lamers (Ecofys Germany GmbH)	2	110	-	-	-	-	-	-	4th paragraph, 6 line from the bottom: revise sentence starting with "These increases are impressive¿"	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	110	20	-	-	-	-	-	Please consider inserting "today" between "biomass use" and "is traditional".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	110	24	110	25	-	-	-	Please consider rewording the sentence "to reach 100 to 300 EJ would require ¿ ten- to thirty-fold" into "to reach 100 to 300 EJ would imply a ten- to thirty-fold increase of modern bioenergy's contribution by 2050 (currently at 10 EJ)".	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	110	22	-	-	-	-	-	Section 2.5.3.4 does not exist. Please provide the right cross-reference.	Accepted
Sweden (Swedish Environmental Protection Agency)	2	110	23	110	26	-	-	-	Starting with:¿ Taking improved traditional use of biomass¿¿ The coherence of the numbers in these two sentences is unclear to me.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	110	22	110	23	-	-	-	The word "offset" is used twice in one sentence. Please consider rephrasing.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	110	27	110	42	-	-	-	This paragraph is very long considering that it merely wants to put the numbers of 100 to 300 EJ into perspective. Please consider cutting it down and/or moving it into a footnote.	Indeed, this will be reduced in length.
Norway (Climate and Pollution Agency)	2	110	-	110	-	8	-	-	the 3. paragraph is difficult to understand	Editorial
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	111	-	-	-	-	2.8.3	-	Earlier (p 10) you discuss NPP and the still wide range of estimated for HANPP (29%, or 20%, of even lower0. In this sense, it's a bit strange to indicate current human biomass harvest as a straight 300 EJ line, when estimates vary between 360, 250 and lower).	Will be finetuned between 2.2 and 2.8
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	111	-	-	-	-	2.8.3	-	Final line of the page: can amount to over 400 EJ: in the ExSum (p4, line 21) it is states as 'up to 400'. Please make consistent. By the way, I find any discussion on whether the max is 300, 400 or 500 EJ a bit beside the point. To me, the uncertainties are key, and the challenge is to come up with e.g. massive (policy) efforts to improve global agriculture, needed to open up any substantial crop-based bioenergy potential. Along the way, we can then see how far we might get in the end in terms of total potential. In this respect, I do not entirely like the big arrow in the figure, implying that efforts on land use en agri productivity can increase biomass potential from max 300 to max 500. For reaching 300, one would already need to make major efforts in these fields. Besides, by the way the graph is costructed, the 2008 estimate up to 500 attracts more attention than the (more recent, more directly backed by this review) indication up to 300.	See 346
Helmut Haberl (Institute of Social Ecology, Vienna)	2	111	-	-	-	-	2.8.3	-	This figure does not seem convincing to me. It seems to be built on the intention to show that technological progress will boost the potential. On the other hand it also shows that the bioenergy potential found in the 2008 review is higher than that in the 2010 review, suggesting that the potential dwindles as we learn more about constraints, in particular constraints resulting from sustainability/environmental considerations. I tend to believe that the second line of reasoning is relevant, but looking at this figure, the reader is a bit a loss which of the two stories to believe.	see 346
Brian Titus (Natural Resources Canada)	2	112	23	112	26	-	-	-	¿Limitations¿ and ¿limits¿ are verging on pejorative, although not so laden in meaning as some other terms currently used in the chapter. Try something neutral like ¿The need to ensure maintenance of healthy ecosystems and avoid soil degradation and loss of biodiversity determines the amount of residue that can be sustainably extracted in agriculture and forestry¿¿	Good suggestion
Brian Titus (Natural Resources Canada)	2	112	35	112	36	-	-	-	Eliminate redundancy: if there is water scarcity then there is a constraint on water. Change from ¿Water constraints may limit production¿ to ¿Water supply may limit production¿	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	112	4	-	-	-	-	-	The bracket "(Biomass Potential 2)" should be replaced.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	112	18	-	-	-	-	-	The use of ¿restrictions¿ is pejorative. Try something neutral like ¿Fischer 2009); and (iii) ecological biomass potentials based on the biophysical resource, including land degradation, water scarcity, and biodiversity and nature conservation requirements (WBGU 2009, Molden 2007, Bai et al. 2008, Berndes 2008).¿	Good suggestion
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	112	20	112	20	2.8.2	-	-	Here, it strikes me again that developments in agricultural productivity are presented as an inherent uncertainty. However, more than e.g. population growth, policy makers can make additional efforts in order to reach productivity improvements. So in stead of only mentioning this issues as uncertainties, one can also present them as challenges for policy makers. But I don't know if you have the freedom of scope to do so.	Good suggestion!!!
Patrick Lamers (Ecofys Germany GmbH)	2	113	-	-	-	-	-	-	First bullet point: could you be more specific and clarify which residues these include? First, second, third, all?	Accepted
Brian Titus (Natural Resources Canada)	2	113	11	113	12	-	-	-	Probably need to define surplus forest growth more here, even just by referring readers back to Section 2.2.2.2: ¿Surplus forestry (i.e., surplus roundwood and associated residues not needed for traditional forest products; see Section 2.2.2.2) may supply an additional 60-100 EJ/yr.¿	this will be structurally addressed throughout the chapter.
Christoph von Stechow (IPCC WGIII TSU)	2	113	3	-	-	-	-	-	The wording "expert review" could be confused with the official IPCC expert review process. Please consider rephrasing.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	113	-	-	-	2.8.2	-	-	First paragraph: this is a confusing passage. You compare the Dornburg review with another assessment, in which this review was also taken into account? And directly after the bullets: how should I place these 500 EJ? See comment in row 76.	figure will still undergo revisions.
Sweden (Swedish Environmental Protection Agency)	2	114	7	114	7	-	-	-	The sentence in the last paragraph ¿ Climate mitigation is initially negative but then increases to a biofuel energy contribution ¿¿ is unclear to me since the biofuel energy contribution of 320 EJ doesn¿t say anything about climate mitigation.	Will be sharpened, also in relation to section 2.5
Zuomin Shi (Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry)	2	114	10	-	-	-	-	-	CO2: 2 should be as subscript	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	114	37	-	-	-	-	-	Figure 2.5.4 does not exist.	Accepted
Frank Behrendt (Institute for Energy Engineering)	2	114	-	-	-	-	-	-	line 6 from the end: reference is given to Fig. 2.5.4 -> wrong reference, that Fig. addresses health aspects	Accepted
Laura Verduzco (Chevron Corporation)	2	114	-	-	-	-	-	-	Need to substantiate claim that biomass will be better for transport fuels than electricity in long term. We think there are significant uncertainties associated with bioenergy, much more so than for fossil fuels.	comment unclear
Christoph von Stechow (IPCC WGIII TSU)	2	114	16	114	19	-	-	-	Please double check the assertions made here for consistency with chapter 10.	Part of this information was removed when reducing pageno. For SOD; will be retrieved.
Christoph von Stechow (IPCC WGIII TSU)	2	114	20	114	27	-	-	-	Please double check the assertions made here for consistency with chapter 8.	Accepted
Gerrit Hansen (TSU)	2	114	37	-	-	-	-	-	reference is wrong (figure 2.5.4 does not display a mitigation scenario).	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	114	4	114	15	-	-	-	These paragraphs do not constitute limitations but could be used in the previous sub-section to summarise the sections on technology and economics.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	114	36	114	40	-	-	-	These sentences do not summarise the text from a previous section but introduce a new study that should be dealt with in the respective section (2.5.3.1).	Accepted
Wibke Avenhaus (Potsdam Institute for Climate Impact Research)	2	114	5	114	8	-	-	-	What analysis do you refer to? Please mention the source.	Accepted
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	114	-	-	-	2.8.3	-	-	4th paragraph: of course the development rate of electric vehicles influences the prospects for biofuels. But the same applies for the development rate of wind, solar, and other power options for the use of biomass for electricity.	This will probably be eliminated and left to chapter 8/10
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	114	-	-	-	2.8.3	-	-	Final paragraph: link to figure 2.5.4 probably wrong.	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	114	-	-	-	2.8.3	-	-	In the first paragraph you should mention that public policy has played, plays, and will continue to play an important role in the expansion of bioenergy activities.	Excellent suggestion

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Norway (Climate and Pollution Agency)	2	114	-	-	-	2.8.3	-	-	The utilzation of biomass within production of fine and bulk chemicals (e.g.: plastics) needs to be adressed. New alternative pathways for combined production of fuel and feedstock chemicals are under development (example: polyethylen is today produced from ethylen, but can also be produced from ethanol, thus there will be a competition of fuel and chemicals). The sector which is willing to pay most will "win"	Accepted
Bernd Wittgens (SINTEF Materials and Chemistry)	2	114	-	-	-	2.8.3	-	-	The utilzation of biomass within production of fine and bulk chemicals (e.g.: plastics) needs to be adressed. New alternative pathways for combined production of fuel and feedstock chemicls are under development (example: polyethylen is today produced from ethylen, but can also be produced from ethanol, thus there will be a competition of fuel and chemicals). The sector which is willing to pay most will "win"	also with cross ref to 2.6
Kristin Seyboth (IPCC WG III TSU)	2	115	-	-	-	2.8.4	-	-	The content of this section does not match the title. Suggest renaming as something like "Extreme biomass scenarios"	Accepted
Kristin Seyboth (IPCC WG III TSU)	2	115	-	-	-	2.8.4	-	-	This section needs more supporting text, references, and discussion on assummjptions of the extreme scenarios presented in Table 2.8.1. It is not acceptable to have a section that contains a table and nothing else.	Will be modified
Modesto Fernandez Diaz-Silveira (Ministry of Science, Technology and Environment)	2	115	-	-	-	-	-	2.8.1	TO include two new bullets, in column on Key Impacts, for High Biomass Scenario: - "Conflicts with water availability for other uses (agriculture, industry and domestic human uses) are solved and this natural resource protected" - "Biodiversity is protected and enhanced while bioenergy derived from crop sources is obtained by agriculture".	Thanks
Australia (0)	2	115	-	-	-	2.8.4	-	2.8.1	There is no explanatory text to accompany this table. What is the relevance of these two opposing long term impacts of bioenergy?	Editorial; table will be reworked
Richard Plevin (UC Berkeley)	2	116	-	-	-	-	-	-	A key message of this chapter must be that we're uncertainty about the climate benefits of many bioenergy policies and fuel production systems. Claiming a large potential GHG mitigation benefit, as the third bullet on this page does ---if certain contraints are met--- paints too rosy a picture and misinforms policymakers about the essential importance of those constraints, and how, absent those constraints, expanding bioenergy use could exacerbate climate change. Also see my comment #3 about 80-90% reductions.	This bullet will be rephrased and substantiated with cross ref to 2.5; there are however more certainties than suggested in the comment. The statement in the comment that "it is a fact that we don't know…" is most certainly not correct. Of many bioenergy systems the GHG performance is well understood, as well as the GHG balances of basically all chains (see e.g. Hoefnagels et al., 2010). This includes direct changes in C-stocks, N2O emissions and allocation options. The key issue that is uncertain is iLUC and related C-impacts, which is still heavily debated (partly controversial, also in line with other review comments on SOD) on the one hand and on the other so far little attention has been paid in this recent debate on how to mitigate iLUC. This key point (e.g. by rationalizing agricultural management and REDD, proper zoning and proper crop/soil combinations) is gaining momentum as well. Many insights are available in practice and in reality how to achieve the better GHG performance of bioenergy options. A key element of the chapter is that the balance between those different viewpoints needs to be incorporated, not just one.
Brazil (Ministry of Science and Technology)	2	116	-	-	-	-	-	-	In the third bullet point it should read: ""perennial and semi-perennial croping systems (...)""	Accepted
Brian Titus (Natural Resources Canada)	2	116	36	116	40	-	-	-	Is this meant to be a final bullet point, or a closing paragraph? Looks like a bullet, as it is not a strong final paragraph (which is not necessary if this section is simply a list of bullet points.	will be modified
Christoph von Stechow (IPCC WGIII TSU)	2	116	1	-	-	-	-	-	Please delete "and policy recommendations" from the title of the last sub-section, since this may sound more policy prescritive than the actual text.	Fully correct.
Kristin Seyboth (IPCC WG III TSU)	2	116	8	-	-	-	-	-	the right policy frameworks' - what are the 'right' policy frameworks? First describe policy frameworks needed (ideally referencing definitions presented in Ch. 11) and THEN move on to tell what happens if you don't implement these policy frameworks. Right now you're describing what happens if you don't do X without explaining what X actually is.	Will be changed and specified.
Brian Titus (Natural Resources Canada)	2	116	16	-	-	-	-	-	The temporal aspect to renewability, the carbon debt/dividend concept, and the impossibility of C neutrality (but differences between feedstocks and systems) are worth working in to this bullet point, as they have major ramifications for feedstock choice.	Accepted
Daniela Thrän (DBFZ / UFZ)	2	116	-	-	-	-	-	-	third key message is especially through for biogas from manure	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	116	3	-	-	-	-	-	This statement is the crux of the whole issue around pejorative terms: do we view the global biomass potential as based upon biomass harvesting that is environmentally sustainable, or do we view the environment as a restriction on un-bridled industrial development? The current wording almost gives readers a choice between the two views, as if environmental sustainability is an option (¿also when¿¿). This statement could be simplified and solidified to make the authors¿ viewpoint unambiguous: ¿The environmentally sustainable biomass resource potential is significant (up to 30% of the world¿s primary energy demand in 2050)¿ ¿ there is no need to qualify this statement with ¿also when¿.	Good suggestions; this will be reformulated.
Modesto Fernandez Diaz-Silveira (Ministry of Science, Technology and Environment)	2	116	-	-	-	-	-	-	TO include text in second bullet, second line, after ¿different regions: "mainly in developing countries,"	Accepted
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	116	-	-	-	2.8.5	-	-	In the second bullet enhance the text, e.g. by amending: "...policy frameworks and enforcement mechanisms¿".	Accepted
Jürgen Scheffran (University of Hamburg)	2	122	-	122	-	-	-	-	Reference Bureau et al. has been published. Full reference: Bureau J.C., Guyomard H., Jacquet F., Treguer D., 2010. European Biofuel Policy: How Far Will Public Support Go? pp. 401-424. In: Handbook of Bioenergy Economics and Policy, Springer, Series: Natural Resource Management and Policy , Vol. 33, Khanna, M; Scheffran, J; Zilberman, D (Eds.)	Accepted
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	140	-	-	-	-	-	-	IEA Task 32, 2010: Link doesn´t work	Accepted
Sweden (Swedish Environmental Protection Agency)	2	-	-	-	-	-	-	-	The logic of the sentence ¿ Given this limited increase, as global scale, competition between food and fuel may not be a serious issue¿ is not fully clear to me. Is the 4% increase in arable land that is estimated in the FAO study (mentioned in the previous paragraph) an estimate of the effects of the competition between food and fuel?	Accepted. Sentence will be redrafted
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	-	-	-	1. Executive summary states 46EJ energy is derived from biomass; in chapter 2.1 respective figure is 47EJ and in the figure 2.4.1 48EJ	Final numbers will use the latest values available (2008). The differences are the years of the data (2005, 2007). The 2008 number is 50.3 EJ.
Kristie Ebi (Department of Global Ecology)	2	-	-	-	-	-	-	-	2.5.3.3, lines 5-7. This sentence doesn't make sense.	Accepted. Sentence will be redrafted
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	All Latin names for genus/species should be in italics.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	All use of Latin phrases should be avoided because (i) the phrases may no longer be commonly understood, and (ii) there are common English phrases that would suffice (e.g., ¿ceteris paribus¿ on Page 20 Line 31; ¿ex ante¿, ¿ex post¿ on Page 73 Line 38).	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	All uses of ¿e.g.¿ should be checked to ensure they are followed by a coma. It is probably best to place these plus following text in brackets. For example, on Page 105 Line 42, change to ¿cost reduction of key technologies (e.g., efficient and complete use of primary biomass energy from most promising first generation feedstocks and new generation lignocellulosic biomass, and a variety of biofuels).¿	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	All uses of ¿et al.¿ should be checked to ensure they are followed by a full stop. Some are not.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Although improved, there is still some pejorative language that treats the environment (and sometimes society) as a restriction, limitation, or constraint on bioenergy production, or a competing use. This could compromise how the chapter is perceived regarding impartiality, which could weaken the chapter¿s impact. The three aspects of sustainable development ¿ environment, economics, society ¿ are essential underpinnings to this chapter. It follows that (i) ecosystems (whether managed or not) define the biophysical foundation for biomass supply, and (ii) societies can make choices that mitigate against expansion of the bioenergy sector because they (under some circumstances) may value other factors more than increased bioenergy production. These are not restrictions, limitations, constraints, or competing uses ¿ they are simply factors (a neutral term) that determine what proportion of the theoretical or technical potential biomass supply that is available for use. I would advise an opening statement in the Executive Summary and a closing statement in Section 2.8 that says clearly that bioenergy development must take place within a context of sustainable development that (i) does not deplete environmental resources that compromise their use by future generations, (ii) respects societal values, and (iii) are economic. Can the authors live with simple neutral words and statements such as ¿the maximum theoretical potential is reduced when environmental and social factors are taken into account¿? Here, ¿reduced¿ is a simple and unarguable statement of fact; but ¿restriction¿, ¿limitation¿, ¿constraint¿ or ¿competing use¿ normally imply that the user believes that a higher potential (value, etc.) would truly be attainable if only the world would allow them to exploit the resource. The issue is not what the words mean in a strict (i.e., dictionary definition) or technical (i.e., scientific or methodological) sense, but how the words will be perceived within the context of the chapter by readers. There may be a fine nuance in meaning for native English speakers compared to those to whom English is a second language, but there is no need to use some of the current terms if there are alternatives that convey the same meaning. I therefore strongly recommend that the authors search for roots such as ¿restrict¿, ¿limit¿, ¿constrain¿ and ¿compet¿ and challenge each use until they are satisfied that only these words ¿ and no others ¿ convey the authors¿ meaning in an objective, impartial and unassailable manner; otherwise, seek more neutral terms.	We have tried to use more neutral words but may not always be successful. The suggestion is excellent.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	As with summary sections, decide on uniform style for when to use bullets, numbered lists, what kind of numbered lists, etc. within text.	Accept. Summaries will use similar style.
