IPCC Fourth Assessment Report

Expert Review of the First-Order Draft

Chapter 5

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-1	A	0	0			This version is a lot better than the first one! I am glad to see that review comments were taken seriously and that a lot of changes have been made according to the suggestions.This version is very interesting and useful! I don't think it needs a lot of additional work. (Bert Van Wee, Delft University of Technology)	Noted
5-2	A	0	0			The remarks concern the inclusion of tourism into the FOD. The IPCC recognizes the need to take into account the mitigation potential of socio-economic systems besides economic sectors such as energy, agriculture and transport (IPCC 2001). Tourism is an activity whose effects are distributed in many economic sectors, such as transport, accommodation and agriculture. Tourism is taken into account in WGII from the point of view of the impacts of climate change on the activity and its adaptation potential.Tourism is also characterised by both the significance of its contribution to GHG emissions and its substantial overall economic importance. It is thus a field for mitigation policies which should in return impact the activity (this last point will possibly be dealt with in WG2) In the present state of the WG3 FOD, the issue is only taken up in the residential chapter,which is in terms of contribution to emissions only a minor part of the problem. Nothing is said about tourism in the transportation chapter where the essential problems lie.With a few collegues we wrote last year a synthetic note on the contribution of tourism to climate change and the mitigation issues and transmitted it to a few people in WG with the idea that it could be taken into account, apparently without any effect. I thus try again.(Mitigating tourism's contribution to GHG emissions. Susanne Becken, Jean-Paul Ceron, Ghislain Dubois, Stefan Gössling, Paul Peeters,April 2005). I believe the main points should be taken up in the transportation chapter. What is said on the subject in a box in the residential chapter will probably be commented by one of the main authors quoted. (Jean Paul Ceron, Université de Limoges)	Accepted. We will consider how to handle this.
5-3	A	0	0			The main messages could be presented more explicit. (Bert Van Wee, Delft University of Technology)	Accepted. We will improve in the next draft.
5-4	A	0	0			General comments on whole Chapter 5. Add new section that describes the needs of integrated study of technology and policy.	We will add some discussion this issue in section 5.5, 5.9 or 5.10.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Reason: Even though policy and measures are described in section 5.5, their future effect on reducing GHG is not clear contrary to the effect of technologies. For instance, the methods or analyses in section 5.9 mostly focus on technology issue, and it sounds like the transport policy issue is not important for global and long-term analysis. To make policy issue connect with the overall assessment of transport sector, I suppose it is better to suggest how the policy and technology studies should collaborate with. (Masahiko Hori, Japan Automobile Research Institute)	
5-5	A	0	0			A good review of the current transport situation globally - the emisisons, types, fuel use, and future scenarios. Also a very useful comparison of different types of fuels that are used globally. (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	Noted
5-6	A	0	0			There are renewed calls for a supersonic aircraft. Such an aircraft would inherently burn more fuel, leading to additional greenhouse gases. It would be helpful to policy makers if the authors could comment on the relative benefits of such an aircraft versus the additional environmental burden. (Lourdes Maurice, US Government)	Accepted – should add text, comment on commercial plans, opportunities and threats.
5-7	A	0	0			The quality of some of the figures is not very good and should be enhanced. (Lourdes Maurice, US Government)	Noted
5-8	A	0	0			Overall, this chapter is disappointing with regard to its discussion of urban passenger transportation. My major criticisms are (1) urban form and transportation infrastructure are not adequately discussed, (2) the potential to improve the fuel efficiency of the automobile fleet is not stated (there are just some piece-meal statement about the effects of some isolated measures), and (3) the possibly of irreversibly losing "windows of opportunity" to reduce long term emissions by directing urban form and transportation infrastructure away from automobile dependence is not even raised. It is a matter of empirical observation that the two largest factors that influence transportation energy use in cities are urban form and the nature of the urban transportation infrastructure. The two extreme cities in the world, Hong Kong and Houston, differ by a factor of 25 in per capita energy use for transportation (see Newman and Kenworthy's book). There is a factor of six difference in energy use per passenger-kilometre between subways and automobiles, given typical passenger loadings in a sample of world cities (again, see Newman and Kenworthy). Although there may be little that can be done to rectify the automobile-intensive, low-density, urban sprawl that we so short-sightedly allowed (and	Taken into account in relation to urban form. The Newman and Kenworthy's book and other papers were referred evenly. 2nd comment; we already dealt with this enough. Assess other studies (DG)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						continue to allow) in North America, in many developing countries, important choices regarding urban form and transportation remain to be made and are being made at this moment. Secondly, a number of studies finding an opportunity for a factor of 2 improvement in the US auto fleet, which I drew to the attention of the authors in my comments on the ZOD, continue to be ignored here. These studies assume an across the board improvement, but there is also room for substantial improvement by shifting the mix of vehciles purchased. This could be accomplished through a combination of taxes/rebates, and by simplying regulating much greater improvements. If the auto companies are incapable of redeploying the substantial technological improvements over the last 25 years that went into making cars needlessly more powerful rather than more efficient, then they can redesign their massive advertising strategies to make efficient and lean seem sexy. The point is, there are lots of ways to get big improvements in fule efficiency if governments are really serious about it. But the whole tone of this chapter is way too timid. (Danny Harvey, University of Toronto)	
5-9	A	0	0			Some reference to section on transport in chapter 12 should be given (Philippe Tulkens, TERI School of Advanced Studies)	We will check..
5-10	A	0	0			Please do not exclusively use local physical units like pounds (instead of kg), miles (instead of km) or gallons (instead of liters = dm3) but - at least additionaly - internationally agreed ones. (Manfred Treber, Germanwatch)	We will take care.
5-11	A	0	0			I think the fact that 'average time budget for travel is roughly constant worldwide' (p12, l4 and 5) desserves a much higher prominence in the transport chapter because decision makers - they are a main target group of the IPCC work - have often not understood this and think in terms of "making transport faster so that we could save time". But the lesser time gained from faster transport is reinvested and often causes more emissions because faster vehicles use more energy (and have thus higher emissions). (Manfred Treber, Germanwatch)	Rejected.....adequate prominance has been given
5-12	A	0	0			The question of the issue of urban planning and whether this was an issue of urban planners are building cities with good public transport and cars. Are cities being built making people walk or to drive cars and how this is addressed in the chapter. (Capetown Industry Expert Meeting, Industry)	Accepted in relation to NMT. We will add more materials.
5-13	A	0	0			More assessment needed on public transport (Capetown Industry Expert Meeting, Industry)	Accepted. We will discuss more in the next draft,
5-14	A	0	0			Infrastructure needs to be more fully described and assessed in this chapter.	Taken into account. The potential was

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Governments have potentials in different fuels but Governments need to enforce this, such as in Brazil where it is enforced. Public transport large potential for emission reductions. Biofuels ethanol good for internal combustion engines but there are some arguments about the availability that needs to be reflected in the chapter. (Capetown Industry Expert Meeting, Industry)	covered.
5-15	A	0	0			Glad to see CCS in the chapter but point made that well to wheel studies were taking place before CCS and that in the case of hydrogen to include CCS and its impact. Also, what is the impact of hydrogen and CCS on some of the infrastructure choices. (Capetown Industry Expert Meeting, Industry)	Accepted. We will add more discussion.
5-16	A	0	0			Chapter to orientated to the automobile with a need to discuss more on freight and logistics. (Capetown Industry Expert Meeting, Industry)	We will add more information on freight.
5-17	A	0	0			A question on the long term outlook and about people and freight wanting speedy delivery and speed to get to a place and using more energy intensive mode transport. How is this being addressed in the chapter and is the tension in this addressed in the literature. (Capetown Industry Expert Meeting, Industry)	We will add more information
5-18	A	0	0			• Costs analysis (including co-benefits) must be broadened – barriers should be more extensively quantified. – Examples include urban planning, consumer choices beyond fuel efficiency • The idea of negative cost (such as those mentioned in 5.5.1.4), the other costs are referred to as barriers to be overcome, but these are just costs that have to be addressed. The Hansen piece in Tokyo and the Flannery reference in the plenary at Tokyo address this issue. • Tech transfer issues need more attention, covering the full range of related issues, including urban planning, infrastructure, etc. • The University of California Davis- ITS centre has more information on technology transfer • Blending biofuels is a major policy initiative in many countries and needs to be reflected more in the text. • This is something that needs to be explored further by the chapter team. • Role of public transportation and fuel taxes also needs fuller consideration. • John Reilly at- MIT addresses the issue of fuel taxes and potential savings for GHGs, this could be a good reference for Chapter 5 to look up • Need to take into account local/regional considerations in developing appropriate	We will add more information. Cobenefits(michel), cost analysis(dg/steven), tech transfer(koba), biofuel(suzanna), fuel tax(PZ/ron), exec summary(dg). Taking into account regarding blending biofuels infrastructure, however keeping in mind the need for the chapter reduction(Suzanna)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						transportation policies. • AFREPEN (Steven Karekezi) is a good source of information regarding transport system in Africa. • The role of emissions trading needs to be explicitly included in the Exec Summary. (Capetown Industry Expert Meeting, Industry)	
5-19	A	0	0			This chapter of the report gets considerably better the further into the report one reads. The material towards the end is factual, well-balanced, informative and readable. The material at the outset is rushed, dense, equivocal and poorly referenced. I think the work should be technically edited with a mind to changing its structure to move the material concerning shipping and aviation to a separate section. The executive summary needs considerable work. The material does not lead to a conclusion or set of recommnedations and certain key impediments to the future management of Co2 emissions have the potential to be overlooked by this presentation. In particular, a problem that probably has the same root cause that could be overlooked is the challenge of reducing the demand on fossil fuel consumptions in the developing world and the behavioural offset of adopting larger vehciles and travelling further each year in developed nations. (Darren Walton, Opus Central Laboratories)	we wll improve, and forcus more on key measseges.
5-20	A	0	0			The FOD version of chapter 5 has improved enormously as compared to the ZOD version (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted
5-21	A	0	0			Some of the writing is dense and difficult to read. There are numerous errors in grammar and extremely awkward expressions (at least a few per page). I know the work is to be edited by a technical group but it's a matter of courtesy to send a copy of a document to a reader with as much care for the reader as one expects in return. This means, to me, I would have preferred to you would have sent the document to the technical group before it was sent to review. I am not at all describing the typos, they are trivial, I mean the really clumsy expressions, wrong use of words, poor paragraph construction, inadequate referencing and so on. (Darren Walton, Opus Central Laboratories)	We will improve.
5-22	A	0	0			I find the sectioning difficult and distracting. Avaiation fuel reduction is interesting when separated from the rest of the discussion. The same is true for maritime fuel consumption. At present it gets tacked on the end of each section and then seems to be a token consideration added because it is predetermined by a structure of getting through the material. Consider whether the material might be better represented as a	Noted – should consider changes to the layout.Disagree

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						complete section dealing with the issues that the rest of the document deals with but focused on the Aviation Fuel use or Maritime fuel use. (Darren Walton, Opus Central Laboratories)	
5-23	A	0	0			I find it strange that so few documents are referenced for the construction of this work; and those that are referenced are referenced repeatedly (eg Fulton, 2004). Some statements of fact go unreferenced and other expressions of opinion are reference (see especially p.18 where the IEA is cited to support the idea that the future is unknown and cannot be predicted). There are some (many) examples where there is strong indication that a reference is required but none exists (eg. P. 7 line 20-25) and again (p.25 717). (Darren Walton, Opus Central Laboratories)	agree,we will improve.
5-24	A	0	0			Chapter 5 on transport addresses several times the link between traffic GHG emissions and other traffic related emissions that have a local effect on health (especially PM and NOx). Since GHG and PM/NOx emissions, as well as their abatement, are strongly intertwined, this topic could be addressed even stronger. Improving local air quality is a top priority in many countries, and on the national level possibly a stronger political driver than GHG emissions. Some measures to improve local air quality (e.g. reduced speed limits on highways, like in the Netherlands near some of the major cities) also reduce GHG emissions. Other air quality driven measures, like obligatory PM and NOx filters and in-engine measures, mostly result in higher fuel use and consequently higher GHG emissions. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	We will deal this more. speed limits (muro)
5-25	A	0	0			The FOD version of chapter 5 has improved enormously as compared to the ZOD version (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as 5-20
5-26	A	0	0			Several figures and tables lack captions, legends and/or units at the axis etc. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	We will take care.
5-27	A	0	0			Chapter 5 on transport addresses several times the link between traffic GHG emissions and other traffic related emissions that have a local effect on health (especially PM and NOx). Since GHG and PM/NOx emissions, as well as their abatement, are strongly intertwined, this topic could be addressed even stronger. Improving local air quality is a top priority in many countries, and on the national level possibly a stronger political driver than GHG emissions. Some measures to improve local air quality (e.g. reduced speed limits on highways, like in the Netherlands near some of the major cities) also reduce GHG emissions. Other air quality driven measures, like obligatory PM and NOx filters and in-engine measures,	same as 5-24.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						mostly result in higher fuel use and consequently higher GHG emissions. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-28	A	0	0			It would also be good to have some information about the magnitude of the contribution from transport to climate change. So far there are not many estimates available, but a brief overview of the RF numbers for aviation from the IPCC special report would be helpful (with more recent updates). For the other sectors or for the transport sector as a whole, the shares of the total man-made emissions of CO2, NOx, CO, SO2 etc would be helpful to get an overview of the role of transport in the context of climate change. (Jan Fuglestvedt, CICERO)	Accepted. We will add
5-29	A	0	0			I think the chapter would benefit from a better overview of how transport affects climate; i.e. emission of long-lived and short lived gases, precursors of trop O3 and aerosols; causing forcing of both sign. Box 5.1 is useful, but does not, in my opinion, give enough information. Maybe this is covered in Table X, which I can not find. (Jan Fuglestvedt, CICERO)	we will assess more in the next version. input from David Lee
5-30	A	0	0			There is almost no mention in the document of grid-connected vehicles (streetcars/trams, trolleybuses, electric trains, etc.). Such vehicles could prevail in an energy-constrained world that has much use of renewable energy, because of their low energy intensity and capacity to use the widest range of primary fuels. (Richard Gilbert, Centre for Sustainable Transportation)	Accepted: we will add, relted to public transort. (maybe some literatures exist, ask Bert Van Wee, Delft University of Technology)
5-31	A	0	0			The document needs much editing, including checking for consistency of style and of use of units. For example, metric energy units are used at 11-12 and non-metric units at 15-20. (Richard Gilbert, Centre for Sustainable Transportation)	Accepted. We will improve.
5-32	A	0	0			The document contains too many unsubstantiated statements. For example, the statement about walking and bicycling at 11-33 has no source. (Richard Gilbert, Centre for Sustainable Transportation)	Accepted in relation to NMT. add more materials.
5-33	A	0	0			General comment: my major concern is that chapter 5 doesn't consider the importance of NMT (non-motorized transport) in the transport sector, both for the relevance of current use than for the importance in the mitigation of GHG emission increase. I add some comments and suggestion, in different part of the chapter; I would like to see more on this topic in the different parts of the chapter (summary, status, policies). I add also some references; let me know if you need further data.	Accepted in relation to NMT. We will add more materials.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Stefano Caserini, Politecnico di Milano)	
5-34	A	0	0			A chapter on barriers empeaching a better market diffusion of GHG mitigation technologies and how to overcome them should be separated from the others, since the barrier/overcoming approach make significant new recommendations possible. One main barrier is the low political willingness in European countries to apply domestic actions on transport energy. For instance, most of the excellent OECD EST project recommendations were not applied by the participating countries. OECD - Organisation of Economic Cooperation and Development (2001): Project on Environmentally Sustainable Transport: Report on Phase 3 – Policy Instruments for Achieving EST. Paris. For the future, it is of highest importance to clarify this question. (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	Accepted. We will improve polisy section to cover these.
5-35	A	0	0			Comment: In contrast to the other chapters such as Chapter 6 (Mitigation options for residential/commercial buildings) and Chapter 7 (Industry), this chapter does not describe fluorinated compounds (F-gases). CFC-12 had been used in developed countries as a refrigerant for car air-conditioners and presently it is switched to HFC-134a (one of F-gases). Future candidates of alternative refrigerants are HFC-152a and CO2. Recently, EU has discussed CO2 refrigeration for mobile air-conditioners. Experts of world car makers, related academic filed including USA and Japan has discussed and compared the performance and environmental impacts of the alternative substances and technologies in 2004. In my opinion, the description ODS (the ozone depleting substances such as CFCs) and F-gases (HFCs, PFCs and SF6) is placed in "5.4.2.1 Road transport." This issue has been summarized in the IPCC/TEAP report: "Safeguarding The Ozone Layer and The Global Climatic System: Issues related to hydrofluorocarbons and perfluorocarbons," which was published in 2005 by Cambridge University Press. For example, the mobile air-conditioning is described on pp.57-60 of Technical Summary. (Koichi Mizuno, National Institute of Advanced Industrial Science and Technology)	Accepted.
5-36	A	0	0			It strikes me that the term "pollutant" is almost exclusively used in the context of aviation and shipping emissions. As this term has a certain emotive weight, it creates a false sense of alarm on the part of the reader. I suggest to change "pollutant(s)" to "emission(s)" throughout the text to redress the balance. (Andreas Hardeman, International Air Transport Association)	Noted – we should be consistent and use emissions

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-37	A	0	0			In various places throughout the document (p.9 line 48; p.15 line 40; p.16 line 40 and elsewhere) attention is drawn to aviation emissions growth, which is said to be strong. This must however be placed in context, especially when considering that aviation's contribution to anthropogenic CO2 emissions appears to be the same in 1992 (IPCC 1999) as in 2000 (AR4), namely 2%. (Andreas Hardeman, International Air Transport Association)	Noted and context should be provided/ Taken into account;In order to balance this, also non-CO2 climate impacts from aviation should be mentioned in the summary, as these are a factor 2 to 4 greater than the climate impact of aviation CO2 alone.
5-38	A	0	0			General remark : although density of cities and planning is mentioned (p.48), emphasis in this chapter is given on solutions based mainly on technical solutions such as H2 wich will not be available during most of the next decades. This gives the whole chapter a wrong balance and removes credibility. (Antoine BONDUELLE, E&E_Consultant)	Accepted. We will improve
5-39	A	0	0			Very clear and easy to read and to understand (Marco Mazzotti, Institute of Process Engineering)	Noted
5-40	A	0	0			The authors may find an interesting global perspective on the key role and risks associated with the transport sector in Crassous, R., J.-C. Hourcade, et al. (2006). "Endogenous Structural Change and Climate Targets: Modelling experiments with IMACLIM-R." in review for Energy Journal (Special Issue: Endogenous technological change and the economics of atmospheric stabilisation, 2006), particulalry issues relating to infrastructure investment (Michael Grubb, Cambridge University)	Accepted. We will check those.
5-41	A	0	0			Chapter is very strong. The only weakness appears to be little reference to the non-CO2 gases in either the Executive Summary or the text. (Nick Campbell (Batch 2), ARKEMA SA)	Accepted. We will take care.
5-42	A	0	0			Several figures and tables lack captions, legends and/or units at the axis etc. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted. We will take care.
5-43	A	0	0			General comment: There is a very good analysis done by the International Energy Agency looking at measures (car-pooling, driver ban, speed limits, transit, telecommuting etc.), their potential for oil saving and the cost effectiveness of each measure. Please see IEA 2005: Saving oil in a hurry. (Stephan Herbst, Toyota Motor Europe)	We will check this.
5-44	A	0	0			Congratulations! The chapter is progressing very well. It is now much more balanced than the ZOD, contains very interesting and important facts and information. (Diana Urge-Vorsatz, Central European University)	Noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-45	A	1	0	1		While the purpose is GHG, should flag other emission benefits/disbenefits of technology options; e.g., greater use of diesel engines could increase PM unless control measures are adopted (Robert Larson, US Environmental Protection Agency)	Taken into account: These will be noted within the chapter as the relevant topics (i.e., diesels) come up.
5-47	A	1	0			Eight pages is surely not an Executive Summary and suggests a lack of focus (Michael Grubb, Cambridge University)	Accepted: will be shortened.
5-46	A	1	1	82	17	Very good first draft! Additional references - Draft ECMT CO2 Review will be submitted, it agrees with many of the points made. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Noted. We look forward to receiving ECMT CO2 report.
5-48	A	2	0			The executive summary is quite long and could be shortened. (Jan Fuglestvedt, CICERO)	Accepted.
5-49	A	2	0			The executive summary is quite long and could be shortened. (Jan Fuglestvedt, CICERO)	Accepted.
5-50	A	2	0	9	0	The chapter text discussed the possibilities of emissions trading - this is not reflect in the Executive Summary (Nick Campbell (Batch 2), ARKEMA SA)	Accepted. Emissions trading will be reflected in the ES.
5-76	A	2	0	9		Summary in general: why is the quantitative potential effect presented for only some of the options? (Bert Van Wee, Delft University of Technology)	Noted. In general, quantitative numbers are provided where the assessed literature provides adequate support for them and where the numbers are large.
5-51	A	2	8			Executive Summary is a bit too long. Other chapters' executive summaries are given a few pages. (Yasuhisa Yaoita, Global Industrial and Social Progress Research Institute)	Accepted.
5-52	A	2	8	91	42	The whole chapter describes the technological improvement of automobiles strongly. It is necessary to describe the enforcement of public transport policy and railway concretely. (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	Accepted. The chapter does deal with public transport policy, this will be brought into the executive summary.
5-53	A	2	8			p. 2. Section Executive Summary. The Executive summary is much longer than summaries of other chapters, it should be shortened. (Philippe Tulkens, TERI School of Advanced Studies)	Accepted.
5-54	A	2	8			p. 2. Section Executive Summary. The Executive summary gives a long term outlook that identifies mostly business as usual trends. I feel that some findings from the draft report are underrepresented in the executive summary. I will take two examples: - Very little is said about the need for better urban planning in other to reduce the	Noted – we might say more about aviation trends, especially the low cost sector.DTI can seek advice on LC trendsOthers to address?

