IPCC Fourth Assessment Report

Expert/Government Review of the Second-Order Draft

Chapter 8

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
8-1	A	0	0	0	0	The SOD has been greatly improved. There are some general comments: a) Overall the context, situation, possible measures, and research results for emission of GHG from agriculture are there. But it lacks the way out. b) It reads like a research report rather than a working guideline. c) Section 8.1 coul be a summary but not a description of chapter's structure. d) The chapter always compares issuses between developing and developed regions, especially for section 8.3, emission trend of GHG. This would mislead governments and readers that development regions produce GHG. There is a question: who consume the agricultural products that emit GHG along the growing processes. Take rice for example, rice produced in developing regions is not only for selfsufficiency but also for developed world demand. Such indication/mention would be beneficial to better understanding the situation. e) For section 8.4, there are many practices, options, and technical methods. But in the reality, degrees of development are unbalance. It seems that the practices could not be easily applied by local famers, especially in developing regions. The authors should summarize a strategy for what practices, options and technical methods are suitable in where. That will be easier accepted by local governments and local people. (Shaohong WU, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences)	**Noted** – thank you a) **Noted** - We have reviewed the literature and policy (and other) barriers. Not policy prescriptive. b) **Accepted** – We reduced length by more than 10% - some of the detail from original literature disappeared. The text readability was greatly improved c) **Rejected** – there is a separate summary. d) **Accepted** with one caveat: most of the food produced in developing countries is actually for self consumption. And this is particularly true for rice, of which only a minor fraction of total amount produced is traded internationally. We added text in Section 8.3 to show that agricultural products may be consumed elsewhere – trade effect. e) **Accepted** – this is accounted for in the estimates of potential and is expanded upon in the barriers section. More text will be added in the barriers section to elaborate on this.
8-2	A	0	0	0	0	1) Chapter 8 has been completely overhauled and as a result improved substantially wrt FOD. 2) By choice of the authors the focus is (in my opinion [Kuikman]) out of balance towards CO2 sequestration, leaving options related to CH4, N2O and fertiliser/manure management underexposed. (,)	1) **Noted** – thank you. 2) **Rejected** – We reject the comment that CH_4 and N_2O measures are under-exposed. The fact is that CH_4 and N_2O mitigation do have potential (assessed and comparable with previous estimates), but the potential for CO_2 mitigation is larger – accounting for 90% of total potential. There is no bias among the

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							authors – we all want to arrive at an objective assessment. Opposite to comment 8.3.
8-3	A	0	0	0	0	The CO2-emissions from soils are not adequatly treated. This does regard many chapters (from the status of emissions to the management options). (,)	**Rejected** – with 90% of total potential mitigation coming from for CO_2 it is difficult to imagine what prompted this comment. Opposite to comment 8.2.
8-4	A	0	0	0	0	Please check previous comments (FOD) on importance and impact on mitigation of the role of management and managers; this would include discussing the ownership of emissions as a incentive to act and implement actual changes in farm management and agricultural practices that indeed change levels of emissions of nitrous oxide, methane and prevent losses of soil carbon (include in section 8.9). Now it is only just mentioned on p.45, l8-9. This issue deserves more discussion as it addresses directly those who need to act other than goverments with laws and regulations. See also 8.6.1 p.42, l.7-9. (Ronald Hutjes, Alterra)	**Noted**. – This is done in the barriers section where land / emission ownership and potential confounding effects of transaction costs in relation to this, are discussed.
8-5	A	0	0	0	0	1) Please see my Commentary titled "Addressing Potential Abrupt Climate Change" which does not fit into this Excel spreadsheet box. I have accordingly asked Dave Rutu to circulate it to lead authors. It draws attention to a body of peer reviewed and gray literature which appears to have been overlooked in the SOD, although it was brought to attention previously in my comments on the FOD. 2) The main point is that the rest of the literature mostly treats atmospheric CO2 as a flow pollution problem, to be addressed through a reduction in emissions. However CO2 is not a noxious gas, and therefore atmospheric CO2 is an excess stock problem with several possible answers. It is technologically much easier to extract CO2 from the atmosphere by land use improvements that increase biotic absorption and yield biomass fuels (de-fossilization) than it is do without any fuel other than hydrogen (decarbonisation). Although it obvious from the text that the authors are very well aware of it, I suggest that the need to assess GHG fluxes rather than simply focus on emissions reductions be brought to the attention of	1) **Noted** - "Addressing Potential Abrupt Climate Change" is a wider issue than just agriculture (i.e. the whole mitigation potential for all sectors) so should be addressed elsewhere. 2) **Noted** – Again – this comment is more wide ranging that agriculture alone. We deal with the agricultural aspects of bioenergy but the decarbonisation / defossilisation aspects of bioenergy are dealt with in the energy chapter (4).

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						readers by a footnote on page 4. Unfortunately time constraints prevent me from providing the detailed comments on this Chapter that I had hoped for, particularly as the technologies and practices discussed in Section 8.4 are a catalogue of what is involved in the agricultural sector in the words "land use improvement" that provide one of the themes in Read and Parshotam 2006 (under review) available from the WG3 TS team. Accordingly apart from, p4, I gather my suggestions on this Chapter to a single suggested extra paragraph for Section 8.10. (Peter Read, Massey University)	
8-6	A	0	0	0	0	Please see my Commentary titled "Addressing Potential Abrupt Climate Change" which does not fit into this Excel spreadsheet box. I have accordingly asked Dave Rutu to circulate it to lead authors. It draws attention to a body of peer reviewed and gray literature which appears to have been overlooked in the SOD, although it was brought to attention previously in my comments on the FOD. The main point is that the rest of the literature mostly treats atmospheric CO2 as a flow pollution problem, to be addressed through a reduction in emissions. However CO2 is not a noxious gas, and therefore atmospheric CO2 is an excess stock problem with several possible answers. It is technologically much easier to extract CO2 from the atmosphere by land use improvements that increase biotic absorption and yield biomass fuels (de-fossilization) than it is do without any fuel other than hydrogen (decarbonisation). Although it obvious from the text that the authors are very well aware of it, I suggest that the need to assess GHG fluxes rather than simply focus on emissions reductions be brought to the attention of readers by a footnote on page 4. Unfortunately time constraints prevent me from providing the detailed comments on this Chapter that I had hoped for, particularly as the technologies and practices discussed in Section 8.4 are a catalogue of what is involved in the agricultural sector in the words "land use improvement" that provide one of the themes in Read and Parshotam 2006 (under review) available from the WG3 TS team. Accordingly apart from, p4, I gather my suggestions on this Chapter to a single suggested extra paragraph for Section 8.10.	Duplicate of comment 8.5 – see above.

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						(Peter Read, Massey University)	
8-7	A	0	0	0	0	Please see the following article on why interim crediting could hinder greenhouse gas reductions Parkinson, S; Begg, K; Bailey, P and Jackson, T (1999) JI/CDM crediting under the Kyoto Protocol: does 'interim period banking' help or hinder GHG emissions reductions? in Energy Policy 27 p.129-136 (Kirsten Macey, Climate Action Network Europe)	**Reject** - this is a policy issue. Interim crediting is a Kyoto Protocol specific concept, and is not a relevant for this chapter
8-8	A	0	0	0	0	Overall a very interesting and well-balanced chapter covering most important issues and taking most relevant literature referecens into account. A clear improvement is noticed in comparison to last version. (Berien Elbersen, WUR-Alterra)	**Noted** – thank you.
8-9	A	0	0	0	0	the chapter that according to the literature climate change policy does not drive agriculture mitigation measures. The potentials estimated in the chapter assume various carbon prices, with higher prices assumed to be an incentive for farmers to apply the mitigation measures. The question is then how can land owners participate in a carbon market? (Expert Review Meeting Paris, IPCC)	**Accepted** – we do discuss the barrier of many scattered land managers / owners and the associated problem of them participating in the carbon market (including the aspect of transactions costs). We added some extra text to make this more explicit.
8-10	A	0	0	0	0	If agriculture is largely driven by other policies (than climate), how sensitive are the mitigation measures proposed for other macro-economic policies? (Expert Review Meeting Paris, IPCC)	**Noted** – they are very sensitive in that a main barrier in non-Annex I countries is poverty. We have a section dedicated to this already.
8-11	A	0	0	0	0	Even if the climate change impact is realized, the mitigation potential in agricultural sector can be maitained? (Toshihiko Masui, National Institute for Environmental Studies)	**Noted**. The mitigation potential is stated relative to a baseline of the same situation (i.e. with climate impact) but without implementation of the mitigation measure – so this is explicitly accounted for already.
8-12	A	0	0	0	0	General comment---Perhaps there is no mention of "Table 10" in the text… in the whole chapter… A thorough check is recommended (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Rejected**. There is no "Table 10" in our chapter. There is a table 8.10 and this is cited.
8-13	A	0	0	0	0	General Comment---Perhaps most of the crop, land and livestock management recommendations are suited for developed countries…. Very little feasible for	**Rejected**. Many are applicable for use in non Annex I countries. The barriers are greater for

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						developing countries as such... (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	many in non Annex I countries as is noted in the section on barriers (8.6)
8-14	A	0	0	0	0	General Comment---Agriculture and WTO and how WTO may affect different countries(Annex-I and Non Annex-I) differently---- has not been dealt at all…. A paragraph may be included in the text. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Accepted**. We will include text describing the differential impacts of the WTO in the section on macro-economic policy (8.7.2).
8-15	A	0	0	0	0	There is no description of mitigation approaches that stabilise or reduce numbers of livestock, even though these will be required (in tandem with approaches that reduce emissions per livestock unit) to stabilise or reduce overall GHG emissions.Such approaches would obviously need to be balanced with socio-economic development issues but should be considered as a medium to long-term mititgation approach. (Government of UK)	**Accepted**. We already included consideration for this in Section 8.2 (p. 7, lines 29-33), in Section 8.3.2 (p. 11, lines 16-24) and in the Executive Summary (p. 4, lines 6-7).
8-16	A	0	0	0	0	Smith et al. (2006b) have recently reviewed emission trends, policies and barriers affecting agricultural GHG mitigation. Sections 8.2, 8.3, 8.6 and 8.8, are largely based on that review. More references for other studies are still needed. (Government of China Meteorological Administration)	**Accepted**. Smith et al. (2006b) was itself a review, but we included more references to primary literature (eg, Fig. 8.3)
8-17	A	0	0	0	0	When considering the mitigations options a integrated farm approach and complete life cycle assesment is completly missing. It will be worth to include some examples perhaps (a box?). In fact at the implementation level may be the best way to optimize several mitigation options. (Government of Spain)	**Rejected**. Space prevents detailed boxes, case studies, farm-scale assessments. For a global assessment, the level of analysis presented in the chapter is appropriate. Agreed that a box is not an option. In any case, we already emphasize in numerous instances that the effectiveness of mitigation practices needs to be assessed on a holistic basis. For example: "Often a practice will affect more than one gas, by more than one mechanism, sometimes in opposite ways, so the net benefit depends on the

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							combined effects on all gases (Robertson and Grace, 2004;Schils *et al.*, 2005)" – pg. 15, line 6).)
8-18	A	0	0	0	0	The lists of mitigation options across the different tables in the chapter are not always the same. It may be worth to try to harmonize in order to help reader to consider complementary aspects of each one (for example different potentialas and enviromental implications) (Government of Spain)	**Rejected**. They are always the same (and in the same order) except where they do not apply (e.g. no per-area mitigation potentials for livestock since they are assessed on a per-animal basis and appear in a different table)
8-19	A	0	0	0	0	It is noticed that many important questions are considered in this chapter. One example which the report handle very well is the fact that the effect on the environment are very complex and must be judged in a broad sense. (Government of Sweden)	**Noted** – thank you.
8-20	A	0	0	0	0	1) generally, there is a lack of transparency in this chapter. When giving mitigation potentials, numbers for activities to reduce emissions or enhance removals are not clearly distinguished. 2) Even more, the definitions for the different potentials at page 16 of TS are not consequently used. 3) Single mitigation measures should be described in more detail and a thorough discussion of uncertaities and non permanence of the enhanced carbon stocks is absolutely needed. especially, as the numbers for the mitigation potentials rely mostly on one study only. It is recommended to follow the very good example given in chapter 9 "Forestry". 4) also, the high mitigation potential should be very carefull examined as the trend in the sector stated in chapter 8 goes in direction of higher emissions. 5) When giving the mitigation potential it should be checked that bio energy and emissions reductions of fossil fuels are not double counted once in the user sectors and once in this sector. 6) Make reference to the relevant subchapters where conclusions of the ES come from. (Government of Germany)	1) **Rejected**. The chapter is completely transparent. It is possible to recalculate all of the regional / per-practice estimates from the per-area / per-animal mitigation factors and the areas / animal numbers given for 2030 in the tables. This comment is in opposition to other comments (e.g. 8.1) suggesting that we remove some of the material that makes it fully transparent as it reads more like a research paper. The individual management practices are grouped at the management practice level – i.e. not just cropland management but 8 sub categories of CM. This allows the most appropriate individual activity to be applied in different regions as appropriate.

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							2) **Rejected**. We have used the appropriate definitions of potential here (as outlined on p16 of TS), i.e. economic potential and technical potential. Market potential is already occurring in agriculture so occurs in the baseline against which we compare mitigation. Physical potential is for non-land based options – in land based mitigation, the physical and technical potential are indistinguishable if land area is conserved in the calculations. 3) **Rejected**. This already occurs in section 8.4. The potentials do not rely on one study – we put more emphasis on the single study as this is the only to compare all GHGs for the same time reference and at the same carbon price bands. This study is compared extensively to previous studies and the estimates are very similar (see table 8.11). Forestry was able to draw on more global estimates since they exist already. In agriculture comparable figures are far less common (see table 8.11). Uncertainty in the estimates is thoroughly and clearly discussed and presented (see Figure 8.5 showing uncertainty limits on a per region basis). Non-permanence of soil C stocks addressed already in Section 8.6.2, p. 44, lines 1-10). 4) **Rejected**. The comment fails to understand the concept of baselines used here. Yes –

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							GHG emissions are projected to increase – this happens in the baseline. Mitigation is assessed relative to that baseline – i.e. the reduction in emissions when mitigation is implemented compared to the emissions were mitigation not implemented. Mitigation is therefore assessed against a baseline where GHG emissions increase. Total GHG emissions increase, but without mitigation they would increase far more. 5) **Rejected**. Bio-energy is not double counted in this sector and energy. It is accounted for only in the user sector (energy chapter 4) – the figures are shown here simply for comparison as clearly stated in the SPM, TS and this chapter, e.g "Although the mitigation potential is counted in the user sectors, the economic mitigation potential of biomass energy from agriculture is estimated to be…" (page 3, lines 28-30). 6) **Accepted**. We added better cross referencing to the energy sector section in Ch8 where this is dealt with in more detail and to TS & SPM sections
8-21	A	2	1	4	19	The Executive Summary is very short and doesnt reflect all subchapters of the underlying chapter. it concentrates on subchapters 8.4.2 and 8.8. Especially, summaries from 8.2, 8.4 8.5 are missing. It is recommended to follow the summary of this chapter in the TS page 68 - 73. the definitions of the term potential should be used throughout the ES consistent with the TS, page 16.	**Rejected**. The ES pulls out all of the major findings. We have considered carefully what to include and these are the areas we consider need the most emphasis. We do not wish to give all sections equal coverage as some parts

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						(Government of Germany)	are of more consequence than others. We have used the appropriate definitions of potential here (as outlined on p16 of TS – see response to comment 8-20), i.e. economic potential and technical potential. Market potential is already occurring in agriculture so occurs in the baseline against which we compare mitigation. Physical potential is for non-land based options – in land based mitigation, the physical and technical potential are indistinguishable if land area is conserved in the calculations.
8-22	A	2	18	2	20	Please note that according to the WG1 assessment (see Tables 7.4.1 and 7.4.2 in chapter 7), agriculture accounts for only about 60% of N2O, but with a very wide band of uncertainty, and between 40 and 70% of CH4. The figure you use here comes from using only a single source of data in this chapter (US EPA), and gives a misleading impression of certainty. Please attempt to reconcile or at least explain the differences between the two IPCC assessments, and ensure that the way you present figures does not give a misleading impression of certainty, and qualify your finding by reference to the much wider band that can be derived from other literature. Giving 4 significant places is clearly not appropriate for figures that have such a large uncertainty. (Andy Reisinger, TSU IPCC Synthesis Report)	**Accepted**. **1.** We checked the figures given in Tables 7.4.1 and 7.4.2 (WG I) and found out the following: a) there is no inconsistency in the data on methane emissions in the agriculture sector between our estimate based on US EPA (2006a) data (**2,800 Mt CO_2 in year 2000**, or **47% of global methane emissions**) and data given in Table 7.4.1 based on six studies (**3,000 Mt CO_2 adding up data from various years** and making the assumption that methane emissions from biomass burning in agriculture is 9% of the sector's methane emissions, **or 50% of global methane emissions**); b) The variability in the estimate of the share

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							of agriculture methane emissions among the six studies is large (ranging from 41 to 77% of global emissions of this gas). However, one of these studies reports a level of emissions from agriculture (301 Tg CH_4) which is more than twice the average of the other five studies (**130 Tg CH_4**), and can be considered as an outlier (the estimate given by EPA 2006a is **134 Tg CH_4**); if this outlier is not included, the variability in estimation is reduced to a range between 41 and 50%, which is a reasonably narrow range, considering that the set of data includes different years and possibly different sources. In spite of this, we accept that giving 4 significant places as we did in the SOD is not appropriate. c) Regarding N_2O, the estimate given by Table 7.4.2 for agriculture emissions (**5.6 Tg N**) is consistent with the value we reported in our chapter (**5.8 Tg N**). What is different is the assumed global total emission of this gas. While we assumed that global N2O emissions in 2000 were **6.9 Tg N**, WG I Chapter 7 reported a global emission of **9.7 Tg N**. Part of this difference is due to the inclusion of new sources by WG I which were not included in previous estimates of anthropogenic emissions ("rivers, estuaries and coastal zones" and human excreta"). Still, there are other differences which we cannot account for, and

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							are out of the scope of our chapter (we are confident about the accuracy of our estimate for N_2O emissions from agriculture). d) We believe that the broad range of estimates given in Table 7.4.2 (from 0.9 to 17.9 Tg N) does not reflect a high uncertainty in the estimation of N_2O emissions in agriculture, but most likely, results from the inclusion of studies which are measuring very different things. As in the case of methane, we acknowledge that using four significant places is not appropriate, but also the uncertainty in the estimate is not so large as suggested. **2.** We have modified the text in Section 8.3 and in the Executive Summary to better reflect the uncertainty associated with the reported emissions, and to provide a less rigid estimation of the share of agriculture in non-CO_2 global emissions.
8-23	A	2	20	2	20	1) it should be explained how this number of 40 Mt.. is calculated. 2) Does it reflect purely the emissions of fossil fuel from the agricultural sector? Or emissions from agricultural soils or the sum of emissions and removals from agricultural soils? 3) It should be noted that according to the submitted CRF tables the EU CO2emissions from grassland and cropland amount to 540 Mt CO2 in 2004. (Government of Germany)	1) **Accepted**. We do state where it is derived from "Emissions of CO_2 from agricultural soils are not normally estimated separately, but are included in the land use change and forestry sector (e.g. in national GHG inventories) so there are few comparable estimates of emissions of this gas in agriculture. However, US-EPA (2006b)

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							recently estimated that agriculture emitted 40 Mt CO_2-eq. of CO_2 into the atmosphere in 2000, less than 1% of global anthropogenic CO_2 emissions." (page 8, line 5-8). In the last paragraph of page V-8 of US-EPA (2006b), the figures for total global N_2O emissions from the DayCent are given. Also given are the net emissions including soil carbon change. By subtracting the 799 Mt CO_2-eq. in 200 for N_2O from the net GHG emissions (N_2O plus soil C change) of 839 Mt CO_2-eq., the figure attributable to soil CO_2 emissions is derived – 40 Mt CO_2-eq. in 2000. Additional text was added to explain this. 2) **Accepted**. The figure is for agricultural soils only (it does not include fossil fuel CO_2 as these are accounted for in the user sector and different chapters (transport, buildings etc.). as noted on page 5, lines 4-8: "a global potential mitigation of 770 Mt CO_2-eq. yr^{-1} by 2030 from improved energy efficiency in agriculture (e.g. through reduced fossil fuel use) but this is usually counted in the relevant user sector rather than in agriculture, so is not considered further here." This is clear in the main chapter (page 8, line 5-8), but not in the ES – we will change "agriculture" to "agricultural soils" on page 2, line 20. 3) **Reject**. The value of net CO_2 emissions from soils under cropland and grassland

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							reported by the European Community for 2004 is 5.3 Mt CO_2.
8-24	A	2	21	0	0	T. Bruulsema: "US-EPA, 2006b" does not appear to be an appropriate and original reference to support the figure of 40 Mt CO2 emission from agriculture. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. It is, but the figures are buried. In the last paragraph of page V-8 of US-EPA (2006b), the figures for total global N_2O emissions from the DayCent are given. Also given are the net emissions including soil carbon change. By subtracting the 799 Mt CO_2-eq. in 200 for N_2O from the net GHG emissions (N_2O plus soil C change) of 839 Mt CO_2-eq., the figure attributable to soil CO_2 emissions is derived – 40 Mt CO_2-eq. in 2000. Additional text was added to explain this. The study is no longer referenced in the ES, but in the main text, and has been substantiated with other evidence
8-25	A	2	23	0	32	It is stated that: "Many of this mitigation opportunities use current technologies and can be implemented immediately". In some countries many of the mitigation opportunities that are described in the report already are in force. The reason for this is that the authorities want to achieve the described synergies of sustainable development not the mitigation of GHG. This has the effect that the actions are optimized for the synergies and not to reduce the emissions of GHG. It might be a good idea to take the time to find actions and agricultural systems that optimize the synergies and reduce the trade-offs. This might demand enhanced knowledge about the actual actions. (Government of Sweden)	**Noted**. We have covered this in more detail in sections 8.7 and 8.8. This is just the summary statement in the ES.
8-26	A	2	23	2	23	delete after "can" till"practices in line 24, redundant (Government of Germany)	**Accepted**. Text was redrafted

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8-27	A	2	32	4	32	why the current technologies were not used for the mitigation opportunities? (Government of China Meteorological Administration)	**Noted**. No economic or other incentive to do so and multiple barriers – discussed in detail in section 8.6 – this is just the summary.
8-28	A	2	35	2	35	1) Give explaination for the high mitigation potential, as the emissions from this sector mentioned in lines 19 to 20 at this page add to more or less the same number (5643Mt CO2) 2) and state explicit which potential is meant with regard to definitions at page 16 in TS. 3) Furthermore given the information in table 8.7 a range of potentials from low to high could be presented. As the low ranges are mostly negative, it should be stated that there are quite high uncertainties with regard to the potential. (Government of Germany)	1) **Rejected**. There is no need to explain why they are high – they are not – they are comparable with almost all previous estimates – see Table 8.11. The reader can find the detail there – not appropriate for the summary. The fact that the technical agricultural mitigation potential is similar to the total 2000 emissions is a coincidence. 2) **Noted**. The potentials are explicit – we use technical potential and economic potentials (at a range of assumed C prices) as per definitions in TS page 16. See also response to comment 8.21. 3) **Rejected**. We give uncertainty estimates (associated with the estimates themselves rather than the scenario uncertainty). In the FOD we did quote estimate uncertainties and scenario uncertainties as two ranges but experts found the two levels of uncertainty confusing and un-transparent. Our approach in the SOD is to state the best estimates with uncertainty associated with the SRES scenario used – but leave the estimate uncertainty to discuss in more detail in section 8.4.3. This seems to be better understood from the comments we have received during this

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							review.
8-29	A	2	40	3	9	In footnote of Table 8.1, reference to the study of Lee et al. (2005) has been quoted five times.This may be rationalized. (Government of Pakistan)	**Accepted**. Footnote was eliminated
8-30	A	2	42	2	45	Just a brief description of different scenarios (A2,B1 etc) may be useful in the executive summary. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Rejected**. Done elsewhere in the Volume.
8-31	A	3	11	3	11	General Comments: 1) Potential mitigation by reducing soil emissions or increasing soil sequestration. See page 3 line 11 and other passages. 2) It is stated at page 3 line 11 that 90% of the potential for mitigation comes from reducing emissions of soil carbon. It is fundamental to be clear whether this is ascribed to land-use change factors, or to tillage factors, and in what proportion. The UK, and presumably EU, experience is that soil emissions have declined as past land-use change has become too distant to produce continuing net release. 3) Following the UK approach as adopted in the National Inventory, one could only be confident of additional scope for sequestering soil C by applying land-use change in the reverse direction, ie arable – permanent pasture – woodland. Since elsewhere (page 5 lines 23 to page 6 line 4, Table 8.2, page 7 lines 16-18, page 13 lines 36-39) it is expected that the area of land cultivated will continue to expand, the 90% of mitigation potential presumably cannot be for the same reasons as the reduction in UK/EU, unless the rate of expansion of agricultural area is reducing. 4) Table 8.2 offers some support for a slowing of the rate of expansion based on historical data, but population trends and dietary changes would have the potential to counteract this and so would any decline in yields from existing cultivated land due to climate change, as noted at page 4 lines 6-9. In this context, it would seem important to state what land-use change the projected Russian expansion would involve. (Is it simply recovering land that went out of production after 1990?) The statement at page 11 lines 32-35 seems in contradiction with others quoted. 5) If the scope for mitigation comes from tillage techniques, this would not be the current	1) **Rejected**. This is the same thing. What is not retained in the soil (soil C sequestration) is lost to the atmosphere as CO_2 (soil CO_2 emission) – they are two sides of the same coin – since CH_4 and N_2O are assessed by emission reduction, soil C sequestration is also expressed as a reduced CO_2 emission for ease of comparison (this is explained at the beginning of section 8.4.1; namely that mitigation redues the net accumulation of CO_2, CH_4, and N_2O in the atmosphere, either by reducing emissions or enhancing removals 2) **Rejected**. This is done in the main part of the chapter (please, see Figure 8.3 which does exactly that, by individual gas as well as in total) – this level of detail is not appropriate for the summary. Regarding past land use change – this is supported by the low global emission of soil CO_2 from agriculture (40 Mt CO_2-eq. in 2000). 3) **Noted**. The LUCLUCF inventory methodology used in the UK can only account

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						EU experience, for the reasons stated at page 7 lines 23-24 and page 17 lines 7-11, which would seem in any case of much wider application. Although at Table 8.13, it is suggested that tillage techniques are only slightly sensitive to climate change, typical East Anglian soils are unworkable without tillage in conditions which are either too dry or too wet.UK Inventory practice would appear to be sceptical about the kind of offsets described at page 43 lines 33-43, (Saskatchewan, Chicago Climate Exchange). Are the certificates in question robust enough for a Kyoto-based scheme? Moreover, carbon gain in the UK is assumed to take twice as long as carbon loss, not a "similar" period of time, as suggested at page 44 line 6.In conclusion, I would be concerned if so much of the potential for mitigation turned out to be geared to tillage or land-use change. (David Viner, University of East Anglia)	for land use change – it cannot account for land management change on the same land use which is where much of the potential is realized – not from land use change as you suggest. Given that it is land management rather than land use change that drives the mitigation, your subsequent statements do not follow. 4) **Noted**. There seems to be also a confusion between emission trends (as we see them going now), versus active mitigation (in which you deliberately change things to mitigate CC) – it is the latter that we assess in IPCC WGIII. The comment fails to understand the concept of baselines used here. Yes – GHG emissions are projected to increase (expansion of agriculture, changing diet etc. as we describe in detail in section 8.3.2) – this happens in the baseline. Mitigation is assessed relative to that baseline – i.e. the reduction in emissions when mitigation is implemented compared to the emissions were mitigation not implemented. Mitigation is therefore assessed against a baseline where GHG emissions increase. Total GHG emissions increase, but without mitigation they would increase far more. 5) **Noted**. We agree that there has been little implementation to date (see also Smith et al., 2005 in reference list) – this is because there are no incentives. We assess how this would

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							change if there were incentives (i.e. prices of 20, 50, 100, >>100 USD per t CO2-eq.)
8-32	A	3	11	2	11	Explain where the 90% number comes from as emissions mentioned at page 2 amount to 40MtCO2 only. Shouldn't it read enhancement of removals instead of reduced soil emissions? List the mitigation practises. (Government of Germany)	**Rejected** – this is dealt with in detail in the chapter. The 90% is from soil C sequestration (i.e. negative CO_2 emissions / enhanced removals – soil sequestration and reduced CO_2 emissions are two sides of the same coin). What is not retained in the soil (soil C sequestration) is lost to the atmosphere as CO_2 (soil CO_2 emission) – since CH_4 and N_2O are assessed by emission reduction, soil C sequestration is also expressed as a reduced CO_2 emission for ease of comparison. We will not list the mitigation practices again - this is a summary and they are dealt with in detail in section 8.4.1. (see comment 8.31).
8-33	A	3	14	3	15	1) I don't believe that the uncertatinty of modells used is the only source of uncertainty. In the forestry chapter, non permanence, low implementing rate, land tenure problems, economic development, climate change etc are other sources of uncertainty. 2) A critical assement of the high mitigation numbers with regard to the above mentioned issues should be done. 3) Note that the mitigation potential in agriculture is higher than that calculated in the bottom up approaches for the forestry sector (3150 Mt CO2)! (Government of Germany)	1) **Rejected**. Uncertainty arises due to scenarios and due to the way we make the estimates. We estimate economic potentials (they are not high – they are comparable with all previous estimates and completely in line with IPCC TAR and SAR estimates – see table 8.11). The estimates of economic POTENTIAL are not made uncertain by non permanence, low implementing rate, land tenure problems, economic development, climate change etc are other sources of uncertainty. The ultimate LEVEL OF IMPLEMENTATION is uncertain due to

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							these barriers (which we discuss in great detail in section 8.6) but the estimate of the economic potential is not – see definition on TS page 16. 2) **Rejected** – see above; they are not high. 3) **Noted**. It is actually similar at similar economic potentials – about 3100-3300 at 0-100 USD / t CO_2-eq. - a little less than 1 Pg C per year – a bit lower than suggested in the SAR and TAR which also suggested potentials of similar magnitude in agriculture and forestry sectors. At 0-20 USD / t CO_2-eq., the potential is 0.5-0.6 Pg C per year – not very high at all.
8-34	A	3	21	0	0	It is extremly important not to just move the "problem" elsewhere and important to understand the impact on the new site. (Government of Sweden)	**Noted** – we deal with leakage in more detail in 8.6.2.
8-35	A	3	26	3	37	1) This is a very significant paragraph, perhaps the most important of all, taken with Fig 8.6. It might be possible to express the potential other than simply in USD t CO2 –equivalent, but this does underline the need for policy instruments. 2) Consequently the sentence at page 4 lines 4-5 needs strengthening, and the barriers and obstacles need fuller examination. This could be done by expanding Section 8.4.1.7 Bioenergy and/or Section 8.4.4.2 (why are they separated?) and 3) including reference to the obstacles described in Viner et al, 2006 (Viner D., Sayer M., Uyarra M., and Hodgson N., 2006 Climate Change and the European Countryside: Impacts on Land Management and Response Strategies. Report Prepared for the Country Land and Business Association., UK. Publ., CLA, UK 180 pages. REFER to CLIO Introduction and calculations of per area savings in CLIO Annex II. These calculations would then complement Table 8.7, which considers only options based	1) **Noted**. 2) **Rejected**. The reason that we do not treat them together is to avoid double counting – the fossil fuel savings from bio-energy substitution are already accounted for in the energy and other user sectors. This is also the case for fossil fuel savings from improved energy efficiency. For that reason, the agricultural sector does not account for the energy savings and we refer the reader to the appropriate places in the energy chapter (4). These two sections are separated because one

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						on management of the existing use)./ 4) The statement at page 36 lines 38-40 could be refocused. It is true, and should be underlined, that climate change itself may induce food shortages which reduce the scope for the biofuels option. Mitigation of climate change might, however, seem to be more important than the other sustainability criteria mentioned, except in unusual local circumstances. / The statement against 5) Bioenergy in Table 8.13 that areas devoted to bio-energy could decrease adaptation options seems highly unlikely as regards annual crops within a normal rotation. (David Viner, University of East Anglia)	describes the practice (8.4.1.7) and the other one (8.4.4.2) reports the mitigation potential. 3) **Accepted** – we have included this document and added it to the reference list. 4) **Rejected** - we cannot be policy prescriptive here, which is what valuing climate mitigation more important than other SD criteria would imply. The text does not refer to food shortages caused by climate change, but to the competition for land resources between food and energy production 5) **Rejected** – these is potential for large scale bioenergy to reduce adaptive capacity (e.g. perennial energy crops like SRC / miscanthus) – not all in a normal rotation.
8-36	A	3	35	3	37	delete from "an additional " to "user sector " as this is not an outcome of this chapter 8. (Government of Germany)	**Rejected**. Like bio-energy, this is a saving that occurs in the agricultural sector but that is counted elsewhere (user sector) – it is useful for comparison.
8-37	A	4	8	4	9	explain how increases in production may offset some or all of the C losses. (Government of Germany)	**Rejected**. Not here – this is a summary. For your information, increases in temperature will increase NPP in some areas and will thereby increase C returns to the soil. This may in turn increase SOC (to counteract the increased loss of SOC due to speeded decomposition) – recent results from Europe suggest this (see page 57, lines 8-16).
8-38	A	4	22	4	22	The word "or" appearing between CH4 and N2O may be replaced by "and".	**Accepted**. Changed.