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	2	-	-	-	-	-	-	-	Being not an expert on biomass, Throughout the document I did not get the correlation between biomass fuel costs, oil price and energy demand for fuel production considering the whole value chain. E.g. in chapter 2, page 5 line 2 a number was given, being competitive at 60-70 US$ per barrel oil. In chapter 2 page 98 line 8 it is noted that biomass supplies are strongly affected by fossil fuel price. Does cheap biomass largely rely on cheap fossil fuel?	Please check the final version where the levelized costs of production of various bioenergy forms are compared with those of the fossil fuel prices and the the impacts of the biomass feedstock prices on the final energy products.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Check all chemical compounds and SI units where sub- and superscripts are needed (e.g., check all uses of ¿CO2¿ and ensure that these are ¿CO2¿ with a subscript for ¿2¿).	Accepted. A careful revision will be performed.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Check all SI units for consistent and proper use throughout chapter (e.g., check for consistency of ¿CO2eq¿ and ¿CO2-eq¿ (see Page 9 Line 22-27), Ceq (Page 61 Line 31), tCO2-equivalent (Page 67 Line 31), tonCO2-e (Page 67 Line 36), etc.).	Accepted. A careful revision will be performed.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Check all uses of ¿Scandinavia¿, which does not include Finland. Suggest use of ¿Nordic countries¿ instead.	Accepted
Patrick Matschoss (TSU)	2	-	-	-	-	-	-	-	check definitions in glossary: p. 2, l.19-28; liaise with chapter 1 if not consistent	Accepted
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Check for variants on US$ (Page 4 Line 17), U$ (Page 4 Line 45), USD (Page 9 Line 23), etc., and use one symbol throughout chapter. Check all tables and figures, too.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Confirm differences in use of "–" and "-" in text; go for consistency throughout. (Probably best to minimize use by revisiting sentence structure to reduce clauses.)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	-	Consolidate feedstock and conversion sections	Accepted in part.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Do ¿perennial crops¿ always need to be referred to as such? There are times when it is not clear why they deserve particular attention and forest and annual crops do not, such as Page 43 Line 43. Consider doing a global word search to eliminate use unless context specifically refers to perennial crops alone and not to annual crops or traditional forestry as well.	Rejected. Sugar cane is treated as a perennial crop and is very relevant for biofuel production.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Does livestock production always require specific mention with agriculture (e.g., Page 4 Line 40: ¿agricultural and livestock sector¿) or can it simply be assumed that livestock is a subset of the agricultural sector, and can it be omitted unless the context focuses specifically on livestock production alone (e.g., manure)? Consider doing a global word search to eliminate joint use of ¿agriculture and livestock¿ throughout the chapter wherever ¿livestock¿ can be accepted as a subset of ¿agriculture¿.	Rejected. In English livestock production is part of agricultural sector. Nevertheless, in other languages this does not occur. To make the text ready for translation we used clear statement. Also, in some circumstances it is important to differentiate between both activities since one interacts with the other.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Each section ends differently, in either bullet points or text under headings such as ¿summary¿, ¿conclusions¿ or ¿final remarks¿. This is the part of each section that readers are most likely to skip to if they do not read the entire report or chapter, or to focus on later as an aide memoire if they have read the entire report. Adopting the same heading and the same format (bullet points?) could therefore increase readability and impact of chapter content, and certainly would help to unify the style of the chapter. There is currently little consistency in format between these section endings and Section 2.8, and hence little opportunity for reductions in length by removing redundancy. A final reconciliation of section endings and Section 2.8 is recommended, once the final draft has been completed.	Accepted. A summary will be added to all sections.
Richard Plevin (UC Berkeley)	2	-	-	-	-	-	-	-	Farrell is missing an L in the bibliography. Plevin 2009 is cited (though to support something the paper doesn't say) but missing from the bibliography.	Accepted and there are many more Plevin references added throughout the report. Thanks for the points of view.
Finland (Finniah Meteorological Institute)	2	-	-	-	-	-	-	-	Field biomass production for food or energy is currently strongly dependant on inputs largely manufactured with fossil fuels. This is a problem if the goal is the production of carbon neutral biomass for bioenergy. The bioenergy product produced and the production technology used should be carefully tailored according to local conditions. Low productivity with high inputs may result in bioenergy products that cause more greenhouse gas emissions than fossil fuels when calculated against the energy unit produced. In northern conditions, perennial crops (grasses, silage) production for biogas production demonstrate much higher energy balance than annual crops (cereals). Furthermore, the sustainability is improved as the technology also serves in recycling the nutrients back into the fields and thus reduces inputs. In general, a thorough life cycle analysis of different biomass based energy sources, as well as from other renewable sources, would add value to the current report.	Accepted. This point is discussed since we include energy balance analysis in our text.
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	-	-	Field biomass production is strongly based on inputs depending on fossil fuels. This is a problem when the production of carbon neutral biomass for bioenergy is the target. The bioenergy product and the production technology used should be carefully tailored according to local conditions. Low productivity with high inputs may result in bioenergy that causes more greenhouse gas emissions than fossil fuels when calculated against the energy unit produced. E.g. in EU limits for grain production for bioethanol are already set, including requirement of 35% reduction of greenhouse gas emissions per energy unit when compared with fossil fuels. Making a life cycle analysis of different bioenergy products (biogas, ethanol, solid materials) produced from biomass (wood, field biomass) would be very important. There have already been attempts to do that (e.g. Soimakallio et al. 2009b). The same applies to other renewable energy sources. It would be very nice if a box containing this information could be added to the report.	Accepted. This point is discussed since we include energy balance analysis in our text.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Forestry is still not always included with agriculture in sentences where the context is relevant to both sectors (e.g., Page 4 Lines 39-41). To check this throughout the entire chapter, do a word search for ¿agricult¿ and ask whether adding the word ¿forestry¿ (or a similar term) is possible without confounding the meaning of the sentence or paragraph; if it is, then add it. Exclusive reference to either forestry or agriculture alone should only be accepted if it is truly relevant to only the one sector.	Accepted. We will try to include forestry everywhere.
Elina Vapaavuori (Finnish Forest Research Institute)	2	-	-	-	-	-	-	-	General comment of tables and figures: Tables and figures with legends should be so informative that they stand on their own. Many of them are of poor quality and do not fill this general norm for scientific papers at all. In some cases the reader is completely lost and needs to look for explanations in the text from the previous or next pages. Please, correct to improve readability.	Good comment. The authors will work with the SRREN will be processed by a professional copy-editor.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Elina Vapaavuori (Finnish Forest Research Institute)	2	-	-	-	-	-	-	-	General comment of the text: This is a very long chapter which should be shortened and condensed. E.g. environmental issues are raised in several sections with no extra views on this important topic. The text remains vague. This may be due to the a very general, global approach with few data/examples of reality in different countries. After wondering through the text to pg. 110, it is stated in pg. 3 that '...it is not possible to deliver conclusive information on the deployment of biomass...on shorter and longer term.' I would expect that at least on short term more precise conclusions could be given.A list of clear recommendations should be included that would help a reader to get an idea of the status and needs about the bioenergy business locally (country by country), regionally and globally. Finally, the quality of the text is in several cases poor and needs improvement.	Accepted. Recommendations will be provided. Regarding biomass potential IPCC authors have to limit their conclusion based on available literature. Good papers present conflicting results due assumptions regarding future behaviour of society. All that we can do is to quantify the maximum and minimum potential and clarify the assumptions assumed. In addition, more importantly, we present sketches of the future and preconditions that enable reaching high and low potentials with and without sustainable conditions. Through these informative descriptions the policymakers can glean the conditions for the various outcomes.
Herbert Wade (none)	2	-	-	-	-	-	-	-	I see No mention of biogas in the text though references are included at the end. Biogas is a mainstream biomass to energy technology for animal waste management and sewer systems as well as small energy systems for rural use (e.g. Nepal, China, India).	The organization of the chapter is not making it easy for the reviewer to find the information. We will improve this. However, biogas in Nepal, China, India and other DC are discussed from page 48 line 46 to page 49 line 23. It is also discussed in the technologies themselves. We will improve the organization of the information.
Herbert Wade (none)	2	-	-	-	-	-	-	-	I think the section should be called bioenergy, not bilmass. I feel it inappropriate to combine bioufuel and biomass to energy conversion in the same overall topic. They are very different technologies and need separate sections under the heading of bioenergy would be more appropriate.	The terminology will be explained better. A driver for the use is how the International Energy Agency collects data for biomass (it is bioenergy but from the solid form) and secondary energy forms which include other solids (pellets, charcoal), liquid and gaseous biofuels. Hopefully, with terminology explained, it will be easier to understand the chapter.
Elina Vapaavuori (Finnish Forest Research Institute)	2	-	-	-	-	-	-	-	List of abbreviations should be given at the end of this chapter (and maybe also in other chapters). This would improve readability of the text. Glossary does not replace this need; also glossary should be improved.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Ladislaus Rybach (Geowatt AG Zurich (company))	2	-	-	-	-	-	-	-	My comments to Chapter 2 of the FOD have been considered.	Thanks
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	-	Proofreading for accuracy and clarity is essential. Consistency in units ($ in 2005, avoid use of cents)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	-	-	-	Ship transportation is only a marginal part in biomass supply in terms of transport quantities. Road and rail transport need to be further developed and particularly the moving and storing of materia between transport means.	Accepted. Further discussion on biomass logistics will be added within the examples given.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Short-rotation woody crops sometimes seem to fall under agriculture, sometimes under forestry, and sometimes have their own focus. A three-way split is fine (agriculture, SRWC, traditional forestry), but authors should double-check the entire chapter to ensure consistency of approach.	Accepted
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Should ¿&¿ be used or not? Probably best to replace with ¿and¿ throughout text, as current use is inconsistent.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Richard Plevin (UC Berkeley)	2	-	-	-	-	-	-	-	The "big story" on bioenergy is that estimating climate change mitigation benefits is very difficult, subject to many subjective assumptions, methodological disagreement, and uncertainty about future policies, macroeconomic factors, and demographic trends. These challenges are discussed briefly on p. 59 in the context of socio-economics, but the same challenges persist for GHG benefits. In this context, concern about barriers to trade seems to be a second-order concern. Which forms of bioenergy are we sure are worth pursing as mitigation strategies? For those, it would be reasonable to discuss policy support and trade relations. Again, the recent work by Wise et al and Melillo et al would inform the discussion of bioenergy trade: if we get the accounting wrong, much deforestation will result.	The reviewer has one point but overlooks the other -- the implementation of bioenergy can be done without leading to significant deforestation if land use is well managed. The emphasis on sustainability frameworks and multiple ways to manage land simultaneously for food, fodder, fiber, products, and bioenergy (in its various forms). Chapter 2 and Chapter 9 combined offer the plus and minus views and the policies are also discussede in Chapter 11.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Japan (the Japanese Ministry of Foreign Affairs)	2	-	-	-	-	-	-	-	The chapter seems to take an overly optimistic approach towards biomass. Japanese experience not only points to competition with food supply, delays in the development of second-generation options, high procurement costs for bioenergy resources (especially in the domestic context), energy security issues in relation with imported bioenergy, the need for subsidies for the continued promotion of bioenergy and the absence of adequate assessment of its sustainability.	We tried to condense published information from the literature and highlight the possibilities of increase (or decrease) and the various factors that would lead to one (or the other) outcome. Competition with food, fodder and forestry is mentioned in the text and good or bad handling of biomass feedstock supply development can increase or decrease these constraints, as is deeply discussed in the report. The exercise of the various models with biomass of this report shows this duality very well depending on the how land use will be developed in the world in the future. The issue of subsidies is considered and highlighted in the text. Almost all renewables require subsidies (and almost all other energy forms require subsidies including oil, nuclear, etc. in many countries).
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	The primary section headings vary in format; for example, the use of upper case is inconsistent (e.g., Section 2.4 vs. 2.6). There is also inconsistency in lower-level sub-headings: Section 2.1.1 (Page 8) uses number with heading; Section 2.3.3.1 uses no number with heading; Section 2.4.5.1 (Page 55) and 2.5.4.2 (Page 56) use number with heading; Section 2.5.3.3 uses no number with heading; etc. All of this needs checking for consistency.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	The serial comma (also known as the series comma, Oxford comma or Harvard comma) is the comma used immediately before a coordinating conjunction (usually ¿and¿ or ¿or¿, sometimes ¿nor¿) preceding the final item in a list of three or more items. For example, a list of three countries can be punctuated as either ¿Portugal, Spain, and France¿ (with the serial comma) or as ¿Portugal, Spain and France (without the serial coma). Will the chapter use the serial coma before the final ¿and¿ in lists or not? (At least judicious use is advisable because of the complexity of some of the sentences in the text, and many of these complex sentences already use it. This could mean some inconsistency, which ¿ unlike some other cases of inconsistency mentioned ¿ is totally acceptable to ensure clarity.)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	-	-	-	-	-	-	-	The terms ""marginal"", ""degraded"", ""underutilized"" lands are used without ever being defined. Need to clarify the meaning of these terms at first use.	Accepted. These terms will be included in the Glossary.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	-	-	-	-	-	-	-	The wording 'based on' is used very frequently in the text, often in a way that hurt my (non-native speaking) eyes. E.g. p17 line 28. Something for the English editor, I suppose.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	There are still sections of the chapter where the focus is exclusively on agriculture, and yet there is ample forestry literature to warrant balancing these two main feedstock production sectors. More work needs to be done on this. First, salvage harvesting deserves at least passing mention because it is far from trivial; Canada has potentially 2.5 times more biomass available annually from salvage than from logging residue. What would the impact on Europe be, especially on future prospects for pellet imports in the near- to medium-term, if Canada stopped salvaging standing deadwood? Northern forests are a substantial global forest resource, and natural disturbance is a major feature in them. Secondly, the potential for increased forest biomass through more intensive forest management deserves more attention and (even if only a paragraph) would balance the current section on agriculture. This requires a global perspective ¿ perhaps FAOSTAT would provide some useful context for the potential role of the extensive and lightly managed Canadian, Russian, and U.S. forests ¿ and some African and South American forests ¿ compared to intensively managed forests in Europe where less improvement may be possible.	Accepted. We will try to include forestry everywhere.
Finland (Finniah Meteorological Institute)	2	-	-	-	-	-	-	-	There exists numerous research papers on air quality and heatlh impacts of various bioenergy production technologies, fuels etc. These results should be assessed in a section of chapter 2.	These aspects are dealt with in Chapter 9, Sustainable Development and Renewable Energy.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	There is sometimes confusion in the chapter between the terms ¿biomass¿, ¿biomass supply (or production)¿ and ¿bioenergy¿: ¿biomass¿ is organic material, ¿biomass supply¿ is that which can be produced, and ¿bioenergy¿ is the actual energy produced from the biomass that can be supplied (or produced). (See Page 4 Lines 27-33 for the first example of imprecise use of terms.) Similarly, if biomass is a ¿resource¿ that is used to produce ¿bioenergy¿ (and therefore ¿bioenergy¿ is not in itself the resource ¿ although perhaps a ¿biofuels¿ could be) then it is essential that the units of measurement match that which is being reported. (See Page 4 Line 21 where the ¿resource potential¿ is in EJ; the biomass resource potential should be in grams, and the bioenergy which can potentially be produced from it should be in joules.) Please double-check the entire chapter using a word search for the relevant terms to ensure correct usage. It is essential that this chapter be precise in all use of terms, and not contribute to the needless confusion of terminology that sometimes arises within the bioenergy sector. Similarly, the reporting in tables of bioenergy in joules without a corresponding column for mass (grams) means that the chapter could have a limited shelf-life if we later start to use different biomass-to-bioenergy conversion factors for different biofuels; and it makes more work for readers who work with the basic unit ¿ biomass (g) ¿ instead of bioenergy (j). It makes perfect sense to have energy as the ultimate focus of the chapter (and hence relevant text, tables and figures), but it would be very useful to have biomass (in units of g) as a new column in all relevant tables, to the left of bioenergy columns (in units of j). If not, then each table should have footnotes giving biomass-to-bioenergy conversion factors for each feedstock type so that readers can easily back-calculate mass themselves.	Partially accepted. We must be careful with the definitions of biomass and bioenergy. Regarding the use of joules to quantify biomass energy is reasonable and found in the literature. The energy listed is the energy content of the biomass that can be harvested or collected. The terminology will be explained better. A driver for the use is how the International Energy Agency collects data for biomass (it is bioenergy but from the solid form) and secondary energy forms which include other solids (pellets, charcoal), liquid and gaseous biofuels. Hopefully, with terminology explained, it will be easier to understand the chapter.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	-	There is too much information. Prioritize, condense and reorganize. Readers need to have a clear set of conclusions and easy to read figures/tables	Accepted
Richard Plevin (UC Berkeley)	2	-	-	-	-	-	-	-	This chapter has a very pro-bioenergy flavor, by which I mean it highlights spurious claims about petroleum fuels (Gorissen; Liska and Perrin) while downplaying serious modeling studies that indicate potentially large GHG increases associated with bioenergy (Wise et al; Melillo et al). Oddly, these latter two studies are cited to support a point about a need for modeling, but the important results of these papers are not discussed at all. Like I said, this gives an impression of bias. Also, several sections tend to rely on repeated references to a relatively small number of mostly-European papers. The literature is much broader.	Accepted. The papers by Wise and Melillo will be further discussed in this chapter of the report.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	-	This section was a very well-developed. Unfortunately, the nature of the topic is such that only very broad generalizations can be made, but the authors handled the challenge well.	Thanks for the comment.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	To shorten the chapter, careful editing to reduce redundancy within sentences, and shorten some complex sentences, would probably result in about a 5% saving. (This would have the added benefit of increasing readability.) There is some redundancy between sections and sub-sections. Authors should read the chapter in one sitting with the sole intent of noting redundancies, and then decide amongst themselves how best to deal with this, and which sections should take priority. I have also noted some subsections that could be deleted or greatly reduced if the chapter length needs to be reduced beyond that which can be achieved by careful editing of sentences and paragraphs (e.g., Sections 2.6.3.3, 2.6.3.4, 2.6.3.5).	Accepted. Effort to reduce redundancy will continue.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Upper case is still not always used when ¿chapter¿, ¿figure¿ or ¿section¿ is part of a proper noun for a specific part of the chapter (e.g., Page 106, Sub-section 2.8.1); in other places, these words have an upper case when it is used as a common noun (i.e., specific chapter, etc., not referred to; see incorrect use Page 10 Line 40 and change ¿The section ends¿ to ¿The Section ends¿). This will need specific attention	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Use ¿1st¿ or ¿first¿ (e.g., Page 16 Line 5)? Check text for other uses of ¿1st¿.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Use of bold or bold/italic font could be used more to draw reader to key words in some paragraphs. (Some sections have used it very effectively, as if it was a sub-section heading, even if not at the beginning of the first sentence in a paragraph.)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	What is the rationale for figure and table numbers? The numbering system is not clear, and two figures have the same number (i.e., there are two Fig. 2.2.5s, one on Page 18 and one on Page 19).	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	What use should be adopted for words currently in inverted comas (Page 10 Line 25) and apostrophes? Probably best to not use them in cases where the word means exactly what is meant, as the two common uses indicate either that the word is a quotation from a different source, or that the meaning (inferred from the text) is the opposite of that usually meant by the word. I would therefore not recommend using them as in Page 10 Line 25.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	-	Writing style varies greatly throughout the chapter, which is undesirable but not necessarily problematic. Greater uniformity could be achieved by careful editing. The quality of the writing is also very variable, and this is more problematic; there were so many obvious (often small) corrections needed that it became an impossible task to note them all. Some sections were not concise in their language, and careful editing should lead to at least some level of reduction in overall chapter length.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
United States (U.S. Department of State)	2	-	-	-	-	2,7	-	-	The cost trends section is not very useful. Recommend that this section be re-written with inputs from a wider group of sources. Potential sources could be: design reports by NREL and PNNL, EPA RFS2 Regulatory Impact Assessment, and the recent National Academy report. Table TS 2.2 shows data on progress ratios. Progress ratios are very difficult for non-experts to understand. Different people use different definitons of progress ratios which makes matters more confusing. It is recommended that Table TS 2.2 be re-written to include data on cost of production and general process parameters such as yield instead of progress ratios.	Section is required due to agreed format; data compiled are based on review in 2.3 & 2.6. SRREN agreed to collect as much as possible information on learning rates.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.1	-	-	According to agreements reached during LA3 in Oxford, several issues are still missing from the Introduction: - introductory text of what the whole chapter includes - material on the historical use of the resource/technology - roadmap for the rest of the chapter, explaining what issues sections 2.2 through 2.8 will deal with.	Review Section 2.1
Richard Plevin (UC Berkeley)	2	-	-	-	-	2.1	-	-	Many (if not most) claims in this section lack citations.As a result, the text appears to be simply opinion.	Citations are in the different sections of the document. We will cross-reference to specific section where the detailed discussion and citations are.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.1.1	-	-	Cross-check energy supply/demand with figure 8.2 for consistency	Accepted
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.1.1	-	-	Some of this could be usefully cut or graphically summarized.	Text condensed and the key figures displayed for comparative purpose.