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						demand for transport. Urban transport planning is discussed on p.45 and urban planning is discussed in section 5.5.1.1. However the findings from these sections are reflected only very briefly in the policies and measures section of the executive summary - Little is said about the relative pricing of the difference modes of transport. Low-cost air travel is now cheaper than fast train travel on similar distances in Europe. This situation is an example of distortions that arise when environmental externalities are ignored. Such example could be pinpointed as non climate-friendly practices. This comment is valid not only for the executive summary but also for the draft chapter itself where pricing issues is being given too little attention. Overall I feel that in the executive summary there is a lack of integration of the chapter's findings in the broad context of sustainable development. This could be looked at while preparing the next draft. (Philippe Tulkens, TERI School of Advanced Studies)	
5-55	A	2	12	2	12	This chapter deals mainly with motorised transport - pedestrians and bicycles are not in the centre (although, if counted as share in global [extended] modal split - not in industrialised countries! - they are not at all negligible). There please insert 'motorised' in the first sentence at the beginning: "Current motorised transportation activity ..." (Manfred Treber, Germanwatch)	Accepted, will insert motorized in first sentence.
5-56	A	2	13			Is "96% of total transport energy use" on a global basis? Although similar description can be seen in line 34 on page 8, the region discussed here is "in the developed economies". I recommend you to explicitly describe in which region petroleum fuels account for 96% of total transport energy use. (Takayuki Takeshita, The University of Tokyo)	Noted: This is a global number from the IEA.
5-57	A	2	13	2	14	For clarification, I recommend you to modify "transport energy use and carbon dioxide emissions" into "transport energy use and its carbon dioxide emissions". (Takayuki Takeshita, The University of Tokyo)	Accepted.
5-58	A	2	14	2	14	same point: please insert 'motorised': "closely track the growth of motorised transportation activity" (Manfred Treber, Germanwatch)	Accepted but noting this twice at the very beginning should be sufficient.
5-59	A	2	14	2	15	Although the description in line 36 on page 10 that "transport energy use and (its) carbon emissions track each other fairly closely" is valid, I think that it is not necessarily true that transport energy use closely track the growth of transportation activity because the energy efficiency in the transportation sector improves over	Accepted.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						time. (Takayuki Takeshita, The University of Tokyo)	
5-60	A	2	15			It would be really good to see the true range of growth in transport activities and its associated carbon emissions. We are growing at at least 3.5% (Darren Walton, Opus Central Laboratories)	Rejected; further breakdown seems excessive
5-61	A	2	15	2	15	please add 'where motorised transport dominates': "in the developed world where motorised transport dominates" (Manfred Treber, Germanwatch)	Noted, but by now, having made the two previously requested insertions of motorized it is not necessary to repeat it a third time.
5-62	A	2	15			I recommend you to explicitly write the time period during which "transport activity and carbon emissions continue to increase at 1-2% per year". (Takayuki Takeshita, The University of Tokyo)	Accepted, time period will be noted.
5-63	A	2	15			Do "carbon emissions" mean total emissions or those from the transport sector? (Takayuki Takeshita, The University of Tokyo)	Noted. We refer in this chapter to transport emissions.
5-64	A	2	23			Add: Although the number of car is growing fast, NMT (non-motorized transport) is the most used means of transport in the world. This is true not only in developing word but also in some developed country in Europe. (Stefano Caserini, Politecnico di Milano)	Rejected. We have added note that we discuss motorized transport as the source of GHG emissions. The statements about increasing speed and energy intensity with GDP remain valid.
5-65	A	2	24			SPMs the give the percentage of the sector in 2000 for transport (chapter 5, page2, line 24), in 2004 for buildings (chapter 6, page2, line 36) and in 2002 for industry (chapter 7, page 2, line 35). It would be nice to have the same date everywhere. (Michel Petit, CGTI)	Accepted. We will update to latest data available, which is 2003.
5-66	A	2	30	2	39	Proposed alternative phrasing for the sentence: "It is clear that conventional oil cannot continue to supply the growing energy needs of the world's transport system." (Dominic Stead, Delft University of Technology)	Rejected. This remains an area of some controversy. Our wording better reflects this.
5-67	A	2	31	2	32	This statement about conventional oil conflicts with the discussion in Chapter 4 where results showing peak oil timing ranges from a few years to a few decades. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. We will cross-check with chapter 4 for consistency.
5-68	A	2	31	2	32	The growing consensus is that conventional oil production will peak in little more than three decades' time - is this 'several'? (Michael Jefferson, World Renewable Energy Network/Congresses)	Rejected, there is no consensus
5-69	A	2	31	2	32	Proposed alternative phrasing for the sentence: "There is a growing consensus that conventional oil production will peak sometime in the next few decades."	Rejected

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Dominic Stead, Delft University of Technology)	
5-70	A	2	33	2	35	Proposed alternative phrasing for the sentence: "There are various alternative fossil energy feedstocks, ranging from coal to oil sands and shale oil and natural gas." (Dominic Stead, Delft University of Technology)	Rejected, key point is that resources are plentiful
5-71	A	2	35	2	36	Proposed alternative phrasing for the sentence: "A transition to alternative fossil energy resources could, depending on the fuel used, significantly increase transportation's GHG emissions, unless the additional carbon emissions were sequestered." (Dominic Stead, Delft University of Technology)	Accepted, although we will say that a transition to oil sands and oil shale or coal would…
5-72	A	2	35	2	35	p.2 L.35. Would a switch to alternative fossil fuel necessarily increase GHG emissions, even if the fuel is natural gas? (Philippe Tulkens, TERI School of Advanced Studies)	Rejected, except that we must stress we're talking about liquid fuels, including GTL
5-73	A	2	35	2	36	In the case of the transition to natural gas, transportation's GHG emission would decrease. Therefore, I think that the description "A transition to alternative fossil energy resources would significantly increase transportation's GHG emission" is unsuitable. (Takayuki Takeshita, The University of Tokyo)	Rejected, except as above
5-74	A	2	37			after "efficiency" add: and the defense of NMT (Stefano Caserini, Politecnico di Milano)	Rejected. Many other options are not mentioned here but are discussed in the chapter. We have noted the options most likely to have a major impact.
5-75	A	2	38			I recommend you to modify "such as electricity or hydrogen" into "such as carbon-neutral electricity or hydrogen". For example of the reason, see lines 21-23 on page 5 in this draft. (Takayuki Takeshita, The University of Tokyo)	Rejected. We could say low-carbon rather than carbon neutral, which would be very precise. However, the use of the word could covers this case.
5-77	A	3	1	3	20	this summary is too vague. The boundaries quoted in the last paragraph should be clearly given, as they have been chosen in the published papers. Orders of magnitude of the emission sharing between the various components of the LCA, are available in section 5.9 and must be recalled in the Executive Summary, with the attached uncertainties. (Michel Petit, CGTI)	Accepted. Numbers from section 5.9 will be brought forward.
5-78	A	3	7		13	the rebound effect does not only include the volume component, but also the way of using vehicles: there is evidence that people drive more fuel efficient if fuel prices are higher. (Bert Van Wee, Delft University of Technology)	Noted. The rebound effect as most commonly used includes increased activity. In theory it includes much more than even the efficiency of operation, e.g.,

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
							type of equipment chosen, income effects in other areas of consumption.
5-79	A	3	10	3	11	should note that any rebound impacts is also offset by increases in oil prices (Robert Larson, US Environmental Protection Agency)	Rejected. Although this is technically possible, there is a limit to how much qualification can be put in the ES. The statement is reasonable as it is.
5-80	A	3	12	3	13	I think that not a capital cost increase but an operating cost (including fuel cost) increase would decrease activities or operations. (Takayuki Takeshita, The University of Tokyo)	Rejected. One should think in terms of long-run as well as short-run costs of vehicle travel.
5-81	A	3	26			What is the definition of "motor vehicles"? Does this include only road vehicles such as cars, buses, and trucks? In this case, I think that the use of light-duty vehicles or cars instea of motor vehicles is better. (Takayuki Takeshita, The University of Tokyo)	Noted. This includes road vehicles and, mostly light-duty vehicles, although test cycles exist for heavy duty vehicles and energy efficiency standards for heavy vehicles are under consideration.
5-82	A	3	40			The word multiplicative is wrongly used. There is a diminishing return from additional intervnetions and the relationship is certainly not linear but that doesn't mean the same as the literal use of 'multiplicative' (Darren Walton, Opus Central Laboratories)	Rejected. Multiplicative as used here means 0.9x0.9, which is correct.
5-83	A	3	40	3	42	delete this trivial statement which moreover conveys the feeling that the estimates are so precise that we can argue in favour of 19 % rather than 20 %. (Michel Petit, CGTI)	Noted. Depending on how we finally decide to aggregate the various mitigating strategies, we may need this statement. If we do not, we will delete it.
5-84	A	3	42	3	44	I don't understand the figures presented in this example. Can the discussion be made clearer? (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. Please see comment to 5-84.
5-85	A	3	50			Our presentation at IEW2005 titled "Difference in optimal strategies between transportation modes under the CO2 stabilization target of 550 ppm" uses a bottom-up type global energy system model that is characterized by a detailed specification of the whole transportation sector (including rail, air, and shipping) and the full supply chain of transportation fuels. We would like you to refer to this presentation. (Takayuki Takeshita, The University of Tokyo)	Noted. While the use of a presentation would not satisfy the requirement for published literature, we will check to see if the presentation has been subsequently documented in a citable source.
5-86	A	4	2	4	2	It should read: "This leaves three alternatives. The first is to rely on the one study available. The second ...and so on." (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-87	A	4	5	4	10	The excutive summary is clearly cut from chapters as the material in this executive summary is referring to 'this chapter'. (Darren Walton, Opus Central Laboratories)	Noted, but not correct.
5-88	A	4	9			Where in the report is such an analysis available? (Michel Petit, CGTI)	Noted. The paragraph will be deleted in the interest of shortening the ES.
5-89	A	4	13			first time TAR: please full name (Bert Van Wee, Delft University of Technology)	Accepted.
5-90	A	4	14	4	14	It should read: "cess of hybrid vehicle technology, the development of clean diesel technology, the large acceptance of low-cost flexfuel vehicles moving with hydrous ethanol, and the institution of" (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted.
5-91	A	4	14	4	14	Are current diesels really clean? Nox emissions on the road far exceed the vehicle certification limits which in turn are in many regions much weaker than for gasoline vehicles. The revolution in diesels is more their penetration in car markets as a result of improved noise and smotheness, but driven by reduced excise taxes. We might have clean diesels around Euro5 limits, but by then variable compression gasoline engines might be outperforming them in terms of fuel efficiency. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Noted: Current, state of the art diesels are equipped with particulate filters and selective reduction catalysts, burn low-sulfur diesel fuel and meet all emissions standards.
5-92	A	4	14	4	14	"clean diesel technology" is ambiguos. Also latest diesel engines (i.e. Euro IV) are far more polluting than gasoline engines, in particular for important atmospheric pollutant as PM (PM10 and PM2.5), NOx and VOC (Ntziachristos L., Samaras Z., 2000). Thus I suggest non to use this term but instead “less polluting diesel engines”. (Stefano Caserini, Politecnico di Milano)	Noted. What we are referring to as clean diesels are those that meet the same emissions standards as gasoline vehicles. Please see comment above.
5-93	A	4	27	4	28	Ethanol is also used in some countries in Europe as a 85% blend (especially in Sweden) (Stephan Herbst, Toyota Motor Europe)	Accepted.
5-94	A	4	28			Are the levels of 5-10% on a energy basis or on a volume basis? (maybe by volume) You should describe the unit explicitly. (Takayuki Takeshita, The University of Tokyo)	Accepted. This is by volume.
5-95	A	4	29	4	31	Ethanol produced from sugarcane uses only 10% of its energy contend from fossil fuels. The remaining energy used is from biomass that had no other use or that is being used as a source of electricity from where heat is a co-product and used in the ethanol process. Thus the statement about large amounts of energy is false. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted. The statement will be revised to clearly distinguish between corn and ethanol.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-96	A	4	29	4	31	The text states: "Chiefly due to the small fraction of the total chemical energy in biomass utilized by these processes and the large energy inputs to their production, it appears unlikely that biofuels produced by fermentation and distillation could displace more than 10% of road transport energy." A sentence or two about the reasons why biofuels produced by fermentation and distillation could not displace more than 10% of road transport energy would be helpful here. (Dominic Stead, Delft University of Technology)	Noted. This statement is not only redundant with statements in the following paragraph but somewhat contradictory. This will be deleted and the language in the following paragraph referring to specific time frames used instead.
5-97	A	4	29			I recommend you to add the constraint on the availability of cropland to the expression "Chiefly due to ~ to their production". (please see IEA (2004) Biofuels for transport.IEA, pp.17, lines 11-20). (Takayuki Takeshita, The University of Tokyo)	Accepted.
5-98	A	4	31	4	31	See Moreira, 2005, Global biomass energy potential. Mitigation and Adaptation Strategies for Global Change(Special Issue, forthcoming) where is shown that ethanol can be produced at the same amount as present gasoline. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. We have not seen this forthcoming study but will review it when published.
5-99	A	4	31	4	31	Is clean diesel more efficient or just produces less local pollution? (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. This does not appear to refer to line 31. Clean diesel is not more efficient than older diesel technology but it is now viable as an energy efficiency options because it is capable of meeting pollutant emissions standards.
5-100	A	4	33			The percentage gain from biofuel seems to underestimate the carbon emissions by not taking into account that the renewable source (the biological material) is not adding to the carbon cycle? (Darren Walton, Opus Central Laboratories)	Noted. We think making a clearer distinction between ethanol from sugar cane versus ethanol from corn will clear this up.
5-101	A	4	36	4	37	Primary energy from sugarcane is being used as a source of heat for ethanol production and as a source of electricity to the grid. Using this approach conversion effiiency from primary to secundary energy is very high (60%) (Moreira, , 2005, Global biomass energy potential. Mitigation and Adaptation Strategies for Global Change(Special Issue, forthcoming).). It is unlikely cellulose hydrolysis will achieve this efficiency. This statement is also backup by figures available in a recent World Bank Report (2005). It is important to say the true and avoids the establishment of false expectations on the readers. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. Again we will review this article when it is published and make changes as appropriate.
5-102	A	4	37			Because the production costs of biofuels by biomass gasification are estimated to be	CHECK

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						high, I think that the expression "both lower the costs" is not plausible. (please see IEA (2004), Table 4.8 and lines 25-26 on page 82) (Takayuki Takeshita, The University of Tokyo)	
5-103	A	4	40	4	41	I understand that statement made here is in conflict with what is state in Page 4, line 31. The mistake is in line 31. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted. The statement in line 31 refers to no time frame and is thus ambiguous. It will be deleted in favour of the explicit discussion here.
5-104	A	4	40			It's a Toyota Prius, you should assume your readers will know what it is. (Darren Walton, Opus Central Laboratories)	Noted.
5-105	A	4	40	4	40	Qualify "might displace half …." by mentioning costs relative to fossil alternatives. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Accepted. The material in chapter will be rewritten to better reflect the distribution of costs of GHG reduction via ethanol as shown in Figure 2 of the IEA Biofuels for Transport book.
5-106	A	4	40	4	41	Was this result derived taking into consideration the competitions for biomass resources and land among various biomass uses such as food production? If so, such a consideration should be described here for ease of understanding this result. (Takayuki Takeshita, The University of Tokyo)	Rejected. This is described in the chapter. The executive summary cannot contain all qualifications.
5-107	A	4	43	4	50	The fuel economy figures cited for hybrids are generally from U.S. EPA. It is well-known that they are massive overestimates. User-groups for hybrid cars generally show about a 25% increase in fuel economy over a base model. In some cases--such as the Honda Accord hybrid, the hybrid can actually get worse mileage than the base comparable car. This occurs in cold weather when an inordinate amount of internal combustion engine energy is diverted towards charging the battery pack, which performs worse and is harder to charge at lower temperatures. You are far too optimistic about the promise of hybrids. Note on page 22, lines 3-4 that Toyota gives the improvement as "20-30%". (Patrick Michaels, University of Virginia and Cato Insitutute)	Noted. The wording here is careful, stating up to 40%. Although hybrids in the U.S. are generally doing worse than their adjusted, combined EPA ratings, in other countries with more congested cities, as Japan, the benefits of hybridization can exceed 40%.
5-108	A	4	47	39		(www.wavegen.com). Also an other device "pelamis" from Ocean Power Delivery (http://www.oceanpd.com/) has been tested at the EMEC (European Marine Energy Centre Limited) in the Orkney's (http://www.emec.org.uk/). OPD Ltd will build in 2006 the first phase of the world's first commercial wave-farm for a Portuguese consortium Enersis. The initial phase will consist of three Pelamis P-750 machines located 5km off the Portuguese coast, near Póvoa de Varim. Two projects are at the R&D stage in France. Also...	This comment clearly pertains to a different chapter. It should be passed along.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(MICHEL PAILLARD, IFREMER)	
5-109	A	4	49	4	49	Current literature indicates diesel advantage can be 30 to 40% compared to gasoline (Robert Larson, US Environmental Protection Agency)	Noted. There is a range of estimates in the literature, some lower some higher than 30%.
5-110	A	4	49			clarify what "(per volume)" means (Stefano Caserini, Politecnico di Milano)	Accepted. "per volume" will be deleted. This refers to volume of fuel but is not needed.
5-111	A	5	1	5	1	Just after "is only about 20%" add the following: "Use of high octane biofuel (like ethanol) can increase significantly the energy efficiency of cars. Previous blending of gasoline and ethanol doesn't take full advantage of the high octane number of ethanol. It should be possible to run a car with almost the same efficiency than an hybrid car by using dual injection sustems, a small than average engine and a turbo compressor (Cohn, D. R., L. Bromberg, J. Heywood, Direct Injection Ethanol Boosted Gasoline Engine, MIT Internal Report, April 20, 2005) (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. We will check this source for details and make changes as appropriate. In particular, we want to investigate the degree to which this efficiency gain requires a dedicated versus a flex-fuel vehicle.
5-112	A	5	1			After 20 % add: On a LCA basis the difference is smaller, give the high CO2 production during car manufacturing. (Stefano Caserini, Politecnico di Milano)	Noted. However, as the statement references WTW reduction, it is correct.
5-113	A	5	5	5	5	Sources? (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Noted. Sources are provided in the body of the chapter.
5-114	A	5	7	5	7	Change "threat" to "issue." The problem is consumer preference. High fuel economy cars have been available in all markets. In more affluent countries, the consumer has opted for comfort and luxury at the expense of fuel economy. This is not a "threat," it is a fact of the market. One can argue over the extent to which advertising has played a role in these choices, but the fact remains that consumers have made the choice and in a free market will continue to make similar choices until convinced that higher fuel economy is a more important characteristic that more power and luxury, or until barred from making such choices by regulation. It is far from clear that such regulations could be imposed against the will of consumers in democratic countries. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted. We will change wording to reflect the sense of this comment.
5-115	A	5	8	5	8	rail is more than some high speed trains. German Railways (Deutsche Bahn AG) have worked for many years to improve their energy use. Not only through technical improvements (beginning with metering electricity consumption from actual driving but also by teaching thousands of train drivers in efficient driving. At the end they	Accepted. Text will refer to passenger rail and also to efficient operation. If the reviewer could provide a citable source for the numbers he provides this would be

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						saved money (less electricity consumption) - nearly 10 million Euros a year - and arrived at their 'climate target' (minus 25 % specific energy use, base year 1990) ahead of time and formulated a further one (minus 15 % [and even more when framework is improved] until 2020 on top of the minus 25%). (Manfred Treber, Germanwatch)	very helpful.
5-116	A	5	8			The increasing penetration of on-board devices such as air-conditioning would also have the same effect on a vehicle fuel economy as the effect of the increases in vehicle power and size. (Takayuki Takeshita, The University of Tokyo)	Accepted. Will also mention accessories as a user of energy.
5-117	A	5	13	5	25	Honda engineers have reported to me that they feel a marketable fuel cell car is "at least" 15 years away. Five years ago they told me the exact same thing. There has been very little real progress in this area, but a lot of publicity. (Patrick Michaels, University of Virginia and Cato Insitutute)	Noted. This seems to us consistent with the text as it is.
5-118	A	5	19	5	25	The figures cited for carbon emissions are without carbon dioxide capture and storage (CCS). As documented in IPCC's recently published Special Report on Carbon Dioxide Capture and Storage (SRCCS), gasification of carbon from any source to produce hydrogen creates a relatively pure carbon dioxide stream which is an excellent candidate for CCS technology, which would dramatically lower carbon emissions. As noted in the SRCCS, production of hydrogen from biomass in conjunction with CCS technology could actually lead to negative carbon emissions. CCS could also lower carbon emissions in the case of hydrogen produced via electrolysis using fossil-fuel based electricity. The SRCCS provides ample evidence that the post-combustion capture of carbon dioxide from coal-based electric power generation is technically feasible, with all components of the technology rated either economically feasible under specific conditions or mature market (SRCCS, Table SPM.2). The chapter's assessment needs to be redone adding CCS to those options in which it makes technical sense. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted. This paragraph needs to be revised to also reflect how difficult it will be for a fuel cell vehicle to achieve a 50% efficiency.
5-119	A	5	23	5	23	I suggest adding a sentence concerning the opportunity to generate hydrogene and store CO2 geologically. "Hydrogene could be produced from natural gas and the generated CO2 could be captured and geologically stored". (Torsten Clemens, OMV E&P)	Noted. This paragraph will be rewritten, as will the supporting text in the chapter, to provide a better discussion of the likelihood of such FCV breakthroughs and the critical role of CCS in low-C hydrogen.
5-120	A	5	25	5	25	At this point, it should be noticed that if the target is to reduce CO2 emission, probably the most efficient alternative would be to use ethanol from sugarcane,	Noted. We are going to revise the treatment of ethanol throughout the chapter

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						instead of converting biomass in hydrogen. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	to make a clear distinction between ethanol from sugar cane and ethanol from corn.
5-121	A	5	26			I would add something on technology for intermodality (Stefano Caserini, Politecnico di Milano)	Noted. This comment seems not to go with line 26. Also, what is being asked is not clear.
5-122	A	5	29	5	29	The authors should be more careful with the use of the term indefinitely. Therefore the following wording is proposed: The dependence of air travel on kerosene appears likely to continue for some decades. Chapter 5.4.2.3. informs on page 41 that H2 technology could be available within 15 to 20 years. (Radunsky Klaus, Umweltbundesamt)	Accepted. Will be changed to for several decades.
5-123	A	5	29	5	31	Add: Energy efficiency gains ... through enhancements in air traffic management technologies (so-called CNS/ATM enhancements; up to 10% fuel efficiency improvements) and aircraft operational improvements (up to 5% fuel efficiency improvements). Refs: ICAO Journal, 2001; Brok et al., 2000. (Paul Brok, National Aerospace Laboratory NLR)	Noted and referred to authors of air efficiency section of chapter for their reference and evaluation.
5-124	A	5	29			I think that the expression "indefinitely" is not suitable because a fuel option based on non-fossil fuels (e.g., biomass-derived F-T kerosene) is expected to become viable for airplanes in the future. (Takayuki Takeshita, The University of Tokyo)	Accepted.
5-125	A	5	34	5	34	I assume that the efficiency increase of 20 % until 2015 is valid for new planes (and not for the existing fleet - we know the inertia). To avoid misinterpretation, please write 'a 20% improvement in aircraft efficiency of new planes over 2000 levels is expected by 2015'. (Manfred Treber, Germanwatch)	Accepted. This is applies to new aircraft.
5-126	A	5	36	5	36	Please add: "Nevertheless, with decline in biofuel production cost and increase in oil prices ethanol is already being used in internal combustion propelled aircrafts in Brazil, significantly reducing CO2 emissions." (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. Material on ethanol from sugar cane will be substantially revised, as noted above.
5-127	A	5	40			I think it better to specifically describe what technical measures could reduce carbon emissions. (Takayuki Takeshita, The University of Tokyo)	Noted. Such detail is for the body of the chapter rather than the executive summary.
5-128	A	5	46	5	48	Regenerative braking is already introduced, e.g. at the German InterCityExpress-3 (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	Accepted with thanks to the reviewer for the reference.
5-129	A	6	10		14	very risky to present cross elasticities, because they really depend on market shares. What is more important is the message that the markets for car use and public	Accepted.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						transport do overlap only for a small part. Therefore an increase in the use of public transport does not result in an equally high (in absolute terms) decrease in car use. (Bert Van Wee, Delft University of Technology)	
5-130	A	6	10	6	15	I found this to be very questionable. At issue is the idea that to encourage walking and cycling it is necessary to improve infrastructure. Well, this might be true but the claim is 'to shift travel to non-motorised modes' and then it is implied that walking and cycling are the only choices available. This is not ture, and really a bad sign of how we can get caught up in certain popular responses to the issues at hand. (Darren Walton, Opus Central Laboratories)	Rejected. The overwhelming majority of non-motorized transport is by walking and cycling. Animal power is very small by comparison.
5-131	A	6	16			You should compare the total CO2 emissions in the case of introducing telecommuting with those in the case without telecommuting. It is a matter of course that telecommuting reduces CO2 emissions from automobiles, but it is important to consider that telecommuting would increase energy consumption because it would give workers more free time (otherwise this time is spent on commuting by cars). (Takayuki Takeshita, The University of Tokyo)	Noted. This will be redrafted in terms of a non-quantitative estimate because 1% gives too much of an impression of precision. We stand by the inference that the literature supports a small but net reduction in travel as a result of telecommuting.
5-132	A	6	19	6	24	This whole paragraph creates confusion and raises several points that are not adequately addressed. There are interdependencies that need to be considered when attempting to minimize energy use and CO2 emissions, taking into account the effects that in-flight operational changes will have upon ground operations. The degree that energy use and CO2 emissions are reduced during flight may significantly overshadow any such benefits for ground operations. The text may mislead readers into thinking that all aspects are potentially equal with regards to reducing energy use and CO2 emissions. In addition emissions of inlfuence during ground operations are likely to be different than those in-flight. What is meant by such strategies has been estimated at several 2-3%? What sources and methods can be referenced to support this claim? In the last sentence is it true that researchers have begun to address the potential to minimize or have they begun to understand the source and significance of effects including associated uncertainties? (Lourdes Maurice, US Government)	Noted. Air authors will address this comment.
5-133	A	6	19	6	24	Another option not mentioned is to use the most environmental friendly type of airplane as there are significant differences in specific GHG emissions between jets and turboprop engines, depending on the distance and other measures relating to air-traffic management. (Radunsky Klaus, Umweltbundesamt)	Noted. However, this level of detail cannot be fully reflected in the executive summary.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-134	A	6	19	6	21	Add: ... by optimising flight procedures, e.g. Continuous Descent Approaches (CDA). (Paul Brok, National Aerospace Laboratory NLR)	Accepted.
5-135	A	6	21	6	21	"The GHG reduction potential ... several 2-3%." What is included in this 2-3% and what is the source of this information? Please note also my previous references (ICAO Journal, 2001; Brok et al., 2000) (Paul Brok, National Aerospace Laboratory NLR)	Noted. Referred to air section authors.
5-136	A	6	21	6	22	Does "several 2-3%" mean the potential of each of "such strategies" or that of the total of "such strategies"? (Takayuki Takeshita, The University of Tokyo)	Noted. Please see responses to 5-135 and 5-132.
5-137	A	6	26	6	36	This section seems to be out of place. (Nick Campbell (Batch 2), ARKEMA SA)	Accepted. This section will be revised in the shortening of the ES.
5-138	A	6	31		35	strange, mixed categorization. Why only those pricing measures that aim to internalize external costs? What is correcting market failures? Cannot pricing (or internalizing external costs) be used for this? Please introduce a clear structure, including for policy measures (see general notes). Besides, the structure in the text following does not fit on the structure as presented. (Bert Van Wee, Delft University of Technology)	Noted. We will note in point three that we are speaking of other market failures, such as imperfect information, bounded rationality in consumer decision-making, and so on. Also, this presentation will be revised to match revisions in the chapter.
5-82	B	6	35	6	36	This is a very sensitive issue because it introduces restrictions on international trade. Influencing consumers and firms to shift their preferences and practices in favour of lower GHG emitting commodities and activities can easily end up being a barrier for trade (products and commodities from developing countries), and the Convention on Climate Change establishes that "Measures taken to combat climate change, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade" (4) United Nations Framework Convention on Climate Change. Article 3 paragraph 5 (Adnan Shihab-Eldin, OPEC)	Noted. This is a general comment for whole report.
5-139	A	6	37			Add a specific chapter on NMT: i.e. 5. Promotion of regulation to protect NMT transport (Stefano Caserini, Politecnico di Milano)	Noted. However, this applies to the chapter as a whole and not the executive summary.
5-140	A	6	40	6	45	I think the claim is facile. It is true in all cases that the energy requirments for urban transport and influence by density etc but in what way? (Darren Walton, Opus Central Laboratories)	Noted. We think very few if any readers will not realize that higher density means less transport energy use.
5-141	A	6	42	7	7	According to other authors, fuel choice and vehicle efficiency has modest impact	Rejected. The evidence is very strong and

