WMO

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

UNEP

**IPCC Fourth Assessment Report**

***Expert/Government Review of the Second-Order Draft***

# Chapter 5

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| **5-1** | **C** | **0** | | | | Tallow and whey are not mentioned as sources of biofuels. They form the feedstocks for the biofuels industry in New Zealand, and we would expect that they will be used also in other economies based on similar agriculture.<br>(Government of New Zealand) | We will add the word animal oil. |
| 5-2 | C | 0 | | | | Liquified petroleum gas (LPG) is not mentioned as a transport fuel. It has been widely used, in New Zealand at least, and as an option for future use we had expected to see some coverage<br>(Government of New Zealand) | ACC, we will add some information to the paragraph of DME |
| 5-3 | C | 0 | | | | Electric cars are not given much coverage. Where there are hydro-electric or other renewable resources and / or security of supply issues for liquid fuels, we would expect them to be considered as a future option<br>(Government of New Zealand) | We will improve |
| 5-1 | A | 0 | 0 | 0 | 0 | The quality of the chapter significantly improved compared to the previous version sent for review comments. However, to be honest, this version is disappointing for me. I consider this as a 70% version, whereas I expected a more or less complete draft. Apart from the typos this version still has many shortcomings of which without any doubt the authors must be aware of. To my opinion it would have been better to send a 90% version for review. Therefore I do think that a relatively detailed review is not the best thing to do yet, it would lead to many remarks that the authors must know already.<br>To my opinion more general thinks that need attention are:<br>1. The structure is not very clear at several places yet<br>2. At many places the texts are quite general or vague. This can be improved, fore example by adding quantifications. (examples: page 4, lines 14-16: OK, but this is generally known. What is the possible quantitative effect?<br>p. 5, line 10: what is substantial?<br>p. 30, line 11: what is considerably low?<br>p. 65, lines 23-25: although a quantification is given, this is a very vague / general text (even without a source)) .<br>3. At many places references are missing but needed to be convincing. (examples:p. 53, line 34-39<br>p. 54 line 40 – page 55 line 6<br>p. 65, lines 140-16, lines 23-25)<br>4. Abbreviations need to be explained fully the first time (e.g: page 2, line 47: what is TAR?)<br>(Bert van Wee, Delft University of Technology) | Noted |

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| 5-2 | A | 0 | 0 | 0 | 0 | • I miss the main messages / lessons to be learned<br>• Some texts are heavily US dominated. E.g. section 5.3.1.3.<br>• At several places I miss the way vehicles are used (speed, accelerations, deceleration) in overviews of determinants for energy use / CO2-emissions. I realize that at a few places this subject is briefly mentioned.<br>• Authors with a middle name are wrongly referred to. E.g. p. 49, line 7: De Jong, and not G.D. Jong.<br>(Bert van Wee, Delft University of Technology) | TIA/davidUrban planning:muro & sperling |
| 5-3 | A | 0 | 0 | 0 | 0 | Biofuels (defined in chapter 5, "The term biofuels describes fuel produced from biomass" biomass fuels is not used in this meaning in chapter 7 - A thorough check for consistent use is needed in all chapters: biofuel, biomass fuel, bioenergy (often used for electricity only other times for all forms of energy based on biomass).<br>(Wolter Elbersen, WUR, AFSG) | I would rephrase "…" for: " biofuels as defined in chapter 4 can be made up…." , once chapter 4 is the right place to define it. |
| 5-4 | A | 0 | 0 | 0 | 0 | The considerations on diesel engines should include observations on the emissions of athmospheric pollutants and, in particular, to the emission of NOx. This issue is partly addressed in the technology description of diesel engines in IEA (2006), Energy technology perspectives, OECD/IEA, Paris.<br>(Pierpaolo Cazzola, IEA) | Accepted/steve |
| 5-5 | A | 0 | 0 | 0 | 0 | The chapter gives priority to alternative fuels (and notably biofuels) over fuel efficiency, but efficiency improvements are likely to have more relevance for mitigation purposes, in the short term. This note may deserve a reordering of the items in the chapter.<br>(Pierpaolo Cazzola, IEA) | Accepted/suzanaSteve:related to FE and cost |
| 5-6 | A | 0 | 0 | 0 | 0 | vi) Is it possible to show in an additional figure the [if possible: extended] modal split (car, motorised two wheeler, public transport, [bike, pedestrians]) in some Megacities worldwide in industrialised and developing countries? This would fit for page 8, after line 29.<br>(Manfred Treber, Germanwatch) | We will consider/muro |
| 5-7 | A | 0 | 0 | 0 | 0 | v) I suggest to include some of the 'success storys' in emission mitigation not connected to cars (e.g. from Chapter 5.5 'Infrastructure' on NMT in developing countries and Bus systems) in the Executive Summary.<br>(Manfred Treber, Germanwatch) | TIA/david,muro |
| 5-8 | A | 0 | 0 | 0 | 0 | iv) This chapter on transport is NOT part of a report from world car industry on how to make their products more climate friendly. This is a report from IPCC on how to influence development in transport so that mistakes of the past won't be imitated | noted |

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| | | | | | | and on what possibilities exist to curb emissions rise in transport so that ambitious climate goals (e.g. stabilisation concentrations to remain below 2 degrees warming) could be realized. See also my comment on pages 95 to 97.<br>(Manfred Treber, Germanwatch) | |
| 5-9 | A | 0 | 0 | 0 | 0 | It would be very enlightening and helpful if at the beginning of the introduction of the Executive Summary or at the introduction of the chapter on transport the fundamental premise for passenger transport is written down: The fact - as nicely described on page 9, line 11 - that the travel time budget is constant (so that there is no time saving from faster transport but an increase of the distance of the trips).<br><Worldwide travel studies have shown that the average time budget for travel is roughly constant worldwide, with the relative speed of travel determining distances traveled yearly (Schafer, 2000).><br>(Manfred Treber, Germanwatch) | TIA |
| 5-10 | A | 0 | 0 | 0 | 0 | iii) The Executive Summary is biased and does not reflect the huge variety of existing transport solutions which are more compatible with sustainable development than individualised car transport. It is too much car-centered and does not reflect the development in many cities away from focussing mainly on car use as mode of transport which is harmful to the city. These alternatives matter, we know that half of world population lives in cities. If you look at http://www.gefweb.org/sustainabletransport.html you see that also GEF and World Bank reflect this in their investment decisions. In the draft text there is no mentioning of the economic advantages of public transport instead of a car centered development ['The cost of transport for the community is clearly lower in medium or high density towns well serviced by public transport'] as the main transport mode (empiric evidence on this you find in http://www.uitp.com/publications/pics/pdf/leaflet.pdf, a new UITP publication "Mobility in cities - Database; Better mobility for people worldwide" or http://www.uitp.com/publications/pics/bonus/Fact%20sheet%20Madrid.pdf) as an example for Madrid.<br>(Manfred Treber, Germanwatch) | noted |
| 5-11 | A | 0 | 0 | 0 | 0 | i) Not only present IPCC Chair Rajendra Pachauri but also former IPCC Chair Robert Watson had several times emphasized that the IPCC Reports should not restrain themselves to references in english language. Especially for the transport sector this is important as we know that the very diverse 'transport reality' happens locally, mostly a regional audience which is addressed in thire local language is interested. Furthermore most of these experien-ces (or innovative practises) are not | noted |

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| | | | | | | published in reviewed literature. If the diverse 'transport reality' through the continents should be described it is neccesary that it covers texts written in the main languages worldwide. If counted correctly, I found only two references written in non english language in the References of Chapter 5 (p. 101-112). This means that most of modalities of the 'transport reality' and many innovations which are tried in the different countries [apart from general surveys] cannot be reflected in this Chapter. One arbitrary - but impressive - example: the very convincing long distance bus transport system in Turkey combined with the gasoline taxation of the Government.<br>(Manfred Treber, Germanwatch) | |
| 5-12 | A | 0 | 0 | 0 | 0 | There are many grammatical mistakes in this chapter in some sections as well as many of the figures and tables not referenced as well as major parts of some sections not referenced at all. Since this is the final time for comments I have put some suggestions for grammatical changes as well as content comments. I would also suggest less text on aviation and to examine alternative options to present the tables at the end of the chapter which take up considerable space<br>(John Kessels, Energy Research Centre of the Netherlands) | noted |
| 5-13 | A | 0 | 0 | 0 | 0 | General Comment: All the analysis concerning engine fuel consumption and emission rates whether using clean diesel or bio-diesel or alternative forms of fuels lack the objectivity in terms of comparison with other forms, since it does not clculate the whole chain.<br>(ALFEHAID MOHAMMED, MINISTRY OF PETROLEUM) | We already cover these. |
| 5-14 | A | 0 | 0 | 0 | 0 | General Comment: There are inconsistency in several instances concerning numbers. Also the whole chapter lacks coherence and objectivity.<br>(ALFEHAID MOHAMMED, MINISTRY OF PETROLEUM) | Noted |
| 5-15 | A | 0 | 0 | 0 | 0 | Executive summary need to mention that non climate policies which are no regret options for transport sector exist which produce cobenefits : e.g reduction in urban congestion, urban planning strict implementation of local air pollution standards, better driving habits etc. These are major issues so far highly populated developing countries are concerned.<br>(Joyashree Roy, Jadavpur University) | TIA/david, michel (speling) |
| 5-16 | A | 0 | 0 | 0 | 0 | This chapter must address in quantitative terms the GHG implications of unconventional oil spurred by higher world oil prices. The climate risk is substantial, as noted briefly in the text, but supporting information is needed in the LCA and global scenarios sections, at a minimum.<br>(Jason Mark, Union of Concerned Scientists) | TIA/steve |

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| 5-17 | A | 0 | 0 | 0 | 0 | General: When referring to the aviation sector the Chapter fails to address accurately the developments in ICAO, in the area of forecasting and statistics. Substantial effort is being undertaken by the Organization to assess the evolution of aviation emissions, using ICAO accepted inventory models, and ICAO has substantial work on operational measures to address fuel and emissions reductions. These are not referred to in the document.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | ACC, we will check if available information exists |
| 5-18 | A | 0 | 0 | 0 | 0 | References to the source of the aviation-related statistics and forecasts are missing. Majority of the material in the aviation chapter is based on studies from a State, and could benefit from the inclusion of other regions' studies/references providing a more international approach to the subject.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted, it will be checked whether all sources are correct and included |
| 5-19 | A | 0 | 0 | 0 | 0 | The chapter is mostly referenced in English language, and worse has no insight on whole parts of the world such as Scandinavia, Germany and Switzerland, France, Turkey… (and as a matter of course Africa and the Middle East but this is also the case of other chapters). This is weakening the chapter in term of diversity and legitimity of the survey, but also misses a whole evolution of parts of Europe and some cities elsewhere where the car is no more the dominant public investment.<br>(ANTOINE BONDUELLE, Université Lille II) | TIA |
| 5-20 | A | 0 | 0 | 0 | 0 | The concentration of the chapter on technology potentials in motor vehicles make the work irrelevant in the most part for policymakers. The chapter should cover a more balanced mode range (bicycles are not even a sub-paragraph!), but also concentrate on the possible policies, examples of best practice or worst cases, with the aim of convincing the reader that public or private policies can or cannot have an impact.<br>(ANTOINE BONDUELLE, Université Lille II) | noted |
| 5-21 | A | 0 | 0 | 0 | 0 | Support all comments made by Manfred<br>(Faouzi Senhaji, I.A.V. Hassan II (GERERE)) | noted |
| 5-22 | A | 0 | 0 | 0 | 0 | the SOD chapter is unbalanced. A lot of attention is given to technical improvements in cars. The next draft needs to address prioritization: most mitigation potential in modal shifts and efficiency improvement motorized transport, and alternative modes of transport, which logically would be reflected in the relative length and emphasis of sections.<br>(Expert Review Meeting Paris, IPCC) | noted |
| 5-23 | A | 0 | 0 | 0 | 0 | the chapter lacks a strong conclusion<br>(Expert Review Meeting Paris, IPCC) | We will redraft |

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| 5-24 | A | 0 | 0 | 0 | 0 | that the chapter should be brought up-to-date. Recent statistics should be used as far as possible<br>(Expert Review Meeting Paris, IPCC) | Noted |
| 5-25 | A | 0 | 0 | 0 | 0 | Substantial use of (advanced) biofuel is one of the key factors for substantial GHG reduction. Biomass AVAILABILITY is not even briefly discussed anywhere in chapter 5. At least refer to literature (and/or to other chapters in the SOD).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Cross reference with other chapters |
| 5-26 | A | 0 | 0 | 0 | 0 | Several references not yet included in reference list<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | noted |
| 5-27 | A | 0 | 0 | 0 | 0 | Several abbreviations not explained and/or not included in the list of abbreviations<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | noted |
| 5-28 | A | 0 | 0 | 0 | 0 | The authors are to be commended for the substantial improvements, alterations, and additions made to this draft compared to the FOD. The revised discussion of vehicle technology, safety issues related to efficient vehicles, land use policies, and the peak oil issue are all most welcome. However, I still think that there are some important issues that are not adequately discussed or not discussed at all. These include: (1) the possibility of very large increases in the price of oil as the rate of extraction peaks, and that reduced fuel use to reduce CO2 emissions could serve as hedge against higher prices (so this is a significant co-benefit) or even deferring price increases (a flaw in the cost-benefit analysis is the assumption that the price of oil is independent of demand reductions due to CO2 emission policies); (2) the concept of energy return on investment is not discussed with regard to the Canadian tar sands and with regard to biofuels.<br>(Danny Harvey, University of Toronto) | TIA, we will add/steve |
| 5-29 | A | 0 | 0 | 0 | 0 | Box 5.1 discusses non-GHG emissions from road transport, indicating that they represent 4-12% of total transport sector GHG emissions, but there is no discussion of mitigation potential or cost for these emissions in the chapter. This is a serious omission that should be rectified in the final draft.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | TIA/davidL, kobaAt first box5.1,then cost &pot |
| 5-30 | A | 0 | 0 | 0 | 0 | At a number of points, the chapter used the 2001 GM/ANL well-to-wheels study. An updated version of this study was published in May, 2005. (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.) Information from the updated study should be used, rather than depending on the information form the older report. | ACC |

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| | | | | | | (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | |
| 5-31 | A | 0 | 0 | 0 | 0 | sometimes the authors of a table or a figure or source of a table is quoted directly in the title of the table or at the bottom, sometimes there are information on the origin of the table only in the text<br>(Stefano Caserini, Politecnico di Milano) | noted |
| 5-32 | A | 0 | 0 | 0 | 0 | More attention is required to the excessive use of significant figures in data provided in tables and figures. Often not withstanding the large data uncertainty and differences, 4 or 5 significant figures are used<br>(Stefano Caserini, Politecnico di Milano) | ACC |
| 5-33 | A | 0 | 0 | 0 | 0 | Chapter 5 does not adequately take into account the fact that aviation is the only transport sector that has been extensively reviewed to establish its potential climate change effects. Comparisons between aviation and other transport modes made in the draft report are based on data that varies significantly in terms of detail and, presumably, accuracy. Such comparisons are therefore inappropriate and should, at a minimum, be qualified.<br>(Andreas Hardeman, International Air Transport Association (IATA)) | ACC, we will mention it in the text./ron |
| 5-34 | A | 0 | 0 | 0 | 0 | From the viewpoint of the technology aspect of transportation, this chapter includes a lot of useful information. On the other hand, description of transportation as a part of the urban system or lifestyle seems to be weak.<br>(Toshihiko Masui, National Institute for Environmental Studies) | We agree, but it is too late. |
| 5-35 | A | 0 | 0 | 0 | 0 | Overview: In general the study seems to be very much written from an engineers perspective focusing on the supply side: more efficient vehicles, alternative fuels. The demand side for transportation services (depending e.g. on city planning) is less intensively analysed.<br>(Sandra Cointreau, World Bank) | noted |
| 5-36 | A | 0 | 0 | 0 | 0 | The transport chapter draft gives precedence to alternative fuels over efficiency in describing the mitigation potential. For the medium term efficiency improvements have more potential to reduce CO2 emissions than alternative fuels. It is only in the very long term that alternative fuels might contribute more. The presentation in Paris correctly put the emphasis on efficiency improvements.<br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | ACC |
| 5-37 | A | 0 | 0 | 0 | 0 | First of all the presentation made by the lead author at the meeting in Paris on 6 September 2006 covered the main issues well and set the right priorities. The second draft itself needs editing to match the priorities as set out in the presentation. Overall all the draft is factually well balanced, with only a few gaps. I do not see major change, e.g. cutting a lot of road transport material, as necessary. | noted |

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| | | | | | | (Steve Perkins, European Conference of Ministers of Transport, OECD) | |
| 5-38 | A | 0 | 0 | 0 | 0 | The sources for much of the data, particularly in the aviation section, are not well referenced. Frequently, much of the text appears to be author's opinion rather than summarizing the results of published studies. Many of the references are not publicly available (e.g., CONSAVE report, ICAO FESG reports) and have not undergone peer review.<br>(Steven Baughcum, Boeing Company) | ACC, we will add |
| 5-39 | A | 0 | 0 | 0 | 0 | Each of the different transportation sectors discusses alternative fuels (natural gas, hydrogen, biofuels). But nowhere is the required infrastructure for this sector discussed or what fraction of the transportation fuels could realistically be replaced by biofuels in an environmentally acceptable manner. Some sectors should be able to introduce alternative fuels more easily than others because of differing infrastructure requirements and different sensitivity to fuel properties (e.g., jet fuel has stringent requirements for fuel density, flash point, low freezing point). An overview of section on transportation alternative fuels would be more useful than treating it separately in a piecemeal, uncoordinated fashion.<br>(Steven Baughcum, Boeing Company) | Agree, we will cover/koba, suzana |
| 5-40 | A | 0 | 0 | 0 | 0 | Many of the comments I made on the previous draft have not yet been accommodated, including:<br>- There is no consistency in the use of units (metric and non-metric).<br>- Use of confusing terminology re. changes in transport energy use (i.e., efficiency and economy).<br>(Richard Gilbert, Centre for Sustainable Transportation) | We will improveFE/steven, peter will check the glossary |
| 5-41 | A | 0 | 0 | 0 | 0 | Although there is a nod towards the possibility that oil will become very expensive, because a world production peak will be reached, the chapter is almost entirely based on the prospect that it will not, which may make it seem pretty irrelevant in a few years. I would prefer a more even-handed approach, including discussion of a major shift from internal combustion engines to electric motors as propulsion for road transport.<br>(Richard Gilbert, Centre for Sustainable Transportation) | Rejected, current discussion is enough. |
| 5-42 | A | 0 | 0 | 0 | 0 | Urban Transport: The two largest factors that influence transportation energy use in cities are urban form (i.e. the structure of the urban area and the manner in which land use is planned) and the nature of the urban transportation infrastructure. Reducing long-term emissions would require an integrated land use and urban transport planning strategy. It is in this context, further analysis and discussion is needed on urban form and transportation infrastructure. | ACC, we will add/Muro |

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| | | | | | | (Government of India) | |
| 5-43 | A | 0 | 0 | 0 | 0 | The report has covered various alternative fuels including bio fuels. The scenarios have also been projected particularly based on analysis of well-to-wheel energy utilisation and emissions, in particular GHG's. The use of oxygenates, in particular ethanol, is being considered in various parts of the world with renewed interest. For these fuels the analysis of unregulated emissions like NMVOC, PAH, NPAH, Ozone potential of speciated HCs, benzene, aldehydes, etc. should also be considered which may be a new emerging environmental concern, and need technology solutions to contain such emissions.<br><br>(Government of India) | I will add something related to that |
| 5-44 | A | 0 | 0 | 0 | 0 | The report 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 is important and need to be addressed even stronger. In this context, the role of Inspection, Certification and Maintenance of in-use vehicles periodically is of utmost importance. If in-use vehicles do not receive adequate maintenance (in quality and frequency) their emissions – both local and global – will suffer. Such programmes are also well suited to include fitness and safety inspection of the older vehicle with a resultant reduction in road accidents. Most emerging Asia does not have a solid maintenance ethic. In many countries, formal workshops staffed with trained mechanics equipped with diagnostics equipment are hard to find for out-of-warranty vehicles and a wide variety of replacement parts that are readily available for their repair do not meet OEM (original Equipment Manufacturer) specifications. A section on importance of a successful Inspection, Certification and Maintenance Programme would be useful.<br>(Government of India) | ACC, we will add/suzana |
| 5-45 | A | 0 | 0 | 0 | 0 | The draft Chapter 5 on 'Transportation and Infrastructure' provides a very good review of the current transport situation globally — the emissions, types, fuel use and the alternatives, and future scenarios. The report is factual, well balanced, informative, clear and easy to read and understand. With a little extra effort, the chapter can be considerably strengthened if the following issues are addressed to comprehensively cover the developing country perspective.<br>(Government of India) | noted |
| 5-46 | A | 0 | 0 | 0 | 0 | The chapter has covered almost all aspects related to transport sector and is really a commendable coverage of studies relevant to different regions of the world. | noted |

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| | | | | | | (Government of India) | |
| 5-47 | A | 0 | 0 | 0 | 0 | It is very informative, covering all the aspects related to transport and GHG emissions comprehensively. Further it reiterates the need to consider GHG emissions reductions as a critical issue for transportation planning, policies and infrastructure for our country. Integration and linkages between transport, local air quality, land use and GHG emissions are important issues to be further studies and explored in the context of our transport and infrastructure needs. (Government of India) | ACC, we will add/muro |
| 5-48 | A | 0 | 0 | 0 | 0 | As has also been pointed out in this chapter, there is a need for further research and reliable data collection in this field, especially in the context of developing countries such as ours. One of the areas where CRRI can contribute is characterization of GHG emissions (CO2) along with other pollutants and engine parameters for different modes of road transport including the funds. Here it will be pertinent to state that CRRI has recently acquired a Portable Emission Monitoring System which can measure exhaust emissions for vehicles using different fuel types (gasoline, diesel, biodiesel, CNG) for on-road, real world situation, which can be utilized for such studies. (Government of India) | noted |
| 5-49 | A | 0 | 0 | 0 | 0 | As far as Infrastructure is concerned, for road transport vehicle the various aspects related to; environment in which these vehicles operate as well as their monitoring for satisfactory operation such that technological advances in vehicle & fuel technologies are properly utilized by the users. Both these aspects need further detailed mention / analysis as essential requirements in actual service condition. These infrastructure requirements are large covering roads, traffic managements, parking, utilisation/service patterns, testing centers, equipments for monitoring, training of man-power, etc., etc. (Government of India) | Taking account it in cosideration/JORGE |
| 5-50 | A | 0 | 0 | 0 | 0 | We propose to change the wording to better reflect the actual flavour of the CO2 from motor vehicle regulating instruments in use today. The word ”standard” (Chapter 5, mentioned at 43 instances, starting page 1) should be preferably be replaced by ”(Fuel economy)” controlling instruments...”. (as on page 4 line 35). This should be done at all occasions when it is used in connection with voluntary commitments or average schemes such as the ones that apply in the European Union and the United States. Generally, this seems to happen in the text in connection with | Accepted, a better distinctions between standards And VA’s will be made |

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| | | | | | | the word ”economy...”. Typically in the Executive Summary section on page 4 in the section Surface Transport at a number of times. On ”economy” , see below. We prefer ”voluntary commitment” and ”CAFE” (at some occasion given ”Corporate Average Fuel Economy”). Note that when talking about emission standards (as for example in the second paragraph at the top of page 3) the word "standards" is a valid one. Do mot replace the word "standards" when connected to ”emission/s”! It is precisely this that shows the difference: emissions standards are set for each and every vehicle and represent a mandatory technical design parameter. While the fuel consumption targets are for (mostly voluntary) attainment of the average in a fleet of vehicles.<br>(Government of Sweden) | |
| 5-51 | A | 0 | 0 | 0 | 0 | Swedish Road Administration have produced a climate strategy for the road transport sector in Sweden.<br>(Government of Sweden) | noted |
| 5-52 | A | 0 | 0 | 0 | 0 | In general, chapter 5 gives a good overview of current status, future trend, possible measures and strategies.<br>(Government of Sweden) | noted |
| 5-53 | A | 0 | 0 | 0 | 0 | As is shown by the table on page 8 heavy-duty vehicles make up of 40% of fuel used on the roads. Projections tell that this share is increasing. It is then a problem that little is said about this in Chapter 5. We believe that heavy-duty vehicles should be dealt with along with cars when technical possibilities for making more efficient engines and vehicles (there is section on aerodynamics on page 21, good!), when it comes to a more efficient use and driving and for going over to renewable fuels. We would also strongly urge that words are added on measures and instruments starting to deal with truck and bus CO2 emissions. A suggestion: 1. At the end of section 5.4.1.3 (page 61) (for example): ”For heavy-duty vehicles – lorries transporting goods and buses carrying people – all measures remain to be put in place in order to get fuel consumption reduction benefits. Initial work (Ahlvik, 2000) has suggested ways to move forward on establishing a method for giving reproducible fuel consumption data for every engine and for whatever engine-vehicle combination, respectively. This would give commercial vehicle buyers the opportunity to compare fuel consumption performance. And also better basis for taxation and other possible measures, such as already apply for light motor vehicles." 2. A follow up on item 1 for the reference section: ”Ahlvik, 2000, Reduction of Greenhouse Gases from Heavy-Duty Vehicles, report no. MTC 9512 (1998) and Greenhouse Gas Emissions from Heavy-Duty Vehicles, report no. MTC 6025, (2000). 3. At the end of section | We will add/koba,Some policy comments will be made in the policy section (Ron) |

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| | | | | | | 5.4.1.5 (page 65): "The above measures mostly would apply to heavy goods transport too. A number of studies have shown potentials for rising the efficiency and reduction of fuels use by cooperative and coordinated transport, via terminals etc. for raising the load factor both for short and medium distance road goods transport. " These points could be reflected in the SPM, page 12 and 15 (paragraphs 16 and 27) and in Chapter 13. (Government of Sweden) | |
| 5-54 | A | 0 | 0 | 0 | 0 | As a minor point, we would also prefer "fuel consumption" before "fuel economy". (Government of Sweden) | noted |
| 5-55 | A | 0 | 0 | 0 | 0 | Chapter 5 tends to focus on high-tech, which is fine. But it should equally refer to low-tech methods such as fuel economy technologies since these seem to be very effective specifically in developing countries. (Government of Japan) | We will take into consideration |
| 5-56 | A | 0 | 0 | 0 | 0 | Straying from Scientific Assessment to Advocacy of Policy Measures Straying from Scientific Assessment to Advocacy of Policy Measures Unlike the Special Report and previous assessments, the draft report for the Fourth Assessment moves beyond the IPCC's role of scientific assessment, and ventures into recommending judgments among policy alternatives. With respect to aviation ICAO studies have shown that taxes and charges are the least cost-efficient of the potential market-based measures identified in the Special Report (FESG/MATG Final Report for CAEP/5 (Nov. 2000), page A-3, Table A2 and Page A-28, Table A21). Another "general conclusion" criticizes voluntary agreements between industry and governments as ineffective. Several governments, including Kyoto signatories, have chosen to address their aviation sectors' contribution to national goals through voluntary agreements for fuel efficiency improvements. In comparing the efficacy of various policy approaches, the draft report gives unqualified approval only to "national emissions targets and emissions trading," while expressing skepticism about sectoral agreements. (Summary for Policy-Makers at 17, Table SPM.3. U.S. Government<br><br>(Government of U.S. Department of State) | Rejected, only policy measures from literature are mentioned. Check on policy descriptive language will be done. Strong Conclusions on cost-effectiveness of charges related to ET is not supported by international literature in general. However, situation specific aspects may alter this conclusions.There is no evidence available in literature that VA's in the aviation sector delivered substantial emission reductions. |
| 5-57 | A | 0 | 0 | 0 | 0 | Failure to Rely on the IPCC Special Report on Aviation and the Global Environment. In 1999, the IPCC issued its only sector-specific report, the Special Report on Aviation and the Global Environment (the Special Report), following an intensive analysis of the potential global effects of GHG emissions from aviation and potential | disagree |

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| | | | | | | measures for their mitigation. The Special Report remains the most comprehensive, peer-reviewed treatment of the sector. It recognizes the essential role of the International Civil Aviation Organization (ICAO) in crafting a globally harmonized approach to aviation. The Transport chapter's Aviation section, however, mentions the Special Report only in passing. ATA's members believe that, wherever possible, the draft report should use the Special Report as a starting point for matters concerning aviation, and should build upon it to address subsequent scientific developments relating to the sector. U.S. Government<br><br>(Government of U.S. Department of State) | |
| 5-58 | A | 0 | 0 | 0 | 0 | Failure to Recognize that Aviation has had a Thorough Climate Change-Related Scientific Review by IPCC Failure to Recognize that Aviation has had a Thorough Climate Change-Related Scientific Review by IPCC<br>Although Chapter 5 of the draft report purports to provide a comprehensive update of what is known about the potential climate change impact of the various modes of transport, it fails to address the consequences of the fact that aviation is the only transport sector that has undergone an extensive review in this regard. In Chapter 5 (page 10, line 33), the draft report acknowledges that "individual [transport] sectors have not been studied, with the exception of aviation," a clear recognition that aviation is the only transport sector that has undergone close study in terms of its potential effect on climate change. Even so, the draft report compares the potential climate change impacts of the various modes, using highly detailed and focused data from aviation as compared to general and somewhat hypothetical data from other transport modes. In light of the disparity in the fidelity of the data and information used, we are gravely concerned that the comparison across transport modes is unsound. This calls into question the validity of all aspects of Chapter 5 (and related points in the Summary for Policy-Makers) that purport to compare transport modes. At a minimum, the Fourth Assessment Report should include a disclaimer to this affect. Preferably, however, the various statements throughout the document purporting to compare aviation's climate change effects with effects from other modes should be struck from the report. U.S. Government<br><br>(Government of U.S. Department of State) | Same as the above |
| 5-1 | B | 0 | 0 | 0 | 0 | Chapter 5 needs to maintain clarity between mitigation through practices and mitigation through policies to avoid repetition within the chapter<br>(Government of Australia) | We will redraft/peterZ |