Helmut Haberl (Institute of Social Ecology, Vienna)	2	-	-	-	-	2.2	-	-	I think one study that should receive more attention in discussing bioenergy potentials is that of Johnston et al. (2009; Johnston M., Foley J.A., Holloway T., Kucharik C. & Monfreda C. (2009). Resetting global expectations from agricultural biofuels. Environmental Research Letters, 4, doi:10.1088/1748-9326/4/1/014004.). This study suggests that many bioenergy potential estimates might have grossly over-estimated yields by not sufficiently including productivity limitations. In my reading, this study should be discussed in section 2.2 and also influence its conclusions (see general comments above)	Reference will be further discussed. Added: b) biofuel yields from crops have frequently been overestimated by neglecting spatial variations in productivity (Johnston et al., 2009).
United States (U.S. Department of State)	2	-	-	-	-	2.2	-	-	One conclusion of the Resource Potential section is that the ultimate resource would be between <50 to 300 EJ per year (Table 2.2.1). However this gets frequently shortened to "several hundred EJ" in e.g. the summary section 2.2.5. The authors need to provide a clearer explanation for the increase in resource potential estimate, or stick to citing the numbers from the table. This also is the case for p 24 line 22-24.	will do
Gerrit Hansen (TSU)	2	-	-	-	-	2.2	-	-	section does not adhere adhere to OOA; most notably, section on climate change impacts on resource is missing, which is a mandatory part of the resource potential sections of technology chapters, and particularly relevant for biomass production. Information contained in the chapter (e.g. in 2.6.1.3) on this topic should be made easily accessible. Linked to this, structured information on water seems to be missing.	there are 2 places in 2.2 and 2.5 discussing climate change impacts, these will be solidified and expanded

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.2	-	-	Somewhere in this section the EEA (2006) report on environmentally sustainable biomass potential for the EU should be clearly cited because it is, to date, the only large-scale biomass inventory that takes guideline-like rules and applies them spatially across a major region of the world to determine biomass inventory; all other inventories make guesses, most of which are not justified in any detail. As a corollary, Titus et al. (2009) draw attention to one of the most important but simple factors which can be calculated from EEA (2006) data and which the original report does not highlight, which is the ratio (0.6) for determining ecological potential from total potential for forest harvesting residue over the EU (based on leaving foliage on-site).	check this
Elina Vapaavuori (Finnish Forest Research Institute)	2	-	-	-	-	2.2.	-	-	I see no reference to Finnish literature. For example, missing is the reference by Asikainen et al. 2008. Forest Energy Potential in Europe (EU27). Http://www.metla.fi/julkaisut/workingpapers/2008/mwp089.htm	A large number of papers, reports and potential citations exists, cannot all be taken on board
Rory Gilsenan (Natural Resources Canada)	2	-	-	-	-	2.2.1	-	-	Note that in the forest industry (and likely in the agricultural industry) there is growing recognition that many of the new conversion processes allow you to fractionate the biomass into its component parts (i.e., lignin, cellulose and hemi-cellulose) in a way that allows you to extract the component chemicals that enables the production of higher-value biochemicals and biomaterials. Thus, the development of these technologies enables new production pathways and product diversification, improving economies of traditional industries.	this section is on potentials, technical aspects are treated in 2.6
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	2.2.2	-	-	1. Chapter 2.2.2 states that ¿They (studies) quantify how much bioenergy could be produced at a certain future year based on using resources not required for meeting food/fibre demands, given a specified development in the world or in a region.¿ More recently, however, the potential of the reallocation of current raw material flows especially in the forest industry has been considered. This is a relevant option as liquid lignocellulosic fuels are introduced. Asikainen (2010) estimated that the potential of reallocation of wood in pulp and paper industry to biofuels could be 180 mill. m3 /year (1.9 GJ) globally. See Asikainen, A. 2010. Availability of woody biomass for biorefining. Celluloce Chemistry and Technology, 44(4-6):111-115.	check whether reference can support arguments in appropriate section
Rory Gilsenan (Natural Resources Canada)	2	-	-	-	-	2.2.2	-	-	Although you list the potential of increased productivity on agricultural lands at possibly increasing the amount of available biomass, you do not refer to possible improvements in forestry sylvicutural methods or management practices. Much research is being conducted on activities such as pre-commercial thinning, inter-cropping and fire suppression in Canada. While there is probably little to be gained in these areas in Europe, other developed countries, and particularly less-developed nations, can make significant strides in these areas.	this is actually mentioned in the section, see p. 21 line 21ff, but will be empasised more
Rory Gilsenan (Natural Resources Canada)	2	-	-	-	-	2.2.2	-	-	As suggested earlier, you should consider adding salvage material from natural disturbances. In Canada salvage material represents a significant source of biomass, which has little alternative uses. Canada ships some 1 million tonnes of pellets per year to Europe, and a significant portion of this material comes from mountain pine bettle salvage in recent years. We anticipate the available amount of this material to increase significantly in coming years due to drought, fire and insect infestation. A recent study has estimated that some 270 Mt of carbon is stored in mountain pine beetle-killed stands in the province of British Columbia alone (Kurz et al. 2008. Nature 452: 987-990)	will be briefly mentioned somewhere, also table 2.2.1
Gerrit Hansen (TSU)	2	-	-	-	-	2.2.2	-	-	definition of terms (economic potential, sustainable potential) needs to be consistent with the definitions provided in the glossary. Please reconcile your definitions with chapter 1 and glossary for consistency. Implementation potential is so far not defined in the glossary and not used in other chapters (agreed term: "potential deployment")	will be consistent, though the embedding of bioenergy in other systems like food production requires somewhat expanded defintions, see 2.2, though compatible with the glossary terms
Japan (the Japanese Ministry of Foreign Affairs)	2	-	-	-	-	2.2.2.3	-	-	Perhaps, the section should mention the social consequences of a develop-and-import scheme, including the acceration of poverty - instead of its elimination - in the case that local workers fall victims of cheap labor	Is being discussed in the chapter
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.2.4.1	-	-	This is an area of huge uncertainty that needs more thorough investigation and that should be one of the main recommendations of this section.	Research needs will be addressed at the conclusion of the chapter
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.2.4.2	-	-	Another major constrain on dedicated land production in forestry is the fact that trees have a higher profit margin when sold to the construction/furniture industry. Agroforestry raises the biomass resource potential without increasing the area of land used for biomass production.	The recent economic downturn has shown how quickly the industry adapts to the appearance of a new market. Solid biomass, chips and pellets, were sold significantly into the energy market.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Michael Jack (Scion (NZ Forest Research Institute))	2	-	-	-	-	2.2.5	-	-	I feel that this section is missing a discussion of the social resistance to land-use change. In NZ or marginal land is under pasture for sheep and beef farming. There is a huge social resistance to changing this to a more sustainable land use such as forestry, even if the economic drivers are there.	this is mentioned in several places, eg p. 23 line 21, and elsewhere, see 2.5; cannot be expanded here due to space limitations
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.2.5	-	-	What conclusions can be drawn from the cost supply curves in figure 2.2.5?	will improve explanation and linkage with other sections as this is a central concept
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.3	-	-	Section 2.3 would benefit from careful copy editing	Editing will be done
Hiromi Takeuchi (Advanced Industrial Science and Technology)	2	-	-	-	-	2.3	-	-	This part is too carefully written, so it will be better to write briefly in order to reduce pages. Partly, the descriptions in this part overlap with those in 2.6.	Why do you mean by 'carefully'? Does it lack clear conclusions?
United States (U.S. Department of State)	2	-	-	-	-	2.3	-	-	This section is inconsistent in formatting of dates - e.g. p. 29 line 32 refers to "the 70-ies" and normal convention would have that as the 1970's.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.3	-	-	This section seems quite confused. It starts by claiming that sugar rich feedstocks need least processing, then in the next paragraph that combustion requires least processing. It needs a clear introductory paragraph outlining which technologies suit which feedstocks and whcih applicaitons before delving into things. Probably it would then be best to have separate sections for biofuel technologies as opposed to heat/power.	Section structure will be simplified.
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.3.1	-	-	Some commentary on the physical and chemcial characteristics of these feedstocks and the issues these raise in conversion would be appropriate - many of them are not easy resources to deal with.	This is actually addressed in the logistics section, but a sentence will be added to link to that subsection
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.3.1.2	-	-	"Synergies" are mentioned beforehand already. Avoid doubling of information.	Some harmonization with 2.2 was already done, but text will be checked again to avoid repeats.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.3.1.2	-	-	Are the terms intercropping and agroforestry used interchangeably? If so, use only one of these terms for consistency.	No, they are not. Intercropping refers to an association of species on a given field, while agroforestry referes to a particular type of species combination
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.3.2	-	-	Nothing on logistics and supply chains of liquid biofuels?	The integration of the fuel systems with current and future energy systems is discussed in Chapter 8.
Rory Gilsenan (Natural Resources Canada)	2	-	-	-	-	2.3.2	-	-	Suggest that you note that moisture content is a major issue, as is heterogeneity of many feedstock supplies. Both of these factors make the biomass more difficult to transport, handle and process.	Highlighted in the text
United States (U.S. Department of State)	2	-	-	-	-	2.3.2	-	-	The section does quickly identify the fundamental transport/handling issues with low-density biomass feedstocks. However the section could use expansion - it only highlights handling issues associated with biomass-based primary energy sources in developing nations. It does not address the transport/logistics issues unfolding in the OECD nations that have set significant biomass/biofuel use policy-based targets for themselves. This includes both biomass for electricity production and certainly liquid biofuels for transportation. It would also be good if the section clarified that supply chain & transport issues arrive at two points in the supply chain for some biomass energy sources - on the front-end (feedstock logistics) and the back-end (i.e., biofuel distribution from point of refining to point of sale). Basically, transportation-related issues are an underappreciated limiting factor to the resource potential for bioenergy. It is also a good idea to point out that bioenergy transportation & supply chains are a critical element in LCA modeling for GHG impacts of various bioenergy resources.	Space restrictions prevent the chapter from addressing all issues raised. Solid biomass is addressed from both developing and developed countries' points of view. The integration of the energy systems (fuels and transportation) is addressed in Chapter 8. References are provided for the fact that transport of liquid fuels contribute only in a minor way to the overall costs and energy use of the bioenergy chains (and also to the GHG emissions). See end of page 29 -30
Rory Gilsenan (Natural Resources Canada)	2	-	-	-	-	2.3.2.1	-	-	Pellets also have issues with spontaneous combustion and with dust. Torrefaction represents a potential way to mitigate these issues, but development is still in the early stages.	Good point but severe space limitation does not allow us to fully describe all processes to this level of detail.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.3.2.1	-	-	Quality of english and especially flow or chapter is not of sufficient quality. (e.g. line 14: "on-goings", lines 15 "via" insteda of "by", line 17 "results" instead of "implies" in high shipping costs)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.3.2.2	-	-	Quality of english and especially flow or chapter is not of sufficient quality.	English will be revised, and section will be restructured

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.3.2.3	-	-	Provide a brief explanation of briquetting and pelletization	English will be revised, and section will be restructured
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.3.2.3	-	-	Weak structure. Improve the flow, shorten text, revise referencing.	English will be revised, and section will be restructured
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.3.3	-	-	Reorganize this section by separating preconditioning from conversion technologies and describe each separately as follows: a)Preconditioning processes mentioned in the first paragraph: mechanical, chemical, thermal or combined processes. Describe each process in this section. b)Conversion technologies Describe according to figure 2.1.1, using the same categorization: thermochemical, physical-chemical, chemical/biological, and biochemical. Further, breakdown in the biochemical processes into alcoholic fermentation, and aerobic and composting. Consolidate this section with 2.6.3.	Two sections will be more clearly separated. 2.3 will only address existing commercial technologies. Developing technologies will be in 2.6 as required by the IPCC format so that all technologies follow the same organization. Reviewer suggestions are good.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	-	-	-	-	2.3.3	-	-	The same applies to (mostly bio)chemical pathways to materials and chemicals. Is it a conscious choice not to pay attention to them? In this context, the concept of biorefinery could also be treated more explicitly.	The developing technologies will be in Section 2.6. Space restrictions do not allow significant additions
Michael Jack (Scion (NZ Forest Research Institute))	2	-	-	-	-	2.3.3	-	-	Think this section is missing some discussion of fuels cells for fuels other than hydrogen. The reason I think this is improtatnt is that these technologies are making quite abit of progress and one of the major shortcoming of bioenergy as a whole is that combustion is fundamentally an inefficient means of extracting chemical energy. This has important consequences for future implementaion, fuel cells are a way out of this issue.	see Chapter 8
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.3.3	-	-	This whole section reads like it has been pasted together from someone who wrote about biofuels and someone who wrote about traditional heating. The treatment of combustion, gasification and pyrolysis for power generation and heat is inadequate and needs revisiting by soemone with the right expertise. This is particularly important from the UK's perspecitve as it is one of our significant growth areas.	Accepted
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.3.3.1	-	-	The description of the processes vary in depth. Expand the descriptions of biomass combustion, pyrolysis and cogeneration. Include efficiencies and operating conditions. Provide a reference for the description of the pyrolysis process.	Space restrictions prevent the chapter from addressing technologies at high levels of detail. Will make them consistent
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.3.3.2	-	-	Introduction missing: which ones are covered here and why?	Will make this clear
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.3.4	-	-	In its current state, the valuable work that has been invested in putting together the data for state-of-the-art technologies is not yet adequately reflected by the text. Many vague expressions (marked in yellow in the addendum (Material_01.doc) make it difficult to extract a clear message and the logic behind the structure is not immediately apparent (e.g. paragraph 2 on biofuels, paragraph 3 on biomass, paragraph 4 and 5 on biofuels again). Also, some sentences are slightly unclear (commented in the addendum, Material_01.doc). For specific data provided in the text, the authors should consider adding the respective references, since it is hard to find in this huge table. Taking into account the excess number of pages of the chapter, a table of 9 page is not tolerable and significantly hinders the flow of the text. Reformatting and streamlining the text of Table 2.3.3 (e.g. the columns "major process" for biofuels, "efficiency process economics" for biomass) is crucial; if this is only possible to a limited degree, relocating the table in the appendix seems to be an alternative solution.	Accepted. The tables will be simplified and better explained.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.3.4	-	-	Revise the English in this section.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.4	-	-	According to agreements reached during LA3 in Oxford, this section should also report on "MWh, % of electric supply, $ investment, and employment". This is currently not the case. For employment, there should be at least a cross-reference to the sub-section 2.5.5.3. For example, the figures in this section should also show the percentage bioenergy share of electricity production per region (apparently 1 EJ globally, 1,4%; p. 18, l. 33)	Not certain al data are available and certainly not with a regional breakdown
Richard Plevin (UC Berkeley)	2	-	-	-	-	2.4	-	-	There is a significant lack of citations in this section, and of those that are there, many are not peer-reviewed sources.	Will increase peer reviewed sources
United States (U.S. Department of State)	2	-	-	-	-	2.4	-	-	This section could be shortened substantially be avoiding repetition and making the writing more concise.	Accepted. Section 2.4 will be rewritten and repetition from previous materials will be reduced.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.4.1	-	-	Some information in this section has been covered by the introduction to 2.1 - please avoid doubling	Introductory nformation will be placed in 2.1
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.4.2	-	-	"Barriers" to renewable energy technologies are a specific subject and are also covered in the SREEN. Hence, proivde cross-reference to this section in the SREEN and shortly explain which ones are covered here and why or why not (technical, economic, legal, infrastructure, etc.). As the chapter is now, it does not provide a clear and scientifically correct picture.	Accepted. We will improve inter chapter cross-referencing in several issues, including barriers.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.4.2	-	-	Section should deal with barriers, but also addresses drivers (see p. 48, line 41ff) -> revise heading or structure	2.4.4 already discusses drivers, space limitation should keep this small though
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.4.4	-	-	According to agreements reached during LA3 in Oxford, the section on policies (2.4.4 in this chapter) should contain a final sub-section titled "impact of policies", covering technology-specific barriers and policies. The current structure does not reflect this agreement.	Space limitations forced the team to remove policy overviews of various key countries. Chapter 9 may absorb part of this information