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Shipper and Shiuen, 2005). The need is to strengthen alternative (fast buses, metro, cycles and feet); the best way to save CO2 is with sustainable cities (Stefano Caserini, Politecnico di Milano)	clear that fuel economy standards have a major impact on energy use and carbon emissions.
5-142	A	6	50	6	50	Change "acceptable" to "high." Acceptable is in the eye of the beholder. The consumers who buy cars with poor fuel economy, as so many do, obviously find their fuel economy "acceptable." (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted. Will delete this sentence.
5-143	A	7	2			Even if stricter fuel economy standards for new cars are adopted, the overall effect on the average fuel economy of the total fleet would be small because old cars with worse fuel economy still exist in a country. (please see Landwehr and Lilliu (2002) Transportation projections in OECD regions. Detailed Report, IEA, Fig. 2.11) (Takayuki Takeshita, The University of Tokyo)	Rejected. Thanks for the reference. However, fleet turnover may be delayed (there is actually little empirical evidence of this effect to be found in the literature) but efficiency gains will come, perhaps slightly later.
5-144	A	7	3	7	3	Could usefully illustrate the different fuel efficiency standards with the graph from the PEW centre report Comparison of Passenger Vehicle Fuel Economy and GHG Emission Standards Around the World, Dec 2004, which shows the very large disparaities between standards and implies a potential for tightening particularly US standards. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Accepted. However, this will be added to the chapter body and simply referred to in the ES. Thanks for this suggestion.
5-145	A	7	10	7	10	Should perhaps mention that TDM strategies have been developed in response to congestion rather than GHG emissions. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Accepted.
5-146	A	7	14			I would add: There is a tremendous need to design better mechanisms for integrating bicycles with public transit – greatly enhancing the effectiveness of both modes (Kennedy, 2002). Efforts such as greater integration of bicycles with public transit might be considered. (Stefano Caserini, Politecnico di Milano)	Noted.
5-147	A	7	15		19	tax differences with respect to fuel type may be introduces to have an impact on CO2- emissions as well (diesel versus petrol, other fuels such as CNG). (Bert Van Wee, Delft University of Technology)	Noted. This is considered a type of motor fuel tax for purposes of this sentence.
5-84	B	7	15	7	16	Suggest inserting the following paragraph: "Taxes on motor fuels, if regarded as an environmental policy tool needs to be considered together with taxes to other fuels, included coal and nuclear, which pose risks to the environment and health. Particularly coal, which produces more CO2 emissions per unit of calorific value than any other fuel, and is often heavily subsidised, whereas motor fuels with	Take consideration part of comments in section 5.5.1.4.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						relatively lighter emissions are heavily taxed or slightly subsidised in most countries. Besides, motor fuel taxes are regressive, and then unpopular, since they account for a greater share of income for lower-income households than for wealthier households." (Adnan Shihab-Eldin, OPEC)	
5-148	A	7	20	7	25	This paragraph discusses "transportation projects" and probably applies to all not just surface transport. It may need re-locating to a general policies section? (Nick Campbell (Batch 2), ARKEMA SA)	Accepted. This will either be moved to follow aviation and marine or deleted in the interests of space, given the difficulty of establishing transportation TDMs.
5-149	A	7	20	7	25	This discussion of the CDM appears out of place and probably should be placed in the Executive Summary section on policies and measures (Page 6 lines 26-36). Furthermore, there is a detailed discussion of the use of emissions trading in aviation and this should be reflected in the Executive Summary not just the CDM part of the discussion. (Andrei Marcu, IETA)	Accepted. Please see reponse to 5-148.
5-150	A	7	21			I recommend you to revise "mitigate GHG emissions" into "mitigate GHG emissions in developing countries". (Takayuki Takeshita, The University of Tokyo)	Accepted.Will be changed if not deleted.
5-151	A	7	29	7	38	This whole paragraph creates the impression that the numbers quoted are absolute (numbers such as 9% and 18% imply a high level of certainty). There is a lot of uncertainty surrounding the information, which should be acknowledged. Also, references should be provided for the studies. (Lourdes Maurice, US Government)	Noted. This paragraph will be reconsidered in the interests of reducing the size of the ES and the degree of detail will be reduced.
5-152	A	7	29	7	43	The discussion on aviation mitigation measures is limited to policies, while shipping measures focus on efficiency. Efficiency is also applicable to aviation and shipping could rely on policies as well. The authors should broaden the discussion on each topic. (Lourdes Maurice, US Government)	Noted. However, it is likely that the discussion in the ES will need to be shortened.
5-153	A	7	29	7	30	ICAO does not "implement" policies -- it makes recommendations to States. (Lourdes Maurice, US Government)	Accepted. Implement will be changed to recommend.
5-154	A	7	29	7	30	Change in English: "…..ICAO has not agreed on the policies to implement to ensure…" (Nick Campbell (Batch 2), ARKEMA SA)	Accepted. Also implement changed to recommend.
5-155	A	7	32	7	34	Refernces for EU and ICAO studies?	Noted. References are more appropriately

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Stephen Perkins, European Conference of Ministers of Transport (ECMT))	placed in the chapter proper.
5-156	A	7	35			not 50 dollar but 50 dollar cents, I assume. (Bert Van Wee, Delft University of Technology)	Accepted. $50/kg of carbon is the correct statement.
5-157	A	7	35	7	35	charge of $50/kg? of jet fuel: per TON? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted. $50/kg of carbon is the correct statement.
5-158	A	7	35	7	35	charge of $50/kg? of jet fuel: per TON? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted. $50/kg of carbon is the correct statement.
5-83	B	7	50	7	50	Suggest to add the following paragraph: "Removing fuel subsidies in developing countries could trigger complex situations: on the one hand the increase in energy end-use prices are felt immediately by the consumers and more by the poorer segments of the population, and can lead to violent reactions. On the other hand, higher market prices to consumers would normally result in lower demand and, therefore, lower output. Employment levels would fall as a consequence. This fall in production and in revenue could result in a lower gross domestic product (GDP) and lower economic welfare." Motor fuel subsidies exist mainly in developing countries and they are not committed to reduce their greenhouse gas emissions under the Kioto Protocol. (Adnan Shihab-Eldin, OPEC)	Noted. We willl address this in 5.5.3.3.
5-159	A	8	7	8	7	... if congestion is decreased.' This negelects the constant time budget for transport. If time is 'saved' due to less congestion this will be 'reinvested' in higher distances so that there is no decrease of km travelled (Manfred Treber, Germanwatch)	Noted. We have just said that investments in road systems will increase travel.
5-160	A	8	7	8	10	The example cited of "…the efficiency per unit of activity may increase if congestion is decreased…" is a good example of recognizing a type of infrastructure project that can decrease emissions. I agree that "…this could be a potentially important area for [sic] in which the CDM, if effectively applied, could have a significant impact on mitigation. At the same time, decreasing congestion is by no means the only kind of infrastructure improvement that may decrease GHG emissions. This subsection should give some recogition to other types of infrastructure projects, e.g., increasing non-motorized modes of transport within the city center may be another type of project. (Arthur Lee, Chevron Corporation)	Noted. These alternatives are covered elsewhere.
5-161	A	8	7	8	10	The example cited of "…the efficiency per unit of activity may increase if congestion is decreased…" is a good example of recognizing a type of infrastructure project that can decrease emissions. I agree that "…this could be a potentially	same as above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						important area for [sic] in which the CDM, if effectively applied, could have a significant impact on mitigation. At the same time, decreasing congestion is by no means the only kind of infrastructure improvement that may decrease GHG emissions. This subsection should give some recogition to other types of infrastructure projects, e.g., increasing non-motorized modes of transport within the city center may be another type of project. (Andrei Marcu, IETA)	
5-162	A	8	12	8	29	This is a very realistic assessment of the roles of the public and private sector in transport R&D and of the need for protecting intellectual property rights. It should be retained in future drafts. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted.
5-163	A	8	14	8	14	Editorial comment: rather than say private companies have not right, rather say "company has limited ability" (Robert Larson, US Environmental Protection Agency)	Accepted. Wording will be changed.
5-164	A	8	14	8	30	Poorly drafted, difficult to get the point being made. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Accepted. Wording will be changed.
5-165	A	8	34	8	34	In Chapter 4 (P49, line 1), there is one statement that oil is responsible for 99% of all transport energy. Check the figure here with the one in Chapter 4 for consistency. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. We have checked and stick with 96% but will coordinate with ch. 4.
5-166	A	8	34			I guess this is a USA-share (96%), but certainly not for developed economies in general! In Europe the share of petrol is much smaller (more diesel). (Bert Van Wee, Delft University of Technology)	Noted. By petroleum, we include diesel, kerosene and other fuels derived from crude oil and NGLs.
5-167	A	8	34	8	34	motorized transport fueled by petroleum: Is this for surface transport in general or only for transport on the road? Rail has a much higher share of other energy modes due to electricity use. (Manfred Treber, Germanwatch)	This is for the whole of transport, including all modes in aggregate.
5-168	A	9	1			In Germany mitigation is discussed under i. avoid transport, ii. shift to more climate friendly transport modes and iii. better technical performance. It is consequent to begin with i. because this is the broad perspective and ending with the details (iii.). Why here another procedure? (Manfred Treber, Germanwatch)	Accepted. This paragraph is repetitive of previous material and only covers part of it. It will be deleted in order to reduce the length of the ES.
5-169	A	9	3			I think that biofuels are regarded as carbon-neutral, so the expression "low carbon fuel" is misleading. (Takayuki Takeshita, The University of Tokyo)	Rejected. On a well-to-wheels basis, most biofuels are not carbon neutral.
5-170	A	9	9	9	9	Should define "costs" since the use in this sentence implies net cost to consumer	Accepted. This section will be entirely

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						after taking into account fuel savings (Robert Larson, US Environmental Protection Agency)	revised.
5-171	A	9	21			line 21 and further: which period does this outlook include? This is also important for the main text, e.g. page 13 and further. (Bert Van Wee, Delft University of Technology)	Accepted, will clarify
5-172	A	9	23			After "As economy grows, people tend to use more energy-intensive mode of travel." add: After certain level of motorization, people find interesting the use of NMT, in particular for the amount of co-benefits (EC, 1999) (Stefano Caserini, Politecnico di Milano)	Rejected
5-173	A	9	25	9	26	You should describe the period during which "the average growth rate of 1.7%/year". (Takayuki Takeshita, The University of Tokyo)	Accepted
5-174	A	9	27	9	27	Spell out LDV. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted
5-175	A	9	27	9	27	The aviation growth rate reported here (2.6%) is not consistent with that reported on page 16 line 17 (3-5%). The authors should clarify whether they are reporting the growth rate of CO2, passenger-km, or ???? (Steven Baughcum, Boeing Company)	Noted
5-176	A	9	36	9	37	I see no reason why we need advanced biofuels in ICE-powered vehycles to offset the growth in CO2. The present generation of ethanol and biodiesel fuels, depending of the biomass source used for their production, is significantly reducing CO2 emission. In Brazil, 30 million t of CO2 is abated every year with the use of ethanol. And it is important to know that by adding carbon capture and storage CO2 emission from ethanol derived from sugarcane can be negative (Mollersten et al, 2003). (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Rejected, adequate supply of sugar cane-based ethanol cannot be obtained
5-177	A	9	43			Remark: Energy efficiency of current average jet airplane is hardly better than the efficiency of the last generation piston powered airplanes. Ref: Peeter et al. (2005) 'Fuel efficiency of commercial aircraft; an overview of historical and future trends' http://www.t-e.nu/docs/Publications/2005pubs/2005-12_nlr_aviation_fuel_efficiency.pdf (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted - Will check and need to comment on efficiency measure. NLR report
5-178	A	9	43			Remark: Energy efficiency of current average jet airplane is hardly better than the efficiency of the last generation piston powered airplanes. Ref: Peeter et al. (2005) 'Fuel efficiency of commercial aircraft; an overview of historical and future trends' http://www.t-e.nu/docs/Publications/2005pubs/2005-12_nlr_aviation_fuel_efficiency.pdf	same as above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-179	A	9	43	9	46	"The efficiency of aircraft engines is increasing, improved aerodynamics and the use of lightweight materials on aircraft, and the enhancements in air traffic management and aircraft operations are expected to continue to be important sources of greater energy efficiency in commercial aviation. (Paul Brok, National Aerospace Laboratory NLR)	Accepted – will ensure this statement is reflected in the text
5-180	A	9	49	9	49	Should read: "improvements may still be possible such as using low C emission biofuels or hydrogen as a commercial aircraft fuel." (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Rejected
5-181	A	9	49	9	49	Please add to 'using hydrogen as a commercial aircraft fuel': But this also implies contrail formation which has a high contribution to the warming induced from aviation fueled by kerosene. (Manfred Treber, Germanwatch)	Noted – will consider adding text
5-182	A	9	49			As a result of the CRYOPLANE project, it was concluded that energy consumption of liquid hydrogen airplanes might increase by 8-15%. (please see h2hh.de/downloads/Westenberger.pdf) Therefore, at this stage, it is not necessarily true that hydrogen airplanes would increase energy efficiency than conventional airplanes. (Takayuki Takeshita, The University of Tokyo)	Noted – will check statement
5-183	A	10	0			It would also be good to have some information about the magnitude of the contribution from transport to climate change. So far there are not many estimates available, but a brief overview of the RF numbers for aviation from the IPCC special report would be helpful (with more recent updates). For the other sectors or for the transport sector as a whole, the shares of the total man-made emissions of CO2, NOx, CO, SO2 etc would be helpful to get an overview of the role of transport in the context of climate change. (Jan Fuglestvedt, CICERO)	We will assess non-GHG.
5-184	A	10	0			I think the chapter would benefit from a better overview of how transport affects climate; i.e. emission of long-lived and short lived gases, precursors of trop O3 and aerosols; causing forcing of both sign. Box 5.1 is useful, but does not, in my opinion, give enough information. Maybe this is covered in Table X, which I can not find. (Jan Fuglestvedt, CICERO)	We will assess non-GHG.
5-185	A	10	1	80	17	Since the GHG potential of road freight could be substantially reduced, the quantifying of options and their respective mitigation potential should be done, but it is not. So we observe in Swizerland a substantial reduction of total CO2 after	Accepted, we will add to the extent possible

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						introduction of the fee on heavy duty vehicles in a magnitude of 7%, and 17% of the fleet tkm in Sweden is done by 60 t trailer, but these examples remains exceptions. Since UK increase the truck size to 44 t, a 3% reduction occured (McKinnon, Transportation Research, Part D: Transport and Environment TRD, 2005) (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	
5-186	A	10	1	80	17	General comment: This is a very good text. Thanks to the excellent authors. Thank you to take into account some of the following constructive remarks. Data, analysis and mitigation options are widely missing in the FOD for freight transport emissions. Overview see McKinnon (2003): Logistics and the Environment; in: Henscher, D.A. und Button, K.J.: Handbook of Transport and the Environment, Amsterdam: Elsevier, 665-685 (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	accepted
5-187	A	10	1	80	17	General comment: Since freight transport energy represents 37% of total transport emissions, research on road freight don't represent by far 37% of all climate mitigation research in transportation. Lw level of research means poor data accuracy, little amount of valid data, and very few knowledge on energy saving measures in companies and few knoledge on policy making. Most of feight research is based on calculations, not on consumption measurements in different branches, countries and contextes. Out of up to 74 categories of measures, only 3 have been quantified. Reduction potential for total CO2 is 20%, if actual measures would be applied in Germany, with no technological innovation like hydrogen etc. Leonardi, J. and Baumgartner, M. (2004): CO2 efficiency in road freight transportation: Status quo, measures and potential. Transportation Research, Part D: Transport and Environment, 9, 2004, 451-464 (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	noted
5-188	A	10	1	80	17	General comment: Important chapters on aviation are writen, I recommend to write a separate chapter on road freight transport emission mitigation options under 5.5.1, or, at least, paragraphs under 5.4.2 (technologies like telematics, fleet management and scheduling systems, packaging software, reducing intervalls of reparations, etc) and under 5.4.3 (organisational and logistical changes like supply chain design, km demand reduction, efficiency through co-operation models, etc.) (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	Accepted, we will do this

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-189	A	10	3	10	17	Introduction - this section sould contain a paragraph on sustainable transport -- i.e., the need for transport options that are economically viable, affordable, socially acceptable and have minimal environmental impacts (PMMM 2005) (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	Taken into account We will add.
5-190	A	10	6			Reference WBCSD 2001 not in Ref list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	We will take care.
5-191	A	10	6			Reference WBCSD 2001 not in Ref list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-192	A	10	8	10	8	"Since transportation ... " is not meant but 'Since motorised transportation on road ...'. Please be correct! (Manfred Treber, Germanwatch)	We will take care.
5-193	A	10	14	10	14	"... where infrastructures including road networks and public transportation system are not well developed. So this leads to congestion ...". This gives the wrong impression that good road infrastructure and good public transport can avoid congestion. Look at California and Tokyo where both good conditions are given and there is nevertheless congestion! The availability of roads and a high number of vehicles produce the congestion which is inevitable. (Manfred Treber, Germanwatch)	accepted, will better reflect this in text
5-194	A	10	20	10	45	Transportation is the key engine of wealth? Is it, are you sure? I doubt the veracity of the statement. I think energy consumption may well be the key engine of wealth but whether this is the same as transportation is moot. It is very important to be clear of the difference between Transport energy consumption underlining wealth and transport energy consumption being concommitant with wealth or the very real chance that wealth generates transport energy consumption. (Darren Walton, Opus Central Laboratories)	rejected
5-195	A	10	24	10	24	high levels of transportation activity not only because they can afford to, but' ... there system constraints (necessity to grow) so that transportation is a key of ... (Manfred Treber, Germanwatch)	This is unclear
5-196	A	10	27	10	30	I recommend you to refer to Schafer and Victor (2000) The future mobility of the world population. Transportation Research Part A 34. pp.171-205, who discussed this issue in great detail both theoretically and empirically. (Takayuki Takeshita, The University of Tokyo)	noted
5-197	A	10	33	10	34	'current transportation activity is overwhelmingly driven by internal combustion engines powered by petroleum-based' is to car oriented. This may be valid for the US. But 5% of global population does not map the complete world. Transport is much more. Please specify to 'current motorised transportation activity on the road is	accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						overwhelmingly driven by internal combustion engines powered by petroleum-based ...' (Manfred Treber, Germanwatch)	
5-198	A	10	39			after "fuels" add "and changes in the patterns of urban development" (Danny Harvey, University of Toronto)	rejected
5-199	A	10	41	10	41	Please add: "-through none appears to be a single "grand solution" in the short time". (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Rejected, true in long term also
5-200	A	10	43			The document notes a potentially imminent peak in conventional oil production (Page 10, Line 43, shortened here as 10-43), but then proceeds in many respects as though this will not happen. If there is to be an imminent peak in conventional oil production, it's not likely that transport energy use in 2030 will be about 80% higher than in 2002, with almost all of the new consumption being fossil fuels. The document needs to be restructured around some realistic scenarios for transport energy use. (Richard Gilbert, Centre for Sustainable Transportation)	Accepted, will add text
5-201	A	10	45	10	46	The term "unconventional fossil resources" is usually used to refer to natural unconventional oil and gas, so I recommend you to delete "liquids from natural gas and coal". (Takayuki Takeshita, The University of Tokyo)	Noted, we will check
5-202	A	10	46			there is no such thing as "oil" sands"; they are "tar" sands (the term used everywhere in the world except in Canada) (Danny Harvey, University of Toronto)	accepted
5-203	A	11	1	11	2	At this point it is useful to recognize that there are lower, zero and negative carbon resource. See IPCC Report on Carbon Capture and Storage where biofuels produced in combination with carbon capture and storage may yield negative CO2 emission." (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	accepted
5-204	A	11	4	11	4	What is the meaning of "Transport Toda". (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	accepted
5-205	A	11	4	11	4	The following wording is proposed: "Transport Today" (Radunsky Klaus, Umweltbundesamt)	accepted
5-206	A	11	4			toda … today (Stefano Caserini, Politecnico di Milano)	Accepted
5-207	A	11	7			Too often, dated or inadequate data sources are used. For example, transport's share of GHG emissions for 2000 are given at 11-7. Data for 2002 are available in IEA (2004a). Moreover, transport's share of final consumption in IEA (2004a) is 39%, not the 28% in the text.	Accepted,

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Richard Gilbert, Centre for Sustainable Transportation)	
5-208	A	11	10	11	10	It is proposed to check the term "highway" vehicles because that term is not very common. In this context it is proposed to use a terminology that is widespread, well established and has already been agreed by many countries. (Radunsky Klaus, Umweltbundesamt)	Accepted, we will check
5-209	A	11	12	11	12	The figure 96% must be negotiated with other Chapter. For example, Chapter 4 (P49, line 1) uses 99%. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	accepted, we will coordinate
5-210	A	11	17			Table 5.1 is not based on empirical data, but on the IEA model that estimates them. I have some doubts about the numbers for 2000 for air and ships, since total kerosene sells estimates varies from 5 to 10% of all transport fuels (OECD - Organisation of Economic Cooperation and Development (2002): Environmental Data 2002 Compendium Transport, Paris). If you decide to use the model, then the evolution in time should be shown. (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	accepted
5-211	A	11	17			A figure on transport energy demand development by modes 1970-2000 should be made available. Table 5.1 is too static. (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	Accepted, if available
5-212	A	11	25	11	26	About 75% of population of the industrialized countries is currently concentrated in urban areas, and this share is projected to increase to nearly 85% by 2030. Only 40% of the population in the countries of the developing regions lives in urban aread today, it is projected that this share will increase to 56% by 2030. Globally, 60% of the world population is projected to live in urban areas by 2030. This has a significant influence on the mobility patterns. (please see WBCSD 2001: Mobility 2001 - world mobility at the end of the twentieth century and its sustainability (page 2-3). (Stephan Herbst, Toyota Motor Europe)	accepted
5-213	A	11	27	11	28	A parallel trend has been the decentralization of cities ...' why not also argueing why (and thus showing which condition has to change to make a change): 'A parallel trend possible allowed by the availability of cheap fossil energy has been the decentralization of cities ...' (Manfred Treber, Germanwatch)	accepted
5-214	A	11	31	11	31	It is proposed to check the term "public transit" because this term is not very common. In this context it is proposed to use a terminology that is widespread, well	Accepted, will determine acceptable terminology

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						established and has already been agreed by many countries. (Radunsky Klaus, Umweltbundesamt)	
5-215	A	11	39	11	40	The data sources for the description "33% of China's population and ~ to all-weather transport" should be referred to. (Takayuki Takeshita, The University of Tokyo)	Rejected, data is from mobility 2001 as stated
5-216	A	11	40	11	40	Is "all-weather transport" an accepted term? The text seems to imply that it means motorised modes. To my mind, however, most non-motorised modes are more "all-weather" than motorised modes. (Dominic Stead, Delft University of Technology)	Accepted, will edit
5-217	A	12	2			I will change “a critical goal will be to minimize…” with “a critical goal will be to limit this increase assuring flexible and short travel time. (Stefano Caserini, Politecnico di Milano)	rejected
5-218	A	12	5	12	15	Need to mention very rapid growth of cars in Central- and Eastern Europe. Fast growth is caused also by cheap second hand cars from Western Europe which wate more energy. (Rein Ahas, University of Tartu)	Accepted, though probably should be mentioned elsewhere
5-219	A	12	7	12	8	I think that the expression "And as income and travel have risen ~ has risen with them" is redundant. (Takayuki Takeshita, The University of Tokyo)	rejected
5-220	A	12	9			According to Landwehr and Lillliu (2002), pp.144, the share of auto travels in Western Europe is 79% (in terms of pkm). I think it better to compare modal shares in terms of passenger-km or tonne-km. (Takayuki Takeshita, The University of Tokyo)	Accepted, but data may not be available for developing nations
5-221	A	12	10			According to Landwehr and Lillliu (2002), pp.154, the share of auto travels in the US is 84% (in terms of pkm). I think it better to compare modal shares in terms of passenger-km or tonne-km. (Takayuki Takeshita, The University of Tokyo)	Accepted as above
5-222	A	12	14	12	14	Are the values for vehicle sales in China actual sales or projected sales? The data are for 2001-2003, but the reference is 2000. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	accepted, we will check
5-223	A	12	16			I recommend you to modify "with a current fleet" into "with a current world fleet". (Takayuki Takeshita, The University of Tokyo)	accepted
5-224	A	12	19	12	20	The data sources for the description "even in Latin America and ~ for 20 to 40% of all trips in many cities" should be referred to. (Takayuki Takeshita, The University of Tokyo)	Rejected; from m2001
5-225	A	12	21			add Amsterdam and Copenhagen to the list.	Accepted, will check