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| 5-2 | B | 0 | 0 | 0 | 0 | The chapter is strong in addressing the differences between the development in the transport sector among the world regions. The authors should be applauded for that. (Jan-Anne Annema, MNP) | noted |
| 5-3 | B | 0 | 0 | 0 | 0 | The chapter includes many different mitigation options, however a complete, structured and transparent overview of these options is lacking. Please make better use of tables. In addition, there is a lack of cost information in the chapter in particularly on the mitigation potential. (Jan-Anne Annema, MNP) | We will improve and try to make a list for various options |
| 5-4 | B | 0 | 0 | 0 | 0 | Some key references on the mitigation options and future scenarios are lacking, like Azar et al., Energy Policy, 31, 2003, p 961 - 976 (Jan-Anne Annema, MNP) | We will check |
| 5-5 | B | 0 | 0 | 0 | 0 | Please use EJ and tCO2 consistently in the chapter, this improves coherence with other sectoral chapters (Jan-Anne Annema, MNP) | We will check |
| 5-6 | B | 0 | 0 | 0 | 0 | Please be consistent in how you treat references. Sometimes they are treated as footnotes, sometimes included in the text (e.g. p 21 line 32) and some in reference list (Jan-Anne Annema, MNP) | We will try to avoid |
| 5-7 | B | 0 | 0 | 0 | 0 | In the transport sector there is contrast in the technical options (supply) that could be implemented and the behaviour of society to buy (demand). The car manufacturers are able to improve fuel efficiency but the trend for the demand is of increasing car size and so lower efficiency. There is literature that proofs this trend, see e.g. ACEA. This complicates the technical potential assessment but this complexity should receive more attention. (Jan-Anne Annema, MNP) | ACC/ron will provide info to steve. |
| 5-8 | B | 0 | 0 | 0 | 0 | In general the chapters contains highly detailed information and the authors should be applauded for the amount of information included and the global scope that is covered. However, to improve the clarity and the distillation of the main messages, the chapter with benefit from additional editing, both at the level of lines as at the level of sections and parts of sections that need to be restructured. (Jan-Anne Annema, MNP) | ACC |
| 5-9 | B | 0 | 0 | 0 | 0 | Whole Chapter - At a number of points, the chapter used the 2001 GM/ANL well-to-wheels study. An updated version of this study was published in May, 2005. (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. | ACC |

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| | | | | | | www.transportation.anl.gov/pdfs/TA/339.pdf.) Information from the updated study should be used, rather than depending on the information form the older report. U.S. Government (Government of U.S. Department of State) | |
| 5-10 | B | 0 | 0 | 0 | 0 | -There are flaws with the estimation of mitigation potential. It is not clear how cost estimates/economic potential for mitigation techniques are derived. Also, Table SPM2 listing economic potential report does not include heavy trucks or non-CO2 GHGs. U.S. Government (Government of U.S. Department of State) | We will try to add more options. |
| 5-11 | B | 0 | 0 | 0 | 0 | The literature cited in this chapter needs to be brought up-to-date. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-12 | B | 0 | 0 | 0 | 0 | The aviation discussion is often Eurocentric. While Europe is focusing on aviation global emissions concerns, noise and local air quality emissions still drive the agenda elsewhere. In addition, the ICAO's work is mischaracterized (see p. 32 and comments 984 and 986). U.S. Government (Government of U.S. Department of State) | Taken into account, many global ICAO related studies are used. Problem is that studies on aviation are mainly done by US and Europe |
| 5-13 | B | 0 | 0 | 0 | 0 | Straying from Scientific Assessment to Advocacy of Policy Measures<br>Unlike the Special Report and previous assessments, the draft report for the Fourth Assessment moves beyond the IPCC's role of scientific assessment, and ventures into recommending judgments among policy alternatives. With respect to aviation ICAO studies have shown that taxes and charges are the least cost-efficient of the potential market-based measures identified in the Special Report (FESG/MATG Final Report for CAEP/5 (Nov. 2000), page A-3, Table A2 and Page A-28, Table A21). Another "general conclusion" criticizes voluntary agreements between industry and governments as ineffective. Several governments, including Kyoto signatories, have chosen to address their aviation sectors' contribution to national goals through voluntary agreements for fuel efficiency improvements. In comparing the efficacy of various policy approaches, the draft report gives unqualified approval only to "national emissions targets and emissions trading," while expressing skepticism about sectoral agreements. (Summary for Policy-Makers at 17, Table SPM.3. U.S. Government (Government of U.S. Department of State) | Same as 5-56 |
| 5-14 | B | 0 | 0 | 0 | 0 | Provide references for all assertions of fact. Where appropriate, provide more thorough analysis of the available literature. Often, important studies that contradicted those cited were not mentioned in the chapter text. U.S. Government | noted |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-15 | B | 0 | 0 | 0 | 0 | In general, not enough attention is paid to the potential of plug-in hybrid vehicles (PHEVs) in the light-duty vehicle sector. Research funds are now being directed towards them. They could dramatically change the volume of oil used for light duty transportation. Depending on which fuels are used to generate electricity for them, their GHG emissions may be beneficial or not. The IPCC analysts should look at the electricity projections in the countries likely to use PHEVs to estimate their GHG effects. U.S. Government (Government of U.S. Department of State) | Rejected,aata is not available |
| 5-16 | B | 0 | 0 | 0 | 0 | General - This chapter has a number of problems which are not easy to overcome. It is uneven in the attention given to carbon emitters. For example, freight trucks are the second largest source for carbon emissions from transportation, but they are given almost no attention. Fuel cells and hybrid technology will not play a very important role in freight trucks and diesels are already used. Weight reductions are limited. Therefore, low carbon fuels are needed to make serious carbon reductions. This is not addressed in this chapter. Also the writing style changes from section to section. Some full paragraphs are written awkwardly. For example the box on page 92. There appears to be too much repeating of some material. U.S. Government (Government of U.S. Department of State) | We will add information related weight reduction |
| 5-17 | B | 0 | 0 | 0 | 0 | General - Several of the figures and graphs are not clear or need to be made readable when printed in black and white. They are figures 5.3, 5.5, 5.6, 5.8, 5.9, 5.12, 5.22, and table 5.5. U.S. Government (Government of U.S. Department of State) | We will improve |
| 5-18 | B | 0 | 0 | 0 | 0 | General - Parts of this section are not written clearly. It would be beneficial to have a close review of the text to enhance clarity. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-19 | B | 0 | 0 | 0 | 0 | General - Pages 35 to 40 are called "Life Cycle Analysis" and pages 78 to 82 are called "Well-to Wheels Analyses". These two sections should be combined and use the latter title. The WTW material on pages 28 and 29 should also be placed in this combined section. It should be noted that WTW should not be used when referring to aviation. U.S. Government (Government of U.S. Department of State) | We will redraft/steven,koba |
| 5-20 | B | 0 | 0 | 0 | 0 | General - Inadequate attention is given to Plug-in HEVs (PHEVs) in this chapter. One of the best sources on this technology (the 2001 EPRI study) is cited in the References on page 103, line 35. But not enough attention is paid to PHEVs in the text. A mention of them appears on page 22 (line 47) and page 24 (line 20). The | We will add/steve |

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| | | | | | | concept of a "vehicle to grid power" (V2G) should also be mentioned. A good website for the V2G is at: http://www.udel.edu/V2G/<br>Mention of PHEVs might be added on page 3 line 2 (or at the end of line 14) and on page 46, line 19. This sentence might be used: "The concept of a plug-in hybrid vehicle (PHEV) is being explored. With an all-electric range of 20 miles, about 30% of the miles traveled by the average driver in the U.S. could be done on electricity instead of the conventional motor fuel. Like in the case for hydrogen, the carbon reduction potential for a PHEV would depend on how the electricity was produced."<br>U.S. Government<br>(Government of U.S. Department of State) | |
| 5-21 | B | 0 | 0 | 0 | 0 | Gaps/Uncovered Material Relevant to Chapter 5<br>-Heavy truck emissions<br>- large part of the problem, few solutions discussed, especially lacking on low-carbon fuels<br>-Biofuels coverage is too limited<br>-Plug-in Hybrid Electric Vehicles are hardly discussed (several comments)<br>-Vessel emissions (lack of reviewer comments)<br>-Infrastructure issues (very little treatment in chapter though in title)<br>-Mitigation potential for non-CO2 GHGs<br>-More distinction and discussion of the mitigation potential for developing and industrialized countries and regional differences.<br>-Not enough attention to potential to mode-shift to reduce emissions U.S. Government<br>(Government of U.S. Department of State) | We will check, PHEV:steve, Ship/ron, Infrastructure(urban transport)/muro |
| 5-22 | B | 0 | 0 | 0 | 0 | Failure to Rely on the IPCC Special Report on Aviation and the Global Environment.<br>In 1999, the IPCC issued its only sector-specific report, the Special Report on Aviation and the Global Environment (the Special Report), following an intensive analysis of the potential global effects of GHG emissions from aviation and potential measures for their mitigation. The Special Report remains the most comprehensive, peer-reviewed treatment of the sector. It recognizes the essential role of the International Civil Aviation Organization (ICAO) in crafting a globally harmonized approach to aviation. The Transport chapter's Aviation section, however, mentions the Special Report only in passing. ATA's members believe that, wherever possible, the draft report should use the Special Report as a starting point for matters concerning aviation, and should build upon it to address subsequent scientific | same |

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| | | | | | | developments relating to the sector. U.S. Government (Government of U.S. Department of State) | |
| 5-23 | B | 0 | 0 | 0 | 0 | Failure to Recognize that Aviation has had a Thorough Climate Change-Related Scientific Review by IPCC<br>Although Chapter 5 of the draft report purports to provide a comprehensive update of what is known about the potential climate change impact of the various modes of transport, it fails to address the consequences of the fact that aviation is the only transport sector that has undergone an extensive review in this regard. In Chapter 5 (page 10, line 33), the draft report acknowledges that "individual [transport] sectors have not been studied, with the exception of aviation," a clear recognition that aviation is the only transport sector that has undergone close study in terms of its potential effect on climate change. Even so, the draft report compares the potential climate change impacts of the various modes, using highly detailed and focused data from aviation as compared to general and somewhat hypothetical data from other transport modes. In light of the disparity in the fidelity of the data and information used, we are gravely concerned that the comparison across transport modes is unsound. This calls into question the validity of all aspects of Chapter 5 (and related points in the Summary for Policy-Makers) that purport to compare transport modes. At a minimum, the Fourth Assessment Report should include a disclaimer to this affect. Preferably, however, the various statements throughout the document purporting to compare aviation's climate change effects with effects from other modes should be struck from the report. U.S. Government (Government of U.S. Department of State) | same |
| 5-24 | B | 0 | 0 | 0 | 0 | Each of the technology chapters has a section on barriers to technologyutilization and/or GHG mitigation, except "5: Transportation and Its Infrastructure". It would be useful to add a section on barriers to sustainable transportation technologies and infrastructure since this sector is quite distinct. U.S. Government (Government of U.S. Department of State) | We will make a table and add this in appropriate area. |
| 5-25 | B | 0 | 0 | 0 | 0 | Box 5.1 discusses non-CO2 emissions from road transport, indicating that they represent 4-12% of total transport sector GHG emissions, but there is no discussion of mitigation potential or cost for these emissions in the chapter. This is a serious omission that should be rectified in the final draft. U.S. Government (Government of U.S. Department of State) | same |
| 5-26 | B | 0 | 0 | 0 | 0 | [5.3 general] There is inadequate consideration and discussion of heavy vehicles (highway trucks) and virtually no discussion on off-highway vehicles. U.S. Government | same |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-27 | B | 0 | 0 | 0 | 0 | Demand side measures, traffic volume reduction, modal shift etc. are described only very shortly compared to technical options. There should be additional paragraphs describing these options.<br>(Government of Germany) | ACC,We will improve that |
| 5-59 | A | 0 | 0 | 0 | 0 | ii) The Chapter on transport of WG3 for AR4 should cover transport in the world, i.e. the majority of daily transport 'transactions', and not mainly those who make a severe problem for climate change. As this chapter should demonstrate what can be done so that (parts of) the majority does not reproduce the (for the climate) problematic behavior of a minority which is the origin of climate emissions from transport. I suggest to begin with a description what percentage of the adult world population - and nearly every adult is participant in transport - owns a car (see also my next comment as well the generall one on consumption patterns for Chapter 13).<br>(Manfred Treber, Germanwatch) | TIA, we will try to clarify. |
| 5-28 | B | 2 | 15 | 0 | 0 | I miss a chapter of 2 pages with main recommendations for policy makers (not a summary, only recommendations)<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | Reject; not appropriate |
| 5-60 | A | 2 | 18 | 0 | 0 | The first sentence is only on land transport and ignores aviation (a sector treated quite intensely in this chapter). Either write ' Current transport activity on land and in water ...' or '... driven by internal combustion engines or turbines ..."<br>(Manfred Treber, Germanwatch) | Reject; turbines are ICEs, sentence refers to all modes |
| 5-61 | A | 2 | 18 | 2 | 19 | Data/numbers to describe the passenger transport situation and activity have normally passenger-km or number of trips per mode as unit. Therefore please describe in the first sentence the transport activities in these units (because the focus on energy brings a bias to car use which consumes much energy, and bike and pedestrians are completely neglected, and public transport is tiny).<br>(Manfred Treber, Germanwatch) | TIA where data is available |
| 5-62 | A | 2 | 18 | 2 | 32 | On line 19-20, the text states that transport energy use and CO2 emissions track each other closely. On lines 22-24, the text states that transport GHG emissions are growing at 1-2%/yr in developed countries and 3-5%/year in developing countries. However, on lines 31-32, the text states that transport energy use is growing at 2.1%/yr in developed countries and 2.6%/year in developing countries. The body of the chapter (Pg. 15, line 19) projects the rate of growth of transport energy use in the "mature market economies" as 1.2%/year. These statements are inconsistent and need to be corrected to provide the a coherent picture of transport energy use and | TIA; growth numbers here are incorrect, will be fixed |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| | | | | | | emissions.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | |
| 5-29 | B | 2 | 18 | 2 | 32 | On line 19-20, the text states that transport energy use and CO2 emissions track each other closely. On lines 22-24, the text states that transport GHG emissions are growing at 1-2%/yr in developed countries and 3-5%/year in developing countries. However, on lines 31-32, the text states that transport energy use is growing at 2.1%/yr in developed countries and 2.6%/year in developing countries. The body of the chapter (Pg. 15, line 19) projects the rate of growth of transport energy use in the "mature market economies" as 1.2%/year. These statements are inconsistent and need to be corrected to provide the a coherent picture of transport energy use and emissions. U.S. Government<br>(Government of U.S. Department of State) | Same |
| 5-63 | A | 2 | 19 | 2 | 19 | Delete As a consequence and replace with Consequently,<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-30 | B | 2 | 20 | 2 | 32 | It is stated that transport energy use and emissions are closely related yet the estimated transport energy growth is estimated at 2.6% in developing countries whereas emissions growth is estimated at between 3 and 5 %. The estimates for developed countries are also different. The authors should explain the discrepancy.<br>(Government of Australia) | TIA; numbers need to be fixed/steve |
| 5-64 | A | 2 | 22 | 2 | 22 | Place are before currently not after<br>(John Kessels, Energy Research Centre of the Netherlands) | Reject |
| 5-31 | B | 2 | 24 | 2 | 32 | Line 24 suggest developing country GHG increasing 3 to 5% per year; line 32 says developing country energy use increasing 2.6% per year; these seem to contradict given that elsewhere in report suggests energy and GHG track closely. U.S. Government<br>(Government of U.S. Department of State) | TIA; will fix numbers/steve |
| 5-65 | A | 2 | 26 | 2 | 26 | I suggest to add information about what fraction of the world-energy related CO2 emissions the transport sector produce (i.e. not only the fraction of GHG emissions).<br>(Michael Danilin, The Boeing Company) | ACC |
| 5-66 | A | 2 | 27 | 2 | 27 | Please, clarify if "currently" refers to the year 2000 or 2006?<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-67 | A | 2 | 28 | 2 | 28 | Delete extra fullstop<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-32 | B | 2 | 29 | 2 | 0 | Putting this as a total contribution would be enlightening: 0.24*0.65 = 0.16 of the total. U.S. Government | ACC |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-68 | A | 2 | 30 | 2 | 30 | Delete well underway and<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ |
| 5-69 | A | 2 | 31 | 2 | 32 | Is 2.6% much more than 2.1%? For me: no. Therefore please change this: '... increased at a slightly faster rate (2.6%) than that (2.1%) in ...'<br>(Manfred Treber, Germanwatch) | As above, fix numbers |
| 5-33 | B | 2 | 31 | 2 | 36 | While these statistics are very interesting, need to include some context for climate change. U.S. Government<br>(Government of U.S. Department of State) | REJ, not appropriate here |
| 5-34 | B | 2 | 31 | 2 | 33 | This says that transport energy use is projected to grow from 32% to 46 % of world transport energy use by 2030. It is likely that the authors intended to say transport energy use is 32/46% of world energy use, not world transport energy use. U.S. Government<br>(Government of U.S. Department of State) | REJ; this is about developing nations |
| 5-70 | A | 2 | 35 | 0 | 0 | Please add: '... focus on economic development, congestion mitigation, better quality of other transport modes than cars and environmental quality.'<br>(Manfred Treber, Germanwatch) | ACC |
| 5-71 | A | 2 | 35 | 2 | 35 | delete "economic". Development in general is better<br>(Stefano Caserini, Politecnico di Milano) | REJ |
| 5-72 | A | 2 | 37 | 2 | 42 | "There is no shortage …" The meaning of this sentence is not clear. Alternative fuel has only a very little market until today. But shortage can appear depending on regional conditions.<br>(Shunsuke Mori, Tokyo University of Science) | TIA; will redraft |
| 5-73 | A | 2 | 38 | 2 | 39 | Vague sentence on oil availability with no time horizon, it is also not clear that conventional oil will become scarce under any plannable horizon. Say instead: Should conventional oil become too expensive to supply the energy needs of transport, there is no shortage of alternative fossil .....<br>(Stephen Perkins, European Conference of Ministers of Transport) | REJ;chapter now discusses possibility of oil peaking, which is controversial… current language should be acceptable |
| 5-74 | A | 2 | 38 | 2 | 39 | Please write: "It is not clear HOW LONG oil from conventional sources WILL continue…etc."<br>(Cédric PHILIBERT, International Energy Agency) | ACC |
| 5-75 | A | 2 | 38 | 2 | 40 | The statement that "it is not clear" is a weak reference to the constrained recoverable conventional oil resource situation, wheras the reference to tar sands and shale is over-optimistic (barely 650 billion barrels recoverable in all).<br>(Michael Jefferson, World Renewable Energy Network & Congresses) | REJ |

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| 5-76 | A | 2 | 38 | 2 | 0 | In this sentence, "It is not clear that oil…" should be changed to "It is not clear whether oil…".<br>(Government of Japan) | ACC |
| 5-77 | A | 2 | 40 | 2 | 41 | As described on page 2, in lines 18-19, almost all (96%) of transportation fuels are currently derived from petroleum at the global level. Moreover, as a matter of cource, carbon content of natural gas is lower than that of conventional oil. Hence, if some of transportation fuels shift away from conventional petroleum products to natural gas-derived fuels, GHG emission from the transportation sector will be lower when compared with the case of the continuous dependence on conventional oil resources. A similar description can be found on page 18, in lines 10-11 in this report. Therefore, the phrase "and possibly natural gas" should be deleted.<br>(Takayuki Takeshita, The University of Tokyo) | REJ; basic premise here is incorrect, liquid fuels from natural gas leads to INCREASED GHG emissions |
| 5-78 | A | 2 | 40 | 2 | 0 | The transition to the coal, oil sands and shale oil feedstocks seems to be based on the condition that emissions would be limited only by sequestration. Therefore, the sentence should read, "However, a transition to these feedstocks would significantly increase transportation's GHG emissions, unless the carbon emissions were sequestered".<br>(Government of Japan) | ACC |
| 5-79 | A | 2 | 41 | 2 | 41 | GHG emissions can be reduced if alternative fuel includes biofuel. Natural gas based fuel does not increase GHG so much.<br>(Shunsuke Mori, Tokyo University of Science) | TAI |
| 5-80 | A | 2 | 42 | 0 | 0 | Please add: ' ... Alternatively, a shift to other modes of transport on a large scale or greatly inceased energy efficiency ...'<br>(Manfred Treber, Germanwatch) | ACC with minor changes |
| 5-35 | B | 2 | 43 | 2 | 43 | Provide some context on the potential atmospheric/climatic impacts of hydrogen fuel (given today's production routes it is not in the same category as bio fuels). U.S. Government<br>(Government of U.S. Department of State) | REJ; not appropriate in this section |
| 5-81 | A | 2 | 44 | 2 | 44 | Change last half sentence on alternative fuels to "might be able to direct the sector towards a low carbon future should low carbon sources prove commerically feasible" (It is not at all clear that biofuels in particular will ever make a real contribution to cutting transport CO2 emissions - even if low carbon well to wheels feedstocks can be developed they can offset more carbon if used to produce heat or power). It might be reasonable to mention here that the energy density of oil based fuels makes them particularly suitable for transport and oil is likely to be substituted for in this sector less and later than in other sectors. | TAI; will redraft this paragraph to take into account/steve |

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| | | | | | | (Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-82 | A | 2 | 46 | 4 | 32 | Summary, pages 3-5: what is the logic for the subdivision of mitigation technologies? The first italic heading ( … technologies and .. fuels) suggest another structure than the second (air, marine, rail – mode), the third seems to be in line with the first… Why not 'motor vehicles' for the first heading? Could be followed by :efficient technologies and alternative fuels<br>(Bert van Wee, Delft University of Technology) | ACC |
| 5-36 | B | 2 | 46 | 3 | 3 | Much more efficient aircraft have also been introduced and following the down turn following September 11 2001, older, less efficient aircraft in the US (which contributed nearly half of aviation activity) have been taken out of service. Air is cited later – but there is no reason not to include air with general improvements.<br>U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-83 | A | 2 | 47 | 2 | 47 | The really significant improvement in auto efficiency is the change in specific CO2 emissions from new passenger cars in the EU and Japan, compared especially to the US. If the US average moved half the way to the EU average we would see signifcant cuts in world emissions - as the chapter suggests later on. This is much more significant than hybrids, hydrogen and biofuels.<br>(Stephen Perkins, European Conference of Ministers of Transport) | REJ; most of the difference in efficiency is due to other factors, e.g. size, power, dieselization..not technology difference |
| 5-84 | A | 2 | 47 | 0 | 0 | Please add: '... since the TAR include new successful bus systems (BRT), a continuation of the renaissance of new light rail (e.g. tramway) systems and the initial market success of hybrid ...'<br>(Manfred Treber, Germanwatch) | REJ, not new technology development |
| 5-85 | A | 2 | 47 | 3 | 3 | It should be added to the list the use of flex-fuel vehicles in developing countries.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | REJ, not new technology development |
| 5-86 | A | 2 | 48 | 2 | 48 | Diesel is far from clean - I suggest cutting "clean diesels" at the very least until they meet the same NOx limits as petrol engines. The test cycles used to approve engines grossly underestimate emissions, particularly of Nox. Engines management systems ensure the tests are complied with at the tested points on the engine map but higher fuel efficeincy/power with correspondingly higher NOx emissions prevail in most real world driving conditions. EGR engines are in addition prone to chip tuning - only Denmark has so far taken legislative efforts to try and prevent this (they estimate half the vehicles on the road have been tuned to deliver yet more power, with more NOx emissions than permitted). SCR (for Euro4 heavy vehicles) is suffering severe teething problems that might prove unsolveable - it is not effective | TAI; discuss emission issues/steve |

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| | | | | | | at engine temperatures reached in stop go traffic - typical of urban busses; there is as yet no satisfactory tamper proof OBD and torque limiting system to discourage use of vehicles that run out of Urea - at which point emission will exceed Euro1 emissions levels; also there are problems with urea crystalising in feed pipes to injectors.<br>(Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-87 | A | 2 | 48 | 2 | 48 | "clean diesel" might better be described in less absolutist terms as "cleaner diesel"<br>(Jason Mark, Union of Concerned Scientists) | ACC |
| 5-88 | A | 2 | 48 | 2 | 48 | "clean diesel" has not a scientific significance. Diesel equipped with DPF emit a lot of pollutants (i.e. NOx, COV), so "clean" is not appropriate. I would suggest the use of "less polluting".<br>(Stefano Caserini, Politecnico di Milano) | ACC |
| 5-37 | B | 3 | 1 | 3 | 0 | While fuel-cell cars would be nice, many OEMs are also pursuing hydrogen-fueled internal combustion engines with attractive performance. Current published brake efficiencies of ~40% have been achieved, with equally impressive emission levels, well below CARB SULEV. In the laboratory with after treatment, levels of NOx near ambient have been measured. Both Ford and BMW believe that brake efficiencies better than 50% are achievable. Note that the DOE goal for efficiency of both the fuel cell and the ICE is 45%. The ICE's that are under development have their roots in production hardware and hence can be produced at a cost significantly below that of the fuel cell today. I recommend removing the words "fuel cell" to include the ICE as a viable option. U.S. Government<br>(Government of U.S. Department of State) | TAI; our current data does not show this, but will examine other data |
| 5-38 | B | 3 | 1 | 3 | 0 | Add "and more recently plug-in hybrids" to the end of the first sentence. U.S. Government<br>(Government of U.S. Department of State) | TAI; we need to examine mitigation potential of plug ins, which may be small, before we include |
| 5-89 | A | 3 | 2 | 3 | 2 | I don't see the biofuel potential yet, and the Energy chapter is more cautious - IF there are major breakthroughs second generation fuels might offer something in the future but as yet biofuels save little CO2 and waste a lot of public money.<br>(Stephen Perkins, European Conference of Ministers of Transport) | REJ; advanced biofuels do have potential |
| 5-90 | A | 3 | 5 | 3 | 11 | Although it may be obvious to some, it should be stated explicitly here or even earlier in the chapter that increased fuel efficiency (or better fuel economy) is the same thing as reduced greenhouse gas emissions. Many people do not understand the connection between fuel economy and GHG emissions.<br>(Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard | ACC |

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| | | | | | | University) | |
| 5-91 | A | 3 | 5 | 3 | 41 | Electric vehicles seem conspicuously absent from this discussion.<br>(Joanna Lewis, Pew Center on Global Climate Change) | TAI; EVs not likely to reduce emissions much in the near term |
| 5-92 | A | 3 | 5 | 3 | 14 | Several comments: 1. A 40% fuel economy gain from full hybridization presumably assumes no other vehicle platform changes, which might be noted. Diesel fuel economy should be presented on an energy equivalent basis, not volumetric, to avoid confusions; 3. A range of estimates would be helpful to support the conventional technology gains estimate. For example, NAS 2001 suggests technical (and economic potential) for the US fleet of nearly 40%. Heywood et al. 2003 estimates as much as 60% (see Table 5.4 of this chapter)<br>(Jason Mark, Union of Concerned Scientists) | TAI; will add text to clarify range of potential/steve |
| 5-93 | A | 3 | 5 | 0 | 0 | The section does not discuss plug-in hybrids or other vehicles that use electricity as a source of energy. This seems an ommission in the context of the discussion of biofuels and hydrogen as long-term strategies.<br>(Jason Mark, Union of Concerned Scientists) | TAI; will examine plug in potential |
| 5-94 | A | 3 | 5 | 0 | 0 | The section might be strengthened with some discussion of costs. For example, lifecycle cost accounting for conventional efficiency technologies implies negative costs per ton of CO2 reduced. This is a critical message.<br>(Jason Mark, Union of Concerned Scientists) | TAI, but our cost analysis does not show much negative cost potential |
| 5-95 | A | 3 | 6 | 3 | 11 | As already noted, progress with the efficeincy of petrol engines in Europe and Japan is much more significant than with hybrids or diesels. If the US average moved half the way to the EU average we would see signifcant cuts in world emissions - as the chapter suggests later on. Diesel is far from clean - I suggest cutting "clean diesels" at the very least until they meet the same NOx limits as petrol engines. The test cycles used to approve engines grossly underestimate emissions, particularly of Nox. Engines management systems ensure the tests are complied with at the tested points on the engine map but higher fuel efficeincy/power with correspondingly higher NOx emissions prevail in most real world driving conditions. EGR engines are in addition prone to chip tuning - only Denmark has so far taken legislative efforts to try and prevent this (they estimate half the vehicles on the road have been tuned to deliver yet more power, with more NOx emissions than permitted). SCR (for Euro4 heavy vehicles) is suffering severe teething problems that might prove unsolveable - it is not effective at engine temperatures reached in stop go traffic - typical of urban busses; there is as yet no satisfactory tamper proof OBD and torque limiting system to discourage use of vehicles that run out of Urea - at which point emission will | TAI; as noted, most US/EU difference is not about advanced technology; will add discussion of emissions |

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| | | | | | | exceed Euro1 emissions levels; also there are problems with urea crystalising in feed pipes to injectors.<br>(Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-96 | A | 3 | 7 | 3 | 9 | The comparison between clean diesel engines with conventional gasoline engines is no doubt correct, but it is incomplete. Information needs to be provided on a well-to-wheels basis the energy advantage between clean diesels and gasoline engines and also between clean and conventional diesels. Diesel fuel contains more energy on a volumetric basis than gasoline, so even if the energy efficiency of the two engines were the same, the diesel would have an advantage. More energy is required to refine clean diesel than to refine conventional diesel fuel, which also needs to be taken into account. Finally, the Euro4 standards are aimed at improving air quality. While this is an important goal, clean diesels do not automatically qualify as GHG mitigation technology.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | TAI, will examine well to wheels data and discuss |
| 5-39 | B | 3 | 7 | 3 | 9 | The comparison between clean diesel engines with conventional gasoline engines is no doubt correct, but it is incomplete. Information needs to be provided on a well-to-wheels basis the energy advantage between clean diesels and gasoline engines and also between clean and conventional diesels. Diesel fuel contains more energy on a volumetric basis than gasoline, so even if the energy efficiency of the two engines were the same, the diesel would have an advantage. More energy is required to refine clean diesel than to refine conventional diesel fuel, which also needs to be taken into account. Finally, the Euro4 standards are aimed at improving air quality. While this is an important goal, clean diesels do not automatically qualify as GHG mitigation technology. U.S. Government<br>(Government of U.S. Department of State) | Same |
| 5-97 | A | 3 | 8 | 3 | 8 | Specify what Euro IV or Tier 2 means: i.e., Euro IV (in Europe) or Tier 2 (in USA)<br>(Stefano Caserini, Politecnico di Milano) | ACC |
| 5-98 | A | 3 | 14 | 3 | 14 | Replace potential to increase with potential to significantly increase<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-99 | A | 3 | 15 | 3 | 15 | Delete significantly<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-100 | A | 3 | 16 | 3 | 18 | There is considerable debate as to the source of the preference for power and size (consumer demand or marketing push). It might be preferable to delete "of the market." More importantly, the statement could more clearly state that power and size have offset much of the potential GHG gains over the past two decades, but that additional opportunities exist for reducing emissions. | ACC |