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.4.4	-	-	Provide a short introduction on the different types of policies and shortly state which ones are currently applied (and where).	Space limitations forced the team to remove policy overviews of various key countries. Chapter 9 may absorb part of this information
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.4.4.2	-	-	Please insert a cross-reference to the relevant sections in chapter 11 (e.g. 11.5.6.1) and 9.	Chapter 11 still needs to be checked on relevant content
United States (U.S. Department of State)	2	-	-	-	-	2.4.4.2	-	-	Section 2.4.4.2 - Sustainability Frameworks Not all sustainability frameworks are likely to be equally effective in addressing adverse consequences associated with biofuel production. Even though uncertainties remain about the extent of indirect land use change, it is a critical component of feedstock production sustainability. It could be helpful to note that addressing unwanted LUC also requires equal treatment of CO2 emissions from both fossil and biological sources.	Pointed out in the chapter
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.4.5.1	-	-	No reference is provided to substantiate the assertions made in the entire sub-section.	New reference is available
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.4.5.1	-	-	Revise structure	Comment unclear.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.4.5.2	-	-	This is a good place to discuss chain of custody: Tracking biofuel feedstocks through the entire process of harvesting, collecting, and converting them to biofuels, then distributing the biofuels themselves, can be complicated. However, to ensure that biofuels are being produced in a sustainable manner, some chain of custody (CoC) method must be used to track them. Generally, the three types of CoC methods are segregation, book-and-claim, and mass-balance.	Aceepted
Richard Plevin (UC Berkeley)	2	-	-	-	-	2.5.1.1	-	-	This section neglects the most fundamental methodological distinction, which is between attributional and consequential LCA. In my view, GHG mitigation estimates require consequential LCA. All the important effects on climate of bioenergy relate to a delta from a baseline: carbon sequestration, displacement of grid electricity, displacement of petrofuels, land use change. All are dependent on the choice of baseline, and thus highly uncertain. Blending these change-based analyses with a static decomposition of the fuel supply chain is incoherent in the sense that the two portions of the analysis apply different assumptions.	We disagree that the static decomposition has no value. We agree that both attributional and consequential analyses are needed and will be expanded. We fully agree that biomass share in the future energy portfolio is dependent of the issues you mention. But these issues are discussed and we use traditional IPCC scenarios to evaluate the share of bienergy. These scenarios includes how society will take care of land use change, , carbon sequestration, displacement of grid electricity and displacement of oil&gas. In particular these drivers are discussed one by one in the report.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.5.1.2	-	-	It is not quite clear why this section is not the introductory section to 2.5.2 and 2.5.3	Comment accepted and included in final
United States (U.S. Department of State)	2	-	-	-	-	2.5.1.2	-	-	Section 2.5.1.2 - Environmental effects related to climate change - It would be helpful to present in this section data on estimates of the cost per ton of CO2 avoided by different biomass energy systems (including land use change, and noting clearly all other key assumptions), which would be a helpful point of comparison with the other renewable sources discussed in this report.	Indeed, this suggestion was taken fully. The comparison resides in Chapter 9 on Sustainable Development and Climate Mitigation. To the extent that data were available that NREL had collected for other purposes, the information was assembled in Chapter 9. Multiple factors were considered.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.5.1.2	-	-	This section would benefit from a clearer discussion of the dynamic aspects of the climate change impacts of bioenergy. The extent to which bioenergy reduces GHG remissions relative to fossil systems depends on the time horizon over which emissions are measured. Because clearing natural vegetation to produce crops typically leads to an initial large release of biological carbon to the atmosphere (which some authors have termed the ¿carbon debt¿) which is only gradually offset by the reduction in fossil emissions, it can take years or even decades to for bioenergy to result in climate benefits. This dynamic element is discussed in Fargione et al (2008), Searchinger et al. (2008), and U.S. Environmental Protection Agency (2010), to name a few references. Results are extremely variable depending on the feedstock types, ecosystems affected, and fossil fuels replaced. This point is mentioned on p. 61 and 64, but it warrants a more in-depth treatment in this chapter.	Accepted. Further information and discussion on this issue will be added trying to make conclusions more transparent.
Switzerland (Swiss Federal Office for the Environment)	2	-	-	-	-	2.5.2	-	-	Results from the literature on life cycle assessments (including the energy/GHG balance) of liquid biofuels, and reference to first/second generation liquid biofuels should be added, e.g. Zah R, Böni H, Gauch H, Hischier R, Lehmann M, Wäger P (2007): 'Ökobilanz von Energieprodukten: Ökologische Bewertung von Biotreibstoffen', EMPA Dübendorf CH (Study is reviewed by Scharlemann JPW and Laurence WF, Science 319 (2008): 43 - 44); or World Watch Institute (2006): 'Biofuels for transportation: global potential and implications for sustainable agriculture and energy in the 21st century.'	Indeed, this reference was used in the analyses and is cited in Chapter 9. The data from this reference was part of the set analyzed by NREL. The GHG/energy balance analysis of Chapter 2 and Chapter 9 were coordinated and not all references made it to both chapters. The data were considered. The World Watch 2006 reference is indeed cited. The reference by Scharlemann is indeed cited in Chapter 1 when discussing policy options, an objective of the Zah et al. and others.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.5.2	-	-	This is a good place to introduce the "carbon neutrality" discussion that is happening in the United States as well as in Europe. Basically, the carbon neutrality of second-generation biofuels-in particular from trees- has been brought into question by researchers who argue that wood is a very carbon-dense feedstock and that it would take many cycles of tree growth/ harvest (sometimes equivalent to hundreds of years) and certain tree management practices to make wood biofuels carbon neutral. More information available at: http://www.manomet.org/node/322 and http://www.ssb.no/emner/08/05/10/oa/201003/holtsmark.pdf	This policy study was considered for inclusion and the combination of references provided in Chapter 2 include the basis for understanding the conclusions of the Monomet study, and go beyond. There was not sufficient space to illustrate all the nuances of the legislation and calculations used in that policy which have very specific conditions (need to repay the carbon very quickly and the baseline comparisons). If we explained this example in detail, we would also have to explain the examples in detail of the Nordic countries. Some of these countries reach conclusions that are quite different than those of the Manomet study. It was not possible within the space available to delve with the multitude of policy options and how they can be viewed in different locations. The bottom line is actually brought in very well in the text: the use of forest biomass can be sustainable (sustainable forestry) but the carbon benefits are not obtained in short term but are in the 20+ year timeframe. They have a role in the future as they have today for sustainable development.
United States (U.S. Department of State)	2	-	-	-	-	2.5.3	-	-	A key reference worth discussing in this section is Wise et al. (2009, Science). This study compares land use under two 450ppm stabilization scenarios¿one in which only fossil emissions are controlled, the other in which both fossil and land use emissions are covered. Bioenergy use is several orders of magnitude lower¿in fact, it barely rises above business-as-usual levels¿when land and fossil emissions are treated comparably. This study is cited but is not discussed in any depth. It could even be worthwhile to include the following figure from the paper illustrating this impact.	The reference Wise et al. (2009) is cited and the discussion of the paper will be increased.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.5.3	-	-	A useful reference for the direct land use impacts for woody biomass used in heat and power systems in the U.S. is by Manomet Center for Conservation Sciences (2010; ¿Biomass Sustainability and Carbon Policy Study¿).	This policy study was considered for inclusion and the combination of references provided in Chapter 2 include the basis for understanding the conclusions of the Monomet study, and go beyond. There was not sufficient space to illustrate all the nuances of the legislation and calculations used in that policy which have very specific conditions (need to repay the carbon very quickly and the baseline comparisons). If we explained this example in detail, we would also have to explain the examples in detail of the Nordic countries. Some of these countries reach conclusions that are quite different than those of the Manomet study. It was not possible within the space available to delve with the multitude of policy options and how they can be viewed in different locations. The bottom line is actually brought in very well in the text: the use of forest biomass can be sustainable (sustainable forestry) but the carbon benefits are not obtained in short term but are in the 20+ year timeframe. They have a role in the future as they have today for sustainable development.
United States (U.S. Department of State)	2	-	-	-	-	2.5.3	-	-	Failure to control carbon emissions and incentivize sequestration from land could lead to ¿leakage¿ of emissions from the energy sector to the agricultural and forestry sectors if carbon prices on fossil fuels only spur the substitution away from fossil to biomass energy.	Accepted. We will enlarge the discussion on iLUC
United States (U.S. Department of State)	2	-	-	-	-	2.5.3	-	-	It is important to explain the role of market forces in causing iLUC. If demand for biomass feedstocks for energy production rises, that raises the price of agricultural crops globally, which in turn spurs and increase in the price of cultivated land and encourages the expansion of agriculture. This is an economic phenomenon that is expected to occur to some extent even if sustainability criteria are adopted.	Accepted. iLUC discussion will be enlarged and this point raised not only in Chapter 2 but also in Chapter 9 (sustainable development and carbon mitigation with renewables).
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.5.3	-	-	Please consider adding the references to the relevant text that are mentioned in Chapter 10.6.2.4 on carbon and energy balances in forestry: Korhonen et al. (2001) and Palosuo (2008).	Neither reference was included in Chapter 10 but other references derived from the studies mentioned and more recent were added in Chapter 2. Our Finnish Lead Author selected representative references to cover the region and all aspects related to sustainability, energy and carbon balances. The Palosuo thesis and the excellent paper by Korhonen are contained within the references cited.
United States (U.S. Department of State)	2	-	-	-	-	2.5.3	-	-	The tradeoff between land use for bioenergy and for biological carbon sequestration (e.g., leaving natural carbon-dense ecosystems intact) is mentioned in this section, but warrants additional emphasis. It is important to note that policies aimed at preventing direct conversion of natural ecosystems to biomass production are likely to be ineffective in preventing LUC, since biomass feedstocks can be grown on existing agricultural lands, and food crops can simply shift into newly cleared land. Nor does setting aside tropical forests in reserves guarantee that bioenergy has climate benefits. Even if particular ecosystems are protected, increased feedstock demand will tend to spur the conversion of native ecosystems to agricultural production somewhere, which could lead to biological carbon releases.	Accepted. The discussion on iLUC was expanded and the indication of the tradeoffs needed to consider various factors simultaneously was indicated. The tradeoffs are also considered in Chapter 9 (sustainable development and carbon mitigation with renewables)
United States (U.S. Department of State)	2	-	-	-	-	2.5.3	-	-	This section could be much clearer if it started with a definition of direct and indirect land use change, noting that the aggregate impact of all land use change that results from bioenergy expansion is what is important in determining the effect on GHG emissions. For studies to be credible, they do not need to separate direct and indirect land use change, as is implied on p. 66--rather, the total effect is what is most relevant for policy analysis, although there may be important regional considerations.	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.5.3.1	-	-	2.5.3.1 ¿ Methodologies for land use change modeling (p. 66-67): The paragraph that begins ¿Implementation of the use of these modeling systems¿¿ (lines 22-28) is a direct repetition of language in the previous paragraph. It should be cut. It is recommended that authors delete the assertion that macroeconomic/econometric models ¿can be viewed as lacking transparency to non-modelers¿ unless evidence is provided that this is true relative to other types of models. It is recommended that authors drop the assertion in this section and elsewhere in the chapter that estimation of LUC impacts is ¿converging.¿ The LUC issue has only gained wide attention with an increasing number of publications since 2008, and studies are still somewhat sparse. E.g., the LUC impacts from using woody biomass and other feedstocks for heat and power production remain under-studied. In addition, better estimates of the key parameters in global land use models (e.g., the land supply elasticity and the elasticities of substation between cropland, pasture, and forests) are needed before stronger conclusions can be drawn. Many more studies will have to be done before it can be determined whether results are converging.	Section will be rewritten and additional data added including of elasticities determined by direct measurements and statistics.
Richard Plevin (UC Berkeley)	2	-	-	-	-	2.5.3.1	-	-	This section is presented (in prior paragraph) as a summary of methods, but in fact it starts out with a critique, and needs for improvement, citing two authors who have voiced opposition to including ILUC estimates in fuel GHG policies. This indicates a lack of balance.	Thanks for the comments. The section will be rewritten to show multiple viewpoints.
United States (U.S. Department of State)	2	-	-	-	-	2.5.3.2	-	-	Section 2.5.3.2 ¿ Traditional bioenergy: This section could be shortened substantially.	The amount of information required needs this much space
United States (U.S. Department of State)	2	-	-	-	-	2.5.3.3	-	-	Argonne National Laboratory has written a recent report on water requirement for corn ethanol. This peer reviewed report "Consumptive Water Use in the Production of Ethanol and Petroleum Gasoline" by May Wu and others is available at http://www.transportation.anl.gov/modeling_simulation/GREET/publications.html and could be used as a source material to supplement this section.	Will include Wu 2010
Germany (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)	2	-	-	-	-	2.5.3.3	-	-	Good summary of indoor air pollution due to "traditional devices". What is missing, is a similarly detailed account of local ambient air pollution and related health impacts due to all but the most technically advanced small appliances for the combustion of solid biomass. See above comments on page 67 and on page 70.	Will consider inclusion of this information although Chapter 9 will treat the air impacts of all renewables more directly.
Peter de Haan (Ernst Basler + Partner AG)	2	-	-	-	-	2.5.3.3	-	-	how does this section relate to the micro-, meso- and macro-scale in fig. 2.5.5?	Will further expain scale implications
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.5.3.3	-	-	it would be relevant to mention reference systems here as wider impacts are often particularly sensitive to thesee.g. changes in biodiversity depend on what is being replaced, likewise agrochemical use and water impacts	This is discussed in Ch2 and then reinforced in Ch 9 dealing with sustainable development. Figures there will show the major changes and values.
United States (U.S. Department of State)	2	-	-	-	-	2.5.3.3	-	-	Section 2.5.3.3 ¿ Impacts on air quality and water resources (p. 70) Please provide data on water usage in biomass energy systems compared to other conventional and renewable energy systems, ideally for both electricity and liquid fuel production.	Will include Wu 2010
Jörn Scharlemann (United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC))	2	-	-	-	-	2.5.3.3	-	-	Section on "Habitat Loss" is biassed towards listing the positive impacts of bioenergy production and mentioning negative impacts only in a paragraph. There are several key papers that could be cited here, eg. Fitzherbert et al 2009 How will oil palm expansion affect biodiversity? Trends in Ecology & Evolution; Danielsen et al 2008 Biofuel Plantations on Forested Lands: Double Jeopardy for Biodiversity and Climate. Conservation Biology; and other publications.	Will further explain biodiversity implications. Will add: Fitzherbert, E.B., M.J. Struebig, A. Morel, F. Danielsen, C.A. Brühl, P.F. Donald, and B. Phalan (2008). How will oil palm expansion affect biodiversity? Trends in Ecology & Evolution, 23(10), pp. 538-545.; Danielsen, F., H. Beukema, N.D. Burgess, F. Parish, C.A. Brühl, P.F. Donald, D. Murdiyarso, B.E.N. Phalan, L. Reijnders, M. Struebig, and E.B. Fitzherbert (2009). Biofuel plantations on forested lands: Double jeopardy for biodiversity and climate (Plantaciones de biocombustible en terrenos boscosos: Doble peligro para la biodiversidad y el clima). Conservation Biology, 23(2), pp. 348-358.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.5.3.3	-	-	The discussion of Habitat Loss reads as overly optimistic about the prospects for bioenergy to have positive impacts on biodiversity. Historic patterns of agricultural expansion suggest that expansion is more likely to occur on unmanaged vegetated land rather than degraded land, and the supply of the former outstrips the latter. It would be useful to note that positive impacts could occur in localized examples, but on the global level, significant expansion has been shown by several economic models to lead to large-scale habitat loss. Suggest shortening the discussion of positive impacts, and also discussing the results of Melillo et al. (2009), since this paper shows that large-scale expansion of bioenergy is likely to lead to land clearing in major world centers of biodiversity, even when significant improvements in agricultural intensification helps to limit deforestation and when non-food cellulosic feedstocks are used. In particular, it is suggested that authors cut the assertions that ¿¿bioenergy can reduce global warming ¿ which is expected to be a major driver behind habitat loss with resulting biodiversity decline,¿ and ¿However, forest clearing is most influenced by local social, economic, technological, biophysical, political and demographic forces.¿	Will further explain biodiversity iimplications. Melillo et al. will be discussed in more detail.
Peter de Haan (Ernst Basler + Partner AG)	2	-	-	-	-	2.5.3.3	-	-	where is biodiversity?	There are specific subsections on biodiversity that will be strengthened.