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						(Government of Pakistan)	
8-39	A	4	24	4	24	decomposition and/or mineralization of soil organic matter (Government of Argentina)	**Accepted**. Same thing but it was changed to make it more clear
8-40	A	4	34	0	0	From "emissions" hang a footnote to read "In this Chapter 'emissions' should be understood as net agricultural emissions, i.e. the emissions minus absorptions that are the net outcome of the fluxes of greenhouse gases involved in agriculture. (Peter Read, Massey University)	**Rejected**. Not here in the summary. This is done in the chapter proper in section 8.4.1.
8-41	A	4	34	4	34	From "emissions" hang a footnote to read "In this Chapter 'emissions' should be understood as net agricultural emissions, i.e. the emissions minus absorptions that are the net outcome of the fluxes of greenhouse gases involved in agriculture. (Peter Read, Massey University)	Duplicate of comment 8.40.
8-42	A	4	34	4	36	give a complete overview of chapter 8, not only 8.2 and 8.4.1. (Government of Germany)	**Reject**. This paragraph is not intended as an overview of the chapter. References to sections are given to inform where to find what we are describing.
8-43	A	4	36	4	36	The word "that" may be replaced by "than". (Government of Pakistan)	**Accepted**. Word replaced
8-44	A	5	19	0	0	1) The pressure should take into account the amount of people being fed. More people give bigger impact. The pressure should be related to impact /person being fed a given diet. 2) And the question is: to what extent can this impact be decreased. Can this be fulfilled by measures in agriculture? or by "accepting" less meat or rice in the given diet? Or by not "accepting" that we eat more than the given diet. (Just to stress that the driving force is people and their choices of food) (Government of Sweden)	1) **Noted**. We agree, and have referred to the growing population as an important driving force in future environmental impacts. 2) **Noted**: Projections of dietary changes are included in the emissions analysis performed by US-EPA (2006a) to which we refer and from which tables 8.4 and 8.5 are derived (these tables have been replaced by Fig. 8.2 in the final draft). The chapter does not address changing diets as a mitigation measure. The information is given just for describing a baseline scenario in which a shift in diets is

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							occurring, with the consequence of increased GHG emissions
8-45	A	5	23	5	30	Check surface data in the text respect the table 8.2. And correct minor discrepancies. (Government of Spain)	**Accept** – Text was modified
8-46	A	5	31	6	4	this para should become part of the ES. (Government of Germany)	**Accepted, partly**. The text is somewhat long for direct inclusion, but the gist of the paragraph was included in ES considering space constraints. Specifically, the ES now briefly mentions the possibility of increased emissions arising from higher food demands, changing diets and other factors (2nd last paragraph of ES).
8-47	A	6	1	7	5	It will be interesting if authors introduce some words about where net importers and exportes for different food setors will be next decades and if the actual picture around the world will then change substantially and in what countries will be more evident. (Government of Spain)	**Rejected**: This would indeed be of some interest, but we have opted not to include the proposed text, given constraints for space.
8-48	A	6	8	6	9	"the share of animal……..in developed countries" … no reference given. And the cause also not specified. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Accepted**: The statement alludes to data in Table 8.3. That has now been noted in the text. Thanks
8-49	A	7	2	7	2	after (China)"causing a growing demand for meat and dairy products" add “due to its very low current level”. (Government of China Meteorological Administration)	**Accepted**. The sentence has been amended o reflect the reviewer’s comment.
8-50	A	7	4	7	8	why are the CRF tables not used to get an overview about emissions and removals of the sector at least for Annex I countries. as already mentioned it should be noted that according to the submitted CRF tables the EU CO2emissions from grassland and cropland amount to 540 Mt CO2 in 2004. the small number of 40 Mt should be justified by more detailed information.	Comment refers to p. 8, not p.7 CRF tables are only for Annex I countries and therefore, give an incomplete picture.

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						(Government of Germany)	The value provided by the government of Germany is two orders of magnitude than the value reported in the CRF tables for the European Community. See also response to comment 8.23
8-51	A	7	9	7	40	this para should become part of the ES. (Government of Germany)	**Accepted, partly**. The text is somewhat long for direct inclusion, but the gist of the paragraph was included in ES considering space constraints.Specifically, the ES now briefly mentions the possibility of increased emissions arising from higher food demands, changing diets and other factors (2nd last paragraph of ES).
8-52	A	7	20	7	24	Rather than accumulating more soil organic C, zero tillage (ZT) causes the stratification of soil organic C in soil. The accumulation of soil organic C largely depends on crop rotation and water and nutrient management (Steinbach and Alvarez 2006). CO2 emissions are often decreased after longterm ZT, provided the soil is covered by agricultural residues. N2O emissions to increase in zero tilled soils because of N denitrification losses (Dalal et al. 2003, Steinbach and Alvarez 2006). Taking into account that the warming potential of nitrous oxide is 210 times greater than that of CO2, the desired objective CO2 mitigation could be hard to get in ZT soils. This is not sustained by Six et al. (2004), who argued that C sequestration can be reached in the long term in ZT soils. References:Dalal R.C., Wang W., Robertson G.P., Parton W.J., 2003. Nitrous oxide emission from Australian agricultural lands and mitigation options: a review. Australian Journal of Soil Research 41, 165-195; Six J., Ogle S. M., Breidt F. J., Conant R. T., Mosier A. R., Paustian K., 2004. The potential to mitigate global warming with no-tillage manangement is only realized when practised in the long term. Global Change Biology 10, 155 – 160; Steinbach H. S., Alvarez R., 2006. Changes in soil organic	**Accepted (partly)**: We agree that, while ZT often elicits soil C gain, this does not always occur, and have explicitly sated that observation elsewhere in the text. (e.g., page 17, line 6). Many of the studies provided have been cited, and most are included in our dataset used to derive the mixed effect model. The variability of the findings is reflected in the uncertainty ranges given in Figure 8.5. Even so, we have slightly revised the sentence to say that ZT "often" increases soil C.

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						carbon contents and nitrous oxude emissions after introduction of no-till in pampean agroecosystems.. Journal of Environmental Quality 35, 3 – 13. (Government of Argentina)	
8-53	A	7	25	7	29	We suggest that it should be said more explcit that increased N fertilization will (not may) cause increased GHG emissions. This will be more consisten with the IPCC guidelines for estimating the GHGs from agriculture. (Government of Norwegian Pollution Control Authority)	**Accepted (partly):** We agree that N_2O emissions generally increase with increased N inputs, as reflected in the IPCC guidelines. But the relationship between N_2O emissions and N inputs has a lot of scatter, and, while true, on average, is not always consistent at individual sites. We have slightly revised the sentence to indicate that "N fertilization can cause increased GHG emissions"
8-54	A	7	30	7	30	add after grassland, (connected with high CO2 emissions). (Government of Germany)	**Accepted**. The sentence has been amended to reflect the reviewer's comment.
8-55	A	7	31	7	32	But if land goes out of arable production due to climatic factors, it is also likely to go into pasture, unless there are serious incentives to convert to forestry. Refer to Viner et al., 2006 (Viner D., Sayer M., Uyarra M., and Hodgson N., 2006 Climate Change and the European Countryside: Impacts on Land Management and Response Strategies. Report Prepared for the Country Land and Business Association., UK. Publ., CLA, UK 180 pages.) (David Viner, University of East Anglia)	**Noted**. But this observation may not be directly pertinent here. Impacts of climate change are addressed briefly in section 8.5 (see table 8.13).
8-56	A	7	34	7	35	after "Intensive production of beef, poultry and pork is increasing more common" please add " as people improve their living standard, so it is unavoidable" before leading to increases in manure with consequent increases in GHG emissions. (Government of China Meteorological Administration)	**Rejected**. In our view, increased consumption of meat is not necessarily "unavoidable". Further, the link between economic growth and meat consumption has already been established in our text. (see page 7, lines 1-7)
8-57	A	7	35	7	36	Some countries of Latin America, like Argentina, even Uruguay are being tradicionally meat exporters. Are the authors suggesting the the sector will increase even more?.	Noted. This is exactly what the text says, that intensification of livestock production is a trend in S & E Asia, **Latin America** and

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						(Government of Spain)	North America
8-58	A	7	41	0	0	F. Al-Ansari: The paragraph starting from " There is an emerging trend ....." should also be bulleted as it forms a trend that has implications for GHG emissions. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted** – corrected, as suggested. Thanks!!
8-59	A	7	45	0	0	Section 8.3: It is no doubt useful to give a detailed break-down of subsectors and their contributions to total emissions, but you need to qualify the US-EPA data by recognising that these figures have very large uncertainties, and that other literature gives very different percentages. See the assessment by WG1 in Tables 7.4.1 and 7.4.2 in chapter 7. Please qualify your presentation of those data by reference to the much wider band that can be derived from other literature. It would be very unhelpful if two different IPCC reports were to be seen to be inconsistent. (Andy Reisinger, TSU IPCC Synthesis Report)	**Accepted**. Text was rephrased to reflect the uncertainty of US EPA data, and to include estimates from WG1. Summary of EPA data was greatly improved by replacing Tables 8.4 and 8.5 by one new figure.
8-60	A	7	47	7	49	It is stated that agriculture accounts for 14 % of anthropogenic non-CO2 emissions. This seems not to be consistent with neither the figures for agriculture consisting 84% of N2O and 47 % of CH4 global emissions, nor the information in TS p 3 line 8 where agriculture's(+forestry) share of global GHGs is estimated to 23%. (Government of Norwegian Pollution Control Authority)	**Accepted**. It should be 14% of total global GHG emissions. We modified the text accordingly
8-61	A	7	47	7	47	delete "Non CO2" and insert " N2O and CH4", non CO2 emissions encompass more than N2O and CH4 (Government of Germany)	**Accepted**. Corrected – thanks!!
8-62	A	7	48	7	48	"Table 8.3" should be changed to read "Table 8.4". (Government of Pakistan)	**Accepted**. Corrected – thanks!!
8-63	A	7	48	7	48	it should read table 8.4 (Government of Germany)	**Accepted**. Table was eliminated
8-64	A	8	0	10	0	1) In table 8.4 and 8.5, the regional country groupings are different from the regional country groupings which are defined in Table 1-4 and Appendix I of the reference, so we can not understand how the data were got?. 2) The estimated data look higher than the data of national inventory, for example the emission amount of non-CO2 in the agriculture sector in developing countries of south Asia including	1) **Noted**. Data from EPA were adapted to accomodate the country grouping agreed by AR4 writing team. We have replaced these tables by a new figure. 2) **Accepted**: National inventories from Non-

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						India, Nepal, Pakistan (except Bangladesh and Myanmar) during 1993-1994 year was summarized based on their national inventory, the total amount is 430 Mt CO2-eq.yr-1which is much lower than 795 of the table 4 for 1990. So a necessary description for uncertainties is needed. (Government of China Meteorological Administration)	Annex I countries are not subjected to reviews and are usually not accurate, incomplete and non-comparable. EPA analysis was based on a methods applied consistently to all countries. We have improved the description of the origin of the data and have redrafted text to indicate the uncertainty implicit in US-EPA estimates.
8-65	A	8	4	8	7	Estimates of CO2 emissions from Cropland and Grassland (from national LULUCF inventories) should be included here, as the arrangement of the report is by Agriculture and Forestry, not Agriculture and LULUCF (as in the inventories), and otherwise these CO2 emissions are ommitted. (Government of UK)	**Noted**: the estimate already includes CO2 emissions from these land use categories (cropland and grassland) but also changes due to conversions of land use to these categories.
8-66	A	8	4	8	6	The sentence is misleading. It is not a fact of where estimates are included in the inventories but if they are comparable across or within a region. (Government of Spain)	**Noted**: the estimate includes CO2 emissions from these land use categories (cropland and grassland) but also changes due to conversions of land use to these categories
8-67	A	8	7	8	8	An estimate of 40 Mt CO2-eq/yr for 2000 is mentioned for the global CO2 emissions from agriculture. Could the source(s) of these emissions be mentioned? (Government of Norwegian Pollution Control Authority)	**Accepted**. We do state where it is derived from (page 8, line 5-8). We have included more text to explain this more clearly. See also response to comment 8-23.
8-68	A	8	7	8	8	Check the figure 40 Mt and 1%. See No. 64#, 67 and 76. (Government of Germany)	**Noted**. We have checked this figure a variety of ways, and it is in the right range
8-69	A	8	10	0	0	Table 8.4: Include column on CO2 emissions from Cropland and Grassland (see comment above) (Government of UK)	**Rejected**: the estimate already includes emissions from cropland and grassland. There is no data available to provide a regional breakdown. Our best approximation is that global CO2 emissions from agricultural soils are nearly balanced with global CO2 removals

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							by these soils.
8-70	A	8	10	8	10	delete "GHG" insert instead "N2O and CH4" (Government of Germany)	**Accepted**. But Table was eliminated.
8-71	A	9	5	9	7	N2 O emissions from biological N fixation may be another important GHG source in countries, where soybean is an important field crop (US, Brazil, Argentina, and so on), or in countries (New Zealand, Argentina, Uruguay, etc) where grass-legume pastures are periodically sown with stock grazing purposes. However, in such situation N2O emissions are suspected to be "double counted", because N is counted when is fixed from the atmosphere and again when is buried into the soil, as shown by Rochette and Janzen (2005).References:Rochette Ph., Janzen H.H., 2005. Towards a revised coefficient for estimating N2O emissions from legumes. Nutrient Cycling in Agroecosystems 73, 171-179. (Government of Argentina)	**Reject**. N2O emissions from soils already include emissions from BNF. We already cover this and cite this reference (page 16, lines 20-25)
8-72	A	9	14	9	14	after "CH4 emissions from rice occurred mostly in South and East Asia (82% of total)", need to add "as rice production feed more than 50 % of the world population". (Government of China Meteorological Administration)	**Accepted**, **partly**: the sentence has been amended to read: "While CH_4 emissions from rice occurred mostly in South and East Asia, where it is a dominant food source (82% of total emissions),"
8-73	A	9	19	0	24	see previous. This paragraph is far too limited. There is more literature than the cited EPA study (e.g. Janssen etal 2003 Science, Vleeshouwewrs et al 2002 Global Change Biology) that generally attributes a very significant net CO2 source from agricultural (cropland) soils. These studies conclude that in Europe alone agriculture is a net source of 199Mton C (or 730Mton CO2) (the sum of emissions from cropland and uptake by grasslands). Also areal expansion of agricultural cropland will lead to net C losses to the atmosphere. (Ronald Hutjes, Alterra)	**Noted**. Although there are estimates of net CO2 exchanges in croplands for some regions (like those described for Europe), we are aware of few studies that provide definitive estimates for croplands globally.We have added more detail to explain where this comes from. See also response to comment 8-23.
8-74	A	9	19	9	24	these numbers should be checked as EU with regard to the CRF tables has emissions out of agricultural lands (2004 540 Mt CO2). Give the range for the numbers! Especially as high uncertainty is mentioned. Elaborate further where and	**Noted**. The value provided by the government of Germany is two orders of magnitude than the value reported in the CRF tables for the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						which removals and emissions occur. (Government of Germany)	European Community. We have anyway added text to better explain this. See also response to comments 8-23 and 8-50
8-75	A	9	28	9	28	Cite table 8.5 instead of 8.4. (Government of Spain)	**Accepted**. Tables 8.4 and 8.5 were eliminated
8-76	A	9	28	9	29	the sentence "with an average annual emission of 49 Mt CO2-eq….." should be replaced with "with an average anual emission increase of 49 Mt CO2-eq" to make the meaning clearer. (Government of Norwegian Pollution Control Authority)	**Accepted**. Corrected – thanks!!
8-77	A	9	28	9	28	"Table 8.4" may be changed to read "Table 8.5". (Government of Pakistan)	**Accepted**. Tables 8.4 and 8.5 were eliminated
8-78	A	9	28	9	33	1) should become part of the ES. 2) Furthermore, it should read table 8.5. 3) insert in line 28 between "agricultural" and " emissions" " N2O and CH4". 4) Clarify, whether the word "rate" or "increase" needs to be inserted after "emission" in line 29 as the annual emissions according to table 8.5 are about 5000Gg. (Government of Germany)	**1) Accepted, partly.** The text is somewhat long for direct inclusion, but the gist of the paragraph was included in ES considering space constraints.Specifically, the ES now briefly mentions the possibility of increased emissions arising from higher food demands, changing diets and other factors (2nd last paragraph of ES). **2) Accepted –** but table 8.5 was eliminated **3) Accepted –** the words have been inserted, but text was extensively revised. **4)Accepted –** the sentence has been clarified.
8-79	A	10	0	10	0	table 8.5 showed GHG emission trends by main sources in the agriculture sector in the different world regions during the period 1990-2020, but there are very large differences between the value of this table and summarized individual national inventory. More detailed approaches and data sources should be given so that governments and experts can understand how large uncertainties were involved in the table.From the reference we know that DAYCENT and DNDC were used for	**Accepted.** Text has been redrafted to give a better notion of uncertainties. National GHG Inventories from Non-Annex I countries are not a reliable source of data. EPA estimated for 2005 a total N2O emission

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						this study, but no validated data for China and other individual region were given, so we haven't no doubts for the model availability, like the N2O estimation for China is larger 17%-40% than China's study, but no clear description. We'd also agree with the idea that more the X % deltas between the baseline scenarios and mitigation scenarios should be given rather than focus on the absolute numbers, which have a very high degree of uncertainty. We hope a sentence should be clear mentioned around this table that is these emission trends are not intended to serve as any national inventory studies, just to provide a basis from which to assess the effects of the different mitigation options. (Government of China Meteorological Administration)	in Agriculture of 2,990 Mt CO2-eq. (2,197 and 793 Mt CO2-eq. for Non-AI and AI countries, resp.), whereas the UNFCCC reported a total N2O emission (FOR ALL SECTORS) of 2,500 Mt CO2-eq. in 2003 (1,300 and 959 Mt CO2-eq. for Non-AI and AI countries, resp.). The figures seem to be consistent for Annex I countries, but not for Non-Annex I countries.
8-80	A	10	1	10	1	delete "GHG" insert instead "N2O and CH4" (Government of Germany)	**Accepted**. But table was eliminated
8-81	A	10	10	0	0	Table 8.5: Include column on CO2 emissions from Cropland and Grassland (see comments above) (Government of UK)	Rejected: There are no suitable data available, and our best approximation is that global CO2 emissions from agricultural soils are nearly balanced with global CO2 removals by these soils.
8-82	A	11	2	11	2	insert before "emissions"N2O and CH4" (Government of Germany)	**Accepted**. This paragraph has now been rewritten and the sentence no longer appears.
8-83	A	11	13	14	14	extract something about emissions trends for the ES from that chapter. (Government of Germany)	**Accepted**. The ES now briefly mentions the possibility of increased emissions arising from higher food demands (2nd last paragraph of ES).
8-84	A	11	15	11	15	clarify which table is meant 8.3.1 doesnt exist. (Government of Germany)	**Accepted**. Reference should have been to Table 8.5, but this table has now been eliminated
8-85	A	11	17	0	18	Here it is recognised that the emissions should relate to a unit of food, or why not to a basic diet/person This is very important since it provides the possibility to compare impacts of different measures. Feeding people is a very critical driving	**Noted**. We must stay policy neutral. Emissions can relate to unit of food, but also to GDP, number of inhabitants, etc. This can

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						force for the emissions (Government of Sweden)	be a controversial issue. What is relevant for climate change mitigation is to reduce emissions. How these emission reductions are allocated is a policy issue (e.g., absolute caps vs, carbon intensity caps).
8-86	A	11	26	11	26	Replace "and thus" by "but". (Government of Pakistan)	**Accepted, partly:** 'and thus' has been replaced by 'so', to indicate the logical sequence (i.e., because rice area is only expected to increase marginally, increases in emissions from that rice are also expected to be small)
8-87	A	11	33	11	34	FAO 2003 is mentioned as reference. However, this reference does not give any information to deforestation. So delete the words ", especially deforestation," or make the relevant reference. Forthermore FAO 2003 quotes only the IPCC Synthesis Report 2001, which is on this part not apropriate to be used as a reference. (,)	**Accepted:** FAO (2003) does mention deforestation, but we have redrafted the text to explain more clearly and to be consistent with Chapter 9.
8-88	A	11	33	11	35	compare statement with content of chapter 9. (Government of Germany)	**Noted:** Text has been redrafted and consistency with Chapter 9 checked.
8-89	A	11	37	11	37	insert between "global" and "emissions" "N2O and CH4" (Government of Germany)	**Accepted**. Revised, as suggested
8-90	A	11	38	11	38	"Table 8.4" may be changed to read "Table 8.5". (Government of Pakistan)	**Accepted**. But tables were eliminated
8-91	A	11	38	11	38	change table 8.4 to 8.5 (Government of Germany)	**Accepted**. But tables were eliminated
8-92	A	11	43	11	43	In the sentence "N2O emissions, expected to average 49 Mt CO2-eq.yr, would continue to grow faster than CH4 emissions, projected to average 35 Mt CO2-eq/yr" it should be considered to ad "grow with" between to and average. (Government of Norwegian Pollution Control Authority)	**Accepted** – The sentence has been revised to clarify (though not exactly as recommended. – see response to comment 8-76 and 8-78.

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8-93	A	11	43	11	43	insert after "N2O emissions" "trend/rate /increase" (Government of Germany)	Accepted – see response to comment 8-76 and 8-78.
8-94	A	12	3	14	14	as in the subchapters before, GHG emissions mean N2O and CH4 only, clarify whether in this subchapter also other GHG emissions are included. Furthermore in the whole subchapter it should be clearly distinguished between gases when describing trends. To use always the term GHG emissions in general does lead to a lack of transparency. (Government of Germany)	**Accepted**. Substantial changes were introduced to this section in response to several comments
8-95	A	12	8	8	12	Fig 8.2, ten world regions separate two figures there are large uncertainties with less clear data sources, do not use this Fig, instead by a Fig. of geophysical region trends, e.g. do not separate developed and developing countries. (Government of China Meteorological Administration)	**Accepted**. We believe it is important to see the difference in emission trends between Annex I and Non-Annex I countries. There are different trends and different drivers causing them. We do not want to hide that important information. To address this and other comments, we have replaced this figure and Tables 8.4 and 8.5 by one figure showing the trends in the 10 regions defined for AR4, as well as for the groups of developed and developing countries.
8-96	A	13	15	13	16	the sentence(for Asia developing countries) is very important, e.g. Since the per-capita consumption of meat and milk is still much lower in these countries than in developed countries, the increasing trends are expected to continue for a relatively long time. (Government of China Meteorological Administration)	**Noted.**
8-97	A	13	20	0	0	The driving force is population (including poulation growth) and the diet of the people. The mission for agriculture must be to provide the food at low emissions, but the size of the population and the diet for the population is not for agriculture to decide. Agriculture is about providing people with C (food=bioenergy for humans) Then the main driver is not "using fertilizer and manure" as is written in the text,	**Rejected.** The diet and population drive the demand for the fertilizer, but it is the fertilizer that increase the GHG emissions.

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						but population and diets (Government of Sweden)	
8-98	A	13	30	13	35	Same comment than in p 7 l 20.. Rather than accumulating more soil organic C, zero tillage (ZT) causes the stratification of soil organic C in soil. The accumulation of soil organic C largely depends on crop rotation and water and nutrient management (Steinbach and Alvarez 2006). CO2 emissions are often decreased after longterm ZT, provided the soil is covered by agricultural residues. N2O emissions to increase in zero tilled soils because of N denitrification losses (Dalal et al. 2003, Steinbach and Alvarez 2006). Taking into account that the warming potential of nitrous oxide is 210 times greater than that of CO2, the desired objective CO2 mitigation could be hard to get in ZT soils. This is not sustained by Six et al. (2004), who argued that C sequestration can be reached in the long term in ZT soils. References:Dalal R.C., Wang W., Robertson G.P., Parton W.J., 2003. Nitrous oxide emission from Australian agricultural lands and mitigation options: a review. Australian Journal of Soil Research 41, 165-195; Six J., Ogle S. M., Breidt F. J., Conant R. T., Mosier A. R., Paustian K., 2004. The potential to mitigate global warming with no-tillage manangement is only realized when practised in the long term. Global Change Biology 10, 155 – 160; Steinbach H. S., Alvarez R., 2006. Changes in soil organic carbon contents and nitrous oxude emissions after introduction of no-till in pampean agroecosystems.. Journal of Environmental Quality 35, 3 – 13. (Government of Argentina)	**Noted**: We do not agree entirely that ZT merely "causes the stratification of soil organic C in soil". In many instances, according to the literature, ZT does apparently also increase total storage, though, as we point out elsewhere, "not always). Our analysis includes many of the papers suggested, and encompasses a broad spectrum of sites (and observed responses). [see also response to comment 8.52.] We have, however, made significant changes to our text, both to clarify and to abbreviate.
8-99	A	13	42	0	44	P. Heffer: Use of fertilizer N will certainly increase in the FSU, but are unlikely to reach again the pre-1990 levels over the next decades. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**: The sentence has been amended to reflect the reviewer's comment.
8-100	A	13	49	13	49	"Table 8.4" may be changed to read "Table 8.5". (Government of Pakistan)	**Accepted**. But Tables 8.4 and 8.5 have been eliminated
8-101	A	14	0	22	0	general comment: it is important to have a global approach on mitigation technologies and practices, in order to be sure not to produce negative side effects.	**Noted**. We have addressed the subject of leakage / displacement of emissions (e.g.,

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						For example, on the para 8.4.1.5.a on improved feeding practices, more concentrates in animal feeding can lead to less grasslands, and more croplands that use more fertilizers and fossil fuels. Moreover, il seems that we don't have enough data on the physiological response of the animals with a lot more concentrates in their feeding. The potential changes in agronomic management has to be evaluated in taking into account all the effects on the production system. (Government of France)	section on 'barriers'). As well, in Section 8.4, we state that "Often a practice will affect more than one gas, by more than one mechanism, sometimes in opposite ways, so the net benefit depends on the combined effects on all gases (Robertson and Grace, 2004; Schils *et al.*, 2005; Koga *et al.*, 2006).". And in Table 8.4, we try to present the 'net mitigation' arising from a practice.
8-102	A	14	11	0	0	GHG emissions are projected to decrease in Western E, but to what extent is this because the food is produced somewhere else? Is the production, "the problem", just taking place in another country? Has something really been mitigated? (Government of Sweden)	**Noted**. This is an important point; we have addressed the subject of leakage / displacement of emissions in the 'barriers' section and also in the 'section on 'co-benefits and trade-offs'
8-103	A	14	11	14	14	clarify which table is meant 8.3. doesnt give trends for 2020 and clarify whether all GHG gases are meant. (Government of Germany)	**Accepted**. 'Table 8.3' should be 'Table 8.5 – corrected. The table caption has been revised to indicate that it refers to CH_4 and N_2O. (Table later replaced).
8-104	A	14	12	14	12	"Table 8.3" may be changed to read "Table 8.5". (Government of Pakistan)	**Accepted**. 'Table 8.3' should be 'Table 8.5 – corrected. The table caption has been revised to indicate that it refers to CH_4 and N_2O. (Table later replaced).
8-105	A	14	16	40	4	this section give more detailed description for individual mitigation technologies, most of them have been discussed for more than 10 years, but still not use in practice, barriers need to be assessed. (Government of China Meteorological Administration)	**Noted**. We agree that the barriers to implementation deserve discussion, and have done that elsewhere (see Section 8.6).
8-106	A	14	16	22	34	Please give clear descriptions of mitigation options see also chapter 9. what is found here is very general! For instance, at page 17 lines 18 to 26 in "water management" it should be indicated and described exactly which measures can	**Rejected**. While providing more detailed descriptions of the various mitigation options might have some merit, that is, regrettably,

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						enhance C storage. it is not suffient to indicate that there are efficient irrigation measures, list them!! water management is only one example but this remark is true for all other management practises mentioned in this subchapter: no defined concrete measures are described. (Government of Germany)	beyond the scope (and length guidelines) of the current chapter. Instead, we refer the reader to some references that provide further detail. (In forestry the situation is much simpler with options being afforestation, reduced deforestation and degradation and forest management. In agriculture we have 59 management practices considered (and this excludes different practices within an activity) which we have grouped under 22 groups of practices which form part of 9 broader activities.) Other reviewers find the examples we give are "are very very good and important" – see comment 8.115.
8-107	A	14	24	0	26	P. Heffer: The word "suppress" (used twice) should be replaced by "reduce". (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. The sentence has been revised ,as suggested.
8-108	A	14	24	0	27	An efficient use of N and C when producing food is essential. A total impact must be considered. Are emissions really decreasing/unit of food, counting all gases and all countries? (Government of Sweden)	**Noted**. The reviewer raises an important issue – it is important to address the total impact of a management option. We have been careful, however, to state in this sentence that these practices 'often' reduce emissions. In some instances, admittedly, the total impact might not be positive. The importance of estimating *net* emissions has been addressed elsewhere in the chapter. (For example, on page 15, lines 4ff we state "Often a practice will affect more than one gas, by more than one mechanism, sometimes in opposite ways, so the net benefit depends on the combined effects on all gases

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							(Robertson and Grace, 2004; Schils *et al.*, 2005)."
8-114	A	15	0	0	0	Table 8.6, comment on "Livestock management - improved feeding practices": the chapter so far only works on a reduction of ruminal CH4 emissions through improved feeding practices (see as well chapter 8.4.1.5., page 20). Improved feeding practices, however, may as well reduce excretion of excess N when N in the diet better matches the animals` N requirements. This measure is applicable for ruminant animals as well as for pigs and poultry. Especially in fattening pig husbandry, phase feeding is a common and well acknowledged practice to reduce N excretion. Less N in the manure then leads to a reduction in N2O emissions from manure management and after manure application to crops and grassland. I´d therefore like to suggest to include the N aspect when summarising feeding practices. A "+" would then have to be added to the column "Mitigative effects - N2O" (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**. Agreed. The table has been revised to include a '+' for N_2O. (We have also, based on the reviewer's reasoning, added a '+' for N_2O for 'longer term structural and management changes …"
8-109	A	15	4	0	0	This sentence is also saying that production should be efficient, so new land must not be used unless necessary (Government of Sweden)	**Noted**. Agreed - that is implied (and it is a noteworthy observation).
8-110	A	15	5	8	20	I suggest to consider the sowing of grass-legume pastures as a mitigation option to reduce GHG emissions. This is so because in temperate humid climates the primaryt net production of pastures is largely greater than that of annual crops. In addition, most added carbon is stored belowground (soil, roots and crowns), regardless the amount of C removed by grazing. This could be an interesting option in those countries where stock grazing in relevant. Please, suggest to include this option in Table 8.6 (Government of Argentina)	**Noted**. We agree that sowing grass-legume pastures is a useful mitigation option, and have already referred to it in both the table (see 5th line under 'Grazing land management/pasture improvement) and in the text (see section 8.4.1.2.e). The practice is also implied in section 8.4.1.1g (land cover (use) change', where we refer to the 'reversion of cropland to another land cover', and in section 8.4.1.1a, where we mention the benefits of planting 'perennial crops' on cultivated lands.