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Danny Harvey, University of Toronto)	
5-226	A	12	21	12	21	New Delhi, China, Vietnam.' Why not adding a city in the Netherlands (or Münster in Germany) to show that this is not only a phaenomenon of developing countries? (Manfred Treber, Germanwatch)	Accepted, will check
5-227	A	12	22			After .. "Vietnmas" add: Although the number of car is growing fast, NMT (non-motorized transport) is the most used means of transport in the world. This is true not only in developing word (NMT account for 25 to 70 percent of vehicle trips in many Asian cities, Hea at al., 2003; Replogle, 2001) but also in some developed country in Europe (EC, 1999; City of Copenhagen, 2005) . Even though there are not reliable data on number of bike existing and used in different regions of the world, number of bike sold indicate clearly that the most used means of transport in a large part of the world (and in total) is bicycle (Brown e Larsen, 2002). In developed nations, while the growing trend in car use continues, the level of bicycle use seems generally stable with only minor fluctuations. The modal share of cycling trips, though varying from country to country, is roughly 5 to 10% of all trips in Western Europe and approximately 1 to 5% in Central and Eastern European countries. Two countries stand out with much higher modal shares for cycling: the Netherlands (27%) and Denmark (18%). Results for Netherlands and Denmark, in which bicycle is one of the main systems of travel in cities, are due at least in part to national governments' strong, long-term, support for cycling (EC, 1999). (Stefano Caserini, Politecnico di Milano)	Accepted, but need to check this out
5-228	A	12	23			It would be useful to add few data about number of different means of transport available in the word, or km-passenger for the different means of transport, including biking and walking. I have seen figure in the past (maybe in the millennium city database) but I'm not able in the few time of this review to provide adequate reference. Don't hesitate to contact me for further information (Stefano Caserini, Politecnico di Milano)	Accepted if data available
5-229	A	12	23			I would very appreciate one sentence (in line 27 after Asian Cities) on light rail and on the renaissance of tramways (one example for light rail) which can be observed in a lot of developed countries (France as frontrunner - in the year 2000 alone new systems in four different cities have opened - but also UK, Greece (Athens before the Olympic Games), Ireland, Spain, US, Germany, Turkey ...) where they regularly have big success after inauguration. This mode needs much lower investments than metro systems and has a much higher attractivity than buses so that also car owners use it (e.g. data from Karlsruhe, Germany, where there is good documentation on the	Accepted, we will add material

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						share of riders of public transport who use bus, tram or light rail train in spite of having access to a car). (Manfred Treber, Germanwatch)	
5-230	A	12	28			According to Fig. 8 in Schafer and Victor (2000), the modal share of rail in Former Soviet Union, Eastern Europe, and Centrally Planned Asia is relatively large. Therefore, I think that the description "only in the largest, densest cities of the industrialized world" is not true. (Takayuki Takeshita, The University of Tokyo)	Accepted, we will check
5-231	A	12	29	12	29	insert one example for the exception to show that is not exotic: 'are rarely (e.g. Tokyo) the dominant mode' (Manfred Treber, Germanwatch)	Accepted, we will check
5-232	A	12	30			add: "except for Hong Kong, Tokyo, and Singapore" (Danny Harvey, University of Toronto)	Accepted, we will check
5-233	A	12	46			It is true that freight transportation modes are shifting from rail or navigation to more energy-intensive modes such as trucks. However, I have a question of whether trucks are faster than rail or shipping. I admit that freight transportation by trucks are more flexible by rail/shipping transportation. (Takayuki Takeshita, The University of Tokyo)	Accepted, we will check
5-234	A	13	6			The document contains too many inaccuracies. For example, at 13-6, carriage of bulk dry cargoes (e.g., iron ore), which comprises about 30% of marine traffic (UNCTAD, Review of Marine Transport 2005, Table 5, is not included as a feature of international freight. At 13-13, Western Europe's freight system is said to be dominated by trucks, whereas more freight is carried by water (European Commission, Energy and Transport in Figures 2004, Figure 3.2.1). (Richard Gilbert, Centre for Sustainable Transportation)	Accepted, we will check
5-235	A	13	9	13	15	It would be welcome to include some reference. Reality is not reflected well in saying that in wetsren Europe virtually no freight is carried by the rail system. It should be mentioned that significant investments are being made to move more freight to the railway system. It might also be useful to inform what the problems are with the railway system in Europe (e.g. not one single system but a conglomerate of national systems that reduces the speed of transport considerable, especially cross-border transport). (Radunsky Klaus, Umweltbundesamt)	Accepted, we will check; reference is m2001
5-236	A	13	11	13	11	which has after the decline of the Sowjet Union the highest ..' (Manfred Treber, Germanwatch)	Accepted, we will check
5-237	A	13	11			Because the share of freight air is marginal, I recommend you to modify "all modes"	Accepted, will say "except air"

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						into "trucks, railways, and navigation". (please see Fig.11.2 in WORLD ENERGY OUTLOOK 2000) (Takayuki Takeshita, The University of Tokyo)	
5-238	A	13	13	13	14	Because the share of railways in total freight activity is 15% for Western Europe and 5% for Japan, I recommend you to delete "with virtually no freight carried by their extensive rail systems". (please see Landwehr and Lilliu (2002), pp.145 and 153) (Takayuki Takeshita, The University of Tokyo)	Accepted, we will check
5-239	A	13	13			Because Japan's freight system is dominated by coastal shipping, I recommend you to delete "and Japan's". (please see Landwehr and Lilliu (2002) , pp.99, lines2-3) (Takayuki Takeshita, The University of Tokyo)	Accepted, we will check
5-240	A	13	15	13	20	The box should mention the leakage of air-conditionning systems from cars, a source becoming very important : 'Fluorocarbons leaking from air-conditionning systems of cars can be a substantial source of emissions : in the case of France, recent figures from CITEPA, the governnment-mandated laboratory for such data, fluorocarbon emissions from transport have gone up in ten years from 0,1 to 2,3 MT CO2 eq. or about as much as marine transport!' (Antoine BONDUELLE, E&E_Consultant)	We will add.
5-241	A	13	16			Box 5.1: This is useful but the RF numbers given here could be compared to e.g. to total RF from CO2 to put the numbers in a context. An illustration could be helpful. (Jan Fuglestvedt, CICERO)	Accepted.
5-242	A	13	16			Box 5.1: This is useful but the RF numbers given here could be compared to e.g. to total RF from CO2 to put the numbers in a context. An illustration could be helpful. (Jan Fuglestvedt, CICERO)	same as above
5-243	A	13	16	13	20	In the last sentence in Box 5.1, the statement that "the single largest influence is potentially enhancement of cirrus clouds" only tells half the story. The other half being that still very considerable uncertainty exists about this effect and its potential magnitude. The fact that the upper bound of cirrus RF estimates is now estimated to be twice as high as before (i.e. 80 mW/m2 instead of 40) might say something about the potential magnitude of the cirrus effect, but it does not reduce the uncertainty. In addition, it is questionable whether such a statement shuld be made on the basis of one single cited source (Stordal et al, 2005) (Andreas Hardeman, International Air Transport Association)	noted
5-244	A	13	18			Table 5.2. There are several inconsistencies, Fuel efficiency is cited as the mitigation measures for CO2 for aviation, while fuel efficiency and ship	noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						modifications are noted for shipping. Are aircraft modifications also not a technological mitigation approach? Are these implied in fuel efficiency? If so, would this not be the case for shipping? Operations are noted as a contrail mitigation technique. Are all operational measures dependent on technology? (The column is labelled technology mitigation measures). (Lourdes Maurice, US Government)	
5-245	A	13	20			It is noted that significant parts of that chapter are not linked to references of literature. It is strongly recommended to either link those paragraphs to literature or to delete them (Radunsky Klaus, Umweltbundesamt)	Rejected, reference is m2001
5-246	A	13	22	14	36	It is noted that all those paragraphs are not linked to references of literature. Either such references can be added or the paragraphs should be deleted. The studies addressed later in this chapter provide enough materials to inform about GHG emissions related to transport in the future. (Radunsky Klaus, Umweltbundesamt)	Rejected; reference is m2001
5-247	A	14	5	14	10	In this chapter, the alarming implications of coal-derived road and air transportation fuels was not given much attention. Several optimistic studies reported that coal-derived liquids fuels require process energy use at at least 20-40 GJ/t fuels. The recent US DOE study (Bechtel et al 2003), however, shows a shocking process energy use at 80 GJ/t fuels with cogeneration of electricity 36 GJ/t fuels. The uncertainty about coal-derived fuels is therefore very high. If China and US, who are busy doing R&D in this field these days, decide to produce fuels from coal in the next 30 years, we can expected high CO2 emissions per unit of fuels. (Tao Ren, Utrecht University)	Accepted, will discuss further
5-248	A	14	7			I recommend you to modify "alternatives to oil" into "alternatives to conventional oil". (Takayuki Takeshita, The University of Tokyo)	accepted
5-249	A	14	9	14	11	It isn't correct to say that biofuels are costlier. There are a few countries where biofuels are being extensively used as Brazil, USA, and some EU-15 countries. The leading one is Brazil and there ethanol from sugarcane is cost competitive with oil at prices higher than US$25/bbl (World Bank Report, 2003). Also at this point, it would be useful to state that ethanol from fermentation of sugars can yield negative CO2 emissions just by capturing and storing the CO2 produced simultaneously with ethanol. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted, we will check
5-250	A	14	10	14	11	I recommend you to revise the description "most will increase ~ without carbon	Rejected; current language is clear

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						sequestration". The first reason is that biomass-based transportation fuels can be viewed as carbon-neutral. The second reason is that non-fossil-based electric power generation (mainly nuclear power) has already had a noticeable share. (Takayuki Takeshita, The University of Tokyo)	
5-251	A	14	14	14	14	Delete refernce to terrorism - does not seem relevant. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	rejected
5-252	A	14	14	14	19	I think that it is not transport demand but modal shares (e.g., declining share of air) that are affected by the potential fear of terrorism. (Takayuki Takeshita, The University of Tokyo)	Rejected; terrorism can slow economy, travel
5-253	A	14	40	15	10	Many people do not find these "official" or conventional projections to be at all credible, due to the growing awareness that global oil production will likely peak some time between now and 2020. Whether or not it peaks by then, it is hard to identify where the additional oil to supply 80% greater consumption than today will come from (Canadian tar sands? - forget it, too much natural gas is needed and nuclear energy input would never be accepted). There is a lot being written on this and a lot of questions about official oil reserve estimates from countries where information is not available to outsiders (i.e., the Persian Gulf countries that are thought to have large remaining reserves), so the alternative viewpoint (that oil extraction will peak soon) should be acknowledged. (Danny Harvey, University of Toronto)	Rejected, point already made on p.16
5-254	A	15	12	15	24	This would be excellent place to raise the issue of the irreversible loss of windows of opportunity and hence the utmost importance of shifting thinking when it comes to urban development so as not to lock in energy-intensive transportation systems and auto dependence. (Danny Harvey, University of Toronto)	accepted
5-255	A	15	13		24	Motorization (increase in automobile holding) is forcast to promote particularly in China."car ownership will surge from 27.42 million cars in 2004 to about 200 to 300 million cars in 2030, and the diffusion rate will increase from 2.1% to 20%. " Please see Table 4-1, page 16 of attached file "Li Z.doc".(Source: Li Z, Ito K and Komiyama R, 2005, Energy Demand and Supply Outlook in China for 2030 and A Northeast Asian Energy Community - The automobile strategy and nuclear power strategy of China -, The Institute of Energy Economics, Japan (IEEJ),http://eneken.ieej.or.jp/en/index.html) (Ryoichi Komiyama, The Institute of Energy Economics, Japan (IEEJ))	Accepted, but we need this file
5-256	A	15	20			here and elsewhere - convert all non-metric units to metric units. (Danny Harvey, University of Toronto)	accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-257	A	15	30	15	30	Is it possible to give the share of the world population these countries have to be more demonstrative? (Manfred Treber, Germanwatch)	accepted
5-258	A	16	4			The expression "total world fuel use" should be modified into "total world fuel use from the transport sector" or "total world fuel use by freight trucks" (I don't understand which is true). I think that the original sentence does not make sense. (Takayuki Takeshita, The University of Tokyo)	accepted
5-259	A	16	13			The expression "peaking of world oil production" should be modified into "peaking of world conventional oil production" to be consistent with the expression in line 44 on page 10. (Takayuki Takeshita, The University of Tokyo)	accepted
5-260	A	16	16			In this section I'm missing results from the EC-project AERO2K (2004) and the Netherlands' AERO study (Main report, 2002) (Paul Brok, National Aerospace Laboratory NLR)	Noted – will consider adding reference and information
5-261	A	16	17	16	25	There are other recent concerted efforts at compiling inventories (AERO2K in Europe, SAGE in the US). These should also be cited (http://www.faa.gov/about/office_org/headquarters_offices/aep/models/sage/; http://www.cate.mmu.ac.uk/aero2k.asp) (Lourdes Maurice, US Government)	same as above
5-262	A	16	17	16	17	It is unclear how aviation's growth is considered to be "strongly" at 3-5%. Suggest a relative measure or delete the word "strongly". (Lourdes Maurice, US Government)	Accepted and will supply information, contrast with other sectors? Information available?
5-263	A	16	17	16	17	The aviation growth rate reported here (3-5%) is not consistent with that reported on page 9 line 27 (2.6%). The authors should clarify whether they are reporting the growth rate of CO2, passenger-km, or ???? (Steven Baughcum, Boeing Company)	Noted, and will review consistency
5-264	A	16	18	16	20	What are the projected growth rates for the US and Europe? Are rates in rapidly growing regions (e.g., China, India) not even greater? (Lourdes Maurice, US Government)	Noted and will change
5-265	A	16	22	16	25	The numbers quoted for the Lee study appear to be significantly higher than those reported previously in the IPCC Special Report on Aviation (1999). The authors should cite other studies (e.g., ERO2K, ANCAT, NASA, SAGE) and discuss the differences. (Steven Baughcum, Boeing Company)	Noted (results differ due to better information) and citation point agreed
5-266	A	16	22			I think that it is kind to the readers if you add an explanation of what "inventory	Rejected

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						methodology" is. (Takayuki Takeshita, The University of Tokyo)	
5-267	A	16	26	16	38	The use of RFI as a climate metric is not well established and does not account for the very differnet lifetimes of CO2, NOx/O3, methane, and contrails. The authors should refer to the recent paper by P.M. de F. Forster et al. / Atmospheric Environment 40 (2006) 1117–1121 and Shine and co-workers in PNAS, vol. 102, 15768–15773 (2005). They should also be consistent with the discussion of climate metrics in the WG1 FAR report. (Steven Baughcum, Boeing Company)	Rejected – text refers to the different effects of the range of pollutants from aviation on the the atmosphere. The reviewer has misunderstood the context.
5-268	A	16	27	16	38	This section is misleading by including radiative forcing numbers without unceratinty bands. (Lourdes Maurice, US Government)	Noted – the text is meant to convey the effects of emissions on the atmosphere. Greater detail might confuse this message, but will add text.
5-269	A	16	30	16	36	I suspect that the single addition of all these effects doesn't provide a reliable figure. Most of the figures have associated uncertainties and when adding them the total uncertainty must be considered. It would be useful to say a few words on these uncertainties. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted as above
5-270	A	16	34	16	38	Taking into account remaining uncertainties, these effects can be estimated to sum up to a total aviation radiative forcing for 2000 broadly in the range of about 50-130 mW/m2. This corresponds to about 3,7 - 9% of total anthropogenic forcing for 2000. The total radiative forcing from aviation in terms of its radiative forcing index (RFI) which is the sum of forcings divided by the CO2 forcing, is in the range of 2-5. Rationale: There is two caveats to the current draft: 1) Sausen et al. (2005), cited here, do not accept the trend observations and the derived RFs from aviation induced cirrus clouds as "best estimate", since "such studies can provide statistical evidence of an association between aviation and observed change in cloudiness, but do not prove causality" (Sausen et al., (2005)). Consequently, they attribute the knowledge on RF from cirrus clouds a level of "poor" and do not add cirrus RF to the rest of aviation RF. This is reflected in the actual draft AR4 text, since cirrus cloud RF and the remainder of aviation RF are not summed up. However, while the argument on causality is true, it fails to recognize other sources available today which bring the knowledge about aviation cirrus to a level at least as advanced as the IPCC (1999) estimate on contrails, which then was labelled as being "fair", and which was consequently included both in the total RF and the RFI for global aviation. This will be discussed in the following. The method used in IPCC (1999) to provide these	Rejected – although the understanding of the effects of cirrus has improved, it is still not sufficiently robust to include here, as cited in the literature.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						"fair" RF estimates of contrails was to calibrate calculated contrail coverage and air traffic data, in order to match observed contrail coverage over a small observed calibration area, and to extrapolate this to the global scale (see IPCC(1999), chapter 3.4.3, Page 91 end, and begin page 92.) This method was also used recently by Mannstein to arrive at a best estimate of global aviation induced cirrus RF (30 - 90 mW/m2), cited in the chapter "aviation, atmosphere and climate, what has been learnt" by U. Schumann, published in Sausen, R., C. Fichter, G. Amanatidis (Eds), 2004: "European Conference on: Aviation, Atmosphere and Climate (AAC) - Proceedings of an international Conference. Air pollution research report 83, European Commission, page 352. Whereas the approaches of Mannstein and IPCC (1999) are the same, the underlying data were better for Mannstein. First, the observed area Mannstein used for calibrating cirrus cover, is bigger than that from Bakan et al. (1994), used back in IPCC (1999) for contrail cover. Mannstein used a model and METEOSAT data to calculate cirrus cover in this calibration area, whereas Bakan (1994) could only estimate the contrail coverage in his calibration area by visually guessing contrails from satellite photos. Second, the knowledge on optical depth of cirrus available to Mannstein is better than what used to be known in 1999 on optical depth of contrails, since Mannstein could rule out an optical depth of less than 0.2 for cirrus clouds (detection by METEOSAT) (Mannstein and Schumann, 2005, aircraft induced contrail cirrus over Europe, Meteorologische Zeitung, Vol. 14, No. 4, 549-554). Those two parameters are crucial for the RF, which was already stated in IPCC (1999): "Computed results for global radiative forcing by contrails depend on assumed values for contrail cover and mean optical depth of contrails. Neither is well known." (IPCC, 1999, chapter 3.6.4, page 104, second paragraph, last line). Hence, the Mannstein guess (30-90mW/m2) for RF of aviation induced cirrus cited above benefit from an improvement of knowledge on these two crucial parameters and can thus be attributed a knowledge level of at least "fair", based on the knowledge benchmark set for contrails by IPCC (1999). Furthermore, Mannstein's estimate compares well with the estimated range of Stordal et al. (2005) (10-80mW/m2), as cited by Sausen (2005), adding one more factor of improved knowledge. In conclusion, the knowledge on RF from aviation induced cirrus clouds available today is at least "fair". Consequently, RF estimates for cirrus clouds can be included in the RF totals of aviation, as it was done in the IPCC (1999) report, leading to a broad range of about 50-130mW/m2. 2) Total anthropogenic forcing in 2000 has been estimated in the IPCC TAR to be 1330 mW. (see section II.3.11, IPCC 2001: "Climate Change 2001: The Scientific Basis",	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), J. T. Houghton, Y. Ding, D.J. Griggs, M. Noguer, P. J. van der Linden and D. Xiaosu (Eds.)). This is an identical value in all 6 SRES scenarios for total forcing, including negative aerosol forcing. Such an scenario value (then from the IS92a) for total forcing (greenhouse gases plus aerosols) was also the basis for the 3.5% estimate of the aviation share in the IPCC 1999 special report on aviation (see IPCC (1999), chapter 6.6.1, page 209, second para.). Hence, in order to stay consistent, again this total forcing, including aerosols, should be the base here. This changes the numbers: The aviation total forcing (50-130mW/m2) thus contributed about 4 to 9% to total anthropogenic forcing in 2000. (Dietrich Brockhagen, atmosfair gGmbH)	
5-271	A	16	35	16	35	47.8 mWm-2 suggests too much accuracy (in the order of 50 mWm-2) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted – use 48
5-272	A	16	35	16	35	47.8 mWm-2 suggests too much accuracy (in the order of 50 mWm-2) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-273	A	16	40	16	40	It is unclear how aviation's future growth can be consdidered to be "strongly". Suggest a relative measure or delete the word "strongly". (Lourdes Maurice, US Government)	Agree – will qualify
5-274	A	16	40	17	10	In this section, the terms and concepts of emissions "scenarios", "predictions" and "forecasts" seem to be used interchangeably and with considerable liberty. Scenarios are not forecasts and should therefore not be used to suggest predictions of future aviation emission levels and associated climate impacts. To the extent that IPCC presents estimates of aviation-related RF values in the future, it must be stated clearly that these are based on scenarios, i.e. without implicit probabilities assigned to them, rather than expected effects within a certain range. (Andreas Hardeman, International Air Transport Association)	Noted – will add terms to glossary. Will add info from FESG forecast.
5-275	A	16	44	16	44	The paper by Berghof (2005) is not included in the reference list and was not available to the reviewer even after he contacted Berghof for a copy. A proper citation should be provided if the paper has been completed or the discussion edited. (Steven Baughcum, Boeing Company)	Noted – report has not yet been published, but will check status and quote if applicable
5-276	A	16	44	16	44	Berghof et al., 2005, is not mentioned in the reference list (Paul Brok, National Aerospace Laboratory NLR)	Noted – report has not yet been published, but will check status and quote if applicable
5-277	A	17	4	17	9	Predictions to 2100 are highly suspect. These are not cited for shipping; what is the point of including for aviaton?	Noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Lourdes Maurice, US Government)	
5-278	A	17	11			Figure 5.3 Is it possible to include uncertainty bars? (Lourdes Maurice, US Government)	Rejected – error bars are not relevant for this chart
5-279	A	17	11			Figure 5.3. The symbols used in the plot are not unique. The authors should try to use better symbols. The authors should also consider showing results from AERO2K, ANCAT, SAGE, and the NASA studies as well for completeness. (Steven Baughcum, Boeing Company)	Accepted – will add information
5-280	A	17	43			analytical framework for what? Please extend heading. (Bert Van Wee, Delft University of Technology)	accepted.
5-281	A	18	10	19	32	All this discussion could be shortened by using a Table. The space used is too much valuable for such long explanation about scenarios. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	accepted.
5-282	A	18	10	20	11	This stuff is impenetrable. It is wrong in principal to suggest that the comparative is open to overlap with the referent. The referent can be temporally distinct, as it is say with the Kyoto suggestion to return to pre 1990 levels and then the comparative and the referent cannot overlap. So, the account is at least a bit confused to me and needs fixing for clarification of the underlying idea. (Darren Walton, Opus Central Laboratories)	Comarative means comperaring with reference. Will make clear.
5-283	A	18	27	18	35	I cannot understand the need to set the frozen BAU case. Technological improvements certainly continue in the future. If a certain technology that can mitigate GHG emissions becomes economically competitive (without any market failure), this technology will penetrate the market and contribute to the GHG emissions reduction in the real world. I think it meaningless to use the model results excluding such features (i.e., without considering any technological improvements) for comparison. (Takayuki Takeshita, The University of Tokyo)	for making the uncertainty minimal
5-284	A	18	32			I recommend you to modify "biofuel" into "alternative transportation fuel" because fuel options that have GHG reduction potentials are not limited to biofuel. (Takayuki Takeshita, The University of Tokyo)	Accepted
5-285	A	18	47			maybe the formula can be adapted according to thegeneral categorization – if introduced at all; see 'notes' above. I guess Li can be split inot technology, driving behavior, efficiency. (Bert Van Wee, Delft University of Technology)	Noted
5-286	A	19	1			A confusing array of terms are used in connection with changes in transport energy use, namely economy, efficiency, and intensity. The confusion begins with the equation of fuel efficiency and energy intensity at 19-1. (In reality, these attributes	I think this is his misunderstanding.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						are more likely to be inversely related to each other, using familiar senses of the terms.) However, the most used term is 'economy', as in 'fuel economy'. This is characterized as miles per gallon or kilometres per litre (also see Note 2 above). In most countries, a term such as 'fuel economy' is not used. This kind of performance is characterized using litres per 100 kilometres, which may be more appropriately termed 'fuel intensity'. (Richard Gilbert, Centre for Sustainable Transportation)	
5-287	A	19	23	19	24	I recommend you to add an economic scale (i.e., GDP level) as one of the determinants of modal split. (Takayuki Takeshita, The University of Tokyo)	Accepted. We will add.
5-288	A	20	0			The structure could even be stricter, starting with section 4. Why not all 'what' subjects (options, possibilities, including technologies) in section 5.4, and 'how' subjects (policies) in chapter 5.5? (and maybeWhy a separate, very short section on infrastructure (5.6)? Why the rather vague title of 5.4.3, and not all non-technology options? A suggestion: the 'what' question could include: technology, volume, modal split, efficiency (load factors, occupancy rates), the way of using vehicles (speeds, driving behaviour). The 'how' question could include: regulation, pricing instruments, infrastructure, land use, information/education. Or use the categorization of Vlek and colleagues (Rijksuniversiteit Groningen, the Netherlands), of about 10 years ago. It starts with the summary: the headings are unclear. For example: page 5, line 27: if here air , marine and rail starts: what is the text before about? (Bert Van Wee, Delft University of Technology)	Accepted, we will change structure
5-291	A	20	0			It is difficult to understand "important to assess the available data". I recommend a modification for ease of understanding. (Takayuki Takeshita, The University of Tokyo)	"Comparativity" is important.
5-289	A	20	12	99		Figure 5.9 - Why the figure refers only to Advanced - biofuels. Ethanol from sugarcane is a conventional alternative fuel and has the same behaviour as the one shown in Figure 5.9 for advanced biofuels. See Figure 5.1 of this same Chapter, which is titled - "Range of Estimated Greenhouse Gas Reductions from Biofuels". See also Figure 5.4, which is titled - "Cost Ranges for Current and Future Ethanol Production". (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted
5-290	A	20	32			Schafer and Victor (1999) doubt whether policies for changing transportation demands or patterns are effective, and describe that it is virtually impossible to	This does not apply for developping countries.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						deviate transport patterns from the natural dynamics of the transportation system. (please see Schafer and Victor (1999) Global passenger travel. Energy 24, pp.657-679). Therefore, I think that little efforts to examine the possibility for modal shifts are not problematic. (Takayuki Takeshita, The University of Tokyo)	
5-292	A	21	12	21	13	Global energy system model works (e.g., MESSAGE by IIASA) can address some of the problems of LCA mentioned on pages 21 and 22, so I think that the description "this (LCA) is the best method available to assess and compare different energy systems" is an overstatement. (Takayuki Takeshita, The University of Tokyo)	We will add "one of".
5-293	A	21	25	21	26	Narrowing the gap between test cycle fuel economy and on-road fuel economy should also be mentioned as an important option to decrease GHG emissions from automobiles. (Takayuki Takeshita, The University of Tokyo)	We discuss this in the section of mitigation potentials
5-303	A	22	0	28		I miss the important question where bio fuels could best be used, in the transport sector or in other sectors (e.g. for electricity production). (Bert Van Wee, Delft University of Technology)	Accepted; will be discussed.
5-294	A	22	7	22	8	I don't agree that production cost of biofuel are very high when comparing with present cost of oil (US$60/bbl). In USA ethanol from starches is quoted at US$45 cents/l. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	The difference of cost and price should be clearly recognized.
5-295	A	22	10			Strictly speaking, there are much more fuel production options than those in Fig. 5.14. For example, coal gasification, partial oxidation of fuel oil, and Iodine-Sulfur thermochemical water splitting using nuclear heat are major hydrogen production options. Furthermore, FT gasoline and FT kerosene (for jet fuel) might be important options in the future, although they are not listed in this figure. (Takayuki Takeshita, The University of Tokyo)	Coal gasification is included in the figure. This illustrate only the major paths.
5-296	A	22	19			I recommend you to modify "using renewable energy" into "using renewable or nuclear energy". (Takayuki Takeshita, The University of Tokyo)	we will
5-297	A	22	28			I recommend you to modify "energy cost" into "feedstock cost". (Takayuki Takeshita, The University of Tokyo)	including all the energy needed for processing, transportation etc.
5-298	A	22	38	35	2	Section 5.4.2.1 should be restructured so that options to increase the fuel economy of road vehicles is discussed first, followed by the discussion of alternative fuels, rather than the other way around. This should be done for two reasons: (1) alternative fuels, such as biomass-derived fuels or hydrogen, are not viable at a large	Accepted; these sections will be restructured, and integrated results will be shown.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						scale in inefficient vehicles (ie., the present vehicle fleet) because either the land area requirements are too large (in the case of biofuels), or the onboard storage problems cannot be solved while giving reasonable driving and interior room (in the case of hydrogen); and (2) improvements in fuel efficiency offer larger near-term prospects for reducing GHG emissions. Thus, it makes more sense to discuss fuel efficiency first. The other MAJOR problem with this section is that there is no statement anywhere in this section as to what the net, integrated effect of the various individual options (that are discussed) would be on the final fuel efficiency of passenger vehicles. This is very disapppointing as, in my comments on the ZOD, I provided several tables of information and several references pertaining to studies of the technical potential, none of which are referenced in this section. This section leaves the impression that the authors are trying to downplay the potential for improvements in fuel economy, although I don't think that that is the case. The following results, based on computer simulations by a group at MIT (Heywood et al. 2003; MIT LFEE 2003-004 RP, available from http://lfee.mit.edu/publications) whose results I don't think can be lightly dismissed, should be prominently highlighted near the beginning of this section: Baseline Gasoline 2001 Vehicle: 7.1 l/100 km (30.6 pmg); Gasoline baseline 2020 vehicle: 5.0 l/100 km (43.2 mpg); Gasoline advanced 2020 vehicle: 4.4 l/100 km (49.2 mpg); Gasoline hybrid 2020 vehicle: 3.1 l/100km (70.7 mpg); Diesel advanced 2020 vehicle: 3.7 l/100 km (58.1 mpg); and Diesel hybrid 2020 vehicle: 2.6 l /100 km (82.5 mpg). Note that the fuel economy for the advanced gasoline hybrid is 2.3 times better than the 2001 vehcile. Once these efficiencies are achieved, then it makes sense to consider H2 (not before). For the H2 vehicle, the projected mpg energy equivalent is 130 mpg - a factor of 4.3 improvement over the 2001 baseline vehicle. Policy makers need to know these results! (Danny Harvey, University of Toronto)	
5-299	A	22	38	35	2	Why no mention of telematics, navigation, onboard and traffic management technologies? Since their market is very intransparent, their effects are mostly not visible. Most of the interviewed firms and survey results suggests that the potential is given here. For Germany Leonardi and Baumgartner 2004, for UK McClelland, D. und McKinnon, A. (2004): Use of Vehicle Telematics Systems for the Collection of Key Performance Indicator Data in Road Freight Transport. Heriot-Watt University, Edinburgh. There is little doubt that these results are transferable to other countries (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et	Noted. We will consider.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						leur Sécurité)	
5-300	A	22	38	35	2	Double deck trucks are reducing up to 32% of total consumption per tkm. Leonardi, Baumgartner and Krusch (2004) CO2-Reduktion im Strassengueterverkehr, Hamburg, MPIMET Report 355, download at http://www.mpimet.mpg.de/en/projects/nestor/indexNESTOR2.html (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	Noted
5-301	A	22	39		42	another non-consistent structure. (Bert Van Wee, Delft University of Technology)	accepted
5-302	A	22	39	22	42	The GHG emissions of a vehicle can also be improved by increasing the efficiency of the air-conditioning system, reducing its weight or reducing its F-gas emissions (IPCC Special Report on HFCs, 2005). (Nick Campbell (Batch 2), ARKEMA SA)	Rejected; this is already covered.
5-304	A	23	2			I don't think that hydrogen distribution directly emits GHG even if it is produced from fossil fuels. (Takayuki Takeshita, The University of Tokyo)	Rejected; distribution requires pumping and compression.
5-305	A	23	25	23	25	Car heating is mostly done with the waste heat of the engine in the liquid cooling system. As energy efficiency increases, waste heat is reduced, which will not make heating more efficient. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected; this basically misses the point, no such claim is made.
5-306	A	23	25	23	25	Car heating is mostly done with the waste heat of the engine in the liquid cooling system. As energy efficiency increases, waste heat is reduced, which will not make heating more efficient. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	ditto
5-307	A	23	35	26	41	This section on biofuels seems repetitive (eg with previous chapter) although the points on cellulosic crops are important and need to be checked for inclusion elsewhere. (Michael Jefferson, World Renewable Energy Network/Congresses)	Accepted. This will be harmonize with chapter 8
5-308	A	23	35	26	40	I found biomass-derived FT liquid fuels require process energy use at about 60 GJ/t fuels. This is five to six times of that for oil-derived road and air transportation fuels. The chance for large-scale production of biomass-derived FT fuels in the next 30 years is extremely limited--even if quite severe CO2 emission costs are imposed worldwide. (Tao Ren, Utrecht University)	Taken into account. The data will be checked
5-309	A	23	35			General comments on "Biofuels" Supplement to sufficient quantity of ethanol in the world, energy security of	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						ethanol by concentration of ethanol in US and Brazil and water control of ethanol during transportation. If ethanol is used for all of the vehicles in the world, it needs huge amount of ethanol. Brazil has also huge cultivated or cultivable land and it possible to supply ethanol for all of the world. However, it cause energy security. The concentration of energy source on the single country has a capable to cause the security problem by the political situation, unusual weather, etc. ETBE has been discussed in Japan instead of ethanol for automobiles. A small amount of ethanol such as 3% in gasoline, affects on phase separation of ethanol and gasoline rather than E10. When developing countries introduce low concentration ethanol in gasoline, they have to control the fuel property to avoid water sinking. (Masahiko Hori, Japan Automobile Research Institute)	
5-310	A	23	35	26	44	When discussing future potentials for bioenergy, the availability of land as well as the competitions for biomass resources among various biomass uses such as food production should be examined in detail. I think that not only the economic viewpoint but also the feedstock availability problem is important in assessing biomass's prospects. (Takayuki Takeshita, The University of Tokyo)	Accepted. This is going to be dealt in chapter 4 and 8
5-311	A	23	36	23	39	I recommend at this point to complement the sentence stating that until now essentially all ethanol is being produced from sugarcane and corn, while biodiesel relies essentially is rapeseed crops. Otherwise, we are giving the wrong impression that ethanol can be commercially produced from a large spectrum of biomass. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted
5-312	A	23	42	23	42	Add: "at present" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-313	A	23	42			General comment: There exist more than two types of biofuels (biodiesel: FAME and advanced biodiesel (BTL) and bioethanol made from plants of bio ester): IEA published a study on biofuels which should also be mentioned in chapter 5. The title is: IEA 2005: Biofuels for transport. (Stephan Herbst, Toyota Motor Europe)	Rejected. This has already been done
5-314	A	23	42	23	42	Add: "at present" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-315	A	23	43			I recommend you to modify "There are two main" into "There are currently two main". (Takayuki Takeshita, The University of Tokyo)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-316	A	23	45	25	10	Not disturbing overlap with ch4 p42 line 11-39, whereby ch4 provides the summary for biofuels. Note differences in blending % between these sections. (Peter Bosch, IPCC TSU WGIII)	Accepted. This will be checked with chapter 4
5-317	A	23	47			The data source for more than 10% replacement should be described. (Takayuki Takeshita, The University of Tokyo)	Accepted
5-318	A	23	49			Are the levels of 5-10% on a energy basis or on a volume basis? (maybe by volume) You should describe the unit explicitly. (Takayuki Takeshita, The University of Tokyo)	Accepted. It is on a volume basis.
5-319	A	24	1	24	2	Let us be fair and provide a real picture. It should read as: "The production of neat ethanol fueled cars achieved 96% market share in 1985, declining to 0,1% em 1998 due lack of consumers confidence on reliable ethanol supply, caused by shortage of ethanol in 1989 and the low cost of oil. Nevertheless, since 1999 neat ethanol cars retake growth and after 2003 with the introduction of flexfuel cars they took the lead again over gasoline powered cars. In parallel to that, the use of 25% ethanol blended to gasoline has continued without any change since 1990." (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted
5-320	A	24	1	24	1	of ethanol fuelled cars, IN BRASIL, achieved…. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-321	A	24	1	24	1	of ethanol fuelled cars, IN BRASIL, achieved…. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Same comment
5-322	A	24	14			Are the levels of 25% and 75% on a energy basis or on a volume basis? (maybe by volume) You should describe the unit explicitly. (Takayuki Takeshita, The University of Tokyo)	Accepted. It is on a volume basis
5-323	A	24	16	24	19	Box flexfuel vehicle. Considering the signicant increase in flexfuel cars it is wise to update the figure until the final document is set. Presently, flexfuel vehicles represents more than 66% of the market share of new light duty vehicles. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted
5-324	A	24	27	24	31	Statement could misimply that land used for biofuel production is different than land used for other crop purposes; this is not the case as most crop value for corn, for example, is not lost through the ethanol process; co-products will still be produced (Robert Larson, US Environmental Protection Agency)	Accepted
5-325	A	25	7	25	17	The cost estimates in this paragraph are projections, not actual data and should be identified as such. Definitive costs can only be assessed when the technology is commercialized. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
5-326	A	25	8	25	10	Statement seems inconsistent with sentence beginning line 42, page 25	Accepted. Statement needs clarification