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| | | | | | | (Jason Mark, Union of Concerned Scientists) | |
| 5-101 | A | 3 | 20 | 3 | 20 | Delete very<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-40 | B | 3 | 20 | 3 | 29 | Provide some context on the potential atmospheric/climatic impacts of hydrogen fuel (see pp. 17, lines 1-4). U.S. Government<br>(Government of U.S. Department of State) | REJ, information already there |
| 5-41 | B | 3 | 20 | 3 | 0 | After the discussion of "investments" in FCV R&D (lines 20 though 29), add in a similar discussion of PHEVs (that their future market, economic technological potential is unknown, but they are generating great interest, what their GHG implications might be, etc). U.S. Government<br>(Government of U.S. Department of State) | rejected, space limitation. |
| 5-42 | B | 3 | 25 | 3 | 0 | Hydrogen vehicles are not 100% dependent on the success of the fuel cell. Delete "fuel cell". U.S. Government<br>(Government of U.S. Department of State) | REJ; fuel cell success does appear critical, given other problems with H2 |
| 5-102 | A | 3 | 26 | 3 | 28 | Either the range for WTW reductions from hydrogen FCVs should be expanded to encompass renewables or the text should clearly state that 50-60% reductions are typical of natural gas derived hydrogen.<br>(Jason Mark, Union of Concerned Scientists) | ACC |
| 5-103 | A | 3 | 26 | 3 | 26 | Well-to-wheel carbon emission reduction of 50-60% by a FC-vehicle, compared to gasoline vehicle, too optimistic (with H2 from fossil sources and without sequestration). On page 77, line 16, reduction is estimated at 45% (which is probably still too high).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, will add discussion |
| 5-104 | A | 3 | 28 | 0 | 0 | Please add: '... production are sequestered. The same effects arise if modal shift to public transport takes place. In the long run ...'<br>(Manfred Treber, Germanwatch) | REJ, out of place here |
| 5-105 | A | 3 | 28 | 3 | 28 | Add between "are" and "sequestred" : " negligible or"<br>(Government of France) | ACC |
| 5-106 | A | 3 | 29 | 3 | 29 | Cut the word Biomass.<br>(Stephen Perkins, European Conference of Ministers of Transport) | REJ, biomass use for H2 is accepted as a potential option |
| 5-107 | A | 3 | 31 | 3 | 41 | This text gives an optimistic view on ethanol production from lignocellulose, forgetting to stress on the uncertainties about such an outlook.<br>Ethanol production from sugar cane has much lower fuel cycle emissions than ethanol produced from corn. Estimates quoted in the text and other estimates (e.g. | TIA, redraft text |

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| | | | | | | Farrel A. E. et al (2006), "Ethanol can contribute to energy an environmental goals", Science, Vol. 3111, 27 January) indicate that the potential well-to-wheel GHG reduction of ethanol from sugar cane is 90% with respect to petroleum gasoline, against only a best estimate of 13% for ethanol from corn. (Pierpaolo Cazzola, IEA) | |
| 5-108 | A | 3 | 32 | 3 | 33 | Delete sentence Ethanol is the most…. With Ethanol is currently the most widely used biofuel. (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-109 | A | 3 | 34 | 3 | 35 | From where the statment of a cap on biofuels produced by fermentation and distillation cames from. There are papers showing higher contribution than 10% (e.g. Moreira, 2006) "Moreira, J.R., 2006; Global Biomass Energy Potential, Journal of Mitigation and Adaptation Strategies for Global Change, 11, 313-333" (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA, examine reference given |
| 5-110 | A | 3 | 34 | 3 | 34 | Is the use of the word "unlikely" meant to indicate <33% probability, as defined in Chapter 2, Table 2.5. If so, that meaning should be indicated. If not, another word should be used. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | we will consider |
| 5-111 | A | 3 | 34 | 3 | 35 | Please, give references justifying this statement and the uncertainty brackets affecting it (Government of France) | REJ, inappropriate here |
| 5-43 | B | 3 | 34 | 3 | 34 | Is the use of the word "unlikely" meant to indicate <33% probability, as defined in Chapter 2, Table 2.5. If so, that meaning should be indicated. If not, another word should be used. U.S. Government (Government of U.S. Department of State) | Same as above |
| 5-112 | A | 3 | 36 | 3 | 37 | Sorry, but if we achieve 10% use of biofuel from sugar cane it will be possible to displace more then 8% of C emission on a well-to-wheel basis (e.g. Macedo, 2005). (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA, examine and correct if necessary |
| 5-113 | A | 3 | 36 | 3 | 41 | Clarify the differences between the two ranges of road transport emission reduction: 2-5 % in line 36 and 16 % in line 41 (Stefano Caserini, Politecnico di Milano) | REJ, existing text is clear |
| 5-114 | A | 3 | 39 | 3 | 41 | Some presentation of GHG reduction potential seems appropriate to maintain consistency with the preceding paragraphs. (Jason Mark, Union of Concerned Scientists) | REJ, potential is already given in text |

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| 5-115 | A | 3 | 40 | 3 | 41 | Please, give references justifying this statement and the uncertainty brackets affecting it<br>(Government of France) | REJ, inappropriate in exec summary |
| 5-44 | B | 3 | 40 | 3 | 0 | The conclusion of one study on the potential benefits of cellulosic ethanol in 2030 is presented, but the same study's conclusion regarding impacts by 2050 is neglected. Since the benefit potential in 2050 is great it should be stated here as well. (The 2050 potential is cited in the Technical Summary on page 47.) U.S. Government<br>(Government of U.S. Department of State) | TIA, study will be reexamined to see if additional discussion is worthwhile |
| 5-116 | A | 3 | 41 | 3 | 41 | Add: However, major breakthroughs in thermochemical processing are required before commercial scale production is possible.<br>(Stephen Perkins, European Conference of Ministers of Transport) | ACC |
| 5-117 | A | 3 | 41 | 3 | 41 | Global biomass availability for up to 20% biofuels by 2030. Biomass AVAILABILITY is not even briefly discussed anywhere in chapter 5. At least refer to literature (and/or to other chapters in the SOD).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | TIA; will coordinate with chap 4 |
| 5-118 | A | 3 | 42 | 0 | 0 | Potential for biofuels depends of the demand for other purposes and increased production might have environmental impacts. The potential for increased production of biofuels needs to be assessed further.<br><br>(Government of Sweden) | TIA, will examine these issues and redraft if necessary |
| 5-119 | A | 3 | 44 | 0 | 0 | Please begin with 'Aviation is the most climate damaging transport mode due to its high specific energy consumption and the effects of contrail emissions on global warming.' as general introduction and then continue with 'The dependence of air travel ...'.<br>(Manfred Treber, Germanwatch) | Reject - Should discuss, but disagree. |
| 5-120 | A | 3 | 44 | 3 | 44 | Typo error. "Kerosine" should read "Kerosene"<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-121 | A | 3 | 44 | 4 | 5 | Information that IPCC has an aviation sector-specific report (Special Report on Aviation and the Global Atmosphere - 1999), could be included in this paragraph. It would set the scene for any additional information/new findings provided in this 4AR. In reading the rest of the chapter it is not clear where all the conclusions come from or if they differ or have improved since the Special Report. ICAO's publication "Operational Opportunities to Minimize Fuel Use and Reduce Emissions" (Circ 303) provides extensive analysis of aircraft operational improvements and ATM improvements are covered in the Global Air Navigation Plan for CNS/ATM | This seems to be an "agenda-driven" comment and should be ignored. So far as I can see the ICAO Circ. 303 only lists the operational and some technical options to reduce fuel burn. There is no |

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| | | | | | | Systems (Doc 9750) and Global Air Traffic Management Operational Concept (Doc 9854). Please revise sentence 48/49 in order for it to make sense (incomplete). (Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | quantification of effect, or analysis that is apparent to me. Doc 9750 on global CNS/ATM improvements suggests that technology developments will, for a traffic increase of 61% from 1999-2015 allow fuel burn to increase by 37%. It states that CNS/ATM improvements might offer an additional 5% improvement over the same time. Could not access Doc 9854. |
| 5-122 | A | 3 | 44 | 3 | 49 | Thank you very much for incorporation of my First Order draft comment. For reasons of (hopefully) better reading, I would like to suggest to rephrase the sentences as follows: "Energy efficiency gains will continue, ... aircraft engines. Further gains are expected through enhancements in air traffic management technologies (which, if implemented, could produce up to 10% fuel efficiency improvements) and through aircraft operational improvements including optimising flight procedures (which might offer up to 5% fuel efficiency improvements). (Paul Brok, National Aerospace Laboratory NLR) | Will consider – might be better. |
| 5-123 | A | 3 | 44 | 4 | 5 | It is unclear that this discussion is supported by the main text of the report. It is also unclear by what time the 10% improvement on line 47 is in reference to. Historically, improvements in aircraft fuel efficiency have occurred incrementally as aerodynamics, engine technology and weight have improved. Aircraft currently under development for production in the next two years will be more than 10% more efficient than the aircraft they replace. The BWB is only one concept which will be considered for future aircraft and has many technical and certification challenges beyond just market acceptability and production costs. (Steven Baughcum, Boeing Company) | Do we need to reference information in the Exec. Summ?Will reference 10% to baseline date. Should recognize weight reductions from composite use and fuel burn benefits, etc. |
| 5-45 | B | 3 | 44 | 3 | 5 | All of the data should be referenced. Also, the specific claims regarding alternative fuels appear to represent a limited view. Alternative fuels are being considered for aviation – Brazil has already flown aircraft on biofuels. While a move from kerosene is challenging, the assertion that it is unlikely or nearly impossible does not appear based on solid facts. Blended wing body is one concept being advanced by | Accepted |

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| | | | | | | some elements within the manufacturing community. Thought interesting, it is not the only option. The report appears to be taking a position on Blended Wing Body. The text should be balanced with other examples. U.S. Government (Government of U.S. Department of State) | |
| 5-124 | A | 3 | 45 | 0 | 0 | kerosine ... kerosene (Stefano Caserini, Politecnico di Milano) | Accepted |
| 5-125 | A | 3 | 48 | 3 | 49 | Edit sentence (Stephen Perkins, European Conference of Ministers of Transport) | ACC |
| 5-126 | A | 3 | 50 | 0 | 0 | and by optimising flight procedures. ??? Something is missing ? (Stefano Caserini, Politecnico di Milano) | Accepted |
| 5-127 | A | 4 | 2 | 4 | 3 | How large are the uncertainty brackets on this estimates ? (Government of France) | we will clarify |
| 5-46 | B | 4 | 2 | 4 | 3 | Regarding a 50% in improvement in aircraft efficiency, please note whether this is expected from technology only, or this accounts for expected operational improvements. U.S. Government (Government of U.S. Department of State) | this is covered in the later sections |
| 5-128 | A | 4 | 4 | 4 | 5 | Since it is not clear what ``increasing significantly'' means I suggest to re-write this sentence as follows: ``Such improvements unlikely will be sufficient to reduce total carbon emissions from global air travel'' (Michael Danilin, The Boeing Company) | ACC |
| 5-47 | B | 4 | 4 | 4 | 5 | The sentence “such improvements would not be sufficient to keep global emissions from air travel” is just one possible scenario that needs to be referenced. What growth forecast is this based on? If on the IPCC 1999 forecast, the conclusion is questionable as that forecast simply assumed that the fleet of 2050 would look just like the baseline – and simply extrapolated growth. It does not take into account fleet changes, and the potential of some aircraft to transition to alternative fuels. U.S. Government (Government of U.S. Department of State) | we will rephrase |
| 5-129 | A | 4 | 5 | 0 | 0 | Please add: ' ... from increasing significantly as demand will multiply (five- or tenfold)'. (Manfred Treber, Germanwatch) | we will |
| 5-130 | A | 4 | 7 | 4 | 7 | Replace From with According to a study… (John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-131 | A | 4 | 8 | 4 | 8 | Should read: "... could reduce carbon emissions by 30% in ships." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Acc |

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| 5-132 | A | 4 | 8 | 0 | 0 | I think it better to specifically describe what technical measures could reduce carbon emissions from ships, similar to the description of the technical measures for aircraft (on page 3, in lines 45-47 and line 49).<br>(Takayuki Takeshita, The University of Tokyo) | Acc |
| 5-48 | B | 4 | 8 | 4 | 8 | Correct ' - 30%'<br>(Government of Australia) | Acc |
| 5-49 | B | 4 | 8 | 4 | 0 | Removed (-) sign from 30%. U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-50 | B | 4 | 8 | 4 | 8 | Do the authors mean that one is reducing by 30% or increasing by double negative? U.S. Government<br>(Government of U.S. Department of State) | Will be corrected |
| 5-51 | B | 4 | 10 | 4 | 11 | The statement "This is not expected to be sufficient to offset the growth in shipping activity over the same period" needs to be referenced. U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-133 | A | 4 | 11 | 4 | 11 | How large are the uncertainty brackets on this estimates ?<br>(Government of France) | Acc, will be added |
| 5-134 | A | 4 | 14 | 5 | 16 | This paragraph on rail completely misses the point if it should describe where the effects of railways are biggest in mitigating climate change. We know that the substitution of road freight transport by rail freight has the biggest mitigation effects. For passenger trains high speed trains are more climate friendly than aircraft and cars but worldwide they are not that emission relevant if you look at the major 'train countries' (those with intense passenger transport) like China, India or Russia or if you look at countries with high modal shares of rail like Switzerland where you have a dense network of local and regional trains. I would mention the good experinces of DB AG (German Railways) with their 'drive energy saving' programme (they made retraining for all of their 14.000 train drivers in efficient driving - 10 % energy saving is theoretically possible - and have seen successes (energy consumption reduction by 4 % in the first year which led to a saving in expenses for energy with a value of nearly 10 mio €/a).<br>(Manfred Treber, Germanwatch) | we will improve |
| 5-135 | A | 4 | 15 | 4 | 21 | this statement is valid also for economies in transition. The strategy proposed is valid also for developed countries<br>(Stefano Caserini, Politecnico di Milano) | noted |
| 5-136 | A | 4 | 16 | 4 | 16 | Add: Electrification of conventional rail lines can also reduce CO2 emissions, depending on the way electricity is generated, by displacing diesel for traction power. | noted |

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| | | | | | | (Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-137 | A | 4 | 16 | 4 | 16 | Replace and, of course, mitigating the GHG emissions…with and mitigating GHG emissions…<br>(John Kessels, Energy Research Centre of the Netherlands) | noted |
| 5-138 | A | 4 | 18 | 4 | 18 | Delete both<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-139 | A | 4 | 22 | 0 | 0 | As explained nicely on page 9, line 11, <Worldwide travel studies have shown that the average time budget for travel is roughly constant worldwide>, therefore a passenger does not save time intraveling faster but the expands the distance of the trip. Therefore it is not correct to write in line 22 "these trends reflect (...) the value of travelers' time", delete this and remain with 'On the passenger side, these trends reflect increasing incomes.'<br>(Manfred Treber, Germanwatch) | REJ, constant travel time budget does not contradict rising value of travelers' time |
| 5-52 | B | 4 | 23 | 4 | 0 | There may be countries where auto uses several times more energy as bus or rail transit, but such is not the case in the U.S. This report says that "one size does not fit all" (page 1 of the TS), but falls into this trap on this issue (and several others). See Tables 2.11 and 2.12 in the Transportation Energy Data Book (http://cta.ornl.gov/data/index.shtml) where the energy per passenger mile is about the same for cars, bus transit, and rail transit. U.S. Government<br>(Government of U.S. Department of State) | TIA, will except US in this statement |
| 5-53 | B | 4 | 23 | 4 | 24 | Clarify that an efficiently used bus is more efficient. Efficiencies are lost if buses are not carrying many passengers. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-54 | B | 4 | 24 | 4 | 24 | The units and reference for "several times" need to be provided as clearly this is not accurate on a net basis. Even on a per passenger basis, this does not appear to be accurate per Davis, S.C. and S. Diegel, 2002. Transportation Energy Data Book: Edition 22, ORNL-6967, Oak Ridge<br>National Laboratory, Oak Ridge, Tennessee, June, Table 8.2. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-140 | A | 4 | 26 | 4 | 26 | Change "conditions" to "circumstances"<br>(Stephen Perkins, European Conference of Ministers of Transport) | ACC |
| 5-141 | A | 4 | 27 | 4 | 27 | Please, explain what NMT means, the first time it is reffered.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-142 | A | 4 | 27 | 4 | 27 | Please explain abbreviation NMT here the first time (Non Motorized Transport)<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC |

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| 5-143 | A | 4 | 27 | 4 | 32 | All this paragraph is not important: I suggest the deletion<br>(Stefano Caserini, Politecnico di Milano) | disagree |
| 5-55 | B | 4 | 27 | 4 | 27 | Define NMT. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-144 | A | 4 | 28 | 4 | 28 | Which recent scenario study, and replace Recent with A Recent….<br>(John Kessels, Energy Research Centre of the Netherlands) | this is ES |
| 5-145 | A | 4 | 28 | 4 | 31 | This sentence is not clear. Why walking is mentionned ? What is the reason for any cost ?<br>(Government of France) | TIA, will clarify |
| 5-56 | B | 4 | 28 | 4 | 31 | Reference the study. U.S. Government<br>(Government of U.S. Department of State) | this is ES |
| 5-146 | A | 4 | 29 | 4 | 29 | specify if mode share is in terms of trips, person or person x km<br>(Stefano Caserini, Politecnico di Milano) | we willclarify |
| 5-147 | A | 4 | 34 | 4 | 34 | Add in this section a note on Electronic km charges for the use of roads. These have been introduced in Switzerland, Germany and Austria for heavy goods vehicles and have resulted in significant rationalisation and improved efficiency in truck loading and the organisation of freight distribution. Their introduction for passenger cars is being considered in the UK and the Netherlands and would reduce car kms. On a local scale London and Stockholm cordon charges for managing congestion have also cut CO2 emissions.<br>(Stephen Perkins, European Conference of Ministers of Transport) | ACC |
| 5-148 | A | 4 | 35 | 4 | 43 | Fuel standards are the only item mentioned here amongst policies and measures for surface transport. Even if fuel standards are extremely relevant, other measures promoting car sharing, multi-model passenger travel and reduced passenger km (e.g. road pricing) deserve to be mentioned, at least briefly.<br>(Pierpaolo Cazzola, IEA) | TIA, will add other policy options |
| 5-149 | A | 4 | 35 | 4 | 42 | Universality is used three times in these two sentences. It might be more effective to write: "Where employed, fuel-efficiency performance standards have proven to be highly effective in affecting automotive fuel effiency and thus in reducing greenhouse gas emissions. There is weaker evidence that higher fuel prices induce greater fuel economy in places where motor fuel prices are high."<br>(Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University) | Taken into account, we will rewrite that part but not completely according to given suggestions (Ron) |
| 5-150 | A | 4 | 35 | 4 | 0 | Also include mode switching, fuel pricing, carbon pricing, information/labeling, R&D, etc? (Most of these are already covered in the later discussion, just not in the overview.) | ACC |

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| | | | | | | (Joanna Lewis, Pew Center on Global Climate Change) | |
| 5-151 | A | 4 | 35 | 0 | 0 | This section fails to mention policies to advance low-carbon fuels (e.g., taxes, performance standards, infrastructure requirements, etc.)<br>(Jason Mark, Union of Concerned Scientists) | TIA, will add additional policies |
| 5-152 | A | 4 | 36 | 4 | 36 | delete now<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-57 | B | 4 | 36 | 4 | 39 | Is this truly a failure of the market or a failure of government (tax breaks, subsidies, etc?) U.S. Government<br>(Government of U.S. Department of State) | TIA; redraft sentence |
| 5-153 | A | 4 | 43 | 4 | 43 | Add: Countries with relatively weak fuel efficiency/CO2 emissions standards can achieve emission cuts at low cost by moving towards the stronger standards already introduced elsewhere.<br>(Stephen Perkins, European Conference of Ministers of Transport) | REJ; unnecessary |
| 5-154 | A | 4 | 45 | 5 | 4 | It is not appropriate for a text in the Executive Summary of a chapter of WG 3 AR4 to make only references to two studies and describe some of their details. More substance on the new arisen intelligence on this item would be very desirable.<br>(Manfred Treber, Germanwatch) | Accepted |
| 5-155 | A | 4 | 45 | 5 | 5 | My first suggestion is to move the global study (ICAO) before the regional (EU) one. Regarding the text itself, please replace "an ICAO study" by "A study prepared for ICAO".<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted |
| 5-58 | B | 4 | 45 | 5 | 4 | This is an inappropriate summary. It singles out two market-based measures-charges and trading-and even then only provides the views and studies of one region of the world. This should reflect the results of work and conclusions reached at the UN organization responsible for aviation and environment, the International Civil Aviation Organization (ICAO). This appears to be an attempt at promoting European policies, versus a true international technical assessment. It promotes charges over trading by referring to trading reductions as “only 1%”. And there is no attempt at communicating the uncertainties in the numbers. Any review of material developed by the UN organization responsible for dealing with the environmental impacts of aviation- the International Civil Aviation Organization- would provide a much different and more accurate view- encompassing not only market-based measures, but standard setting, operational and other policy approaches to deal with greenhouse gas emissions. ICAO’s review of emission charges found they were not a cost-effective means for reducing greenhouse gas emissions, especially when compared against emission trading. In fact, depending | Noted. The report quotes the results of ICAO studies. |

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| | | | | | | on the target, charges could be 40 times more expensive to obtain the same reduction in greenhouse gas emissions. he same time, air travel has continued to grow . U.S. Government<br>(Government of U.S. Department of State) | |
| 5-156 | A | 4 | 46 | 4 | 46 | Replace second CO2 with GHG.<br>(Stephen Perkins, European Conference of Ministers of Transport) | Accepted |
| 5-157 | A | 4 | 46 | 5 | 4 | Here costs are given for the aviation sector while no costs where previously given for the terrestrial transport - costs being mentioned only later under the subtitle "transport mitigation potential". Maybe some restructuring could fix this.<br>(Cédric PHILIBERT, International Energy Agency) | Accepted – will restructure |
| 5-59 | B | 4 | 46 | 4 | 1 | Reference the studies. U.S. Government<br>(Government of U.S. Department of State) | Accepted |
| 5-60 | B | 4 | 46 | 5 | 1 | Fees, charges, and taxes may be effective for reducing aircraft emissions in the short term. However, if total travel is not reduced, overall emissions may actually increase when a decrease in travel by air is replaced by a less efficient transportation mode, such as automobile. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-61 | B | 5 | 1 | 5 | 4 | Provide further details on whether a 1% reduction in air transport activity due to open emissions trading system is significant to climate. U.S. Government<br>(Government of U.S. Department of State) | Noted – can we model the impact and report? |
| 5-158 | A | 5 | 3 | 5 | 4 | Change because aviation…to as it is likely the aviation industry would….<br>(John Kessels, Energy Research Centre of the Netherlands) | Noted |
| 5-62 | B | 5 | 5 | 5 | 0 | The volumetric fuel economy improvement of clean diesels over spark-ignition engines of comparable performance has been shown to be >50% for SUVs. The statement of 30% improvement is roughly correct for some smaller vehicles but understates the fuel economy advantages for most vehicles. Regarding the potential increase in fine particles, "unless adequate filtering devices are used." In the US, Europe, and Japan there is no question that highly effective diesel particle filters will be used to make particle emissions no higher than in spark-ignition engines. This concern seems to be improperly raised. U.S. Government<br>(Government of U.S. Department of State) | TIA; this statement applies to p.3 lines 7-11, not p.5 ….we will investigate and change text if necessary. As for diesel particulate emissions, concern still applies to developing nations; we will fix text/steve |
| 5-159 | A | 5 | 6 | 5 | 23 | It is probably worth to mention that the transportation sector is the most difficult to be de-carbonised.<br>(Pierpaolo Cazzola, IEA) | REJ; we haven't concluded this, this chapter doesn'[t compare to others |
| 5-63 | B | 5 | 6 | 5 | 9 | What about catalytic converters and filtration/scrubbing technologies? U.S. | REJ; not needed here |

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| | | | | | | Government<br>(Government of U.S. Department of State) | |
| 5-160 | A | 5 | 7 | 5 | 7 | Add after first sentence: The most significant opportunities in the medium term are for fuel efficeincy improvements, in particular in gasoline engines, but more generally in vehicle and vehicle component (tyres, lights etc) design.<br>(Stephen Perkins, European Conference of Ministers of Transport) | TIA; we will consider adding this |
| 5-161 | A | 5 | 7 | 0 | 0 | Please state after the first sentence: '...measures for the transport sector. Modal shift to public transport is in most cases the most effective measure. For road transport, these include ... '<br>(Manfred Treber, Germanwatch) | REJ; disagree with this |
| 5-64 | B | 5 | 7 | 5 | 15 | What does term 'total mitigation potential' (line 7) mean? How does term relate to taxonomy of potentials set out in Chapter 2, Section 2.5.3.1. (Need to apply this taxonomy consistently throughout the WGIII report). What are these units of Gt CO2 eg - are they an annual emissions abatement; or cumulative over some period?<br>(Government of Australia) | This doesn't apply to this page |
| 5-65 | B | 5 | 7 | 5 | 7 | Should clarify that there are various technology and, in particular, operational and market measures. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-162 | A | 5 | 8 | 5 | 9 | Replace these two lines with: They also include cleaner diesels, hybridisation and fuel cells, coupled with improvements in vehicles use. In the very long term, the use of low carbon fuels, such as fossil fuels with carbon capture, hydrogen and second generation biofuels may also contribute.<br>(Stephen Perkins, European Conference of Ministers of Transport) | TIA; we will consider this language |
| 5-66 | B | 5 | 8 | 5 | 0 | Should include hydrogen-fueled ICE's, which are much more efficient than their gasoline counterpart. Gasoline ICE @ ~23%, Current H2-ICE @ 40% for a 70% increase. U.S. Government<br>(Government of U.S. Department of State) | TIA; will consider, but GM study doesn't show this |
| 5-67 | B | 5 | 8 | 5 | 0 | Add "including plug-ins" after "hybridization". U.S. Government<br>(Government of U.S. Department of State) | REJ; plug ins are great for oil use reduction, less clear for GHG mitigation |
| 5-163 | A | 5 | 10 | 5 | 12 | This is not correct for aviation-related technology<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | noted |
| 5-164 | A | 5 | 12 | 5 | 12 | This statement implies that the vehicle market operates efficiently and that consumer preferences are perfectly expressed in current choices. Under this rationale, demand for vehicle efficiency is perfectly balanced against demand for other attributes that | REJ; no evidence that consumers don't have good information |

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| | | | | | | oppose efficiency (e.g,. power). This approach ignores the potential for substantial friction and imperfections in the vehicle market that might lead to sub-optimal purchase decisions due, for example, to imperfect information or limited technology choices.<br>(Jason Mark, Union of Concerned Scientists) | |
| 5-165 | A | 5 | 13 | 5 | 15 | The sentence is unclear. From what reference level will an assessment of economic potential and also market potential will decrease the estimates of mitigation potential substantially? The sentence seems to be a negative appreciation of the "many studies" indicating that substantial reductions could be achieved at negative or minimal costs, but what is the source of this appreciation? Please justify or delete. Maybe some results of some of these studies (e.g. WEO 2005 as indicated in comment n 10 re: p. 25) could be mentioned here.<br>(Cédric PHILIBERT, International Energy Agency) | TIA; will clarify as to nature of study assumptions |
| 5-166 | A | 5 | 14 | 5 | 14 | Add something along the lines of: A number of ex-ante studies conclude that efficiency measures exist in the transport sector that are more cost effective than measures in other sectors, whilst other studies find transport sector efficiency measures highly uncompetitive (CE 2006). There is a large body of literature estimating costs for fuel economy measures but remarkably little agreement in the findings. In particular, there is debate whether the benefits of fuel economy measures (i.e. saved fuel) outweigh the costs. While some studies (i.e. Greene, D.L. and Schafer, A., 2003; NRC, 2002; Department for Transport, 2003; T&E, 2005) indicate that net costs will be negative (i.e. measures for fuel economy would generate net benefits), other studies indicate moderate to substantial costs for fuel economy measures (EC, 2004; ACEA, 2006). There are a number of factors that explain these apparently contradictory results.<br>…./…. Fuel economy measures cover a range of approaches including engine modification, drive train modification and lowering the weight of cars, and fuel efficiency can be stimulated by three distinct types of measures:<br>• Type 1 - technical adaptations in vehicle design, such as downsizing, engine port injection, direct injection, hybrid drives, etc.<br>• Type 2 - behavioral changes in driving, i.e. more fuel efficient driving.<br>• Type 3 - behavioral changes in purchasing automobiles (consumers switch to smaller or lighter or more fuel efficient vehicles such as diesel engines).<br>In general, technical adaptations in engine and vehicle design tend to generate net costs while behavioral changes tend to generate net benefits. Some measures to promote efficient vehicle components (the performance of which is not reflected in | TIA; this suggests far too much detail for here, but will consider using some of it |

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| | | | | | | tests of fuel efficiency for vehicle certification) are also expected to generate net benefits (ECMT/IEA 2005).<br><br>(Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-167 | A | 5 | 14 | 5 | 14 | Move substantially to will substantially decrease….<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-168 | A | 5 | 15 | 5 | 22 | Not only in developing coutntries, in developed countries there are potential to reduce demand using public transportation system.<br>(Junichi Fujino, NIES) | TIA; good point, tho potentiaql is much larger in developing nations |
| 5-169 | A | 5 | 24 | 0 | 0 | p. 5, line 24: I would add (start with) the increase in the volumes (at least passenger transport, maybe also goods transport)<br>(Bert van Wee, Delft University of Technology) | ACC |
| 5-170 | A | 5 | 24 | 0 | 0 | Please insert: ' ... grow, people in developing countries tend to use more energy-intensive modes of travel. Therefore ..."<br>(Manfred Treber, Germanwatch) | ACC |
| 5-171 | A | 5 | 25 | 6 | 5 | The main reference here is the WBCSD analysis. There are no references to the conclusions of the Special Report on the growth or relative impact of aviation. Also (in paragraph 45), I suggest that expressions such as "particular challenge" and "so great" (page 6) be deleted. Each model has its particularities and no specific information was provided to substantiate the expression "particular challenge"; and the growth can be better illustrated by actual numbers or with a more accurate comparison of the values. (Please note that the last figure of this chapter (5.32) seems to convey that the highest growth rates for CO2 equiv. GHG/year is attained to LDVs on non-OECD Countries and not to aviation.)<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Reject. Qualify with "…as traffic growth is outstripping the ability for technology and other mitigation measures to reduce fuel consumption" |
| 5-68 | B | 5 | 25 | 5 | 0 | Hydrogen is an excellent fuel for combustion engines as well as fuel cells. If the storage and production issues with hydrogen are resolved, at least partial benefits can be achieved irrespective of the success of fuel cells. U.S. Government<br>(Government of U.S. Department of State) | TIA; wrong place, but will look into claims about H2 ICE engines |
| 5-172 | A | 5 | 26 | 5 | 46 | The long-term transport demand will depend on policies and measures discussed in the chapter. This should be mentionned in the Executive Summary.<br>(Government of France) | TIA; add to text |
| 5-173 | A | 5 | 30 | 0 | 0 | On page 41 lines 15/16 you find (on aviation) that <by 2025 traffic will have increased by a factor of 2.6 and this could increase fuel burn by a factor of 2.1> [what is the base year?]. In line 30 of page 5 we find growth rates for aviation of 2.6% [per year??] - is this the same source as in page 42, lines 15/16? Please be | Noted. Will clarify. |