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8-111	A	15	7	0	8	P. Heffer: It would be useful to state as well that reducing GHG emissions can result in increased losses through other pathways, e.g. decreasing N2O losses can result in increased nitrate leaching. This must be taken carefully into account. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Noted**. We agree and have implied this point elsewhere. For example, on page 51 we state that "Practices for mitigation GHGs can have both negative and positive effects on conservation of water, and on its quality." And, further, that "some practices may affect quality of water, through enhanced leaching of pesticides and nutrients". Admittedly, we do not mention this trade-off between N_2O mitigation and nitrate leaching explicitly, but that might be beyond the scope of this chapter. Moreover, in some instances, reducing N_2O emissions might be accompanied by *reduced* leaching of nitrate.
8-112	A	15	13	15	13	insert here a discussion about uncertainty and non permanence connected with the enhancement of sinks, see also chapter 9. this is a main concern also when governments need to decide if to include CM and GM as a 3.4 option for the first CP. (Government of Germany)	**Rejected**. Whilst issues of uncertainty and non-permanence are clearly important, they have been addressed elsewhere (see section 8.6.2)
8-113	A	15	14	15	14	insert after first "The" "qualitative". (Government of Germany)	**Accepted**. Excellent suggestion – thanks!! The term 'qualitatively' has been inserted in the sentence.
8-115	A	16	11	16	15	Examples are very very good and important (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. Thank you. (This comment partly contradicts comment 8.106 which implied that we had insufficient detail.)
8-116	A	16	12	16	19	Droughts, and also unduly wet drilling seasons (esp in autumn) would have a countervailing effect (David Viner, University of East Anglia)	**Rejected**. Although unfavorable weather can indeed affect the benefits of these practices in individual years, we refer here to general, overall trends. If the reviewer is referring to

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							altered precipitation patterns from climate change, then that subject may not be entirely relevant here.
8-117	A	16	18	16	18	The sentence "……and CO2 from fertilizer manafacture" should be replaced by"……N2O and CO2 from fertilizer manafacture" E.g In Norway the production of mineral fertilizer contributed in 2004 with about 1/3 to the national N2O emissions. (Government of Norwegian Pollution Control Authority)	**Accepted**. N_2O emission from fertilizer manufacture can be significant. We have amended the sentence as suggested, and also included a reference.
8-118	A	16	22	0	24	P. Heffer: The sentence must be reworded as biological N fixation is also an "N input". (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted (partly)**. We agree that legumes can also be an important source of N_2O but have already stated that explicitly in our text. We have, however, inserted the word 'external' to distinguish biological N fixation from other sources.
8-119	A	16	25	16	28	Where perennial woody species are important (i.e. Olive or grapes) mantain green covers may represent an interesting option, it should be explicetly mention. (Government of Spain)	**Accepted**. The sentence has been amended, as suggested.
8-120	A	16	26	16	28	A word of caution may be added, suggestion… '"provided you don't apply any fertilizer to these catch/cover crops", otherwise the conclusion is misleading. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Rejected**. We do not disagree that fertilizer applied to catch crops might lead to N_2O emissions; but we contend that it is unlikely that farmers would apply fertilizer to these crops, since part of their intent is to trap excess nutrients.
8-121	A	16	31	16	32	IPCCs guidelines for the estimation of GHGs from agriculture assume that a significant part of N added to soils leak out to (ground)water where a part is transformed to N2O. The production of mineral nitrogenfertilizer emits N2O. We suggest therefor that the sentence beginning with "Improving this ……" should be altered to: "Improving this efficiency can reduce emissions of N2O, generated by soil microbes largely from surplus N and in water from leakage of surplus Nitrate-	**Accepted**. We have inserted a new sentence to address this important point. Thank you.

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						N, and it can indirectly reduce emissions of N2O and CO2 from fertilizer manafacture. (Government of Norwegian Pollution Control Authority)	
8-122	A	16	32	0	0	T. Bruulsema: The statement that "N2O [is] generated by soil microbes largely from surplus N" calls into question the IPCC method for calculation of N2O emissions. The current method, as I understand it, is to multiply total N fertilizer use by the emission factor of 1.25%. However, if it is true that surplus N generates more N2O than that applied to match crop uptake needs, it would be more accurate to apply an emission factor to the SURPLUS of N applied relative to crop uptake or removal. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted (partly)**: While it is true that N_2O emissions generally increase with increasing rates of N addition, there is evidence that surplus N is particularly vulnerable to production of N_2O. We have, however, re-phrased the sentence somewhat, and have added a reference to bolster our observation.
8-123	A	16	35	0	0	P. Heffer: Replace “slow-release fertilizer” by “slow- and controlled-release fertilizers”. Below are definitions of these two product categories: § Slow-release fertilizer: A fertilizer product that is decomposed microbially and/or by hydrolysis, which delays the availability of a nutrient for plant uptake and use after application, or which extends its availability to the plant significantly longer than a reference “rapidly available nutrient fertilizer” such as ammonium nitrate, urea, ammonium phosphate or potassium chloride. Examples: urea-formaldehyde, isobutylidene diurea (IBDU), crotonylidene diurea (CDU). § Controlled-release fertilizer: A coated or encapsulated fertilizer product, or a nutrient-releasing material incorporated into a matrix which itself may be coated and which delays the availability of a nutrient for plant uptake and use after application, or which extends its availability to the plant significantly longer than a reference “rapidly available nutrient fertilizer” such as ammonium nitrate, urea, ammonium phosphate or potassium chloride. Nutrients are released progressively from the matrix and/or through tiny pores of the coating/capsule membrane to match the pattern of plant nutrient uptake over a defined period. Examples: polymer-coated/encapsulated fertilizers, polymer/sulphur-coated fertilizers.	**Accepted**. The sentence has been amended

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						(Ben Muirheid , International Fertilizer Industry Association (IFA))	
8-124	A	16	37	16	38	"Placing the N more precisely……." Though in experimental fields it has been found to be a very good option yet How far this is feasible for farmers' fields in developing countries? (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. This point is important, but is more relevant in a later section 8.6 ('barriers'). Economic constraints to adoption of mitigation practices are briefly referred to there.
8-125	A	16	38	0	0	T. Bruulsema: "eliminating N applications where possible" is redundant since "avoiding excess N applications" is already mentioned. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Agreed -The sentence has been revised to read "or avoiding N applications in excess of immediate plant requirements"
8-126	A	16	38	0	0	P. Heffer: The issue is not about eliminating N applications (fertilizer, manure, biosolids…) but about applying N in a time- and site-specific manner in order to match crop needs, and therefore avoid overuse, under-use or misuse and their environmental impacts. From a sustainability point of view, eliminating N applications is only possible in legume crops (if one considers that biological N fixation is not an N application) and in non-cultivated ecosystems. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Agreed -The sentence has been revised to read "or avoiding N applications in excess of immediate plant requirements"
8-127	A	16	38	0	0	F. Ledoux: § 8.4.1.1.b. Avoiding excess N applications, limiting volatilization, etc (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Rejected**: We are listing here some examples of *practices* that promote N use efficiency, not the *mechanisms* that promote efficiency. While 'limiting volatilization' is indeed an important mechanism, it is achieved by at least one of the practices already listed (e.g., precise placement of fertilizers).
8-128	A	17	11	0	0	The mitigation options by tillage/residue management are evaluated using life cycle inventory (LCI) analysis that includs both GHG emissions from soils and fossil fuel consumption by agricultural machines and off-farm processes (Koga, N., T. Sawamoto and H. Tsuruta (2006) Life cycle inventory-based analysis of greenhouse gas emissions from arable land farming systems in Hokkaido, northern Japan, Soil Science and Plant Nutrition, 52, 564–574; see attached PDF).	**Accepted**. A sentence has been added to indicate the potential CO_2-savings from reduced energy use, citing the reference provided. As well, we have inserted the reference in the text (in Section 8.4.1) which already emphasizes the importance of 'life

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						Therefore, I would suggest to add the following sentences: "Reduced tillage may reduce fossil fuel consumption by agricultural machines and off-farm processes. Therefore, it is necessary to adopt life cycle inventory (LCI) analysis to evaluate overall mitigation effect of the management (Koga et al., 2006)." (Kazuyuki Yagi, National Institute for Agro-Environmental Sciences)	cycle analysis (though we did not use that term to describe it). The latter sentence now reads: "Many practices have been advocated to mitigate emissions through the mechanisms cited above. Often a practice will affect more than one gas, by more than one mechanism, sometimes in opposite ways, so the net benefit depends on the combined effects on all gases (Robertson and Grace, 2004; Schils *et al.*, 2005; Koga and Tsuruta, 2006)"
8-129	A	17	16	17	16	insert here a discussion about uncertainty and non permanence connected with the enhancement of sinks, see also chapter 9. this is a main concern when governments need to decide if to include CM and GM as a 3.4 option for the first CP. (Government of Germany)	**Rejected**. The issues mentioned certainly merit consideration, but are addressed elsewhere (section 8.6.2).
8-130	A	17	18	17	23	Water limitation, and inability to fill winter storage reservoirs in dry winters, would restrict this potential. Refer to Viner et al., 2006 (Viner D., Sayer M., Uyarra M., and Hodgson N., 2006 Climate Change and the European Countryside: Impacts on Land Management and Response Strategies. Report Prepared for the Country Land and Business Association., UK. Publ., CLA, UK 180 pages.) (David Viner, University of East Anglia)	**Accepted (partly)**. We have inserted a phrase "(where water reserves allow)" to acknowledge that expansion of irrigation is not always possible. The limited supply of water and increasing competition for dwindling reserves is already discussed elsewhere (section 8.8).
8-131	A	17	18	0	0	F. Al-Ansari: We are of the opinion that the use of treated sewage effluent and its sludge for irrigation and soil conditioning purposes should be considered . The impact of the above usage on the overall water management, soil fertility and finally GHG emissions should also be analysed in this chapter. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Biosolids have been briefly mentioned in 8.4.1.1b (nutrient management).
8-132	A	17	24	17	26	I would be cautious when describing that drainage of land could lead to increased soil C storage. This may certainly be true, but since drainage can have enormous adverse effects on biodiversity, this should also be mentioned in the same section.	**Rejected (partly)**. Although effects on biodiversity are potentially important, the effect is mentioned elsewhere (section 8.8).As

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						(Berien Elbersen, WUR-Alterra)	well, in Table 8.13 we already explicitly state that avoiding drainage of wetlands has a beneficial effect on biodiversity.). Please note: our text in the section referred to by the reviewer refers specifically to 'agricultural lands' (i.e., lands already used for agriculture), not to wetlands not yet cultivated. To further clarify this point, we have replaced 'agricultural lands' with croplands'.
8-133	A	17	28	17	41	My comment to the 1st order draft on integrating the findings of Khalil (new procedures of rice growing with changes from organic to anorganic fertilizer and from whole time to part time flooding as a reason for methane emissions from rice agriculture to decline rather than to increase have not been considered. I put the reference here again, but now in the form published by Elsevier now:Add: 'M.A.K. Khalil and M.J. Shearer, 2006. Decreasing emissions of methane from rice agriculture. In: Greenhouse Gases and Animal Agriculture: An Update (Soliva, C.R., Takahashi, J. and Kreuzer, M., eds.), Int. Congr. Series No. 1293, Elsevier, The Netherlands, 33-41+K8 (Government of Switzerland)	**Accepted (partly)**. We agree that the changing from 'whole time to part time flooding' can reduce emissions, but have already mentioned that in our text (page 17, lines 31ff: "For example, draining the wetland rice once or several times during the growing season effectively reduces CH_4 emissions (Smith and Conen 2004; Yan *et al.*, 2003)". Further, we have now included the reference provided – thank you!. However, the effectiveness of "changes from organic to anorganic fertilizer" has not yet been consistently established.
8-134	A	17	32	0	0	Replace "higher" with "increased". And add a reference, Akiyama, H., K. Yagi, and X. Yan (2005), Direct N2O emissions from rice paddy fields: Summary of available data, Global Biogeochem. Cycles, 19, GB1005, doi:10.1029/2004GB002378. (Kazuyuki Yagi, National Institute for Agro-Environmental Sciences)	**Accepted**. Adopted, as suggested, and the reference has been included. Thank you!!
8-135	A	17	38	17	39	Very important point… may be highlighted or brought in Exec Summary (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Rejected**. We thank the reviewer for confirming the importance of this point.

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							Unfortunately, it may be too detailed to included explicitly in the Executive Summary. We have declined that suggestion.
8-136	A	18	8	18	22	The recommendation may be good but is it scientifically recommendable considering the increased food demand of the world??? Though a word of caution is mentioned in lines 23-24, yet most farmers in developing countries are marginal farmers and have very less land to avail such an option..... (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. The reviewer's comment has merit; but we are not recommending it – merely presenting and evaluating the options. As with other measures, this one is more applicable in some regions (e.g. EU where land is being abandoned) than others (e.g. non Annex I where land for food is in great demand). See also response to your comment 8-139.
8-137	A	18	9	0	0	T. Bruulsema: 1) Land cover change is introduced as "one of the most effective methods of reducing emissions" - yet, the following text raises considerable doubt about the net effect, particular in conversion to wetlands where CH4 and N2O emissions may increase. 2) Also, shifting crop production from this converted land to land of lower productivity, or to land obtained from deforestation, could have negative effects on net GHG emission. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Reject, partly:** Our statement (quoted by the reviewer) ends by specifying 'typically one similar to the native vegetation'. Further, we specify 'conversion of cropland' to other land covers. Thus, we are not directly referring here to practices such as draining wetlands. Nevertheless, we have inserted the word 'often' into the text to further acknowledge that there may be exceptions. The reviewer also refers to the possibility of 'shifting crop production'. That issue, while important, is addressed later in our discussion of 'leakage' (section 8.6.2.
8-138	A	19	2	19	2	According to IPCCs guidelines for estimating GHGs for agriculture N2O emissions will increase with the amount of added nitrogen. The expression "may stimulate" should therefor be revised. (Government of Norwegian Pollution Control Authority)	**Accepted (partly)**: There is indeed a general tendency for N_2O emissions to increase with rate of added N (as documented in the IPCC methodology), but the relationship is not

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							perfectly consistent, and may not be true in all cases. We have revised the sentence to read "Adding nitrogen, however, often stimulates N_2O emissions..." to reflect partially the reviewer's concern.
8-139	A	19	3	0	0	"Irrigating grasslands….." How many grasslands are irrigated in the developing world. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. Irrigation of grasslands may indeed not be widespread, but it is a practice for which results have been reported (see reference cited). We merely summarize these findings.
8-140	A	19	12	19	33	Very very relevant points made here… may be highlighted in the EXEC Summ also (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Rejected**. We agree that these points have relevance, but because of limited space, we have opted not to include this level of detail directly in the Executive Summary.
8-141	A	19	28	19	28	define and check term "radiant forcing" how does it relate to the "radiative forcing" used in FoAr WGI. (Government of Germany)	**Accepted**. The sentence has been corrected to refer to "radiative forcing".
8-142	A	19	30	19	30	To burn is a practice that is done only in certain periods (very narrow windows a long the year). It is difficult the to follow the recomendation. (Government of Spain)	**Noted**. It is not a recommendation. We are just presenting and evaluating the options.
8-143	A	19	31	19	33	1) delete "although", 2) start a new sentence with ""There " 3) Line 31, delete "the" in line 31 4) insert instead "some" and use plural construction, 5) delete "would" and insert "could" in line 33. 6) There is clear evidence at least in parts of Europe that there would be much less fires if humans wouldn't be involved. Maybe the statement in the subchapter is true for special regions of the world if so give exact indication of those regions. (Government of Germany)	**Rejected**. We decided to leave the sentence as it is. Comments 1) through 5) refer to editorial suggestions which we judge as not necessary. Comment 6) does not refer to a specific region, but is a general concept.
8-144	A	20	26	21	30	All the points are a bit expensive propositions for a developing country….No idea what can be done…. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. But these measures can be implemented in any country.

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8-145	A	20	27	22	5	Most of the actions in the section 8.4.1.5 and 8.4.1.6 must be further analyzed with respect to animal welfare etc. (Government of Sweden)	**Noted**. These appear in the co-benefits and trade-offs sector as well as barriers (society's acceptable or not of these practices)
8-146	A	20	28	20	33	This paragraph only mentions CH4 emissions from ruminants as GHG emission source from livestock. However, N in the diet and subsequent N excretion are as well important GHG sources and should be included in this paragraph to give a complete picture of dietary measures that help to mitigate GHG emissions. The possibility of mitigating CH4 emissions from manure management through adapting the animal diet is mentioned on page 21, line 44, and must therefore not be included in chapter 8.4.1.5. CH4 and N2O emissions from animal manure are estimated under "Manure management", but there as well feeding practices that reduce N excretion are not mentioned. I would tend to suggest to include the aspects of N in the diet in the "livestock management" chapter, even if the resulting CH4 and N2O emissions are estimated in the "manure management" chapter. (Barbara Amon, Institute of Agricultural Engineering)	**Accepted.** Text has been revised at line 29 to recognize impact of N excretion on N2O emissions. Reference has been added to encompass strategies that are also targeted at lowering N20 emissions.
8-147	A	20	29	20	30	if livestock are responsible for 18% of anthropogenic CH4, where does the balance of the 47% quoted at page 2 line 19 come from? (David Viner, University of East Anglia)	**Accepted**. Figure has been modified to include sources from manure as well. Revised to indicate that livestock are responsible for about 1/3 of emissions.
8-148	A	20	33	20	33	You could add: "A comprehensive overview of experimental testing of feeding practices for methane mitigation is given in Soliva et al. (2006)." The complete reference is: Soliva, C.R., Takahashi, J. and Kreuzer, M. (eds.), 2006. Greenhouse Gases and Animal Agriculture: An Update. Int. Congr. Series No. 1293, Elsevier, The Netherlands, 377 p. (Government of Switzerland)	**Accepted**. Reference has been added
8-149	A	20	35	20	41	In this section, but also in further sections, that improved feeding methods through exchanging roughage with concentrates will decrease Ch4 emissions per kg/meat produced. This is true. However, there are several expected effects coming from a	**Accepted**. Text has modified to indicate that concentrate feeding can have impacts on land use and a +/- has been added to table 8.6 to

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						shift to increased concentrate feeding which will have an adverse effect on GHG mitigation (especially CO2 and N2O). Firstly, increased concentrate feeding leads to less grazing or no grazing (land independent livestock systems). No grazing may negatively affect C acrual as described on pag 18 line 31-38. Secondly, less grazing and higher demand for contrate feeding may enhance the conversion of grazing land to arable land which may lead to large release of CO2. Thirdly, higher concentrate demands (especially in western countries) may lead to increased imports of concentrate feeds grown of deforestated lands. Fourthly, increased use of concentrate feeding decreases land dependence. This again may lead to a larger concentration of livestock activities in regions where there is already a large manure surplus and this will lead to increased N2O emissions locally. Transport of manure to other regions maybe a solution, but this will increase transport and process requirements which may enhance CO2 emissions. So overall it is very doubtful whether more efficient feeding systems will be effective in reducing emissions, even if world population is growing and demand for proteins is increasing. (Berien Elbersen, WUR-Alterra)	indicate that this practice may have variable impacts on CO2 emissions.
8-150	A	20	35	20	41	comment on chapter 8.4.1.5.: The chapter so far only works on a reduction of ruminal CH4 emissions through improved feeding practices. Improved feeding practices, however, may as well reduce excretion of excess N when N in the diet better matches the animals` N requirements. This measure is applicable for ruminant animals as well as for pigs and poultry. Especially in fattening pig husbandry, phase feeding is a common and well acknowledged practice to reduce N excretion. Less N in the manure then leads to a reduction in N2O emissions from manure management and after manure application to crops and grassland. I´d therefore like to suggest to include the N aspect in chapter 8.4.1.5 (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**. This point has been taken into account in above comments that emphasized that feeding practices can also influence nitrous oxide emissions.
8-151	A	20	37	20	38	"emissions per kg…. are almost invariably reduced". It is correct that CH4 emissions are almost always reduced, but not - and this is an important issue - to the	**Accepted.** A lot of these comments are covered under considerations for impact on

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						same extent. The higher the milk yield, the smaller is the reduction in CH4 emissions per kg of milk. e.g. when increasing the milk yield from 3000 to 6000 kg milk per year, then a considerable effect on CH4 emissions per kg of milk is achieved. An increase from 6000 to 9000 kg milk per year only results in a small decrease in CH4 emissions per kg of milk. To my opinion, this should be mentioned in the text considering the ecological side effects of more concentrates and less roughage in the cattle diet. Concentrates often can as well serve as a valuable feed for humans and / or pigs, thus introducing a competition on a limited amount of feed between cattle and pigs and / or humans. Roughage however, can only be digested by ruminants. Concentrate production often results in higher GHG emissions than grassland production. In many areas (e.g. alpine areas), only grassland is available and an abandonment of grassland management due to an increase in concentrate feeding leads to a marked change in the cultural landscape. Concentrates are often not produced in these grassland areas, but are imported from other areas. This results in a constant nutrient import to these areas and as a consequence to an N excess after manure application. I would therefore like to propose to describe the measure "higher milk yield" and "more concentrates" as an important issue, but mention that there is a turning point where the disadvantages of this measure exceed the advantages. (Barbara Amon, Institute of Agricultural Engineering)	land use as well as the relationship between diet and N20 emissions. Sentence has been modified to take reviewers point into consideration. This was also considered by decreasing the reduction potential in the higher output regions.
8-152	A	20	43	20	43	Again: "adding oils" is too general. Suggestion for rewording: "adding certain oils and whole crushed oilseeds". This distinction is particularly important as not all oils are effective! (Government of Switzerland)	**Accepted**. Revised by adding term certain oils, as well as oilseeds. Did not add term "crushed" as responses with whole – unprocessed oilseeds have also been observed.
8-153	A	21	3	21	3	Specific agents and dietary additives:it should be mentioned that the costs/benefits are main barrier to practice. (Government of China Meteorological Administration)	**Noted**. We do note that they are expensive and also discuss them in the barriers section.

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8-154	A	21	20	25	25	The Bovine somototropin is written on page 21, line 20 as "BSt" whereas on page 25 lines 19 and 25 it is written as "bST". The notation may be made uniform. (Government of Pakistan)	**Accepted**. Corrected to bST.
8-155	A	21	23	0	30	8.4.1.5c In contrast to other actions in 8.4.15 better productivity as a way to reduce GHG doesn't give reasons to so many doubts. The emissions from Swedish agriculture is decreasing mainly due too development of technical factors and management leading to better productivity. An action that has been discussed earlier is to keep dairy cows longer before slaughter. For dairy cows it takes at least two years before they start to produce. The emission from the heifer during that period effects the overall GHG efficiency. To keep the dairy cows longer might therefore be an effective action against GHG emissions. (Government of Sweden)	**Accepted.** Reduction in replacement heifers added as an example, and deleted statement "spreads the energy cost of maintenance across greater feed intake"
8-156	A	21	29	21	30	Please reword to: "ple, intensive selectin for higher yield might not only reduce fertility, but by itself requires more replacement animals (Lovett et al., 2006) thus reducing the longevity and increasing lifetime emissions." The latter part is quantitatively much more important. (Government of Switzerland)	**Accepted**. Statement added "reductions in fertility as a result of increased productivity is a phenomena that is more related to dairy than beef. Beef cows generally have a much longer period of productivity than dairy."
8-157	A	21	31	22	5	"Capturing Methane" "altering feeding practices" are very important… and excellent points mentioned. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted** – thank you.
8-158	A	21	34	21	35	slurry separation (i.e. mechanical separation of solids from the slurry) is an additional measure to reduce GHG emissions during slurry storage and should be mentioned in the text. (See Amon, B., Kryvoruchko, V., Amon, T., Zechmeister-Boltenstern, S. (2006): Methane, nitrous oxide and ammonia emissions during storage and after application of dairy cattle slurry and influence of slurry treatment. Agriculture, Ecosystems & Environment, Special Issue "Mitigation of Greenhouse Gas Emissions from Livestock Production", 112, 2 - 3, 153-162. (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**. Reference added and text revised

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8-159	A	21	34	21	35	chapter 8.4.1.6 "Manure management": "can be reduced by… covering the sources" CH4 emissions from slurry stores are only reduced, if the store is equipped with a SOLID cover. Please insert "solid" to the text. It is often common, to cover slurry stores with chopped straw in order to reduce NH3 emissions. The straw cover leads to an increase in CH4 emissions. see e.g. results from the EU project "MIDAIR": Amon, B., Kryvoruchko, V., Amon, T. (2006). Influence of different levels of covering on greenhouse gas and ammonia emissions from slurry stores. In: International Congress Series (ICS) No 1293 "2nd International Conference on Greenhouse Gases and Animal Agriculture", Zurich, Switzerland, 20-24 September 2005 Elsevier B.V., pp 315-318 and Amon, B., Kryvoruchko, V., Amon, T., Zechmeister-Boltenstern, S. (2006): Methane, nitrous oxide and ammonia emissions during storage and after application of dairy cattle slurry and influence of slurry treatment. Agriculture, Ecosystems & Environment, Special Issue "Mitigation of Greenhouse Gas Emissions from Livestock Production", 112, 2 - 3, 153-162. (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**. Point has been added, but do not feel that it is of sufficient magnitude to warrant addition of another reference.
8-160	A	21	36	0	0	Anaerobic digestion of manures is appropriate for wet systems of manure management. However, where manures and bedding are mixed or where manures are managed through dry collection systems, composting is a most viable option. It seems to get far too little attention in the document. Composting can fully avoid methane emissions. Also, when piles are covered with a geotextile that allows natural aeration and keeps in the heat, degradation rates are accelerated, temperatures are elevated and vectors (such as flies) do not have access to the pile. While manure management by composting has been limited to date, the culling of over 200 million poultry and the loss of trade in over 30 countries due to highly pathogenic avian influenza, resulting in billions of lost income, is leading to a full reconsideration of manure management. This paragraph needs to be updated for the new reality. Unless we implement manure management that destroys the HPAI virus in manure and keeps manure from wild birds, there will be no way to control	**Accepted**. Term "compost" has been added to the text, a survey of the literature demonstrates that the emissions of methane from compost are not zero. Relevance of policy section 8.7 is not clear. The rest of the points by this reviewer are largely irrelevant to the goals of the present chapter.

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						this disease. Please review and upgrade for this to provide the motivation and guidance needed. The HPAI virus is very hardy in manure, able to last weeks in soil and months in cool water that has received runoff and direct fecal discharge. (Sandra Cointreau, World Bank)	
8-161	A	21	36	21	37	"CH4 as an energy source" I would like to suggest to insert the term "renewable" before "energy source" in order to make it even more clear that biogas is a CO2 neutral, renewable energy source. (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**.
8-162	A	21	36	21	37	We would suggest to introduce the following paragraph after the sentence about anaerobical digestion of manures: "Anaerobic digestion of manures can have a significant potential for the mitigation of GHGs with a number of environmental, agricultural and socioeconomic cobenefits, specially if manure is mixed with organic waste e.g from food processing industry. The organic waste is necessary for the economical profibility, and the mixing with manure secures the recycling of the nutrients in the organic waste. This conclusion is based on 20 years of experience with centralised biogas plants in Denmark and documented in 2 reports: L. H. Nielsen & K. Hjort-Gregersen: Socio-economic Analysis of Centralised Biogas Plants Report nr. 136 Copenhagen 2002) and (Kurt Hjort-Gregersen :Economy in Centralised Biogas Plants, Development and State in 2002. Report nr. 150, Copenhagen 2003) Both reports are in Danish with English summaries" See also comment to chapter 10, p 21 (Government of Norwegian Pollution Control Authority)	**Accepted**
8-163	A	21	45	22	1	"or by composting the manure" you may - if you wish to - insert the reference "Amon, B.; Amon Th.; Boxberger, J.; Wagner-Alt, Ch.: (2001) Emissions of NH3, N2O and CH4 from dairy cows housed in a farmyard manure tying stall (housing, manure storage, manure spreading). In: Nutrient Cycling in Agro-Ecosystems 60: p. 103-113" after "Pattey et al., 2005) as we were as well able to show that the composting of FYM leads to a reduction of GHG emissions. (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**. Reference added.

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8-164	A	21	45	21	45	The work of Külling et al. 2003 is only the first of a series and there are some newer (Hindrichsen et al., 2005 and 2006) as well a new overall review (Kreuzer and Hindrichsen, 2006) across all these experiments made within the same lab. I suggest to include these references or use the most recent ones. The complete quotations of the three publications are: Hindrichsen, I.K., Wettstein, H.-R., Machmüller, A., Jörg, B. and Kreuzer, M., 2005. Effect of the carbohydrate composition of feed concentrates on methane emission from and their slurry. Environm. Monit. Assessm. 107, 329-350 I.K. Hindrichsen, H.-R. Wettstein, A. Machmüller, M. Kreuzer, 2006. Methane emission, nutrient degradation and nitrogen turnover in dairy cows and their slurry at different milk production scenarios with and without concentrate supplementation, Agric. Ecosyst. Environm. 113, 150-161 M. Kreuzer and I.K. Hindrichsen, 2006. Methane mitigation in ruminants by dietary means: The role of their methane emission from manure. In: Greenhouse Gases and Animal Agriculture: An Update (Soliva, C.R., Takahashi, J. and Kreuzer, M., eds.), Int. Congr. Series No. 1293, Elsevier, The Netherlands, 199-208 (Government of Switzerland)	**Accepted**. Only two of three suggested references added due to space considerations.
8-165	A	22	1	22	1	I do not fully get the meaning of "system-wide influence". What does that comprise? It may be very clear to other readers and if so, please discount my comment! (Barbara Amon, Institute of Agricultural Engineering)	**Accepted**. Replaced with “whole life cycle impact”
8-166	A	22	7	22	34	7.8.4.1.7 Bioenergy: biogas pool and agro-waste treatment should be involved in this sector, need more assessment. (Government of China Meteorological Administration)	**Noted**. They are included either here or in the manure management (8.4.1.6) section (for biogas)
8-167	A	22	9	22	35	Check consistency with the bioenergy chapter. (Government of Spain)	**Accepted**. You mean the energy chapter – chapter 4 presumably. We did check for consistency with Ch4 and Ch9 text on bioenergy.
8-168	A	22	26	0	0	F. Ledoux: § 8.4.1. Moreover there are some agronomic benefits when e.g. manure	**Noted.** This has been added to the section

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						is used as support for fermentation / biogas production before spread on fields (cf Danemark). (Ben Muirheid , International Fertilizer Industry Association (IFA))	(8.8) on co-benefits and trade offs – though not here as this only deals with GHG balance. Shown as a + for nutrient management for energy conservation in table 8.12
8-169	A	22	31	22	34	The sentence - especially the expression in brackets - is not easily readable. It is understandable, but the reader may catch the meaning more easily if the expression in brackets is put into an extra sentence. (Barbara Amon, Institute of Agricultural Engineering)	**Accepted.** Reworded
8-170	A	22	39	22	40	"it is important to consider the impacts on all GHGs together" To my feeling, it would be better not to limit this statement to GHGs, but as well include NH3 emissions and N leaching (see e.g. the CORINAIR guidelines, that attempt to get a full N flow approach) (Barbara Amon, Institute of Agricultural Engineering)	**Partly accepted**. It is beyond the scope of this assessment to address the effects of agriculture on the full N cycle. This report is focused on GHG emissions and removals. However, nitrogen leaching and NH3 emissions can lead to indirect emissions of N2O after the N is redeposited on the soil or losses in waterways. These effects are included in the analysis. Additional text added in footnote 1 of table 8.7 to clarify that indirect N2O emissions associated with volatilization and leaching are included in the analysis.
8-171	A	23	0	23	0	1) give an indication which of the potentials defined in TS page 16 are meant, 2) indicate the meaning of + and - (sink? Source?) 3) check whether only reduction of emissions are dealt with and not also enhancement of removals if the latter is the case give separate numbers for both , removals and emissions. (Government of Germany)	1) **Reject but clarified**. These are the per-hectare estimates of the GHG emission reduction that occur when implementing a measure on a given ha of land in each region. The potentials on page 16 are the amount of hectares that could be used for this practice – not the per-area potential it could yield if it were applied. Text was added to caption of

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							figure 8.7 in order to clarify this point. 2) **Accepted**. The table gives emission reductions – therefore positive values are emission reductions (sinks) and negative values are negative emission reductions – i.e. increases in source. Clarified in caption to figure 8.7. 3) **Partly Accept**. The analysis is dealing with carbon sinks for CO2 in soils and the emission reductions for CH4 and N2O. It is not possible to subdivide the change in soil C stocks into the emissions and uptake because the experimental studies are measuring the change in the stock over time and not the input and output of C from the soil C pool. Note that CO2 emission reductions associated with energy and production of pesticides and fertilizers are dealt with in other chapters. Text was added in caption and text in this section to better clarify this point.
8-172	A	23	1	0	0	The table has three columns…. "Emission reduction (estimate) Low and High….." The third column I did not understand….Please check it. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. The first column is the mean estimate of the emission reduction potential, the second is the low end of the range of estimates and the third is the high end of the range of estimates. Column headings have been re-aligned over each set of numbers.
8-173	A	23	1	23	0	Are the mitigation potentials reflected equally reliable across different regions. In	**Noted**. We have used the same procedure and

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						which regions estimate may need to be improved. Can authors indude few words about it for example in footnotes to the table?. (Government of Spain)	same datasets for all regions so the assessment should be equally reliable for all regions. The figures for change in SOC however are based on more data since the long term experiments from which the were derived were dominated by those in the temperate regions (see footnote 1 of table 8.7). However, this is reflected in the larger uncertainty ranges given for soil C change in the warm-moist and warm-dry regions i.e., tropical). This is already included based on the high land low estimates in the table.
8-174	A	25	7	25	0	Clarify units in table 8.8. (Government of Spain)	**Rejected**. The units are already stated in the Table heading: "(proportion of an animal's enteric methane production)" – proportion – no units.
8-175	A	25	8	25	31	give an indication how much of the technical potential can be realised. (Government of Germany)	**Rejected**. That is what the whole chapter is about. We go on to assess the economic potentials at different carbon prices – i.e. how much is likely to be realized at different C prices.
8-176	A	25	30	25	30	please include "Hindrichsen et al., 2006;" before "Lovett" (Government of Switzerland)	**Accepted.** Reference added.
8-177	A	25	41	0	0	Consider revising terminology 'compensation', as this refers to paying individuals or landowners for unsustainable behaviour - consider using 'funds'. The example in Queensland, Australia to reduce landclearing was a program of financial assistance to farmers 'structural adjustment package'. (Kirsten Macey, Climate Action Network Europe)	**Chapter 9 comment?** Compensation does not occur on this page or anywhere else in the chapter. Should this be Chapter 9?
8-187	A	26	0	36	0	In Figure 8.5 (p.32), Table 8.9 (p.27), etc.,	**Rejected**. Japan is treated as a separate region

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						"Japan" should be deleted and included in East Asia. (reasons) It is unbalanced in the description of the Chapter, where only Japan is specified, while the other countries are included in regions. In addition, we needs to examine the reliability of Smith et al (2006a), which is "in press". (Government of Japan)	as its economy is very different from the rest of East Asia and also has very different emission trends. It is a separate region within the IMAGE 2.2 model so is treated differently here.
8-178	A	26	10	26	25	When talking about multigas mitigation or effectiviness of mitigation options the concept of life cicle assesment and farm level assesment should be mention as option to increase efectiviness and better selections of mitigation portafolios. (Government of Spain)	**Accepted**. Farm level assessments and life cycle analyses will be important for evaluating the effectiveness of mitigation options, and this will need to be undertaken at the local scale since there are no universal list of options that will be effective in all conditions. Additional text added at the end of the paragraph to highlight this issue
8-179	A	26	14	26	14	"Table 8.6" should be changed to read "Table 8.8" (Government of Pakistan)	**Partly Accept**. The reference should read Table 8.7 but a reference to Table 8.8 has also been added.
8-180	A	26	17	0	0	There is no universally-applicable list of mitigation. It is important that mitigation in one field must be related to how other impacts change (Government of Sweden)	**Taken into account** (Comment 8-178). Agreed and additional text provided highlighting the need for local scale assessments to determine the most appropriate practices for mitigation at local scales.
8-181	A	26	27	36	50	In Figure 8.5 (p.32), Table 8.9 (p.27), etc., "Japan" should be deleted and included in East Asia. (reasons) It is unbalanced in the description of the Chapter, where only Japan is specified, while the other countries are included in regions. In addition, we needs to examine the reliability of Smith et al (2006a), which is "in press".	**Rejected**. Japan is treated as a separate region as its economy is very different from the rest of East Asia and also has very different emission trends. It is a separate region within the IMAGE 2.2 model so is treated differently here.