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Robert Larson, US Environmental Protection Agency)	
5-327	A	25	8			The term "biodiesel" should be deleted. (Takayuki Takeshita, The University of Tokyo)	Rejected. However, this will be delt in chapter 4
5-328	A	25	10	25	10	If this were really true, the biofuel industry would be prospering, given oil prices for the last two years. You need to state why it has NOT happened. As it stands the $30/barrel figure clearly is a calculation error. (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected. The biofuel industry IS prospering
5-329	A	25	10			According to Table 4.8 in IEA (2004), the production cost of ethanol from poplar via advanced processes is $0.27/liter gasoline-equivalent, i.e., US$42.9/barrel, which is about 43% higher than cost of US$30/barrel. (Takayuki Takeshita, The University of Tokyo)	Taken into account. It is going to be checked
5-330	A	25	12	25	12	Why are we using the future like "will also be competition with producing biofuels from sugarcane in Brazil since the cellulose and lignin will provide the process energy". In reality this is being used since 1975 in Brazil. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted
5-331	A	25	14	25	14	Add BTL (Bio to Liquid) in this sentence. Reason: The Fischer-Tropsch technique for biofuels is called as a BTL in general. (Masahiko Hori, Japan Automobile Research Institute)	Accepted
5-332	A	25	17	25		Growing cellulosic crops on "unsuitable" grounds may seriously threat nature/biodiversity, especially in tropical regions (www.millenniumassessment.org) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Taken into account. This will be addressed in chapter 8
5-333	A	25	17	25		Growing cellulosic crops on "unsuitable" grounds may seriously threat nature/biodiversity, especially in tropical regions (www.millenniumassessment.org) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-334	A	25	19			Because ethanol and biodiesel are also biofuels, the description "the potential for biofuels is far greater than that of ethanol and biodiesel" does not make sense. (Takayuki Takeshita, The University of Tokyo)	Taken into account. It can be rephrazed
5-335	A	25	43	25	44	I don't agree that ethanol in USA is 3 times more expensive than gasoline from oil quoted at the present price (US$60/bbl). (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Taken into account. It will be checked
5-336	A	25	43	25	44	It would be welcome of the oil price on which the calculation has been based would be indicated. (Radunsky Klaus, Umweltbundesamt)	Accepted
5-337	A	25	45	25	47	Biodiesel produced from used frying oil has already been used in regions such as Austria. (please see IEA (2004), pp.120)	Taken into account.Need to check if the volume is reasonable to be considered

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Takayuki Takeshita, The University of Tokyo)	
5-346	A	26	0	35		This seems to be a section that is qualitatively different from the preceding material. It is dense but concise, well-written and informative. (Darren Walton, Opus Central Laboratories)	Accepted
5-338	A	26	1	26	2	Although I admit that ethanol from cellulosic feedstocks via advanced processes might be cheaper than grain ethanol (IEA (2004), pp.77), I think that the description "much lower cost ethanol" is an overstatement (IEA (2004), Fig. 4.5). (Takayuki Takeshita, The University of Tokyo)	Taken into account. Need to check the reference
5-339	A	26	7	26	7	Review the statement. With present oil price of US$60/bbl ethanol from sugarcane in Brazil has a lower cost than gasoline. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted
5-340	A	26	15	26	15	Erratum: Figure 5.18 (FÉLIX HERNÁNDEZ, IEG-CSIC)	Accepted
5-341	A	26	22	26	22	How does this (additional) demand for agricultural land relate to the rapidly growing animal protein consumption, and related (enormously) demand for land to grow animal food. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Taken into account. This will be dealt in chapter 8.
5-342	A	26	22	26	22	How does this (additional) demand for agricultural land relate to the rapidly growing animal protein consumption, and related (enormously) demand for land to grow animal food. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-343	A	26	22			If it is implicitly assumed that sugarcane ethanol will displace 50-100% of all petroleum by 2050, more severe competitions for sugarcane among energy use and food production are expected because of population increase in the developing world. I recommend you to mention this aspect. (Takayuki Takeshita, The University of Tokyo)	Taken into account. Need to be hamonize with Chapter 8
5-344	A	26	36	26	37	I think that the description "considerable cost reductions are possible ~ as shown in the "post 2010" section shown in Figure 19" is implausible, as shown in this figure. (Takayuki Takeshita, The University of Tokyo)	Taken into account. Need more clarification
5-345	A	26	45	27	15	The discussion on GTL is missing although it was mentioned in LINE 45. According to my analysis, current state-of-the-art GTL technologies, which convert natural gas to transportation fuel liquids via FT (e.g. FT diesel and kerosene), use at least 30 GJ (process energy only; energy content of fuels excluded) to produce one ton of fuel. Current oil refining technologies use only 1/3 or 1/2 of such energy to do the same job. Experts from BP say that it will take 30 years for GTL technologies to catch up with the energy-efficiency level of the current oil refinery.	We will add

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						As more and more GTL capacities will be constructed, I expect that the average CO2 emissions per unit of road and air transportation fuels in the next 30 years will go up as the result. (Tao Ren, Utrecht University)	
5-347	A	27	11	27	31	Comment Modify "to CNG. " to "CNG without cold start." Reason: Gaseous fuel is supreme fuel for cold start, because liquefied fuel such as gasoline adhere on the surface of the intake manifold, but gaseous fuel does not adhere on the surface. (Masahiko Hori, Japan Automobile Research Institute)	Accepted
5-348	A	27	17	27	18	I cannot understand why CNG is more suitable for vehicles because larger and heavier tanks are required. Instead, I recommend you to mention a relatively high cost of CNG cars. (please see IEA (2001) Saving oil and reducing CO2 emissions in transport. IEA, Table 4.2) (Takayuki Takeshita, The University of Tokyo)	Taken into account. The mentioned reference will be checked
5-349	A	27	18	27	18	The sentence "Thus … vehicles" does not logically follow after the previous sentence. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-350	A	27	18	27	18	The sentence "Thus … vehicles" does not logically follow after the previous sentence. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-351	A	27	20	27	31	Comment Delete the column of methanol. Reason: Disadvantage of methanol had been appeared to use for vehicles in use and possibility of introduction of methanol for internal combustion engine was vanished in the world already. Methanol is one of the candidate fuels for fuel cell, therefore, I recommend to transfer it to the session of fuel cell. (Masahiko Hori, Japan Automobile Research Institute)	Accepted
5-352	A	27	31	27	31	It seems that some text has been lost. (Radunsky Klaus, Umweltbundesamt)	Taken into account. Need to be checked
5-353	A	27	41	27	43	Strictly speaking, synthetic fuels production plants (including DME plants) usually use electricity. Because in most countries, fossil fuels are still used for power generation, the description "in case of no fossil fuel is used in manufacturing and transport chains" is considered unrealistic. (Takayuki Takeshita, The University of Tokyo)	Taken into account. Need clarification, it will be written again.
5-354	A	27	44	27	45	COMMENT: Durinng experiments DME has shown to produce lower emissions of	Taken into account. The reference will be

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						hydrocarbons,nitric oxides and carbon monoxide than diesel, and zero emission of soot. REFERENCE: Shuichi Kajitani, "A Study of Low Compression Ratio Diesel Engines Operated with Neat Dimethyl Ether(DME)",JSME TED Newsletter,No.42,2004, (MASAHIRO NISHIO, Ministry of Economy, Trade and Industry)	checked
5-355	A	27	44	27	45	Durinng experiments DME has shown to produce lower emissions of hydrocarbons,nitric oxides and carbon monoxide than diesel, and zero emission of soot. REFERENCE: Shuichi Kajitani, "A Study of Low Compression Ratio Diesel Engines Operated with Neat Dimethyl Ether(DME)",JSME TED Newsletter,No.42,2004, (MASAHIRO NISHIO, Ministry of Economy, Trade and Industry)	same as above
5-356	A	28	1	28	10	Comment Move this sentence to 27 page 19 line. Reason: It is an explanation about CNG. (Masahiko Hori, Japan Automobile Research Institute)	Accepted
5-357	A	28	1	28	18	In this draft, these issues are put in the paragraph relating to DME, but these issues focus on natural gas. Hence, I recommend you to move them in the paragraph relating to natural gas on page 27. (Takayuki Takeshita, The University of Tokyo)	
5-358	A	28	5	98		Table 5.5 - No headings for the table? (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	noted
5-359	A	28	5	99		please add titles for tables 5.5 and 5.6 (also relevant for other tables) (Bert Van Wee, Delft University of Technology)	noted
5-360	A	28	7	28	7	Reconfirm carbon intensity of 17.2 tC/TJ. I suppose its of Methane is 15 and City gas is 15.6 including Ethane, Propane and Butane. (Masahiko Hori, Japan Automobile Research Institute)	Taken into account. Need to check the reference
5-361	A	28	9	28	9	NOx emissions from gas engines strongly depends on the chosen (stoichiometric based) balance between emissions, power and efficiency. Ref: Nylund and Lawson (2000). Exhaust emissions from natural gas vehicles. Issues related to engine performance, exhaust emissions and environmental impacts. A report prepared for the IANGV Technical Committee. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Taken into account. Need to check the reference
5-362	A	28	9	28	9	NOx emissions from gas engines strongly depends on the chosen (stoichiometric based) balance between emissions, power and efficiency. Ref: Nylund and Lawson	same as above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(2000). Exhaust emissions from natural gas vehicles. Issues related to engine performance, exhaust emissions and environmental impacts. A report prepared for the IANGV Technical Committee. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-363	A	28	12	28	18	Comment Move this sentence to session of fuel cell. Reason: This is a comment of fuel specification. (Masahiko Hori, Japan Automobile Research Institute)	Accepted.
5-364	A	28	12	28	18	Some additional information related to net GHG emissions of the full life cycle (well to wheels analysis) would be appreciated as well as some clarification about the current total cost and the expected decrease in cost and a more concrete identification of the point in time by when it could be expected that the technology could be competetive in cost. In this context scenarios on cost development for more conventional technology is missing throughout this chapter. Some additional subchapter would be very much appreciated as well. (Radunsky Klaus, Umweltbundesamt)	We will discuss more this point in the next version.
5-365	A	28	16			I admit that the difference in delivered costs between natural gas-based hydrogen and gasoline becomes smaller, but I cannot agree to the expression "costs could eventually drop to near parity with those of gasoline". (please see Fig. 12 in Ogden (1999) Developing an infrastructure for hydrogen vehicles. International Journal of Hydrogen Energy 24, pp.709-730) (Takayuki Takeshita, The University of Tokyo)	we will check.
5-366	A	28	33	28	33	A more efficient cycle than Otto is not a hybrid-specific energy saving issue (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected; the Prius engine cycle has low specific power, is not practical for a conventional drivetrain.
5-367	A	28	33	28	33	A more efficient cycle than Otto is not a hybrid-specific energy saving issue (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-368	A	29	15			The Prius is a so called full hybrid. That means that it is possible to drive purely on the electric drivetrain (the ICE is switched off then). The Honda Accord is a so called mild hybrid. That means that the electric drivetrain is used for acceleration: it is not possible to drive only on the electric drivetrain. I enclosed a slide showing the main difference between a mild and a full hybrid technology. (Stephan Herbst, Toyota Motor Europe)	Rejected; not a crucial point, and full/mild terminology is controversial
5-369	A	30	25	30	26	I recommend you to add an increase in vehicle costs relative to hydrogen FCVs as one of the disadvantaves of FCVs fueled liquid fuels. (Takayuki Takeshita, The University of Tokyo)	It depends on the cost of tank.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-370	A	31	2	31	3	Carbon capture and sequestration (CCS) needs to be demonstrated on a commercial scale and its costs should be reduced, both of which are necessary for hydrogen production with CCS to be a viable option. (Takayuki Takeshita, The University of Tokyo)	agree
5-371	A	31	10			The efficiency of hydrogen production from natural gas is much higher than 60%, e.g., 76.2% (please see Simbeck and Chang (2002) Hydrogen supply. NREL/SR-540-32525). (Takayuki Takeshita, The University of Tokyo)	depend on the scale of production.
5-372	A	31	12	31	13	It is expected that the efficiency for ICE gasoline vehicles would also improve. Was this taken into consideration? (Takayuki Takeshita, The University of Tokyo)	We will make clear
5-373	A	31	13	31	15	Hydrogen derived from water by electrolysis using electricity from "nuclear energy" also leads to a truly "zero emission". Only renewable power plant and fossil fuel firedplant with carbon sequestration are mentioned here. The use of nuclear power plant should not be excluded. (Ryota OMORI, Japan Science and Technology Agency)	we will add
5-374	A	31	14			I recommend you to modify "using renewable energy" into "using nuclear or renewable energy". (Takayuki Takeshita, The University of Tokyo)	same as above
5-375	A	31	23			Installing a sufficient number of H2 refueling stations also influences the penetration rate of hydrogen FCVs. (Takayuki Takeshita, The University of Tokyo)	agree
5-376	A	32	7	32	8	Comment Delete the sentence of "(European share)". Reason: Tax of diesel fuel in Europe is different from countries and that of diesel in Japan also lower than gasoline. (Masahiko Hori, Japan Automobile Research Institute)	Rejected; correct but not relevant
5-377	A	32	31	33	43	Stylistic improvements to this section are required. (Michael Jefferson, World Renewable Energy Network/Congresses)	We will try.
5-378	A	32	32			reducing weight includes more than using light weight materials. One could consider paying attention to other options (accessories, downsizing volume). (Bert Van Wee, Delft University of Technology)	agree
5-379	A	33	45	35	2	Comment Contract the column of aerodynamics improvement. Reason: The effect of aerodynamics improvement is not a little, but too large volume of detail. I, therefore, recommend a suitable volume of description.	Rejected; aerodynamics is important, particularly for long distance trucks