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| | | | | | | more precise and understandable.<br>(Manfred Treber, Germanwatch) | |
| 5-69 | B | 5 | 30 | 6 | 4 | The draft report appropriately notes that expected growth in road transport (tripling of light duty vehicle (LDV) numbers by 2050) will mean that road transport will account for a more than 70 percent of transport energy use, and that LDVs will account for almost 40 percent of all energy use. However, the draft report consistently fails to make comparable statements regarding the current and projected percentage of total GHG emissions that are attributable to aviation. Instead, it addresses only projected growth rates, stating that "both energy use and GHG emissions are projected to increase faster [in aviation] than in any other transport modes." This statement is misleading, because it does not systematically compare growth statistics for aviation with those for other modes and does not mention aviation's initial – and small – overall contribution to global GHG emissions. The Special Report concluded that aviation accounted for about 2 percent of CO2 emissions in 1992. Even assuming significant growth, aviation will remain a relatively small percentage of global emissions. As a matter of organization, the energy consumption growth statistic for air transport that appears on page 5, line 30 should be removed from that paragraph, since the remainder of the paragraph has nothing to do with air transport. If it is retained, it should be moved to the following paragraph and supported with appropriate citation. U.S. Government<br>(Government of U.S. Department of State) | we will redraft |
| 5-70 | B | 5 | 34 | 5 | 34 | "Credible" seems value-laden. Perhaps use a term like 'economically efficient'.<br>(Government of Australia) | Wrong part of text…Australia seems to have a different version of chapter |
| 5-174 | A | 5 | 37 | 5 | 37 | Typo error: "... or fuel cells fueled with natural gas..."<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-175 | A | 5 | 37 | 5 | 37 | Delete with<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ; instead, delete "by" |
| 5-71 | B | 5 | 37 | 5 | 0 | Need to include H2 ICE's or remove the specific call out of fuel cells. U.S. Government<br>(Government of U.S. Department of State) | TIA; again, need to see if data supports claims about hydrogen ICEs, otherwise reject |
| 5-176 | A | 5 | 39 | 5 | 41 | This statement conflicts with the one in page 3, line 36 to line 37 where it is stated that biofuels use at 10% will reduce GHGs emissions by 2 to 5%. Please, correct that | REJ; misunderstands nature of statement |

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| | | | | | | information as I suggested in an earlier comment.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | |
| 5-72 | B | 5 | 39 | 5 | 0 | Remove fuel cell and replace it with hydrogen vehicles. U.S. Government<br>(Government of U.S. Department of State) | TIA…check data on h2 ICEs |
| 5-73 | B | 5 | 39 | 5 | 0 | Consider replacing “carbon-neutral” H2 (“neutral” to what?) with “low-carbon” H2. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-74 | B | 5 | 39 | 5 | 40 | Add “PHEVs operating a substantial % of VMT on electricity generated by low-carbon fuels (or with carbon sequestration) to “the use of low-carbon (see comment above) hydrogen in fuel cells and advanced biofuels in ICE-powered vehicles”. U.S. Government<br>(Government of U.S. Department of State) | TIA; issue is PHEVs are unlikely to see lowC electricity for many decades, if ever….should we stress this technology? |
| 5-177 | A | 5 | 42 | 5 | 45 | In addition to noting the challenges facing hydrogen, barriers to biofuels production (e.g., land use, advanced conversion technologies) should be noted for completeness.<br>(Jason Mark, Union of Concerned Scientists) | ACC |
| 5-178 | A | 5 | 42 | 5 | 45 | “Comment. I suggest to integrate the phrase: - Questions on technical feasibility must still be answered. The introduction and widespread use of hydrogen fuel cell vehicles, for example, requires overcoming many major obstacles, such as huge reductions in the costs of fuel cells, breakthroughs in onboard hydrogen storage, and major advances in hydrogen production.-<br>in this way: Questions on technical feasibility must still be answered. The introduction and widespread use of hydrogen fuel cell vehicles, for example, requires overcoming many major obstacles, such as huge reductions in the costs of fuel cells, breakthroughs in onboard hydrogen storage, and major advances in hydrogen production, as analysed in the book Prospect for hydrogen and fuel cell (2005 IEA).<br>References: IEA, 2005, Prospects for Hydrogen and Fuel Cell, International Energy Agency, IEA/OECD, Paris. www.iea.org”<br>(Mario Valentino Romeri, none - private Italian citizen) | REJ; unnecessary |
| 5-179 | A | 5 | 43 | 5 | 44 | Add after "such as" (end of line 43" "the shift of other catalysts than Pt which is available in limited quantities,"<br>(Government of France) | REJ; this is a subset of cost reductions |
| 5-75 | B | 5 | 44 | 5 | 0 | Hydrogen ICE's are not plagued with the need for huge reductions in the costs of fuel cells. U.S. Government | TIA…ICE issue again, check data |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-76 | B | 5 | 44 | 5 | 0 | 70MPa tanks are near implementation. This provides at least an immediate non-optimal solution to the storage problem. While not an optimal solution, resulting in a packaging problem, vehicles with a 300 mile range can be constructed. U.S. Government<br>(Government of U.S. Department of State) | TIA; check data |
| 5-180 | A | 5 | 46 | 6 | 4 | I suggest to drop this paragraph. I particularly disagree with the statement that ``commercial aircraft present a particular challenge". While it is true that the projected growth of aviation is larger in relative terms than other forms of transportation, one should also keep in mind their absolute values, which are the most important parameters for the transportation impact on climate. This report mentioned several times (see e.g. Figure 5.1) that road transportation will provide by far the strongest climate perturbation by total transportation. Also, your Box 5.1 tells that aviation produced only 2% of total anthropogenic foring in 2000. However, if the authors will decide to keep this paragraph, I strongly encourage them to clearly mention these caveats.<br>(Michael Danilin, The Boeing Company) | Noted and will address with traffic growth comment, effects of other emissions and with caveats. |
| 5-181 | A | 5 | 47 | 4 | 47 | It is not clear why commercial aircraft present a particular challenge. Aviation accounts for about 2-3% of fossil use and the aviation industry has been continuously driven to improve fuel efficiency. Even though aviation is growing faster than other sectors as a percentage, it is still a small portion of total transportation CO2 emissions. Figure 5.1 shows that road transport is projected to have a bigger increase in CO2 than does aviation.<br>(Steven Baughcum, Boeing Company) | Tia, maybe adapt wordings. But besides the relatively strong growth, aviation also generates relatively more non-CO2 effects, which make the share in the order of 4 to 8% of total GHG emissions (see also IPCC, that speaks of 3.5 to 5% |
| 5-77 | B | 5 | 47 | 6 | 4 | Some quantitative description will be better suited here. U.S. Government<br>(Government of U.S. Department of State) | Noted and covered in later text |
| 5-182 | A | 6 | 0 | 6 | 0 | This source is too out of date for a review of current status. Much has changed since the 1990s.<br>(Richard Gilbert, Centre for Sustainable Transportation) | disagree |
| 5-78 | B | 6 | 3 | 6 | 4 | Reference projections. Also, this sentence fails to provide the proper context that while aviation emissions may be growing faster than some other transport modes, this growth is coming from a very small base, especially compared to ground transport. U.S. Government | Rejected, this is made clear in table 5.1 and page 16 |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-183 | A | 6 | 9 | 6 | 12 | I suggest to insert a sentence that travel time budget is constant (see my comment above referring to Schafer, 2000).<br>(Manfred Treber, Germanwatch) | REJ; doesn't fit here |
| 5-184 | A | 6 | 9 | 6 | 10 | Delete in profound ways<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-185 | A | 6 | 11 | 6 | 11 | this sentence needs to be rewritten, cities would still exist without transport but perhaps it would be better to write that mobility systems for cities and global trade to allow for cost effective systems to transport people and goods<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ; disagree with point |
| 5-186 | A | 6 | 12 | 6 | 12 | There were cities and trade before motorized transport<br>(Richard Gilbert, Centre for Sustainable Transportation) | Noted…but text doesn't specify motorized transport |
| 5-187 | A | 6 | 14 | 0 | 0 | We know Megacities like Tokyo that have a 60% modal share of rail which receives its energy from electricity, in the former Sowjet Union exist numerous (electrical) trolleybus [183 in 1998] and tramway systems. Where do I find such realities in the draft text? To be correct please change line 14 to: ' Since motorized transportation on roads relies on oil for virtually all its fuel, ...'<br>(Manfred Treber, Germanwatch) | REJ; 96% seems close to "virtually all" |
| 5-188 | A | 6 | 16 | 6 | 16 | replace future options with future technology options<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ, too narrow |
| 5-189 | A | 6 | 18 | 6 | 19 | Do we know deterministicly the future and do we want to demoralise policy makers who try to implement mitigation measures in transport? For me the intention of AR 4 is a different one. Therefore the following proposal to adjust the first sentence: ' It can be problematic when policymakers think that GHG emissions reductions will not be viewed as the critical issue in transportation during the coming decades.'<br>(Manfred Treber, Germanwatch) | TIA, text redrafted to show less certainty |
| 5-190 | A | 6 | 18 | 6 | 19 | This is the personal opinion of whoever wrote the statement. It is a prediction about future perceptions concerning how serious the global warming issue – something that cannot be predicted with any confidence. The sentence should be deleted.<br>(Danny Harvey, University of Toronto) | Same |
| 5-191 | A | 6 | 18 | 6 | 19 | Is not clear who will not recognize the critical issues of GHG reduction: policymakers ?<br>(Stefano Caserini, Politecnico di Milano) | Same |
| 5-192 | A | 6 | 18 | 6 | 18 | Too categorical ( … will not be viewed …)<br>(Richard Gilbert, Centre for Sustainable Transportation) | Same |

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| 5-79 | B | 6 | 18 | 6 | 26 | Some relevance to the standing of developed countries would be appropriate here. Can the authors make a distinction of critical issues among various transport modes in developing and developed world? U.S. Government (Government of U.S. Department of State) | TIA; will explore separating developing and developed nations in the text |
| 5-193 | A | 6 | 27 | 8 | 35 | Link between urbanization and transport activity is unclear. (Richard Gilbert, Centre for Sustainable Transportation) | Comment unclear |
| 5-194 | A | 6 | 32 | 6 | 34 | This is an overly simplistic and unjustified statement. At the level of individual cities, there is an enormous difference in per capita energy use for transportation among cities with comparable degrees of per capita wealth (as shown in the work by Kenworthy and Newman). This is too deterministic a statement, and ignores the many ways to decouple economic growth from transportation energy use. It should be deleted. (Danny Harvey, University of Toronto) | REJ; statement is not about per capita energy use |
| 5-195 | A | 6 | 34 | 6 | 34 | There is a valid argument that transport reflects rather than causes economic development (Richard Gilbert, Centre for Sustainable Transportation) | REJ; somewhat true but irrelevant here |
| 5-196 | A | 6 | 36 | 0 | 0 | Delete “inextricably” (Danny Harvey, University of Toronto) | REJ |
| 5-197 | A | 6 | 37 | 0 | 0 | We know that helicopters are often the fastest modes for relatively short distances - that's why heads of states often use them. But in general this is not very common, not that popular. That's why we should change line 43 to '... has increasingly moved towards the faster modes ...' (Manfred Treber, Germanwatch) | ACC |
| 5-198 | A | 6 | 37 | 0 | 0 | where transportation activity is high ? At Pag. 9, line 10 (chapter 5) is correctly remembered that "Worldwide travel studies have shown that the average time budget for travel is roughly constant worldwide". (Stefano Caserini, Politecnico di Milano) | REJ; statement is still correct |
| 5-199 | A | 6 | 43 | 0 | 0 | Please be more precise: '... however – current motorized transportation activity on road is overwhelmingly driven ..' (Manfred Treber, Germanwatch) | REJ; statement is true for air and shipping also |
| 5-80 | B | 6 | 43 | 6 | 0 | The statement“…engines…” is misleading. Turbine fuels should be identified separately from fuels used in IC engines. U.S. Government (Government of U.S. Department of State) | REJ; a turbine is an ICE |
| 5-200 | A | 6 | 45 | 6 | 45 | replace transport energy,,,,with transport energy and carbon emissions closely track each other. (John Kessels, Energy Research Centre of the Netherlands) | ACC |

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| 5-208 | A | 7 | 0 | 7 | 0 | Figure 1 where is it sourced from there is no reference year, is it WBSCD or IEA or both and what year, publications?<br>(John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-201 | A | 7 | 3 | 0 | 0 | Please add: '... increases in efficiency and/or shifts toward non-carbon fuels or other transport modes. There exist ...'<br>(Manfred Treber, Germanwatch) | REJ; modal split change will not stop growth |
| 5-202 | A | 7 | 5 | 5 | 23 | Please consult the broad literature from the Integrated Assessment community about how various technologies will deploy in response to greenhouse gas emissions constraints. It would be far more useful if this section communicated to the readers that a broad portfolio of options will be needed and that the use of any given technology type will vary across space and time. Instead the text here seems to be saying that certain technologies are inherently better / more important and that some are far cheaper than others will ever be to deploy. How else is one supposed to interpret the negative cost for nuclear power and the very high costs for CCS. At the very least, the authors of this section should note that their is broad agreement in the literature that carbon permit prices will increase with time and therefore what is an economic means of reducing emissions changes with time and regional circumstances. Chapter 4's adoption of a timeframe that only extends to 2030 really alters the picture for a lay reader about what is the broad portfolio of actions needed to address cliamte change. More thought needs to be given to spanning the difference between the long term view of Chapter 3 of AR4 and Chapter 4 so readers better understand what the literature tells us about the totality of actions needed to address climate change.<br>(James Dooley, Battelle) | Comment out of place here |
| 5-203 | A | 7 | 5 | 7 | 10 | Tables are not clear. No source mentioned.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | TIA; will correct |
| 5-81 | B | 7 | 6 | 7 | 10 | In Figure 5.1 there is a large difference between historical and projected air emissions at 2000. While some difference is understandable the doubling of emissions that occurs in this figure needs explanation.<br>(Government of Australia) | Accepted |
| 5-204 | A | 7 | 9 | 7 | 9 | Please provide a reference to Fig.5.1 and explain why there is a kink in 2000. It seems to me that this kink indicates that historical data (IEA) and estimated data (WBCSD) are inconsistent in 2000, particularly for aviation. Why?<br>(Michael Danilin, The Boeing Company) | Accepted |
| 5-205 | A | 7 | 9 | 0 | 0 | Figure 5,1 I suggest the use of the unit of measure J (MJ, GJ, TJ ..) in all the chapter 5, or else add at the end f the legend (1000 Mton = 42 EJ). | We will |

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| | | | | | | (Stefano Caserini, Politecnico di Milano) | |
| 5-206 | A | 7 | 9 | 0 | 0 | Figure 5,1 explain the large differences between IEA and WBCSD air emission data<br>(Stefano Caserini, Politecnico di Milano) | As above |
| 5-207 | A | 7 | 9 | 7 | 9 | Figure 5.1 shows an odd break between the two data sources. Aviation CO2 would appear to have doubled in 2000. The authors should comment on the difficulty of merging different data sources and consider scaling one or the other to be self consistent. Note that International Energy Agency tables (e.g., from the US DOE International Energy Annual) exist for apparent consumption of jet fuel based on refinery output. So, this issue can be addressed better than it has been here.<br>(Steven Baughcum, Boeing Company) | Accepted, see also data on aviation later in this section |
| 5-209 | A | 8 | 1 | 8 | 2 | This sentence may seem right but is not. Emissions from the heat and power sector have been growing at a faster rate than emissions from transport - for example, by 40.8% against 30.8% over 1990-2003. (IEA, 2005, CO2 emissions from fuel combustion, OECD/IEA, Paris, p.II.75). The forthcoming 2006 edition, having corrected a number of past data, will show a growth of 53% for heat and power against 36% for transport between 1990 to 2004. The argument that only end-use sectors are considered in this sentence is not acceptable for two good reasons: 1) IPCC reports should follow the IPCC guidelines for national greenhouse gas inventories, where emissions from electricity and heat are addressed exactly the same way as emissions from transport or any end-use sector. 2) Even if one wanted to compare only end-use sectors, then it would be necessary to allocate the emissions of the electricity and heat sector to the various end-use sectors, mainly industry and commercial and residential. This makes a considerable difference in the emissions of these sectors, and thus to their growth rates.<br>(Cédric PHILIBERT, International Energy Agency) | REJ; heat and power is not an end use sector |
| 5-210 | A | 8 | 8 | 8 | 8 | Replace roughly with approximately<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-211 | A | 8 | 10 | 8 | 0 | Table 5.1 what year is the source/reference?<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA; will add |
| 5-212 | A | 8 | 10 | 8 | 19 | I suggest to add two additional columns to Table 5.1, namely, showing fuel used and CO2 emissions by each of the transportation source listed here. I think it will be very useful for general public who can better understand how many Mt of fuel was used or how many Mt of CO2 was emitted instead of dreadful Exajoules showing here.<br>(Michael Danilin, The Boeing Company) | Accept, but also for all GHG emissions and their impacts |
| 5-213 | A | 8 | 10 | 8 | 20 | as already mentionned (see remarks 3&4) should it be possible to show the regional | ACC if possible |

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| | | | | | | (EC, USA, Japan) absolute figures of world transport energy uses ? (from IEA or UNFCC NIR reports, or EC reports 2004) ? It also should help reading of fig 5.1.9 page 52.<br>(Brigitte POOT, Total s.a.) | |
| 5-214 | A | 8 | 10 | 8 | 19 | The total share of heavy freight trucks, medium freight trucks and buses in total energy use (nearly 1/3) would justify much more attention for reducing emissions from these vehicles in the remainder of the chapter.<br>(Government of European Community / European Commission) | TIA; we will try to add more on heavy trucks |
| 5-215 | A | 8 | 25 | 8 | 36 | This section is not referenced and refers to precise numbers of 75% industrialised world, 40% developing nations living in urban areas, where did this reference come from?<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ; reference is Mobility 2001 |
| 5-216 | A | 8 | 29 | 0 | 0 | It this the right place to add a figure on the extended modal split of several megacities in different world regions?<br>(Manfred Treber, Germanwatch) | TIA if data is available |
| 5-217 | A | 8 | 29 | 8 | 29 | delete have gotten and replace with are, also perhaps mention the concept of megacities<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA as above |
| 5-218 | A | 8 | 34 | 0 | 0 | At least in Europe there is some trend towards public transport and away from an increase in car use. In many cities you see a rising modal share of public transport, in Germany the motorisation of young men (age from 18 to 29) has declined from 605 cars per 1000 men in 1993 to 453 cars in 2003 (Shell, 2004, 24; PKW Szenarien bis 2030. Flexibilität bestimmt Motorisierung). The modal share (in Pkm) of public transport in Germany has risen for years (see 'Wettbewerbsbericht 2006 der Deutschen Bahn'), car use (in Pkm) has diminished this year and every year in the last six years (Treber, 2006; http://www.germanwatch.org/rio/mt06verk.htm). Please include therefore these new remarkable developments: "... decling share of transit. This has been reversed in numerable European Cities recently, even in entire countries (Germany, see (Treber, 2006)). Further, the ..."<br>(Manfred Treber, Germanwatch) | TIA; will examine data, incorporate if acceptable and logical |
| 5-219 | A | 8 | 42 | 9 | 1 | This reference is several years old are their not more up to date figures? For example from the World Energy Council study on Energy and Poverty, which I believe has references to transport<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA, but limited changes because data is not easy to access |
| 5-220 | A | 8 | 42 | 8 | 43 | 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- | TIA, will check and clarify |

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| | | | | | | weather" than motorised modes.<br>(Dominic Stead, Delft University of Technology) | |
| 5-82 | B | 8 | 42 | 8 | 43 | A definition of "all weather transport" would be helpful.<br>(Government of Australia) | As above |
| 5-221 | A | 8 | 43 | 8 | 43 | The meaning of the term “all-weather transport” is unclear. Is this the same as motorized transportation, or is it more limited?<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | Same |
| 5-83 | B | 8 | 43 | 8 | 43 | The meaning of the term “all-weather transport” is unclear. Suggest change to “motorized transport.” U.S. Government<br>(Government of U.S. Department of State) | Same |
| 5-222 | A | 8 | 45 | 9 | 1 | As already stated above (first comment to page 5, "0"), an intense survey from UITP "Mobility in cities - Database; Better mobility for people worldwide" has shown that cars are costlier than public transport in quite dense populated cities. If we can read only as in line 45 'public transport is very costly for the urban poor' this does not reflect the economic reality for policy makers. They should know that car use is much more costly than public transport so that they can decide correctly on the least cost option they have when designing the transport infrastructure in their city. Please add some text which reflects this.<br>(Manfred Treber, Germanwatch) | REJ; we do not believe anyone will interpret this to mean that cars are cheaper |
| 5-223 | A | 9 | 5 | 0 | 0 | Bizarre. On page 5, line 11, we learn that the time budget for travel is constant, and 6 lines before we can read that motorised personal vehicles lead to 'shorter travel times'. That is not correct, the constant travel time budget leads in conjunction with higher transport velocities to an increase of the distances travelled; no time is saved. Therefore please write in lines 5 and 6: "... freedom, and usually higher speed. Further aggravating ...'<br>(Manfred Treber, Germanwatch) | REJ; current text is clear |
| 5-224 | A | 9 | 9 | 9 | 9 | Focus on developing world overlooks main growth in vehicles still being in developed world, and likely will be for foreseeable future. In almost every year more are added there. In 2001, for example, 75% of the increase in vehicle registrations was in countries with per capita GDP >US$10,000.<br>(Richard Gilbert, Centre for Sustainable Transportation) | TIA; will check data and correct if necessary |
| 5-225 | A | 9 | 15 | 10 | 23 | This section is not referenced or is it all from Schafer, 2000? These two pages need to be referenced<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ; ref is WBSCD 2001 |
| 5-226 | A | 9 | 15 | 9 | 17 | Please specify what units are used for auto travel: km? Passenger x km? Or something else? | REJ; units are trips, not distance |

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| | | | | | | (Michael Danilin, The Boeing Company) | |
| 5-227 | A | 9 | 16 | 0 | 0 | It would be helpful to reflect the new development in parts of Western Europe in this line: "... but 50% in Western Europe where we see a decline of car use in the most populated country, in Germany, in the last six years, and 90% in the United States. ...' (for the sources see my comment on Chapter 5, page 8, line 34) (Manfred Treber, Germanwatch) | REJ; not appropriate here |
| 5-228 | A | 9 | 19 | 9 | 21 | It is no doubt that vehicle sales in china increased, but the increase speed is not "extremely rapidly" at all, so it is suggested to delete "extremely rapidly". (Government of China Meteorological Administration) | REJ; term seems fair given data |
| 5-229 | A | 9 | 21 | 9 | 21 | Note that China's 2-wheeler production may be several times production of ≥4-wheelers (8.9 vs. 1.6 million in 1998). (Richard Gilbert, Centre for Sustainable Transportation) | Noted, but don't have data |
| 5-84 | B | 9 | 21 | 0 | 0 | 2003 is not the most recent year for China new car registrations. Data for 2004 is 3.2 million and for 2005 it is 3.8 million. The source is: R. L. Polk and Company, press release, March 14, 2006 (USA) U.S. Government (Government of U.S. Department of State) | ACC |
| 5-230 | A | 9 | 27 | 0 | 0 | Add Amsterdam and Copenhagen to the list of cities. (Danny Harvey, University of Toronto) | TIA if we can get data |
| 5-85 | B | 9 | 29 | 9 | 31 | The statement that buses are declining in importance in the industrialized world is questionable. In the U.S., buses made up 60.8 percent of transit trips in the first quarter of 2006, up from 60.6 percent in the first quarter of 2005. (The percentage might be lower on a passenger-mile basis.) And, bus transit trips increased by 4.36 percent from Q1 2005 to Q1 2006. (APTA data). UITP data indicates that while urban areas have sprawled, transit's proportion of trips has been held steady in part due to bus services. This is true in places as diverse as Helsinki, Paris, Vienna, and Singapore. The greatest reason for this holding of market share was restricting downtown auto parking and providing exclusive lanes or priority for buses and trams. Suggest looking at data for other industrialized countries. U.S. Government (Government of U.S. Department of State) | TIA; we will check data/Jorge |
| 5-231 | A | 9 | 30 | 0 | 0 | I would add one explanation: ' ... in the industrialised world partially because of higher appreciation of rail, are ...' (Manfred Treber, Germanwatch) | TIA; will check and add if appropriate/Muro |
| 5-232 | A | 9 | 30 | 9 | 30 | In India in 2000-1, >75% of motorized road passenger-kilometres were by conventional bus, bus, <5% by auto-rickshaw. (Richard Gilbert, Centre for Sustainable Transportation) | TIA if we can confirm data |
| 5-233 | A | 9 | 34 | 0 | 0 | This sentence refers to the expensive "heavy rail" systems (in Germany: 'S-Bahn') or | ACC |

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| | | | | | | to underground metros. It is not valid for tramway system ('light rail'). Therefore please insert in line 34: ' Fixed heavy rail transit systems are ..'<br>(Manfred Treber, Germanwatch) | |
| 5-234 | A | 9 | 36 | 0 | 0 | Please add one sentence which reflects the renaissance of tramway systems in Europe (and elsewhere): ' ... dominant mode. In smaller cities in developing countries (with population higher than 100 000 inhabitants) light rail experiences a renaissance of tramway systems which are an effective instrument to attract car drivers and to revitalise town centers.' For more details on this item see my comments for page 49.<br>(Manfred Treber, Germanwatch) | TIA; will try to get data on light rail, draft added sentence/phrase |
| 5-86 | B | 9 | 44 | 9 | 45 | Reference the 5 percent per year passenger air travel growth figure as well as the figure pertaining to China. U.S. Government<br>(Government of U.S. Department of State) | REJ; reference for this section is Mobility 2001 |
| 5-235 | A | 10 | 18 | 0 | 0 | The Sovjet Union had a much higher freight traffic on rail than the US - the US transported roughly 2 000 billion tkm/a, in the last years of the Sovjet Union (until 1990) more than 4 000 billion tkm/a freight had been transported on rail. I suggest to include this information in the text: '... which has after the decline of the Sovjet Union the highest total ...'<br>(Manfred Treber, Germanwatch) | REJ; too much detail for this section |
| 5-236 | A | 10 | 19 | 10 | 19 | Please insert "ïncluding air freight" after "all modes".<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | REJ; no particular reason to call this out |
| 5-237 | A | 10 | 20 | 10 | 20 | In 2004, 44% of EU-25's internal freight tkm were by road. 39% were by short-sea shipping.<br>(Richard Gilbert, Centre for Sustainable Transportation) | Noted; we need data source |
| 5-238 | A | 10 | 23 | 11 | 22 | This box appears to be inconsistent with much of the discussion in the FAR WG1 volume on non-CO2 impacts. The use of RFI is no longer accepted, if it ever was. WG1 concludes that there is not a good metric for considering the climatic impact of non well mixed perturbations (e.g., NOx, ozone, contrails, etc.) at this time. Similarly, they discuss efficacy of the different perturbations; an issue not considered here. There have been several recent publications by Keith Shine's on this topic as well. The discussion presented here should either be dropped or rewritten to be consistent with the WG1 report.<br>(Steven Baughcum, Boeing Company) | Tia, we don't think so, but we will check the SOD of WG1 |
| 5-239 | A | 10 | 24 | 11 | 23 | Text is an accurate reflection of current situation (except "gasses" spelling). For completeness the following sentence could be considered: "The European Union has adopted Directive 2006/40/EC relating to emissions from air-conditioning systems | Rejected, this is not the place for policiesWe will |

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| | | | | | | in motor vehicles and amending Council Directive 70/156/EEC in May 2006. This Directive will lead to the phase-out of HFC-134a in mobile air-conditioning in new vehicle types and finally in all new vehicles. This Directive will lead to a substantive reduction in the direct climate climate change impact of MAC from HFC-134a emissions but may result in increased indirect (energy) emissions unless issues such as the lower energy efficiency of alternative systems and the extra weight (due to higher pressure) of such systems are resolved.<br>In Japan, lower charge sizes and mandatory recovery and recycling have led to decreased emissions of HFcs from mobile air-conditioning. In the USA, no venting regulations for HFCs apply.<br>(Nick Campbell, ARKEMA SA) | consider to include it in section 5.4 |
| 5-240 | A | 10 | 24 | 0 | 0 | Title of box 5,1: Non- CO2 impacts on climate. There are other "Non-CO2 impacts" (i.e. Local air pollution)<br>(Stefano Caserini, Politecnico di Milano) | Rejected, we only refer to climate impacts (radiative forcing from transport emissions. |
| 5-87 | B | 10 | 24 | 11 | 22 | Provide the range of uncertainties in the stated magnitudes of RF. Also, provide some details on appropriateness of RF and RFI as measures of all aviation-induced climate impacts. U.S. Government<br>(Government of U.S. Department of State) | we will |
| 5-88 | B | 10 | 24 | 0 | 0 | It is unclear how mitigation potential for non-CO2 emissions is accounted for. U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-241 | A | 10 | 35 | 10 | 35 | VOCs rather than VOcs<br>(Pierpaolo Cazzola, IEA) | Accepted |
| 5-242 | A | 10 | 35 | 10 | 35 | VOCs, not Vocs.<br>(Michael Danilin, The Boeing Company) | Accepted |
| 5-89 | B | 10 | 36 | 10 | 36 | Unit MtC- again, is it annual or cumulative? Why C in some parts of chapter and CO2 eg elsewhere - would help reader follow discussion to standardise.<br>(Government of Australia) | we will improve |
| 5-243 | A | 10 | 38 | 10 | 38 | Quote RF the first time it appears .<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-244 | A | 10 | 44 | 11 | 10 | Apart from the three mis-spellings of gases (and one of forecast), these sentences are a model of clarity and accuracy.<br>(Archie McCulloch, Marbury Technical Consulting) | noted |

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| 5-90 | B | 10 | 45 | 10 | 45 | This is the first use of "F-gasses" in this chapter. It should be explained because some may take it to mean all fluorinated gases (including CFCs, HCFCs, HFCs, PFCs, and SF6) while others may assume it means just the fluorinated gases required to be reported under UNFCCC Inventories (HFCs, PFCs and SF6). Suggest adding a footnote to F-gasses stating something like "F-gasses refers to manufactured fluorinated chemicals including CFCs, HCFCs, HFCs, PFCs and SF6. Those that deplete the stratospheric ozone layer (e.g., CFCs, HCFCs) are being phased out under the Montreal Protocol while others (e.g., HFCs, PFCs and SF6) are included under the UNFCCC." U.S. Government (Government of U.S. Department of State) | ACC |
| 5-91 | B | 10 | 46 | 11 | 1 | This sentence is confusing because it appears to be combining two causes and two effects. Also, some clarity is needed to distinguish between mass and CO2-equivalents. Suggest changing to read "The total amount (mass) of F-gasses is increasing due to the increase in vehicles with air conditioning. However, due to the rapid switch from CFC-12 to HFC-134a, which has a much lower GWP index, total bank and emissions in CO2 equivalent is decreasing and is forecasted to continue to decrease." U.S. Government (Government of U.S. Department of State) | ACC |
| 5-245 | A | 10 | 50 | 0 | 0 | Please add to footnote 4: '... national rail systems and lack of adequate road pricing for trucks (if the latter exists the modal share of rail freight is substantially higher, see e.g. Switzerland).' Look at page 1 of http://forum.europa.eu.int/Public/irc/env/eccp_2/library?l=/eccp_transport_measures/material-background/eccp_transportation/_EN_1.0_ as a short hint to the situation in the EU. (Manfred Treber, Germanwatch) | Rejected, will be part of policy section |
| 5-246 | A | 11 | 1 | 11 | 8 | as already mentionned (see remarks 6) should it be possible to highlight clearly the world impact and future trend of F-gases for transportation (USA figures > others ? or average ) and mention potential mitigation for this non-negligeable contribution to GHG, as well as it impact on vehicle energy consumption of 2,5-7,5 % ?. (Brigitte POOT, Total s.a.) | no data available |
| 5-92 | B | 11 | 1 | 11 | 1 | Some context is needed on the forecast of decreasing emissions. Suggest "… is forecasted to continue to decrease until approximately 2010. After that, total CO2-equivalent emissions are forecasted to be steady until about 2015 but clearly continued increases in the sales of vehicles with air conditioning thereafter may cause total emissions to increase again." U.S. Government (Government of U.S. Department of State) | we will clarify |