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						(Yasuhito Shirato, Agriculture, Forestry and Fisheries Research Council)	
8-182	A	26	27	36	2	here all potentials (see TS page 16) should be regarded, or it should be explained what is meant by potential and an excursus about the expected differences to the other potentials should be added. (Government of Germany)	**Noted**. These are explained very clearly. We have used the appropriate definitions of potential here (as outlined on p16 of TS), i.e. economic potential and technical potential. Market potential is already occurring in agriculture so occurs in the baseline against which we compare mitigation. Physical potential is for non-land based options – in land based mitigation, the physical and technical potential are indistinguishable if land area is conserved in the calculations.
8-183	A	26	36	26	36	The referred tables 8.4.2a and b could not be found. Most likely they are tables 8.7 and 8.8 (Government of Norwegian Pollution Control Authority)	**Accepted**. That is correct. This is the old notation – they should be 8.7 and 8.8. We have changed it.
8-184	A	26	36	26	36	The Tables "8.4.2a and b" do not exist. Please check and adjust. (Government of Pakistan)	**Accepted**. That is correct. This is the old notation – they should be 8.7 and 8.8. We have changed it.
8-185	A	26	36	26	36	delete 8.4.2a and b and insert 8.9 and 10 instead. (Government of Germany)	**Accepted**. This is the old notation – they should actually be 8.7 and 8.8. We have changed it.
8-186	A	26	49	26	49	Table 8.1. should be 8.10 (Government of Norwegian Pollution Control Authority)	**Accepted**. We have changed this.
8-188	A	28	0	0	0	Table 8.10: Put the two right-hand column headings in bold. Align dashes with numbers in column. (Government of UK)	**Accepted**. We have done that.
8-189	A	28	0	0	0	Set aside is a cheap method, but where and how should our food be produced? The mitigation acheived by set aside must relate to how/if this food is produced elsewhere and what emissions are produced there. Again, we think a given unit is	**Noted**. We cover leakage in the section on barriers (8.6.2).

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						needed, emmissions/person beeing fed to be able to compare and find true solutions. (Government of Sweden)	
8-192	A	28	0	0	0	Table 8.10: the table attributes identical costs to manure management measures for storage and for biogas production. The reason for this assumption is not fully understandable for me. Farmers normally operate biogas plants, because they can earn money with them. Therefore, biogas production should lead to savings and not to extra expenditures as do the other storage measures. (Barbara Amon, Institute of Agricultural Engineering)	**Noted**. This covers the range of options available within manure management / biogas. If biogas is profitable, it will occur in the baseline (i.e. it will already be happening) – if it is inexpensive, it will be part of the mitigation adopted at low C price. More expensive options are only adopted at higher prices. This is accounted for in the analysis.
8-190	A	28	1	0	0	T. Bruulsema: Table 8.10. Breeding is listed as a mitigation option for livestock, but not for crops. Crop breeding has potential to improve crop yields and nutrient use efficiency, both of which can affect future GHG emissions from global crop production. The chapter should include more analysis of the cost-effectiveness of expanded efforts in plant breeding and crop cultivar improvement. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Noted**. Crop breeding is included under our group of practices "agronomy" as part of the cropland management activity – see page 16, lines 13-15 where we expand upon what we mean by agronomy: "Examples of such practices include: using improved crop varieties; extending crop rotations, notably those with perennial crops which allocate more C below-ground; and avoiding or reducing use of bare (unplanted) fallow"
8-191	A	28	1	0	0	F. Al-Ansari: Table 8.10. The figures mentioned in the column number 4 and 5 need to be centered. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. We have done that.
8-198	A	29	0	0	0	The "Table 8.1" has been repeated at pages 2 and 29. One of them may be deleted. (Government of Pakistan)	**Accepted**.
8-193	A	29	1	28	1	Change the sentence to: In Agriculture, as in other sectors, there is a relationship between the amount paid for GHGs…… (Government of Norwegian Pollution Control Authority)	**Accepted**. All session was rewritten

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
8-194	A	29	1	29	1	delete "in agriculture" the statement is true for all sectors. (Government of Germany)	**Accepted**. All session was rewritten
8-195	A	29	19	30	6	The global technical mitigation potential from agriculture by agriculture is estimated to be 5500-6000 MtCO2 eq/yr, of this 90 % from reduced soil emissions of CO2. This amount, 5400 Mt CO2-eq from CO2, seems to be inconsistent with the figure of 40 Mt CO2 for the CO2 emisions of gobal agriculture, given several places in chapter 8, a.o at p 2 line 20-21. We assume that the amount 5400 Mt CO2 eq/yr is not reduced soil emissions but atmosferic CO2 sequestrated in soil carbon. We would recommand to explain this more clearly+G87. (Government of Norwegian Pollution Control Authority)	**Accepted**. This is correct – this is increasing a negative emission (i.e. C sequestration). We have had a few other comments suggesting confusion about this usage (even though soil CO_2 emissions and soil sequestration are just different sides of the same coin), so we have added this to our description to make this more explicit.
8-196	A	29	25	0	0	Table 8.1. Confusing table numbering - table is already included in Executive Summary. Omit one copy of the table and make reference to the other copy. (Government of UK)	**Accepted**.
8-197	A	29	27	29	32	discuss the problem of using price quantity schedules valid for North America for the whole world. (Government of Germany)	**Accepted**. Analysis was done again using other sources.
8-199	A	30	0	0	0	Figure 8.3: Realign x-axis labels so they do not overlap column bars. (Government of UK)	**Accepted**.
8-200	A	30	1	30	1	Label of vertical axis in Figure 8.3 needs some adjustment. (Muhammad Latif, Applied Systems Analysis Group)	**Accepted**.
8-201	A	31	1	31	5	Figure 8.4 has two headlines at the top mean biophysical potential at the bottom total technical potential, please clarify which potential is the right one or whether technical and biophysical potential means the same. (Government of Germany)	**Accepted**.
8-202	A	32	0	0	0	Figure 8.5.: Relaign x-axis lables so that they do not overlap column bars. (Government of UK)	**Accepted**.
8-203	A	32	1	32	1	Label of vertical axis in Figure 8.5 needs some adjustment. (Muhammad Latif, Applied Systems Analysis Group)	**Accepted**.
8-204	A	33	3	33	3	insert here the comprised results of the FOAR in the same manner as for SAR and	**Reject**. Not part of the economic potential.

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						TAR and add discussion on permanence, uncertainty and probable implementation rate for the suggested measures(see those discusssions in chapter 9) (Government of Germany)	See TS page 16
8-205	A	34	1	35	1	Table 8.11 has been splitted into Portrait and Landscape pages. (Muhammad Latif, Applied Systems Analysis Group)	**Noted**. Formatting issue.
8-206	A	35	4	0	0	"Estimates" in different font and also line 3 & line 11 needs formatting (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted**. Formatting issue.
8-207	A	35	4	0	0	Font error (Government of UK)	**Noted**. Formatting issue.
8-208	A	35	11	0	0	List footnotes 12-15 on separate lines (Government of UK)	**Accepted**.
8-209	A	36	1	36	1	insert after "reduction" "and enhancement" of removals" (Government of Germany)	**Accepted**.
8-210	A	36	5	37	0	Check consistency with the bioenergy chapter. (Government of Spain)	**Accepted**. We did check for consistency with Ch4 and Ch9 text on bioenergy.
8-211	A	36	6	36	7	In this sentence there is only mention of the use of agricultural feedstock for the production of fuels, while in the rest of the section it is also seen as a feedstock for bio-electricity, bio-heat and biogas. (Berien Elbersen, WUR-Alterra)	**Rejected**. This is not the case. It is simply a statement of the use of bio-energy for fossil fuel substitution, whichever process is used to derive energy end use.
8-212	A	36	28	36	33	Organic waste and agricultural residues are estimated to have a potential for GHG mitigation of 1000-6000 Mt CO2-eq/yr by offsetting fossil fuel for the generation of electricity. This is a significant option. Could it be clearified what is "organic waste"; is this manure or is it the organic waste from households, restaurants catering and food processing industry. (Government of Norwegian Pollution Control Authority)	**Noted**. It is actually 600-4000 Mt CO2-eq/yr for 2030.
8-213	A	36	45	36	45	The word "could" appearing after "agricultural land" may be deleted. (Government of Pakistan)	**Accepted**.
8-214	A	37	19	37	0	Rescale figure 8.6, use broken scale to fit the large bioenergy bars will allow to better see the other options. Will be possible to have an indication of uncertanty in	**Accepted**.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						the graph?. (Government of Spain)	
8-215	A	38	3	0	0	P. Heffer: Table 8.12. The environmental impact should be positive for "management of organic soils", "enhanced energy efficiency" and "livestock management-improved feeding". (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**.
8-216	A	38	3	0	0	P. Heffer: Table 8.12. Footnotes: It is not clear to which activity category they relate. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**.
8-217	A	38	3	0	0	P. Heffer: Table 8.12. "Manure/biosolid management": We may have a positive impact on the environment from a GHG point of view, but a negative one as far as heavy metals are concerned. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted.** This is included in the new table 8.12
8-218	A	38	15	0	0	Table 8.12: missing Environmnetal consequence for activity 10. What does n/d mean? Replace Activity 14/Social consequence "society" with "societies". Notes numbering is not clearly aligned with corresponding activity. (Government of UK)	**Accepted**. A + sign was added.
8-219	A	38	19	0	0	Agronomy is not just a critical sector of world ecconomy, but the sector that keeps humans alive. How can this be done with low emissions? And if food is produced efficiently, there is land left to produce bioenergy for other uses than food. (Government of Sweden)	**Noted**. It can be done by reducing emissions relative to the baseline of "do nothing" – overall emissions may go up, but with mitigation they will not go up as much. Covered (pertly) in our 'Trade-offs' section (8.8)
8-220	A	39	7	0	0	agriculture contributes more than half of emissions… - clarify this statement by inserting "all", or "anthropogenic" before emissions. (Government of UK)	**Accepted.** Wording revised.
8-221	A	39	17	0	0	"greater use" should be replaced by "better use". The manure produced today should be used efficiently, of course, but, to have greater use of manure you first need more animals, which is an impact in itself.	**Accepted.** Wording revised.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						(Government of Sweden)	
8-222	A	39	37	39	37	The word "there" may be replaced by "their". (Government of Pakistan)	**Accepted.** Corrected.
8-223	A	39	38	39	38	The word "of" before "sustainable development constituents"may be replaced by "on". (Government of Pakistan)	**Accepted**.
8-224	A	41	1	41	46	one of the key vulnerabilities mentioned at page 40 lines 27 to 30, the increased microbial decomposition, is not reflected in the table at this page, add in row 4(CM- tillage) and row 10 (management of agricultural soils) what is stated at page 40 lines 27 -30 :"higher temperatures will lower carbon sequestration potential" (Government of Germany)	**Accepted**. The table has been modified accordingly.
8-225	A	41	3	0	0	P. Heffer: Table 8.13. “Bio-energy”: In the last column, it is said “If fertilizers are used…”. It is not possible to produce bioenergy crops in a sustainable way without using N inputs, be they fertilizers, biosolids, biological N fixation… All these N sources contribute some N2O emissions. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. The table has been modified accordingly
8-226	A	42	7	42	19	1) shift whole reflection about realistic potential to chapter 8.4, as this issue is to be kept in mind when starting to read about the various potentials. 2) Furthermore the para from lines 11 to 19 should also be shifted to the ES as it is very important to know what the difference between the economic and the technical potential is. 3) and please define the realistic potential as it is not part of the definitions at page 16 TS. (Government of Germany)	1) **Rejected**. Not part of economic potential assessment and this is the structure dictated by the TSU outline. 2) **Accepted**. We considered this in the new version of the ES. 3) **Accepted**. Explanation added in brackets
8-227	A	42	21	42	26	Include exaples of non climate policies, even if treated later in 8.7 will be desirable here. (Government of Spain)	**Rejected**. We have a whole section on this in 8.7 and we refer the reader to that section. No point in repeating it.
8-228	A	42	25	42	28	"In Europe, the European Climate Change Programme (2001) recommended the reduction of livestock methane emissions as being the most cost effective GHG mitigation options for European agriculture". Replace this sentence by the	**Accepted**.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						following one, more comprehensive:"In Europe, the European Climate Change Programme (2001) recommended the improvement of fertilizer application, the set-aside, and the reduction of livestock methane emissions (through mainly biogas production) as being the most cost effective GHG mitigation options for European agriculture". (Government of European Community / European Commission)	
8-229	A	42	31	0	0	Grammatical error " Some of this activity has…." "should be some of these activities have…" (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Accepted**. Text was redrafted.
8-230	A	42	33	42	39	delete text from "In the US" till "of that trend" it is to specific and not closely related to the issue. (Government of Germany)	**Accepted**. Text was revised
8-231	A	43	14	43	15	“but these were implemented for reasons other than climate policy”. The phrase should be deleted . (Government of China Meteorological Administration)	**Rejected**. Here we are discussing specific climate policies. We discuss non-climate policies in the next section.
8-232	A	43	17	43	0	The following Japanese policies should be inserted. Japan is promoting "Biomass Nippon Strategy", determined by the Cabinet meeting on 27, Dec, 2002, where the utilization of biomass as an alternative energy is being promoted. For example, we are promoting the following items, □The construction of total synthesized system to circulate and utilize biomass resources locally produced or emitted, as much as possible, such as CH4 from livestock wastes. □Large-scale extensive technological examination and practice, in large scale, to accelerate the utilization of biofuel for transportation □Research and development to adopt crops for energy resource. HP:http://www.biomassandbioenergy.nl/biomass_japan.htm□This cabinet plan has updated to an strenghtened and enhanced version on March, this year. The English reference to this new Cabinet decision is not yet available on the HP, but we are	**Accepted**. We have added text to reflect Japanese policies.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						happy to send it in PDF file if necessary.□ (Government of Japan)	
8-233	A	43	17	43	0	The following Japanese policies should be inserted. In order to save energy and reduce CO2 emission in horticulture, Japan is promoting □ "new-generation energy", such as solar, water, and wind power, □ small water-powered generation system by means of agricultural irrigation channel, □ tri-generation system which utilizes electricity, heat, CO2, etc., being generated from burning gas. (Government of Japan)	**Accepted**. We have added text to reflect Japanese policies.
8-234	A	43	17	43	0	The following Japanese policies should be inserted. For the purpose of reducing CO2 generated from agricultural machinery in using fossil-fuel, N2O from fertilizer, and CH4 emission during management of livestock wastes, Japan is promoting "Environment-Conserving Agriculture" based on the Cabinet decision "New grand plan for food, agriculture and rural communities (on 25, March, 2005)", such as; □ dissemination of energy-efficient agricultural machinery, □ reduction of volume of fertilizer □ the appropriate management of livestock wastes HP:http://www.maff.go.jp/english_p/basicplan.pdf HP:http://www.maff.go.jp/kankyo/kihonhousin/outline_e.pdf □These HP present just the outline of our policy. The detailed infomation not yet available in English.□ (Government of Japan)	**Accepted**. We have added text to reflect Japanese policies.
8-235	A	43	18	43	44	Two paragraphs very confusing. Authors should be careful about CDM concept and to which country applies (for example the text can be interpreted as USA can have CDM). Also it is quite risky to state that there are no projects in Africa to reduce emissions in agriculture, may be not CDM but it may be other efforts are made	**Accepted**. The comment refers to lines 24-44. We reworded the text to make it clear that there are no CDM projects in the US.

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						outside of CDM though international cooperation finsnced by ODA or bilateral cooperation. (Government of Spain)	
8-236	A	43	31	0	0	it should be "Clean Development Mechanism" not Clean design Mechanism (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Accepted**. Typographical error!
8-237	A	43	42	43	42	Change "to by traded" to "to be traded". (Government of Pakistan)	**Accepted**
8-238	A	44	1	0	0	"there"…. Needs to be checked or deleted. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Accepted** – Section was substantially modified
8-239	A	44	1	44	30	When using concepts as Permanence, leakage and additionallity that is KP laeguaje authors should take into account that some of the strong statements may trigger over reactions in the policy community due to former debates in the definition of the rules for first commintement period. (Government of Spain)	**Accepted** – Section was substantially modified
8-240	A	44	1	44	1	The word "there" appearing before "both removal and emissions occur…." may be deleted. (Government of Pakistan)	**Accepted** – Section was substantially modified
8-241	A	44	6	44	6	add after ""time" "More over a sudden change in management practices, e.g. tillage after some years of no-tillage will reverse the carbon removals very fast" or something different along this line. (Government of Germany)	**Accepted** – Section was substantially modified
8-242	A	44	26	44	30	The leakage point, which could also be described as extensification, is an important one, and applies equally at page 16 line 20 and page 18 lines 30-38 (grazing intensity). (David Viner, University of East Anglia)	**Noted**. Text was substantially modified
8-243	A	44	28	0	0	It is agreed that it is important to analyse the net reduction of emissions, so impact is not only moved to another place or another sector. (Government of Sweden)	**Noted**. Text was substantially modified
8-244	A	44	45	44	46	Such statements some how may not apply to all Europe since seme EU countries	**Accepted** – Section was substantially

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						are electing in fact Cropland management for the first commintment period, therefore it seems they can take the transsaction costs. (Government of Spain)	modified
8-245	A	45	0	45	0	Section 8.7.2. The word "sectoral" could be included in the title, so "Macroeconomic and sectoral policies" (Government of European Community / European Commission)	**Accepted.** This has been done
8-246	A	45	2	45	6	It is likely that some countries will use a modelling approach for SOM dinamics, with minimun sampling for validation purposes. This is not reflected here as an option (cheap one compare to full monitoring). (Government of Spain)	**Accepted** – Text was modified
8-247	A	45	4	0	0	Extremly important to notice that C stock exchange must rely on measurements on change of bulk density of the soil. The potential for reduced tillage is otherwise overestimated (Government of Sweden)	**Noted**. Should be "underestimated"
8-248	A	45	8	45	9	"property rights"… very very important point mentioned….landholding also comes under it… should the topic be altered because when we use property rights we mean IPR issues mainly, not landholding… so the important point mentioned may be overlooked or undermined....Needs a thought from the authors... (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Noted** – thank you. Inserted "landholding".
8-249	A	45	10	45	10	add: thoughts about barriers resulting from climate change (Government of Germany)	**Rejected**. This occurs under the section on interactions between adaptation and mitigation (8.5) and also see table 8.13.
8-250	A	45	15	45	17	The cost for soil tests before fertilization is high not only in China, but also in other countries. Straw burning is more convenient than removing, which is not only for China but for all regions in the world. So, please delete “China”. Furthermore, the succedent problems□e.g. deposite and disposal□after the straw is removed also induce the farmers to choose straw burning. (Government of China Meteorological Administration)	**Accepted** – wording revised
8-251	A	45	23	45	24	It would be more accurate to replace "macroeconomic" by "sector" or "sectoral"	**Accepted.** “sectoral” added to title

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						and to take out "CAP reform" in the sentence "macroeconomic policy such as EU Common Agricultural Policy (CAP) / CAP reform". The CAP is not a macroeconomic policy. (Government of European Community / European Commission)	
8-252	A	45	30	45	40	CLRTAP (Gotteborg Protocol for example) is also a UN effort that in fact lead many of the regulations in Europe that affect the agriculture sector (for example affecting N cycle) to control air pollutants that had and will have a substatial impacts in emission reductions. It should be included. (Government of Spain)	**Accepted.** This has been added.
8-253	A	46	6	46	7	One cannot assume that there is a linear relationship between enlargement of the EU to the New Member States and intensification. Ater all, intensification can be seen as an autonomous process which will also take place without EU enlargement in the new MS. However, what is more plausible is that EU enlargement may stimulate the intensification process to go faster than it would normally go if the new MS would not have become member of the EU market. (Berien Elbersen, WUR-Alterra)	**Accepted** – wording revised.
8-254	A	46	6	46	7	Delete the sentence "....though enlargement of the EU may intensify agriculture in the new member states and may increase GHG emissions." It does not reflect the results of the recent estimations made by IIASA and reported in the ECCP II report on agriculture. According to this, emissions are expected to decline in both EU-15 and in the NMS, although the majority of emissions and the largest mitigation potentials emerge in the EU-15. For the new Member States, reductions between 15 and 20% (since 1990) are estimated, although the majority of these reductions occurred between 1990 and 2000. (Government of European Community / European Commission)	**Accepted** – wording revised.
8-255	A	46	7	46	7	I would not refer to the 2003 reform of the CAP through the Luxembourg agreement and I would explain what this reform entails. I would therefore rather phrase it as follows: With the Common Agricultural Policy (CAP) reform, adopted by the EU agricultural ministers in June 2003, a shift was introduced from market	**Accepted** – rephrased, although not exactly as suggested in the comment

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						support to single farm payments and obligatory Cross Compliance. It is predicted to lead to reductions in animal numbers ..... (Berien Elbersen, WUR-Alterra)	
8-256	A	46	7	46	9	Make the sentence on the CAP (" On the other hand, the Luxembourg Agreement on CAP reform in 2003 is predicted to lead to reductions in animal numbers in the EU (Binfield et al., 2006) which will result in reduced enteric methane emissions.") more comprehensive.We propose the following, following the ECCP II report on agriculture: "The declining emission trend in Western Europe is mainly a consequence of successive reforms of the CAP since 1992. The 2003 CAP reform, with the introduction of a decoupled income support to farmers and cross-compliance (granting of income support is conditional to the respect of statutory environmental requirements), is expected to lead to further reductions in animal numbers and to a more efficient application of fertilizers in the EU". (Government of European Community / European Commission)	**Accepted** – rephrased, although not exactly as suggested in the comment
8-257	A	46	7	46	9	It is stated that the reduction in animal numbers in the EU, due to the CAP reform will result in reduced enteric methane emissions. We would like to add that it also will reduce the emissions of CH4 and N2O from manure management, from manure/execretion on pasture land, and (substantial) emissions of CO2 and N2O associated with the production and transport of feed for these animals. However, if the reduction in animal numbers in the EU is compensated by increased import of meat/dairy products it will lead to increased GHG emissions in the exporting countries. We suggest the following sentence to replace the existing; "On the other hand, The Luxembourg agreement on CAP reform in 2003 is predicted to lead to reductions in animal numbers in the EU (Binfield et al., 2006). This will result in reduced emissions in the EU of methane, dinitrous oxide and carbondioxide from enteric fermentation, manure management, pasture land and the production and transport of feed. However, if the reduction in animal numbers in the EU is compensated by increased import of meat/dairy products it will lead to increased GHG emissions in the exporting countries, possibly resulting in the same GHGs	**Accepted** – rephrased, although not exactly as suggested in the comment

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Actions by the writing team
						globally". (Government of Norwegian Pollution Control Authority)	
8-258	A	47	0	47	0	Table 8.14, row referring to Europe. Rephrase the first bullet point as follows: "Common Agricultural Policy (CAP) reform 2003 - Single Farm Payment decoupled from production replaces most of the previous area-based payments with the expected effect of reducing incentives towards intensive production (e.g., extensification, decreased livestock number, reduced fertiliser use, etc.). The full granting of income support is conditional to the respect of statutory environmental management requirements (e.g., legislation on nitrates) and the obligation to maintain land under permanent pasture (cross-compliance)." (Government of European Community / European Commission)	**Accepted** - rephrased taking this and other comments into account
8-259	A	47	0	47	0	Table 8.14, row referring to Europe. Delete the last bullet " Enlargement of the EU may encourage more intensive agriculture in the new member states - potentially increasing GHG emissions (EU)", for the reasons given above (not consistent with ECCP II report). This could be replaced by the following bullet point: "Reductions in fertiliser use has also been achieved due to the implementation of EU environmental legislation such as the Nitrates Directive, and the agri-environmental programmes (under the CAP) supporting cropland management measures." (Government of European Community / European Commission)	**Accepted** - rephrased taking this and other comments into account
8-266	A	47	0	47	0	In table for EU three policy measures should be mentioned: 1) EU Transport Biofuel Directive (2003/30/EC) with a 5.75% target for transport fuels to be biofuels and in several EU countries it has now become obligatory to have this 5.75% share in consumer transport fuels by 2010 (e.g. The Netherlands, Sweden) 2) 1997 the EU White Paper on Renewable Sources of Energy (COM 97)599 set a general target for renewable energy production at 12% of gross inland consumption by 2010. It was estimated that this target could be realised with around 90 million tonnes of oil equivalent (TOE) coming from biomass energy, derived from agricultural and forest products, including residues and waste streams as well as energy crops. 3) The 2001 Directive on Renewable Electricity (2001/77/EC) gives	**Rejected.** Bioenergy is dealt with in the energy sector.

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						indicative 2010 targets for the renewable share of electricity production, on a Member State basis. The combined EU25 target is a 21% share of renewable electricity in gross electricity consumption. 4) In Germany there is a special tax exemption for renewable biofuels and other energy sources. (Berien Elbersen, WUR-Alterra)	
8-260	A	47	1	50	0	P. Heffer: Table 8.14/8.15. General comment: There is a problem of alignment of bullet points and signs, which makes the table hardly readable. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**.
8-261	A	47	1	0	0	P. Heffer: Table 8.14. "North America", 3rd bullet point: increase in livestock should result in increased CH4 emissions. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted.** Table fully revised.
8-262	A	47	1	0	0	P. Heffer: Table 8.14. "Latin America", 2nd bullet point: It should be said that ethanol consumption is increasing again in Brazil with recent development of "flexfuel" cars. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted** – But comment not relevant since text was modified.
8-263	A	47	1	0	0	P. Heffer: Table 8.14. "Europe & FSU", 4th bullet, item (b): It is my understanding that straw burning is a declining practice in the FSU. This should be checked. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Rejected.** US-EPA data actually show an increasing trend in burning after 1990 (see new Fig. 8.2 in final draft)
8-264	A	47	1	0	0	P. Heffer: Table 8.14. "Asia", 1st bullet: In my view cropland is in set-aside in China for environmental reasons, not for economic reasons. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Noted.**
8-265	A	47	1	47	45	1) clarify what is meant by "positive effect"? emissons reduction? 2) explain why the closure of intensive pig units has a negative impact ? Check the rows carefully it seems sometimes the policies and the +/- are not in the right row. (Government of Germany)	1) **Noted**. Positive is stated as a benefit, i.e. an emission reduction or a sink enhancement. 2) **Accepted**. But comment not relevant since table was modified.
8-267	A	48	1	49	1	Table 8.15 has been splitted into Portrait and Landscape pages. (Muhammad Latif, Applied Systems Analysis Group)	**Noted**. Formatting detail.
8-268	A	48	8	0	0	P. Heffer: Table 8.15. "Latin America", 1st bullet point: There are no signs in front	**Accepted**.

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						of this bullet. (Ben Muirheid , International Fertilizer Industry Association (IFA))	
8-274	A	49	0	49	0	Danmark has carried out 2 different "Vandmiljøplaner" (waterenvironmental plans) for the agricultural sector with clear effect (decrease) of GHGs (Government of Norwegian Pollution Control Authority)	**Accepted.** Revised.
8-269	A	49	1	0	0	In Table 8.5, the bullet point # 4 under "Asia"-- "Air quality legislation t - bans straw burning" is not clear. Please check and clarify. (Government of Pakistan)	**Accepted**. Revised.
8-270	A	49	8	0	0	P. Heffer: Table 8.15. "Latin America", 4th bullet point: There are no signs in front of this bullet. Policy in Brazil promoting transition from manual to mechanical sugarcane harvest (without burning) contributes to reduced CO2 emissions. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Revised.
8-271	A	49	8	0	0	P. Heffer: Table 8.15. "Europe & FSU", general: There are 14 bullet points and 15 lines of signs! (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Revised.
8-272	A	49	8	0	0	P. Heffer: Table 8.15. "Europe & FSU", 4th bullet point: Both the EU Nitrate Directive (1991) and the EU Water Framework Directive (2000) promote careful use of N fertilizer. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Revised.
8-273	A	49	8	0	0	P. Heffer: Table 8.15. "Europe & FSU", 13th bullet point: I am not aware of areas where fertilizer applications are banned in the FSU. Please specify. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted.** This is specified.
8-275	A	50	5	50	5	Add a discussion on why all the listed policies(mostly positive) does not result in emission reduction till 2020. (Government of Germany)	**Rejected**. If these policies had not been implemented, emissions would be higher
8-276	A	51	7	0	0	F. Al-Ansari: We are of the opinion that the use of treated sewage effluent and its sludge for irrigation and soil conditioning purposes should be considered . The impact of the above usage on the overall water management, soil fertility and finally GHG emissions should also be analysed in this chapter.	**Accepted**. Text modified to accomodate this suggestion.