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Masahiko Hori, Japan Automobile Research Institute)	
5-380	A	34	22	34	40	The authors are commended for their careful reading of the literature. (Richard Doctor, Argonne National Laboratory)	Noted
5-381	A	35	1	35	2	Fuel loss is proportional to the square of speed, thus energy loss by driving 80 vs 60 mph would be expected larger than driving 70 vs 50 mph? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected; load is proportional to vsquared, energy also depends on engine efficiency
5-382	A	35	1	35	2	Fuel loss is proportional to the square of speed, thus energy loss by driving 80 vs 60 mph would be expected larger than driving 70 vs 50 mph? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected as above
5-383	A	35	4		40	very clear, but yet another structure. (Bert Van Wee, Delft University of Technology)	Noted
5-384	A	35	5			The two most important traction technologies for railways are electric traction and diesel traction. Because of better (technical) performance of electric traction there is a tendency towards this kind of traction and elektrification of diesel lines, especially in cases of haevy traffic. Electric traction has also many other (environmental) advantages, e.g. no local emissions of polluting gasses, there are many sources for the production of electricity (so becoming more independent from oil) and the GHG-emssions are usually lower. This last feature depends of course on the fuel mix used for electricity-generation and is different over the countries in the world. Electric traction offers also the possibility for zero- GHG emission transport by changing the fuel mix to 100% renewables. Some railway companies are already changing towards more renewables for elektric traction, the Swedish railways (SJ) 100%, Austrian Railways 60%, Dutch Railways 5% (see www.greenprices.com/ large users).With regard to the environmental en economical aspects electricity has alomost the same advantages as fuel cells/H2 transport, it offers the possibilities of low/zero GHG-emissions and becoming more independent from oil. The big difference is in the stage of development. Electric trcation is a mature technology (almost 100 years of experience), while Fuel cells/H2 still have to be developed, much R&D is needed. (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	we will add more discussion.
5-385	A	35	5			Overview of energy saving technologies in the railway branche: http://www.railway-energy.org/tfee/index.php (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	noted
5-386	A	35	5			Other energy saving (R&D) measures: energy efficicent driving for train drivers using the time margins in the time tables (the difference between a energy efficient and in-efficient trip is about 15% to 20%).	noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	
5-387	A	35	5			ICT (Information and Communication Technologies) offers new opportunities for the railway branche. By better informing the train driver and traffic control about the actual situation many unplanned stops can be avoided, so energy cann be saved this way. (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	we will consider
5-388	A	35	5			Heating of the electrical driven trains consumes a considerable amount of energy (in the Dutch case about 10% to 12%, depending on the severity of the winter). Interesting technologies for heating the train, like heatpumpes, are appearing. Energy saving potential about 50% of the heating energy. (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	we will add
5-389	A	35	6	35	40	(5.4.2.2 Rail)Failed to mention the CO2 reduction potential in terms of LCA or well-to-wheel basis. (Shigeo Murayama, The Federation of Electric Power Companies)	We show some result in other part of draft. We will refer this.
5-390	A	35	6	35	6	Its main roles are high speed passenger transportation...": This is a main role. But go to China, India and Russia where the bulk of long distance rail passengers travel, the speed of these trains is not so that I would call it 'high speed' (for me trains with maximum speed higher than 200 km/h). I suggest to write: 'Its main roles are (sometimes high speed) passenger transportation...' (Manfred Treber, Germanwatch)	we will take care
5-391	A	35	9	35	10	As part of cutting costs, energy saving is an important issue. (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	agree
5-392	A	35	15	35	16	a reference is needed (Danny Harvey, University of Toronto)	we will
5-393	A	35	24	35	34	Energy saving by regenerative braking and storage of braking energy are related topics. In (urban) networks with heavy traffic there is no need for a storage device. In a busy network like the Dutch railways about 80% of the elektric braking energy is directly used by other trains in the neighbourhood. Nevertheless research on energy storage at substations (on the ground) is being initiated. (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	agree
5-394	A	35	36	35	38	a reference is needed (Danny Harvey, University of Toronto)	same as392
5-395	A	35	42			Paragraph 5.4.2.3. "Aviation" can be slightly better condensed/structured (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted – will address in SOD
5-396	A	35	42			Paragraph 5.4.2.3. "Aviation" can be slightly better condensed/structured (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-397	A	35	44	42	13	(5.4.2.3 Aviation)Failed to mention the CO2 reduction potential in terms of LCA or well-to-wheel basis. (Shigeo Murayama, The Federation of Electric Power Companies)	Noted, not sure how to address – comments from others? Is this necessary? Energy Chapter issue?
5-398	A	35	44	36	9	This section seems to duplicate (although with different references and different numbers) a similar discussion on page 16. The authors of the two sections should combine their efforts in one place or the other. (Steven Baughcum, Boeing Company)	Noted – P16 provides the introductory overview, and we might reduce the text on pages 35 and 36 where duplication exists.
5-399	A	35	44	35	47	The authors should check the numbers reported for AERO2K. The numbers shown here do not seem to match those in the AERO2K report which shows a doubling of fuel between 2002 and 2025, not triple as reported here. (Steven Baughcum, Boeing Company)	Noted – will check and amend if necessary
5-400	A	35	46	35	46	Ref "Aero2K 2004" not listed in ref list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted
5-401	A	35	46	35	46	Ref "Aero2K 2004" not listed in ref list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted
5-402	A	35	46	35	47	The Aero2K reference should be cited as Eyers and co-workers to match the reference list (Steven Baughcum, Boeing Company)	Noted
5-403	A	35	49	35	50	More NOx emitted than CO2?: are the units correct? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted – will check and amend if necessary
5-404	A	35	49	35	50	More NOx emitted than CO2?: are the units correct? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-405	A	35	49	35	50	The numbers shown for CO2 and Nox do not make any sense since they indicate that more Nox is emitted than CO2. The authors should check their numbers. (Steven Baughcum, Boeing Company)	Noted as above
5-406	A	35	49	35	50	It is proposed to check the emission figures because the figures of 2 million tonnes and 3.16 million tonnes seem to be rather low (assuming that the base year is 1990 - or is it another one? If so, please indicate!) (Radunsky Klaus, Umweltbundesamt)	Noted and will check
5-407	A	35	50	36	3	What are the metrics being considered here for environmental impact? What is meant by effects versus impacts and do they differ in regards to this description of aviation's influence on the atmosphere? Given the state of scientific uncertainty how can these definitive statements regarding impacts and effects be made without supporting quantification? (Lourdes Maurice, US Government)	Noted – and we need to address the issue of "impact" and offer an agreed definition if appropriate, eg "in terms of RF"

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-408	A	35	50	36	3	What are the metrics being considered here for environmental impact? What is meant by effects versus impacts and do they differ in regards to this description of aviation's influence on the atmosphere? Given the state of scientific uncertainty how can these definitive statements regarding impacts and effects be made without supporting quantification? (Lourdes Maurice, US Government)	same as above
5-409	A	35	50	36	3	What are the metrics being considered here for environmental impact? What is meant by effects versus impacts and do they differ in regards to this description of aviation's influence on the atmosphere? Given the state of scientific uncertainty how can these definitive statements regarding impacts and effects be made without supporting quantification? (Lourdes Maurice, US Government)	same as above
5-410	A	36	5	36	5	What modal comparison analyses is the basis for the statement "Civil aviation is one of the world's fastest growing transport means." ? (Lourdes Maurice, US Government)	Noted – and we need to qualify this assertion
5-411	A	36	14	36	23	The authors should clarify that aircraft and engine designers must also consider safety, reliability, cost, and noise as major design considerations. (Steven Baughcum, Boeing Company)	Noted – and we should reflect these essential design requirements and constraints, but these will exist for other sectors too. Is aviation that different? How is this handled for other transport sectors? Use suggested "Box" text?
5-412	A	36	15			What is "the trend for the figures given above"? You should describe it more clearly. (Takayuki Takeshita, The University of Tokyo)	Accepted – and this refers to Sect. 5.2.2 and 5.2.3, but we might need to be more specific and reproduce the figures or add a chart/graph to show the trend.
5-413	A	36	18	36	18	What is the reference source for the claim that fuel currently represents up to 15% of DOC for modern aircraft? (Lourdes Maurice, US Government)	Noted – and this is taken from industry sources and should be referenced. I have sought this information.
5-414	A	36	19	36	23	This is an unclear description of the significant interdependencies that exist when considering technological developments. There are also influences that need to be considered between landing anf takeoff cycle and full missions and these may involve several pollutants. The influence of nosie considerations should also be noted. (Lourdes Maurice, US Government)	Noted – but is more detail needed here and if so, how much? Can offer more if required.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-415	A	36	32	36	32	Please briefly explain 'active systems' (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted – and can expand on this.
5-416	A	36	32	36	32	Please briefly explain 'active systems' (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-417	A	37	12	37	20	It should be clear that the certification standards are developed under the auspices of ICAO and that they currently encompass only the landing and takeoff cycle. The description of the interdependence between LTO NOx emissions and fuel efficiency is confusing. Additional information should be provided to give a more in-depth understanding of the interdependencies. (Lourdes Maurice, US Government)	Accepted – and agreed and more detail can be supplied.
5-418	A	37	22	38	5	The discussion of combustor technology generations does not seem to add much relevant information to this discussion. The authors should consider deleting it. The authors might say that Nox emissions have improved as the engine manufacturers have implemented increasingly more sophisticated and complicated combustors. (Steven Baughcum, Boeing Company)	Noted – and I agree with this comment. I think this section should be altered, as I believe I suggested in a previous submission of the text. Might need to reflect on the effect on emissions tradeoff of the increasing complexity (weight, etc)
5-419	A	38	5	38	5	It should be useful to add information that internal combustion engines propelled airplanes are using ethanol in Brazil. EMBRAER, one of the world major aircraft manufacturer produces neat ethanol - based airplanes for agricultural services. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted – and we might need to stress that the current text refers to the jet-powered civil fleet, not to light, piston-engined aircraft. Add such qualification?
5-420	A	38	13			What is "the chart"? You should describe it more clearly. (Takayuki Takeshita, The University of Tokyo)	Noted – and refers to the “carpet plot” mentioned above. Need to show chart as an illustration.
5-421	A	38	23	38	27	"Subsonic jet aircraft being produced today are about 70% more fuel efficient per passenger kilometre than the first jet aircraft (DH Comet 4) 40 years ago ..." [or 55% re the first successful jet aircraft family, B707; or about 0% considering earlier piston engine powered aircraft] (Ref. Peeters et al., 2005) (Paul Brok, National Aerospace Laboratory NLR)	Noted – and we might add more qualification, and comment on the speed element that has been missed from the efficiency consideration.
5-422	A	38	24	38	24	Remark: Energy efficiency of current average jet airplane is hardly better than the efficiency of the last generation piston powered airplanes. Ref: Peeter et al. (2005) 'Fuel efficiency of commercial aircraft; an overview of historical and future trends' http://www.t-e.nu/docs/Publications/2005pubs/2005-12_nlr_aviation_fuel_efficiency.pdf (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted as above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-423	A	38	24	38	24	Remark: Energy efficiency of current average jet airplane is hardly better than the efficiency of the last generation piston powered airplanes. Ref: Peeter et al. (2005) 'Fuel efficiency of commercial aircraft; an overview of historical and future trends' http://www.t-e.nu/docs/Publications/2005pubs/2005-12_nlr_aviation_fuel_efficiency.pdf (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-424	A	38	25	38	28	The quote shown seems to contradict Table 7.1 in the IPCC aviation report (1999) which seems to indicate that engine and airframe improvements have been comparable in their contributions to fuel efficiency. (Steven Baughcum, Boeing Company)	Rejected – the quote is sound. Checked the figures and they are correct 40% vs 30%. Need to qualify the remark?
5-425	A	38	25	38	27	WEC (1998) Global transport and energy development, pp.26 mentioned the increases in load factors as one of the factors decreasing the energy intensity of airplanes (Takayuki Takeshita, The University of Tokyo)	Noted
5-426	A	38	28			Schafer and Victor (1999, pp.673, Section 4.1.3) describe that further reductions (in aircraft fuel efficiency) in the order of 70% are possible by 2050. (Takayuki Takeshita, The University of Tokyo)	Noted – need to check this reference and compare with our projections.
5-427	A	38	33	40	17	The discussion of aircraft developments seems to be exclusively focused on the UK Greener by Design reports. Significant contributions to aviation development have occurred in the US, France, Germany and other countries. The authors should provide a more comprehensive and more balanced discussion. An extensive literature exists relating to aircraft efficiency, weight, aerodynamics and engine efficiency improvements. (Steven Baughcum, Boeing Company)	Noted – and I will ask Steve for references.
5-428	A	38	42			What is L/D? (maybe Lift to Drag ratio) You should define it before using abbreviations. (Takayuki Takeshita, The University of Tokyo)	Noted – and can define
5-429	A	39	5			Table 5.6. All acronyms should be defined. (Lourdes Maurice, US Government)	Noted and I thought I had! They should be in the Glossary.
5-430	A	39	5			I think it better to also compare fuel efficiencies of several types of airplanes on a MJ/pkm basis. (Takayuki Takeshita, The University of Tokyo)	Noted – agreed that comment here should relate to aviation on a seat.km basis.
5-431	A	39	7	40	2	While interesting, the discussion seems excessively focused on a single study, "Greener by Design". There is repetition of the conclusions without any accompanying assessment or analyses. The authors should focus this discussion. (Lourdes Maurice, US Government)	same as 427

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-432	A	39	18	39	25	It is hard to evaluate this section without the proper citation to the data presented. (Steven Baughcum, Boeing Company)	Accepted – The ref. is needed as well as a summary.
5-433	A	39	38	39	40	Discussions of minimizing contrails by appropriate air traffic management need to clarify that this will also require much better data or model predictions of supersaturated regions than exists today. (Steven Baughcum, Boeing Company)	Accepted
5-434	A	40	4	40	8	Source reference needs to be cited. (Lourdes Maurice, US Government)	same as 432
5-435	A	40	20	40	37	The value of this discussion is not clear. The efficiency of a new airplane is probably better correlated with its use of the latest engine technology, latest lightweight materials, and better aerodynamics than with the size of the airplane. Fuel efficiency claims are also sensitive to assumptions of the number of seats on the airplane. (Steven Baughcum, Boeing Company)	Accepted – see 5-430 above.
5-436	A	40	39	41	20	There have been other projects related to hydrogen fueled airplanes than the EC project. The authors should address those as well. (Steven Baughcum, Boeing Company)	Noted – will request details
5-437	A	41	1			The description "14%, the weight of ~ as a result, and the" should be deleted because of the overlapping of the last line on the previous page. (Takayuki Takeshita, The University of Tokyo)	Noted
5-438	A	41	3	41	20	It is desirable that in addition to the operating cost, the projected capital cost of hydrogen aircraft should be compared with that of conventional kerosene aircraft. (Takayuki Takeshita, The University of Tokyo)	Noted – not sure of the information sources or if any current information exists – will provide comment if reliable information exists
5-439	A	41	8			I recommend you to modify "use of renewable energy" into "use of renewable or nuclear energy". (Takayuki Takeshita, The University of Tokyo)	Noted – but might need to reflect on the long term environmental problems that might accompany nuclear energy?
5-440	A	41	12	41	13	The lifetime of emitted water vapor will depend strongly on the flight altitude, location, and season. (Steven Baughcum, Boeing Company)	Noted – should check and make this comment if appropriate.
5-441	A	41	15	41	18	What is the basis for this statement "The earliest implementation of this technology could b e expected to be around 15-20 years, provided that research work was pursued at an appropriate level." It seems excessively optimistic given all of the challenges. (Lourdes Maurice, US Government)	Noted – but this was the information in the quoted sources. Will seek other views and comment accordingly.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-442	A	41	18	41	20	In their discussion, the authors seem to focus on whether hydrogen can be used on an airplane. This one sentence raises the most critical issues associated with hydrogen as a means of reducing CO2 emissions - how do you make the hydrogen and how do you get it to the airports in very large quantities. The rest of the discussion is irrelevant unless these issues are addressed. (Steven Baughcum, Boeing Company)	Rejected – covered in the text
5-443	A	41	23	41	49	Some of the discussion of biofuels probably is dealt with elsewhere in the WGIII report. A critical issue is whether biofuels really provide a net environmental benefit. (Steven Baughcum, Boeing Company)	Accepted – must be consistent.
5-444	A	41	23	41	49	In their discussion of biofuels, the authors should clarify than current Jet-A fuels used in commercial aircraft must meet a very comprehensive specification. In particular, the freezing point and flash point may prove to be significant challenges for some alternative fuels. (Steven Baughcum, Boeing Company)	Accepted – can provide additional text, comments on how much might be needed given the space restrictions?
5-445	A	41	24	41	39	Here is should be useful add information that internal combustion engines propelled airplanes are using ethanol in Brazil. EMBRAER, one of the world major aircraft manufacturer produces neat ethanol - based airplanes for agricultural services. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Rejected – not relevant to civil jet aviation, but will report on the relative proportion of Light Aircraft activity and emissions compared to the civil jet fleet
5-446	A	41	42	41	44	Please, try to update fossil based fuels to the present scenario. Oil cost has significantly increased in the last 12 months. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted – but might relate the information provided to a specific date?
5-447	A	41	43			According to Table 4.8 in IEA (2004), the production cost of biodiesel is estimated to be approximately US$24.4/GJ(LHV). Even considering its delivering and refueling costs, I think that the cost of biodiesel of $33.5-52.6/GJ is somewhat high. (Takayuki Takeshita, The University of Tokyo)	Noted – and need to check. Might need to reflect a wider cost range than that taken from the reference?
5-448	A	41	44	41	44	In contrast to this section on aviation, the road transport sections estimated FT fuel to be substantially more expensive than bio diesel. Also the sections on aviation and road transport sometimes use different units for fuel prices. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted
5-449	A	41	44	41	44	In contrast to this section on aviation, the road transport sections estimated FT fuel to be substantially more expensive than bio diesel. Also the sections on aviation and road transport sometimes use different units for fuel prices. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-450	A	42	11	42	11	Where is the figure?	Noted – need to supply

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-451	A	42	11	42	11	Where is the figure? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-452	A	42	11	42	11	Refers to a figure which apparently does not exist. (Steven Baughcum, Boeing Company)	Noted – as above
5-453	A	42	11			What is "the figure"? You should describe it more clearly. (Takayuki Takeshita, The University of Tokyo)	Noted – as above
5-454	A	42	16			The sections 5.4.2.4 on shipping (techn. and operat. measures)' and the section on rail (5.4.2.2) are short compared to the sections on aviation 5.4.2.3 and road transport 5.4.2.1 (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	agree
5-455	A	42	16			The sections 5.4.2.4 on shipping (techn. and operat. measures)' and the section on rail (5.4.2.2) are short compared to the sections on aviation 5.4.2.3 and road transport 5.4.2.1 (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted, section on aviation techn and operations should be made more condensed.(Peter, I am happy to provide some suggestions if appreciated)
5-456	A	42	22	42	22	Where is table 1? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted
5-457	A	42	22	42	22	Where is table 1? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Noted
5-458	A	42	22			Perhaps, Table 1 mentioned here is missing. (Takayuki Takeshita, The University of Tokyo)	Noted
5-459	A	43	11		23	In Norway the safetyregulations for natural gas in ferries have been developed by Det Norske Veritas. It is advisable to make this norms international available, to overcome legal barriers by the introduction of CNG in ships. (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	Taken into account, study will be assessed
5-460	A	43	11	43	23	In a study in the Netherlands carried out for SenterNovem in 2005 (Duurzame Waddenvloot) the possible transition to a sustainable shipping system in the Waddensearegion was examined. Particularly promising is the introduction of CNG as fuel in bifuel ships. Another initiative is the use of biofuels in ships. Ferries are most likely to introduce new fuels, as they have to uphold their green image in the eyes of customers. However, the economic feasibility would much improve with stronger norms for ships emissions, and pricing. (for report contact author) (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	noted
5-461	A	43	25	43	30	The use of a very large sail for supertankers is currently being tested in Germany and looks very promising. (	Noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	
5-462	A	43	26	43	27	I recommend you to refer to the EC FCSHIP project (Altmann et al. (2004) Life cycle analysis results of fuel cell ships. Final report). (Takayuki Takeshita, The University of Tokyo)	Taken into account, study will be assessed
5-463	A	43	29			Altmann et al. (2004, pp.11) assumed that for larger ships fuel cells could supply only auxiliary power, but that their propulsion power is supplied by conventional ship engines. (Takayuki Takeshita, The University of Tokyo)	noted
5-464	A	43	46			General comment: The driver has a quite big influence of approximately 10-20% (see IEA 2005, page 107) on the fuel consumption. The driver can be encouraged e.g. through awareness campaigns (eco driving tips, e.g. done in Brussels last year) offering eco driver trainings (e.g. offered by ADAC in Germany) or offering new technologies like SIL (shift indicator lamp) that indicates the optimal moment to shift gears. The worldwide saving potential estimated is quite significant at a low cost. please see: IEA 2005: Saving oil in a hurry, page 19, 25 and 107. (Stephan Herbst, Toyota Motor Europe)	Accepted. We deal this in the section of ecodriving.
5-465	A	43	46	44	14	Comment Add a comment at the end this column that "it is very important policy, but it is very difficult to practice on the road. It needs make a mechanism to drive economically without human efforts." Reason: It is very difficult to anticipate the eco-driving by drivers themseves and it is irresponsibility in government. (Masahiko Hori, Japan Automobile Research Institute)	There is also an oposite opinion, too.
5-466	A	44	0	44	15	I have serious reservations about the selective use of research that presents a positive face on the benefits of driving awareness and training. If it were as easy as these authors imply then road accidents would be zero and we'd all take trains to work. The facts suggest otherwise and an enormous body of literature is being overlooked. A much better effort is achieved with the material concerning mode shifts where the authors point out that mode shifting is often achieved by inducing change in the behaviour of those already adopting alternate modes to the motor vehicle. (Darren Walton, Opus Central Laboratories)	Accepted. We will add more materials.
5-467	A	44	1			What is reduced by improving driving style, CO2 emissions, fuel consumption or fuel efficiency? You should describe it more clearly. (Takayuki Takeshita, The University of Tokyo)	Accepted. We will make clear.
5-468	A	44	4	44	7	I think that the effect of education on fuel saving differ widely by region. I recommend you to explicitly describe the region for which these estimates were	Accepted. We will