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| 5-247 | A | 11 | 2 | 11 | 2 | I believe that the authors meant N2O, not N2.<br>(Michael Danilin, The Boeing Company) | ACC |
| 5-248 | A | 11 | 2 | 11 | 2 | Erratum: to change N2 for N2O<br>(Félix Hernández, Economía y Geografía. Consejo Superior de Investigaciones Científicas (IEG-CSIC)) | ACC |
| 5-93 | B | 11 | 2 | 11 | 2 | typo: "N2" should be "N2O". U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-94 | B | 11 | 2 | 11 | 2 | Vedantham and Oppenheimer (1998) is not used in the chapter, so it is not necessary in the list of citations. U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-249 | A | 11 | 4 | 11 | 6 | One line (CO2, CH4, N2, F) in the table seems to be missing<br>(Pierpaolo Cazzola, IEA) | Acc, box and table will be made more transparent |
| 5-95 | B | 11 | 4 | 11 | 4 | The source cited gives emission percentages inconsistent with the US Inventory. Table A-105 of the US Inventory (http://yosemite.epa.gov\oar\globalwarming.nsf\content\ResourceCenterPublicationsGHGEmissionsUSEmissionsInventory2006.html) indicates that the share of CO2, CH4, N2O and HFC emissions from "Transportation and Mobile Source[s]" to be 95.7%, 2.0T, 0.1% and 2.1%, respectively. The numbers would be different, but still inconsistent, if only "Transportation" sources were analyzed; for instance, Table A-104 shows that the two HFC sources — Mobile Air Conditioning and Refigerated Transport — only add up to about 3% of the total emissions. U.S. Government<br>(Government of U.S. Department of State) | we will check |
| 5-250 | A | 11 | 7 | 11 | 7 | Please add after "…we can not neglect those.": "The European Union has realised this and consequently bans the use of high GWP refrigerants like HFC 134a in mobile air-conditioning systems in future (directive 2006/40/EC)."<br>(Government of Germany) | noted |
| 5-96 | B | 11 | 9 | 11 | 9 | It is not clear if the 2.5%-7.5% cited only refers to "major Annex I parties" stated earlier (page 10, line 44). Checking with the reference source, it seems that the stated range comes from analysis of data for the U.S. and Europe. Elsewhere, the % can be significantly higher. For instance, it has been reported that in India, due to the generally smaller engine size and the severe hot/humid climate, it is about 30%. U.S. Government<br>(Government of U.S. Department of State) | we will clarify |
| 5-97 | B | 11 | 10 | 11 | 11 | It is unclear how the estimate of mitigation potential in Table SPM.2 for the transport sector was developed. This text indicates that they are the potentials for light duty vehicles, biofuels and aviation only, but a sum for these factors is not | TIA; this will all have to be reconciled/steve |

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| | | | | | | shown in either Chapter 5 or 11. Chapter 11, Pg. 16, lines 36-42, referring to the transport sector, states "… some crude extrapolation is required for overall coverage.", but does not explain the basis or process for extrapolation. Finally, Table 5.17, is a summary of CO2 mitigation potential in the transport sector from several studies, but none estimate the 28.3% reduction indicated in this table. That table provides cost estimates for specific technologies, but not for the global total. There are costs estimates for an unspecified amount of mitigation in LDVs, which indicate that the cost will be below $100/tCO2 if oil price is somewhat above $40/Bbl. U.S. Government (Government of U.S. Department of State) | |
| 5-251 | A | 11 | 12 | 11 | 22 | I think that authors should talk about all types of transportation at the end of Box 5.1 and do not talk about aviation alone. Such aviation-biased discussion portraits aviation as a particularly climate damaging transportation. This is not true. Also referring the radiative forcing index (RFI) as a metric of the climate impact is bad because RFI is a very bad metric in this sense (recent TAC conference in Oxford clearly showed this). Also, IPCC WG! 4th Assessment Report did not endorse the RFI, particularly for non-CO2 emissions. My understanding that WG3 should follow the WG1 recommendations and do not try to invent something here which is not supported by the best experts in this field worked in WG1. (Michael Danilin, The Boeing Company) | Reject comment about discussion of aviation.Accept comment about RFI |
| 5-252 | A | 11 | 12 | 11 | 22 | The report states that "aviation has a significantly greater climate impact in terms of radiative forcing than its CO2 emissions alone". This statement is misleading in two ways. First of all, given that large uncertainties still exist with regard to the non-CO2 effects from aviation, there is insufficient evidence to support this statement. Secondly, the report gives the impression that radiative forcing from non-CO2 emissions is an issue that is unique to aviation. This is not the case and should be clarified. (Andreas Hardeman, International Air Transport Association (IATA)) | Accepted, but should only recognise the uncertainties and qualify the non-CO2 effects, if possible. |
| 5-98 | B | 11 | 12 | 11 | 22 | The authors should reference the WG1 discussion of aerosols to ensure consistency in treatment of aerosols across the AR4. (Government of Australia) | we will check |
| 5-99 | B | 11 | 12 | 11 | 0 | The draft report states that "aviation has a significantly greater climate impact in terms of radiative forcing than its CO2 emissions alone." This statement and the citations that follow it are misleading on at least two counts. First, this section of the report fails to identify the significant uncertainties involving the issue of radiative forcing potential. For example, it does not address the point that contrails and cirrus | Noted, but the scientific consensus suggests that the RF effects from NOx generated Ozone could be 1.9 times the effects from aviation CO2, as |

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| | | | | | | clouds are believed to have a very short residence time, particularly compared with the residence time of CO2, such that the radiative forcing effect of such elements could be negligible. Accordingly, it is inappropriate for the report to state that aviation has a "significantly" greater climate impact in terms of radiative forcing – when, in fact, the effects are not known. Second, by making this statement about aviation in isolation, the report makes it seem that only aviation has a potential radiative forcing component. To the contrary, however, the issue of radiative forcing effects beyond CO2 is not a question that is unique to aviation. U.S. Government<br>(Government of U.S. Department of State) | stated in Box 5.1, and a recent report for ICAO's CAEP offers a scientific view that the climate effects from NOx are at least equivalent to that from CO2 over 50 years. |
| 5-253 | A | 11 | 18 | 11 | 20 | Proposed amendement: "These effects result in a total aviation radiative forcing for 2000 of 47.8 mW m-2, excluding cirrus cloud enhancement. Cirrus clouds included, total aviation radiative forcing could amount to up to 130 mW/m-2. The total radiative effect from aviation in terms of its radiative forcing index (RFI) which is the sum of forcings divided by the CO2 forcing, is 1.9 (excluding cirrus) and could be up to 5.0 (cirrus included)." rationale: 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 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 "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 | Noted – David Lee should advise on the proposed change |

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| | | | | | | 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.<br>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.<br>(Dietrich Brockhagen, atmosfair gGmbH) | |
| 5-254 | A | 11 | 21 | 11 | 22 | Proposed Amendement: "The total radiative effect corresponds to approximately 4% (up to 9%) of total anthropogenic forcing for if cirrus is excluded (is included) for 2000." rationale: 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", 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, | Noted – David Lee to consider and advise |

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| | | | | | | 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.<br>(Dietrich Brockhagen, atmosfair gGmbH) | |
| 5-259 | A | 12 | 0 | 0 | 0 | table 5,2: what means "+ve" ?<br>(Stefano Caserini, Politecnico di Milano) | We will correct |
| 5-255 | A | 12 | 1 | 12 | 5 | In Table 5.2 it is necessary to explain the meaning of +ve, -ve, indirect (forcing).<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accepted |
| 5-256 | A | 12 | 1 | 12 | 12 | Table 5.2: a) What does ``ve" mean? B) Aviation NOx(O3) RF=22, not 23 mW/m2 (see Box 5.1) c) I am afraid to say that the authors should drop the Eyring et al (2005 in preparation) reference, since if this paper is not submitted yet, likely that it won't be published before publication of this Report in early 2007.<br>(Michael Danilin, The Boeing Company) | Accepted – glossary issue? |
| 5-257 | A | 12 | 1 | 0 | 0 | For Table 5.2, fuel switching should be added to technological mitigation measures.<br>(Takayuki Takeshita, The University of Tokyo) | Noted – see above |
| 5-258 | A | 12 | 1 | 12 | 0 | This table needs to be consistent with the WG1 report and should be reviewed by the WG1 lead authors. This table does not address the issues associated with non well mixed perturbations and the fact that RF is not a good metric for such perturbations. This chart can easily be misused. In principle, it may appear to add value but does it confuse and mislead? Do other sectors in the WG III have similar charts? Is this a WG1, not a WG III, issue? Why is there no number for CO2 forcing by road transport since it is the dominant contributor here? References are needed for all numbers or conclusions cited (including the assumptions about negligible). Road transportation is considered a source of NOx/CO/VOC which contribute to ozone which is a greenhouse gas. CO/VOC are important pollutants in this process for some locations (e.g., Los Angeles).<br>(Steven Baughcum, Boeing Company) | Noted – is this an aviation point? |
| 5-100 | B | 12 | 1 | 12 | 0 | Table 5.2: The “ve” notation is unexplained. It would also be helpful to have a summary line in the table. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-101 | B | 12 | 1 | 12 | 10 | Table 5.2 should be harmonized with the mitigation measures suggested on page 3. | Rejected, measures will be |

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| | | | | | | The table should include operational mitigation measures in addition to the technological measures. U.S. Government (Government of U.S. Department of State) | taken out |
| 5-102 | B | 12 | 1 | 12 | 2 | Suggest Table 5.2 be more inclusive by including a row on HFCs. The Technological mitigation measures could read: under Surface Transportation, "new mobile air conditioners" to refer to CO2, HFC-152a, other low-GWP refrigerants and Improved HFC-134a technologies under development; under Shipping, "alternative technologies, low-GWP refrigerants" to refer to use of ammonia and hydrocarbons in transport refrigeration; and under aviation, "low-GWP fire suppression agents" because fire extinguishing is still largely reliant on ozone-depleting halons but is likely to move to HFCs (air conditioning is not usually achieved with HFCs except in small aircraft). All would simply reference IPCC, 2005 (Chapters 6, 4 and 9, respectively). U.S. Government (Government of U.S. Department of State) | Tia, we will check IPCC 2005 and possibly include relevant numbers. |
| 5-103 | B | 12 | 1 | 12 | 0 | On Table 5.2, add "low carbon fuels" to "technological mitigation measures" for CO2, at least under "surface transportation". U.S. Government (Government of U.S. Department of State) | ACC |
| 5-104 | B | 12 | 20 | 12 | 28 | Add in a sentence about the potential of PHEVs. U.S. Government (Government of U.S. Department of State) | Wrong page? |
| 5-105 | B | 12 | 21 | 12 | 34 | "Transportation emissions are growing faster than emissions in any other sector. However, since the TAR, more mitigation options in the transport sector have become available." This discussion of mitigation options for transportation emissions seems to be focused almost exclusively on cleaner and/or more fuel efficient vehicles. What is barely mentioned here, and is covered in less than two pages in Chapter 5, is the potential for transport demand management that is aimed at reducing vehicle-miles traveled (VMT). Particularly with the rapid growth of broadband Internet access, new opportunities for VMT reduction are increasingly available. U.S. Government (Government of U.S. Department of State) | Same |
| 5-106 | B | 12 | 25 | 12 | 27 | True, but is that enough to provide a significant amount of transportation fuels? U.S. Government (Government of U.S. Department of State) | confusing |
| 5-107 | B | 12 | 29 | 12 | 30 | How much will it depend on government policies? Statement lacks information and, as a result, seems a bit policy prescriptive. Because of market factors high gas prices may have a substantial effect. U.S. Government (Government of U.S. Department of State) | Confusing |

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| 5-108 | B | 12 | 29 | 12 | 0 | Change "Achieving the emissions reduction potential" to "Realizing potential emissions reductions". Rationale: The assessment should not imply that emissions reductions are an "all or nothing choice" with a decision to be made between achieving "the" potential or doing nothing. U.S. Government (Government of U.S. Department of State) | Confusing |
| 5-109 | B | 12 | 30 | 12 | 31 | Do fuel economy standards have to be stringent and cover the whole sector to work or will some standards drive other parts of the sector to self-regulate in order to avoid regulation? U.S. Government (Government of U.S. Department of State) | Confusing |
| 5-260 | A | 13 | 3 | 13 | 3 | Too categorical (There seems little doubt …) (Richard Gilbert, Centre for Sustainable Transportation) | REJ; we are comfortable with wording |
| 5-261 | A | 13 | 5 | 13 | 6 | Move However to the beginning of the sentence (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-262 | A | 13 | 8 | 13 | 40 | This is completely unreferenced, where does this information come from? (John Kessels, Energy Research Centre of the Netherlands) | TIA; reference not especially necessary, but we may add |
| 5-263 | A | 13 | 8 | 13 | 9 | Delete that it has been for a century. (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-264 | A | 13 | 8 | 13 | 14 | This is the closest the AR4 gets to a discussion of the Peak Oil problem, but it is very weak. The recoverable resource numbers need to be shown against projected demand. It is also simply not the case that there is no shortage of alternatives to conventional oil, beginning with liquid fuels from so-called unconventional oil (heavy oil, tar sands). As indicated immediately above, the latter combined recoverable resource is barely 650 billion barrels. (Michael Jefferson, World Renewable Energy Network & Congresses) | REJ; this belongs in supply section, ch 4 |
| 5-265 | A | 13 | 8 | 13 | 0 | In this sentence, "First, it is not clear that oil can continue.." should be changed to "First, it is not clear whether oil can continue…". (Government of Japan) | ACC |
| 5-266 | A | 13 | 10 | 13 | 10 | Who are you referning to when you say many arguing, this is not referenced? (John Kessels, Energy Research Centre of the Netherlands) | TIA; will restate, or be more specific |
| 5-267 | A | 13 | 10 | 13 | 10 | Replace turning downwards to descending (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-268 | A | 13 | 11 | 0 | 0 | After "decades" insert "or is occurring right now" (Danny Harvey, University of Toronto) | REJ; very few analysts have this view |
| 5-269 | A | 13 | 12 | 13 | 12 | The meaning of "There is no shortage …" is unclear. If it is intended to mean that the supply is unlimited at whatever required production level this is not true. | TIA, redraft sentence |

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| | | | | | | (Richard Gilbert, Centre for Sustainable Transportation) | |
| 5-110 | B | 13 | 15 | 13 | 0 | Neither electricity nor hydrogen represent an energy resource. They are both energy carriers. Both are derived from primary energy feed stocks. As such, it is confusing to include these two carriers in the same discussion without recognition that these do not represent primary energy feed stocks. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-270 | A | 13 | 16 | 0 | 0 | It is not true that "most" of the alternatives to conventional oil will increase greenhouse gas emissions significantly without carbon sequestration. For example, the use of natural gas and final energy carriers derived from natural gas, nuclear energy, biomass or other renewables can reduce greenhouse gas emissions when compared with the case of the continuous dependence on conventional oil resources. (Takayuki Takeshita, The University of Tokyo) | TIA; will either be more specific or use the word "many" rather than most |
| 5-271 | A | 13 | 23 | 13 | 23 | Typo error. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-272 | A | 13 | 23 | 0 | 0 | After "disrupted", add "or if a sufficiently strong/effective mix of policy measures is implemented" (Danny Harvey, University of Toronto) | REJ; here we are talking about transport demand, not energy use or GHG emissions |
| 5-273 | A | 13 | 32 | 13 | 32 | It should read: "...e.g light-duty diesel in Europe and alcohol fuels in Brazil and USA." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-274 | A | 13 | 36 | 0 | 0 | I know the city referred to as 'Curitiba'. (Manfred Treber, Germanwatch) | ACC |
| 5-275 | A | 13 | 36 | 13 | 36 | Typo error: Change "Curitaibo" by "Curitiba". (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-276 | A | 13 | 36 | 13 | 37 | The name of the city is spelled wrong. There are many other newer examples that could be cited, including Bogota, Beijing, Kunming (with their rapid bus transit systems). (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University) | ACC, TIA…add examples |
| 5-111 | B | 13 | 38 | 0 | 0 | Source of figure 5.2: It is recommended to use a newer source including available data from 2005: "Panorama des statistiques de l'OCDE 2006: Économie, environnement et société - ISBN 92-64-03563-X - © OCDE 2006", or the world | TIA, if possible |

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| | | | | | | statistics on vehicle density from l'"Industrie Automobile Francaise, Analyse et Statistiques Edition 2004<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | |
| 5-4 | C | 14 | | | | Figure 5.2 comment: The curve for New Zealand cannot be correct. New Zealand data show a much more uniform growth in both GDP per capita and Vehicle Ownership. Data will be attached to the cover email with this speadsheet: alternatively contact the IPCC Focal Point for New Zealand: howard.larsen@mfe.govt.nz<br>(Government of New Zealand) | We will check the data/koba |
| 5-277 | A | 14 | 1 | 14 | 3 | Figure 5.2, Demark is out of the range. It may give wrong message such as vehicle ownership will increase to around 800 due to income growth.<br>(Junichi Fujino, NIES) | REJ, text is clear about variation |
| 5-278 | A | 14 | 1 | 0 | 0 | figure 5.2 Charts in this chapter are similarly un-labeled. Are each of these lines a progression over time?<br>(Joanna Lewis, Pew Center on Global Climate Change) | TIA, clarify meaning of charts |
| 5-279 | A | 14 | 2 | 14 | 0 | Figure 5.2 is unreferenced<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA, add reference |
| 5-112 | B | 14 | 2 | 0 | 0 | Source of figure 5.2: It is recommended to use a newer source including available data from 2005: "Panorama des statistiques de l'OCDE 2006: Économie, environnement et société - ISBN 92-64-03563-X - © OCDE 2006", or the world statistics on vehicle density from l'"Industrie Automobile Francaise, Analyse et Statistiques Edition 2004<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | TIA, if possible |
| 5-280 | A | 14 | 4 | 14 | 4 | Replace try to imagine with produce scenarios of the future where governments continued….<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ |
| 5-281 | A | 14 | 7 | 14 | 7 | Replace illuminate with identify<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ |
| 5-282 | A | 14 | 14 | 14 | 14 | IEO ahould be replaced by WEO, or IEA<br>(Pierpaolo Cazzola, IEA) | ACC |
| 5-283 | A | 14 | 14 | 14 | 14 | IEA/SMP , 2004 not available in the reference paragraph;<br>(Stefano Caserini, Politecnico di Milano) | CONFUSING |
| 5-284 | A | 14 | 23 | 14 | 23 | I do not understand this line of grow essentially in lockstep with energy consumption do you mean grow in parallel with energy consumption? | TIA, restate |

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| | | | | | | (John Kessels, Energy Research Centre of the Netherlands) | |
| 5-285 | A | 15 | 1 | 15 | 13 | Is this section all from the same reference of EIA or is it also from WBCSD, 2002? (John Kessels, Energy Research Centre of the Netherlands) | REJ, referencing is clear that its WBSCD |
| 5-286 | A | 15 | 2 | 15 | 3 | Replace with For example with According to… (John Kessels, Energy Research Centre of the Netherlands) | REJ |
| 5-287 | A | 15 | 5 | 15 | 15 | Figure 5.3 is not readable. (Shunsuke Mori, Tokyo University of Science) | TIA, if possible will improve |
| 5-288 | A | 15 | 6 | 15 | 6 | I think that the correct values of 32% (instead of 31%) and 46% (instead of 43%) should be used here based on the Executive Summary of this Chapter. (Michael Danilin, The Boeing Company) | REJ, different years and sources |
| 5-289 | A | 15 | 6 | 15 | 10 | It is suggested to delete the part from "In China" to " in 2025".Reason: According to the personal average holding number, the growing rates of cars and transportation energy use are not "astounding". And only mention a few countries in this part does not comply to the geographic balance principle. (Government of China Meteorological Administration) | REJ, China's growth IS the key driver, despite Chinese sensitivity |
| 5-290 | A | 15 | 7 | 15 | 7 | If there is a source for this increase in personal travel (… factor of five …) I would be interested to have a reference to it. The term "personal travel" is vague and may need explanation. (Richard Gilbert, Centre for Sustainable Transportation) | ACC, will check and clarify |
| 5-291 | A | 15 | 8 | 15 | 10 | Please, use metric system. Change quatrillion Btu to EJ. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-292 | A | 15 | 10 | 15 | 12 | Taiwan and Hongkong are parts of China.So Taiwan and Hongkong should be deleted. It is also suggested to delete all the similar descriptions in AR4. (Government of China Meteorological Administration) | TIA, delete Hong Kong, not Taiwan |
| 5-293 | A | 15 | 13 | 0 | 0 | It is described that the number of cars in China has been growing at 20% per year and that personal travel in China has increased by a factor 5 over the past 20 years. Is this personal travel in cars or overall personal travel? I do not know the passenger km travelled in China for the different transport modes (road in personal cars, road in buses, rail, aircraft, I fear we find no data on bikes) - it would be interesting if this information could be added in this paragraph. (Manfred Treber, Germanwatch) | TIA, but data likely not available |
| 5-113 | B | 15 | 15 | 15 | 25 | Discussion of these estimates would be improved if the underlying drivers of the growth and any uncertainty were incorporated and included in a way similar to the aviation discussion on the following page. (Government of Australia) | Wrong page? |

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| 5-294 | A | 15 | 16 | 15 | 0 | Figure 5.3 is using quite old data why not use the latest information from the IEA, 2006,,,,, (John Kessels, Energy Research Centre of the Netherlands) | TIA, if we can get it |
| 5-295 | A | 15 | 18 | 30 | 15 | Is this section all referenced from WBCSD, 2002? (John Kessels, Energy Research Centre of the Netherlands) | Yes, and it's so stated in text |
| 5-114 | B | 15 | 22 | 15 | 22 | Coupled with? U.S. Government (Government of U.S. Department of State) | TIA |
| 5-296 | A | 16 | 1 | 16 | 7 | I strongly believe that the authors should give credit to other people developed aviation emissions inventories before Lee et al (2005). At least, three independent inventories were used in the IPCC Aviation Special Report (1999): NASA (Baughcum et al.,1996), ANCAT (Gardner, 1998), and DLR (Schmitt and Brunner, 1997). (Michael Danilin, The Boeing Company) | Noted – but surely one reference is sufficient? And it's more up-to-date than the others. Lee to comment. |
| 5-297 | A | 16 | 2 | 16 | 7 | why base this discussion on an unrefereed report and ignore the previous scenarios of aviation emissions. The main conclusions of the 1999 IPCC Special Report on Aviation haven't changed (aviation emissions are expected to increase by 2050) and that report was peer reviewed. (Steven Baughcum, Boeing Company) | Noted – as above |
| 5-115 | B | 16 | 4 | 16 | 5 | There have also been projections by SAGE and AERO2K. These should be referenced as well, rather than give the impression that the Lee estimates are the only ones available. Also, the first two are endorsed by IPCC as higher tier methodologies for computing greenhouse gases, unlike the Lee methodology. References are available at (http://www.faa.gov/about/office_org/headquarters_offices/aep/models/sage/; http://www.cate.mmu.ac.uk/aero2k.asp) U.S. Government (Government of U.S. Department of State) | Tia, will chack whether these could be included |
| 5-298 | A | 16 | 5 | 16 | 6 | It is very important to understand why the Lee et al (2005) numbers of aviation CO2 emissions quoted in this report are quite different from other inventories. Using the EI(CO2)=3.16 g(CO2)/kg(fuel), one gets 104.7 and 151.9 Mt(fuel) in 1990 and 2000, respectively, according to Lee et al (2005). On the other hand, Table 9-4 (IPCC, 1999) shows the values of 129.3-139.4 Mt(fuel) for the global traffic and the NASA value of 94.8 Mt for the scheduled traffic alone in 1992. I would like to see a clear explanation why such a big difference exists between the Lee et al (2005) and IPCC (1999). On a similar note, the 1999 NASA scenario (Sutkus et al., 2001) shows 128 Mt(fuel) and 164.3 Mt(fuel) for scheduled and all air traffic, respectively. These values are noticeably differ from the Lee et al. (2005) value of 151.9 Mt for | Tia, but the IPCC report is the most comprehensive scenario report and therefore used |

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| | | | | | | the 2000 scenario. Why? Since the IPCC Report has such a big weight in atmospheric community, all published relevant results should be quoted here with a good explanation why they differ.<br>(Michael Danilin, The Boeing Company) | |
| 5-299 | A | 16 | 5 | 16 | 6 | Comparing numbers for Tg CO2 yr-1 with Pg C yr-1 is confusing. Please use either Tg or Pg CO2 or Tg or Pg C.<br>(Paul Brok, National Aerospace Laboratory NLR) | Noted |
| 5-300 | A | 16 | 6 | 16 | 7 | IPCC WG1 4AR gave 6.6 Gt(Carbon) (or 24.2 Gt(CO2)) anthropogenic emissions in 2000. Thus, global aviation contributes ~164.3 Mt(fuel)*3.16/24200 Mt=2.15% and 480Mt(CO2)/24200Mt(CO2)=1.98% according to Sutkus et al (2001) and Lee et al. (2005), respectively.Hence, it is better to write that aviation represent slightly more than 2% of anthropogenic CO2 emissions in 2000.<br>(Michael Danilin, The Boeing Company) | Rejected, we will limit the text to the exact percentage |
| 5-301 | A | 16 | 6 | 16 | 6 | use Gt instead of Pg<br>(Stefano Caserini, Politecnico di Milano) | Noted |
| 5-302 | A | 16 | 6 | 16 | 6 | Figure 5,4 use Mt instead of Tg<br>(Stefano Caserini, Politecnico di Milano) | Noted |
| 5-303 | A | 16 | 9 | 16 | 24 | The CONSAVE report cited in not publicly available.<br>(Steven Baughcum, Boeing Company) | Noted |
| 5-116 | B | 16 | 9 | 16 | 24 | What are the projected regional increases in aviation emissions? Some context is relevant here. Also, the discussion here fails to mention the fact the aviation emissions growth internationally has slowed dramatically since 2000. In fact, in the United States- the largest aviation market in the world- there has been absolute declines in greenhouse gas emissions from aviation. This means that past projections may need significant revisions and certainly future forecasts of aviation's greenhouse gas inventories need to be adjusted. U.S. Government<br>(Government of U.S. Department of State) | Rejected, literature shows that emissions rised again fast within a two year after 9/11 |
| 5-117 | B | 16 | 9 | 16 | 33 | The text should include some caution about the credibility of projections to 2050, particularly by the FAST model, which appears to be significantly different than the IPCC and CONSAVE scenarios. Should also note whether these figures account for technological improvement in fleet replacement and expected operational improvements. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-304 | A | 16 | 10 | 16 | 12 | The authors may use Boeing and Airbus current market outlook (2006) and update their numbers for the traffic growth.<br>(Michael Danilin, The Boeing Company) | Noted |

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| 5-305 | A | 16 | 10 | 16 | 10 | Text does not mentions the ICAO forecast, and we suggest it be included as follows:"ICAO forecasts a growth rate of 4.4 per cent for scheduled passenger traffic and 5.5 percent freight traffic over the period 2002-2015. The 2002 ICAO FESG traffic forecast provides for a growth rate of 4.3 per cent over the period 2000-2020." Historically, the manufacturers forecasts tend to be on the high side of the industry forecasts.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted and will consider using this text, but not sure if ICAO data is publicly available |
| 5-118 | B | 16 | 14 | 16 | 15 | The assertion that total air traffic growth is 5%, but that freight is higher (which are referenced), appears at odds with the previous (unreferenced) assertion that passenger traffic would grow at a 5% rate (page 9, lines 44-45). It is unclear whether these percentages are additive. Also, suggest referencing ICAO projections, rather than those of the manufacturers, which tend to be optimistic about the possibility of future sales. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-306 | A | 16 | 24 | 0 | 0 | Please add a few lines explaining what accounts for the wide range of emission estimates for 2050, seen in Fig. 5.4.<br>(Danny Harvey, University of Toronto) | Acc, explanation of the figure will be made |
| 5-307 | A | 16 | 26 | 16 | 0 | Figure 5.4 should have that it is referenced from Owen and Lee, 2005<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-308 | A | 17 | 1 | 17 | 4 | I siggest to drop discussion about hydrogen fuel here since it is not a practical solution for the near- and mid-terms as this Report is targeting to. Instead, the authors may talk about improvements in air traffic management and fligh operations, which they mentioned in this Chapter Executive Summary.<br>(Michael Danilin, The Boeing Company) | Acc, paragraph will be deleted as mitigation measures are discussed in next section. |
| 5-119 | B | 17 | 1 | 17 | 0 | The statement that the use of hydrogen in aircraft is unlikely to occur before the latter half of the 21st century is an opinion, which is pessimistic. While widespread use of hydrogen aircraft is unlikely to occur before the latter half of the 21st century, the phased introduction could happen well before that. U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-120 | B | 17 | 1 | 17 | 5 | It is not clear that the scientific community has reached a consensus on the effects of contrails and increased cloud cover. U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-121 | B | 17 | 1 | 17 | 4 | A switch to hydrogen is not the only potential approach for reducing aviation CO2 emissions (note that it appears that the projections cited did not appear to include projected technological and operational improvements). Also, the reference to contrails lacks context and some explanation is needed (along with a mention of the | Noted, paragraph will be removed |