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						(Ben Muirheid , International Fertilizer Industry Association (IFA))	
8-277	A	51	25	0	27	P. Heffer: It is more the "inappropriate input use" than "intensified inputs" that may lead to acidification or salinization. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted, partly.** The sentence has been revised slightly to refer to 'increased inputs', rather than 'intensified inputs'. It is conceivable that even 'appropriate use' of some inputs, over the long term, can lead to soil depletion. Furthermore, our sentence specifies that 'in some instances', there 'may be risks', thereby indicating that this is merely a possibility.
8-278	A	51	34	0	36	P. Heffer: It should be added that some practices reducing N2O emissions might result in greater nitrate leaching. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. A sentence has been inserted, as proposed.
8-279	A	51	38	0	39	P. Heffer: Use preferably the following wording: "For example, practices that diminish productivity in cropland (e.g. set-aside, limited nutrient availability) and respond to new markets (e.g. bioenergy) may elsewhere induce conversion of forests by cultivation." (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted:** The sentence has been revised, though not exactly as proposed. 'Limited nutrient availability', in our view, is not a practice (though the net effect of any practice that 'diminishes' productivity – for example, reduced fertilizer application – is covered by our sentence.) We would rather not, for reasons of brevity, specifically list all the practices that might diminish productivity.
8-280	A	51	45	0	48	P. Heffer: Use preferably the following wording: "Agro-ecosystems have become increasingly dependent on N inputs, much of it added as manufactured fertilizers and animal manure. Practices that improve the efficiency of N use often reduce N2O emissions. They also reduce energy use for fertilizer manufacture and limit negative impacts on water and air quality from N pollutants." (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted, partly:** .The paragraph has been revised, though not exactly as proposed. The input os new reactive nitrogen is, in fact, to a large extent from fertilizers (manures are re-cycled N, not newly-created reactive N). But the reviewer is correct – improved efficiency of manure N is also important, and this

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							observation has been reflected in the new text.
8-281	A	51	47	51	47	The manufacture of N-fertilizer results not only in the use of energy and associated emissions of CO2 and air pollutants but also process emissions of significant amounts of N2O. The sentence should reflect this; " …., thereby also reducing energy use for, and N2O emissions from N-fertilizer manafacture....." (Government of Norwegian Pollution Control Authority)	**Accepted**. We have amended the sentence to refer to 'greenhouse gas emissions' from fertilizer manufacture, rather than referring solely to energy use.
8-282	A	52	5	52	6	Reference of EEA should be: EEA (2006), How much bioenergy can Europe produce without harming the environment? EEA report no. 7/2006. an additional reference could be: Elbersen, B; Elbersen, W. & Bakker, R. (2005), Biodiversity impacts of biomass crop production on land use and farmland habitats. Paper presented at the 14th European Biomass Conference, 17-21 October 2005. Paris. and Elbersen. B.; Andersen. E; R. Bakker. R. Bunce. P.Carey. W. Elbersen. M. van Eupen. A. Guldemond. A. Kool. B.Meuleman. G.J. Noij & J. Roos Klein-Lankhorst (2006). Large-scale biomass production and agricultural land use – potential effects on farmland habitats and related biodiversity. Technical report EEA study contract: EEA/EAS/03/004. (In press) (Berien Elbersen, WUR-Alterra)	**Rejected**. Formats for references are dictated by TSU. We have no possibility of including new references at this stage.
8-283	A	52	16	52	17	Ozone is not a pollutant that is emitted, it is in fact a secondary pollutant. Its precursors are emitted. Remove it form the list and replace by NOx. (Government of Spain)	**Accepted**. Ozone has been deleted from the sentence. (NO_x is not specifically included, but is covered by the term 'other pollutants'.
8-284	A	53	0	0	0	Table 8.16: Replace "Pertinent references (footnotes)" with "References" (Government of UK)	**Accepted**. Text was replaced as suggested
8-285	A	55	1	55	42	The technology R & D has been dealt extensively but least mention of Technology Transfer issues is being given very less importance---which(tech transfer) is an important issue for developing countries. (ANISH CHATTERJEE, DEVELOPMENT ALTERNATIVES)	**Accepted**. Statement added that indicates that transfer of technologies is a key requirement for mitigations to be realized
8-286	A	55	4	0	0	P. Heffer: Replace "production" by "productivity". (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Revision implemented
8-287	A	55	4	0	0	Yes, the emissions per unit of production is possible to reduce .	**Noted**.

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						(Government of Sweden)	
8-288	A	55	5	0	0	P. Heffer: Replace "production" by "productivity". (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Revision implemented
8-289	A	55	5	55	43	I think that the potential to mitigate GHG emissions is limited by the hugely different warming potential of CO2 (x 1) and nitrous oxide (x 210). Most technological option of mitigation are related to crop yield increases and (I guess) more addition of N fertilization, regardless the expansion precission agriculture or the adoption of slow release fertilizers. In addition, the problem of doubble counting in N2O emissions by crop and forage legumes (Rochette and Janzen 2005) must be dilucidated. This is a very important issue, taking into account the great expansion soybean area in Latin American countries. (Government of Argentina)	**Rejected**. We have included this in the analysis. GWP of N_2O is 296 by the way, not 210. All measures do not involve more N addition – in fact, most use less N. We have included this including the reference given. Also, there is no double counting, since N2O emissions from soils are determined taking into account not just N fertilizers, but also crop residues and BNF
8-290	A	55	12	55	12	The word "of" may be added before "current trends in FAO data". (Government of Pakistan)	**Accepted**. Revision made.
8-291	A	55	15	0	0	Statement about relevance of technological improvement needs to be worked out and linked to technology transfer and management. (Ronald Hutjes, Alterra)	**Accepted**. Revised as per above as a result of statement on technology transfer included.
8-292	A	55	23	0	24	P. Heffer: Nitrification inhibitors are not a new technology. These products have been used for a long time, but on a limited scale, essentially because of economic reasons. If there would be greater incentives for their use, there could be a much larger demand. With current nitrification inhibitors, N2O emissions can be cut by half. For more information on enhanced-efficiency fertilizers, see the papers presented at the IFA International Workshop on Enhanced-Efficiency Fertilizers, held from 28 to 30 June 2005 in Frankfurt, Germany: http://www.fertilizer.org/ifa/news/2005_17.asp. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Terminology has been changed to "refined" as there are efforts underway to improve all of these approaches.
8-293	A	55	27	0	28	P. Heffer: Technology transfer is the main challenge for improving fertilizer use efficiency. Analysis of trends over the past four decades show that significant	**Accepted**. Statement has been used to enhance the point on importance of

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						improvements in N use efficiency have been achieved over the past two decades in developed countries, while N use efficiency is still declining in most developing countries. Developing best agricultural practices and having them adopted by small-scale farmers in developing countries is a great challenge if one wants to mitigate GHG emissions from agriculture. Reference: IFA, 2006. Sustainable Management of the Nitrogen Cycle in Agriculture and Mitigation of Reactive Nitrogen Side-Effects. International Fertilizer Industry Association, Paris, France (to be published by the end of the year). (Ben Muirheid , International Fertilizer Industry Association (IFA))	technology transfer as an example. This still needs consideration as IFA 2006 reference is still not published.
8-294	A	55	27	55	27	I suggest to delete "- replace roughage with concentrates" as also no concrete example for crop management ist given. (Government of Switzerland)	**Accepted**. Statement changed to "livestock management" for consistency.
8-295	A	55	42	0	0	P. Heffer: I would rather state that GM crops are “not yet allowed” than “banned”. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**.– modified by addition of statement “are not presently approved for use”
8-296	A	55	48	56	2	Is population size and chosen diet a part of socio-economic development? These factors are discussed in the following text, but shouldn´t they be mentioned more explicit in the beginning? (Government of Sweden)	**Accepted**. Text added.
8-297	A	56	9	0	0	P. Heffer: Add “and products” after “more efficient fertilization techniques”. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Text added.
8-298	A	56	10	56	10	The word “conceivably” should be deleted. systems. But there are strong pressures in favour of outdoor grazing. (David Viner, University of East Anglia)	**Accepted**. Text revised.
8-299	A	56	22	0	24	P. Heffer: Rephrase the sentence as follows: “Global sharing of innovative technologies for efficient use of land and water resources and agricultural inputs,…”. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Text revised.
8-300	A	56	25	0	0	Given the uncertainties both in performance and measurement manifest in the	**Noted**. Interesting point, but it does seem that

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						preceding assessment, it would be generally difficult to use land improvement projects in the agricultural sector as offsets against post 2012 Kyoto Protocol commitments (e.g. through J.I or the CDM) which may go towards explaining why credit for land use change projects has so far been restricted to more easily accounted for afforestation and reforestation. This difficulty provides additional grounds (apart from responding to the threat of abrupt climate change) for developing a separate framework for stimulating such projects so as to realise the very large, if somewhat uncertain, benefits to the atmosphere that can come from widespread deployment of land use improvement projects. Since the land available is mostly in developing countries, such large scale implementation would be a potent driver of sustainable rural development. Funding for such land use improvement would, under the holistic GHG management strategy outlined in Chapter 2 Section 2.3.4 (Read and Parshotam, 2006, under review) come from transport fuel suppliers seeking to meet a rising biofuels (ethanol, biodiesel, etc) obligation and constrained by sustainability conditions. (Peter Read, Massey University)	these projects could occur within the framework of post Kyoto commitments similar to afforestation and reforestation in the first commitment period. As discussed in this assessment, it is likely that GHG mitigation will occur if market mechanisms evolve to stimulate adoption of mitigation practices. It is not clear how mitigation through holistic management strategies will be more attractive for policy makers in terms of the uncertainties discussed here. Many of the issues discussed here will affect GHG emission from agriculture regardless of action or inaction in this sector, and it would be beneficial for policy makers to encourage changes promoting GHG mitigation to the extent that is possible given the weather, soils and socioeconomic conditions in their country. These systems are not GHG neutral and never will be – lack of inaction will not lead to reductions in this sector.
8-301	A	56	25	56	25	Given the uncertainties both in performance and measurement manifest in the preceding assessment, it would be generally difficult to use land improvement projects in the agricultural sector as offsets against post 2012 Kyoto Protocol commitments (e.g. through J.I or the CDM) which may go towards explaining why credit for land use change projects has so far been restricted to more easily accounted for afforestation and reforestation. This difficulty provides additional grounds (apart from responding to the threat of abrupt climate change) for developing a separate framework for stimulating such projects so as to realise the	Duplicate of comment 8-300.

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						very large, if somewhat uncertain, benefits to the atmosphere that can come from widespread deployment of land use improvement projects. Since the land available is mostly in developing countries, such large scale implementation would be a potent driver of sustainable rural development. Funding for such land use improvement would, under the holistic GHG management strategy outlined in Chapter 2 Section 2.3.4 (Read and Parshotam, 2006, under review) come from transport fuel suppliers seeking to meet a rising biofuels (ethanol, biodiesel, etc) obligation and constrained by sustainability conditions. (Peter Read, Massey University)	
8-302	A	56	27	0	28	P. Heffer: Rephrase the sentence as follows: "Examples include better use of fertilizer through precision farming, wider use of slow- and controlled release fertilizers and of nitrification inhibitors,…" (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Text revised.
8-303	A	56	28	0	30	P. Heffer: Rephrase the sentence as follows: "Similarly, enhanced N use efficiency is achievable as technologies such as…" (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Text revised.
8-304	A	56	30	0	31	P. Heffer: Delete the sentence about nitrification inhibitors (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. Text revised.
8-305	A	57	5	0	6	P. Heffer: Add the following wording after "but socio-economic aspects": "… and associated risks of losses through other pathways (e.g. nitrate leaching)…" (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Partly Accepted**. The point is well taken that there are also broader concerns about other environmental impacts so text has been added addressing this issue. Text has been revised.
8-306	A	57	8	57	10	N atmospheric deposition is also expected to increase in som regions that as CO2 may inclease productivity? (Government of Spain)	**Accepted**. Text has been revised to recognize that atmospheric N deposition also increases crop productivity.
8-307	A	57	13	0	15	P. Heffer: It should be noted that experiments show that higher night temperatures may also result in smaller rice yields. Reference: Peng, S. et al., 2004. Rice yields decline with higher night temperature from global warming, PNAS, vol. 101, no. 27, pp 9971-9975 (see	**Noted**. Clearly the effects will be crop specific and depend on the magnitude of the change. Text has been added making this point.

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						www.pnas.org/cgi/doi/10.1073/pnas.0403720101). (Ben Muirheid , International Fertilizer Industry Association (IFA))	
8-308	A	57	18	0	28	P. Heffer: This paragraph is redundant with the previous one. (Ben Muirheid , International Fertilizer Industry Association (IFA))	**Accepted**. The two paragraphs have been merged.
8-309	A	57	32	71	47	Section 8.11. References. Requires proof-reading to ensure that references are consistent and all journal names are given in full. (Government of UK)	**Accepted**. References have been checked.
8-310	A	57	36	57	39	replace "…2005…In …" by "...2006...In: Greenhouse Gases and Animal Agriculture: An Update (Soliva, C.R., Takahashi, J. and Kreuzer, M., eds.), Int. Congr. Series No. 1293, Elsevier, The Netherlands, 103-106 replace "2005" by "2006" in text, too. (Government of Switzerland)	**Accepted**.
8-311	A	66	25	66	27	replace "…2005…In …" by "...2006...In: Greenhouse Gases and Animal Agriculture: An Update (Soliva, C.R., Takahashi, J. and Kreuzer, M., eds.), Int. Congr. Series No. 1293, Elsevier, The Netherlands, 138-147 replace "2005" by "2006" in text, too. (REF!)	Duplicate of comment 8-310.
8-312	A	71	11	71	14	replace "…2005…In …" by "...2006...In: Greenhouse Gases and Animal Agriculture: An Update (Soliva, C.R., Takahashi, J. and Kreuzer, M., eds.), Int. Congr. Series No. 1293, Elsevier, The Netherlands, 148-151 replace "2005" by "2006" in text, too. (Government of Switzerland)	Duplicate of comment 8-310.

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8-1	B	0	0	0	0	1) Undue reliance on a single, unpublished paper. The Chapter's dependence on the unpublished work of Smith et al (2006a) is of concern. The bulk of analysis presented in the Chapter is drawn from this work, which governments have not had the opportunity to review. 2) As a matter of process, where a work forms such a substantial basis for a publication such as the AR4, the material should first be available for scrutiny, and should 'stand the test of time' in the literature before becoming a cornerstone paper. 3) The studies listed in Table 8.11 and that of Smith et al (2006a) cannot properly be compared as a basis for validating the unpublished work of Smith et al. (2006a). Ranges within the results are too large, and there is no assurance that the land areas dealt with are similar, preventing meaningful comparison. (Government of Australia)	**Accepted.** 1) The Smith et al. (2007a) paper is now complemented by other studies that were not available at the time and is discussed with the same status as all previous papers on the subject. The Smith et al. (2007a) paper will soon appear in *Philosophical Transactions of the Royal Society, B*. 2) The accepted draft is available for consultation. This paper will "stand the test of time" – it meets the criteria of having been accepted for publication before the specified date. 3) The results are not presented as validation of Smith et al. (2007a). Instead all previous estimates are now presented together for cross comparison. The ranges reported reflect the uncertainty quoted in those studies – this cannot be described as too large – these are the published estimates and we are simply reporting and reviewing them.
8-2	B	0	0	0	0	1) Reality of mitigation technical potentials. There are a number of practical limitations to these potentials that appear to have been discounted in analysis, including in relation to bioenergy, livestock management, and soil carbon sequestration. 2) Insufficient caveats have been attached to broad statements of potential. 3) Suggestions that agricultural production should be reduced for mitigative purposes should be avoided. Some specific queries/comments regarding assessments of technical potential are listed below. (Government of Australia)	1) **Rejected.** We have not ignored these factors, they are discussed in detail is section 8.6.2. 2) **Accepted.** Caveats are now discussed in detail and all estimates are compared on an equal footing. 3) **Rejected.** We make no such policy prescriptive suggestion in Chapter 8. Extensification is listed and its potential is explored, just as is intensification of existing land to avoid expansion of agriculture into new areas.
8-3	B	0	0	0	0	Lack of holistic and comprehensive analysis of mitigation measures. Emissions that fall into non-agriculture sectors for inventory reporting purposes are not adequately addressed. It is important to take a life cycle perspective of emissions mitigation	**Partially accepted.** Fossil fuel savings from agriculture (through improved energy efficiency and bio-energy fossil fuel offsets

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						options as is done in the transport chapter (Chapter 5) in analysing technologies on a well-to-wheels basis. In particular, the Chapter should note the implications for emissions from energy use of the mitigation measures discussed. Specific examples of where this issue arises are listed below. (Government of Australia)	are now included in the chapter, though they are discussed separately from other mitigation measures as they are necessarily assessed in a different framework. A full LCA would need to done across sectoral chapters since many sectors other than agriculture are involved in the GHG costs, though the need for holistic analysis (life cycle analysis; system-wide analysis) is mentioned in our chapter numerous times.
8-4	B	0	0	0	0	Confusion of actual and reportable mitigation. The report should focus squarely on the potential for actual mitigation, however this Chapter is currently structured and heavily biased towards reportable mitigation (under the greenhouse gas inventory methodologies of the IPCC) only. This has the effect of skewing statements of mitigation opportunities in the following ways: (a) practices that may achieve actual mitigation, but which would not be reflected in national inventories, are insufficiently addressed; and (b) some of those practices that are discussed do not properly account for unreportable side-effects, whether greenhouse-related or more socially or economically-based. It is recommended that the Chapter be reviewed with the aim of redressing this bias. Some examples of where it is exhibited are listed below (not exhaustively) (Government of Australia)	**Accepted.** Fossil fuel savings from agriculture (through improved energy efficiency and bio-energy fossil fuel offsets are now included in the chapter, though they are discussed separately from other mitigation measures as they are necessarily assessed in a different framework. We do not confuse actual and reportable mitigation and we do focus on actual rather than reportable mitigation. We do not focus on mitigation that can be reported under the GHG inventory methods of the IPCC – in fact this is irrelevant – we only report what can be achieved at different costs. How this is accounted for is beyond the scope of this chapter.
8-5	B	0	0	0		There are several references to biofuels that will need to be cross-referenced with the energy chapters. U.S. Government (Government of U.S. Department of State)	**Accepted**. At the time of submission of the SOD section numbers from the energy chapter were not available to us. Now we have checked with Ch 4 and Ch 9 for data consistency.
8-6	B	0	0	0		There are a number of concerns about the global mitigation potential estimates presented for agriculture, including: -1) An over-reliance on one study (Smith, et. Al.) which is poorly described in the chapter and the paper is not well documented; Other literature exists that could be drawn on. For example, there are global and regional estimates of the mitigation potential of agricultural activities, including the 2) EMF-21 results and 3) EPA,	1) **Accepted.** The Smith et al. (2007a) paper is now complemented by other studies that were not available at the time and is discussed with the same status as all previous papers on the subject. The Smith et al. (2007a) paper will soon appear in *Philosophical Transactions of*

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						2006b, that are not captured in the chapter. -The extrapolation of U.S. results based on the FASOM model to other regions of the world; -Because the global results use the FASOM model as an underlying tool, there are double-counting concerns with results presented in the forestry chapter. -The results appear to be cobbled-together and are not appropriately caveated. There are global estimates of the mitigation potential of agricultural activities, including the EMF-21 results and EPA, 2005, that are not captured in the chapter. U.S. Government (Government of U.S. Department of State)	*the Royal Society, B.* 2) **Accepted.** US-EPA (2006b) was well captured already but results have been revised now that the final report is published and EMF-21 results are now integral to the Chapter. 3) **Accepted.** These have been revised to use global MACs, or where available, region specific MACs 4) **Noted.** FASOM was not used – only the MACs from FASOM. There is no double counting 5) a) *Cobbled together*: **Rejected.** The results are not "cobbled together". The SOC change estimates all come from a reanalysis of the Ogle et al. (2005) database with over 200 experiments globally, (with IPCC defaults for organic soils), all livestock, riceland and manure management emissions are derived from US-EPA (2006b) – new text added to demonstrate this; *b) Caveats*: **Accepted.** These are now described in more detail; c) *Other studies*: Accepted. Now included (see response to B8-1).
8-7	B	0	0	0		The characterization of U.S. agricultural climate change policy is inaccurate. U.S. Government (Government of U.S. Department of State)	**Accepted**. Text has been revised.
8-8	B	0	0	0		General comment -The discussion of major trends in agriculture sector is not well organized and disjointed. U.S. Government (Government of U.S. Department of State)	**Accepted**. This section was substantially modified in response to several comments.
8-9	B	0	0	0		General comment - The Smith et al (2006a) study is poorly described and documented in the chapter. In addition, the underlying paper itself lacks details on methods, sources, and caveats on the approach. U.S. Government (Government of U.S. Department of State)	**Accepted.** Less reliance on Smith et al. (2007a). Final version of Smith et al. (2007a) now has more detail. More text on caveats included.
8-10	B	0	0	0		General comment - The extrapolation of U.S. results based on the FASOM model to other regions of the world. U.S. Government	**Accepted.** These have been revised to use global MACs, or where available, region

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						(Government of U.S. Department of State)	specific MACs
8-11	B	0	0	0		General comment - Recommend that a presentation of results from other studies is needed as well as documentation of the limitations of the Smith et al. (2006a) study. This could be accomplished through a comparison either at the global or regional scales. U.S. Government (Government of U.S. Department of State)	**Accepted.** Comparison table (Table 8.11 of SOD) replaced with comparative figures.
8-12	B	0	0	0		General comment - Because the global results use the FASOM model as an underlying tool, there are double-counting concerns with results presented in the forestry chapter. U.S. Government (Government of U.S. Department of State)	**Noted.** FASOM was not used – only the MACs from FASOM. There is no double counting
8-13	B	2	9	4		Executive Summary General comments: This is only a partial approach. Land use change, which is a very important aspect, is insufficiently considered. The following introductory remarks and the suggested changes are, in our opinion, very important and indispensable to transform this chapter into an acceptable IPCC product. Two options may be envisaged ; (1) Introduce enough changes and indicate at the very beginnning of the executive summary " This chapter does not consider land use change resulting from changing practices in agriculture. This aspect is considered only in chapter 11"; or (2) add at the very beginning " In this chapter we do not consider thoroughly the cross cutting aspects such as the global impact of increasing land productivity which on one hand may increase GHG emissions per hectare from land considered under agriculture, but at the same time reduce the additionnal land necessary to increase agricultuital products and thus reduce land use change with increasing demand of food fiber and bioenergy; thus avoiding or reducing the needd to convert grassland or forestland into cropland. This important issue which may be globally positive for GHG mitigation when considering all land use is not considered here only in chapter 11". (Arthur Riedacker, INRA)	**Rejected**. This comment arises from a mis-understanding of the baseline. Land use change will occur. We assess mitigation options relative to that baseline – i.e. what reduction in GHGs is possible compared to agriculture that will be present in 2030 in the absence of mitigation measures. Land-use change is considered in as far as it is a mitigation measure (agroforestry, set-aside, restoration of cultivated organic soils this is not a land use change, (only a management practice), restoration of degraded land). Land use change *impacts* are not considered – this should be considered in the adaptation volume prepared by WGII.
8-14	B	2	14	2	21	Paragraph would be assisted by a sentence stating total global share of all ghgs from agriculture (Government of Australia)	**Accepted**. The 14% 'non-CO2' contribution was a typo (it should have been contribution to ALL GHGs) which has been fixed.
8-15	B	2	18	2		Agriculture accounts for a much larger share of global non-CO2 greenhouse gases (CH4, N2O, High-GWP gases) than 14%. According to EPA (2006a) referenced in the chapter, the percentage in year 2000 is 60%. U.S. Government (Government of U.S. Department of State)	**Accepted**. The 14% 'non-CO2' contribution was a typo (it should have been contribution to ALL GHGs) which has been fixed.
8-16	B	2	19	2	20	The absolute values for global N2O and CH4 emissions need to be updated from the EPA (2006a) reference. Global N2O emissions in year 2000 are 2616	**Accepted**. Thanks. We had only the draft version at the stage of writing the SOD - we

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						MtCO2eq. And global CH4 emissions in year 2000 are 3113 MtCO2eq. The percentage of agricultural accounting for global CH4 needs to change from 47% to 52%. U.S. Government (Government of U.S. Department of State)	have now updated the figures.
8-17	B	2	20	2	20	add before Agriculture "But N2O emissions from cropland cannot be compared with emissions from other activities and in particular from industrial activitities. Adding more organic or mineral N fertilizer increases usually the solar energy conversion by plants and therefore produces more phytomass. Total emissions of N2O per ha may increase, but total GHG emissions per ton of agricultural product does usually decrease. This is unique to the land use activities and should underlined". Comment: This should also be indicated in the technical summary and in the SPM when considering GHG emissions which are up to now added without making that distinction. More explanation for that are given further down. (Arthur Riedacker, INRA)	**Rejected**. Reduction of emissions per unit product are implicit in the mitigation practices already included in the ES. We concluded that there is no need to add this level of detail.
8-18	B	2	23	2	23	Phrase 'many agricultural practices' is opaque. Phrasing used in line 31 'active management of agricultural systems' is clearer. (Government of Australia)	**Accepted**. Text was modified.
8-19	B	2	23	2	24	This sentence should be edited to simply read "Many agricultural practices can mitigate GHG emissions." U.S. Government (Government of U.S. Department of State)	**Accepted**. Text was modified.
8-20	B	2	24	2	25	This second sentence of the paragraph should be edited to read "Viable mitigation practices reduce net emissions, because more than one GHG can be affected by more than one mechanism." U.S. Government (Government of U.S. Department of State)	**Accepted**. Text was modified.
8-21	B	2	25	2	26	Insert here line 22 to 24 from page 3 There is no universally applicable lists of …. . (Arthur Riedacker, INRA)	**Accepted**. But not applicable because txt was modified.
8-22	B	2	27	2	27	Insert here in brackets before improved agronomy a very important aspect, . (including more efficient land use, and reduced land use change which is considered in chapter 11, more efficient agronomy and nutrient management, set aside ….) (Arthur Riedacker, INRA)	**Rejected**. Most of these concepts are already included in the practices we had listed. "Reduced land channge": this concept not included because this is not a mitigation practice (i.e., there are some land use changes which reduce emissions, and others increase emissions).
8-23	B	2	29	2	29	Phrase 'land use change' not easily interpreted by reader (and glossary does not help much).	**Accepted.** Clarifying text was added to indicate that certain land use changes cause

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						(Government of Australia)	mitigation
8-24	B	2	34	2	37	Add a) "The global emissions from agricultural land (excluding fossil fuel offsets from biomass and assuming that under the different land use is exogeneously fixed for each scenario)" Additionnal xomments; (1) Total emissions, see above line 19 to 21 (from N2O , CH4 and CO2), are estimated to be 5640 Mt CO2 eq. And here the global technical mitigation potential is estimated to be between 5500 - 6000 MtCO2 -eqyr-1 Please remove "technical mitigation" and replace it by "emissions" 2) The technical mitigation here would mean the end of food production and therefore the end of mankind. In that case the technical potential for GHG mitigation would be much higher than indicated ! (Arthur Riedacker, INRA)	a), 1) **Rejected**. The figures given are mitigation potentials, not emissions. 2) **Rejected**. There is no support for this statement – GHG emissions can be reduced (including C sequestration) without reducing productivity.
8-25	B	2	34	3	24	Use of the Lee et al. (2005) U.S. study to estimate global mitigation potential needs to 1) be clarified even further; 2) give justification for extrapoloating U.S. results to the global scale; and 3) describe the many shortcomings of this approach, which are currently almost completely ignored in the chapter. Is it correct that the percentage of baseline emissions mitigated through different carbon priced scenarios in Lee et al. is then applied as that same percentage reduction from regional and global baselines, as estimated in 2030 in SRES? If this is indeed the case, these mitigation estimates should be shown only as one potential estimate, but the chapter should not give the impression that these are IPCC consensus estimates. This approach is very crude, and ignores the numerous inconsistencies between SRES baselines and baselines/mitigation potential estimated by Lee et al. (e.g., agricultural and forestry activities included, relative potential of different activities in different regions of the world). U.S. Government (Government of U.S. Department of State)	**Accepted.** 1) Done. New text added to describe where the MACs were derived from. 2) US MACs are no longer used for the globe. Global MACs from US-EPA (2006b) are used unless region specific MACs are available in which case they are used. Derivation of MACs now described. 3) Taken in to account – global / region specific MACs now used. The percentage reductions are not applied to regional and global baselines as suspected, but instead are applied to the amount of the technical potential available that would be realized at a given carbon cost, so this is not as crude as the reviewer suspects.
8-26	B	2	34	3	24	There is a more recent study (with a more up to date version of the FASOMGHG model, including revisions to the treatment of biofuels) than the Lee et al. (2005) study. There is an EPA (2005) report entitled Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture, available at www.epa.gov/sequestration The authors should consider using estimates from this report. U.S. Government (Government of U.S. Department of State)	**Accepted.** Global / region specific MACs from US-EPA (2006b) are now used in place of FASOM MACs for US described in Lee et al. (2005). EPA (2005) reference now included and discussed.
8-27	B	2	34	3	6	The role of biofuels needs to be clarified in these global mitigation estimates. P. 2, lines 34-35 state that fossil fuel offsets from biofuels are excluded. The footnote, however, states that Lee et al. estimates for biofuels are used. U.S. Government	**Accepted**. Top-down estimates for bio-energy mitigation potential (from data compiled from EMF-21) is now used.

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						(Government of U.S. Department of State)	
8-28	B	2	34	3	24	The Lee et al. (2005) study includes forestry activities like afforestation and changes in forest management. Is there then double counting with the forestry mitigation estimates in chapter 9? U.S. Government (Government of U.S. Department of State)	**Noted**. Lee et al paper is no longer used. Only agricultural mitigation measures specified were used, so no double counting with the forestry chapter is possible.
8-29	B	2	35	2	35	Add, after biomass, "and from land use change including afforestation" see also chapter 11)". The reason for that very important insertion will be detailed later on, and in particular in comments for chapter 11 Mitigation from a cross sectoral-perspective (Arthur Riedacker, INRA)	**Rejected**. This is a chapter on agricultural mitigation. Afforestation is dealt with in Chapter 9.
8-30	B	2	37	0		We do strongly suggest to insert here, in the Executive summary, figure 8.6 . Table 8.1 could be removed. (Arthur Riedacker, INRA)	**Accepted**. ES figure (8.1) now used here.
8-31	B	2	37	3	37	Add "In table 8.1 under the different scenarios, different land use with different yieds per hectare are considered" Please indicate also at which page the assumptions for the different scenarios can be found. (Arthur Riedacker, INRA)	**Rejected**. SRES scenarios are described in one of the early cross-cutting chapters.
8-32	B	2	38	2	50	Table 8.1 utilizes 4 SRES scenarios. Why are results given for these 4, when B2 is the AR4 main scenario? Not consistent with Chapter 9 Forestry mitigation potential estimates. U.S. Government (Government of U.S. Department of State)	**Noted**. We were asked to assess mitigation potential for A1b and B2 in IPCC AR4 WGIII LA2. We include estimates also for A2 and B1 for completeness, since they were also calculated and given in Smith et al. (2007a). A2 and B1 could be removed, but since the information is available, it does not seem necessary to us to remove it.
8-33	B	2	38	3	15	Table 8.1 and discussion in text about it needs a short description of the key Smith et al. 2006a and 2006b papers (in press, and not available), their key assumptions, the model(s) employed for the analysis, etc., since these two papers are repeatedly cited throughout chapter--but are largely described in footnotes to tables. U.S. Government (Government of U.S. Department of State)	**Accepted**. Less reliance on these papers which have now been published. Salient assumptions of these (and all papers) discussed as appropriate.
8-34	B	2	38	2	50	Other global estimates are available which the authors should consider. For example, the Energy Modeling Forum 21 estimates of international non-CO2 mitigation potential either, resulting in a series of papers in press in Energy Journal and more recent articles (see ch 3). U.S. Government (Government of U.S. Department of State)	**Accepted.** These are now included

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8-35	B	3	11	3	11	1) Remove"90%" and after from reduced soil emissions add ", land use change and other activities " -Comment This addition is very important but not sufficient It is impossible to present such huge mitigation possibilities as in the table 8.1 and to say that 90% of this derives from reduced soil emissions of CO2 (CO2 emissions are said to be only 40 Mt of CO2 at page 2 line 20, whereas N2O and CH4 emissions reach togeteher 5643 Mt CO2 eq !!). 2) Moreover if there is reduced land use change, avoided emissions from biomass (in trees, from deforestation etc. should obvioulsy be taken into account and not only emissions from soils as indicarted. This statement is also in contradiction with line 6 page 3 where it is said that afforestation becomes more important as ... : 3) Without these this statement would suggest that there is nothing to be done except carbon sequestration in soils. But this is definitely not correct. 4) The possibilities for increasing soils carbon stocks may also vary very much with the latitude... It is very important to revise this paragraph . (Arthur Riedacker, INRA)	1) **Rejected**, but text was modified to avoid this confusion. The reviewer does not understand that reduced soil CO2 emissions includes soil C sequestration (i.e. negative emissions). The mitigation potentials are not huge, they are consistent with estimates in previous IPCC assessment reports. New text added to clarify the use of soil sinks. 2) **Rejected**. Deforestation is a Chapter 9 issue – avoidance of land use change is discussed. 3) **Rejected**. It does not imply that, but it does imply that in agriculture soil C sequestration potential is large relative to reduction of other GHGs. 4) **Rejected**. Regional variability is already taken into account by using four climate regions in the global estimates..
8-36	B	3	11	3	11	The authors should review the very high mitigation potential accorded reduced soil emissions of carbon dioxide (90% of mitigation potential - of a total of almost 6,000Mt). This requires further explanation, including of how the practical limitations of building soil carbon levels have been dealt with in this analysis. This is a very bold statement, which should attract an equally high burden in terms of evidence required to support the claim. (Government of Australia)	**Rejected**. The total technical potential is high (=1.6 Pg C / yr) but at reasonable carbon prices, this is not likely to be realized. At C prices ranging from 20 to 100 USD / tCO_2-eq., about 0.5 to 0.8 Pg C / yr could be sequestered. This is NOT a bold statement – indeed it is similar to estimates made in the IPCC SAR and TAR and other global estimates of soil C sequestration potential – see new figure 8.3a. It is supported by all other global estimates of soil C sequestration potential: IPCC SAR (1996), IPCC TAR (2001), Lal (2003), Lal (2004), Manne & Richels (2004), IPCC SR-LULUCF (2000), Caldeira *et al.* (2004). Not one differs significantly from this so the finding in un-contentious.
8-37	B	3	11	3	12	The major chapter finding that 90% of mitigation potential derives from reduced	**Rejected**. (but we have included the

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						soil emissions of CO2 is probably highly dependent on the methodology used-- use of US price and technical potential trends in Lee et al. 2005 projected globally. Other studies (eg, EPA 2006b; EMF 21 non-CO2 mitigation papers-- e.g., DeAngelo et al., in press Energy Journal ("Methane and Nitrous Oxide Mitigation in Agriculture") show large mitigation potential from non-CO2 options in China, Brazil, India, etc. Consider other findings. U.S. Government (Government of U.S. Department of State)	additional reference given). All findings are consistent with US-EPA (2006b) and DeAngelo et al. (2006).
8-38	B	3	15	3	15	Please add :"Other mitigation options are available for regions or crops where production is not yet optimised During the last 50 years, although emissions per hectare have generally increased in industriualised countries, the land necessary, fossil energy input and GHG emissions per ton of wheat have been considerably reduced. To achieve similar progress with other species or in other regions should be considered. (Arthur Riedacker, INRA)	**Rejected**. The estimates of mitigation potentials already include the options suggested by the reviewer.
8-39	B	3	23	3	24	Remove the sentence here and insert it at the beginning of the summary at page 2 line 25 (Arthur Riedacker, INRA)	**Rejected**. This concept is relevant for the discussion on the mitigation potential at different carbon prices, and not for the paragraph suggested by the reviewer.
8-40	B	3	26	3	37	Unexplained assumptions regarding mitigation potential of biofuels. Important to account for the greenhouse impacts of growing and processing bio-energy feedstock (i.e., a life-cycle approach). Benefits, if any, must be expressed as net of these embodied emissions - regardless of which inventory sector such emissions fall into. (Government of Australia)	**Accepted.** We have now used top-down figures from internally consistent integrated assessment models and cited the relevant sources / caveats.
8-41	B	3	26	3	37	Suggest authors seek consistency across chapters addressing biofuels as mitigation to avoid a compartmentalized, inconsistent discussion. The AR4 cross-chapter biofuels working group should address this issue. U.S. Government (Government of U.S. Department of State)	**Accepted**. Bioenergy estimates are now consistent across AR4 chapters.
8-42	B	3	26	3	37	Bioenergy mitigation: if assumptions are contained in analysis that food demand is met first and surplus land is then available for biofuels, that should be stated carefully and consistently throughout chapter. U.S. Government (Government of U.S. Department of State)	**Accepted (partly).** We have now used top-down figures from internally consistent integrated assessment models and cited the relevant sources / caveats.
8-43	B	3	36	3	36	Add " Similarly more productive agricultural practices could at least in some parts of the world, - in particular in Sub Saharan Africa - , although increasing emissions in the agricultural sector due to increased use of fertilizer (more N20 from nitrogen fertilizer in the field or in industry, more CO2 in the industrial sector for	**Rejected**. These issues, including regional mitigation potentials are already covered in the chapter. This detail is not relevant for the ES.