Brazil (Ministry of Science and Technology)	2	-	-	-	-	2.5.3.3.1	-	-	This section is poorly developed when compared with the importance of soil. Non-tillage (with soy, for instance) and other soil protection practices may be highlighted here.	Will expand on soil importance
United States (U.S. Department of State)	2	-	-	-	-	2.5.5	-	-	Section 2.5.5 ¿ Socioeconomic Aspects (p. 73): Rather than claiming employment, income, and health benefits from biofuels in the first paragraph of this section, it would be more defensible to list these factors neutrally as areas where change may occur. It is not clear that biofuel production always improves employment, income, and health on net relative to baseline conditions. It is also misleading to suggest that ¿sustainability criteria¿ can always mitigate any adverse socioeconomic impacts. As noted in a later subsection of the report, the landless poor in developing countries are very likely to experience adverse impacts from higher food prices in response to use of land for bioenergy production, while poor farmers will benefit form higher prices (whether or not they produce bioenergy feedstocks); on balance, positive impacts are far from assured. Also, sustainability criteria are never clearly defined, nor are examples given of what types of criteria are likely to be successful in mitigating negative impacts. Suggest removing any claims that bioenergy ¿will result in increased social cohesion and conditions for greater social stability.¿ Where is the evidence in support of such a claim?	Accepted. Removals of claims accepted.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.5.5	-	-	Section 2.5.5 has little on forestry in it. Balance is needed, and the literature surely exists to do this? (It is outside my area of expertise, but I have seen papers on socioeconomic aspects of forest bioenergy.)	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.5.5.1	-	-	Please insert a cross-reference to the relevant sections in chapter 11 (e.g. 11.5.6.1) and 9.	Accepted
United States (U.S. Department of State)	2	-	-	-	-	2.5.5.1	-	-	Sec. 2.5.5.1 ¿ Socio-economic impact studies¿ (p. 73-74): It is incorrect to claim that socioeconomic impacts like employment and income or environmental externalities are not amenable to quantitative analysis. I do not agree with the recommendation that ¿semi-quantitative approaches based on stakeholder involvement¿ are preferable to quantitative approaches for assessing these impacts. That statement that ¿externalities (environmental and social) are seldom quantified in cost-benefit analyses¿ is overstated; many of the studies cited in this report include quantification of GHG and air pollution externalities associated with bioenergy and fossil fuel use. Citation for monetization of GHG benefits is the U.S. Government Interagency Working Group on the Social Cost of Carbon (2010). Also refer to economic valuation (for GHG benefits) work by Nordhaus, Hope, etc.	Reviewer is correct that both approaches are possible and text will include some examples. The statement is less overstated in the context of the DC where some multicriteria analyses have been performed but not to the same level of the studies of Environmental and Social Impact Statements that are used in developed countries.
United States (U.S. Department of State)	2	-	-	-	-	2.5.5.2	-	-	Section 2.5.5.2 (p.74-75): Suggest cutting figure 2.5.4, as it seems only tangentially related to the topic of this chapter. This entire subsection could be substantially shortened.	The section will be revised and shortened but the figure makes a critical contribution

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.5.5.3	-	-	According to agreements reached during LA3 in Oxford, this section should also report on "public attitudes and acceptance" as well as on "minimizing social and environmental concerns". This is currently not the case.	Accepted
United States (U.S. Department of State)	2	-	-	-	-	2.5.5.3	-	-	Section 2.5.5.3: Provide a citation for the assertion that ¿bioenergy generates more jobs per energy delivered than other energy sources¿, particularly compared to other renewable energy sources (p. 76). Please provide data on the labor intensity of various conventional and renewable energy systems to support this claim.	Various references added. See also Chapters 9 and 10.
Supachai Panitchpakdi (United Nations Conference on Trade and Development)	2	-	-	-	-	2.5.5.4	-	-	Risks to food security: The sub-section¿s main points need to be stated more clearly. The differences between net-food buyers and net sellers need to be put forward in a more rigorous way. The same comment applies to the tentative argument regarding the strong interlinkages between energy and food commodities. See the background papers posted prepared by UNCTAD¿s Special Unit on Commodities, available at: http://www.unctad.info/en/Special-Unit-on-Commodities/Events-and-Meetings/Multi-Year-Expert-Meeting/.	This section will be revised significantly
Brazil (Ministry of Science and Technology)	2	-	-	-	-	2.5.5.4	-	-	This section is clearly biased against bioenergy, particularly against liquid fuels. Most of the studies cited are from 2007 and 2008, a period marked by significant food price increases due in large measure to crop failures related to adverse weather, and also to speculative activities in commodities markets. In addition, most of the references made to these studies stress the negative aspects of bioenergy. Many positive aspects of bioenergy mentioned in the same studies were not taken into account. This whole section should be redrafted in a more balanced way, and should make reference to more recent studies, which analyse commodity prices after the peaks of 2007 and 2008.	We will revised the section to provide a more balanced text
Brazil (Ministry of Science and Technology)	2	-	-	-	-	2.5.5.4	-	-	This section should start with the remark that commodity prices are determined by a complex set of factors, of which biofuels is only one and not the greatest, and that projections of future prices are highly uncertain. It should also be noted that projections concerning biofuels rely on highly uncertain assumptions about the entry into the market of second-generation technologies. Sources: Zezza et al 2008, p. 2-3; OECD-FAO Agricultural Outlook 2008-2017, p. 16, 49; OECD-FAO Agricultural Outlook 2009-2018, p. 116.	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.5.6	-	-	Because of the usage of the expressions "we found" (p. 80, l.12), "it was possible" (p. 80, l. 20), "we illustrate" (p. 81, l. 1), "was then coupled" (p. 81, l. 17/8), "we show" (p. 81, l. 21) etc., this conclusion reads rather like a conclusion from a research paper as opposed to a assessment report. Please consider rephrasing, also because tenses are not consistently used.	Will edit tense
United States (U.S. Department of State)	2	-	-	-	-	2.5.6	-	-	I found this section in particular to be poorly written and very difficult to follow as a result. It needs a thorough re-write. One particularly bad example is on p. 81 lines 1-5 - a run-on sentence which makes no sense.	Section will be rewritten
United States (U.S. Department of State)	2	-	-	-	-	2.5.6	-	-	Section 2.5.6 ¿ Summary - p. 80: This sub-section could be substantially shortened by cutting digressions and more concisely stating the main conclusions of the section. Suggest cutting figure 2.5.5 (Climate Change-Land Use-Energy Nexus), as it is not adding much value beyond what is already contained in the text, nor is it explained. Note that, according to Melillo et al. 2009, agricultural intensification can mitigate some, but not all, of the adverse GHG and biodiversity impacts associated with large-scale biofuel production.	Will edit tense
Richard Plevin (UC Berkeley)	2	-	-	-	-	2.5.6	-	-	This summary is very weak. Parts appear to have been copied from another source, given the change in tone, the use of "we illustrate" and "we show" in cases that apparently are not illustrated or shown. (E.g., "We show that initial models were lacking in geographic resolution" Where was this shown?) This section overall is somewhat incoherent.	Section will be rewritten
Michael Jack (Scion (NZ Forest Research Institute))	2	-	-	-	-	2.6	-	-	Given the important constraints on combustion methods of extracting useful energy from biomass, this section should also at least mention the posibility of using fuel cells with fuels of biomass-origin. This description should go beyong simply hydrogen, as there are anumber of other fuel cell types under development and even comercialization.	Need to check with the integration chapter where fuel cells are discussed.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.6.1	-	-	This section gives only vague lip service to the potential role of climate impacts in future bioenergy feedstock production. It is not included at all in table 2.6.1, which is misleading. The specific section on climate impacts - 2.6.1.3 - relies entirely on one reference, the last IPCC report. This issue needs more attention. If more literature cannot be found, then the authors need to highlight climate impacts on bioenergy feedstocks as a area where more research is necessary.	More references will be added, esp regarding the forestry sector (see below remark). There is a lack of literature data, though. This will be pointed out.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.1.1	-	-	No reference to forestry, but yield gains are certainly possible. Once timber supply exceeds AAC, then excess roundwood and resultant logging residue can all be used for bioenergy as well (see EEA 2006). See my comments on first draft on potential to increase managed forest productivity through intensive silviculture re: multiple benefits in C management (increased sequestration); increased roundwood for forest products (including bioenergy, once traditional markets are saturated); and increased availability of harvesting residue if cutting increases. Paquette and Messier (2009) Front. Ecol. Environ. point out that plantations need not be biological deserts; they refer readers to Seymour & Hunter re: land zonation for different intensities of forest management called the triad approach (see also Messier et al. 2009. For. Chron. 85: 885-896 for practical application of triad approach); see Markewitz (2006) For. Ecol. Manage. 236:153-161 for review of silviculture and C issues; fertilization alone can create a 7- to 15-fold net increase on return of C invested in fertilization cf. new growth. The potential for inter-related benefits (including biomass feedstock and C sequestration) through intensive forest management should not be ignored. There is no shortage of literature on increased tree growth through improved reforestation methods, improved genetic stock, spacing, fertilization, etc. Some European foresters may feel that they have little room for improvement but, from a Canadian perspective, the Atlantic Provinces Economic Council (2003; The New Brunswick Forest Industry: The Potential Economic Impact of Proposals to Increase the Wood Supply. Atlantic Provinces Economic Council, Halifax, N.S.) estimates that it would be possible to increase forest productivity of public lands in New Brunswick two-fold within 35 years; and Paquette and Messier (2010; The role of plantations in managing the world's forests in the Anthropocene. Frontiers in Ecology and the Environment 8: 27-34) estimate that Canada could increase forest plantations without harming the environment. Intuitively, it seems that there should be great global potential if forests in Russia, Canada, the U.S. and some of the larger countries in the developing world were to increase growth rates through improved management, perhaps in response to C markets leading to even just increased fertilization? Why should we assume that it will only be agriculture that increases site productivity in the coming decades, especially if C markets expand, or countries begin to put policies in place to support intensification of forest management? What about compiling some statistics from FAOSTAT for major forest nations and estimate what a 50% or 100% increase in AAC would mean re: bioenergy production? If the chapter authors are willing to accept estimates of a 70% increase in global food production by 2050, what kind of increase in global forest productivity are they willing to accept as credible, if we were serious about bioenergy production? This is surely worth at least gaming with different possible scenarios: Fig. 2.1.2 shows that agriculture contributes 9% to global bioenergy but forestry contributes 87%; Fig. 2.1.3 is not easy to digest but suggests the same kinds of proportions; P. 9 L.15-16 puts the two at the same level (and far behind energy crops, which presumably includes willow and poplar); Table 2.2.1 puts residues from forestry ahead of those from agriculture ¿ but shows largest potential for surplus and marginal agricultural land. The chapter needs balance and still more details on forestry¿ and the above is also relevant to Section 2.2.2 (Assessments of the biomass resource potential) and Section 2.6.1 (Feedstock production).	More references for potential increased biomass output from forestry will be added
United States (U.S. Department of State)	2	-	-	-	-	2.6.1.2	-	-	The "aquatic biomass" section suffers because it is missing any discussion of heterotrophic algae. There are 3 primary microalgae systems under consideration: open pond, closed photobioreactor (both phototrophic) and heterotropic. Description of heterotrophic algae and data for these systems needs to be included. Solazyme is one example of an industrial entity leading this area. In many instances, heterotrophic algae systems may have cost advantages over the photosynthetic algae.	Will be added; in fact, it is referred to in Table 2.6.2.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.1.2	-	-	There is no mention of algae up until this point in the chapter. Can it be at least introduced in earlier sections (in a sentence or two, or comment in some of the tables) and readers referred to Section 2.6.1.2 for more details? This would mean that this section is less of a surprise to readers.	Mention of aquatic biomass in section 2.3 will be considered; in addition, the microalgae portion was already included in Figure 2.5.1 among the various conversion technologies
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.6.1.3	-	-	According to agreements reached during LA3 in Oxford, this sub-section should be part of section 2.2.	I do not remember this agreement. The current agreement was introduc CC impacts to transfer text on CC effects to 2.6.1
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.1.4	-	-	Is there nothing that can be said about future outlooks and costs for forestry? Short-rotation woody crops?	No literature was found. But additional expertise will be sought to broaden the literature base.
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	2.6.2	-	-	1. Improvements in biomass Logistics and supply chains does not mention the technology transfer the importance of which has stressed by number of authors in the improvement of logistics and supply chains and also to steep the learning curve. see e.g. Asikainen, A., Anttila, P., Heinimö, J., Smith, T., Stupak, I. and Ferreira Quirino, W. 2010. Forest and Bioenergy Production. In: Mery, G., Katila, P., Galloway, G., Alfaro, R., Kanninen, M., Lobovikov, M. and Varjo, J. (eds.) Forest and Society - Responding to Global Drivers of Change. IUFRO World Series Vol. 25. Vienna. p. 183-200.	Add a sentence on Technology Transfer and the reference provided
United States (U.S. Department of State)	2	-	-	-	-	2.6.2	-	-	Placing the discussion of pyrolysis in the pretreatment section is not appropriate. The Kior version, for example, employs a catalyst inside the pyrolysis reactor and so constitutes a new process of ¿catalytic pyrolysis¿ which yields a bio-oil intermediate which can be fed directly into an existing petroleum refinery. This intermediate is akin to the C15 hydrocarbon intermediate produced in the Amyris process, which needs only minor further processing for end use. It may be more appropriate, with the latest versions of pyrolysis, to treat this as a conversion process and not pretreatment.	Accepted. Pyrolysis as a pretreatment (yes it is used as such to generate oil for electricity generation) will be separated from pyrolysis or other thermal treatments. Amyris and other microbial processing variants will also be separated.
United States (U.S. Department of State)	2	-	-	-	-	2.6.3	-	-	(Part 1 of 2 of this 2nd comment on Section 2.6.3) The outdatedness of the information in this section is also reflected in the summary of biofuels conversion process given earlier in the chapter in Figures 2.1.1 and 2.3.1(lower part), which say nothing of the aqueous phase processing, nor the microbial routes to hydrocarbons. I feel that these figures should be updated to include these pathways. Section 2.3.3.3 should contain a clear description of fermentation to hydrocarbons. Section 2.3.3.1 should include a description of aqueous phase processing and pyrolysis and gasification paragraphs should be rewritten to include the newest catalytic versions of these processes. (See continuation of comment in new row)	Table 2.6.2 incluse the Algal biomass derived fuels. No space to discuss technologies in detail
United States (U.S. Department of State)	2	-	-	-	-	2.6.3	-	-	(Part 1 of 2 of this first comment on Section 2.6.3) Biomass conversion sections of chapter 2, including in the Chapter Conclusion, are seriously deficient in content. Section 2.6.3 is both outdated and incomplete. In Table 2.6.2, for example, the status of the technologies drop-in hydrocarbons, as listed in the ¿Development needed¿ column indicates that all of these technologies are at benchtop scale and need proof at pilot scale. In fact, a good number of ¿advanced hydrocarbon¿ fuel synthesis process have progressed well beyond pilot scale and not only have achieved demonstration scale but their commercialization is being planned. 1. Virent Energy Systems announced in March 2010 the successful startup of a demonstration plant in Madison, Wisconsin. See http://www.virent.com/News/press/06-08-10_Virent_Secures_46_Million_in_Funding_to_Accelerate_Technology_Scale-Up.pdf. This is an ¿aqueous phase processing¿ pathway that utilized solid catalysts to convert dissolved carbohydrates into gasoline. Virent has recently secured $46 million to accelerate biofuels scaleup from Shell, Cargill and other investors (http://www.virent.com/News/press/06-08-10_Virent_Secures_46_Million_in_Funding_to_Accelerate_Technology_Scale-Up.pdf). (Continued in next comment)	Tables 2.6.2 and 2.6.3 include not only ethanol, but hydrocarbon fuels. The section will be rewritten to include multiple biofuels and multiple pathways. The initial request was to highlight commercial biofuels and only briefly describe developing.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.6.3	-	-	(Part 2 of 2 of this 2nd comment on 2.6.3, continued from early comment above) Elsewhere, phrases are used which convey an ¿ethanol only¿ mentality that is now outdated. For example, in section 2.1, p. 6/168 line 23 ¿ethanol instead of gasoline¿ could instead read ¿renewable gasoline instead of crude-oil-derived gasoline¿, in section 2.3.3, p. 31/168, line 35 ¿¿that can be fermented into liquid fuels such as ethanol or butanol or a variety of other products¿ could read ¿¿that can be fermented into liquid alcohol or hydrocarbon fuels¿, and in section 2.4.4, on page 51/168, line 23, U.S. state and federal incentives are referred to for ethanol, but in fact should read ¿biofuels¿. EISA 2007 is not an ethanol mandate, it¿s a biofuels mandate. The impression is that the material was written several years ago when ethanol was the main focus of biofuels research and funding in the U.S. and has not been updated to include the recent R&D successes in drop-in replacement HC fuels and the change in U.S. federal funding priorities. If it was written more recently, the authors have simply missed the most recent developments in hydrocarbon biofuels. In either case, the chapter is not as accurate and indeed, as optimistic, as it should be.	Tables 2.6.2 and 2.6.3 include not only ethanol, but hydrocarbon fuels. The section will be rewritten to include multiple biofuels and multiple pathways. The initial request was to highlight commercial biofuels and only briefly describe developing.