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| | | | | | | timescales for contrail impacts versus those for CO2 impacts – with the latter being much greater, which suggests CO2 reductions might be of more value). In any case, the uncertainties regarding the impact of contrails should be noted. U.S. Government<br>(Government of U.S. Department of State) | |
| 5-309 | A | 17 | 6 | 17 | 8 | Unclear sentence: first part "Seagoing….. decades" not logically related to second half "although….statistics".<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Acc |
| 5-310 | A | 17 | 18 | 0 | 21 | The relationship between TS1-4 and SRES is not clear.<br>(Toshihiko Masui, National Institute for Environmental Studies) | Acc |
| 5-311 | A | 17 | 24 | 17 | 25 | The phrase "alternative plant" is quite ambiguous. I have thoroughly read Eyring et al. (2005b) and recommend you to add a footnote describing that alternative plant denotes hydrogen fuel cells, nuclear propulsion systems, wind-based systems or solar panels.<br>(Takayuki Takeshita, The University of Tokyo) | Acc |
| 5-131 | B | 18 | 0 | 18 | 0 | Section 5.3 (General comment): It would be desirable to include more information about cost in this section. Whether various technologies are ultimately adopted is as much a function of economic considerations as technical/engineering ones. U.S. Government<br>(Government of U.S. Department of State) | TIA, add brief discussion of marketability in 5.3 |
| 5-132 | B | 18 | 0 | 18 | 0 | Figure 5.5: Some of the emissions scenarios in the legend appear not to be displayed in the chart. U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-312 | A | 18 | 2 | 0 | 3 | Even if Table 5.3 is checked, the difference between D1TS1 and D2TS1 cannot be understood.<br>(Toshihiko Masui, National Institute for Environmental Studies) | Acc |
| 5-313 | A | 18 | 5 | 55 | 6 | The South Asian region has the world's highest concentration of motorized two- and three-wheelers both in absolute terms and as a fraction of overall road vehicle population. In many cities these vehicles account for 50 to 90 percent of the total vehicle fleet, a situation unheard of in other parts of the world. Many of these vehicles are fuel inefficient and have no emissions controls, and those that do are often poorly maintained. The lower capacity motorcycles which dominate the Asian market have a clear advantage in GHG emissions which tend to be less than half those of small cars since substantial development has taken place focused on improving fuel economy. Also, there has been substantial development of 3-wheeler engines towards gaseous fuels. The switch from two-wheelers (i.e., scooters and | TIA, but data are lacking…not clear what we can do |

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| | | | | | | motor-cycles) to conventional cars and multi-utility vehicles due to income rise triggers a sharp increase in energy use, pollution, road space demand, and GHG emissions. While the local impacts are serious, there are significant implications for global issues such as energy security and climate change as well. The report has almost no discussion on the technological improvement potential of two- wheelers (and also three-wheelers) as well as the regulatory and fiscal measures in achieving both energy savings and hence GHG reduction in these category of vehicles. (Government of India) | |
| 5-314 | A | 18 | 5 | 55 | 6 | The focus of section 5.3 on Mitigation Technologies and Practices has been mainly on emerging/frontier automobile technologies (that too mainly on cars and SUVs) and range of fuel options from developed/industrialized countries (USA, Europe and Japan). This section appears to be more developed country focused and needs to capture developing country perspective as well. Like for instance, the trends in development of two- and three-wheeler technologies, and that of public transport (as the main issue is moving people and not automobiles) in Asian perspective have not been covered. (Government of India) | TIA; not much available on 2,3 wheelers, but we will balance discussion towards public transport |
| 5-315 | A | 18 | 5 | 55 | 6 | It is well known that public transport occupies less road space and causes less pollution per passenger-km than personal vehicles. As such, more assessment are needed on public transport with regard to quality and pricing of public transport for alternative technologies. There is a wide spectrum of public transport technologies. At one end is high capacity, but high cost underground metro systems and at the other are low capacity, low cost bus systems running on a shared right of way. Within these extremes is a range of intermediate possibilities, such as buses on dedicated rights of way, elevated sky bus and monorail systems, electric trolley buses etc. With the growing attention on the importance of public transport in redressing the common woes of the polluting urban transport sectors, there have been a number of policy interventions – technological and non-technological – throughout the world. The report needs to highlight the performance level of alternative public transport technologies in different cities along with their ratio of revenue to operating cost based on some of the best practices. The infrastructure needs to be more fully described and assessed in this chapter. It would also be useful if the report highlights that the most successful public transport systems are those where policies are integrated and not asymmetrically dependent on one or two measures. (Government of India) | Same as above |

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| 5-316 | A | 18 | 5 | 55 | 6 | Experience of countries where taxes/rebates have been successfully demonstrated to reduce automobile dependence need to be presented.<br>(Government of India) | TIA |
| 5-122 | B | 18 | 5 | 40 | 35 | Section 5.3 is highly technical and needs further structuring. This can be done by making use of tables (e.g. a table with the main mitigation options ordered by ) and by explicitly distinguish HDV and LDV, fuel efficiency improvements and a reduction of carbon content in fuels.<br>(Jan-Anne Annema, MNP) | We will |
| 5-123 | B | 18 | 6 | 18 | 15 | In the sentence "However, the report makes clear…." and the sentence "Despite all of this effort and the increasing price of oil, the report…" can you be more precise what report you are referring to?<br>(Jan-Anne Annema, MNP) | ACC |
| 5-124 | B | 18 | 8 | 18 | 8 | Vehicles? U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-317 | A | 18 | 10 | 18 | 10 | "good possibility" is generic but ambiguous<br>(Stefano Caserini, Politecnico di Milano) | REJ |
| 5-125 | B | 18 | 13 | 18 | 13 | Huge is subjective and does not fit grammatically U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-126 | B | 18 | 14 | 18 | 14 | Activity, result of U.S. Government<br>(Government of U.S. Department of State) | CONFUSING |
| 5-318 | A | 18 | 15 | 18 | 15 | Replace specially with especially<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-319 | A | 18 | 16 | 19 | 36 | Section 5.3.1: Add some information on mobile air-conditioning systems based on low GWP refrigerants like e.g. CO2. At least add a fourth measure as suggested below (next line).<br>(,) | ACC |
| 5-320 | A | 18 | 16 | 26 | 5 | This part of the chapter could be summed up in one table of potential gains on motor vehicles and a list of sources, and the rest should be deleted. Suggestion : Replace it with policy relevant material.<br>(ANTOINE BONDUELLE, Université Lille II) | REJ |
| 5-127 | B | 18 | 17 | 0 | 0 | General comment on chapter 5.3.1: It would be needed to understand the difference between the prospective studies assessed here by the authors, the mitigation potential studies of chapter 5.8, and the original IPCC work on the chapter 5.9 long term outlook that is not published until now. All three chapters have the same topic 'future transport energy use and its mitigation potential', but in different form.<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur | TIA; section will undergo major editing |

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| | | | | | | Sécurité) | |
| 5-321 | A | 18 | 19 | 18 | 23 | Measures can also include VMT reduction.<br>(Joanna Lewis, Pew Center on Global Climate Change) | REJ, wrong place for this |
| 5-322 | A | 18 | 19 | 18 | 19 | change 'types of measures' into 'types of technical measures'<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | REJ |
| 5-323 | A | 18 | 19 | 0 | 0 | Here and everywhere else that non-metric units are used (miles, mpg, mph), switch to metric units (non-metric, if shown, should be shown in brackets after the metric units, which should be primary).<br>(Danny Harvey, University of Toronto) | ACC |
| 5-324 | A | 18 | 19 | 18 | 19 | Change GHG to CO2. The measures cited here will not affect non-CO2 GHG emissions.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | REJ; measures added that will affect other gases |
| 5-325 | A | 18 | 20 | 18 | 20 | Change to; Reducing the weight, air and rolling resistance of vehicles.<br>(Stephen Perkins, European Conference of Ministers of Transport) | ACC |
| 5-128 | B | 18 | 20 | 18 | 0 | Here there is reference to reducing the "work" needed to move the vehicle and in the following text the arguments are presented with respect to "forces." The text should pick either work or force (Work=force x applied distance=energy)<br>Example, the aero forces are indeed proportional to the square of the speed, but the rate of energy consumed is force x velocity and hence is proportional to the cube of the speed. The discussion would be more technically accurate if these distinctions were preserved. U.S. Government<br>(Government of U.S. Department of State) | REJ; emphasis on loads and forces is reasonable |
| 5-326 | A | 18 | 24 | 18 | 24 | Add a point 4.: Consolidating freight loads and rationalising routings to reduce vehicle km driven.<br>(Stephen Perkins, European Conference of Ministers of Transport) | REJ, not appropriate here |
| 5-327 | A | 18 | 24 | 18 | 24 | "4. Replacement of high GWP gases as refrigerant in mobile air-conditioning systems as described in the Special Report on Safeguarding the Ozone Layer and the Global Climate System."<br>(,) | TIA, will add some mention of this |
| 5-129 | B | 18 | 24 | 18 | 24 | Catalyst/scrubbing technologies. See Table 5.2 and add relevant text.<br>(Government of U.S. Department of State) | TIA, will add "reducing emissions of non-CO2 gases" |
| 5-130 | B | 18 | 25 | 18 | 0 | A more specific reference to losses in transmissions and other gear components would be appropriate. U.S. Government<br>(Government of U.S. Department of State) | ACC, but on next page |
| 5-328 | A | 19 | 1 | 19 | 35 | Is it possible to include a reference to this technical description? | REJ, this was drafted by the |

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| | | | | | | (John Kessels, Energy Research Centre of the Netherlands) | lead author |
| 5-329 | A | 19 | 2 | 19 | 3 | Delete And and replace with Reducing…<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ |
| 5-133 | B | 19 | 4 | 19 | 0 | Pressure losses around the vehicle are dominated by form drag - not friction. The dominate factors will be the shape of the vehicle to minimize separation zones, not smoothing the vehicle surface, which only addresses the friction (less important) part of the overall air drag term. U.S. Government<br>(Government of U.S. Department of State) | ACC, add note on form drag |
| 5-330 | A | 19 | 8 | 19 | 34 | Change GHG to CO2. The measures cited here will not affect non-CO2 GHG emissions.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | REJ, because adding measures that will affect these gases |
| 5-331 | A | 19 | 15 | 19 | 15 | Replace great with greater…<br>(John Kessels, Energy Research Centre of the Netherlands) | REJ |
| 5-134 | B | 19 | 25 | 19 | 0 | This is equally true for hydrogen, suggest this read "Electricity and Hydrogen can be generated ..." U.S. Government<br>(Government of U.S. Department of State) | ACC, but actually this applies to all fuels |
| 5-135 | B | 19 | 29 | 19 | 0 | Except water. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-332 | A | 19 | 30 | 0 | 0 | Hydrogen distribution does not emit GHG even if it is produced from fossil fuels. According to Ogden, J.M. and Nitsch, J. (1993) "Solar Hydrogen." In: Johansson, T.B., Kelly, H., Reddy, A.K.N., and Williams, R.H. (eds) "Renewable Energy". Island Press, pp.925-1009, in the case of hydrogen pipeline delivery, hydrogen is typically compressed using turbo-compressors driven by gas turbines fueled by gas from the pipeline.<br>(Takayuki Takeshita, The University of Tokyo) | REJ, quibbling |
| 5-333 | A | 19 | 38 | 20 | 45 | p. 19, line 38 – p. 20 line 45: I miss a life cycle approach related to the use of these materials. Which are promising from a life cycle perspective (for which submarkets), which are not?<br>(Bert van Wee, Delft University of Technology) | We will check the details |
| 5-136 | B | 19 | 38 | 20 | 47 | In the discussion of lightweight materials, the authors should always state what country or countries the statistics cited are referring to. For example, line 42-43 states “the average weight has increased by 10-20%” but does not mention the “average weight” for which country’s vehicles. U.S. Government<br>(Government of U.S. Department of State) | We will improve |
| 5-137 | B | 19 | 39 | 19 | 42 | Redraft this sentence for clarity. U.S. Government<br>(Government of U.S. Department of State) | ACC, we will |

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| 5-334 | A | 19 | 40 | 19 | 40 | Replace depending vehicle size with depending on vehicle size<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-335 | A | 19 | 40 | 20 | 5 | Reference to aluminium and lightweighting should be expanded. Lightweighting in cars has been used to allow new safety and comfort additions, so often no net savings, but lightweighting in trucks and trains has led to net reductions in weight with corresponding energy and emissions savings (see 'lca2006.07.258.pdf' attached, "The Potential Contribution of Lightweighting to Reduce Transport Energy Consumption" (Helms & Lambrecht 2006) 'http://www.ifeu.org/verkehrundumwelt/pdf/lca2006.07.258.pdf'). This reference is also relevant to section on rail - page 40, lines 20-22<br>"Currently, most Life Cycle Assessments (LCAs) use rough estimates on potential energy savings by light-weighting, which are not comparable due to different scopes and methodologies. This paper therefore presents a set of scientific data for use phase energy savings for different vehicle types for a harmonised and, thus comparable weight reduction of 100kg." (Insert 'lightweighting_energy_savings.doc')<br>According to the European Aluminium Association (see 'MovingUp_en.pdf' attached and at http://www.aluminium.org/downloads/MovingUp_en.pdf):<br>"Without aluminium, average articulated vehicles would be 800 kg heavier. The weight of the average articulated truck in the future could be 2000kg less, if all existing aluminium applications were used. Aluminium applications also provide great design flexibility for manufacturers, lower costs for operators and improved ergonomics for drivers. Aluminium contributes to the reduction of CO2 emissions from road transport by increasing the load capacity of vehicles and therefore more goods can be carried per trip. By carrying voluminous goods or numerous passengers, it reduces the overall weight and therefore reduces fuel consumption per kilometre. 1kg of aluminium in today's average articulated trucks saves 28kg of CO2 over the lifetime of the vehicle. Every additional kg of aluminium in tomorrow's articulated trucks would save a minimum of 20kg of CO2 1 kg of aluminium in a city bus typically saves 45kg of CO2.<br>Increased payload achieved by light-weighting reduces the number of trips necessary to transport a given tonnage of goods. The fuel saved through reduced travelling translates into energy savings and the reduction of CO2 and particulate emissions. For example the replacement of 2,800 kg of steel by 1300 kg of aluminium increases the payload of a semi-trailer from 25 to 26.5 MT. With a yearly mileage of 100.000 km, the aluminium semi-trailer globally saves 815 GJ of | We can not include all the information requested, but we will try to include some. |

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| | | | | | | energy, and reduces CO2 emissions by 58 MT over a 10-year period. 1kg of aluminium in today's articulated trucks saves 29kg of CO2 during their use phase and 28kg of CO2 during their whole life-cycle. The aluminium presently used in articulated trucks allows saving more than 3Mt of CO2 per year in Western Europe and more than 6 additional Mt of CO2 could be saved through maximised use of aluminium. This last figure is based on an estimated 15% share of weight-limited kilometres for vehicles where aluminium penetration could be further increased." (Robert Chase, International Aluminium Institute) | |
| 5-336 | A | 19 | 40 | 20 | 5 | Reference to aluminium and lightweighting should be expanded. Lightweighting in trucks and trains has led to significant net reductions in weight with corresponding energy and emissions savings (see 'lca2006.07.258.pdf' attached, "The Potential Contribution of Lightweighting to Reduce Transport Energy Consumption" (Helms & Lambrecht 2006) 'http://www.ifeu.org/verkehrundumwelt/pdf/lca2006.07.258.pdf'). This reference is also relevant to section on rail - page 40, lines 20-22 (Kenneth Martchek, Alcoa) | Same as the above |
| 5-337 | A | 19 | 41 | 19 | 41 | in vehicle…..with in the vehicle has been historically been progressively increasing (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-138 | B | 19 | 41 | 19 | 41 | In vehicle U.S. Government (Government of U.S. Department of State) | Not clear |
| 5-338 | A | 19 | 42 | 19 | 42 | Replace of vehicle with of a vehicle (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-339 | A | 19 | 43 | 19 | 43 | Replace these with the last 10 years…. (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-340 | A | 20 | 1 | 20 | 5 | Mention also the use of aluminium castings in rims (Pierpaolo Cazzola, IEA) | Rejected, space limitation |
| 5-341 | A | 20 | 1 | 20 | 20 | These two paragraphs are unreferenced (John Kessels, Energy Research Centre of the Netherlands) | We will add |
| 5-139 | B | 20 | 6 | 20 | 6 | Vehicles U.S. Government (Government of U.S. Department of State) | ACC |
| 5-342 | A | 20 | 15 | 20 | 15 | Should be 0.1-0.3% (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | ACC |
| 5-140 | B | 20 | 15 | 20 | 15 | Should be 0.1-0.3% U.S. Government (Government of U.S. Department of State) | same |
| 5-141 | B | 20 | 15 | 20 | 15 | 01 = 0.1? U.S. Government (Government of U.S. Department of State) | same |

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| 5-343 | A | 20 | 20 | 20 | 25 | "Based on known technology and feedstock availability about 20% of road transport fuel could be derived from very low GHG biofuels by 2030…" Global CO2 emissions from road transport were (about) 4 Pg CO2 in 2004 (Fig. 5.1 Ch 5; also Fig. 1.2 Ch 1) and about 7 Pg CO2 in 2030. This requires relatively high amounts of biofuels. Also "this would provide an additional 16% reduction in road transport CO2… " This is based on rather optimistic view about the production of biofuels. Also some data about the needed areas and other resources to achieve the reduction about 1Pg CO2/yr should be given. (Government of Finland) | E will redraft. |
| 5-142 | B | 20 | 22 | 20 | 22 | 8% U.S. Government (Government of U.S. Department of State) | ACC |
| 5-344 | A | 20 | 24 | 20 | 24 | Replace for the and issue with over recycling, (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-345 | A | 20 | 25 | 20 | 25 | Replace life with the vehicle life. (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-143 | B | 20 | 30 | 20 | 30 | How can 22kg be 60% of vehicle mass? The figures used in this discussion need to be more clearly explained. (Government of Australia) | We will |
| 5-144 | B | 20 | 31 | 20 | 31 | 60% U.S. Government (Government of U.S. Department of State) | ACC |
| 5-346 | A | 20 | 36 | 20 | 36 | Deletet steel is major materials comprising about with As mentioned above, 70% of whole vehicle weight is steel. (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-145 | B | 20 | 38 | 20 | 38 | steels (HSS) U.S. Government (Government of U.S. Department of State) | ACC |
| 5-146 | B | 20 | 42 | 20 | 42 | The authors should explain why car manufacturer Mercedes has been singled out, (i.e. is the A-class at the pinnacle of HSS engineering?). (Government of Australia) | rejected |
| 5-347 | A | 20 | 47 | 20 | 47 | Correct reference from Nipon Steel 2002 to Nippon Steel,2002) (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-348 | A | 21 | 1 | 21 | 25 | Are these two paragraphs based on SAE International, 2004)? Also, is the powerpoint presentation based on a report or is it from a conference proceedings, needs to be corrected (John Kessels, Energy Research Centre of the Netherlands) | TIA, will clarify |
| 5-349 | A | 21 | 2 | 21 | 2 | Delete Although and begin sentence with Improvements… (John Kessels, Energy Research Centre of the Netherlands) | ACC |

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| 5-350 | A | 21 | 8 | 21 | 9 | Use km/h instead of kph<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-351 | A | 21 | 32 | 21 | 33 | Again is this a PPP or from a Proceedings or study reference?<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA, will clarify |
| 5-352 | A | 21 | 38 | 21 | 38 | Delete extra )<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-353 | A | 22 | 0 | 35 | 0 | The transport chapter draft gives precedence to alternative fuels over efficiency in describing the mitigation potential. For the medium term efficiency improvements have more potential to reduce CO2 emissions than alternative fuels. It is only in the very long term that alternative fuels might contribute more. The presentation in Paris correctly put the emphasis on efficiency improvements.<br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | TIA, will balance discussion |
| 5-354 | A | 22 | 6 | 22 | 25 | This section has a reference EEA, 2004 but it is not listed in the references?<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA, am trying to get this onto the web |
| 5-147 | B | 22 | 15 | 22 | 20 | There appears to be some confusion between fuel efficiency and fuel economy, which the authors should rectify.<br>(Government of Australia) | ACC |
| 5-148 | B | 22 | 32 | 22 | 34 | Ford recently announced that they will be scaling back deployment of CVTs. U.S. Government<br>(Government of U.S. Department of State) | Noted, but irrelevant |
| 5-355 | A | 22 | 43 | 24 | 30 | The important role that hybrids could play in emission reduction (see also section 5.8.4.) justify a discussion about what prevents car manufacturers to adopt hybrid technology on a much larger scale. What are the practical limits? What could policies contribute?<br>(Government of European Community / European Commission) | TIA, but discussed elsewhere |
| 5-149 | B | 22 | 44 | 22 | 0 | Not necessarily; hydrogen fueled vehicles (fuel cell or ICE) will most likely be hybridized. U.S. Government<br>(Government of U.S. Department of State) | TIA, discussion made more general |
| 5-150 | B | 23 | 1 | 23 | 0 | Correction: inertia is a concept from conservation of momentum. The correct term is kinetic energy. This should be rephrased to read "Recovering the kinetic energy losses by using the motor to break..." U.S. Government<br>(Government of U.S. Department of State) | REJ; term of art in vehicle analysis is “inertia losses” |
| 5-356 | A | 23 | 3 | 23 | 5 | I suspect the bullets should read: "Using the electric motor to boost power during accelleration..." and "Using the electric motor instead of the engine..."<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao | ACC for first use |

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| | | | | | | Paulo-IEE-USP) | |
| 5-151 | B | 23 | 5 | 23 | 0 | This statement is true only when comparing to the contemporary conventional gasoline power train; it is not true in general. Only conventional gasoline engines experience this low efficiency at low loads. This is primarily due to throttling losses. For unthrottled engines (like a hydrogen fueled ICE or a diesel) the efficiency curves are nearly flat over the load-speed map. U.S. Government (Government of U.S. Department of State) | TIA, will check data |
| 5-152 | B | 23 | 16 | 23 | 0 | This "more than doubling" of fuel economy is an overstatement, and inconsistent with the statement on line 15 that the Prius improves mileage by 50% on US driving cycles. It is established that EPA city mileage values are overestimated by the correction factors that are applied to the raw test data. EPA is designing new tests to remedy the situation. For example, the Prius does not get 10 mpg higher mileage on the city test compared to highway; the drive-cycle data for the city/highway cycles are within 1 mpg of being the same. U.S. Government (Government of U.S. Department of State) | TIA, will check data |
| 5-357 | A | 23 | 20 | 23 | 20 | Include more recent data on the vast growing hybrid sales (e.g. http://www.hybridcars.com/sales-numbers.html ) (Hein De Wilde, Energy Research Centre of the Netherlands) | ACC |
| 5-153 | B | 23 | 20 | 23 | 0 | The HEV figure can be updated. The U.S. HEV registrations were 199,148 in 2005 according to R.L.Polk (http://usa.polk.com/News/LatestNews/2006_0504_hybrids.htm) U.S. Government (Government of U.S. Department of State) | ACC |
| 5-154 | B | 23 | 20 | 23 | 0 | Hybrid sales numbers should be updated to 2005. US new hybrid registrations were nearly 200,000 in 2005. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-358 | A | 23 | 22 | 24 | 4 | Where is this information from it needs to be referenced (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-359 | A | 23 | 24 | 0 | 0 | Indicate in brackets the units for specific energy (kWh/kg?) (Danny Harvey, University of Toronto) | ACC |
| 5-360 | A | 23 | 29 | 23 | 41 | To what extent are the additional costs of the car compensated by fuel savings? Are there prospects of reduction of these additional costs? (Government of European Community / European Commission) | TIA, will illuminate |
| 5-155 | B | 23 | 43 | 23 | 44 | The cited benefits (e.g., greater performance) are in some cases in lieu of greater fuel economy rather than in addition to it. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-361 | A | 24 | 0 | 26 | 0 | The improvements in the specific CO2 emissions of new petrol engines for | TIA, but will check data on |

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| | | | | | | passenger cars achieved in Europe and Japan are not given prominence. Transferring half of the improvements made in the last decade in these markets to the USA (and elsewhere) is eminently feasible at very low cost with significant mitigation potential.<br>The fuel economy of diesel engines is highlighted, characterizing European light duty diesels engines and heavy duty diesel engines in general as “clean”. However there are persistent problems with excess NOx emissions (OEMs tuning engines to pass test cycles but emit much more NOx on the road, after sales chip tuning to override NOx controls, persistent teething problems with SCR engines). Until diesels meet the same emissions limits as petrol engines and behave on the road as in tests, the CO2 bonus is not worth the NOx penalty.<br><br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | petrol engines to insure accuracy |
| 5-362 | A | 24 | 20 | 24 | 30 | Plug -in hybrids may be a key technology for the de-carbonisation of the transport sector, as they could leverage on the progress made in other fields, as - for instance - the power generation technology using CCS. Plug-in hybrids may largely benefit from possible breakthroughs of battery technology, which is being characterised by significant improvements. A box on plug-in hybrids is available in IEA (2006), Energy technology perspectives, OECD/IEA, Paris and Plotkin, S. (2006) "Grid-connected hybrids: another option in the search to replace gasoline", paper presented to the 85th Annual Meeting of the Transportation Research Board, Washington DC, 22-26 January.<br>(Pierpaolo Cazzola, IEA) | TIA, but we have to deal with this more up-front in chapter; long term measure only, because lowC electricity will be limited for next few decades |
| 5-156 | B | 24 | 20 | 24 | 0 | The authors should expand the discussion of PHEV potential here. U.S. Government (Government of U.S. Department of State) | As above |
| 5-157 | B | 24 | 21 | 24 | 21 | Institute, 2001 U.S. Government<br>(Government of U.S. Department of State) | REJ, most technologies available now |
| 5-363 | A | 24 | 29 | 24 | 30 | why to mention only natural gaz as CO2 mitigation mean, and not nuclear which is more efficient or CCS?<br>(Government of France) | ACC |
| 5-158 | B | 24 | 30 | 24 | 30 | It would be useful for the authors to include a table here summarising the abatement potential and likely availability time of the alternative technologies discussed above. (Government of Australia) | Duplicate comment |
| 5-159 | B | 24 | 30 | 24 | 0 | However, in regions that rely on coal fired power, the GHG emissions could be substantially increased. This point should be made to stress that the "...Identification of the source of electricity must be done carefully, ..."However, if the utility sector | TIA, but unlikely that electricity sector will move |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| | | | | | | were to move more quickly to carbon emission free technologies then plug-in hybrids--regardless of the power source--could significantly reduce GHG emissions. The point is a long term transition perspective needs to be considered. U.S. Government<br>(Government of U.S. Department of State) | "quickly" to lowC fuels…will draft somje language pointing out that this is long term |
| 5-364 | A | 24 | 32 | 25 | 29 | p. 24 – 25, section 5.3.1.3: a general warning: his approach has shown to lead to over-optimistic results. Forecasts in the eighties / ninetees overestimated the fuel efficiency improvement in the EU and Japan. This probably is also true for the developments in aircraft as described at page 43.<br>(Bert van Wee, Delft University of Technology) | Noted, but this is an estimate of potential, not a forecast |
| 5-365 | A | 25 | 9 | 0 | 0 | p. 25, line 9: why 41% both in the base line as well as advanced version?<br>(Bert van Wee, Delft University of Technology) | Noted; this is because technology is highly likely |
| 5-366 | A | 25 | 11 | 25 | 11 | Quote HCCI the first time it appears.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-160 | B | 25 | 11 | 25 | 0 | There is substantial debate in the research community over HCCI. Questions of whether or not one can really achieve homogeneous combustion or whether one really wants to are unanswered at this point. However, it is clear that advanced compression ignition mixed with spark ignition, some degree of premixing, and an array of fuel mixtures (diesel and gasoline for example) will be used in advanced engine concepts of the future. (From IEA Efficiency and Emission Reduction in Combustion Task Leaders Meeting 8/13-16/2006.<br>Change HCCI to "advanced engine combustion strategies". U.S. Government<br>(Government of U.S. Department of State) | TIA, will check, probably will accept |
| 5-161 | B | 25 | 14 | 25 | 22 | The "l" looks like a "1" and the authors should clarify the abbreviation. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-367 | A | 25 | 23 | 0 | 0 | I would suggest adding the following sentence and a figure. "The IEA has recently analysed the potential impact of a wide range of technology options for improving vehicle fuel economy and then modelled their impact using the IEAs Energy Technology Perspectives Model. Improvements in the internal combustion engine offered the largest single improvement, accounting for 40% of the improvement in LDV fuel efficiency, followed by the contribution of hybrids (24%), energy-efficient on-board applainces (20%), with energy efficient tyres, lightweighting and improved aerodynamics accounting for the rest. The average fuel intensity of the vehicle stock (l/100 km) in 2050 is around 40% lower, that is to say better, than that in a Baseline | TIA, will examine report |

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| | | | | | | Scenario." You could include Figure 2.33 and/or 2.34 from the ETP publication to illustrate this.<br>(Michael Taylor, International Energy Agency) | |
| 5-162 | B | 25 | 25 | 25 | 25 | It would be of assistance if the authors could answer the following question: What is a realistic estimate of improvement in vehicle performance?<br>(Government of Australia) | REJ, this is impossible |
| 5-368 | A | 25 | 29 | 25 | 29 | There should be here some information on the investment costs and levelised costs of these improvements, taking fuel economy into account. For example, IEA's World Energy Outlook 2005 indicates in its Alternative Policy Scenario that consumers would have to invest some $1.1trillion over the scenario's timeframe (2005-2030) to get more energy-efficient capital goods, mostly more efficient cars and vehicles . Cumulative oil savings over the same period would be about 52 billion barrels (p.275). This would provide financial savings (not discounted, but nor are the investments) of $ 2.028 trillions with the assumption of a price averaging 39 $/barrel over the period. This would suffice to make such a policy a "negative cost" potential. The WEO goes further in assuming that reduced demand for oil would drive the oil price down to $33 per barrel in this scenario. The gross savings over the entire period would thus be the difference between the cost of 935 billion barrels at 39$ each and the cost of 883 billion barrels at 33$ each, or $ 7.326 trillion.The negative cost of the associated emission reductions would thus be over 6 trillion dollars.<br>(Cédric PHILIBERT, International Energy Agency) | TIA, will have to obtain report and discuss, if useful |
| 5-369 | A | 26 | 0 | 35 | 0 | These fuel systems are missing from the discussion. Together with low carbon hydrogen, and probably ahead of it, these fuels appear the most likely route to large scale mitigation in the very long term.<br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | Don't understand comment |
| 5-370 | A | 26 | 0 | 35 | 0 | There is an unfounded presumption that oil is running out. I am skeptical about the current fashion to believe in peak oil, and the Energy chapter takes a more balanced position. More fundamentally, even when non-conventional or alternative fuels out-compete conventional oil in some energy markets, transport is likely to be the last sector to move to substitutes. This is because the energy density of oil derived fuels makes them particularly suitable for carrying on vehicles.<br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | TIA; reasonable viewpoint, though at odds with many analyses…deserves some discussion in text A key point is that transport sector should be able to pay higher prices, because of high competing fuel prices. |
| 5-371 | A | 26 | 0 | 35 | 0 | Biofuels are presented as achieving significant well to wheels savings compared to | TIA, we will redraft |