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						fertilizer (nitrogen, phosphate and potassium) production usually end up with reduced deforestation when it is necessary to increase crop production. This would also considerably reduce CO2 emissions from carbon in biomass and soils by reducing the need for land use change ." (see chapter 9 and 11) Comments : This is the least of what can be said here . More explantaion would be preferable as it could be an essential part in SS Africa policies. In this part of the worlde the average use of mineral fertilizer is below 15 kg per hectare, which leads not only to low yields, but also to mineral depletion of soils. See further down (Riedacker and Dessus 1991) Many more comments could be made here . I am ready to contribute more, is this is wished, to this important issue.) (Arthur Riedacker, INRA)	
8-44	B	3	45	3	45	Phrase 'may also be' seems weak when compared to first sentence of para (lines 39-40). Suggest '…other policy objectives short-term benefits are likely'. (Government of Australia)	**Accepted**. Wording changed.
8-45	B	3	48	3	48	insert in brackets (e.g. more efficient land use, nutrient management etc..) (Arthur Riedacker, INRA)	**Rejected**. Not clear what "more efficient land use" means.
8-46	B	3	49	3	50	The authors should redraft this sentence as it is unclear as to how climate impacts may alter the efficacy of mitigation measures (an example of this would also be of assistance). (Government of Australia)	**Rejected**. This is just the summary, which has to be brief. The detail and examples are in the chapter (section 8.5).
8-47	B	4	1	4	1	add (and begin with) "including increasing yields per hectare, macro economics …(Riedacker 2006 c and 2007)": Explanations; macroeconomics may increase or decrease yields per hectare. In some cases, when they decrease outputs per hectare they increase land requirement for the same total output; this has very often a very negative effect on GHG emissions (more land for food production means deforestation or less land for afforestation, for bioenergy etc. See explanation further down (Arthur Riedacker, INRA)	**Accepted, partly**. We have added words to this effect in the body of the chapter (under increasing production / efficient use of fertilizers) but not here in the summary.
8-48	B	4	3	4	4	Need to make clear that expression 'little progress' relates to global aggregate picture. There are case examples in countries where good progress has been made. (Government of Australia)	**Accepted**. Sentence has been modified to make clear that the little progress refers to the global scale.
8-49	B	4	13	4	13	Insert, before Most agricultural, "To assess the global effect on GHG emissions it is important to consider not only the emissions from agriculture but also those from other sectors in particular from aldn use change. More emissions in agriculture can for instance mean less GHG emissions from the land use sector in particular from land use change when considering cropland, grassland and	**Rejected**. This comment arises from a mis-understanding of the baseline. Land use change will occur. We assess mitigation options relative to that baseline – i.e. what reduction in GHGs is possible compared to

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						forestland (see chapter 11). Comments: The statement from line 10 to 15 is true only if this is added. Otherwise, and we do strongly insist on that, it is biased, misleading and may end up with wrong recommandations. (Arthur Riedacker, INRA)	agriculture that will be present in 2030 in the absence of mitigation measures. Land-use change is considered in as far as it is a mitigation measure (agro-forestry, set-aside, restoration of cultivated organic soils, restoration of degraded land). Land use change *impacts* are not considered – this should be considered in the adaptation volume prepared by WGII.
8-50	B	4	22	4	22	"or" should read "and" (Government of Australia)	**Accepted**. The word "or" was replaced by "and".
8-51	B	4	29	4	29	add before agricultural GHG " Nitrous oxide is not only produced in the field but also during production of nitrate fertilizer." (Riedacker 2006b) (Arthur Riedacker, INRA)	**Rejected**. Emissions from production of fertilizer are considered under Industrial Processes, not Agriculture.
8-52	B	4	36	4	36	"that" should read "than" (Government of Australia)	**Accepted**. Word has been replaced.
8-53	B	5	4	5	9	Agricultural mitigation practices should be presented in context of holistic agricultural management systems. Energy efficiency is an integral part of this holistic approach. Accounting for farm fossil fuel emissions in the energy sector is a theoretical accounting construct separate from farm management strategies. Chapter 8 on mitigation in the agriculture sector should take a holistic approach, including energy efficiency, concerning farm management practices. (Government of Australia)	**Rejected**. This suggestion collides with the general approach followed in AR4. However, in line with the arguments given by the Government of Australia, we have included an estimate of mitigation potential for energy efficiency improvement in agriculture, to make this explicit in our chapter.
8-54	B	5	10	5	11	add " With more efficient land use, GHG emissions per hectare may increase, but land, fossil energy required and GHG emissions per ton of product may decrease up to certain point. In France, between 1950 and 2000 and per ton of wheat, the average land required has decreased from 0.55 ha to 0.14 ha, the fossil energy input from 5.8 GJ to 2.5 GJ and GHG emissions from 0.79 tCO2-eq to 0.42 tCO2-eq (including CO2 emissions from fertilizer manufacture but assuming no use of nitrate and therefore no N2O emissions at the factory). This allowed wheat production to increase , to decrease GHG emisisons per ton of product and t in addition to that to avoid deforestation of an area equivalent to the present french forest (14.6 Mha - about a quarter of France- and therefor loss of about a 1000 MtC (80% from biomass and 20% due to decrease in soil carbon stocks). (Riedacker 2006 c , d and 2007) (Arthur Riedacker, INRA)	**Partly accepted**. We do not deal with fossil energy input here. Due to space constraints, we can not detail the specific case of France, but we do analyze trends at the global and regional level. The issues suggested by the reviewer are, in general terms, covered in the various sections of the chapter.

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8-55	B	5	20	5	20	Expression 'not been successful' is vague. Does it mean 'no progress made', or 'yet still has not eliminated the problem', or 'has meant improvement in some, but not others', …? (Government of Australia)	**Accepted**. Sentence has been reworded.
8-56	B	6	9	6	9	Add : "But to assess correctly GHG mitigation possibilities related with diet, it is also necessary to consider changes in composition of protein consumption (e.g. white or red meat, fish) and from which type of ecosystem meat comes from (Riedacker 2006 c, d and 2007) (Arthur Riedacker, INRA)	**Rejected**. Though such observations may have merit, this level of detail may be beyond the scope of this report.
8-57	B	7	9	7	39	1) The discussion of major trends in agricultural sector is not well organized. Major trends in agricultural sector are listed, 2) but no discussion about if or how they are addressed in the mitigation analyses in this chapter. Some probably are not. Please identify which are addressed, and which are not, especially in the central analysis of the chapter: Smith et al. 2006a and b. U.S. Government (Government of U.S. Department of State)	1) **Accepted**: this section has been extensively re-written to make it more streamlined and reduce length. 2) **Rejected (partly)**: This section merely presents background for subsequent discussion of mitigation options. In the interest of brevity, we have opted not to specifically identify here which of the trends are directly addressed and which are not. In our view, most or all of the information presented here is relevant to the options discussed later.
8-58	B	7	15	7	15	Add on top of the list, " - Food demand has been the main driver for increased land use, but technical progress, in particuler growth of land productivity, have to some extend counteracted this trend by reducing GHG emission per ton of product (Riedacker 2006)" If this is not added , to be correct it is necessary to add at line 13 "(trends in land use change are not considered in this chapter but only in chapter 11) " Comment as it was in the past the most important factor reponsible for GHG emissions from land use, this should be added. (Arthur Riedacker, INRA)	**Accepted (partly)**. We have inserted pertinent wording, but opted to place it earlier in the chapter, where we discuss land use change. The revised text states: "During the last four decades, agricultural land has gained almost 500 Mha from other land uses, a change driven largely by increasing demands for food from a growing population." (page 5, line 25).
8-59	B	7	21	7	21	Unsubstantiated claim: that conservation and zero tillage increases soil carbon. Comment conflicts with p 17 line 5 that correctly states that no till often results in an increase in soil carbon, but not always. (Government of Australia)	**Accepted**. The sentence has been revised to read: "thus reducing the use of energy and often increasing carbon storage in soils"
8-60	B	7	24	7	24	Add " Moreover the final carbon balance of soils depends also very much of productivity of plants introduced together with the traditional crops. The introduced plants not only protect the soil, but also change its structure and soil	**Accepted (partly):** We agree that no-till does not always increase soil C, and have revised the sentence accordingly. The reviewer's other

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						organic matter content by adding more phytomass" Comment: It is not only the conservation tillage and zero tillage which increases carbon stocks but also the introduction of plants to protect the soil and produce organic matter. In some situation no till practice without additionnal plants, may hardly increase soil carbon stocks and may sometimes even increase N2O emissions, thus ending with higher GHG emissions! . (Arthur Riedacker, INRA)	points, regarding benefits of introducing other plants and the effects on N_2O, are discussed elsewhere. For example: the introduction of new plants is briefly covered in sections 8.4.1.1 and 8.4.1.2. And the effects of no-till on N_2O emissions is addressed in section 8.4.1.1.c
8-61	B	7	27	7	27	Suggest "GHG" should read "N2O" (discussion is on fertiliser use and irrigation) (Government of Australia)	**Rejected**: These practices might conceivably also affect other GHG's, notably CO_2 from energy use.
8-62	B	7	28	7	28	Add " It must be underlined here that nitrous oxide emissions from croplands and to some extent of methane from rice cultivation, are not at all comparable to other GHG emissions. Adding more fertilizer per ha usually increases productivity per ha, reduces GHG emissions per ton of product. This is due to the fact that it is improving the efficiency of solar energy bioconversion in the field, a process which is unique to land use. Therefore the impact of changes in crop production cannot be assessed correctly when together with increased nitrous oxides emissions are not considered, at the same time, changes in all GHG emission per ton of product and the increase of land use efficiency (Riedacker 2006 c) (Arthur Riedacker, INRA)	**Accepted, partly**. We have already stated in our text that "Mitigation practices can affect more than one GHG, so it is important to consider the impact of mitigation options on all GHGs (Robertson *et al.*, 2000; Smith *et al.*, 2001; Gregorich *et al.*, 2005)." (section 8.4.2). However, we have further tried to emphasize a wholistic approach to estimates of GHG mitigation. Formexample, in section 8.4 we say: "The impacts of mitigation options considered are summarised qualitatively in Table 8.4. Although comprehensive life cycle analyses are not always possible, given the complexity of many farming systems, the table estimates also the confidence, based on expert opinion, that the practice can reduce overall net emissions at the site of adoption. Some of these practices also have indirect effects on ecosystems elsewhere; for example, increased productivity in existing croplands could avoid deforestation and its attendant emissions (see also section 8.8)."
8-63	B	7	33	7	33	Add "To get a final picture it is necessary to consider not only GHG emissions from animals, but also the land used and avoided land use change such as conversion of forestland or grassland into cropland. (Riedacker 2006c, d and 2007) (Arthur Riedacker, INRA)	**Rejected**. We agree wholeheartedly with the reviewer, but this point has already been articulated in our text. For example, in section 8.8, we say "Agricultural mitigation practices

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							may influence non-agricultural ecosystems. For example, practices that diminish productivity in existing cropland (e.g. set-aside lands) or divert products to alternate uses (e.g. bio-energy crops) may induce conversion of forests to cropland elsewhere; conversely, increasing productivity on existing croplands may 'spare' some forest- or grasslands (West and Marland, 2003; Balmford *et al.*, 2005; Mooney *et al.*, 2005)."
8-64	B	7	37	7	37	add "which" are causing etc.. (Arthur Riedacker, INRA)	**Rejected**. Inserting 'which' seems grammatically incorrect.
8-65	B	7	39	7	39	add also at the end of the sentence " But policies which are increasing the use of locally produced food may decrease drastically energy requirement for transportation (Jones A. (2002) Comments This article indicates that energy consumption for transportation may be 20 times higher than energy consumption for apple production ! (Arthur Riedacker, INRA)	**Rejected**. The reviewer raises a worthwhile point; but it falls outside the scope of our chapter. We note this in section 8.1 ("Smith *et al.* (2007a) recently estimated a global potential mitigation of 770 Mt CO_2-eq. yr^{-1} by 2030 from improved energy efficiency in agriculture (e.g. through reduced fossil fuel use) but this is usually counted in the relevant user sector rather than in agriculture, so is not considered further here."
8-66	B	7	47	7	49	Numbers from the EPA (2006a) citation should be updated as follows: 5969 MtCO2eq. for non-CO2 emissions from total world agriculture should be revised to 6075 MtCO2eq. for year 2005 (5730 MtCO2eq. for year 2000). The 14% number is surely too low (% agriculture of global non-CO2 emissions). According to EPA (2006a), agriculture is responsible for approximately 60% of non-CO2 emissions in year 2000. U.S. Government (Government of U.S. Department of State)	**Accepted**. Values were updated and corrected in consultation with the latest version of EPA (2006a). (We presumably used an earlier version). The '14%' value was indeed incorrect – thanks! – and was revised.
8-67	B	8	3	7	3	Add here again, as it is very important, add " However, although adding more organic or mineral nitrogen increases N2O emissions, the increased yields reduce the need of land and therefore land use changes. This generally decreases GHG emissions per ton of products. (Arthur Riedacker, INRA)	**Rejected**. We agree, but contend that this point has already been adequately addressed elsewhere. (see response to comment 8-63).
8-68	B	8	4	8	4	Add here .before the sentence starting with "Emissions of CO2 from agricultural soils … " Emissions of CO2 from land use change are very important. But it is	**Rejected** – this issue, while important, will presumably be addressed in Chapters 9 and

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						necessary to consider the whole land use (cropland , grassland and forestland). In particular increasing crop yields may have a very large contribution in GHG mitigation by avoiding GHG emission (Riedacker 2006 and Riedacker and Dessus 1993)" Comment . This should at least be mentioned here even if this important aspect is only considered in detail in chapter 11 It is particularly important. without this change the next sentence alone would really misleading, in particular for sub Saharan Africa countries,were inputs are today very low. (Arthur Riedacker, INRA)	11. Furthermore, we have already alluded briefly to it in section 8.8.
8-69	B	8	7	8	8	add soils after " that agriculture emitted" , "from soil carbon" , 40 MtCO2 -eq of …. This is repeated page 9 line 23 tor 25 . The latter part at page 9 should be removed (Arthur Riedacker, INRA)	**Accepted**. The word "soils" was inserted to indicate that these are emissions from soils. As suggested, text from p. 9 was removed.
8-70	B	8	10	8		This table should be clearly labeled "Estimated" GHG emissions. None of these emissions are measured, especially not at the national or regional scale. These are estimates only, and the table might have a footnote along the lines of "estimates presented carry considerable uncertainty, of the order of +/-50%" (or whatever uncertainty can be scientifically justified) U.S. Government (Government of U.S. Department of State)	**Accepted (partly)**. The caption (now of a figure) has been amended, as suggested. We have opted not to include estimates of confidence, since the reference from which the data are taken is provided, in the event readers want to study it further.
8-71	B	8	10	8	50	Table 8.4: need to add in CO2 emissions from agricultural sector as well as non-CO2 if available, since soil C management is 90% of mitigation potential according to text p. 3; or at least retitle table as "Non-CO2 GHG emissions…" U.S. Government (Government of U.S. Department of State)	**Accepted**. These figures are from US-EPA (2006a); CO_2 values are not available. The table caption (now a figure caption) has been amended.
8-72	B	8	10	8		Table 8.4: A few spot checks with the final version of EPA (2006a) reveal that many of the numbers in Table. 8.4 need to be updated. The authors should consult the final version of the report at: http://www.epa.gov/nonco2/econ-inv/pdfs/GreenhouseGasReport.pdf U.S. Government (Government of U.S. Department of State)	**Accepted**. Values have now been included in a completely revised form (as a figure).
8-73	B	9	6	9	6	Add "However the emissions on an area basis are much lower in Sub saharan Africa due to the low input of fertilizer and in particular of nitrogen par hectare". Comments: The results are quite surprising. Sub saharan Africa is the country using the least amount of nitrogen fertilizer in the world (less than 20 kg /ha /year). Of course acacias may fix nitrogen and generate N2O. On an area basis, which is a much more adequate criteria than abosulte emissions, N2O emissions must be much lower than in any region in the world. In fact if you add South Asia and East Asia the emissions amount up to 1136 MtCO2-eq.yr-1 whereas in SSA they reach	**Rejected**. Although the reviewer's observation may be pertinent, we do not have adequate documentation in the literature to support its inclusion.

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						only 350MtCO2-eq.yr-1! (Arthur Riedacker, INRA)	
8-74	B	9	23	9	24	This has already been said at page 8 line 7 and 8 and should be removed (Arthur Riedacker, INRA)	**Accepted**. Thanks!!
8-75	B	9	28	9	29	Something wrong with description of 49Mt. Perhaps it is meant to relate to annual increase in emissions. (Government of Australia)	**Accepted**. The sentence has been amended to indicate that the value refers to an *increase* in emissions.
8-76	B	9	31	9	31	after emissions from " outdoor " biomass burning. Comments; emissions is modern stoves are many times less pollutant than biomass burning in the field. Morevover in grassland and forest fires oxygen is a limiting factor. This leads to generation of large amounts of carbon monoxide, a precursor of tropospheric ozone which is also a GHG (Arthur Riedacker, INRA)	**Rejected**. While the reviewer's comment has merit, our text here merely lists the trends in emissions from various sources; describing the processes involved, as suggested by the reviewer, is not directly relevant here. The reviewer seems to be confused. We deal with agricultural residue burning in fields, not biomass fuel in stoves.
8-77	B	10	1	10		Table 8.5 and also 8.4 It would be nice to have the area and emissions per hectare for the differents parts of the world (Arthur Riedacker, INRA)	**Rejected**. Such information might indeed be useful, but we declined to include it, given severe limitations in space.
8-78	B	10	1	10		This table should be clearly labeled "Estimated and projected" GHG emissions and trends. None of the 2005 emissions are measured, especially not at the national or regional scale. The 2005 values are estimates only, and the table might have a footnote along the lines of "estimates presented for 2005 carry considerable uncertainty, of the order of +/-50%" (or whatever uncertainty can be scientifically justified). Moreover, the 2020 values are mere projections, or projected trends. They are not actual emissions and must be labeled as such (e.g., "projected trends adapted from US-EPA, 2006a)"). A footnote portraying the considerable uncertainty (+/-75%?) of the 2020 projections could be included to help the reader understand how firm the numbers are. U.S. Government (Government of U.S. Department of State)	**Accepted**. The table (now a figure) caption has been amended.
8-79	B	10	1	10		Table 8.5: Authors should ensure that the numbers in this table are consistent with the final version of EPA (2006a) available at: http://www.epa.gov/nonco2/econ-inv/pdfs/GreenhouseGasReport.pdf U.S. Government (Government of U.S. Department of State)	**Accepted**. Thanks, perhaps we had only the draft version at the stage of writing the SOD.
8-80	B	10	1	10	50	Table 8.5 Agriculture row results need to be replaced with final revised global mitigation estimates from revised Chapter 8 Table 8.1, taking into account comments made on Table 8.1 that it be revised to include global climate economic	**Accepted**. Thanks, perhaps we had only the draft version at the stage of writing the SOD.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						model results, not US estimates projected globally. U.S. Government (Government of U.S. Department of State)	
8-81	B	11	8	11	9	Conflicted claim: that climate policies in the EU have reduced agricultural emissions is not collaborated in section 8.7.1 as suggested. Indeed, 8.7.1 states there is little evidence climate policies have had impact. (Government of Australia)	**Accepted**. The sentence has been revised.
8-82	B	11	18	11	18	Remove "may" and change like that ; technologies permit in many situations a reduction of …. a reduction (Arthur Riedacker, INRA)	**Rejected**. We do not see how the proposed change improves the intent of the sentence.
8-83	B	11	33	11	33	The authors should insert "from the Agricultural sector, and" before " mainly from …". The authors also need to ensure that this discussion matches the discussion of the agricultural sector in Working Group 2. (Government of Australia)	**Accepted**. The sentence has been revised and made consistent with Ch. 9 and Agriculture chapter in WGII.
8-84	B	11	34	11	35	Change from "this combined" … .as follows . "Deforestation could even be more reduced in developing countries and afforestation be increased with higher agricultural yields as this makes more land free for aforestation. Agricultural land which may become available for afforestation up to 2050 depends very much on the scenarios and of agricultural practices envisaged; 140 Mha under scenario, A2 and 950 Mha under scenario B1 may become available. These are the extreme situations but this does show the extreme interest of increasing land productivity. Technical mitigation potential through carbon storage and fossils fuel substitution and saving with biomass depends first of all on the area of land which can be afforested. But but it also depends of the the type of afforestation, of the demand for wood products, availability of technologies and investments in plants to use and capable to transform that wood. Short rotation for raw material have the highest technical mitigation potential. But the latter is constrained by the insufficient demand of wood products. Therefore short rotations for heat and electricity production - liquid biofuel production from wood was not considered as this technology is not yet mature- , have the highest mitigation potential in 2050 ; respectively 7.3 GtC (26.8 GtCO2) under A2 and 27.8 GtC (102 GtCO2) under B1) (Dameron et al. 2005, Riedacker et. al. 2006 a) (Arthur Riedacker, INRA)	**Rejected**. While important and worthy of mention, issues pertaining to deforestation and bioenergy under afforestation are considered in chapters 9 and 4 of this report. The influence of improved productivity on preservation of land elsewhere has been considered in section 8.8 of our chapter. (For example, we already point out that "Agricultural mitigation practices may influence non-agricultural ecosystems. For example, practices that diminish productivity in existing cropland (e.g. set-aside lands) or divert products to alternate uses (e.g. bio-energy crops) may induce conversion of forests to cropland elsewhere; conversely, increasing productivity on existing croplands may 'spare' some forest- or grasslands (West and Marland, 2003; Balmford *et al.*, 2005; Mooney *et al.*, 2005). The net effect of such trade-offs on biodiversity and other ecosystem services has not yet been fully quantified (Huston and Marland, 2003; Green *et al.*, 2005)."

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8-85	B	12	6	12		Fig 8.2 On top This figure could be improved by splitting the emissions by regions (a baseline per region which would allow to compare the real changes with time) . That in SSA emissions' are low and not really increasing when taking the US EPA assumptions would for instance appear more clearly . Moreover, but this is less important, a distinction should be made between values up to 2005, which are probably actual values and projections based on the model . Today we do not have the emissions for 2010 ... But let us hope that this report will still have some value in 2010 ..... (Arthur Riedacker, INRA)	**Noted.** The figure has been extensively revised for various reasons. We have amended the caption to indicate that these values are 'estimated'.
8-86	B	12	8	12		Capture of fig 8.2 Indicate that values up to 2005 are real values and beyond 2005 we deal with projections (Arthur Riedacker, INRA)	**Accepted**. We have amended the caption to indicate that these values are 'estimated'.
8-87	B	13	7	13	7	after inputs you could add a reference. We have developped that in "Riedacker and Dessus (1991) (Arthur Riedacker, INRA)	**Accepted** – but we were unable to find the reference.
8-88	B	13	11	13	11	Add " But this increase of emissions from agricultural land may be more than compensated by reducedvor avoided deforestation, when yields per hectare can be increased by adding some organic or mineral fertilize,r in particular in Sub-saharan Africa were inputs are today very low and very often even insufficient to maintain mineral soil fertility.Riedacker and Dessus (1991)" (Arthur Riedacker, INRA)	**Rejected**. This observation has already been included in section 8.8.
8-89	B	13	24	13	24	. (Arthur Riedacker, INRA)	No comment
8-90	B	13	26	13	26	Again emissions from trees have been forgotten. Please add "biomass" ; emissions from biomass and soils (Arthur Riedacker, INRA)	**Rejected**. Though important, emissions from trees are considered in Chapter 9.
8-91	B	13	28	13	28	The word "organic" should be deleted; restoration of cultivated soils in general, not just those labeled by soil scientists as "organic", might be beneficial. U.S. Government (Government of U.S. Department of State)	Page / line numbers do not match.
8-92	B	13	32	13	35	No reference is provided for the statement that minimum/no till practices are producing CO2 removals sufficient to offset annual increases of all other agricultural emissions. Soil C sequestration capacities are highly variable and uncertain. (Government of Australia)	**Accepted**. The statement has been removed due to the lack of an appropriate reference.
8-93	B	13	33	13	33	Clarify. Explain how soil carbon can be maintained.	Page / line numbers do not match.