United States (U.S. Department of State)	2	-	-	-	-	2.6.3	-	-	(Part 2 of 2 of this first comment on Section 2.6.3 - Continued from earlier comment above) 2. Amyris now has a demonstration plant in Campinas, Brasil, to turn sugarcane juice into diesel fuel using microbial fermentation to C15 hydrocarbon intermediates which can be further processed into diesel fuel and chemicals. See http://www.amyrisbiotech.com/products/commercialization. They are also planning their first commercial facility in Pradopolis, Brasil, to be in service by the second quarter of 2012. For the U.S. they plan to use sweet sorghum as a feedstock. 3. LS9 announced last February (http://www.ls9.com/news/pr_100203.html) that by late 2010 it will place into operation a 50,000 ¿ 100,000 gallon/year demonstration plant in Okeechobee, Florida. Via their ¿Renewable Petroleum¿¿ technology ¿ designer microbes - they will convert diverse renewable feeds (soluble sugars) into diesel fuel. The ¿Ultraclean Diesel¿ has received EPA registration (http://www.ls9.com/news/pr_100413.html). 4. While they have thus far operated in stealth mode, Kior has operated a demonstration plant in Houston, Texas since April, 2010. They convert wood waste via catalytic pyrolysis to a high quality bio-oil intermediate that can be directly inserted into existing petroleum refineries. Kior has made open presentations at NSF and DOE for the last several years and was featured in a Science perspective in August, 2009 (Science 325, 822). Thus, not only does the pathway of BTL have a demonstration unit (Table 2.6.2) for advanced hydrocarbon fuels, but also the pathways of microbial fermentation (e.g. Amyris and LS9), aqueous phase processing (Virent), and catalytic pyrolysis (e.g. KIOR).	Table 2.6.2 incluse the Algal biomass derived fuels. To present new technologies already in use requires unbiassed references. These are not provided by the reviewers.
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	2.6.3	-	-	This section on technology improvements focuses almost entirely on biofuels - there is a need to consider gasificaiton, pyrolysis, potential direct firing in turbines, issues associated with combustion at higher steam temperatures, fuel cell operation, oxy-firing, CCS etc.	The gasification, pyrolysis and CCS are shown in this section. The fuel cell operation is seem a kind of power generation system; --> Chapter Integration. The higher efficient combustion; direct firing in turbines, higher steam temperature combustion and oxy-firing are ..... In my understanding we have to add something on these technologies (Moreira)
United States (U.S. Department of State)	2	-	-	-	-	2.6.3.1	-	-	P92: Section 2.6.3.1 on Liquid fuels would be improved with a paragraph on the potential for converting sugars/or cellulose via advanced fermentation and/or synthetic biology to drop-in hydrocarbons. This fuel pathway appears in table 2.6.2, but is omitted in table 2.6.3 and is omitted in the text in this section.	Will be revised and make the various categories more clear.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.3.2	-	-	Align style of first words in paragraphs (i.e., sub-headings) with rest of chapter.	Accepted
United States (U.S. Department of State)	2	-	-	-	-	2.6.3.3	-	-	In this section the omission of the effects of mitigation policies on bioenergy is particularly apparent. It needs to be mentioned somewhere that CCS will not be deployed in the absence of a global mitigation policy that puts a price on C emissions.	Bio-CCS has big GHG mittigation potencial. The potencial will be shown in Table 2.5.1. At 2.6.3, technologies are introduced. The section will be redrafted to include more aspects of Bio-CCS, as claimed by many reviewrs.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.6.3.3	-	-	Recommend avoiding discussion of offsets in this sub-section. Offsets are a policy tool used under some cap-and-trade systems and are not required to incentivize biomass-CCS under a comprehensive climate policy.	Bio-CCS has big GHG mitigation potential. The potential will be shown in Table 2.5.1. At 2.6.3, technologies are introduced. The offset aspect for this technology is particular relevant.
United States (U.S. Department of State)	2	-	-	-	-	2.6.3.3	-	-	Section 2.6.3.3 ¿ Biomass with CCS: Use of CCS with biomass does not guarantee negative emissions; the net emissions still depend on emissions that occur during the rest of the production process, including land use change. Recommend removing reference to negative emissions here. If CCS is going to be mentioned, a more complete discussion is warranted, noting CCS costs and feasibility in the coming decades, as well as competition between biomass-CCS with fossil-CCS systems.	Bio-CCS has big GHG mittigation potential. The potencial will be shown in Table 2.5.1. At 2.6.3, technologies are introduced. The tables of technologies mention the cases of gasification of coal and biomass which would lead to higher decreases of carbon with bioCCS (see Figure 2.5.1)
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.3.3	-	-	What makes bio-CCS any different from CCS for fossil fuels? If not different and unique, then perhaps a sentence elsewhere would suffice for CCS ¿ which presumably will be applied to fossil fuels as a top priority? If reductions in text are necessary then this section could probably be omitted.	Bio-CCS has big GHG mittigation potencial. The potencial will be shown in Table 2.5.1. At 2.6.3, technologies are introduced.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.3.4	-	-	The concept of bioenergy being a by-product of future biorefineries seems to be a core concept for second-generation biofuels, and its inclusion here as a separate sub-section seems out of context with the (assumed) importance of biorefineries for future biofuel production and the overall chapter structure. Perhaps a simple statement warrants inclusion on P. 87 in the introduction of Section 2.6.3, and also in the Executive Summary and perhaps earlier in the chapter? If reductions in text are necessary then this section could probably be omitted, and the core information (in shortened form) used elsewhere.	Will introduce the various topics initially sections and re-emphasize in Section 2.3 when commercial technologies are discussed
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.6.3.5	-	-	If reductions in text are necessary then this section could probably be omitted, given that the chapter is on bioenergy and not bioproducts. A few sentences could suffice, if needs be, along with some general comments on biorefineries as sources of biofuels (in introductions to other sections, as suggested for Section 2.6.3.4).	There is no agreement from reviewers on whether to delete or maintain.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	2.6.4	-	-	What are the conclusions about resource potential? What is the potential for biofuels to replace fossil-based fuels in the transportation sector? What is the potential for biomass to replace fossil-based fuels in the power sector?	This information comes out in Section 2.8 and also in Chapter 10 as a result of the modeling of the various technologies discussed and the GHG mitigation scenarios from the IPCC. This will become clearer in the final draft
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.6.6.3	-	-	Please elaborate on this section, since it is very brief and BCCS is generally not well covered in the chapter. Against this background it is not easy to understand, where the assertion that BCCS may become an "attractive medium term mitigation option" is based on (see TS, p. 23, l. 6; ch2, p. 5, l. 20 and p. 105, l. 33). Please cross-reference and discuss with chapter 10, if more literature on this topic is available (e.g. Clarke et al., 2009 that is mentioned in chapter 10, page 21, line 19; Tavoni and Tol (2010), Counting only the hits? The risk of underestimating the costs of stringent climate policy, Economic and Social Research Institute (ESRI), accepted; Edenhofer et al. (2010) The Economics of Low Stabilization: Model Comparison of Mitigation Strategies and Costs, The Energy Journal, Volume 31; Azar et al. (2006), Carbon capture and storage from fossil fuels and bomass - costs and potential role in stabilising the atmosphere, Climatic Change 74; Keith et al. (2005), Climate strategy with CO2 capture from the air, Climatic Change 74).	Bio-CCS has big GHG mittigation potential. The section will be redrafted to include more aspects of Bio-CCS, as claimed by many reviewrs.
Bernd Wittgens (SINTEF Materials and Chemistry)	2	-	-	-	-	2.7.3	-	-	What is included in "total production costs" and "production costs", Definition needed	Accepted
Norway (Climate and Pollution Agency)	2	-	-	-	-	2.7.3	-	-	You need to specify/define what is included in "total production costs" and "production costs".	Accepted. The studies are complex in that they analyze components of total production costs and then assemble them (with some assumptions) into total production costs.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.8	-	-	According to agreements reached during LA3 in Oxford, the potential deployment section should contain the following fixed subheadings: "Near-term forecasts", "Long-term deployment in the context of carbon mitigation", and "conclusions regarding deployment". This is currently not the case! Althoug bioenergy is different to other technologies, since the resource (biomass) has to be shared among different purposes (food, fodder, fiber, energy) and has to be produced sustainably with scarce resources (e.g. water, land) as opposed to wind, solar, ocean, geothermal energy, this is no sufficient justification for not following the agreed structure. The scope of the section also exceeds the character of a summary leaving significant room for cutting down the text (particularly the paragraphs on resource potential and social and environmental concerns).	Will implement as far as possible although bioenergy does not fit the format everywhere
Helmut Haberl (Institute of Social Ecology, Vienna)	2	-	-	-	-	2.8	-	-	As stated above, I believe that this whole section requires considerable revision to be in line with the above-presented evidence. Also, the material presented here is rambling and often quite inconclusive	Will implement as far as possible although bioenergy does not fit the format everywhere
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.8	-	-	Section 2.8 is a key section. On top of capturing the important points of the chapter, it is essential that the section be clear and succinct, and reads well. Some reductions in length could be attained by editing. Use of bold/italic font for key words could help draw readers¿ attention to different paragraphs (e.g., P.107 L.23 ¿key points¿; P.108 L.1 ¿social and environmental issues¿; L.16 ¿GHG performance evaluation¿; etc.) It is important that this section, more than all other sections, balance agriculture and forestry.	Edting will be performed
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.8.1	-	-	Although this sub-section is very accessible and well written, it is supposed to summarize the whole chapter, covering the following points: "Resource Pontential", "Regional Deployment", "Supply Chain Issues", "Technology and Economics", "Social and Environmental Concerns". Although it covers some of these points, it does not so in the right order and dwells on some of the issues too extensively (e.g. social and environmental concerns: 2,5 pages; resource potential: 4 pages), implying redundancies. The paragraphs on p. 106, l.14-18 and on p. 114, l. 4-15 could be grouped under the point "technology and economics"; the paragraphs on p. 108, l.1 to p. 110, l.14 could be grouped under the "social and environmental concerns" but should be cut; the paragraphs on p. 110, l.15 to p.114, l.2 could be grouped under the point "resource potential" but should be significantly cut. Nothing is said on supply chain and regional deployment issues and little on technology and economics.	Edting will be performed
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.8.1	-	-	Double Section heading	Accepted
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.8.1	-	-	Instead of "SRREN Chapter 10 review", this sub-section is supposed to be named "Long-term deployment in the context of carbon mitigation". As agreed in Oxford during LA3, this sub-section should report on deployment scenarios from AR4, WEO and IEO until 2050; it should include a thourough discussion of the data delivered from chapter 10 on both BAU and policy cases comparing these to each other and to other sources (such as AR4); it should also discuss the feasibility of higher level estimates of the range deliverd by Chapter 10. Contrary to these requirements, the current paragraph discusses the Chapter 10 figure very briefly without even differentiating between BAU and policy cases!	This material WAS available in the longer version of the chapter just before delivery; this infomration will be channeled back
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.8.1	-	-	The sub-section "Near-term forecasts" is completely missing; as agreed during LA3 in Oxford, this sub-section should cover BAU forecasts until 2015 from the IEA WEO and the EIA IEO as well as from industry groups.	Not certain al data are available but will be checked
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	2.8.2	-	-	Although this sub-section is meant to be a summary of the previous sections, there are a lot of references that are not mentioned in the previous sections. This is both a loss for those sections as well as it gives the impression that this sub-section should be better integrated with the other sections, both in terms of content (many redundancies) and references: Wicke et al., 2008 (p. 108, l. 28/9); Fischer et al., 2010 (p. 109, l. 32); Wicke et al., 2009 (p. 109, l. 42); van Dam et al., 2008 (p. 110, l. 9/10); Chum and Overend, 2005 (p. 110, l. 35); Dornburg et al., 2010 (p. 112, l. 7); Hoogwijk et al., 2005 (p. 112, l. 14); Molden 2007 (p. 112, l. 20); Malezieux et al., 2009 (p. 112, l. 34).	Ediing and cross checks with the other sections (including use of refs) will be improved
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	-	-	-	-	2.8.2	-	-	It's a bit surprising to me that in this synthesis section still so many refs are used. Ideally, the material to refer to should already have been mentioned in earlier sections. I get a bit of the impression that authors and/or internal reviewers are still arguing about the key message, and e.g. the range of potentials, and it shows in the section not yet being fully condensed and consistent. Well, good luck with reaching agreement.	Editing and cross checks with the other sections (including use of refs) will be improved

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	2	-	-	-	-	2.8.2	-	-	Section 2.8.2: A more complete description of the data, assumptions, and methods used to generate quantitative estimates of bioenergy potential for the potential 1 and potential 2 scenarios is needed. Clarify whether land use emissions fully considered in these estimates? Clarify whether the IPCC estimates of bioenergy potential take cost-effectiveness or economic factors into account. Clarify, when carbon taxes are considered, whether taxes on CO2 emissions from land use are included in the policy regime.	This information is covvered in the subsections; we are asked to be as brief as possible here.
United States (U.S. Department of State)	2	-	-	-	-	2.8.2	-	-	This synthesis section is long winded and, as written, not helpful to the reader. It needs to be edited to be much more concise and clearly convey the main points of the preceding sections.	Current Section 2.8.2 will be synthesized and Section 2.8 will be restructured to the same format of the other chapters. A summary of the chapter's sections
Netherlands (KNMI (Royal Dutch Meteorological Institute))	2	-	-	-	-	2.8.2/3	-	-	Quite striking that in 2.8.2 and 2.8.3, there is hardly any attention for uncertainties in technology development.	Is part of the general overview of development pathways. Very limited space for more details.
United States (U.S. Department of State)	2	-	-	-	-	2.8.3	-	-	2.8.3 ¿ Limitations Recommend a discussion of the Wise et al. (2009) paper in this sub-section in the paragraph on long-term stabilization scenarios (p. 114, last paragraph). This article focuses on this question precisely.	Comment unclear; cross check with Ch 10 will be made
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.8.3	-	-	If reductions in text are necessary then this section could probably be reduced by half.	Unspecified comment; editing will be performed.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.8.4	-	-	Section content does not fit the heading: where are the key messages and which policies are needed? The table does provide some but only brief information/hints. Please include some explanatory text; at least how to read the table.	Will be improved; but severe space limitations force it to be more generic.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	2.8.5	-	-	I believe the conclusions could be stronger (i.e. more challenging and "problem oriented" see comment above on barriers to technically advanced bioenergy technologies in developing countries) given the level and experience of the main authors.	Will be improved and more challenging.
United States (U.S. Department of State)	2	-	-	-	-	2.8.5	-	-	Section 2.8.5 ¿ Key messages: Suggest removing the reference to CCS in the key messages, since CCS was discussed so briefly in the rest of the chapter. Need clarification on the basis or citation for the statement that biomass-CCS ¿can offer fully competitive deployment of bioenergy on the medium term¿ (p. 116). This seems like a premature assertion.	Text on CCS in 2.6 will be expanded, so probably a remark will be maintained here
Brian Titus (Natural Resources Canada)	2	-	-	-	-	2.8.5	-	-	This is a crucial part of the most important chapter. This section is only one page long, with only six points; each point has to hit its mark.	Space limitations limit possibilities for including many details; also requests to compact the section
Haroon Kheshgi (ExxonMobil Research and Engineering Company)	2	-	-	-	-	2.8.5	-	-	This section title states that the section gives policy recommendations which would imply that the section is policy prescriptive although the section does not actually appear to give policy recommendations. Suggest that ¿policy recommendations¿ be removed from the title.	Wording will be changed
Steffen Schlömer (IPCC WGIII)	2	-	-	-	-	Costs	-	-	For consistency reasons please use the term levelized cost of energy (LCOE) with relevant subscript to denote the type of final energy product, e.g. LCOEel, LCOEth, LCOEfuel, instead of the term production costs. Happy to discuss alternatives at LA4.	Accepted
Steffen Schlömer (IPCC WGIII)	2	-	-	-	-	Costs	-	-	Production costs of electricity, heat and fuels are discussed, but presented in black-box style. That means that individual cost components of the various production chains ranging from (1) feedstocks' production costs via (2) feedstock transport costs to (3) capital cost of power plants, CHP plants or feedstock-to-fuel conversion facilities and their respective O&M costs, lifetimes, capacity factors, and conversion efficiencies are not made very transparent.	Final draft will include a transparent set of commercial technologies separating the cost components as mentioned by the reviewer.
Steffen Schlömer (IPCC WGIII)	2	-	-	-	-	Costs	-	-	Separate discussion of costs of feedstocks, i.e. organic wastes, residues from forestry and agriculture, and energy crops, would be helpful.	This is ineherent to the review in 2.3 and 2.6 which deals with bioenergy systems and not separate components. Space limitations do not allow for further detail.
Steffen Schlömer (IPCC WGIII)	2	-	-	-	-	Costs	-	-	When you discuss the competitiveness of bioenergy options with gas, coal at certain carbon prices and/or oil, please state the implicit unit cost of energy (LCOE) explicitly, e.g. several times on page 105.	Please check the final version where this comparison is made (ranges of renewable energy technologies and ranges of fossil sources)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	Executive Summary	-	-	As agreed during LA3 in Oxford, each key line of argument in the Executive Summary should be introduced by a sentence in bold (instead of a title). Here is a suggestion for each key line of argument for the authors' consideration: Bioenergy is the most important renewable energy source today, providing about 10% (46 EJ) of annual global primary energy demand. The expected medium to longer term deployment of bioenergy differs among studies on the future potential of bioenergy. Impacts of increasing bioenergy use may be positive or negative. Future options and cost trends of bioenergy are promising. Bioenergy has a significant GHG mitigation potential, provided that resources are developed sustainably and that the right bioenergy systems are applied.	EB will be redrafted
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	Executive Summary	-	-	As agreed during LA3 in Oxford, the Executive Summary should start with a paragraph linking the respective technology to near and long-term potential for mitigation, followed by a sentence on each key line of argument in the chapter. Along these lines, the first paragraph could read: "Bioenergy is the most important renewable energy source today and offers significant potential for near- and long-term GHG mitigation. Chapter 2 thus discusses biomass, a primary source of fiber, food, fodder and energy. Biomass resource potential, even when key sustainability concerns are incorporated, is significant (up to 30% of the world¿s primary energy demand in 2050) but conditional. A large part of the potential biomass resource base is interlinked with improvements in agricultural and forestry management, investment in infrastructure, good governance of land, smart land use and introduction of effective sustainability frameworks and land-use monitoring. Further improvement in the many existing and rapidly evolving bioenergy chains for electricity, heat or fuel production through technological learning and related cost reductions may lead to competitiveness with fossil alternatives already at moderate CO2 prices (< 50 US$/ton) and/or fossil fuel price increases. Provided that resources are developed sustainably, bioenergy systems are able to contribute significantly to near and long-term carbon emissions mitigation potential."	ES will be redrafted
United States (U.S. Department of State)	2	-	-	-	-	Executive Summary	-	-	There is not a consensus that carbon taxes of US$20-30 are sufficient to make biomass competitive with coal power. Delete from Executive Summary. If citation is available, discuss the carbon tax estimate in the body of Chapter 2 with appropriate references.	The statement on CO2 taxes of US$ 20 to 30 needs reference.