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| | | | | | | hydrocarbons. A much more optimistic outlook for their effectiveness and cost effectiveness is presented than is the case in Chapter 4: Energy. The more balanced energy chapter figures should be used as input for the transport chapter.<br>Major biochemical engineering breakthroughs will be required if 2nd generation fuels are to deliver their theoretical potential. Even then it is likely to be more cost effective to use the limited biomass resources available for heat and power generation rather than transport fuels. The environmental impacts of massive biofuel production are likely to be higher than the benefits in terms of reduced CO2 especially with current feedstocks.<br>Integrated Brazilian ethanol production is the exception, in terms of cost effectiveness not the rule. Temperate crops perform much more poorly on well to wheels analysis. The demands on water resources (corn and rape seed) and pesticide use (rape seed) have serious implications for sustainability. Some tropical crop production (palm oil, sugar cane) will have serious biodiversity impacts where it involves bringing uncultivated land into development.<br><br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | |
| 5-372 | A | 26 | 1 | 26 | 0 | Figure 5.4 needs to have the year of the MIT study<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-373 | A | 26 | 1 | 0 | 0 | In the last row of Table 5.4, I think that it would be better to give the savings as a % change relative to the Reference rather than relative to the baseline, so that the reader can see how large the changes are compared to the present.<br>(Danny Harvey, University of Toronto) | ACC |
| 5-374 | A | 26 | 1 | 26 | 4 | This table gives fuel cycle energy for diesel as 0.14 MJ/MJ. This value is valid for Europe and Japan, but not for the U.S. The 2005 GM/ANL well-to-wheels study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.) indicates that for the U.S. values of 0.17-0.26 MJ/MJ would be more appropriate. Also, it is unclear why hybrid vehicles in 2020 have lower mass than the 2020 baseline vehicle. In general, hybrids are heavier than their baseline vehicles.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | TIA for diesel, REJ for hybrid…baseline vehicle doesn't have as much weight reduction |
| 5-375 | A | 26 | 1 | 26 | 4 | Please also report in liter per 100km and especially in gram CO2 per km (comment is also relevant further on in the Chapter).<br>(Government of European Community / European Commission) | ACC |

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| 5-163 | B | 26 | 1 | 26 | 5 | Table 5.4. This is an interesting table that could get more attention in the chapter. However would a similar table including costs be possible? (Jan-Anne Annema, MNP) | TIA, will do if possible |
| 5-164 | B | 26 | 1 | 26 | 4 | This table gives fuel cycle energy for diesel as 0.14 MJ/MJ. This value is valid for Europe and Japan, but not for the U.S. The 2005 GM/ANL well-to-wheels study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.) indicates that for the U.S. values of 0.17-0.26 MJ/MJ would be more appropriate. Also, it is unclear why hybrid vehicles in 2020 have lower mass than the 2020 baseline vehicle. In general, hybrids are heavier than their baseline vehicles. U.S. Government (Government of U.S. Department of State) | Duplicate comment |
| 5-376 | A | 26 | 5 | 32 | 5 | check order of words, structure of sentence, spelling etc. (,) | OK |
| 5-377 | A | 26 | 5 | 35 | 13 | biofuels not mentioned: biogas from both fermentative as thermical conversion, methanol (,) | This will be redraft and cross reference to chapter 4 |
| 5-378 | A | 26 | 5 | 0 | 0 | Section 5.3.1.4 would benefit from a thorough treatment of electricity as a propulsion energy source. The treatment of electric storage technologies is valuable, but additional coverage of key issues (e.g., vehicle control strategies, infrastructure, and electric grid impacts) would be helpful. (Jason Mark, Union of Concerned Scientists) | TIA. We are considering a relocation of energy storage. |
| 5-379 | A | 26 | 5 | 35 | 36 | This part of the chapter could be summed up in one table of potential switch in fuels for motor vehicles and a list of sources, and the rest should be deleted. Suggestion : Replace it with policy relevant material. (ANTOINE BONDUELLE, Université Lille II) | This will be taken into account |
| 5-380 | A | 26 | 5 | 0 | 0 | 5.3.1.4 I'm missing an anlaysis that covers also the GHG impact due to the production of biofuels (deforestation, fertilizers) and potential environmental and sustainability risks (one-crop system, use of land that would have been used otherwise for agricultural purposes). (Sandra Cointreau, World Bank) | There will be a cross reference to chapter 8 and 9 |
| 5-381 | A | 26 | 5 | 35 | 36 | Section 5.3.1.4 on Alternative Fuels still needs work particularly for it to become economically competitive in the transport sector. It would be useful to have a comparative cost comparisons of alternative fuels produced from different resources with conventional petroleum products used in the transport sector. This section | Accepted, this will be done. |

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| | | | | | | requires extensive editing.<br>(Government of India) | |
| 5-165 | B | 26 | 5 | 35 | 40 | It is noted that in chapter 5.3.1.4 the paragraph on Methanol has been skipped. It is suggested to reinsert it (however, the paragraph in the FOD seems to have been incomplete).<br>(Government of Austria) | It is not significant, but can be mentioned. |
| 5-166 | B | 26 | 5 | 33 | 1 | the section on biofuels is interesting but could benefit from editing. Please start with a reference to the type of fuels that exists. Refer to Chapter 4 to prevent duplication (fig 5.10 needs to be moved forward, it may be a duplicate with chapter 4 if so, please delete). Continue with a description on the current use, current state of development, current costs and efficiencies for the different fuels and the future expected costs and efficiencies. After that a discussion on LCA efficiency could be held. Please also refer to Chapter 4 and 8 for a discussion on the sustainability. A key reference here is the PhD thesis of Carlo Hamelinck, C. Hamelinck, Outlook for advanced biofuels, Utrecht University, 2004, pp 232 with handy overview tables . What is lacking in this section is also a discussion on what can be expected from biofuels in the future, see e.g. Azar et al., Energy policy 31, 2003<br>(Jan-Anne Annema, MNP) | Accepted, this will be improved |
| 5-167 | B | 26 | 5 | 35 | 36 | Section 5.3.1.4. The alternative fuels discussion ignores aviation, primarily based on the findings of a single study, the UK's Potential for Renewable Energy Sources in Aviation (PRESAV). While there are many challenges toward adopting alternative aviation fuels, there are options which should be explored. For example, Between 1980 and 1984 Brazil developed PROSENE®, an alternative combustible lipofuel (vegetable oil) used as an alternative to aviation kerosene, thereby demonstating feasibility. And while production of a Fisher-Tropsch (FT) kerosene (such as Sasol) does entail greater GHG generation, sequestration offers an opportunity to reduce impact. FT fuels are attractive as they contain no (or little if blended) sulfur, thereby reducing particulates which in turn may impact climate. The potential of alternative aviation fuels to mitigate environmental impact should be better acknowledged. U.S. Government<br>(Government of U.S. Department of State) | This subject is being dealt in aviation section, but it will be made a reference to that. However it will be redraft. |
| 5-382 | A | 26 | 7 | 31 | 2 | Section on biofuels is repetitive and poorly structured.<br>(Stephen Perkins, European Conference of Ministers of Transport) | It will be redraft |
| 5-383 | A | 26 | 9 | 26 | 9 | What does undemanding mean???<br>(John Kessels, Energy Research Centre of the Netherlands) | It will be rephrased |
| 5-384 | A | 26 | 13 | 35 | 37 | Complementing the current list of reasons to stimulate development of biofuels in | Agree it will be mentioned |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| | | | | | | the world, it is worth adding other reason from the environmental side: biofuels serving as alternatives to fossil fuels can provide relevant relief to the reduction of local air pollution problems, particularly in cities of developing countries struggling with severe urban atmospheric pollution concerns.<br>(Government of Chile) | |
| 5-385 | A | 26 | 15 | 26 | 15 | Current text: There are two biofuels currently used in the world for transport purposes - ethanol and bio ester. Remark: Add at least also biogas.<br>(Government of Sweden) | It is not significant but can be mentioned |
| 5-386 | A | 26 | 17 | 26 | 17 | Delete Today and begin sentence Ethanol is currently made….,<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-387 | A | 26 | 20 | 26 | 20 | In case you need a reference for sugar cane, to balance the one used for corn and cereals may I suggest: "Ethanol from sugar cane may replace more than 10% of all gasoline used in tropical regions, where it is grown (Moreira, 2006) "Moreira, J.R., 2006; Global Biomass Energy Potential, Journal of Mitigation and Adaptation Strategies for Global Change, 11, 313-333", but ethanol from ..."<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA, we will check this reference |
| 5-388 | A | 26 | 20 | 26 | 21 | What do you mean by “are less productive”? That it can displace less, or that the energy yield as a ratio of energy inputs is smaller?<br>(Danny Harvey, University of Toronto) | Energy input is smaller |
| 5-389 | A | 27 | 1 | 27 | 38 | Entire page unreferenced or is it all from Ribeiro and Yones, 2001<br>(John Kessels, Energy Research Centre of the Netherlands) | The reference is related to the data of 10% … |
| 5-390 | A | 27 | 2 | 27 | 3 | It should be read: "In Brazil ethanol is used either as a blend with gasoline at a concentration of 20-25% or in its pure form replacing gasoline."<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |
| 5-391 | A | 27 | 2 | 27 | 2 | Replace form replacing gasoline with form to replace gasolline.<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-392 | A | 27 | 2 | 0 | 0 | ethanol is used in Brazil pure, but also and more often as a blend in different concentrations (e.g. E85)<br>(Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | noted |
| 5-168 | B | 27 | 3 | 27 | 3 | Fueled U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-393 | A | 27 | 4 | 27 | 4 | Replace on reliable with in reliable<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| 5-394 | A | 27 | 4 | 5 | 27 | Delete retake growth and took the lead in growth again over gasoline…<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-395 | A | 27 | 6 | 27 | 19 | Page 27, line 6-7 "In….1990" much overlap with line 18-19 "Another-basis"<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | It will be redraft |
| 5-396 | A | 27 | 9 | 27 | 12 | The fall in oil prices occurred after 1985 should also be mentioned as one of the causes of the crisis of the Proalcool program. For a completer explanation, see IEA (2004), Biofuels for transport. An international perspective, OECD/IEA, Paris.<br>(Pierpaolo Cazzola, IEA) | accepted |
| 5-397 | A | 27 | 9 | 5 | 9 | Delete expressive and replace with impressive<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-398 | A | 27 | 11 | 27 | 11 | Delete consumer's with led to a lack of consumer confidence in the Brazilian…<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-399 | A | 27 | 12 | 27 | 12 | move substanitally to vehicles substantially decrease.<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-169 | B | 27 | 14 | 27 | 14 | Run U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-170 | B | 27 | 15 | 27 | 15 | Likely to be as the U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-400 | A | 27 | 18 | 27 | 19 | Please, remove the last sentence of the paragraph. It is a repetition.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |
| 5-171 | B | 27 | 18 | 27 | 18 | Through U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-172 | B | 27 | 20 | 27 | 39 | Include in Box 5.2 fact that FFVs approaching 6 million in US and US domestic manufacturers in particular are planning to further expand their sales of FFVs. U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-401 | A | 27 | 21 | 0 | 0 | Box 5.2. The Brazilian experience with FFVs differs substantially from that in the US, particulary in that US consumers do not typically fill their tank with ethanol. Perhaps the box should be relabeled to be Brazil specific.<br>(Jason Mark, Union of Concerned Scientists) | It will be redraft |
| 5-402 | A | 27 | 23 | 27 | 23 | Delete Nowadays and in especially Brazil to begin sentence with In Brazil particularly,<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-173 | B | 27 | 23 | 27 | 23 | Strike “nowadays” U.S. Government<br>(Government of U.S. Department of State) | OK |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| 5-403 | A | 27 | 27 | 27 | 27 | It should read: "...or more liquid fuels, stored in the same fuel tank". (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |
| 5-174 | B | 27 | 30 | 27 | 0 | The process is more complex than this; suggest changing "... then adjusts the injection system ..." to "... then the engine control system makes the suitable adjustments allowing the running of the engine ..." U.S. Government (Government of U.S. Department of State) | OK |
| 5-404 | A | 27 | 41 | 0 | 0 | It is very important to provide some comments on the Input/Output ratios shown in Table 5.5. First, it should be explained what this ratio is – the ratio of all external energy inputs in the production process other than the biomass itself, to the energy of the fuel produced from the biomass. Second, it should be explained that when this ratio is greater than one, the production of biomass is a net sink – more energy is used (not even counting solar energy) in producing it than is provided by the fuel itself. An input/output ratio of 1.6 means an EREI (Energy Return on Energy Invested) of 1/1.6. Even an input/output ratio of 0.5 gives an EREI of only 2.0, compared to a value of 5.0 thought to be necessary to sustain an energy-intensive civilization. If this is true then, in the long run, biomass transportation with an input/output ratio greater than 0.2 is not viable. These are obviously very critical issues that need to be prominently flagged here. I have not been able to pursue this matter further myself in time for these comments, but I would try to get some more information and references from David Fridley at LBNL (DGFridley@lbl.gov). (Danny Harvey, University of Toronto) | accepted |
| 5-418 | A | 28 | 0 | 0 | 0 | Table 5-5: to present most recent data, check CONCAWE update of summer 2006 (Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | We will check other references |
| 5-405 | A | 28 | 1 | 28 | 32 | Data from the 2001 GM/ANL study should be replaced with data from the 2005 GM/ANL study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.). This study indicates that use of ethanol will result in an 18% reduction in well-to-wheels GHG emissions, compared with a gasoline baseline vehicle. Also, it is unclear why the authors did not include results from EUCAR/CONCAWE/JRC, 2004 in this table, since that well-to-wheels study also evaluated ethanol as a vehicles fuel. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | TIA, we are going to check this reference. |
| 5-175 | B | 28 | 1 | 28 | 30 | Table 5.5 should include sugar to ethanol for completeness. (Government of Australia) | It will be considered |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| 5-176 | B | 28 | 1 | 28 | 33 | table 5.5., there is not even a reference to this table in the text and nothing is done with this information.<br>(Jan-Anne Annema, MNP) | This will be redraft |
| 5-177 | B | 28 | 1 | 28 | 32 | Data from the 2001 GM/ANL study should be replaced with data from the 2005 GM/ANL study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.). This study indicates that use of ethanol will result in an 18% reduction in well-to-wheels GHG emissions, compared with a gasoline baseline vehicle. Also, it is unclear why the authors did not include results from EUCAR/CONCAWE/JRC, 2004 in this table, since that well-to-wheels study also evaluated ethanol as a vehicles fuel. U.S. Government<br>(Government of U.S. Department of State) | The same comment |
| 5-406 | A | 28 | 11 | 28 | 15 | There are many other estimates of the net effect on GHG emissions of ethanol from corn. Look for work by Dan Kammon, Sperling (UC Davis?) Charles Hall.<br>(Danny Harvey, University of Toronto) | It will be checked |
| 5-407 | A | 28 | 33 | 28 | 33 | I suggest that Table 5.5 should include a row for alcohol from sugar cane. All necessary figures are available on Macedo, 2005.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | It will be considered |
| 5-408 | A | 28 | 33 | 28 | 33 | Delete close to those of and replace with similar<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-409 | A | 28 | 34 | 28 | 35 | "and the two can …" may be changed to "allowing blending of bio esters in it or the use of 100% bio esters in diesel engines".<br>(Pierpaolo Cazzola, IEA) | OK |
| 5-410 | A | 28 | 34 | 28 | 34 | insert are between they are all called biodiesel<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-411 | A | 28 | 34 | 28 | 35 | Blending of ethanol to gasoline is still discussed controversial in Germany and Europe, as to technical restrictions.<br>(Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | Rejected, it has been used in several different countries. However if a literature on that is given, we will consider that. |
| 5-412 | A | 28 | 35 | 0 | 0 | "And therefore they all called biodiesel." Please insert ".. are ..."<br>(Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | OK |
| 5-178 | B | 28 | 35 | 28 | 35 | They are all called U.S. Government | OK |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-413 | A | 28 | 39 | 28 | 39 | "advanced biofuels" suggestion to add: "also named second generation biofuels" (Hein De Wilde, Energy Research Centre of the Netherlands) | OK |
| 5-179 | B | 28 | 39 | 28 | 39 | Besides there U.S. Government (Government of U.S. Department of State) | OK |
| 5-414 | A | 28 | 40 | 28 | 46 | Reference who stated ethanol has been produced in Canada and Sweden… (John Kessels, Energy Research Centre of the Netherlands) | It will be checked |
| 5-180 | B | 28 | 42 | 28 | 0 | The phrase “dimethyl ether” should be substituted for the word “ester” in this sentence to make it technically correct. Also, throughout page 28, there are terminology issues. As an example, the term “Biodiesel” is standardly used to refer to the pure ester, whereas the text on page 28 defines it as the blended combination of petrol diesel and the ester. U.S. Government (Government of U.S. Department of State) | Agree it will be fixed |
| 5-415 | A | 28 | 43 | 28 | 43 | "More recently ethanol has being produced….". Replace "being" with "been" (Government of India) | OK |
| 5-416 | A | 28 | 47 | 28 | 48 | The commercialisation of the technology within less than one year is very doubtful (perhaps 2016?). (Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | Accepted. This will be redraft |
| 5-417 | A | 28 | 48 | 29 | 2 | There is a conflict between this sentence and earlier statement that ethanol from sugar cane in Brazil is less costly than gasoline. If this is true, the cost of ethanol is negative per tonne of CO2, instead of US$ 25 - 50. Thus, I suggest to say: "on a well to wheel basis from negative to US$50 per tonne of CO2 for biofuels from sugar cane, depending of the region." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accepted. |
| 5-419 | A | 29 | 5 | 29 | 9 | Very optimistic view. Other issues, like uncertainties related to the use of fertilisers, impacts on biodiversity and land availability deserve to be mentioned here, especially for conventional (first generation) biofuels. The environmental impacts biofuels produced from current feedstoocks in intensive cropping systems may be very significant. Information on the topic are available in OECD (2005), Agriculture, trade and the environment – The arable crop sector, OECD, Paris. (Pierpaolo Cazzola, IEA) | Cross reference with chapter 8 |
| 5-420 | A | 29 | 5 | 29 | 5 | It should read: "Therefore, the physical potential for advanced biofuel may be far greater than..." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |

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| 5-421 | A | 29 | 5 | 29 | 10 | Who states there is a new earning potential from biomass as a primary energy resource, reference needed<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-181 | B | 29 | 5 | 29 | 5 | advanced U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-422 | A | 29 | 10 | 29 | 20 | IEA, 2004c is not listed in the references<br>(John Kessels, Energy Research Centre of the Netherlands) | We will fix it |
| 5-423 | A | 29 | 11 | 0 | 0 | The statement about ethanol, in general, is not true. For ethanol from corn, for example, there is probably no (or at best, little) net reduction in CO2 emissions.<br>(Danny Harvey, University of Toronto) | Accept. This will be redraft |
| 5-182 | B | 29 | 11 | 30 | 47 | Section needs to explain more fully what life-cycle emissions of biofuels are covered by a 'well-to-wheels' analysis. In particular, it should be stated whether any/all of the following are/are not covered: emissions associated with fertiliser production and use; transport emissions associated with moving biomass from field to factory; indirect emissions associated with electricity consumed in processing of biomass to make biofuel; non-CO2 emissions associated with combustion of biofuels. (Term 'well-to-wheels' is not contained in WGIII glossary).<br>(Government of Australia) | TIA, this will be done . There is a specific section on that, where this issue will be address.The term “well-to-wheel” will be add at the glossary. |
| 5-424 | A | 29 | 17 | 0 | 0 | If Figure 5.6 is labeled as reductions, the scale on the y-axis should be positive.<br>(Danny Harvey, University of Toronto) | Rejected. The figure came from literature, it was not built by the authors |
| 5-425 | A | 29 | 18 | 29 | 19 | fig 5.6 mentions only cellulosic ethanol, not biodiesel from cellulosic, which will have improved performance<br>(Government of France) | TIA. This can be mentioned. |
| 5-426 | A | 29 | 19 | 0 | 0 | Figure 5.6. The estiamte for US corn-based ethanol seem to ignore the potential (and current trend towards) the use of coal for process energy in ethanol distilleries, which could eliminate the GHG benefits of corn ethanol (see Farrell et al. in Science, 27 Jan 2006, Vol 311, p. 506)<br>(Jason Mark, Union of Concerned Scientists) | TIA. This can be mentioned |
| 5-427 | A | 29 | 21 | 29 | 22 | It should read: "...and feedstock availability, about 20% or even more of the road transport fuel could be derived from very low GHG biofuels by 2030 (Fulton, 2004; Moreira, 2006). Fulton, Lee et al, IEA Publication; "Moreira, J.R., 2006; Global Biomass Energy Potential, Journal of Mitigation and Adaptation Strategies for Global Change, 11, 313-333"<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |

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| 5-428 | A | 29 | 21 | 0 | 0 | here: 20% share of biofuel, in chapter 4, page 87, line 16 only 4% share was mentioned. Please check for consistency<br>(Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | This will be checked with chapter 4 and we will fix it. |
| 5-429 | A | 29 | 23 | 29 | 23 | Substantial use of (advanced) biofuel is one of the key factors for substantial GHG reduction. Biomass availability, especially in relationship to other claims for land, is not even briefly discussed anywhere in chapter 5. At least refer to literature (and/or to other chapters in the SOD).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Cross reference with chapter 8 |
| 5-430 | A | 29 | 25 | 29 | 25 | Replace essentially in oilseed crops with essentially on oilseed crops.<br>(John Kessels, Energy Research Centre of the Netherlands) | ok |
| 5-183 | B | 29 | 35 | 29 | 35 | Authors should discuss land use feasibility of growing sufficient biodiesel to meet demand. Excluding cellulosic fuel, grain fuel demand will abut grain food demand as both demands continue to grow, and it has been estimated that there is not enough arable crop land to produce sufficient amounts of both. U.S. Government<br>(Government of U.S. Department of State) | Cross reference with chapter 8 |
| 5-431 | A | 30 | 4 | 30 | 4 | Delete drop and replace with reduce<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-184 | B | 30 | 4 | 30 | 5 | Chapter 4 has a nice graph on the prices of biofuels in comparison with oil prices. This is more illustrative than Figure 5.9, please move figure from ch 4 to ch5 and discuss in text<br>(Jan-Anne Annema, MNP) | TIA, the graph will be checked. |
| 5-432 | A | 30 | 5 | 30 | 5 | Delete But and replace with It does not….<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-185 | B | 30 | 5 | 0 | 0 | This sentence says that biofuels from grain cannot compete. At least in the US, ethanol produced from corn is economically competitive with gasoline at current or expected world oil prices. In the US, the Department of Energy's Annual Energy Outlook for 2006 predicts rapid growth of ethanol use in the US, reaching 9.6 billion gallons in 2012 due to relative low cost compared to gasoline assuming a reference case price of oil at $47 per barrel. While factors such as air quality requirements and state mandates require the use of some ethanol, these levels will be reached because ethanol from corn is expected to be a competetive source of transportation fuel even without special tax incentives such as the US$0.51 per gallon tax incentive for ethanol currently in place. Note also that page 30, line 25 suggests ethanol competitive at oil prices above $25 per barrel, a low price level not generally anticipated. U.S. Government<br>(Government of U.S. Department of State) | TIA, data will be checked |

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| 5-186 | B | 30 | 5 | 30 | 5 | produced U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-433 | A | 30 | 7 | 30 | 9 | Only the optimistic outlook is highlighted here. There should be more coordination with the considerations experessed in chapter 4, notably for what concerns the uncertainties attached to the potential cost reduction of ethanol production from lignocellulosic materials, not to mention the technological challenges that have not been solved, yet. Some information are available in IEA (2006), Energy technology perspectives, OECD/IEA, Paris (p.277-279).<br>(Pierpaolo Cazzola, IEA) | TIA, this will be checked with chapter 4. |
| 5-434 | A | 30 | 7 | 30 | 7 | oil prices have already raised, in the last year. It is not clear if the statement is still valid or seen the increase of the last year now biofuel are competitive<br>(Stefano Caserini, Politecnico di Milano) | TIA, we will clarify. |
| 5-187 | B | 30 | 7 | 30 | 7 | to rise U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-435 | A | 30 | 9 | 30 | 9 | Figure 5.7 is refered to as IEA, 2004 which is not in the references<br>(John Kessels, Energy Research Centre of the Netherlands) | We will fix it |
| 5-436 | A | 30 | 11 | 30 | 11 | Delete However and replace with The cost, delete low and replace with lower and delete sunny, warm and replace with tropical<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-188 | B | 30 | 11 | 30 | 11 | lower U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-437 | A | 30 | 12 | 30 | 12 | Add to list of factors the most important point: bagasse (cane waste) is used to heat the distilleries;<br>(Stephen Perkins, European Conference of Ministers of Transport) | Accept. This will be included |
| 5-438 | A | 30 | 14 | 30 | 15 | This sentence conflicts with earlier statement that ethanol in Brazil is less costly than gasoline. Thus, it should be replace by: "Thus, the cost of producing ethanol from sugar cane is now lower than the Brazilian cost of gasoline in regions near sugar cane plantations.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |
| 5-439 | A | 30 | 14 | 30 | 15 | Isn't the price ot ethanol even cheaper than gasoline? Why would people buy it?<br>(Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | I did not get the point |
| 5-440 | A | 30 | 20 | 31 | 5 | Figure 5.8 is bases on oil prices of 25$/bbl. No published updates are available (even if updated figures were presented at the Audition publique of the Office parlementaire d'évaluation des choix scientifiques et technologiques de l'Assembée Nationbale de la Republique Française « Pollution urbaine - éffet de serre : quelle | TIA, this will be done. |

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| | | | | | | est la part de l'automobile? Quelles solutions? » of October 18th, 2005). The oil prices behind this figure should be mentioned in the title.<br>(Pierpaolo Cazzola, IEA) | |
| 5-441 | A | 30 | 20 | 30 | 21 | Figure 5.8 is missed.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | We will fix it |
| 5-442 | A | 30 | 20 | 30 | 20 | Figure 5.8 is refered to IEA, 2005c which is not in the references please include<br>(John Kessels, Energy Research Centre of the Netherlands) | We will fix it |
| 5-443 | A | 30 | 23 | 30 | 23 | Figure 5.9 shows that BRAZILIAN ethanol …..<br>(Stephen Perkins, European Conference of Ministers of Transport) | OK |
| 5-444 | A | 30 | 23 | 30 | 23 | Figure 5.9 does not have a reference,<br>(John Kessels, Energy Research Centre of the Netherlands) | We will fix it |
| 5-445 | A | 30 | 24 | 30 | 24 | Replace ethanol is now close to competitive with ethanonl is now close to being competitive and also include reference<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-446 | A | 30 | 24 | 30 | 25 | It seems that most of the evaluation in this paragraph are based on literature of 2005 or 2004, that does not consider that oil prices have raised substantially in the last year, and it is not likely that they will decrease in the future. Now oil prices are much higher than 25$ per barrel. It is important to add how the today a price of 70 $ per barrel could change all the analyses in this paragraph. It seems that there could be important differences.<br>(Stefano Caserini, Politecnico di Milano) | TIA ,we are going to add this reflection |
| 5-447 | A | 30 | 25 | 30 | 25 | Add: North American ethanol from corn is far from competitive.<br>(Stephen Perkins, European Conference of Ministers of Transport) | OK |
| 5-189 | B | 30 | 25 | 30 | 25 | The use of a figure of $25/barrel is obviously lower than the current oil price. The authors, where possible, should incorporate some assessment of how the higher oil price may affect mitigation potentials.<br>(Government of Australia) | TIA, we are going to add this reflection |
| 5-448 | A | 30 | 27 | 30 | 31 | This statemement should be associated to a clarification of the hypotheses laying behind it. This evaluation seems extremely optimistic. I believe that it is likely to be associated to very radical assumptions on intensive cropping, as well as animal raising.<br>(Pierpaolo Cazzola, IEA) | Accept. |
| 5-449 | A | 30 | 27 | 30 | 31 | According to IEA (2004) "Biofuels for Transport", the precondition under which biofuels can displace significant amounts of petroleum products over the long term is the development of cellulose-to-ethanol production technologies (please see page | Accept. |

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| | | | | | | 137 in lines 5-9 in IEA (2004)). Therefore, I think it better to insert the sentence "If a strong push were made towards development of cellulose-to-ethanol production and other pathways such as lignocellulose-to-disel, the amount of biofuels that could be produced around the world will eventually be much greater." before the sentence "Such an approach ... (Fulton, 2004)".<br>(Takayuki Takeshita, The University of Tokyo) | |
| 5-190 | B | 30 | 27 | 30 | 31 | You cite a huge benefit (displacement of 50-100% of all petroleum) by 2050 biofuels but say nothing of the GHG benefit (though one could assume it would be similar). This section must be expanded. The authors should present Fulton's analysis in more detail if possible. U.S. Government<br>(Government of U.S. Department of State) | We will go deeper in the analysis and also check for other references. |
| 5-450 | A | 30 | 30 | 30 | 31 | Substantial use of (advanced) biofuel is one of the key factors for substantial GHG reduction. Biomass availability, especially in relationship to other claims for land, is not even briefly discussed anywhere in chapter 5. At least refer to literature (and/or to other chapters in the SOD).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Cross reference with chapter 8 |
| 5-191 | B | 30 | 30 | 30 | 31 | The estimate that biofuels could replace 50-100% of petroleum fuels seems out of line with other estimates. Impacts on food production and prices and on LULUCF GHG emissions should be discussed. U.S. Government<br>(Government of U.S. Department of State) | This will be redraft. However, regarding impact on food production we will cross reference with chapter 8 |
| 5-451 | A | 30 | 31 | 30 | 31 | Add: This would require removing the import tariffs that protect US and EU biofuel producers from competition from LDCs.<br>(Stephen Perkins, European Conference of Ministers of Transport) | It will be rephrase "current import tariff s to biofuels maybe a barrier. |
| 5-452 | A | 30 | 31 | 30 | 31 | It should read (Fulton, 2004; Moreira, 2006). Fulton Lee et al., IEA publication; "Moreira, J.R., 2006; Global Biomass Energy Potential, Journal of Mitigation and Adaptation Strategies for Global Change, 11, 313-333"<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA |
| 5-192 | B | 30 | 31 | 30 | 31 | If developing countries have the greatest potential for developing these fuels, it may contradict the earlier statement that biofuels are a good way to lessen a country's dependence on foreign oil. For example, what happens when nations start depending on Somalia for bio-oil? U.S. Government<br>(Government of U.S. Department of State) | It will be rephrase. The statement will be toward energy diversification |
| 5-453 | A | 30 | 35 | 30 | 35 | Typo error: "cellulosic crops" | OK |