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						Explain what is meant by "efficient use" of fertilizers. U.S. Government (Government of U.S. Department of State)	1) Soil carbon can be maintained by measures described through section 8.4.1. 2) Efficient use of fertilizers means avoiding over-fertilisation by supplying fertilizer when and where needed (see section on 'Nurtient management' in 8.4.1.1
8-94	B	13	33	13	33	"Maintain soil carbon" should be written as "maintain soil carbon content" or "maintain soil carbon storage". U.S. Government (Government of U.S. Department of State)	Page / line numbers do not match. Based on a search, the phrase "maintain soil carbon" does not appear anywhere in our chapter.
8-95	B	13	35	13	35	Add after 20 MtCO2-eq /year "; but this does neither take into account emissions resulting from deforestation which are only very partially compensated by soil carbon stock increase resulting from no-till agriculture, nor the fact that increase in carbon stocks resulting from this practice is significant only for a limited number of years, probably not more than 20 years even under permanent no-till. " (Arthur Riedacker, INRA)	**Accepted**. This paragraph has been modified.
8-96	B	13	35	13	35	"Effective to" might be written "effective set of options to" U.S. Government (Government of U.S. Department of State)	Page / line numbers do not match. Based on a search, the phrase "effective to" does not appear anywhere in our chapter.
8-97	B	14	2	14	3	Incorrect data: Nitrogen fertiliser use in Australia has more than doubled since 1990, and has increased by around five times since 1980 (Source: National Land and Water Resources Audit (2001) Australian Agriculture Assessment 2001, Canberra, Australia, page 84). (Government of Australia)	**Noted**. This is exactly what we had said (a two and a half fold increase in N fertiliser use in Australia since 1990). We have rephrased to make this more clear.
8-98	B	14	10	14	11	What is the confidence of the first sentence? Are the two sentences really accurate or known well-enough to be put in the SPM? U.S. Government (Government of U.S. Department of State)	Page / line numbers do not match. Comment seems to refer to SPM.
8-99	B	14	38	0	38	Add at the end of this para. " Some phytomass is to remain in the fied to compensate soil carbon loss through oxidation. But it is clearly more effective to use as much biomass as possible to substitute fossil fuels than to aspire a C - sequestration by raising C-contents in the mineral soil Stülpnagel (2004) and Riedacker (2006) " comments : Details of references are given further down. (Arthur Riedacker, INRA)	**Rejected**: Although we agree with the reviewer's comment, it is perhaps more relevant in a later section devoted to bioenergy (8.4.4)
8-100	B	15	15	16	5	Table 8.6: Inconsistent approaches: "Mitigative effects" of livestock management are based on analysis of emissions per unit of product, as explained on page 25. However, table heading refers to "overall net emissions". In fact, some of these	**Accepted**. The table heading has been modified to "*... overall net emissions at the site of adoption"*. The practices listed can

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						practices have low potentials for net emissions reductions, unless it is assumed that animal numbers remain constant or decrease, which is clearly highly unlikely in a practical sense. The Chapter should avoid suggestions of reduced production as a means of achieving greenhouse objectives. (Government of Australia)	produce both "overall net", and per unit product emissions reductions. The mechanisms involved are discussed in the chapter sections specific to these practices.
8-101	B	15	16	0		Table 8.6 1/ After cropland add under "Nutrients management" Increased Productivity (e.g. fertilisation) and a + for CO2 mitigative effect as it reduces the need for land use change Evidence *** . 2/ Add also underneath "Improved species and nitrogen fixing species" . and a + under CO2 and a + under N20 then at least ** in the other columns 3/ for livestock management add "Animals converting more efficiently local feedstuff " 4/ add also "Greater use of locally produced fodder" Comment ; 1/ This report is not only for countries where the use of fertilizer is already optimized or even sometimes excessive, but also for parts of the world, like most of Sub Saharan Africa, where, as explained in previous comments, the use of fertilizer is very low and return of mineral to soils largely insufficient (Cf . for instance International Center for Fertilization if more information is needed) 2/ "More efficient plants" is usually not clearly covered by agronomy ; nitrogen fixing species can for instance reduce the need for fossil energy in manufacturing mineral fertilizer and N2O emission in nitrate manufacturing and 4 / Improved feeding practice can mean a lot of things. Obviously more productive cows can reduce the amount of CH4 generated per kg of milk or meat, but generally only when neither the land used to produce such feedstuff nor CO2 emissions for national and international transportation are considered. Moreover the transformation coefficient of fooder (per ton of protein for human consumption) is quite variable with the kind of animals considered . This should also be indicated. See FAO references (Arthur Riedacker, INRA)	**Accepted (partly)** 1. This table presents the estimated effectiveness of mitigation practices at the site of adoption. While effects of the practices on emissions elsewhere (e.g. leakage) are important, they are discussed elsewhere. We have amended the table caption to specify more clearly the scope of this table. 2. Improved species and the use of legumes are already included under 'Agronomy' (see examples of practices in 8.4.1.1a). While listing of this individual practices in Table 8.6 might have been useful, it would have made the table excessively long and unwieldy. 3. This practice ('Animals converting more efficiently local feedstuff') is already included under 'Longer term structural and management changes and animal breeding') 4. We are not quite sure how "Greater use of locally produced fodder" will reduce emisisons, except through reduced energy use for transportation. Those effects are perhaps more relevant in the energy chapter. Responses to 'comments': 1. We agree that adding nutrients to deficient soils (like those in developing countries) can be beneficial for productivity. This

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
							practice, however, is already covered under 'Agronomy' (See 8.4.1.1a where we say "Adding more nutrients, when deficient, can also promote soil C gains (Alvarez, 2005),…" 2. The benefits of N-fixing species are included under the general category 'agronomy' (see 8.4.1.1a). While it would have been informative to list all of these practices individually, space constraints do not allow that. A detailed listing and discussion of all these individual practices, however useful, is simply not possible given space constraints for this chapter. 3. Again, because of limited space, we have had to limit our table and discussion to general approaches (e.g., 'improved feeding practices') rather than discuss all individual approaches. We have briefly discussed elsewhere the reviewer's excellent point about considering the net, system-wide benefits greenhouse gas emissions.
8-102	B	15	17	15		Table 8.6: The source of the table needs to be identified. The term "confidence" in this table is subjective and potentially inconsistent with the use of the term confidence in other IPCC conclusions. There is a need to specify the criteria for designating one vs. two or three stars. U.S. Government (Government of U.S. Department of State)	**Accepted**. Table 8.6 was adapted from Smith et al. (2006a) – this has now been indicated. The confidence in evidence and agreement given by *, **, or *** is the IPCC standard notation for confidence, as recommended in 'Uncertainty guidance' by Swart, Rogner, and Duong. An explanation of this term is given elsewhere in the volume.
8-103	B	15	17	15		Table 8.6: Grazing intensity would presumably affect enteric CH4 emissions by potentially changing forage quantity and quality, and therefore a "+/-" should be added under the CH4 column. U.S. Government (Government of U.S. Department of State)	**Accepted** – The table has been modified as proposed.
8-104	B	15	17	15		Table 8.6: Rice management can affect soil carbon positively or negatively, and therefore a "+/-" should be included under CO2. See for example: Li, C., W. Salas,	**Accepted**. The table has been amended, as recommended

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						B. DeAngelo, and S. Rose. (2006). Assessing Alternatives for Mitigating Net Greenhouse Gas Emissions and Increasing Yields from Rice Production in China Over the Next 20 Years. Journal of Environmental Quality, 35: 1554-1565. U.S. Government (Government of U.S. Department of State)	
8-105	B	15	17	15	20	Table 8.6, grazing land measures, fire management: should included "+" is CH4 column, as fire reduction would reduce Ch4 emissions, as noted p. 19 fire management section. Bioenergy measures row: also needs "+/-" in CH4 column, since CH4 emitted in combustion but not taken up in growth of crops; if only soil C aspects are considered here, then should state that. U.S. Government (Government of U.S. Department of State)	**Accepted**. We will change this and state soil only for bio-energy.
8-106	B	16	17	16	19	after (Alvarez 2005) remove "but" and end the sentence there. Then change the following sentence as follows ".However although adding N fertilizer ends up in higher GHG emissions per hectare (including N20 emissions from soils and GHG emissions from fertilizer manufacturing such as higher CO2 emissions from fossil energy consumption and N20 from nitrate production) the results appears as being negative only when considering neither the reductions of emissions per ton of product, nor avoided emissions resulting from avoided land use change (Riedacker 2006c, Schlesinger, 1999; Robertson et al 2004,; Gregoritch et al. 2005) And then addd, line 19, " In fact even when GHG emissions per hectare increase, emissions per ton of product usually decrease and this ends up with large benefits for the GHG mitigation even when higher emissions from soils and manufacturing of fertilizer are taken into account. In addtion to that, if avoided land use change, in particular avoided deforestation, is also considered, adding more fertilizer becomes even more benefitial .(Riedacker 2006c). " Comments ; These changes and additions are very important. If they are not taken on board, IPCC may send a confusing and even a wrong message. No additional comments are probably necessary here as they have been made above e.g. page 5 line 10 (Arthur Riedacker, INRA)	**Rejected (partly):** We agree that the indirect benefits of a practice on emissions elsewhere also need to be considered. For example, as the reviewer adroitly points out, increasing the yields at one site may avoid land use change elsewhere. But that point is already made elsewhere. For example, in section 8.8, we say "Agricultural mitigation practices may influence non-agricultural ecosystems. For example, practices that diminish productivity in existing cropland (e.g. set-aside lands) or divert products to alternate uses (e.g. bio-energy crops) may induce conversion of forests to cropland elsewhere; conversely, increasing productivity on existing croplands may 'spare' some forest- or grasslands (West and Marland, 2003; Balmford *et al.*, 2005; Mooney *et al.*, 2005).".." For the sake of efficiency we chose not to repeat this important point for all the practices listed.
8-107	B	16	20	16	20	Please add per "hectare" "Emissions per hectare can also be reduced by adopting less intensive systems. Add also: "Less intensive cropping systems can have various environmental benefits, but when less intensive cropping means lower yields (e.g. lower output per hectare), GHG generally are to increase when the total production is not reduced".	**Accepted**.

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						(Arthur Riedacker, INRA)	
8-108	B	16	22	16	24	Query analysis: Presumption appears to be that the source of soil nitrogen determines N2O emissions. In fact, excess N in soils can lead to N2O emissions regardless of the source (whether from legumes or synthetic fertilizers). In any case, the reduction in emissions in this example appears to be due to reduced agricultural production - a premise that should be avoided (Government of Australia)	**Noted**: The source of N (fertilizer vs. legumes) may not affect N_2O emissions, but can influence other emissions (e.g., CO2 from manufacture of inputs, as indicated in the first sentence of the paragraph). We explicitly state that legumes are also a source of N_2O.
8-109	B	16	23	16	23	Start with a new para and remove "an important example" and start with a new sentence " The use of rotation with legumes .....) Comments, It is better to give the facts: Using legume crops is not necessarily less intensive, it just allows to reduce N non biological inputs. The successions of alfalfa and wheat reduces the need for nitrogen fertilizer but this is not necessarily less productive or more extensive. Alalfa is a highly productive plant.. That is different from more extensive. Otherwise it is necessary to explain what is meant by "less intensive" ? The same production per hectare with less inputs. ? Less production per hectare ? Or something else ? .. (Arthur Riedacker, INRA)	**Accepted, partly**. We have amended the first sentence to delete 'less intensive', thereby avoiding the ambiguity described by the reviewer.
8-110	B	16	25	16	23	"Another group" instead of a third ……Comments and explanations This is a very important option and much more important than less intensive cropping mentionend above. It should be placed on top of the list. It reduces at the same time nitrate leaching, N2O emitted by microbes, increases soil organic matter and does not reduces crop production per hectare. We have examples where organic farming without "cover" ends up with more nitrate leaching in automn and winter time and only 50% of the grain yield of conventional farming . That means that organic farming without "cover" not only emits more N2O per hectare but also needs twice the land to produce the same amount of wheat grain. For constant total production, that means more land use change and therefore more emissions, and even very high emissions when it is necessary to deforest to get the same wheat production. (Arthur Riedacker, INRA)	**Accepted**: While the order of the practices was not intended to denote any order of importance, we have nevertheless made the change to avoid that misperception.
8-111	B	16	31	16	31	It would be of assistance if the authors could provide an estimate of the percentage reduction in emissions of N2O possible through the improved efficiency of fuel use by crops. (Government of Australia)	**Rejected:** A discussion of N2O emissions from fuel use may be more pertinent in the 'Energy' chapter.
8-112	B	16	33	0		either remove this as it has already been said or add after Schlesinger "N2O emitted by nitrate production (Riedacker 2006 b)" Comments; this is detailed in	**Accepted**: The sentence has been amended o read "greenhouse gases" rather than

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						our book page 46 (Riedacker 2006b) Emissions of N2O resulting from nitrate manufacturing -from factories producing nitrate - may however be drastically reduced in the future if the new technique just developped in Denmark is adopted in the new plants (Arthur Riedacker, INRA)	specifying only CO_2. As mentioned by the reviewer, our text earlier already mentioned the gases emitted (CO_2 and N_2O) from fertilizer manufacture.
8-113	B	16	35	16	39	Recommended practices not commercially viable, at least in Australia at this stage. E.g. nitrification inhibitors and slow-release fertilisers. If these technologies are to be put forward as mitigation strategies, these limitation should be noted. (Government of Australia)	**Rejected**. In this section we are not necessarily advocating the use of the practices listed – merely reporting the possible practices presented in the literature. Constraints to their adoption, including costs, are briefly considered elsewhere in the chapter.
8-114	B	16	38	0	38	Add "avoiding to apply nitrogen under hypoxic conditions (e.g. excess of water in the field). Replace also ""eliminating" by "reducing " Comments: Emissions are known to increase exponentially when oxygen becomes limiting. (Arthur Riedacker, INRA)	**Accepted**. The paragraph has been significantly revised, also in response to other reviewers' comments. Although we do no mentioned hypoxic conditions specifically, we now say "applying N when least susceptible to loss, often just prior to plant uptake" which also encompasses this important point.
8-115	B	17	12	17	15	The discussion of reducing burning of residues (and therefore GHG emissions) by increasing mechanisation, needs to include the caveat that increasing mechanisation will itself increase emissions, through increased fossil fuel use. (Government of Australia)	**Accepted**. A phrase was added to reflect this point
8-116	B	18	23	18	24	Restoration of land cover can also be important for land sustainability (e.g. prevention of soil erosion). (Government of Australia)	**Noted**. We agree – but this is discussed in the co-benefits and trade-offs section (8.8)
8-117	B	19	13	0		Suggestion "In-site biomass burning" Comment. It is very important, as it is done here, to distinguish biomass burning within ecosystems from off-site burning in heating plants or stoves. Non CO2 emissions during the combustion are completely different. Why not systematically adopt "In-site biomass burning" and "Off- site biomass burning" through out the report? (Arthur Riedacker, INRA)	**Accepted**. Biomass burning has been changed to 'On-site biomass burning'
8-118	B	19	15	19	16	More precise to say '…is reabsorbed by vegetation regrowing on the site and is usually not included in greenhouse inventory amounts' (Government of Australia)	**Accepted (partly):** The sentence has been amended to read "the CO_2 released is of recent origin, is absorbed by vegetative regrowth, and is usually not included in GHG inventories".

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
8-119	B	19	39	19	41	Query analysis: Presumption (as above), that N from legumes, by replacing N from synthetic fertilizers, can avoid N2O emissions is flawed if the basis for this Chapter is to be actual atmospheric effects, rather than just reportable mitigation. Excess N in soils can lead to N2O emissions regardless of source or reportability. (Government of Australia)	**Accepted**: The sentence has been revised to refer to greenhouse gas emissions from fertilizer manufacture.
8-120	B	20	23	20	25	Remove this sentence starting with "Where these practices ….. up to the end" Comment This is not correct unless you add "This may however appear as true only when the whole land use is not considered". See explanations for that in comments page 11 , 13 etc.. (Arthur Riedacker, INRA)	**Rejected**: the sentence ,in our view, already has several qualifiers indicating that the effect is tentative ('may be partly offset'). Furthermore, the off-site, indirect effects via land use change elsewhere is an important effect – but is discussed elsewhere.
8-121	B	20	32	0		replace "three" by "four" and add at the end "reducing the number of animals" Comment: Reducing the number of Replace "treee " by "four" and add at the end of the list "reducing the number of animals" Comment reducing the number of animals has probably been the most important effect of the EU CAP (Common Agricultural Policy) on livestock GHG emission reduction. (Arthur Riedacker, INRA)	**Rejected**. The practices included in the three categories listed here may cause a reduction in the number of animals needed to achieve a given amount of animal products. But reducing the number of animals is not in itself a mitigation option.
8-122	B	20	37	0		add "per animal" ; "daily methane emission per animal, emissions … " (Arthur Riedacker, INRA)	**Accepted**. Thanks!
8-123	B	21	5	0		Add "But these additives are not widely accepted and almost no governemental policy is yet recommending to use them. It has not yet been demonstrated that they are harmless on human health" Comment; This comment is important unless you can demonstrate the contrary .From my personnal experience, having been reponsible for climate change policies in agriculture and forestry in France, we never dared to recommend to use such additives. (Arthur Riedacker, INRA)	**Rejected**. Here we just provide mitigation options reported in the literature, and do not deal with policies, since different countries may have different approaches in this regard.
8-124	B	21	34	21	35	Cooling of manure to reduce GHG emissions is totally impractical and should not even be mentioned U.S. Government (Government of U.S. Department of State)	**Rejected**. We have included all measures for which there is literature, and although we agree that slurry cooling is probably impractical, this is not enough reason for not mentioning it here.
8-125	B	21	39	21	40	Covering manure heaps may reduce nitrous oxide emissions but will increase methane emissions U.S. Government (Government of U.S. Department of State)	**Accepted**. A phrase was added to reflect this point.
8-126	B	21	44	22	2	Composting of manure has been shown to be a source of emissions of methane and several VOCs. U.S. Government	**Accepted**. A phrase was added to reflect this point.

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						(Government of U.S. Department of State)	
8-127	B	22	9	22	34	1) Bioenergy discussion occurs in chapters 3, 4, 8, and 9. The AR4 needs to tell a consistent story across these chapters. If only soil C benefits of biofuel mitigation are discussed here, that is fine, but need to assure holistic storyline is presented in report. Apparently a cross-chapter issue team exists within AR4 to address this--but its efforts have not produced what is needed. Need to add discussion of non-CO2 gases emitted by biofuel burning (Ch4, N2O especially) but not uptaken in next rotation biomass growth--thus net emissions. 2) Need to address, at least briefly, effects of expanded biofuel feedstock production on land use competition, fertilizer, water, pesticide etc use as well, now not considered. U.S. Government (Government of U.S. Department of State)	1) **Accepted**. There is now generic text and assessment of supply, demand and mitigation potential in Chapter 11. 2) **Accepted**. This has been dealt with in section 8.8 of co-benefits and trade-offs
8-128	B	22	15	22	15	Clearer for general reader to say '…(via photosynthetic carbon uptake)' (Government of Australia)	**Accepted**. Done.
8-129	B	22	17	0		add "Converting biomass into heat and replacing coal or oil by using them in modern stoves or heating plants gives generally the best results. Addition of fertilizer is usually highly benefitial for GHG mitigation (Riedacker (2004 and 2006a)." (Arthur Riedacker, INRA)	**Rejected**. This is dealt with in Energy chapter.
8-130	B	22	25	22	26	Unsubstantiated / unreferenced claim: the economics of bioenergy will likely depend highly on local conditions. If the figures provided are from a particular study in a particular locality, this should be noted. (Government of Australia)	**Accepted.** Results from Berndes et al. paper. Wording changed in re-write.
8-131	B	22	25	22	26	Statements of the greenhouse benefits of bioenergy should be based on a life-cycle analysis, and should reflect actual atmospheric impacts rather than being limited to emissions reportable in the agriculture inventory sector. (Government of Australia)	**Noted.** Full LCA has not been possible across sectoral chapters. This is addressed / discussed in Chapter 1.
8-132	B	22	28	22	34	Para seems somewhat policy prescriptive in way it is drafted; line 28: replace 'are' by 'would be'. Line 30: replace 'can' by 'could'. Line 30: 'under less favourable conditions' is vague. Lines 32-33: not clear what is meant by 'intercontinental transport of biomass .....energy carriers'. (Government of Australia)	**Accepted (partly)**. Text has been slightly reworded to make it not policy prescriptive and clearer.
8-133	B	23	1	24		Table 8.7 Add "This table does not take into account the the benefit which may result from higher yields associated with higher inputs, but which may reduce land use change and therfore the global GHG emissions when considereing the whole land use " Comment : This table seems strange . I could not get clearly the underlying assumptions. How do you take into account emission reductions per	**Rejected**. These occur both in the baseline and in the mitigation scenario for 2030. If efficiency of production has increased in 2030 so that less land is used to get more product, this is manifest as the difference between the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						ton of product resulting from increased use of fertilizer and in particular nitrogen. The effect on land use change does not appear clearly . Reducing the emissions per hectare is not a aim as such, neither a sound approach for reducing globally GHG emissions . Comments related with this have already been made above At least some additional information indicating that this table does not take into accounht the benefits resulting from reduced or avoided land use change should be mentionned (Arthur Riedacker, INRA)	2030 projection and the baseline. We compare what additional benefit is achieved by adding mitigation measures. In short, improving productivity is a technological change that will occur anyway – the mitigation assessed is what additional benefits can be gained by management.
8-134	B	23	1	24	1	It is not clear what "mixed effect modeling" means. The authors should clarify this term to explain how the Smith et al. work derives estimates of soil C storage. U.S. Government (Government of U.S. Department of State)	**Accepted**. Additional text has been added in footnote 1 of Table 8.7 to describe the method. In addition, we refer the reader to Ogle et al. (2005) where it is described in detail.
8-135	B	24	1	23	End	Discussion needed on how representative these numbers are. E.g. sample sizes, methodologies, overview, weaknesses, and provide research guidance. U.S. Government (Government of U.S. Department of State)	**Accepted**. Additional information on the methods is provided, as well as the number of experiments and additional citations (a full list of citations is provided in the 2006 IPCC guidelines as cited in the revised text for this caption). We have given the ranges (low and high estimates) as a measure of uncertainty. We also describe the weaknesses and provide research guidance, i.e., these values were derived specifically for large scale assessments and not intended for fine scale assessments such as individual farms. The database used is an update of that used by Ogle et al. (2004, 2005) and is the most comprehensive database of soil C changes available globally. Methane emissions from livestock, rice land and manure were calculated using emission rates taken from US-EPA (2006b), as were soil N_2O emissions. The only exceptions were methane emissions from organic soils (from Le Mer & Roger [2001]) and carbon from organic soils (IPCC defaults) for which estimates were unavailable

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							from the database of Ogle et al. (2005) and US-EPA (2006b).
8-136	B	24	9	24	13	1) Authors should consider lifting details from the footnote to main body of the text. A number of minor additions should be made to clarify methods used in the EPA (2006b) mitigation report. First, it should be noted that the N2O results from EPA come from applying the DAYCENT model, which is well known, especially among the agricultural community. 2) Second, it should be noted that all rice estimates from the EPA report come from the DNDC model, which is also well known. Finally, the last statement, about mid-season drainage assuming to already occur on 80% of rice paddies, is the assumption made for China only in the EPA report. For other Asian regions in EPA (2006b), it is assumed that the baseline is continuous flooding. U.S. Government (Government of U.S. Department of State)	**Partly accepted**. Due to page limitations imposed on this chapter, it is not possible to lift all of this text into the main section (i.e., font increase). A short sentence was added to mention that the N2O emissions are estimated using the DAYCENT and DNDC as well as revising the text assumption about water management assumptions for rice
8-137	B	26	14	0		"Table 8.6" should read "Table 8.7" (Government of Australia)	**Accepted**. Taken into account – Comment 8-179 from Batch A.
8-138	B	26	49	0		"Table 8.1" should read "Table 8.10" (Government of Australia)	**Accepted**.
8-139	B	28	1	28	10	Table 8.10: the authors should provide an explanation for the significantly higher cost figure provided for water management in each of the climate zones. (Government of Australia)	**Taken in to Account.** Table has been removed.
8-140	B	29	1	29	17	The addition of the EPA (2005) report Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture (www.epa.gov/sequestration) would bolster the findings made in this paragraph, and this report represents a more up-to-date and comprehensive version of the models used in Lee et al. and McCarl and Schneider. U.S. Government (Government of U.S. Department of State)	**Accepted**. We made reference to that and added pertinent findings from that report. Note that we no longer use the findings of Lee et al. (2005) or McCarl and Schneider, but now use MACs from US-EPA (2006b).
8-141	B	29	18	0		"Agricultural land which may become available for afforestation up to 2050 depends very much on the scenarios and of agricultural practices envisaged; 140 Mha . under scenario, A2 and 950 Mha under scenario B1 may become available. These are the extreme situations and do show theimportance of increasing land productivity. Technical mitigation potential through carbon storage and fossils fuel substitution or saving with biomass depends first of all on the area of land which can be afforested but but also of the the type of afforestation, the demand for wood products and on availability of technologies and investments in plants to use that wood. Short rotation for raw material have the highest technical mitigation potential. But the latter is constrained by the insufficient demand of wood products.	**Rejected**. We do not deal with forestry (see Ch9) or bioenergy fossil fuel substitution (see Ch4; Ch11).

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Therefore short rotations for energy (heat and electricity (liquid biofuel production from wood was not included as this technology is not yet mature), have the highest mitigation potential in 2050 ; respectively 7.3 GtC (26.8 GtCO2) under A2, and 27.8 GtC (102 GtCO2) under B1. (Dameron et al. 2005, Riedacker et. al. 2005) (Arthur Riedacker, INRA)	
8-142	B	29	19	0		Indicate that "The global emissions from agricultural land (excluding fossil fuel offsets from biomass replacing fossil fuel" do not take into account land use changes which are exogeneously fixed for each scenario". Already commented in the executive summary page 2 line 19 to 21 Total emissions (of N2O , CH4 and CO2) are estimated to reach 5640 Mt CO2 eq. between 5500 and 6000 MtCO2 eq . And here the global technical mitigation potential is estimated to reach 5500 - 6000 MtCO2 -eqyr-1 Please remove "technical mitigation and just say' 'Emissions" or explain the difference .The technical mitigation here would mean the end of food production and therefore the end of mankind. In that case the technical potential for GHG mitigation would be much higher ! (Arthur Riedacker, INRA)	**Rejected**. See response to comment B 8-35
8-143	B	30	1	0		Fig 8.3 Clearly indicate here that "Consideration are given here neither to increasing land productivity nor to avoided land use change" Of course when you exclude the energy saving from biomass and consider only the soils component and not even the biomass component of short rotation crops like Salix or Eucalyptus and other species, the mitigation potental of bioenergy appears to be small. This gives definitely a wrong signal ! This addition is very important and we insist that should be added at least avoid to sent wrong signals to policy makers. (Arthur Riedacker, INRA)	**Rejected**. 1) Increased land productivity is considered in the estimates (e.g., under cropland management). 2) Bio-energy fossil fuel offsets are accounted for in the energy chapter (4) and Chapter 11.
8-144	B	30	6	30	15	Already commented at page 3; Remove " Of this total potentials, about 90% is from reduced soil emissions of CO2 ..... and after from reduced soil emissions add ", land use change and other activities " -Comment This addition is very important but not sufficient It is impossible to present such huge mitigation possibilities as indicated in the table 8.1 and to say that 90% of this derives from reduced soil emissions of CO2 (CO2 emissions are said to be only 40 Mt of CO2 at page 2 line 20 line whereas N2O and CH4 emissions reach togeteher 5643 Mt CO2 eq !!). Moreover if there is reduced land use change, avoided emissions from biomass (in trees, from deforestation, should obvioulsy be taken into account and not only emissions from soils. This statement is also in contradiction with line 6 page 3 (or page 29 line 35 where it is said that afforestation becomes more	**Reject**ed. Already commented – see response to comment B 8-35

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						important as ... : This statement suggests that there is nothing to be done except carbon sequestration in soils, which is definitely not correct. The possibilities for increasing soils carbon stocks may vary very much with the latitude... It is very important to revise this paragraph . (Arthur Riedacker, INRA)	
8-145	B	31	0	31	5	Inadequate explanation: the corresponding text (p 30 line 16) uses the term 'mean per area estimate' and cites Fig. 8.4. In contrast, Fig. 8.4 describes emissions per year for each region, not area. (Government of Australia)	**Accepted**. Text on page 30, line 16 misleading – this is the total mitigation potential for the whole region for 2030. We changed the text.
8-146	B	31	1	0		Fig 8.4 What is the interest of that figure after the comments made above for table 8.1 and figure 8.3 ? Unless you give additionnal explanations we suggest to remove it (Arthur Riedacker, INRA)	**Rejected**. Figure 8.4 shows the regional breakdown of total mitigation potential. Not sown in tables 8.1 or figure 8.3.
8-147	B	32	19	0		" Options that both …. " comments; A very important sentence . However this aspect is not adequately considered in the report (Arthur Riedacker, INRA)	**Noted**. Mainly occurs in the co-benefits section.
8-148	B	32	22	0		You could also have a look at the SAR which considered also biomass production for energy in chapter 19 (Arthur Riedacker, INRA)	Noted. Bio-energy fossil fuel offsets accounted for in the energy chapter (4).
8-149	B	33	4	0		The fact that estimates made by Smith et al are (may be) the only to date ….. Is not sufficient to endorse the conclusions which are misleading as presented . If the similarities with other studies are so striking why don' you give somme references different from Smith et al. , ? . (Arthur Riedacker, INRA)	**Rejected**. Please, look at Table 8.11. The Smith et al. study is compared to 29 other studies there. There are 14.5 pages of references in addition to the Smith et al. (2006a) paper. Smith et al. (2006a) is used extensively as it is the only study to consider all GHGs at the target CO_2-eq. prices (0-20, 0-50, 0-100 and >>100 USD / t CO_2-eq.), for the SRES scenarios agreed upon for comparison with other sectors and with a regional breakdown.
8-150	B	36	1	36	2	This sentence should be deleted as it adds little to the discussion in the chapter. (Government of Australia)	**Accepted**.
8-151	B	36	15	0		This statement is not correct. Take wheat, the most important agricultural crop, as an example; the ratio straw/grain has decreased but in spite of that the total amount of straw per hectare has drastically increased between 1950 and 2000 . Riedacker (2006 c) Please change that uncorrect statement	**Rejected**. The statement is consistent with what the reviewer says: "*Intensively managed systems allow for higher utilisation rates of residues, but usually deploy crops with lower*

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						(Arthur Riedacker, INRA)	*crop to residue ratios*".
8-152	B	36	24	0		A strange statement Do you believe that dried dung is really the residue from agriculture which deserves the highest consideration ? !!!!!! Why don' you start with the most important potential ? Can the total contribution of dried dung really reach 55 EJ/yr ? From which countries do you expect to get such large figures ? Do youn recommend to use more dried dung ? (Arthur Riedacker, INRA)	**Rejected**. It is used in much of the developing world for this purpose. The reviewer does not seem to understand the IPCC process – we are not making recommendations – we are assessing the potential of options and this is on residue that is used for bio-energy.
8-153	B	36	29	0		You wrote "organic wastes potentially having an important role" Could you not be more explicit ? (Arthur Riedacker, INRA)	**Accepted**. Reworded to "making a significant contribution"
8-154	B	36	31	0		You could also make other assumptions such as replacing hydro with biomass ??? Do you know many places were biomass has replaced gas. Generally biomass is replacing oilor coal. The mitigation potential is then much higher. Either you ignore what is happening in this fields and ignore this question or you try to lower as much as possible biomass contribution in GHG mitigation. (Riedacker 2004 and Riedacker 2006b) (Arthur Riedacker, INRA)	**Rejected**. The are multiple energy generation pathways that could be considered, and multiple fossil fuel replacements – we are well aware of this – these are dealt with in Chapter 4. This is not the main focus here – it is just to get potentials that can be compared with agricultural options.
8-155	B	36	42	0		This study from Berndes et al. (2003) of course did not review the future biomass availaibility in publication which came out after 2003. I have indicated above the study we made on the potential of biomass and bioenergy production on agricultural land which could become available up to 2050 under two extreme IPCC scenarios (Dameron et al. 2005) (Arthur Riedacker, INRA)	**Rejected**. This is a matter for Chapter 4 – that chapter deals with bio-energy.
8-156	B	36	45	37	17	Bioenergy mitigation potential estimates need to consider additional references to supplement IMAGE 2.2 results (e.g., Energy Modeling Forum 21 papers in press in Energy Journal). Also, carefully review the adequacy of the Lee et al 2005 analysis for the US expanded to the globe in the central Smith et al 2006 papers, and probably eliminate that result from this section, replacing it with global climate economic model results. U.S. Government (Government of U.S. Department of State)	**Accepted.** The bio-energy mitigation potential estimates now come from EMF-21
8-157	B	37	1	37	17	Query analysis: Statements on the mitigative potential of bioenergy do not appear to account for limitations on land capability, or substitutability (where conversion of croplands is suggested). This section does not account for the non-reportable impacts of such action, including non-reportable or non-agriculture sector emissions, but also effects on food supply and rural economies. These comments also apply to Fig 8.6.	**Taken in to Account.** The bio-energy mitigation potential estimates now come from EMF-21 and account for land competition.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Government of Australia)	
8-158	B	37	17	37	20	Figure 8.6: This figure on the technical potential should highlight the barriers to the implementation of the technical potential for GHG mitigation in the agricultural sector, that are drawn out in section 8.6.1. (Government of Australia)	**Noted**. These have not been quantified for use on a figure. Discussed in section 8.8
8-159	B	37	19	0		Fig 8.6 This figure should also be in the executive summary (Arthur Riedacker, INRA)	**Rejected**. Should not contain bio-energy – this is just for comparison to shoe that bio-energy potentially has a much greater mitigation potential than other GHGs.
8-160	B	38	5	38	15	The authors should ensure that the use of the terms "likely" and "uncertain" are based on the same likelihoods used in the standardised IPCC terminology. (Government of Australia)	**Accepted**. Table has been modified.
8-161	B	39	7	39	8	change the sentenceas follows " Emissions from agriculture, when not considering emissions from land use change resulting from changes in agricultural practices, are mainly non CO2 GHG. They contribute then to more than half of emissions of CH4 and N2O and rice ……GHGs" . (Arthur Riedacker, INRA)	**Rejected**. Un-necessary complication.
8-162	B	39	10	39	15	Inadequate explanation / detail: The statement "An appropriate mix of rice cultivation with livestock…" provides no guidance as to what (if any) particular combination is beneficial for greenhouse reasons. The claim that such a mix can "enhance net income" requires explanation of what the change involves moving from, and to. (Government of Australia)	**Accepted.** Text re-written**.**
8-163	B	39	18	0		add " mineral fertilizer" after farmyard manure (Arthur Riedacker, INRA)	**Accepted**. Text has been reworded.
8-164	B	39	25	39	30	The authors should note that for some countries with long traditions of 'free grazing' it may not be feasible to ban the practice due to cultural constraints. (Government of Australia)	**Accepted**. This caveat has been added.
8-165	B	40	23	40	25	It would be more helpful if the 2 references to IPCC 2007 were replaced with the specific section of the WG2 report that is applicable. (Government of Australia)	**Accepted**. Reference to WGII included.
8-166	B	41	1	41	30	Table 8.13 seems to be incomplete. Strategies for minimising emissions not addressed in column 3, despite heading. Assumptions are built into column 3 - e.g. that farmers forced to farm 'set asides' will adopt low GHG emitting practices. Implications for grazing land management / pasture improvement are incomplete - no consideration of 2 of the 3 issues raised in column 2. In relation to water	**Accepted**. Table was revised and updated, including these suggestions.