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	2	-	-	-	-	General Comment	-	-	There is no mention of coconut oil in any of the biofuel/bioenergy liquid fuels. Can this be reflected or is it insignificant in the global arena thus its absence??	The reviewer correctly identifies that the resource is not appropriate for very large scale applicatios. For small local applications the residues and wastes can contribute to bioenergy and some biofuels depending on the location.
United States (U.S. Department of State)	2	-	-	-	-	References	-	-	There are several blank spaces in the Reference list. These suggest missing references. For example, Aden et. al (from Ch. 2, pg 70, line 28) and Dale 2008 (from Ch. 2, pg 22, line 48) citations were missed by the authors.	References will be checked and completed.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	-	-	-	-	-	2.1.1	-	Anaerobic fermentation should be figured as commercial technology with high improvement potential.	Accepted. Anaerobic digestion was placed as a commercial technology in the revision and also as a developing technology.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	2.1.1	-	Change from ¿Energy and Annual Crops¿ to ¿Perennial and Annual Crops¿; better fit for forestry	Accepted
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.1.1	-	It would be more useful if the chart specified pretreatment and conversion technologies for each feedstock type. Instead of grouping all pretreatment technologies in one box, pathways should be more clearly specified for each feedstock.	Examples were given to indicate the point the reviewer raised but a detailed explanation of what technologies work for which feedstocks was deemed too much detail for the space limitation of developing technologies. The emphasis was on commercial technologies and to give an idea of the wide range of evolving technologies.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	2.1.1	-	This is for agriculture only, so amend caption accordingly. Change from ¿¿bioenergy potential¿ to ¿¿bioenergy potential from agriculture¿	The Chapter considered both -- forestry and agriculture potential.
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	-	2.1.2	-	1. Figure 2.1.2: IEA has published Key World Energy Statistics 2009, consider updating	Accepted but figure will be redrafted
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.1.2	-	Are there not any more recent data sets available than IPCC (2007) and IEA (2008)?	Accepted but figure will be redrafted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	-	-	-	-	-	2.2.1	-	Remove, together with the paragraph above	Was thoroughly discussed in author team, decision was clearly to keep; bioenergy is an issue of complex embedding, this is shown here
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.2.1	-	There are many more interactions that could be considered relevant in the assessment of bioenergy potentials. Consider deleting this figure. All these relationships and more are already explained in the text.	Was thoroughly discussed in author team, decision was clearly to keep; bioenergy is an issue of complex embedding, this is shown here
Gerrit Hansen (TSU)	2	-	-	-	-	-	2.2.5	-	figure is also included in the bioenergy chapter (figure 10.4.1), please reconcile which chapter uses the figure and which includes a reference.	figure will be removed
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	2.2.5	-	Note that (b) and (d) have different units on y-axis: one (b) is energy and one (d) is mass. Can these be converted to the same unit?	figure will be considerably revised and improved for clarity and consistency
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.2.5	-	The term "rest land" is not defined in the second line of the caption text.	figure will be removed
United States (U.S. Department of State)	2	-	-	-	-	-	2.2.5	-	There are two different figures labeled 2.2.5. The one on p. 18 is a very poor quality copy and needs to be improved. Also, no definition is given for the category of "rest land", which is not a standard land use definition. The Figure 2.2.5 on p. 19 also is quite unclear and really is four separate figures that do not form a cohesive point. Suggest the authors standardize the representations of the cost supply curves for the US and Europe so that they are directly comparable. Similarly, the two bar charts should somehow be standardized so that the relationship between them is clear.	first figure will be removed, second renumbered and considerably revised and improved for clarity and consistency
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.2.5	-	There are two figures with the same number (2.2.5). This comment refers to the first figure. Provide a brief description of A1, A2, B1 and B2 scenarios	first figure will be removed, second renumbered
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.2.5	-	There are two figures with the same number (2.2.5). This comment refers to the second figure. Although it's good information, there is too much going on in a small space. We suggest separating the figures and making them comparable. For instance, display figures b and d side-by-side and use the same scale for the X axis (supply). Display figures a and c side-by-side and use the same scale. Figure b- Make production cost units consistent with figure d.	figure will be considerably revised and improved for clarity and consistency
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	2.2.5	-	Visually cluttered. Consider splitting into two different figures, with (a) and (c) in one and (b) and (d) in another.	figure will be considerably revised and improved for clarity and consistency (but not split)
United States (U.S. Department of State)	2	-	-	-	-	-	2.3.1	-	P32, line 4, figure 2.3.1: 1) On bottom chart, the key is mislabeled. Liquid biofuels in chart are in blue and gaseous are in green, but key indicates the reverse. Should be corrected. 2) Bottom part of figure should be updated to include other fuels (as detailed in further comments), e.g. green gasoline, gasoline diesel and jet-fuels from sugars.	Accepted
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.3.1	-	Re: biomass densification, there are a few commercial biomass-to-power projects in Europe based on both, torrefaction and pyrolsis. There is a subtle distinction with these two technologies, and also HTU. If you¿re intending to gasify or combust the densified product, the pyrolysis and torrefaction are early-commercial, with HTU lagging quite a bit. If the intent is to convert the densified biomass to liquid transportation fuel, then interaction between the densification technology and the subsequent upgrading steps is quite complex, and for that they could be back at least into the demo range. Perhaps the answer is to represent pyrolysis and torrefaction as more advanced, then have a separate line item for upgrading thermally-densified biomass. The former would be near the early-commercial / commercial transition, and the former firmly in Basic & Applied. An example of a commercial torrefaction application is: R&D.http://www.newearth1.net/ecopyrotorrefaction.html. Re: bioethanol, there are some advances in ethanol from sugar & starch crops that are not yet commercial, but which may have significant commercial impact in the next few years. So maybe on the line between Demo and Early Comm., you can put ¿Advanced sugar / starch ethanol.¿ More importantly, there is a suite of technologies missing entirely ¿ Conventional hydrocarbon fuels from sugars. There are two versions of this ¿ one based on sugar & starch crops, and one based on lignocellulose. The former is already at the early commercial stage, and the latter will be just a bit behind lignocellulosic ethanol.	Accepted. Will be more clear. The stage of development of a technology can be very subjective depending on the level of familiarity with the technologies.
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	2.3.1	-	Should be written: combined heat and power	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Rory Gilsenan (Natural Resources Canada)	2	-	-	-	-	-	2.3.1	-	The top portion of the graphic list pyrolysis as a densification technique, which is an incorrect characterization (you even note on pg 33 that it is a ¿thernal decomposition¿). You should consider devoting a separate bar in the graph to pyrolysis, as you have done for gasification. Also, a company in Canada (Ensyn Technologies) has a commercial plant in operation, so I would shift it to the right ¿ to at least ¿early commercial¿	Accepted
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	-	2.3.1	-	This table is very odd - the left hand column appears to mix technologies and demand sectors. Why does gasificaiton sit on its own as a line on the top table and then gets mentioned within one of the lines in the lower table. As a way of illustrating whcih technologies/fuels service which sectors and where the overlaps lie, it fails.	Accepted
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	2.4.1	-	Change all ¿biomass¿ to ¿bioenergy¿.	Not always correct
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.4.1	-	update of IEA 2007? Why is data from IEA 2009 used here and is not used in Figure 2.1.2?	editorial error, will be resolved
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.4.2	-	Ploease specify what is implied by "national sources".	will be checked or removed
Richard Plevin (UC Berkeley)	2	-	-	-	-	-	2.4.2	-	The sentence in the caption starting "Actually,¿" is not clear.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	-	2.4.2	-	Which year is this or is it an average over a certain period?	2007
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.4.3	-	Reformatting and streamlining the text of Table 2.4.3 (e.g. the columns "major process" for biofuels, "efficiency process economics" for biomass) is crucial; if this is only possible to a limited degree, relocating the table in the appendix seems to be an alternative solution.	Figure 2.4.2 and 2.4.3 will be merged
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	2.4.4	-	missing	Comment unclear
Gilberto Jannuzzi (University of Campinas)	2	-	-	-	-	-	2.4.4.1	-	see also NIST 2007 (Tripartite Task Force Brazil, European Union & United States of America. ¿White Paper on Internationally Compatible Biofuel Standards Tripartite, ¿ http://www.nist.gov/public_affairs/biofuels_report.pdf. And also section 8.2.4.4.1.	The international biofuel standards development are mentioned in biodiesel (much more difficult to harmonize than ethanol) and the references Knothe, 2010; Balat, 2011 given. Chapter 8 addresses the integration of the renewables with the existing and developing energy systems. This is the appropriate place for this development to be discussed. Chapter 2 concentrated on the framework and standards for the production of the bioenergy/biofuels and Chapter 8 concentrated on its connection with grids for electricity, natural gas, and liquid fuels. This was the division of the structure of the various chapters.
Gilberto Jannuzzi (University of Campinas)	2	-	-	-	-	-	2.4.4.1	-	Task Force, 2007. Tripartite Task Force Brazil, European Union & United States of America. ¿White Paper on Internationally Compatible Biofuel Standards Tripartite,¿ 2007. http://www.nist.gov/public_affairs/biofuels_report.pdf.	OK
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	2.4.5	-	missing	Comment unclear
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	-	2.4.6	-	I do not agree with this figure. It is too general. In the above section, it is claimed that feed-in tariffs exists for the whole of Canada and the US. While this is true for some states within the countries (e.g. Ontario), it is not true for the whole countries. In the lower section, the biofuel mandates which are currently present in various MS are not represented in the graph. Hence, I suggest to either update the graph, provide limitations, or delete it.	Need for the figure and/or reformatting options will be explored
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	2.4.6	-	This figure could be omitted, not crucial and little info provided.	Need for the figure and/or reformatting options will be explored
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.5.1	-	Explain the difference between renewable diesel and bio diesel. What fuel is used for the combined heat and power pathway? What electricity mix is used for the combined heat and power (fossil-based) pathway?	Needs discussion
United States (U.S. Department of State)	2	-	-	-	-	-	2.5.1	-	The units for transport (g CO2-eq./km) are different than the units for electricity and heat (g CO2-eq/MJ). km is a proper functional unit for transport, and MJ is an appropriate functional unit for heat and electricity. However, trying to put this data on the same graph with the same y-axis makes comparison somewhat confusing between the 3 end use sectors.	Needs discussion

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	2.5.5	-	Beautiful picture, but not necessary to understand the content of the text. Could be omitted.	Will be updating figure
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	2.5.5	-	Figure is agrocentric at the moment. Change ¿Agrobiodiversity¿ to ¿Biodiversity¿, and ¿Agroecological areas¿ to ¿Ecological areas¿. Under ¿Risks¿, either add more bullets or remove existing bullet. Under ¿Macro scale¿ consider adding ¿Carbon stores¿, ¿Atmospheric carbon¿ and ¿World climate¿.	Thank you for the suggestions. Agro was meant as an example and not that it was all there was. The heading was Food, Feed, Fibre and Fuel. Similarly, to avoid overburdening the graph, the biodiversity angle was selected but there could be many others related to each of the factors that impact climate change.
Gilberto Jannuzzi (University of Campinas)	2	-	-	-	-	-	2.5.5.3	-	should include references to the Brazilian case, e.g. Martinelli, Luiz A., e Solange Filoso. 2008. EXPANSION OF SUGARCANE ETHANOL PRODUCTION IN BRAZIL: ENVIRONMENTAL AND SOCIAL CHALLENGES. Ecological Applications 18, n. 4 (6): 885-898. doi:10.1890/07-1813.1. Sparovek, Gerd, Alberto Barretto, Goran Berndes, Sergio Martins, e Rodrigo Maule. 2008. Environmental, land-use and economic implications of Brazilian sugarcane expansion 1996¿2006. Mitigation and Adaptation Strategies for Global Change 14, n. 3 (11): 285-298. doi:10.1007/s11027-008-9164-3.	Accepted. Reference will be included
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.7.1	-	Why does capital vary so much by location?	See background ref; will consider explanatory remark.
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	-	-	-	-	-	2.7.1	-	With respect to current cost structure the measured cost range seems too optimistic in context to high efficient bioenergies with industrial standard. In Germany today's cost structure for maize (being the most prominent feedstock für biogas production yet) is around 8 to 10 US-$ per GJ. Raw biogas ranges from 20 to 25 US-$ per GJ and biogas feed-in into gas grid ranges from 30 to 35 US-$ per GJ.	Limited space for details; main cost trends tackled, but also in section 2.3 and 2.6
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.7.2	-	Don't need separate data series for 2020 values	Comment unclear
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.7.3	-	Is anyone making fuel at the projected costs in 2010? Are these projections credible?	IEA is main source; these level refer to demo units
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	2.8.1	-	Combine plot side-by-side with Fig. 2.8.2	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Gerrit Hansen (TSU)	2	-	-	-	-	-	2.8.2	-	(median) biomass potential is depicted lower in the most stringent scenario in 2050. please comment reconcile with ch.10 and discuss this in the text.	Will be addressed; Ch 10 are on deployment; Ch 2 reports on potentials in particular. Linkage between the two will be elaborated on; also crosslink with Ch 10
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.8.3	-	How does the NPP of 1260 EJ/year (page 10, line 2) compare to the technical potential of 1500EJ in Figure 2.8.3?	Will be elaborated on; NPP can be influenced by management of land.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	2.8.3	-	It would be easier to grasp the figure if it was place at the end of the sub-section, since many components are only explained further down the text. Further, the caption about the references Dornburg et al. 2008 and 2010 is not very clear.	Modificiations will be made to the figure and text
United States (U.S. Department of State)	2	-	-	-	-	-	2.8.3	-	The upper range for technical biomass potential should agree with references on pg. 4 of the Executive Summary (line 21, upper range of 400 EJ). The figure is also displayed in the Technical Summary (i.e. TS 2.3). Figure SPM 4 of the Summary for Policy Makers should also be made consistent.	All will be made consistent
United States (U.S. Department of State)	2	-	-	-	-	-	2.8.3	-	This figure is of poor quality, and therefore difficult to follow. It also has no value to the x-axis. I would suggest scrapping this figure and trying to find a different way to present this information.	Figure will be revised, but most certainly not be removed since it syntehsizes a large amount of key information
Bernd Wittgens (SINTEF Materials and Chemistry)	2	-	-	-	-	-	-	2.1.1	Energy crops and annual crops; why are energy wood and preannually grases not included. They are (though slowly) integraed in a biomass based energy production	These species are evolving and appear in 2.6.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.2.1	Category 1, Comment, line 8: this is not only true for modeling runs but also observed for reality?!	check wording

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.2.1	Category 4 (Forest biomass) ¿ and/or text somewhere in the chapter ¿ should contain some statement on the fact that biomass from thinnings, stand rehabilitation, and salvage are regionally important. From a salvage potential alone, Dymond et al. (2010; already in reference section) estimate that the predicted forest biomass supply (2005 to 2020) from salvage logging after natural disturbance in Canada (39,770 Gt y-1 from fire plus 61,391 Gt y-1 from insects, for a total of 101,160 Gt y-1) is over 2½ times that from final felling residue (39,440 Gt y-1) ¿ this is not an insignificant amount of biomass, even at a world scale. (The area of forest lost in Canada annually from fire, insect and disease can often be well over that harvested.) Add to this the amount of salvage wood in Australia after years of drought and fire, the Russian fires from this summer, and the over 2 million ha lost in the western US from fire this year, and the magnitude is surely worthy of mention somewhere in the chapter, even if only a line or two. In Europe, Schelhaas et al. (2003) found that, over the period 1950¿2000, an annual average of 35 million m3 wood (=8.1% of the total fellings in Europe and about 0.15% of the total volume of growing stock) was damaged by disturbances. Over the period 1961¿2000, the average annual area of forest fires was 213 000 ha, which is 0.15% of the total forest area in Europe. (Schelhaas, M.J., Nabuurs, G.J., Schuck, A., 2003. Natural disturbances in the European forests in the 19th and 20th centuries. Global Change Biology 9(11), p. 1620-1633.)	will add a few words, no space for longer explanations
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.2.1	Change from ¿Global biomass resource potential¿ to ¿Global bioenergy resource potential¿ because units are EJ. Can a column be added to give biomass (g)?	will do
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.2.1	Consider using the word "technical" in the caption to clarify what kind of potential you are referring to. "Overview of the assessed technical global biomass resource potential..." Also include the biomass potential of algae. Reference:http://www.nrel.gov/docs/fy08osti/42414.pdf Provide an uncertainty assessment for the values in each category or explain what assumptions were used to calculate min/max values	will do
Finland (Finniah Meteorological Institute)	2	-	-	-	-	-	-	2.2.1	Has this table been referred in other parts of the report? The figures given in the different tables should be analogical to each other.	OK
Sampo Soimakallio (VTT Technical Research Centre of Finland)	2	-	-	-	-	-	-	2.2.1	I didn't recognize that this table would have been referred in other parts of the report. The figures given in the different tables should be consistent with each other. (Are there any climate implications of using these biomass resources?	not clear what commenter suggests; function of table is clear from text, numbers discussed further subsequently, this is the basis for the whole assessment of technical potentials in this chapter, resulting ultimately in 2.8
Shigeki KOBAYASHI (Toyota R&D Labs.)	2	-	-	-	-	-	-	2.2.1	If any information on the marine biomass is available, please add some sentences in the text.	accessibility of marine biomass too uncertain
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.2.1	If the total numer starts with "<50" because of today's annual use of 50 EJ, this should be indicated in a clearer way. If this is not the case, it should be replaced by "<25" (which is the sum of 15+5+5)	The lower limit is not an adidition of the categories but an assessment of how different categories might combine at the lower bound; not related to current use
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	-	-	2.2.1	Table 2.2.1, Category 4, Forest Biomass. The lower limit has been set to 0 in the table. This is very improbable assumption. Energy is always a necessity whereas fibre products such as paper, boards etc. are not. Reconsider the lower value or add a remark about it	Yes it can be zero: the table is for extraction for bioenergy only, and increased demand from other processing sectors could reduce the potential for energy to zweo; table needs to cover all perspectives from the literature
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.2.1	The order of the different categories in the table is different from the order in the text making it harder to grasp for the reader.	table will be re-ordered
United States (U.S. Department of State)	2	-	-	-	-	-	-	2.2.1	The references need to be given within the table at the relevant point.	Accepted
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.2.2	Move ¿Regions¿ up one row; Delete ¿Of which (Mha)¿, move the two cells beneath up one row, and add ¿(Mha)¿ to each cell; Change from ¿Balance available¿ to ¿Area available¿; Move ¿Rough balance¿¿ to a footnote; Change from ¿Biomass supply¿ to ¿Bioenergy supply¿.	will check and might do
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.3.1	¿Fuelwood (chopped)¿ ¿ what is meant by this? And why is there a ¿forest residue¿ coproduct? Do these actually come from fuelwood crops? If not, should they be here or in next section, under ¿Forest residues¿?	The Chapter had to consider both -- residues from forest management for industrial uses that were directed to industrial energy systems and fuelwood from the traditional biomass use, which refers to often unsustainable use of available wood, bushes that are harvested by people, often women and children.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Antti Asikainen (Finnish Forest Research Institute)	2	-	-	-	-	-	-	2.3.1	1. , Consider updating the figures of Karjalainen et al 2004. New report was published in 2008. ref: Asikainen, A., Liiri, H., Peltola, S., Karjalainen, T. & Laitila, J. 2008. Forest energy potential in Europe (EU 27). Metlan työraportteja /Working Papers of the Finnish Forest Research Institute 69. 33 p. ISBN 978-951-40-2080-3. Available at: http://www.metla.fi/julkaisut/workingpapers/2008/mwp069.htm	Thank you for the update, we will use this new reference.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.3.1	As with earlier tables, can data also be reported as mass?	Unfortunately this is impossible due to space limitations.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.3.1	Change ¿N/P/K use¿ in column heading to ¿N, P, K use¿	NPK replaced with fertilizers. n/a will be added.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.3.1	Change ¿S.rotation Willow¿ to ¿Short rotation willow¿	Accepted
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	-	2.3.1	Costs (USD/GJ) presented in this Table are underestimated. If they represent production costs, they are too low. Values need to be recalculated.	Values are taken from published references, bear in mind they represent feedstock production costs and not end-product costs. This will be emphasized again in text. Final version has a detailed cost estimation for commercial production for various countries that shows the ranges of the major cost variables
United States (U.S. Department of State)	2	-	-	-	-	-	-	2.3.1	P25, table 2.3.1: Under Oil Crops consider inclusion of camelina (N. America, D), and algae (global, D). Note, realize that these also appear in section 2.6 in which case they may not need to appear here.	These species are still marginal, they had better appear in 2.6., we agree.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.3.1	Please provide explanations for the abbrevations N/P/K and DDGS; additionally, the table seems to be incomplete due to void places. Please consider inserting "n/a" where no information is available.	NPK replaced with fertilizers. n/a will be added.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	-	-	2.3.2	Cattle slurry is missing an energy content indicator: 14-17 ? per cattle head	Table has been removed
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.2	It is not clear why this table is under section 2.3.1.2. We recommend moving this table to the end of section 2.3.1.1	Table has been removed
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	-	2.3.2	should explain what is it MSW	Table has been removed
United States (U.S. Department of State)	2	-	-	-	-	-	-	2.3.2	There are several blank cells under "Cost". It would be helpful to give some indication of what that means - no cost, no available data, etc.	OK – the data is not available, but this will be mentionned
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.3.3	Change from ¿Eff = Energy Product energy/Biomass Energy ¿ to ¿Eff. = Biofuel Energy/Biomass Energy¿; Change from ¿% GHG reduction from fossil fuel reference¿ to ¿GHG reduction from fossil fuel reference (%)¿; for text in cells under ¿2030 Efficiency¿¿ the use of bullets might make this easier to read.	Bullets aren't used due space limitation.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.3	Estimated production costs are not normalized to US$2005. The fact that the title reads "US$2005/GJ" is confusing and misleading. The "% GHG reduction from fossil reference" column is also misleading. The lifecycle emissions of the reference fossil fuel are calculated under different assumptions depending on the study. Hence, the numbers in this column are not comparable.	Costs are normalized to $2005 to allow comparability but the financial assumptions (e.g., interest rate) may vary from study to study. The GHG data provided refer to attributional LCA studies. They do not include Land Use Impacts.