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						derived. (Takayuki Takeshita, The University of Tokyo)	
5-469	A	44	7	44	7	Ref. JECC (2003) not listed in ref. list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted. We will
5-470	A	44	7	44	7	Ref. JECC (2003) not listed in ref. list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-471	A	44	16			Comment to modal split: At the moment in Europe the ETS (emission trading sheme) on CO2 is in force. So for energy supply and some other industrial companies there is a cap on CO2-emmision. This implies also that the customers of the energy power plants have to deal (indirectly) wtih these caps. In others words the have to make a contibution in complying the Kyoto-protocol. While the transportsector is not a part of ETS this is not true for all parties within this sector, except for trains with electic traction. The GHG-emissions of electric trains is limited by the cap for the power plants. This means also that a modal shift towards (electric) trains ia always favourable for lowering the GHG-emissions, independent of the occupation rate of the train! (Wilco Fiechter, Nederlandse Spoorwegen (Dutch Railways))	noted
5-472	A	44	21	44	25	Reconfirm the average energy use per passenger kilometer for automobile and buses in US. (Masahiko Hori, Japan Automobile Research Institute)	Noted. We will check.
5-473	A	44	24			The expression "2 to 6 times higher in Japan" is doubtful taking into consideration the data in Landwehr and Lilliu (2002), pp.152. (Takayuki Takeshita, The University of Tokyo)	Noted. We will check.
5-474	A	44	24	44	25	In the light of Landwehr and Lilliu (2002), pp. 154, I cannot understand the sentence "The figure ~ for rails." What is "the figure"? (Takayuki Takeshita, The University of Tokyo)	Noted. We will check.
5-475	A	44	28	44	29	I cannot understand why the shift from bus and rail trips to automobiles hardly entails additional emissions. (Takayuki Takeshita, The University of Tokyo)	Noted, but space is limited.
5-476	A	44	34	44	37	I think that it is kind to the readers if you add the footnote explaining "an average cross elasticity of public transport demand with respect to petrol prices" and "an average cross elasticity of public transport trips with respect to fuel prices and car time". At least, I cannot understand them in this draft, although I know the concept of cross-elasticity. (Takayuki Takeshita, The University of Tokyo)	Noted.
5-477	A	44	46			The point is not the reduction of CO2 emissions by switching from car to NMT, but	Taken into account.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						to avoid the increase of CO2 emissions by defending the role of NMT, such as bike. (Stefano Caserini, Politecnico di Milano)	
5-478	A	44	46			I believe that this paragraph undermine the potential of non-motorized modes. European data show that NMT could lower car use and misuse. The potential is still greater if NMT is well integrated with other modes of transport (i.e. public transport). (Stefano Caserini, Politecnico di Milano)	Accepted . We will add more materials.
5-479	A	44	49			After "…cycling" add. More than 30 % of trips made in cars in Europe cover distances of less than 3 km and 50 % are less than 5 km (EC, 1999). For such journeys bicycles could easily replace cars, thus satisfying a large proportion of the demand and contributing directly to cutting down traffic jams (Stefano Caserini, Politecnico di Milano)	Noted. Traffic jams?
5-480	A	44	50	45	1	The sentence "the promotion of NMT does not necessarily leads to less car use…" is misleading: even it could not be excluded in particular conditions, this is not true in general. Bike and public transport have different target in terms of type of trip, and in opposite efforts for greater integration of bicycles with public transit has to be considered (Kennedy, 2002). (Stefano Caserini, Politecnico di Milano)	Accepted . We will add more materials.
5-481	A	45	0	45		The planning of a transport system should start with facilitate walking and cycling, within a circle of 6 kilometers, and then go on to facilitate motorized transport. This has a strong behavorial component, as currently a person is rewarded every time he chooses the car for his transport. (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	Accepted . We will add more materials.
5-482	A	45	0			Devising a cycle network should take speed and comfort into account for the bicycle to become a serious alternative to others modes of transport. 'Bicycle highways' between commuter centres can stimulate cycle use. (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	Accepted . We will add more materials.
5-488	A	45	0	52		Good discussion, well balanced and well referenced. (Darren Walton, Opus Central Laboratories)	Accepted
5-483	A	45	6			The title of the section should perhaps be changed, since the issue is more than just transport planning - it is the whole pattern of land use and the clustering of moderate-to-high density developments around rapid transit nodes that has to be planned. (Danny Harvey, University of Toronto)	Taken into account in other section.
5-484	A	45	6	45	40	In the above mentioned study several examples were found of introducing new, high	noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						speed, efficient ferry-routes for passengers in large cities, especially in cities with large ports and waterways. (Boston, New York, San Francisco) This could replace commuter car journeys very effectively, connecting bus- or metroservices is a precondition. Public investment is necessary to provide port-facilities for ferries and passengers. (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	
5-485	A	45	11	45	11	Reference to Wachs (1993) does not appear in the list of references at the end of the chapter. (Dominic Stead, Delft University of Technology)	Accepted. We will add it.
5-486	A	45	42			This section could/should include improved flight procedures like Continuous Descent Approaches. (Brok/AERONET, 2004) (Paul Brok, National Aerospace Laboratory NLR)	Accepted – will add text
5-487	A	45	48	46	25	This discussion is probably more appropriate to the FAR Science volume (WG1) than here. (Steven Baughcum, Boeing Company)	Noted – will condense as necessary
5-489	A	46	18	46	21	Easily avoiding contrails by changing altitudes assumes that accurate data is available in real time of the supersaturated (with respect to ice) region to be avoided. That knowledge/capability does not currently exist. (Steven Baughcum, Boeing Company)	Accepted – will include
5-490	A	46	27	46	48	The discussion of air traffic management only cites the Eurocontrol study (which is not cited but should be). Similar studies have been done in the US and presumably elsewhere. These should also be cited. (Steven Baughcum, Boeing Company)	Accepted – information will be requested
5-491	A	46	35	46	36	How did you obtain these annual benefits from the actual experiments for three days? I think that the environmental benefit with introducing RVSM varies by season and other factors. (Takayuki Takeshita, The University of Tokyo)	Noted – reference will be provided
5-492	A	47	5	47	21	This paragraph mainly discussed about the technology of lower speed aircraft. Such discussion should go to the section "5.4.2.3 Aviation". Instead, in this paragraph, the main topic may be that how much emission reduction is achieved if lower cruise speed is accepted and how lower cruise speed is accepted by the public with some references. (Shigeo Murayama, The Federation of Electric Power Companies)	Noted – will consider revising framework of the Chapter
5-493	A	47	5	47	21	The discussion of lower flight speeds seems to imply that only engine changes would be required. In fact, if lower speeds were the objective, the entire airplane would be optimized for the new design point considering all the factors critical in	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						airplane design (safety, reliability, efficiency, maintainability, cost, noise, emissions, etc.) . (Steven Baughcum, Boeing Company)	
5-494	A	47	7			What are "the efficiencies of their design"? Do they mean fuel efficiencies? (Takayuki Takeshita, The University of Tokyo)	Accepted – will clarify
5-495	A	47	21	47	21	please add: lower speed had also the advantage (for mitigation) that because of 'constant travel time budget' (time daily available for transport purposes) a lower demand in km travelled results (Manfred Treber, Germanwatch)	noted
5-496	A	47	23			p. 47. Section 5.5. Policies and Measures. I wonder if it would be of interest to add a paragraph in this section on the difficulties faced by decision-makers in getting the agreement from finance ministries in several countries on specific tax schemes, (on road traffic for instance) in which the revenue would be allocated to a particular objective (such as more environmental friendly types of transports in the example chosen). Several attempts from environment ministries in European countries have failed on this issue and a recent attempt by the European Commission to propose a tax scheme where the revenue from a tax on road freight transport would fund the development of freight rail transport also failed. There seem to be some resistance from finance ministries to this type of scheme that people though tend to accept and prefer to the standard approach transferring tax reveues to the overall budget. An explanation on the economic (or political) justification for the reluctance of finance ministries to accept such policies would be interesting if there is literature on this matter. It is actually one of the many barriers to the adoption of policies and measures in the transport sector. (Philippe Tulkens, TERI School of Advanced Studies)	INTERESTING ASPECT BUT LITERATURE NEEDED TO SHOW THAT.
5-497	A	47	24	47	24	Paragraph 5 (Policies and Measures) addresses several times the link between traffic GHG emissions and other traffic related emissions that have a local effect on health (especially PM and NOx). Since GHG and PM/NOx emissions, as well as their abatement, are strongly intertwined, this topic could be addressed even stronger. Improving local air quality is a top priority in many countries, and on the national level possibly a stronger political driver than GHG emissions. Some measures to improve local air quality (e.g. reduced speed limits on highways, like in the Netherlands near some of the major cities) also reduce GHG emissions. Other air quality driven measures, like obligatory PM and NOx filters and in-engine measures, mostly result in higher fuel use and consequently higher GHG emissions. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
5-498	A	47	24	47	24	Paragraph 5 (Policies and Measures) addresses several times the link between traffic GHG emissions and other traffic related emissions that have a local effect on health (especially PM and NOx). Since GHG and PM/NOx emissions, as well as their abatement, are strongly intertwined, this topic could be addressed even stronger. Improving local air quality is a top priority in many countries, and on the national level possibly a stronger political driver than GHG emissions. Some measures to improve local air quality (e.g. reduced speed limits on highways, like in the Netherlands near some of the major cities) also reduce GHG emissions. Other air quality driven measures, like obligatory PM and NOx filters and in-engine measures, mostly result in higher fuel use and consequently higher GHG emissions. (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	REPETITION
5-499	A	47	43	47	44	Linkage between spatial planning and transport policies should be the message here, not linkage between firms. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	ACCEPTED
5-509	A	48	0			I suggest to add a specific chapter on NMT NMT is an important and often overlooked component of urban transport systems in developing Countries. Given the characteristics of NMT (pro-poor, low cost, and relatively easy to implement in a short period of time), it has been highlighted as an important urban transport strategy (Karekezi S.,et al, 2003). NMT initiatives have the potential to reduce the carbon intensity of urban (and rural) transport and at the same time providing low-cost transport alternatives to the poor. The local environmental benefits of increased pedestrian and non- motorized transport are also very important in developing country cities. Policies for the support of NMT transport are: (a) Integration of NMT and pedestrian concerns within city and regional urban and transport planning (b) Design and planning of specific NMT components (c) Construction of NMT lanes and pathways (d) Strengthening of NMT manufacturing and maintenance capacity (e) Traffic-calming measures to improve the efficiency and safety of pedestrians and NMT (f) Capacity-building for institutions involved in the management and maintenance	Rejected, but We will add more materials.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						of NMT systems (g) Information and awareness-raising for decision- makers and the public. (Stefano Caserini, Politecnico di Milano)	
5-500	A	48	7			Subchapter 5.5.1 is very much apprececiated because it reflects highly policy relevant policies in a very informative but still comprehensive manner and addressing issues relevant for developed as well as developing countries. (Radunsky Klaus, Umweltbundesamt)	NOTED
5-501	A	48	25	48	45	For better estimation of transportation demand and integration of personal movement info and activity spaces into sustainable planning model is need to apply new methods for movement tracking. Movement of mobile phones is used by several authors for sustainable planning models (Ahas, R., Mark, Ü. 2005. Location based services – new challenges for planning and public administration? Futures, 37(6): 547-561.) (Rein Ahas, University of Tartu)	Rejected. Not directly related with emission.
5-502	A	48	34	48	34	Spell out NMT the first time it is used. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted. We will modify it.
5-503	A	48	34	48	34	Please explain abbreviation "NMT" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted. We will modify it.
5-504	A	48	34	48	34	Please explain abbreviation "NMT" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-505	A	48	34			Before using abbreviation NMT, you should describe it in a complete form (perhaps, non-motorized transport). (Takayuki Takeshita, The University of Tokyo)	Accepted. We will modify it.
5-506	A	48	36	49	40	This part describes examples of U.S and U.K. But there are many good policies in the world. It is necessary to take up examples of the Netherlands, Germany and France. In particular, LOTI (Loi d'Orientation des Transports Interieurs) in France is remarkable because it makes it local authority’s duty to reduce a volume of traffic by automobiles. (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	ACCEPTED-WILL CONSIDER FIRTHER SOURCES
5-507	A	48	41	48	48	If I understand what is written here, it is saying that urban density has almost no impact on transportation energy use. How anyone could assert that in light of the data in Newman and Kenworthy's book is completely beyond me. (Danny Harvey, University of Toronto)	Noted, but it also incurred criticism.
5-508	A	48	49			At this point I miss some text on the relationship between good supply/quality of	Taken into account in other section.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						public transport and car ownership (motorisation). E.g. for Berlin in contrast to rural areas in Germany. (Manfred Treber, Germanwatch)	
5-510	A	49	3			Before using abbreviation LRT, you should describe it in a complete form (perhaps, light rail transit). (Takayuki Takeshita, The University of Tokyo)	Accepted. We will fix
5-511	A	49	7	49	16	This text provides a good description of the UK planning system, but doesn't provide any indication as to whether the system has any value in mitigating CO2 emissions. Such an assessment needs to be added. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	noted
5-512	A	49	19			These are only examples from two countries (UK, USA) which are not successful but rather unsuccessful tackling the challenge of individual car traffic. Please bring also positive examples where development is more positive (e.g. in Switzerland) (Manfred Treber, Germanwatch)	noted
5-513	A	49	29			there is a new version of the SEA manual (2005). (Bert Van Wee, Delft University of Technology)	Noted. I will comfirm it.
5-514	A	50	1	52	19	This whole part of the chapter does not mention at all the integration of speed limits on roads or built-in limitation to engines, a measure on the table for many years in Europe. The figure for France used in the preparation of the last climate plan is that a decrease on 10 km/h of the legal speed would bring a benefit of 4 MTons CO2 equivalent. Built-in limits would bring even more. (Antoine BONDUELLE, E&E_Consultant)	Accepted
5-515	A	50	3	52	18	There is no discussion in this section on the benefits of lower speed limits on highways, or of better enforcement of existing speed limits, on fuel consumption. Fuel economy is best at 90-110 kph, and decreases sharply at higher speeds. (Danny Harvey, University of Toronto)	Accepted
5-516	A	50	6	50	6	please add:'... light duty vehicle fleets but mostly only for fuel consumption for pure driving without including auxiliary devices like air conditioning' (Manfred Treber, Germanwatch)	Accepted, but placed elsewhere (p51)
5-517	A	50	6			My understanding is that major policies for fuel economy improvements have been implemented in Europe and Japan that target new cars (not total vehicle fleets). (please see Landwehr and Lilliu (2002), Table 3.4 and pp.69) (Takayuki Takeshita, The University of Tokyo)	Accepted, will clarify
5-518	A	50	7		21	nearly no one in Germany thinks in "km/l"-data but instead "l/100km"-data is very common even in public media where millions of people know are knowledgeable. Please do this arithmetics.	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Manfred Treber, Germanwatch)	
5-519	A	50	13	50	13	Comment Add on "the European auto manufactures " to "the European, Korean and Japanese auto manufactures " (Masahiko Hori, Japan Automobile Research Institute)	Accepted
5-520	A	50	13			Before using abbreviation NEDC, you should describe it in a complete form. (Takayuki Takeshita, The University of Tokyo)	Accepted
5-521	A	50	14			Before using abbreviation ACEA, you should describe it in a complete form. (Takayuki Takeshita, The University of Tokyo)	Accepted, acronym removed
5-522	A	50	20			I think that 16.8 l/100km is a mistake. (Takayuki Takeshita, The University of Tokyo)	Accepted; was 6.8
5-523	A	50	26	50	26	When the Japan driving cycle is slower, one would expect a higher (better) fuel economy, in stead of the reported lower fuel economy? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected, slow speed is inefficient for engine
5-524	A	50	26	50	26	When the Japan driving cycle is slower, one would expect a higher (better) fuel economy, in stead of the reported lower fuel economy? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected, as above
5-525	A	50	26	50	33	Could usefully illustrate the different fuel efficiency standards with the graph from the PEW centre report Comparison of Passenger Vehicle Fuel Economy and GHG Emission Standards Around the World, Dec 2004, which shows the very large disparaities between standards and implies a potential for tightening particularly US standards. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Accepted, will obtain graph
5-526	A	50	33	50	34	The sentence on Europe making good progress is misleading and not accurate. The present ACEA agreement is now stuck and heading to failure partly because of its voluntary nature and absence of outside compliance. It is even qualified as "a failure" by governement officials in the case of France. This sentence should be deleted (Antoine BONDUELLE, E&E_Consultant)	Accepted; this needs updating
5-527	A	51	7	51	7	Please add: 'of the vehicles nor the additional energy use from air conditioning' (Manfred Treber, Germanwatch)	Rejected
5-528	A	51	8	51	11	This paragraph is misleading because safety studies now have proven that heavy individual vehicles in the USA bring less safety than standard ones. The link between "weight" and "safety" was advocated already in Kyoto 97 by uninformed papers from groups such as CEI of the US, and does not take into account the safety of other road users (bicycles, pedestrians, other cars). This paragraph should be	Accepted (though overstated); will edit paragraph

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						deleted. (Antoine BONDUELLE, E&E_Consultant)	
5-529	A	51	11	50	11	Comment Add on the sentence at the end of column, " Trade off between fuel economy and vehicle safety has to be improved." (Masahiko Hori, Japan Automobile Research Institute)	Rejected
5-530	A	51	13	51	21	Comment Delete the column or contract it. Reason: The detailed comment about vehicle safety is not suitable in this section. (Masahiko Hori, Japan Automobile Research Institute)	Rejected; key issue in U.S., perhaps will be elsewhere
5-531	A	51	13	51	21	This discussion is quite inadequate. Only one side of the argument about safety vs fuel economy is being cited. Missing is the point, borne out by data, that the disparity in size and mass between cars and SUV/light trucks substantially reduces road safety. Thus, requiring improvements in fuel economy large enough that automakers will be forced to either greatly reduce the weight and height of SUVs and light trucks as car substitutes, or eliminate them altogether, would improve safety. I provided information and references in my comments on the ZOD, so why is that information not here? This information is needed in order to counter the contrived arguments by automakers that greater fuel efficiency will compromise safety. It is important that policy makers know that safety can at least be protected, if not enhanced, while improving fuel economy. To repeat my comments on the ZOD: "Ross and Wenzel (2002) present data (they have a useful figure) that compares the risk to drivers of vehicles and the risk to drivers of other vehicles on the road for different kinds of cars, SUVs, and light trucks. Gas-guzzling vehicles (SUVs and light trucks) are not particularly safe for the drivers of these vehicles (compared to many compact and subcompact cars), and are several times more hazardous to the occupants of other vehicles on the road. Thus, measures to reduce fuel efficiency – by requiring weight reduction of SUVs and trucks, or their elimination altogether – would increase road safety." The reference is: Ross, M. and T. Wenzel. 2002. An Analysis of Traffic Deaths by Vehicle Type and Model. American Council for an Energy-Efficient Economy, Washington. 18 pages. A more-up-to date discussion, which re-inforces the above points, is found in Ross, M., Patel, D. and Wemzel, T. 2006 Vehicle design and the physics of traffic safety, Physics Today, Jan 2006, pp. 49-53. (Danny Harvey, University of Toronto)	Accepted; will add material
5-532	A	51	14	51	14	please be more specific and insert '... Improves vehicle safety for car passengers but	Rejected; effects on pedestrians and

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						not for others not sitting in the vehicle like cyclists or pedestrians' (Manfred Treber, Germanwatch)	motorists is most dependent on vehicle design, not weight
5-533	A	51	17			DRI and NAS are missing from the reference list (Danny Harvey, University of Toronto)	Accepted
5-534	A	52	5	52	5	please insert again '... provide safety benefits for car drivers and passengers' (Manfred Treber, Germanwatch)	Rejected
5-535	A	52	23		28	higher prices are also relevant: the higher the price, the more impact of price changes. (Bert Van Wee, Delft University of Technology)	noted
5-536	A	52	44	53	15	All this text is repetition os material presented on Page 45. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Accepted. We will fix it.
5-537	A	52	44	53	22	Overlap: This section is almost identical to the paragraph 5.4.3 'Urban Transport Planning' (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted. We will fix it.
5-538	A	52	44	53	22	Overlap: This section is almost identical to the paragraph 5.4.3 'Urban Transport Planning' (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-539	A	52	46	53	22	These sentences should be deleted because they are the same as the sentences from lines 17-40 on page 45. (Takayuki Takeshita, The University of Tokyo)	Accepted. We will fix it.
5-540	A	53	6		15	also on page 45. (Bert Van Wee, Delft University of Technology)	Accepted. We will fix it.
5-541	A	53	7	53	7	parking demand'. Please insert: But often the parking for employees is cost free for them and this is even not treated for taxation as 'virtual salary'. (Manfred Treber, Germanwatch)	Accepted. We will fix it.
5-542	A	53	50	54	2	I think that this result is for new light-duty vehicles. If so, I recommend you to describe it explicitly. (Takayuki Takeshita, The University of Tokyo)	WILL BE TAKEN INTO ACCOUNT
5-543	A	54	10	54	16	Overlap with page 51 line 1-6 (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-544	A	54	10	54	16	Overlap with page 51 line 1-6 (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-545	A	54	30	54	40	Change "ancillary benefits" to "co-benefits." The TAR (WG III, Pg. 708) defines ancillary benefits as "The ancillary, or side effects, of policies aimed exclusively at climate change mitigation." Co-benefits are defined (WG III, Pg. 711) as "the	WILL TAKE INTO ACCOUNT

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						benefits of policies that are implemented for various reasons at the same time -- including climate change mitigation ..." In the real world, policies are almost always implemented to achieve multiple benefits, so co-benefits is the more correct term. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
5-546	A	54	46			are you shure about UK vehicles being twice as fuel efficient as US cars? I hardly can't believe this, it contradicts with other sources, such as Lee Schippers' database. (Bert Van Wee, Delft University of Technology)	Accepted, will check
5-547	A	55	0			In the discussion on emission trading, only transport sector CDM in developing countries is mentioned. It is also possible to use the Kyoto mechanisms to place responsibility for emissions from motor fuels with the upstream companies that provide the fuels. Arquit Niederberger, A., The Swiss Climate Penny: An innovative approach to transport sector emissions, Transport Policy, 12(4), 303-313, July 2005 outlines a voluntary agreement with the Swiss government under which the oil industry took responsibility for greenhouse gas emissions from the road transport sector, which they supply with fuel. As of 1 October 2005, Swiss oil importers voluntarily contribute the equivalent of about 5 cents per gallon (approx. $80 million annually) into a climate protection fund that is invested via a non-profit (non-governmental) foundation into climate mitigation projects domestically and abroad (via the emerging carbon market mechanisms of the Kyoto Protocol). Cost savings (compared with an incentive tax) are huge and the private sector is in charge of investing the funds effectively. A similar system in the USA could generate US$ 9 billion in funds annually to incentivize clean, alternative fuels and energy efficient vehicles, which could lower US dependency on foreign fuel sources. The paper also explains why this policy was more credible from a sustainable development perspective than the alternative CO2 tax, since the high CO2 tax would have led to large-scale shifts in tank tourism -- and bookkeeping GHG reductions for Switzerland -- although the real reductions would have been less than half of the total effect and neighboring countries would have been left with the excess emissions. (Anne Arquit Niederberger, Policy Solutions)	SCOPE WILL BE INCREASED TO INCUDE ET AND JI. Climate Protection Fund is a good policy instrument- How to relate Fund to carbon offset could be related to specific projects funded
5-548	A	55	1	55	2	WEO 2000 (pp.249) pointed out "Its (transport's) weak responsiveness to energy prive movements", so the sentence "Clearly, automobile use is sensitive to price" needs a caution. (Takayuki Takeshita, The University of Tokyo)	NOTED-reference will be consulted
5-549	A	55	1			I cannot understand the sentence "This results in about average per capita fuel expenditures.".	Taken into account, the WEO 2000 study will be assessed.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Takayuki Takeshita, The University of Tokyo)	
5-550	A	55	5			Which mode of transport was analyzed by Goodwin et al. (2004) and where did Goodwin et al. (2004) perform this analysis? These impacts certainly vary by mode and by region (please see Tables 2.2 and 2.5 in Landwehr and Lilliu (2002)). These information should be described clearly in Table 5.8 in the draft. (Takayuki Takeshita, The University of Tokyo)	Accepted, will be explained or left out
5-551	A	55	32	55	33	Where was the result that "general estimates of reduction ~ is 15-20%) obtained? You should describe the region explicitly. (Takayuki Takeshita, The University of Tokyo)	Accepted
5-552	A	55	42	55	42	This section should be renamed Clean Development Mechanism (CDM) (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
5-553	A	55	42			The heading "Clean Development Mechanism (CDM)" is more appropriate then "Emission Trading" because this chapter refers not to article 17 of the Kyoto protocol (emissions trading) but to article 12 (CDM). (Stephan Herbst, Toyota Motor Europe)	No, I think that this section should also include specific material about emissions trading in the road transport sector. There are two recent studies available: One for the Swedish EPA (to be published) and IEEP (2005).
5-554	A	55	44	56	2	This subject is continuously evolving and it is necessary to update the discussion based in a search to the unfccc.int web site when preparing final text. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	NOTED-WILL CONSULT WEBSITE
5-555	A	55	44	57	21	This subsection of 5.5.1.5, "Emissions Trading," is a thought provoking one, raising the potential issue of recognizing entire government programs in transportation as an eligible CDM project. The issue raised in this section is now superseded favorably by the decision reached at Montreal, at COP/MOP1. See next row. (Arthur Lee, Chevron Corporation)	NOT 'ENTIRE' BUT DECISION WILL BE PUT IN CONTEXT
5-556	A	55	44	57	21	This subsection of 5.5.1.5, "Emissions Trading," is a thought provoking one, raising the potential issue of recognizing entire government programs in transportation as an eligible CDM project. The issue raised in this section is now superseded favorably by the decision reached at Montreal, at COP/MOP1. See next row. (Andrei Marcu, IETA)	REPETITION
5-557	A	56	2	56	2	Ref "CDM, 2004" not listed in ref. list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	ACCEPTED- WILL BE LISTED
5-558	A	56	2	56	2	Ref "CDM, 2004" not listed in ref. list? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	REPETITION
5-559	A	56	33	56	33	Please explain abbreviation "CERs"	ACCEPTED-WILL DO THAT

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-560	A	56	33	56	33	Please explain abbreviation "CERs" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	REPETITION
5-568	A	57	0	60		In various places in section 5.5.2 (International Bunkers) the UN International Civil Aviation Organization (ICAO) is implicitly blamed for not being able to agree on mitigating actions, for acting too slow, etc. Such statements do not belong in a report developed under the auspices of sister-UN bodies. (Andreas Hardeman, International Air Transport Association)	Noted – for Ron Wit to comment, and guidance from the Chapter LAs that "softer" language, avoiding judgemental phrases such as "too slow", would be more appropriate.
5-561	A	57	15	57	19	In the advanced unedited version of the decision entitled "Further guidance relating to the clean development mechanism," the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, ... "20. Decides that a local/regional/national policy or standard cannot be considered as a clean development mechanism project activity, but that project activities under a programme of activities can be registered as a single clean development mechanism project activity provided that approved baseline and monitoring methodologies are used that, inter alia, define the appropriate boundary, avoid doublecounting and account for leakage, ensuring that the emission reductions are real, measurable and verifiable, and additional to any that would occur in the absence of the project activity." This decision can be found on the COP web site. The decision appears to be interpretable as allowing for, as an example, a package of projects to increase non-motorized transport, reducing congestion, switching fuels on public buses, etc., provided that such package of projects produce emissions reductions that are real, measurable and verifiable and additional to any that would occur in the absence of the project activity. Although there is still the question of additionality, this decision does open up the door for considering a package of projects in transportation infrastructure, for example. This is a favorable development for the CDM and should be described in the text. Further baseline methodology development and additionality analytical tool will be needed. (Arthur Lee, Chevron Corporation)	NOTED
5-562	A	57	15	57	19	In the advanced unedited version of the decision entitled "Further guidance relating to the clean development mechanism," the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, ... "20. Decides that a local/regional/national policy or standard cannot be considered as a clean	REPETITION