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						management - adaptation measure of increased pumping distances probably unlikely in most situations: an increase in water use efficiency is perhaps more likely. (Government of Australia)	
8-167	B	42	33	42	34	The authors should include examples of the policies that they refer the US as having implemented. (Government of Australia)	**Rejected**. That is what is done in the remainder of the paragraph (lines 29-46).
8-168	B	42	33	42	39	This paragraph needs to be re-written with accurate information about US climate policies. Clear Skies Initiative deals with criteria air pollutants and is not the policy to reduce GHG intensity. The US global climate change initiative aims to reduce GHG intesnity by 18% by 2012 (not 2010) (see www.usinfo.state.gov/gi/global_issues/climate_change.html). The voluntary GHG registry program is US DOE's 1605(b) program. U.S. Government (Government of U.S. Department of State)	**Accepted**. Text has been revised.
8-169	B	42	48	43	5	Outdated commentary for Australia: Suggest following amendments from P43L2: "Research is being supported to develop cost-effective GHG abatement technologies for livestock (including dietary manipulation and other methods of reducing enteric methane emissions, as well as manure management), agricultural soils (including nutrient and soil management strategies), savannas and planted forests (source - Australian Greenhouse Office 2004, Greenhouse Action in Regional Australia - Strategic R&D Investment Plan, Canberra, Australia). The Greenhouse Challenge Plus programme and other partnership initiatives between the Government and industry are facilitating the integration of GHG abatement measures into management systems in agricultural industries. (source - Australian Greenhouse Office 2006 Agriculture Industry Partnerships - Climate Change Action for Multiple Benefits, Canberra, Australia." (Government of Australia)	**Accepted**. Thank you – we used this text to replace.
8-170	B	43	18	43	18	The first part of this sentence ("No African…..Kyoto Protocol") should be deleted as the authors seem to be stating that having a Kyoto target is the reason that countries put in place climate policies. (Government of Australia)	**Accepted**. Sentence reworded.
8-171	B	43	24	43	40	Policy discussion is factually incorrect: a) line 31: should be Clean Development Mechanism, b) in the US, the Pacific Northwest Direct Seeding project (of Environmental Defense, and Entergy company) needs to be listed as an operating soil management project. U.S. Government (Government of U.S. Department of State)	**Accepted**. Text has been revised.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
8-172	B	43	32	43	32	The authors should provide examples of the "other types of certificate" to which they refer. (Government of Australia)	**Accepted**. Text has been reworded
8-173	B	44	12	44	15	Not clear why 'additionality' is relevant to discussion of mitigation options. (Government of Australia)	**Accepted**. Kyoto terms have been removed..
8-174	B	44	26	44	30	Leakage discussion should also consider USEPA 2005 report "Greenhouse Gas Mitigation Potential in US Agriculture and Forestry" that provides leakage estimates by mitigation activity and reports low leakage estimates for agricultural options in US using a sectoral ag/forest economic model FASOMGHG also used in the Lee et al, analysis (see: www.epa.gov/sequestration) U.S. Government (Government of U.S. Department of State)	**Accepted** - But not relevant, since discussion on leakage was removed.
8-175	B	47	0	48	0	Table 8.14: Incorrect symbols entered into columns corresponding to "Political Changes…" and "Enlargement of the EU" for the Europe & FSU Region - Political changes have reduced GHG emissions, so should be reflected as a positive mitigation effect (+); Enlargement of EU likely to increase GHG emissions, so should be reflected as (-). (Government of Australia)	**Accepted**. Table was revised.
8-176	B	48	3	48	3	Table 8.14 - Oceania row - last dot point: The authors should delete "will" and replace with "are expected" as it is not certain that the establishment of water markets in Australia will definitely result in the size of the rice and dairy industries in Australia. (Government of Australia)	**Accepted**. Reworded..
8-177	B	48	15	48	20	Table 8.15 - North American row - list includes initiatives with a specific greenhouse focus - contrary to table heading and in contrast to other regions (Government of Australia)	**Accepted**. Initiatives with GHG focus have been removed..
8-178	B	49	50	49	50	Table 8.15 - Oceania row - last 2 dot points: The authors should rephrase the last two examples as they currently are not "policies" but are evidence of changing agricultural practices.. (Government of Australia)	**Accepted**. Examples which are not policies have been removed.
8-179	B	52	1	52	1	Inadequate explanation: Important to say ' curtailing supplementary N use without a corresponding increase in N use efficiency could …' (Government of Australia)	**Accepted**. Excellent point! The sentence has been revised.
8-180	B	52	8	52	14	Unsubstantiated claim / unexplained assumption or generalisation: environmental benefits of establishing bio-energy plantations will depend largely on previous land use. Moving from grassland or forest to production will unlikely have net positive outcomes, and even where the land was previously used for cropping the net impact	**Rejected (partly)**. Our text specifically states that 'If bio-energy plantations are located, designed and managed in specific ways, they can generate additional environmental

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						will vary (Government of Australia)	services..". The reviewer is correct – any benefits depend on previous land use – but we think that point is already captured by our opening clause. We have, however, made a minor change to further emphasize this point. As well, 'can' has been replaced with 'may' to reflect the variability of responses, depending on site. References are provided at the end of the sentence.
8-181	B	52	8	52	14	Unsubstantiated claim / unexplained assumption or generalisation: environmental benefits from establishing bio-energy crops will depend largely on the original use of the land. Moving from grassland or forest to production will unlikely have net positive outcomes, and even where the land was previously used for cropping the net impact will vary (Government of Australia)	[Duplicate of comment B 8-181]
8-182	B	57	8	57	13	Uncertainty on field-based effects of elevated CO2 on production should be emphasised - see Long 2006. Amend text to: It has been demonstrated experimentally that ….on average may increase crop yields …. This feedback effect has the potential to increase .... (Government of Australia)	**Partly accepted**. Paragraph was combined with next paragraph as requested in comment 8-308 of Batch A, and this particular text was not retained. However a reference to the Long et al. study has been added.
8-183	B	60	9	0		insert Dameron V.,C. Barbier and A. Riedacker (2005) Les réductions potentielles d'émissions de CO2 par des plantations forestières sur des terres agricoles dans le monde à l'horizon 2050 (World CO2 emission reductions with forest plantations on agricultural land becoming available up to 2050) Cahier du CLIP N 17 Septembre 2005 41-92 www.iddri.org (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-184	B	63	13	0		Jones A. (2002) Environnmental Assessment of Food Supply Chains : A case study on dessert apple. Environmental Management vol 30 , No .4 , pp 560-576 Springer Verlag (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-185	B	67	40	0		Riedacker A., V. Dameron and C Barbier (2006a) An integrated approach to stabilize grenhouse gas concentration in the atmosphere : the impact of aforestation of agricultural land becoming available in the world up to 2050 . 14 th European Conference and Exhibition Biomass for Energy, Industry and Climate Protection Paris 17-21 October 2005 (published in 2006) (arthur.riedacker@ivry.inra.fr) (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
8-186	B	67	40	0		Riedacker A, (2007) Global Integrated Environmental Assessments for Activities in Agriculture and Forestry for Global Sustainable Development and Climate Change Mitigation" International Journal for Sustainable Development Submitted for publication (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-187	B	67	40	0		Riedacker (2006 b) Les biomasses dans le contexte du changement climatique et du développement durable in Chapitre 1 , pp 7-59, du Guide Biomasses Energie , publié sous la direction de Yves Schenkel et Boufeldaja Benabdallah avec la collaboration d'Arthur Riedacker et Philippe Girard Collection Point Repères 4 Les publications de l'IEPF CRA de Wallonie Gembloux Belgique 391 pages (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-188	B	67	40	0		Riedacker A and Dessus B. (1993) Increasing productivity of agricultural land and forests Plantations to slow down the increase ot the greenhouse effect EEC 6th European conference on biomass for Energy , Industry and Environment Athenes 1991 Edited by G. Grassi Londre Elseviers in 1993 pp 228-232 . (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-189	B	67	40	0		Riedacker (2004) Changements climatiques et forêts 232 pages Paris edited by SILVA and RIAT Paris (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-190	B	67	40	0		Riedacker (2006c) Report to ADEME, (the French Agency for Environment and Energy Management), (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-191	B	67	40	0		Riedacker (2006 d) A global land use and biomass approach to limit greenhouse gas emissions, fossil fuel use and preserve biodiversity" Trieste Workshop on Climate Mitigation Measures in the Agroforestry Sector and Biodiversity Future Ecological and Environemental Economic Programme UNESCO Man and Biopshere Programme and IASA 16-17 October 2006 (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-192	B	70	21	0		Stülpnagel R (2004) Estimating the potential of biomas for energy and industry with particular respect to political directives to an orderly agriculture and C-sequestration in soils in Proceedings of the 2nd World Conference on Biomass for Energy and Industry Rome 2003 Published in 2004. 4 pages (stuelpnagel@unbi-kassel.de) (Arthur Riedacker, INRA)	**Rejected**. No arguments given for including this reference.
8-1	C	14	38			Higher rates of soil methane removal have been recorded when grasslands have	**Accepted** – reference added

						been changed into forestland. Reference: "Does afforestation of pastures with pine trees reduce net emissions of methane in New Zealand?" K R Tate, S Saggar, C B Hedley, J Dando, S J Price and G Rys. Proceedings, Non Co2 GHG Conference, Utrecht, July 2005. (Government of New Zealand)	
8-2	C	15				Table 8.6 comment: Livestock management row: improved feeding practices, specific agents and dietary additives, long term structual and management changes and animal breeding will all also usually result in decreased nitrous oxide emissions. (Government of New Zealand)	**Accepted** all except for specific agents and dietary additives which are targeted at CH_4 reduction.
8-3	C	21	3	21	23	The role of condensed tannins in reducing methane emissions in ruminant livestock has not been identified here. References: Woodward, S.L., G.C. Waghorn, M.J. Ulyatt and K.R. Lassey, 2001, "Early indications that feeding Lotus will reduce methane emissions from ruminants", Proceedings of the New Zealand Society of Animal Production, 61, 23-26. Woodward, S.L., G.C. Waghorn, K.R. Lassey and P.G. Laboyrie, 2002, "Feeding sulla (Hedysarum coronarium) reduces methane emissions from dairy cows", Proceedings of the New Zealand Society of Animal Production, 62, p227-230. (Government of New Zealand)	**Accepted**. This point has been covered by the addition of a section entitled "Novel plant compounds". In addition to condensed tannins, saponins and essential oils have been added. The first reference suggested by the Government of New Zealand was included in the footnote of new Table 8.6
8-4	C	21	23	21	30	Consideration of the genetic basis for methane emission levels of animals directly needs to be addressed. There have been few attempts to select for lower methane producing animals directly. This has been attempted in New Zealand but measurement limitations have restricted the number of animals that can be tested. See annual report of Pastoral Greenhouse Gas Research Consortium www.pggrc.co.nz (Government of New Zealand)	**Accepted** A sentence has been added under longer-term management changes, but with the caveat that such an approach is likely to be difficult due to limitations in measurement techniques.
8-5	C	22	36			Little or no reseach has been conducted on the simultaneous use of multiple mitigation practices. The impacts are unknown whether the results are additative or not. It is likely that farmers will use several practices at the same time. (Government of New Zealand)	**Noted**. This is already included: "When assessing the impact of agriculture on changes in GHG emissions, it is important to consider the impacts on all GHGs together (Robertson *et al.*, 2000; Smith *et al.*, 2001; Gregorich *et al.*, 2005)." We have accounted for the non additivity of measures to some extent in the model (see footnote to Table 8.8, now Table 8.6).
8-6	C	25				Table 8.8 comment: The values for Oceania on technical mitigation potential should be no different than those for N Europe. Certainly for New Zealand, there is no evidence that higher values are appropriate. The figures used should thus be: Improved feeding practices for dairy cattle - 0.18, beef - 0.12 sheep - 0.04. Specific agents and dietary additives dairy - 0.08, beef - 0.04, sheep - 0.004 Longer term structural /management change and animal breeding . Dairy 0.04, Beef 0.03 Sheep	**Rejected**. For consistency with all other figures used from US-EPA (2006b) we have retained the US-EPA (2006b)-derived figures. Changing the factors would have minimal impact on regional potentials. Besides, we disagree with the comment for the following

						0.003 . (Government of New Zealand)	reasons: 1) Oceania generally has lower levels of concentate in the diets than N. Euorpe, thus potential mitigations are greater with the opportunity to increase concentrate levels to a greater extent. 2) Large portions of the pastures in Australia are unmanged so opportunities for mitigation through pasture improvement are also greater. 3) There is a greater opportunity for the use of hormonal implants and additives such as ionophores in Oceania than in N. Europe. 4) The milk yield per animal is lower in Oceania than in N. Europe. Consequently, the degree of mitigation per unit of product is greater in Oceania than it is in N. Eupope. Please see comment 8-151 in batch A comments for futher details. It is also important to keep in mind that New Zealand is only a portion of Oceania and that conditions are quite different in other areas of this region
8-1	D	0	0	0	0	General comments: Table 8.16 must be revised. General comments: More General comments: 1. Throughout the text, the totality of direct and indirect factors: technical, social, economic and even cultural, that affect the GHG emission, are considered.On the other hand, the level of hierarchy of each one of them is diluted. In this way, the conclusions and, mainly, the proposals, can be applicable, but with little effect on the mitigation. For example: the positive fact of change in the use of land in the countries of greater economic development - with the aim of conserving biodiversity and diminish GHG emissions- implies that food production will carried out in other lands. In addition, the policies of countries with smaller economic development is oriented - impelled, among others, by the external debt- to the production of farming raw materials for export - neglecting, in many cases, domestic needs. It should also be considered that the farming production subsidies of developed countries competes with the production's profitability of agricultural producers developing countries, increasing the pressure on their natural resources and, producing, among other effects, increase of GHG emissions and deterioration of living conditions and overall sustenaibility. 2. The following concepts should be highlighted: 2.1. The contribution of the farming sector - control and reduction of GHG in the	**Accepted – it has been revised.** **1. Noted. We have noted the problem of displacement of agriculture on to other lands (section 8.6). We have discussed the economic need to export products as a driver (sections 8.2 and 8.3) and we have included a paragraph on implications of WTO negotiations on GHG emissinos (section 8.7).** **2. Comments have been addressed or are already included – see below:** **2.1. TIA: Already included at the very start of section 8.4.2: "Mitigation practices can affect more than one GHG, and consequently it is important to consider the impact of mitigation options on all GHGs (Robertson et al., 2000; Smith et al., 2001; Gregorich et al., 2005)."**

						atmosphere- has to be consider the fact of "GHG balance" like a whole before the fact of the reduction of emissions. This question appears very diluted in the text. 2.2. "Production of farming foods and raw material", "natural resources conservation" "climate change adaptation" and "GHG mitigation – emission retention balance" are interrelated. To be effective, the mitigation policy of emissions must be based on synergy search. This concept should be prioritized in the text. 2.3. The text insists with "the price level and its relation with the mitigation alternatives". It's correct, but it doesn't have to be the only alternative through developments of participation and motivation tools. The GHG emissions of farming origin come from dispersed sources, hard to estimate for value granting, and with a big uncertainty factor. It's difficult that the mitigation could be adopted through carbon market mechanisms. Especially when many of the mitigation procedures are based on handling technologies and affects, also, on productivity. For countries like the Argentine Republic, these process technologies are important. The fact that they do not have "additionality" does not imply ignoring neither the importance nor the necessity to motivate its occurrence. It should not passed unnoticed that: the implementation of process technologies oriented to allow the increase of productivity and the diminution of the emissions implies the financing of the initial improvements, those that later would be recoverable. 2.4. The recognition of environmental quality or low emissions by unit of product would be a mechanism suitable for the mitigation of emissions not considered through Carbon Market Mechanisms, due to the lack of "additionality" and the factors of "measurement uncertainty". A serious implementation would require assuring the traceability of the production (feasible in the case of meat and milky products). 3. Specific questions 3.1. 3.1.1. In 8.2 (15) it is highlighted that marginal lands use "increases risk of soil erosion and degradation". Also, it must be made clear that it would affect the sustainability and, mainly, the capacity of adaptation to future effects of Climate Change. 3.1.2. In 8.2 (20) it is highlighted that the practice of direct farming "are frequently combined with periodical tillage, thus making the assessment of the GHG balance highly uncertain". It is true: but it must be remarked - in the corresponding item like a problem to be solved, given the importance of CO2 in GHG balance. 3.1.3. In 8.2 (40) it is highlighted the increasing importance of the use of agricultural products in substitution of products based on fossil fuels. Although it is clarified later (in another Chapter), the conclusion does not seem proper: "This has the potential to reduce to GHG emissions in the future". It should be de-emphasized	**2.2. TIA: There are two sections dealing specifically with these items; 8.4.5 and 8.8.** **2.3. Accepted – text removed. Barriers section deals with other barriers and how they might be overcome (section 8.6).** **2.4. Noted. Emissions per unit product are discussed in several parts of the chapter.** **3. Specific question addressed below.** **3.1.1. TIA – discussed in section 8.5** **3.1.2. TIA – this is already implicit** **3.1.3. Rejected. Our assessment is that storing has a low significance as a way of climate change mitigation, and this is what we expressed. The text has been reworded to make this point more clear.** **3.2.1 TIA: This is already taken into account – as noted – this is discussed later.**

						like for example: …. But it can be subject to conditions such as demand of lands for food and other agricultural products. 3.2. 3.2.1. At the end in 8.3.2 (15), it is highlighted: "but improved management practices and emerging technologies may permit a reduction in emissions to per unit of food (or protein) produced". Although it is remarked in other parts of the Chapter, other factors which condition the possibility of diminishing emissions, it should be added a text which interlinkages "management practices and emerging technologies" with proper national policies (territorial zoning plan, promotion of activities) and the negative pressure over natural resources of agricultural subsidies. 3.2.2. In 8.3.2 (20): "changes in feeding practices and manure management could ameliorate this increase" talks about emissions increase. In fact, and as we see later, the question shouldn't have to be reduced to "changes in feeding practice" but in changes of the management of the rodeos, from techniques and knowledge currently available (sanity, feeding, reproduction, genetics). 3.3. 3.3.1. In 8.4.1.1. (a) (20) it is pointed out that "Emissions can also be reduced by adopting less intensive cropping systems….". It seems to be a reference to the intensive inputs systems but is not applicable to the intensive systems like farmer systems which are intensive and of poli-crops. 3.3.2. The practice of "precision farming" appears related to "Nutrient Management -8.4.1.1. (b) (34) -". It has own being; "precision farming" should appear in the previous item (Agronomy) emphasizing the importance of planing the use of lands, the maintenance of the biodiversity, the management and the intensity of the inputs used at estate level in regard to the sustainability of the agro-ecosystems, to optimize the use of dependent petroleum inputs and to improve the GHG balance. 3.3.3. The crop rotation must be highlighted as one of the practices that assures a suitable gain and maintains the organic C of lands. Also, it should be highlighted as being a practice oriented to reduce the erosion and degradation of soils. It should be included in (a. Agronomy) or give it an own title in the item 8.4.1.1. 3.3.4. In 8.4.1.1. (g) (10) "One of the most effective methods of reducing emissions is to allow or encourage the reversion of cropland to another land cover". In (16) it is used the same principle to the reconvertion of croplands to grazing lands. Food production is an increasing necessity given the constant growth of population and demand. It should be better to make reference to the promotion of the territorial zoning plan as State policy (of the States) to use suitable croplands and climates for a rational use and diversifying of production. 3.3.5. The 8.4.1.2 point. (a) (30-35) is of the greatest importance for the Argentine Republic. 3.3.6. The point 8.4.1.2 point. (c) (35-41) should have to be de-emphasized. The introduction of species must be ecologically evaluated as a previous step.	**3.2.2. Rejected. Both are mitigation options and both are considered.** **3.3.1. Noted.** **3.3.2. Rejected. Precision agriculture could go in either category but since it is often used to make precisie fertilizer apoplications, its best home is under nutrient management.** **3.3.3. Rejected. Again, improved rotations could be placed under agronomy or given its own category, but it equally well fits here. We describe the benefits and interactions as requested.** **3.3.4. Noted, but too specific for generic description.** **3.3.5. Noted.**

						Unsustainable situations could arise from the introduction of species. In addition, this introduction could affect the biological diversity and the capacity of the ecosystem to adapt to stress situations. 3.3.7. The 8.4.1.5 point. "Livestock management" is of greatest importance for the Argentine Republic. The works made at local level and the forecasts conducted from them show that: 3.3.7.1. It is possible, in pasture situation, to improve the productivity and to reduce emissions by product unit. It should be proposed that the point "Improved feeding practices" be oriented to intensive practice of type feed-lots - it would seem that it is but it must be clarified that the use of "feeding more concentrates" implies the use of lands and input to produce foods. This way, the external costs are increased including those which derive from the indirect emissions of GHG (agricultural production, inputs, and transport of products). On the other hand, this practice (feed-lot), implies that smaller amount of land is dedicated to the animal pasturing and, therefore, to pastures seeding. The maintenance of improved and natural implanted pastures is important for the conservation of soils and the maintenance of the organic C of them. An item called "integral Improvement of the cattle ranch in pasture" is proposed. "The use of available technologies of management, adapted to different production systems and based in ecological characteristic (climate, soils, biological diversity) of the different regions, can allow improvements to productivity and the emission of methane by product unit, and, simultaneously can have a positive effect on the increase of the carbon retention and the lowering of the NO2 emissions. These technologies of management are related to: improvement of the reproduction indexes (greater number of bull calves/rodeo/year), improvement of animal sanity, improvement of pastures and their management. The objective is to reduce the young rodeo (young cows) and to lower the period from the birth of the bull calf to its slaughter. The limitations of the system are as follows: i. Necessity of adaptative researches for each region and production system, ii. Necessity to finance the systems initial period, which can be seen limited by the financial necessities of some of the required improvements (pastures, to improve quality of the property). , It is possible to think a system which can follow-up the animals that allows establishing in each case, the totality of the emissions produced by product unit (meat and milk) including that produced by the young bull and the mother." It implies that if the mother produces bigger number of bull calves, their own emissions are prorated by greater number of animals. Based on the bibliography values, for the Argentine Republic production case of pasture, we can have the following order of importance of management to obtain, in progressive form, the CH4 diminution emitted by produced meat: The first apparent factor to be consider is the efficiency of the young rodeo; to improve the rate of weaning, still with low rates of gain of alive weight, it implies reductions of until	**3.3.6. Accpted. Text added "Ecological impacts of species introduction need to be considered."** **3.3.7 and 3.3.7.1. Noted. It is good to hear that these are working well in the Argentine Republic, but of course we cannot include this detail in this generic section.** **Indirect emissions already taken into account (see las sentence in first paragraph of section 8.4.1.5.a).** **Pasture improvement already taken into account under grazing land management (Section 8.4.1.2).**

						the 11% of the emissions. From the maximum rate of weaning considered (70%)it would be advisable to intervene on the rate of gain of alive weight; in this case improvements of up to 31% are obtained. Finally, when the offered diet quality is improved (forage) is possible to reduce the emissions up to 54%, considered on the base of the values of digestibility of ka dry matter (55%, 65% and 75% of DMS). 3.4. The relation between mitigation, CC impacts and adaptation (see 8.5. -8-30-) requires references on the regional aspects, because the environmental, social and economic differences will have an important relative weight. The Table 8.13. must be reviewed. For example: □ In Cropland management-agronomy (see first column) it should be added into the third column (for Implication GHG emissions….)that the rate of soil CO2 accumulation can diminish and, even, in the vegetation (smaller development in cultivated systems, and possibility of lost of species in ecosystems). □ In Cropland management-agroforestry (see in the first column) is unnecessary and even biased to add (see second column) "in particular situations". 3.5. In 8.6.1. "Impacts of climatic policies" (8-9) it should be important to clarify, between parentheses, that the implementation barriers refers to: social, cultural, technological access, economic development and dependence on external markets. 3.6. Table 8.14 does not reflect the deterioration effect of agricultural subsidies that increase Nx emission because of intensive agrochemical use and, distorting the market, discourage developing countries's sustainable agricultural production. In addiction reduced or non tillage, particularly in soya beans products, increase Nx emission beyond the CO2 effects. 3.7. In 8.8. ("Co-benefits and trade-off of mitigation options") This Item must be carefully studied. The impression given is that the vision is incomplete, there is a lack of treatment of other issues. For example, from 37 to 44 it should be highlighted that the promotion of bio-fuels with economic incentives measures which would affect the conversion of native forests areas in croplands. In 8.8. page 52 (10) it is highlighted that the plantations for bio-energy will allow the removal of cadmium and other heavy metals from cultivated soils. Should it be that way, it would be necessary a follow up of bio-fuel since these metals could cause contaminations. emphasis should be placed on the methane's use, diminishing as much as possible the flaring. The process should lead to recovery and use and not to recovery and flaring. For example, in the references on line 10 of the initial paragraph, introduction and point 10.5.5. (Government of Argentina)	**3.4. Rejected. Table is indicative – not exhaustive and summarised points that are dealt with in more detail (and references provided) in the text.** **First additional point – see response above.** **Second additional point – rejected – not biased.** **3.5. Accepted. This section has been re-written and now reflects these aspects** **3.6. Rejected. GHG trade offs are discussed in section 8.4.1. This section and table deal with other impacts.** **3.7. Accepted. Trade-offs with other land uses now explicitly mentioned and a study cited to support it.** **Last point. Noted – but GHG trade offs are dealt with in section 8.4.1.**
8-2	D	4	24	4	24	decomposition and/or mineralization of soil organic matter (Government of Argentina)	**Duplicate of Comment 8-39, Batch A** **Accepted. Same thing but it was changed to**

							make it more clear.
8-3	D	7	20	7	24	Rather than accumulating more soil organic C, zero tillage (ZT) causes the stratification of soil organic C in soil. The accumulation of soil organic C largely depends on crop rotation and water and nutrient management (Steinbach and Alvarez 2006). CO2 emissions are often decreased after long-term ZT, provided the soil is covered by agricultural residues. N2O emissions to increase in zero tilled soils because of N denitrification losses (Dalal et al. 2003, Steinbach and Alvarez 2006). Taking into account that the warming potential of nitrous oxide is 210 times greater than that of CO2, the desired objective CO2 mitigation could be hard to get in ZT soils. This is not sustained by Six et al. (2004), who argued that C sequestration can be reached in the long term in ZT soils. References:Dalal R.C., Wang W., Robertson G.P, Parton W.J., 2003. Nitrous oxide emission from Australian agricultural lands and mitigation options: a review. Australian Journal of Soil Research 41, 165-195; Six J., Ogle S. M., Breidt F (Government of Argentina)	**Duplicate of Comment 8-52, Batch A** **Accepted (partly): We agree that, while ZT often elicits soil C gain, this does not always occur, and have explicitly sated that observation elsewhere in the text. (e.g., page 17, line 6). Many of the studies provided have been cited, and most are included in our dataset used to derive the mixed effect model. The variability of the findings is reflected in the uncertainty ranges given in Figure 8.5.** **Even so, we have slightly revised the sentence to say that ZT "often" increases soil C.**
8-4	D	9	5	9	7	N2 O emissions from biological N fixation may be another important GHG source in countries, where soybean is an important field crop (US, Brazil, Argentina, and so on), or in countries (New Zealand, Argentina, Uruguay, etc) where grass-legume pastures are periodically sown with stock grazing purposes. However, in such situation N2O emissions are suspected to be "double counted", because N is counted when is fixed from the atmosphere and again when is buried into the soil, as shown by Rochette and Janzen (2005).References:Rochette Ph., Janzen H.H., 2005. Towards a revised coefficient for estimating N2O emissions from legumes. Nutrient Cycling in Agroecosystems 73, 171-179. (Government of Argentina)	**Duplicate of Comment 8-71, Batch A** **Reject. N2O emissions from soils already include emissions from BNF. We already cover this and cite this reference (page 16, lines 20-25)** **We have reflected this debate in section 8.4.1.**
8-5	D	11	30	11	30	After Wang et al. (1997), it should read as follows: "...(Wang et al., 1997). Also, in Brazil rice is mostly cultivated in upland rainfed system in which the recent rice varieties show similar yield potential as those for wetland irrigated system (Fageria, 2001) (Pedro Machado, Embrapa Rice and Beans)	**Reject. This comment does not belong in a global trends section as it is specific to Brazil.**
8-6	D	13	30	13	35	Same comment than in p 7 l 20.. Rather than accumulating more soil organic C, zero tillage (ZT) causes the stratification of soil organic C in soil. The accumulation of soil organic C largely depends on crop rotation and water and nutrient management (Steinbach and Alvarez 2006). CO2 emissions are often decreased after long-term ZT, provided the soil is covered by agricultural residues. N2O emissions to increase in zero tilled soils because of N denitrification losses (Dalal et al. 2003, Steinbach and Alvarez 2006). Taking into account that the warming potential of nitrous oxide is 210 times greater than that of CO2, the desired objective CO2 mitigation could be hard to get in ZT soils. This is not sustained by	**Duplicate of Comment 8-52, Batch A** **Accepted (partly): We agree that, while ZT often elicits soil C gain, this does not always occur, and have explicitly sated that observation elsewhere in the text. (e.g., page 17, line 6). Many of the studies provided have been cited, and most are included in our dataset used to derive the mixed effect**

						Six et al. (2004), who argued that C sequestration can be reached in the long term in ZT soils. References:Dalal R.C., Wang W., Robertson G.P., Parton W.J., 2003. Nitrous oxide emission from Australian agricultural lands and mitigation options: a review. Australian Journal of Soil Research 41, 165-1 (Government of Argentina)	**model. The variability of the findings is reflected in the uncertainty ranges given in Figure 8.5.** **Even so, we have slightly revised the sentence to say that ZT "often" increases soil C.**
8-7	D	15	5	8	20	We suggest considering the sowing of grass-legume pastures as a mitigation option to reduce GHG emissions. This is so because in temperate humid climates the primary net production of pastures is largely greater than that of annual crops. In addition, most added carbon is stored belowground (soil, roots and crowns), regardless the amount of C removed by grazing. This could be an interesting option in those countries where stock grazing is relevant. Please, include this option in Table 8.6 (Government of Argentina)	**TIA: This option already appears in section 8.4.1.2e**
8-8	D	16	23	16	24	Addition of quotation and two references on the improvement of soil C accumulation due to legume cover crops: "..., which reduce reliance on inputs of N and improve soil C accumulation (Sisti et al., 2004; Diekow et al., 2005). However, legume-derived N can also..." (Pedro Machado, Embrapa Rice and Beans)	**Accepted. Done – references added.**
8-9	D	17	4	17	4	Addition of quotation and one reference: "...throughout the world (e.g. Machado and Silva, 2001; Cerri et al., 2004). Since soil disturbance..." (Pedro Machado, Embrapa Rice and Beans)	**TAI: Already done.**
8-10	D	17	13	17	13	Addition of quotation and two references: "..., the main store of carbon in the soil (Freixo et al., 2002). Also, systems that avoid soil turning over tend to promote macroaggregation and these accumulate soil organic matter (Madari et al., 2005)..." (Pedro Machado, Embrapa Rice and Beans)	**Accepted – reference provided added.**
8-11	D	19	38	19	38	"...; Davidson et al., 1995). In the Brazilian Savanna (Cerrado biome), integrated crop-livestock system using Brachiaria grasses and zero tillage is already being adopted (Machado and Freitas, 2004). Introducing legumes..." (Pedro Machado, Embrapa Rice and Beans)	**Accepted – text and reference added.**
8-12	D	55	5	55	43	We think that the potential to mitigate GHG emissions is limited by the hugely different warming potential of CO2 (x 1) and nitrous oxide (x 210). Most technological option of mitigation are related to crop yield increases and (We guess) more addition of N fertilization, regardless the expansion precision agriculture or the adoption of slow release fertilizers. In addition, the problem of double counting in N2O emissions by crop and forage legumes (Rochette and Janzen 2005) must be dilucidated. This is a very important issue, taking into account the great expansion of the soybean area in Latin American countries. (Government of Argentina)	**Duplicate of Comment 8-289 (Batch A)** **Rejected. We have included this in the analysis. GWP of N2O is 296 by the way, not 210. All measures do not involve more N addition – in fact, most use less N. We have included this including the reference given.** **Also, there is no double counting, since N2O emissions from soils are determined**

							taking into account not just N fertilizers, but also crop residues and BNF
8-13	D	60	22	60	22	Diekow, J., Mielniczuk, J., Knicker, H., Bayer, C., Dick, D.P., Kögel-Knabner, I. 2005. Soil C and N stocks as affected by cropping systems and nitrogen fertilization in a southern Brazil Acrisol managed under no-tillage for 17 years. Soil and Tillage Research, 81, 87-95. (Pedro Machado, Embrapa Rice and Beans)	**Accepted: added**
8-14	D	60	46	60	46	Fageria, N.K. 2001. Nutrient management for improving upland rice productivity and sustainability. Communications in Soil Science and Plant Analysis, 32, 2603-2629. (Pedro Machado, Embrapa Rice and Beans)	**Accepted: added**
8-15	D	64	48	64	48	Wrong reference, spelling error on Machado and Silva, 2001. Where it reads "...Machado, P.L.O.D. ...", it should read as follows: "...Machado, P.L.O.A...." (Pedro Machado, Embrapa Rice and Beans)	**Accepted: corrected**
8-16	D	65	1	69	4	Machado, P.L.O.A., Freitas, P.L. 2004:No-till farming in Brazil and its impact on food security and environmental quality. In: Lal, R., Hobbs, P.R., Uphoff, N., Hansen, D.O. (Eds.) Sustainable Agriculture and the International Rice-Wheat System. (ed.) New York: Marcel Dekker. pp. 291-310. (Pedro Machado, Embrapa Rice and Beans)	**Accepted: added**
8-17	D	65	6	65	6	Madari, B., Machado, P.L.O.A., Torres, E., Andrade, A.G., Valencia, L.I.O. 2005. No tillage and crop rotation effects on soil aggregation and organic carbon in a Fhodic Ferralsol from southern Brazil. Soil and Tillage Research, 80, 185-200. (Pedro Machado, Embrapa Rice and Beans)	**Accepted: added**
8-18	D	69	13	69	13	Sisti, C.P.J., Santos, H.P., Kohhann, R., Alves, B.J.R., Urquiaga, S., Boddey, R.M. 2004. Change in carbon and nitrogen stocks in soil under 13 years of conventional or zero tillage in southern Brazil. Soil and Tillage Research, 76, 39-58. (Pedro Machado, Embrapa Rice and Beans)	**Accepted: added**