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	-	-	2.3.3	Exists twice on p. 43 and 44	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Sampo Soimakallio (VTT Technical Research Centre of Finland)	2	-	-	-	-	-	-	2.3.3	It is not reasonabe to provide one single GHG performance figures for various technologies due to likely differences in methodological choices, data set selection etc. As significant uncertainties are involved in this kinds of figures, I suggest to present a range based on various studies or to remove the particular column from the table.	Ranges will be provided from the literature. In several cases they already are related to calculation ranges using different coproduct allocation methodologies.
Finland (Finniah Meteorological Institute)	2	-	-	-	-	-	-	2.3.3	It is not reasonalbe to provide one single GHG performance figures for various technologies due to likely differences in methodological choices, data set selection etc. As significant uncertainties are involved in this kinds of figures, it would be better to present a range based on various studies or to remove the particular column from the table.	Multiple values will be provided or ranges when available. The references were selected from those that used same methodologies that were well described.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	-	-	2.3.3	No figures are given for GHG savings from heat. Our analyses (Thornley et al., "Cost effective carbon reductions in the bioenergy sector", accepted, BIOTEN conference, Birmingham, U.K., September 2010) are 93% (domestic pellet boiler) and 94% (wood chip DH scheme). Somewhere it should be pointed out that this is only one way of thinking about GHG savings - thinking about the maximum GHG savings that cna be achieved by a unit of wood or a unit of land will give different answers on the technologies that acheive the highest savings.	The reference will be checked. IPCC prefers references that are cited in peer reviewed literature and not conference proceedings or data from companies without a parallel peer reviewed publication.
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	-	2.3.3	Regarding ""Sugarcane bagasse and waste"", in column ""Efficiency and process economics"" it should read: ""The use is much smaller than the potential"". Operational demand and fuel quality are not critical issues, as mentioned in the text.	We already state the "large potential availability". For the second comment we need to quote a reference
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.3	Regarding Heat from Solid Biomass Fuels-Fuelwood-Estimated Production Cost, 8 GJ is not cost	Accepted. More attention to distinguish between price and cost will be necessary.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.3	Regarding rapeseed, soya and oil palm, under the efficiency column two of the processes have the words "Same size plant". What plant are they referring to?	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	-	-	-	-	-	-	2.3.3	Regarding Table 2.3.3 I would suggest to simplify the design of the table. First of all it is not comprehensibly arranged which is probably due to the sheer mass of information that is presented here. Furthermore, especially if it comes to CO2 reduction potentials, it is difficult to present only one distinct figure (as biodiesel in Germany 31% CO2 reduction and biodiesel in France 75% CO2 reduction) and not at least present a scope of reduction potentials. Those figures are prone to be contested. Therefore, sythesising the table would reduce the amount of the information and make the data less vulnerable.	Ranges will be provided from the literature. In several cases they already are related to calculation ranges using different coproduct allocation methodologies.
Felix Kaup (Potsdam Institute for Climate Impact Research)	2	-	-	-	-	-	-	2.3.3	Regarding Table 2.3.3 I would suggest to simplify the design of the table. First of all it is not comprehensibly arranged which is probably due to the sheer mass of information that is presented here. Furthermore, especially if it comes to CO2 reduction potentials, it is difficult to present only one distinct figure (as biodiesel in Germany 31% CO2 reduction and biodiesel in France 75% CO2 reduction) and not at least present a scope of reduction potentials. Those figures are prone to be contested. Therefore, sythesising the table would reduce the amount of the information and make the data less vulnerable.	Ranges will be provided from the literature. In several cases they already are related to calculation ranges using different coproduct allocation methodologies.
Fernando Rubiera (Instituto Nacional del Carbon (CSIC))	2	-	-	-	-	-	-	2.3.3	Revise the format of the Table	Accepted
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.3	Simplify table and remove non-essential text. On GHG reduction from fossil case need to be clear about assumptions (e.g. % co-firing). Production costs are of limited value unless assumptions are specified (CAPEX, OPEX, feedstock cost)	Many cases have CAPEX and OPEX data. Others do not have them but were added to give a broader range of countries and technologies.
Gustavo Nadal (Fundacion Bariloche)	2	-	-	-	-	-	-	2.3.3	Soya GHGsavings: according to the Renewable Energy Directive the default value is 31% (this value considers transport of soy grain to Europe for processing. Currently, biodiesel is being produced in Argentina and then exported to the EU). According to data presented by INTA (Jorge Hilbert, Instituto Nacional de Tecnología Agropecuaria) to JRC, the values range from 75.5% to 81.3%, depending on soil and agricultural practices. However, no uncertainty/sensibility analysis is provided for key parameters. More research is needed and there is currently a large uncertainty in INTA concerning N2Oemissions (field measurements are needed for different conditions).	The idea is to quote ranges. But in some cases only one reference is identified. Can you provide further references preferably from peer reviewed literature?
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	-	2.3.3	The heading of this table is repeated several times. It would save space to only give one heading at the beginning.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.3	This table lacks information about biohydrocarbons fungible with fossil fuels such as gasoline and jet fuel	In this section we are only listing technologies under use or under advanced stage of development.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.3	Titles of rows and columns should accurately describe the nature of the entries in the table. Table is far too long. May consider putting details in appendix and concise version in the main body.	Table will be simplified.
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	-	2.3.4	In first row, GHG savings related to CCS are future estimates and not current values.	The table heading includes projected carbon mitigation. Anyway the table will be eliminated and the information described in the text with more context.
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.3.4	Mixed use of upper and lower case for headings in this table; would benefit from copy editing for consistency.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	2	-	-	-	-	-	-	2.3.4	table is confusing to the reader.	Table will be eliminated and the information described in the text with more context.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.3.4	The measures "kg GHG savings per tonne of biomass feedstock", "kg GHG per unit output" and "kg GHG savings by biomass production per ha" are difficult to grasp, since there is no information about costs. If this is not readily available, comparison to replaced conventional fuels would possibly make the comparison more accessible.	Table will be deleted from this context and into the indicator of environmental areas in Section 2.5
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	-	2.3.4	The second row of Table 2.3.4 (""Bioenergy output and fossil energy use....."") relates to emissions/energy (and not to energy itself). The way it is written is not clear.	Table will be eliminated and the information described in the text with more context.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.3.4	This table can be integrated into table 2.3.3. It is unclear what is the baseline for the estimated kg GHG savings. Why are there less savings in 2005/2006 from sugar ethanol than there were in 2002? It is difficult to understand what each number represents. Again, it would be easier to understand these numbers if they are presented in the same format as those in table 2.3.3	Table will be integrated with text and not be standalone
Richard Plevin (UC Berkeley)	2	-	-	-	-	-	-	2.3.4	This table is also very hard to read: too many abbreviations, and the units aren't clearly specified. (They are specified, just not clearly.) Each cell contains a table, which makes for a difficult presentation. I would rethink this.	Table will be eliminated and the information described in the text with more context.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.4.2	In the US the Environmental Protection Agency set a mandatory target for bio diesel. Bio diesel in the United States has government incentives	Table will be reworked
Patrick Lamers (Ecofys Germany GmbH)	2	-	-	-	-	-	-	2.4.2	Incorrect information on Germany. Binding mandates (second column) only apply to transport fuels and not all renewable energy sources. (no target for electricity; target with unbinding character for heating/cooling (see Renewable Heat Act)).	Table will be reworked
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.5.1	Order of rows could perhaps be group by topic more. Perhaps re-order rows to reflect environment, then social values, and then economics (because this is the order in the table caption). The order then could become: Global/regional (off site) effects; Physical amenities including biodiversity and aesthetic features; Social amenities and relationships including psychological features; Social pattern or life style; Health; Cultural, religion, traditional beliefs; Economic and occupational status; Political and legal; Technology. Check one punctuation typo: ¿Physical amenities, including. biodiversity and aesthetic features [add coma and delete period] ¿	Thanks for the suggestions. Will modify the table and link it more specifically to bioenergy (although many of the topics are common to agriculture, forestry, and any land or other resources use).
United States (U.S. Department of State)	2	-	-	-	-	-	-	2.5.1	The impact categories listed in table 2.5.1 seem too wide-ranging to be particularly useful for scientists and policymakers attempting to ensure sustainability. It is recommended that the authors delete this table.	Table will be modified to provide the areas of concern and examples of impact categories for bioenergy for policymakers. Unfortunately, the complexity of bioenergy is higher as it includes agriculture, forestry, and any kind of land and other resource use.
Richard Plevin (UC Berkeley)	2	-	-	-	-	-	-	2.5.2	It's unclear why the Searchinger 2008 papers is labeled "preliminary" and the Hertel 2010 paper labeled "comprehensive". I think both adjectives are incorrect and unnecessary commentary. The citation should be to Hertel et al 2010, BioScience 60(3): 223-231, not to the Energy Journal article listed in the bibliography. (I suspect the other references in this section to Hertel et al 2010 are also incorrect.) The second table labeled 2.5.2. (this should have a separate number) incorrectly states the value for corn ethanol in the CARB row: it should be 30 g/MJ. The EPA row lacks their 2012 results, which indicate yet higher ILUC values, closer to that of Searchinger 2008 for maize.	Table will be deleted
Brazil (Ministry of Science and Technology)	2	-	-	-	-	-	-	2.5.2	Should include a reference to the Brazilian Land Use Model (BLUM), used by EPA to update the Brazilian land use data (as mentioned on page 66).	Table will be deleted
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.5.4	How is Table 2.5.4 related to Table 2.5.1?	Will be combined and be presented only in the introduction
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.6.1	The table seems to be incomplete in the last column.	Some of the lines are merged in the last column – format has been made clearer.
United States (U.S. Department of State)	2	-	-	-	-	-	-	2.6.2	P88, line 3, table 2.6.2: Correction: Note that aviation community is using updated terminology. Recommend changing to ¿Hydroprocessed Renewable Jet¿ for HRJ rather than ¿Hydrotreated renewable Jet". Correction: Under feedstocks should read ¿camelina" rather than current "carmelina" Addition: The fuel process category in left column, bottom of page should read ¿Biodiesel, Renewable Diesel [or Jet]¿. Believe this type of process is currently being used by company called Solazyme to produce both Jet and diesel for the Navy.	Thanks for the comment. Change will be made. Rephrased the last line to include jet fuel in the last example that Solazyme is making.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.6.3	Although Edwards et al. (2008) is among the references (no. 28), the paper is not referenced in the table (only in Table 2.3.3). Since Chapter 10 (page 73, line 40) references the paper explicitely, please consider discussing it more in-depth.	Will reconcile the two
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	2	-	-	-	-	-	-	2.6.3	No reference to potential and costs of anaerobic fermentation (e.g. biogas production and usage).	See table 2.3.3 on p.44. These technologies are commercial and improving. Costs of both current and future shown on 2.3.3
United States (U.S. Department of State)	2	-	-	-	-	-	-	2.6.3	P90, table 2.6.3 Recommend inclusion of a row in chart 2.6.3 to account for class of fuels produced from sugars or cellulose via advanced fermentation such as those described in table 2.6.2 as ¿Synthetic hydrocarbons, also called drop-in hydrocarbons.¿ This class of fuels appears to be missing from the table--but is of significant interest and promise. P91, table 2.6.3 Consider inclusion of bracketed text: in fuel category ¿Algal Biodiesel or Renewable Diesel [or Jet]¿	Few cost numbers for these fuels are available by other than as provided by technology developers or by consultants in gray literature. We will add these costs and highlight that they have not been produced by independent technoeconomic analyses. Table 2.6.2 will be deleted and specific fuels merged with the SOD Table 2.6.3
Brian Titus (Natural Resources Canada)	2	-	-	-	-	-	-	2.6.3	Re-order columns to match Table 2.3.3 as much as possible.	will attempt - two different situations
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.7.1	This table should appear further below since it belong to section 2.7.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	-	-	2.7.2	Disagree with the dismissal of energy crops as not suitable for heat in long term. On the contrary land constraints mean these are more likely to be used close to where they have been grown and the tight fuel specifications required for small scale boilers are more likely to be met by crops where there is complete control over the production chain.	Table 2.7.2 will be merged with 2.7.3
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.7.3	show units in heading ($/GJ) and not in each table entry	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Laura Verduzco (Chevron Corporation)	2	-	-	-	-	-	-	2.7.4	Format to make easier to read. What is meant by 93/71 for sugarcane EtOH PR?	Accepted. Table will be redrafted.
Kaija Hakala (MTT Agrifood Research)	2	-	-	-	-	-	-	2.7.4	The references should be as footnotes at the end of the table, as in other tables of this report.	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.7.4	The uncertainty range of 0.02 seems too low in the second row; the column "region" seems to be incomplete; why is there a question mark behind EU?	The reviewer is correct. It is 2. The 0.02 was for the number and not the percentage. Thanks for noticing that the region is missing. It is for Nordic countries. Reference checked and it is OECD.
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	-	-	2.7.4	This section must acknowledge the limitations of the evidence base more (two first generation biofuel chains and one CHP system)	remarks will be included
Christoph von Stechow (IPCC WGIII TSU)	2	-	-	-	-	-	-	2.7.4	Why are books, press releases and interviews mentioned in the caption text, since all reference analysed in the table seem to be journal articles?	Accepted
United Kingdom (Department of Energy and Climate Change)	2	-	-	-	-	-	-	2.8.3	In this discussion of where future bioenergy might be focused it would be worthwhile considering aviation demands separately along with projected growth in these. If biofuels are the only method of decarbonising that sector it may demand a very substantial proportion of the available resource.	Accepted. Aviation fuels will be discussed briefly.