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						development mechanism project activity, but that project activities under a programme of activities can be registered as a single clean development mechanism project activity provided that approved baseline and monitoring methodologies are used that, inter alia, define the appropriate boundary, avoid doublecounting and account for leakage, ensuring that the emission reductions are real, measurable and verifiable, and additional to any that would occur in the absence of the project activity." This decision can be found on the COP web site. The decision appears to be interpretable as allowing for, as an example, a package of projects to increase non-motorized transport, reducing congestion, switching fuels on public buses, etc., provided that such package of projects produce emissions reductions that are real, measurable and verifiable and additional to any that would occur in the absence of the project activity. Although there is still the question of additionality, this decision does open up the door for considering a package of projects in transportation infrastructure, for example. This is a favorable development for the CDM and should be described in the text. Further baseline methodology development and additionality analytical tool will be needed. (Andrei Marcu, IETA)	
5-563	A	57	23			Subchapter 5.5.2 is very much apprececiated because it reflects highly policy relevant policies in a very informative but still comprehensive manner and addressing issues relevant for developed as well as developing countries. (Radunsky Klaus, Umweltbundesamt)	NOTED
5-564	A	57	25			Aviation section - The section seems to present similar material in diferent places. A reorganization and the use of section headings would help to organize the chapter better. (e.g., vehicle design, fuels, operational practices, etc.) (Steven Baughcum, Boeing Company)	Accepted – will revise as appropriate
5-565	A	57	25			Aviation section - The discussion seems to be based almost entirely on European work with a heavy emphasis on UK studies. The report might have better balance if studies from other countries were considered as well. There is an extensive literature on engineering work related to fuel efficiency improvments, combustor technology, weight reduction, and air traffic improvements. The authors should provide a more comprehensive review. (Steven Baughcum, Boeing Company)	Accepted – other sources sought from the Reviewer
5-566	A	57	25			Aviation section - Atmospheric science conclusions are provided in a number of locations. These more properly should have been addressed in the WG1 portion of	Rejected – conclusions from WG1 are not finalised and the WG3 report should be

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						the FAR. This section should be dealing with the conclusions of the science volume (WG1) and not necessarily discussing individual science papers. The chapter would be stronger if it focused better on technology and mitigation options and provided more balance. (Steven Baughcum, Boeing Company)	self-standing as far as possible, but consistency between WG1 and 3 is important and comparative checks will be made.
5-567	A	57	38			Question in Principle: Is it 'emission trading' or 'emissions trading'? (Manfred Treber, Germanwatch)	Noted – should be emissions, but Ron Wit should comment
5-569	A	58	4	58	49	Much of this discussion seems to forget that aviation is only about 2% of the anthopogenic CO2 emissions. (Steven Baughcum, Boeing Company)	Noted
5-570	A	58	11	58	11	Ref. CE Delft (2002 and 2004) not listed in ref. List; Change to Wit et al. (2002, 2005) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-571	A	58	11	58	11	Ref. CE Delft (2002 and 2004) not listed in ref. List; Change to Wit et al. (2002, 2005) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	accepted
5-572	A	58	24	58	24	Please add a sentence on the relatively new development in the European Union. E.g. "ince the EU Directive on Energy Taxation is in force it is possible that individual member states introduce taxation on kerosene." (Manfred Treber, Germanwatch)	Taken into account, we will assess this.
5-573	A	58	37			Does this "CO2 reduction " mean the reduction in CO2 from aviation or global total CO2? You should describe it explicitly (Takayuki Takeshita, The University of Tokyo)	Noted – Ron Wit to clarify
5-574	A	58	39	58	39	AERO modeling system: please briefly explain, or refer to literature (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted – Ron Wit to explain
5-575	A	58	39	58	39	AERO modeling system: please briefly explain, or refer to literature (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-576	A	59	7	59	11	Here, a recommendation from a consultant (Wit et al) is described as the preferred option from the European Commission. This is misleading, as the EC has not yet formally made any such decisions. (Andreas Hardeman, International Air Transport Association)	Taken into account, specific formulation of the EC will be checked
5-577	A	59	17	59	18	p. 59. L. 17-18. Some references should be given on the level of taxation for aviation fuel in the countries listed. It is somewhat suprising to see that fuel for regional flights is subject to taxation in the Netherlands for instance. How significant is the domestic air traffic in the Netherlands and what's the level of taxation? Regarding	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						the USA, knowing the level of taxation referred to would be of interest since it is said on p.58 L. 20 that regional taxation would in the regional context bring considerable distortions. In the USA and in the Netherlands such type of distortions is usually not favoured by decision-makers. Some clarification is therefore needed. (Philippe Tulkens, TERI School of Advanced Studies)	
5-578	A	59	24	59	24	... Save 1 Mt CO2 per annum'. Please add (as I assume): But it does not take into account rebound effects. (Manfred Treber, Germanwatch)	Taken into account, will be cross-checked with section 5.4.2.3.
5-579	A	59	26	59	35	As discussed in the WGI science volume of the FAR and in the recent P.M. de F. Forster et al. / Atmospheric Environment 40 (2006) 1117–1121 and Shine and co-workers in PNAS, vol. 102, 15768–15773 (2005) papers, it is not clear what metric to use in evaluating non-well mixed forcings for aviation or any other sector. For aviation, the uncertainties remain large and the tradeoffs (both technology and policy) are unclear. (Steven Baughcum, Boeing Company)	noted
5-580	A	59	26	60	19	A disproportionate amount of attention is given to the non-CO2 climate impacts from aviation, and the possible ways of addressing these. Other emission sources also have non-CO2 related effects but these are not addressed in the report at all. Large swathes of material are simply copied from the Wit report and pasted verbatim into the IPCC report. This provides an unbalanced picture that should be redressed. (Andreas Hardeman, International Air Transport Association)	Taken into account, Reason for including substantial attention for con-CO2 climate impacts from aviation is the following:1) these impacts are a factor 2 to 4 times larger than CO2 alone, according to IPCC 1999. This is mainly caused by high altitude emissions2) fuel burn by surface transport doesn't have this factor3) Given the relatively large share of non-CO2 climate impacts from aviation, it is crucial to address also policies that may capture these effects. THIS SHOULD ALSO BE MENTIONED IN THE SUMMARY
5-581	A	60	5			Before using abbreviation LTO, you should describe it in a complete form. (Takayuki Takeshita, The University of Tokyo)	Accepted
5-582	A	62	3	62	7	"A credit-based programme would allow ship owners to reduce emissions and sell the emission reduction credits…" This study by a noted economics consultant (Harrison, 2005) is a good piece of work. As in all such programs, a good monitoring (emissions estimating) program would be very valuable in ensuring the validity of the credits generated.	noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Arthur Lee, Chevron Corporation)	
5-583	A	62	3	62	7	"A credit-based programme would allow ship owners to reduce emissions and sell the emission reduction credits…" This study by a noted economics consultant (Harrison, 2005) is a good piece of work. As in all such programs, a good monitoring (emissions estimating) program would be very valuable in ensuring the validity of the credits generated. (Andrei Marcu, IETA)	noted
5-584	A	62	32	58	0	There is no mention in this section of the impacts of the Montreal Protocol in leading to the phase-out of CFCs used in, particularly, mobile air-conditioning and their replacement with lower GWP HFCs. This has resulted in a considerable reduction in the overall GHG emission contribution of the mobile air-conditioning sector (quantified in IPCC Special Report on HFCs). (Nick Campbell (Batch 2), ARKEMA SA)	Taken into account, it will be analysed whether this should be included
5-585	A	62	34	64	23	Section 5.5.3.1 refers to other policies in the field of "local air quality, congestion reduction, energy security, land use and the provision of public transport". Here it would perhaps be pertinent to make the point that air quality regulations, whilst desirable, are in some cases being used as an argument against new development in urban areas (the argument runs along the lines of "air quality is already a problem in City X, so additional development will only exacerbate the problem"). Such argumentation can lead to more development taking place outside existing cities and can potentially mean increased travel and CO2 emissions. What is needed are policies/ regulations to manage urban air quality PLUS mechanisms to reduce the demand for transport in towns and cities PLUS incentives to focus new development in existing urban areas (in smart locations). (Dominic Stead, Delft University of Technology)	Taken into account
5-586	A	62	45			Chapter 11 (11.8.2-11.8.4 starting on p.56) , as the summarizing chapter is the most logical place to discuss this issue extensively, with chapter 4-10 concentrating on (preferably quantified) co-benefits of specific measures in the sector. Ch5: p62 Generally well focused on transport. General text can be taken out with a reference to ch 11: p62 line 45 to p 63 line 11. and p63 line 49 to p64 line 23. (Peter Bosch, IPCC TSU WGIII)	Accepted
5-588	A	63	0			Good discussion of the benefits of non-Co2 related interventions to reduce travel, though more could be made of this in the overall argumentation of the report. (Darren Walton, Opus Central Laboratories)	Overall argumentation will be left to Chapter 11
5-587	A	63	50			NMT is the most important policies with large and consistent co-benefits between GHG reduction, air quality and people health improvement. First, greater use of	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						bicycles for shorter distances holds great potential (Mohan & Tiwari 1999). (Stefano Caserini, Politecnico di Milano)	
5-589	A	64	33	64	33	BOT and BOOT need to be defined. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	ACCEPTED-WILL BE DONE
5-590	A	64	33	64	33	Please explain abbrevations (BOT, BOOT) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	ACCEPTED-WILL BE DONE
5-591	A	64	33	64	33	Please explain abbrevations (BOT, BOOT) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	REPETITION
5-592	A	65	4	65	7	I don't agree with the sentence "Nonetheless Mexico, Argentina, the UK and Brazil among others have successfully concessioned national rail networks to the private sector." It is necessary to look at the negative effects for environment and economy by abolishing many local lines. See Christian Wolmar"Broken rails:how privatisation wrecked Britain's railways(2nd ver.)"London : Aurum , 2001 (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	TAKEN INTO ACCOUNT-WILL CONSULT REFERENCE
5-593	A	66	13			the text as presented earlier on CBA (page 49) is also applicable for infrastructure. (Bert Van Wee, Delft University of Technology)	NOTED-WILL RATIONALIZE
5-594	A	66	18			Define "NMT" (Danny Harvey, University of Toronto)	Accepted. We will
5-595	A	66	18	66	18	It is proposed to explain "NMT" when it is used the first time in subchapter 5.6. (Radunsky Klaus, Umweltbundesamt)	Accepted. We will
5-596	A	66	26	66	31	There are many successful examples in the developing countries, for example, subway at Mexico City and Bangkok and so on. (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	Taken in to account. It will be covered in other section.
5-597	A	66	27	66	28	The urban rail systems are however prohibitive on account of the high capital and operational costs...' Please insert: "The urban heavy rail systems are prohibitive on account of the high capital and operational costs, light rail however not that much..." (Manfred Treber, Germanwatch)	WILL CHANGE ACCORDINGLY
5-598	A	67	1		4	on this general level this seems an obvious statement, after section 5.2.2; consider to take it out (Peter Bosch, IPCC TSU WGIII)	we will take care
5-599	A	67	1		4	Obvious statement. Can be taken out. (Peter Bosch, IPCC TSU WGIII)	same as above
5-600	A	67	6	67	7	Change "Any private company has no right to press consumers in a particular direction of technology …" to "Vehicle manufacturers cannot pressure consumers into accepting a particular technology …" It is neither illegal or unethical for a	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						company to produce a single technology and to try to convince customers to use it. Many companies do this and in some cases, e.g. Microsoft, they are highly successful. Even in the transportation sector there have been cases where a company was successful for a period of time producing a single technology, e.g., the Volkswagen Beetle. It is no longer the case, but a clear distinction needs to be made between what is necessary to succeed in the market and what is legal and ethical. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
5-601	A	67	14	68	15	Ch5, p66 section 5.7 has little specific for the transport sector and lacks a conclusion with regard to RD3 for transport. The following is general text that can be considered for taking out, while referring to ch. 2. : p67 line 14-35, p67 line 38 top p68 line 15. (Peter Bosch, IPCC TSU WGIII)	we will consider
5-602	A	68	17			General comments on a whole section 5.8 of chapter 5. Add explanation about Chinese situation much more and technical support to developing countries by developed countries. Reason: Chinese car population is growing up and vehicles in use will expand. Chinese automobile circumstance affects on the world policy of GHG mitigation strongly, therefore, please add a little comment on regional differences. It is an obligation for developed countries to support developing countries to reduce CO2 in the world. (Masahiko Hori, Japan Automobile Research Institute)	we will
5-603	A	68	48	69	6	The statements about two-cycle engines are correct, but incomplete. Since this report is about climate change mitigation, the analysis should include the impact of switching from two-cycle to four-cycle engines on both CO2 and black carbon emissions. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	we will add
5-604	A	69	22	69	22	The figure 96% doesn't agree with what has been presented in Chapter 4 (P49, line 1). Check for consistency. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	we will check
5-605	A	69	31	69	38	While the long-term prospect of producing hydrogen from renewables is appealing, in the shorter-term, hydrogen is most likely to be produced by gasification of fossil fuel carbon. However, as documented in the recently published IPCC Special Report on Carbon Dioxide Capture and Storage (SRCCS), hydrogen manufacture in conjunction with CCS technology can provide a low-carbon emission energy carrier. This option needs to be included in any discussion of future vehicle-fuel combinations.	we will deal this in H2 section.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
5-606	A	70	26			p. 70. Box: Asia. The figures given for the increase of motor vehicles in China and Korea seem to be given in % per year but it is not specified. The unit or the time frame condired should be specified. (Philippe Tulkens, TERI School of Advanced Studies)	Accepted. We wil make clear
5-610	A	71	0			Too much emphasis on scenario assumptions. Empirical work on mitigation potential would be easy to include. (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	we will improve
5-607	A	71	43	78	6	Section 5.9 "Mitigation Potential" gives scenario's and examples, but would improve if a synthesis view would be added. In addition the question is not answered HOW the envisioned emission reduction scenario's could be stimulated more effectively and how barriers can be lowered. E.g. by addressing innovative financial constructions or by programmes to increase the sense of urgency etc? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted in part; a synthesis will be added; section not designed to deal with policy
5-608	A	71	43	78	6	Section 5.9 "Mitigation Potential" gives scenario's and examples, but would improve if a synthesis view would be added. In addition the question is not answered HOW the envisioned emission reduction scenario's could be stimulated more effectively and how barriers can be lowered. E.g. by addressing innovative financial constructions or by programmes to increase the sense of urgency etc? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted in part; a synthesis will be added; section not designed to deal with policy
5-609	A	71	43	71	46	It is proposed that these scenarios relate to business as usual and not to mitigation scenarios. (Radunsky Klaus, Umweltbundesamt)	Accepted; we will makeit clear that these are BAU scenarios
5-611	A	72	12			I would add that few studies exist on the GHG mitigation potential of NMT transport (not covered by the IEA Outlook and by the WBCSD Mobility 2030), and only few studies exist (M. Replogle, 2001; Hea et al., 2003) (Stefano Caserini, Politecnico di Milano)	Accepted
5-612	A	72	15	72	17	This is a repetition from page 14. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Rejected; true that studies are mentioned on p.14, but for different purpose
5-613	A	72	15	72	15	Please add reference WBCSD (2004) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-614	A	72	15	72	15	Please add reference WBCSD (2004) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-615	A	72	16	72	16	Please add reference IEA (2004,b)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	
5-616	A	72	16	72	16	Please add reference IEA (2004,b) (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Accepted
5-617	A	73	11			Figure 5.21. Explanations for the graphics missing (at least in the version I printed)? (Matti Melanen, Finnish Environment Institute)	Accepted; figure somehow got cut off, will correct
5-618	A	73	28	73	37	This section explains a scenario with in line 29 "assumed change in consumer preferences for larger vehicles" which appears to be in contradiction with line 36 "reduced consumer preference for size and power" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected; these are not contradictory
5-619	A	73	28	73	37	This section explains a scenario with in line 29 "assumed change in consumer preferences for larger vehicles" which appears to be in contradiction with line 36 "reduced consumer preference for size and power" (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	Rejected as above
5-620	A	74	18	74	26	The authors are commended for their careful reference to the GREET model. (Richard Doctor, Argonne National Laboratory)	Noted
5-621	A	74	36	75	37	None of the hydrogen studies mentioned in this section included the use of carbon dioxide capture and storage (CCS) technology to reduce CO2 emissions from hydrogen manufacture. As documented in IPCC's recently published Special Report on Carbon Dioxide Capture and Storage (SRCCS), gasification of carbon from any source to produce hydrogen creates a relatively pure carbon dioxide stream which is an excellent candidate for CCS technology, which would dramatically lower carbon emissions. As noted in the SRCCS, production of hydrogen from biomass in conjunction with CCS technology could actually lead to negative carbon emissions. CCS could also lower carbon emissions in the case of hydrogen produced via electrolysis using fossil-fuel based electricity. The SRCCS provides ample evidence that the post-combustion capture of carbon dioxide from coal-based electric power generation is technically feasible, with all components of the technology rated either economically feasible under specific conditions or mature market (SRCCS, Table SPM.2). This assessment needs to be redone adding CCS to those options in which it makes technical sense. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	accepted
5-622	A	75	34	75	35	I think it doubtful that "FCV will be more fuel-efficient than a diesel parallel hybrid only when fuel cells become extremely efficient". Almost all of the literature I have ever read assumes that hydrogen FCVs will be more fuel-effficient than advanced diesel hybrids, e.g., Table 5.3 in Weiss et al. (2000) On the Road in 2020. Energy Laboratory Report #MIT EL 00-003.	Rejected; text simply quotes the study, and good chance the study is correct.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Takayuki Takeshita, The University of Tokyo)	
5-623	A	75	42			I believe the point is not to study "the potential to reduce transportation GHG emissions in developing nations" but the potential to weaken the increase of transportation GHG emissions in developing nations. Since GHG are very low in most developing nations, our goal has to be avoid the excessive increase. (Stefano Caserini, Politecnico di Milano)	Accepted
5-624	A	76	5	76	6	I think that the policy for slowing the growth of personal vehicle ownership is not desirable. It is important for pollicy makers to find solutions to curb the negative effect of transport use without reducing the social welfare arising from personal transportation. (Takayuki Takeshita, The University of Tokyo)	Rejected; we are not trying to reduce mobility, but making sure externalities are taken account of, and offering alternatives to the automobile where that makes sense.
5-625	A	76	40			According to Rogner (1997) An assessment of world hydrocarbon resources. Annual Review of Energy and the Environment, pp.217-262, South Asia has a very small amount of natural gas resources. Therefore, I think that "push for more natural gas use in vehicles" is unrealistic for Delhi. (Takayuki Takeshita, The University of Tokyo)	Rejected: Indian policy is to increase natural gas use for air quality benefits; importing gas is not worse than importing oil, which India would have to do otherwise.
5-626	A	78	5	78	6	Too few remarks are done in the FOD on the status quo of science and how the future research on transport GHG mitigation options should be developped. A report (110 pages) from Leonardi and Umweltbundesamt as OECD case study Germany on decoupling road freight from its climatic impact is in print and will be publicly available soon 2006. See actual report and IEW presentation at http://www.mpimet.mpg.de/en/projects/nestor/indexNESTOR2.html (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	we will study it.
5-627	A	78	8			The table 5,14 is comming too late, because it shows a good overview on mitigation options. However, these options are not explained coherently, nor how policy makers should apply them. Many options are missing in this important table that should be completed and explained with much more details, since it encompass an overview on most of the domestic actions. A structuring proposition would be to begin with global, far reaching measures (e.g: global supply chains LCA) (Rizet, C und Keita, B. (2005): Chaînes logistiques et consommation d'énergie: cas du Yaourt et du Jean in : INRETS (Eds): Actes de la journée INRETS du 18 mai, Consommation d'énergie et émissions de GES en transport de marchandises. Arcueil), down to domestic action (tax), cities (charges), companies (fleet management) and the driver/consumer scale (behaviour and driver training	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						measures) (Harmsen, R., Kroon, P., Ybema, J.R., Jespersen, M. S. und Jordal-Jorgensen, J. (2003): International CO2 Policy Benchmark for the Road Transport Sector. Results of a Pilot Study. ECN-C--03-001. ECN Beleidsstudies. Petten. Niederlande. www.ecn.nl/library/reports/2003/c03001.html) (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	
5-628	A	78	41			To what extend information society emergence will reduce the transport activity is not discussed. Freight transport is likely to increase. On the contrary, business travelling is likely to be partly replaced by virtual meetings allowing all participants to see each other and the common practice to move all employees at the same location, inherited from the industrial era, will progressively disappear, as working at home will save transport cost and time and building costs and be a source of GHG emissions reduction both in transport and buildings sectors. (Michel Petit, CGTI)	Noted. We will consider
5-85	B	79	8	0	0	"highly unlikely" does not conform with the prefered language in the IPCC guidance note on uncertainty (Peter Bosch, IPCC TSU WGIII)	Accepted. We will fix it.
5-629	A	79	13	79	14	Why the conclusion to reduce significantly CO2 emission requires advanced biofuels in ICE - powered vehicles? Ethanol is a biofuel produced through traditional sugar fermentation or a modern biofuel if produced from cellulose or Fischer-Tropsch process. But ethanol, from sugarcane, from cellulose and from Fischer-Tropsch can have very low CO2 emission (as is the case in Brazil) and will be able to mitigate CO2 emission in cars. (Jose Moreira, Institute of Electrotechnology and Energy - University of Sao Paulo)	Noted. We will make clear.
5-630	A	79	38	79	40	This basic sentence on trucks should appears more in the beginning of chapter 5 (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	we will consider
5-633	A	80	0			References for the chapter 5 Brown Lester R., Larsen Janet (2002) Bicycle Sales Top 100 Million In 2000. http://www.worldwatch.org/pubs/globaltrends/ City of Copenhagen (2005) Bicycle Account 2004 www.vejpark.kk.dk/CityofCyclists E.C. (1999): Cycling: the way ahead for towns and cities. European Commission, DG XI. 64 p, ISBN 92-828-5724-7. http://europa.eu.int/comm/environment/cycling/cycling_en.htm Hook Walter, Wright Lloyd (2002) Reducing greenhouse gas emissions by shifting	we will consider to refer.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						passenger trips to less polluting modes. Institute For Transportation And Development Policy, March, 2002 Karekezi S., Majoro L, Johnson T.M. (2003) Climate change mitigation in the urban transport sector. Priorities for the World Bank. World Bank – Global Environment Facility Publication, Washington D.C., June 2003. Kebin Hea, Hong Huob, Qiang Zhangc (2003) A Comparative Study on Urban Transport system and Related Environmental Impact in Asian Mega-cities: Beijing, Shanghai and Tokyo. Proceedings of International Workshop on Policy Integration Towards Sustainable Urban Energy Use for Cities in Asia, 4-5 February 2003 (East West Center, Honolulu, Hawaii) © 2003 Institute for Global Environmental Strategies Kennedy Christopher A (2002) A comparison of the sustainability of public and private transportation systems: Study of the Greater Toronto Area. Transportation 29: 459–493, 2002, Kluwer Academic Publishers. M. Replogle (2001) Non-Motorized Vehicles in Asia: Lessons for Sustainable Transport Planning and Policy www.environmentaldefense.org/ documents/2293_NonmotorizedVehiclesAsia.pdf Mohan D & Tiwari G (1999) Sustainable transportsystems: Linkages between environmental issues, public transport, non-motorized transport and safety. Economic and Political Weekly XXXIV(25): 1589–1596. Ntziachristos L., Samaras Z. (2000), "COPERT III - Computer Programme to Calculate Emission from Road Transport Methodology and Emission Factors (version 2.1)". European topic centre on air emission, European Enviroment Agency. Shipper Lee, Shiuen Wei (2005) Seeking a crystal ball: future automobility, fuel use and CO2 e emissions in China. World Resources Institute – Embarq Cop-11 Side event, Montreal Quebec, Canada, Dec 5, 2005 (Stefano Caserini, Politecnico di Milano)	
5-631	A	80	15	80	17	What is the vision at present regarding the cost effectiveness of measures in transport compared to other sectors? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	we will discuss this more in the next version.
5-632	A	80	15	80	17	What is the vision at present regarding the cost effectiveness of measures in transport compared to other sectors? (Hein De Wilde, Energy Research Centre of the Netherlands (ECN))	same as above
5-634	A	81	1			the references in the text and in the reference list deserve attention. Please only present familiy names in the main text (e.g. Mokhtarian, and not P.L. Moktharian),	TAKEN INTO ACCOUNT

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						please give all names in reference list (and no 'et al.'). (Bert Van Wee, Delft University of Technology)	
5-635	A	86	47			The reference Karekezi, S., L. Majoro, T. M. Johnson, 2003. Climate Change and Urban Transport: is incomplete. The reference could be Karekezi S., Majoro L, Johnson T.M. (2003) Climate change mitigation in the urban transport sector. Priorities for the World Bank. World Bank – Global Environment Facility Publication, Washington D.C., June 2003. (Stefano Caserini, Politecnico di Milano)	TAKEN INTO ACCOUNT
5-636	A	88	5	88	6	Nakamura, H., Hayashi, Y. and Miyamoto, K. (eds.), 2004 has an English version. It is necessary to quote not a Japanese version but an English version. World Conference on Transport Research Society and Institute for Transport Policy Studies"Urban transport and the environment : an international perspective " (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	Accepted
5-637	A	90	6	90	6	Leonardi J., 2004 instead of Leornadi (Jacques Leonardi, INRETS - Institut National de Recherche sur les Transports et leur Sécurité)	Accepted
5-638	A	95	0			Table 5.2. Please, explain the abbreviation +ve in the footnotes of the table. (Ilkka Savolainen, Technical Research Centre of Finland VTT)	Accepted.
5-639	A	99	0	99		Table 5.6 . The authors should identify the source of this data. (Steven Baughcum, Boeing Company)	Accepted – Will identify