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| | | | | | | (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | |
| 5-193 | B | 30 | 35 | 30 | 35 | Cellulosic U.S. Government<br>(Government of U.S. Department of State) | OK |
| 5-454 | A | 30 | 37 | 30 | 37 | Typo error: "Jatropha"<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |
| 5-455 | A | 30 | 39 | 30 | 40 | Is this sentence based on the reference from Yamba and Mastika, 2004 or is it a new reference?<br>(John Kessels, Energy Research Centre of the Netherlands) | This will be checked |
| 5-456 | A | 30 | 40 | 30 | 40 | add "respectively" between "CO2 and "per annum"<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | OK |
| 5-457 | A | 30 | 42 | 30 | 42 | Cut the word "enormous".<br>(Stephen Perkins, European Conference of Ministers of Transport) | OK |
| 5-458 | A | 30 | 42 | 30 | 55 | The conflict with other possible uses of biomass should also be mentioned here.<br>(Pierpaolo Cazzola, IEA) | Cross reference with chapter 8 |
| 5-459 | A | 30 | 45 | 0 | 0 | Strong increase in production of biofuels might give other, negative, environment impacts. The potential for increased production of biofuels needs to be assessed further and carefull studies would be necessary.<br>(Government of Sweden) | TIA |
| 5-194 | B | 30 | 45 | 30 | 45 | Wider U.S. Government<br>(Government of U.S. Department of State) | ok |
| 5-460 | A | 30 | 47 | 30 | 47 | To conclude, biofuels MIGHT play ….<br>(Stephen Perkins, European Conference of Ministers of Transport) | ok |
| 5-461 | A | 30 | 47 | 30 | 47 | Replace emissions of transport sector with emissions in the transport sector.<br>(John Kessels, Energy Research Centre of the Netherlands) | ok |
| 5-462 | A | 30 | 48 | 30 | 48 | In the years to come, SOME biofuels can …….<br>(Stephen Perkins, European Conference of Ministers of Transport) | ok |
| 5-468 | A | 31 | 0 | 0 | 0 | Figure 5,7: is important to clarify on what oil price the comparison is based. Prices of gasoline in USA are $0.46-$0.77/liter, and are larger in Europe (i.e. 1,3 $/liter in Italy) see http://hypertextbook.com/facts/2006/ScottSchechter.shtml<br>(Stefano Caserini, Politecnico di Milano) | TIA |
| 5-463 | A | 31 | 1 | 1 | 32 | Three of the figures need to include their references both in the text and in the References<br>(John Kessels, Energy Research Centre of the Netherlands) | This will be fixed |

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| 5-464 | A | 31 | 2 | 31 | 2 | Replace A good example is the use of ethanol in Brazil with: However, exports from the most cost effective producer, Brazil, are prevented by import tariffs in the main developed country markets. There are are also major environmental concerns with increased use of biofuels. If biofuel crops in the tropics replace forest cover biodiversity loss will be severe. In temparate zones, intensive rape seed production would add massively to the demands on water resources and increase pesticide burdens (to achieve the level of bio diesel supply envisaged moncropping without crop rotation would be required and rape is particularly prone to an number of common insect pests). Even when considering potentially more attractive second generation biofuels, biomass can generally be used more cost effectively with greater CO2 mitigation in heat and power production than in producing transport fuels as the latter require additional processing and distribution. Finally there is simply not enough land available to take away from food production and ecosystem services …/… to be able to make much contribution to transport sector fuel demand as well as contributing to heat and power production.<br>(Stephen Perkins, European Conference of Ministers of Transport) | This will be redraft, however issues related to land and environment impact from biomass use will be cross reference with chapter 8 |
| 5-195 | B | 31 | 2 | 31 | 2 | Why is Brazil a good example? The authors should discuss in greater detail. U.S. Government<br>(Government of U.S. Department of State) | Yes Brazil is a good example. There is not enough room to discuss in detail. |
| 5-465 | A | 31 | 3 | 0 | 0 | suggest to add a small paragraph to warn policy makers on the competition between agriculture and energy culture, the problem of food production being more and more acute in developing countries.<br>(Faouzi Senhaji, I.A.V. Hassan II (GERERE)) | Accept. , this is na issue for CCT - Biomass |
| 5-466 | A | 31 | 3 | 31 | 4 | This figure indicates a cost of gasoline of <$1.25/US gallon. This is much lower than today's price or any reasonable price forecast for the future. The figure should be updated to show a more realistic gasoline price.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | TIA |
| 5-467 | A | 31 | 3 | 31 | 5 | fig 5.7 created in 2004, quote gasoline costs 0.21$/l (2000) and only 0.22 $/l post 2010 ! No more valid forecast does not take ilto account the strong oil price takeoff of these last two years.<br>(Government of France) | TIA |
| 5-196 | B | 31 | 3 | 31 | 4 | This figure indicates a cost of gasoline of <$1.25/US gallon. This is much lower than today's price or any reasonable price forecast for the future. The figure should be updated to show a more realistic gasoline price. U.S. Government<br>(Government of U.S. Department of State) | Same comment |
| 5-197 | B | 31 | 5 | 31 | 0 | Figure 5.7: Is there a more up-to-date version of this figure? The gasoline prices if | TIA |

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| | | | | | | not the ethanol prices in the figure have already become outdated. U.S. Government (Government of U.S. Department of State) | |
| 5-198 | B | 32 | 5 | 32 | 0 | Figure 5.10 comment. This figure inappropriately uses the term “Biodiesel” to refer to diesel fuel produced from any bio source. “Biodiesel” is universally and precisely defined as being the fatty acid esters from vegetable oils or animal fats. Perhaps the word “biofuel” could be used instead. U.S. Government (Government of U.S. Department of State) | TIA |
| 5-469 | A | 32 | 36 | 32 | 36 | I suggest to use: "...production cost is high and fuel..." (e.g. ethanol cost in USA is 20 to 30% higher than gasoline at present oil price"). (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accept. |
| 5-488 | A | 33 | 0 | 33 | 0 | Footnote 13 would be more clearer to include the website and the name of the organisation, International Association for Natural Gas Vehicles (John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-470 | A | 33 | 6 | 33 | 0 | Section discusses use of CNG as transport fuel. There are operational plants which make CNG from landfill gas for use as a transport fuel. I can provide reference(s) if desired (if not enough space, that is OK). (Jean Bogner, Landfills +, Inc) | This is correct but is not significant. Due to space constraint we will not be able to address that. |
| 5-471 | A | 33 | 7 | 33 | 27 | It's unclear whether CNG has emissions advantages over gasoline or not… emissions reductions are listed, but it also says that "CNG loses its emission advantages". (Joanna Lewis, Pew Center on Global Climate Change) | It will be rephrased. |
| 5-199 | B | 33 | 7 | 33 | 0 | Needs an explanation as to why LNG stored onboard the vehicle is not an option. Depending upon its composition, CNG may require a considerable amount of processing to remove contaminants and to establish a consistency of properties. U.S. Government (Government of U.S. Department of State) | TIA |
| 5-472 | A | 33 | 12 | 33 | 14 | Delete And and replace with Increasing, also insert reference (John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-473 | A | 33 | 14 | 33 | 15 | End sentence at gasoline engines and delete as mentioned before (John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-200 | B | 33 | 14 | 33 | 0 | The text should use the term “spark-ignition” engine instead of “gasoline” engine. U.S. Government (Government of U.S. Department of State) | Accept |
| 5-201 | B | 33 | 15 | 33 | 0 | Instead of referring to “Otto process” in this line it would be more correct to say that | OK |

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| | | | | | | the 120 octane number allows higher compression ratio for improved efficiency. U.S. Government (Government of U.S. Department of State) | |
| 5-474 | A | 33 | 16 | 33 | 17 | Please, review the sentence. It is unclear what is the meaning of "without cold start". (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | We will clarify that |
| 5-475 | A | 33 | 16 | 33 | 27 | natural gas has a lower co2 content than oil and is therefore advantageous to gasoline. Similar emissions can be achieved in gasoline engines only by implementing high-tech. exhaust fume cleaning, which is not required using CNG. (Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | OK |
| 5-202 | B | 33 | 16 | 33 | 0 | Otto “cycle” would be technically more correct than Otto “process”. U.S. Government (Government of U.S. Department of State) | This will be rephrase |
| 5-203 | B | 33 | 18 | 33 | 0 | Suggest "... it produces less CO2." Drop the "...during the burning process in a motor engine." The last part of the sentence is not technically complete and is not necessary to make the point. U.S. Government (Government of U.S. Department of State) | Accept |
| 5-476 | A | 33 | 19 | 33 | 19 | If the comparison is made between new CNG and gasoline vehicle of the same size, reduction (CO by 70%, NOx by 87%) are too high. If the gasoline is catalised, the CO and NOx reduction are not larger than 30 % in Europe, ad I believe also in USA. I can provided clear figures on this. (Stefano Caserini, Politecnico di Milano) | We need to check that. We need those references. |
| 5-204 | B | 33 | 19 | 33 | 0 | Line 19 statement about reduced CO and NOx with CNG needs a citation. This statement is inaccurate for modern catalyst-equipped vehicles. U.S. Government (Government of U.S. Department of State) | TIA, this will be checked |
| 5-477 | A | 33 | 20 | 33 | 20 | I suggest to add some disadvantage of CNG, like "Regarding CH4, CNG can be a significant source of emission due the incomplete combustion or due leakages in the preparation, distribution and compression process." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA |
| 5-478 | A | 33 | 21 | 33 | 21 | Replace In Europe, a dedicated…with In Europe, dedicated…. (John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-479 | A | 33 | 21 | 33 | 23 | The meaning of this sentence is unclear, please check grammar and wording. (Nikolaus Supersberger, Wuppertal Institute for Climate Environment Energy) | OK |
| 5-480 | A | 33 | 21 | 0 | 0 | delete ";" | OK |

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| | | | | | | (Stefano Caserini, Politecnico di Milano) | |
| 5-205 | B | 33 | 23 | 33 | 23 | "the nature of the supply chain"- This needs more explanation. U.S. Government (Government of U.S. Department of State) | TIA |
| 5-481 | A | 33 | 24 | 33 | 25 | It should read: "As CNG is stored under pressure and has lower energy content by unit of volume as diesel for example..." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | OK |
| 5-206 | B | 33 | 25 | 33 | 0 | Energy content measured on a per volume basis? Needs to be more specific. U.S. Government (Government of U.S. Department of State) | We will clarify that. |
| 5-482 | A | 33 | 28 | 33 | 30 | To make first sentence compatible with the second one it should read: "There were over 2.5 million vehicles..." (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accept. |
| 5-483 | A | 33 | 28 | 33 | 29 | Move In 2001 to beginning of the sentence (John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-484 | A | 33 | 28 | 33 | 30 | The latest data from "The Gas Vehicle Report (2006, February)" show that the number of natural gas vehicles (NGVs) is approximately 4.7 million fueled at approximately 9 thousand refueling stations. The number of NGVs in Argentina is 1457118 and that in Brazil is 1011206. (Takayuki Takeshita, The University of Tokyo) | This will be rechecked |
| 5-207 | B | 33 | 28 | 33 | 30 | The sum of the NGVs in Argentina and Brazil is higher than the global total. The authors should rectify this discrepancy. (Government of Australia) | This will be rechecked |
| 5-485 | A | 33 | 30 | 0 | 0 | More than 3 significant figures are excessive, given the uncertainty of the assessment and the use of 1 significant figure for Brazil. I suggest the use of 1.4 million of vehicles (Stefano Caserini, Politecnico di Milano) | Accept |
| 5-208 | B | 33 | 34 | 33 | 0 | Is this statement taking into consideration liquid fuels from non-conventional petroleum resources? U.S. Government (Government of U.S. Department of State) | We will clarify. |
| 5-486 | A | 33 | 36 | 33 | 36 | DME can also produced by waste plastics such as PE, PS and PP. (Shunsuke Mori, Tokyo University of Science) | TIA |
| 5-209 | B | 33 | 38 | 33 | 38 | Considerably U.S. Government (Government of U.S. Department of State) | OK |
| 5-210 | B | 33 | 39 | 33 | 39 | On board the vehicle U.S. Government | OK |

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| | | | | | | (Government of U.S. Department of State) | |
| 5-211 | B | 33 | 42 | 33 | 0 | This is not quite correct. Otto cycles are more efficient than Diesel cycles at the same compression ratio. The Diesel engine is more efficient in practice, because it can operate at a higher compression ratio and effectively open throttle, whereas the Otto Cycle engine must operate at a lower compression ratio and the conventional implementation requires a throttle, incurring losses at low power output. Consider changing "... higher level of efficiency of the diesel engines compared with the Otto engines ..." to "... higher efficiency of the compression ignition diesel engine compared to the conventional spark ignited gasoline engine ..." U.S. Government (Government of U.S. Department of State) | OK, this will be rephrased |
| 5-487 | A | 33 | 46 | 34 | 1 | It should be also pointed out that DME contains no sulfur and that therefore contributes to reducing PM emissions.<br>(Shunsuke Mori, Tokyo University of Science) | TIA |
| 5-489 | A | 34 | 1 | 34 | 1 | Delete Today, replace with There is no currently developed…<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-490 | A | 34 | 3 | 34 | 3 | Delete It and replace with DME has a potential….<br>(John Kessels, Energy Research Centre of the Netherlands) | OK |
| 5-491 | A | 34 | 5 | 34 | 25 | This text has no references,<br>(John Kessels, Energy Research Centre of the Netherlands) | This will be checked |
| 5-212 | B | 34 | 6 | 0 | 0 | Drop “and Batteries” from this heading. They are not mentioned. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-213 | B | 34 | 7 | 34 | 0 | This is a mix -- Hydrogen and Batteries are energy carriers and Fuel Cells are energy conversion devices. Fuel cells need hydrogen, hydrogen does not need fuel cells. While fuel cells may eventually be commercially viable and at an efficiency higher than the contemporary heat engines, other conversion technologies are advancing quickly and very well could provide cost effective, efficient, and emission free solutions.<br>Specifically, a spark ignited reciprocating internal combustion engine designed to optimize efficiency while minimizing emission operating on hydrogen as a fuel is a very attractive technology. All but one OEM has an H2-ICE strategy moving forward. Two most notable (Ford and BMW) are aggressively pursuing H2-ICEs as transition strategy or as the final end-game for power (respectively). Both OEM's have demonstrated zero or near zero emissions (specifically NOx) and have demonstrated very attractive efficiencies. Both BMW and Ford engines operate with efficiencies in the 40% range with expectations of reaching 50% brake. This is better than current fuel cell technologies. Moreover, these engines can be produced | TIA, we will add information on H2-ICE |

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| | | | | | | on the order of $50 / kW whereas fuel cell technologies are still about $1000/ kW. It is important to discuss fuel cell technologies, but GHG mitigation and the evolution of a hydrogen economy do not depend on the evolution of the fuel cell. U.S. Government<br>(Government of U.S. Department of State) | |
| 5-214 | B | 34 | 10 | 34 | 0 | All these drivers are drivers for a hydrogen economy, not the fuel cell. A H2-ICE also satisfies these drivers. U.S. Government<br>(Government of U.S. Department of State) | agree |
| 5-492 | A | 34 | 19 | 34 | 25 | "Comment. Between the phrase -Another progress since TAR is the world-wide establishment of many demonstration projects. Since 2000, members of California Fuel Cell Partnership have placed 55 light duty FCVs and 3 FC buses in California, and traveled over 232,000 km on California's roads and highways. In 2002-2003, Japanese automakers got the government certification and started to lease their FCVs in Japan and US, now totaling 17 FCVs.- and the phrase -In Europe, there are several partnership for demonstration such as CUTE (Clean Urban Transport for Europe), CEP (Clean Energy Partnership), and ECTOS (Ecological City Transport System) , using more than 27 buses and 20 passenger cars.- I suggest to include a brief paragraph describing the recent development of the U.S. hydrogen and fuel cell initiatives.<br>I think to the U.S. President's Hydrogen Fuel Initiative, launched in 2003, the U.S. Policy Energy Act of 2005 (Public Law 109-58, Title VIII Hydrogen) and the recent DOE's Hydrogen Goal-Setting Methodologies Report to Congress (August 2006). From my point of view, the most important aspects of these documents, usefull to be mentioned in the IPPC 4AR Report are:<br>For the Energy Policy Act of 2005:<br>The purpose of the act. Section 802 (Purposes) states: The purposes of this title are— (1) to enable and promote comprehensive development, demonstration, and commercialization of hydrogen and fuel cell technology in partnership with industry; (2) to make critical public investments in building strong links to private industry, institutions of higher education, National Laboratories, and research institutions to expand innovation and industrial growth; (3) to build a mature hydrogen economy that creates fuel diversity in the massive transportation sector of the United States; (4) to sharply decrease the dependency of the United States on imported oil, eliminate most emissions from the transportation sector, and greatly enhance our energy security; and (5) to create, strengthen, and protect a sustainable national energy economy. | ACC, we will add |

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| | | | | | | The reports to the Congress and the FCV diffusion goals. Section 811 (Reports): -(a) Secretary.—Subject to subsection (c), not later than 2 years after the date of enactment of this Act, and triennially thereafter, the Secretary shall submit to Congress a report describing— (…) (4) progress, including progress in infrastructure, made toward achieving the goal of producing and deploying not less than— (A) 100,000 hydrogen-fueled vehicles in the United States by 2010; and (B) 2,500,000 hydrogen-fueled vehicles in the United States by 2020; (…).<br>The appropriation. Different Sections (805, 808, 809 and 811) of the Energy Policy Act of 2005 define appropriation for hydrogen and fuel cell RD&D activities for more than 3.2 billion dollars for the period 2006-2010.<br>For the Hydrogen Goal-Setting Methodologies Report to Congress, August 2006: The Technology-Specific 2010 and 2015 research goals. To ensure reliable systems for future fuel cell powertrains with costs comparable to conventional internal combustion engine/automatic transmission systems, the goals are: A) Electric Propulsion System with a 15-year life capable of delivering at least 55kW for 18 seconds, and 30kW continuous at a system cost of $12/kW peak. B) 60% peak energy-efficient, durable fuel cell power system (including hydrogen storage) that achieves a 325 W/kg power density and 220 W/L operating on hydrogen. Cost targets are at $45/kW by 2010 ($30/kW by 2015).<br>To enable the transition to a hydrogen economy, ensure widespread availability of hydrogen fuels, and retain the functional characteristics of current vehicles, the goals are: A) Demonstrated hydrogen refueling with developed commercial codes and standards and diverse renewable and non-renewable energy sources with a cost of energy from hydrogen equivalent to gasoline at market price, assumed to be $2.00-3.00 per gallon gasoline equivalent produced and delivered to the consumer independent of pathway by 2015. B) On-board Hydrogen Storage Systems demonstrating specific energy of 2.0 kWh/kg (6 weight percent hydrogen), and energy density of 1.5 kWh/liter at a cost of $4/kWh by 2010 and specific energy of 3.0 kWh/kg (9 weight percent hydrogen), 2.7 kWh/liter, and $2.00/kWh by 2015.<br>Reference:<br>1) U.S. President's Hydrogen Fuel Iniziative: Office of the President. Hydrogen Fuel: A Clean and Secure Energy Future. 30 Jan. 2003. Available on the Web at <http://www.whitehouse.gov/news/releases/2003/01/20030130-20.html>.<br>2) U.S. Policy Energy Act of 2005, Public Law 109-58. 8 Aug. 2005. Available on the Web at <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109.pdf>. | |

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| | | | | | | 3) Hydrogen Goal-Setting Methodologies Report to Congress. U.S. Department of Energy. Hydrogen Program. August 2006. Available on the Web at <http://www.hydrogen.energy.gov/pdfs/goal_setting_report_congress.pdf>."<br>(Mario Valentino Romeri, none - private Italian citizen) | |
| 5-493 | A | 34 | 26 | 35 | 7 | This text I am assuming is reference to GM/ANL but in the references there is only the year and title, the publication, journal, report and location, country need to be included.<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add the information. |
| 5-494 | A | 34 | 28 | 34 | 28 | Typo error. "Conclusion"<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-495 | A | 34 | 28 | 34 | 28 | Replace conculsions with conclusions<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-215 | B | 34 | 33 | 34 | 0 | More precisely this should be "...today's conventional gasoline fueled internal combustion engine..." U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-496 | A | 34 | 38 | 34 | 38 | Please explain abbreviation "CaFCP"<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | We will |
| 5-497 | A | 34 | 42 | 34 | 43 | Review the sentence. Very confusing to state present and near-future together.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-216 | B | 34 | 43 | 34 | 0 | Please recognize that this statement also holds for the hydrogen-fueled ICE. Also, one needs to consider the entire power train in the analysis. The efficiency of a mechanical power train (transmission and differential) is about 90%. The efficiency of the power converter (90%), transmission (100%) and the motors (90%) gives 81% making the fuel cell power plant to wheels (PPTW) about 40% efficient while the H2-ICE PPTW about 45%. The point is they are about the same! U.S. Government<br>(Government of U.S. Department of State) | We will check the data. |
| 5-498 | A | 34 | 44 | 34 | 44 | This isn´t the first time well-to-wheel expression is used. The abbreviation (WTW) should be introduced at the first time it is used and not here.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-499 | A | 34 | 46 | 35 | 4 | Hydrogen generation using nuclear energy should be added in this section as one of the promissing truly zero emmision options<br>Truly zero emmision methods comprise not only water electrolysis using electricity from renewable energy or fossil sources with CCS, but also water electrolysis or | ACC |

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| | | | | | | themo-chemical water splitting using nuclear energy. Especially, electrolysis using nuclear energy is technically feasible and has higher potential than renewable energy based hydorogen production at least in the comming decades.<br>(Ryota OMORI, Japan Science and Technology Agency) | |
| 5-500 | A | 35 | 1 | 35 | 2 | Should read: "...electricity which is produced using renewable energy such as hydro, solar and wind, the entire..."<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-501 | A | 35 | 1 | 0 | 0 | I recommend you to modify "using renewable energy" into "using nuclear or renewable energy".<br>(Takayuki Takeshita, The University of Tokyo) | ACC |
| 5-502 | A | 35 | 4 | 35 | 7 | This sentence should be updated with information from the 2005 GM/ANL well-to-wheels study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.).<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | ACC |
| 5-217 | B | 35 | 4 | 35 | 7 | This sentence should be updated with information from the 2005 GM/ANL well-to-wheels study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.). U.S. Government<br>(Government of U.S. Department of State) | same |
| 5-503 | A | 35 | 5 | 35 | 7 | Please, check the reference GW/AN1, 2001 since it is difficutl to make the CO2 emission quantification. It is necessary to assume some energy efficiency improvement for vehicles powered by full cells compared with the ones using ICE engines.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | We did |
| 5-504 | A | 35 | 9 | 35 | 13 | It would be appropriate to mention also the significant barriers that exist for the development of the hydrogen distribution infrastructure. The development of and hydrogen-based transportation system is not only related to the development of FCV technologies.<br>(Pierpaolo Cazzola, IEA) | ACC |
| 5-505 | A | 35 | 9 | 34 | 26 | Not referenced adequately, is a press release scientific literature?<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add ref for cost estimate. |

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| 5-506 | A | 35 | 10 | 35 | 11 | The availability of hydrogen, i.e., installing a sufficient number of H2 refueling stations, also influences the penetration rate of hydrogen FCVs. Ogden, J.M. (19999) "Developing an Infrastructure for Hydrogen Vehicles: A Southern California Case Study" International Journal of Hydrogen Energy 24, pp.709-730 pointed out that when any non-gasoline fuel reaches beyond centrally refueled fleet markets into large automotive markets, the so-called "chicken and egg" problem is inevitably faced. Such an issue should be mentioned in this report. (Takayuki Takeshita, The University of Tokyo) | ACC |
| 5-507 | A | 35 | 11 | 35 | 12 | "Comment. The text: -The cost of FCV is estimated to be much higher than the conventional ICE and the retail price of H2 is 2-7 times higher than gasoline.- is incoherent with the phrase (Technical Summary, page 48, lines 15-16): -Hydrogen costs are currently estimated to be 2 to 7 times the cost of gasoline (without taxes).- The hydrogen costs are with or without taxes? Please clarified this aspect and give the appropriate references." (Mario Valentino Romeri, none - private Italian citizen) | We will calrify |
| 5-218 | B | 35 | 11 | 35 | 12 | Text: "The cost of FCV is estimated to be much higher than the conventional ICE and the retail price of H2 is 2-7times higher than gasoline." Suggest to modify the text in this way: "The cost of FCV is estimated to be much higher than the conventional ICE and the retail price of H2 is 1.3 – 3.8 times higher than gasoline." References: US DOE, Well-to-Wheels Case Studies for Hydrogen Pathways (excluding Wind Centralized) - http://www.hydrogen.energy.gov/well_wheels_analysis.html; EIA Retail Gasoline Prices, 21 August 2006 - http://www.eia.doe.gov/; US DOT FHWA, Gasoline Taxes -http://www.fhwa.dot.gov/ohim/mmfr/mmfrpage.htm; Natural Gas Spot Prices Henry Hub, 21 August 2006 - http://www.wtrg.com. U.S. Government (Government of U.S. Department of State) | Rejected, we refer this to not only the NRC (DOE)work but also other studies. |
| 5-508 | A | 35 | 12 | 35 | 13 | "Comment. I suggest to integrate the phrase: -It should be noted that the cost estimate of future technologies is highly challenging and has substantially high uncertainty.- in this way: It should be noted that the cost estimate of future technologies is highly challenging and has substantially high uncertainty (see: Prospect for hydrogen and fuel cell, 2005 IEA). References: IEA, 2005, Prospects for Hydrogen and Fuel Cell, International Energy Agency, IEA/OECD, Paris. www.iea.org" (Mario Valentino Romeri, none - private Italian citizen) | Rejected, this is more general consensus. |
| 5-509 | A | 35 | 15 | 35 | 38 | There should be a full section in this report on potential for electrification of | Agree with the importance of |

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| | | | | | | transports, in which these elements on energy storage for future vehicle should be included. It should contain an analysis of existing and forthcoming niche markets for full electric vehicles, spell out the limitation in range and refuelling time and consider options for addressing them (such as empty-full battery instantaenous exchanges in fuel stations). This section should refer to the previous section on hybrid drive-trains to consider the possibilities of using the existing trend towards hybrid motorisation that includes batteries to allow for refuelling on the grid in daily operations when a long range autonomy is necessary ("plug-in hybrids"). The information on p.24 lines 20 to 30 could be brought in this new section, while the 'improving drive train efficiency' should simply refer to this new full electric section by indicating in brief the possibility for plug-in hybrids. This electricity section could also briefly refer to other sections in this chapter by mentioning that the shift towards mass transit systems often leads to a greater rate of electrification, as does the densification of habitat and cities, thanks to mass-transit systems, and even elevators...<br>(Cédric PHILIBERT, International Energy Agency) | EV, but because of space limitation, the priority of EV is not high enough to cover extensively. |
| 5-219 | B | 35 | 23 | 35 | 0 | After "EV", add "and plug-in HEV". U.S. Government<br>(Government of U.S. Department of State) | Rejected, this is their product name. |
| 5-510 | A | 35 | 28 | 34 | 36 | Again not referenced, according to who Power 2005 is a press release not a journal or scientific literature is it based on a report, study??<br>(John Kessels, Energy Research Centre of the Netherlands) | Rejected, information on this type of high-edge technologies is not gotten from the scientific journals. |
| 5-511 | A | 35 | 40 | 34 | 40 | Replace from the various aspects to from various aspects<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-512 | A | 35 | 42 | 34 | 43 | Replace only global warming….with GHG emission reductions.<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-513 | A | 35 | 45 | 34 | 45 | Delete An LCA has to cope with and replace with LCA consider several difficulties…<br>(John Kessels, Energy Research Centre of the Netherlands) | rejected |
| 5-514 | A | 35 | 46 | 35 | 46 | Delete Among them…always clear and replace with One key difficulty is where to…..<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-220 | B | 35 | 48 | 35 | 48 | strongly depend U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-515 | A | 36 | 1 | 36 | 46 | I found this whole page difficult to understand, perhaps it would read better with the | We will redraft. |

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| | | | | | | figures inserted with the appropriate text and better referencing<br>(John Kessels, Energy Research Centre of the Netherlands) | |
| 5-516 | A | 36 | 1 | 36 | 1 | Delete For a and replace with In the case of…<br>(John Kessels, Energy Research Centre of the Netherlands) | Same as the above |
| 5-517 | A | 36 | 4 | 36 | 6 | This sentence refs to many studies, what studies?<br>(John Kessels, Energy Research Centre of the Netherlands) | Same as the above |
| 5-518 | A | 36 | 4 | 36 | 4 | Is Figure 5.11 sourced from any material or original?<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add |
| 5-519 | A | 36 | 8 | 36 | 8 | Figure 5.12 has no reference<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add |
| 5-520 | A | 36 | 16 | 36 | 16 | What targets are you refering too?<br>(John Kessels, Energy Research Centre of the Netherlands) | rejected |
| 5-521 | A | 36 | 18 | 18 | 46 | This section should include analysis of well-to-wheel CO2 emissions for full electric and plug-in hybrids vehicle as there is already for hydrogen vehicles.<br>(Cédric PHILIBERT, International Energy Agency) | We will check the available data. |
| 5-221 | B | 36 | 18 | 36 | 20 | Should also be noted that many well-to-wheel studies such as these do not fully anticipate improvements in vehicle technology or improvements in lifecycle energy or emissions required to produce renewable fuels, for example. Technology enhacements tend to improve performance, resulting to better energy utilization and lower GHG emissions. U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-522 | A | 36 | 19 | 36 | 20 | Delete The three typical studies published are.. And replace with Three published studies shown…<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-222 | B | 36 | 20 | 36 | 0 | The GM/ANL WTW analysis was updated in a 238 page report in May 2005 and is located at: http://www.transportation.anl.gov/pdfs/TA/339.pdf U.S. Government<br>(Government of U.S. Department of State) | We will update |
| 5-523 | A | 36 | 21 | 0 | 0 | CONCAWE have updated their study of Well-to-wheels emissions analysis, and a 2006 report is available. It might be worthwhile to update your data here and figures 5.14 and 5.16 with this information.<br>(Michael Taylor, International Energy Agency) | Same as the above |
| 5-524 | A | 36 | 26 | 36 | 26 | What is and where is Fig X2?<br>(John Kessels, Energy Research Centre of the Netherlands) | We will change |
| 5-223 | B | 36 | 26 | 36 | 26 | Figure X2? U.S. Government<br>(Government of U.S. Department of State) | same |

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| 5-525 | A | 36 | 28 | 36 | 33 | I did not understand this paragraph, it was unclear what the authors are trying to explain and what is the baseline they are measuring the 20-30% reduction? (John Kessels, Energy Research Centre of the Netherlands) | We will improve |
| 5-526 | A | 36 | 32 | 36 | 32 | Please, what is the meaning of "Japanese 10 - 15 driving cycle?" (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | We will clarify |
| 5-527 | A | 36 | 37 | 36 | 37 | Figure 5.15 is not referenced (John Kessels, Energy Research Centre of the Netherlands) | This is general figure |
| 5-528 | A | 36 | 46 | 36 | 46 | Figure 5.16 is not referenced (John Kessels, Energy Research Centre of the Netherlands) | We will add |
| 5-529 | A | 36 | 46 | 0 | 0 | I recommend you to modify "using renewable energy" into "using renewable or nuclear energy". (Takayuki Takeshita, The University of Tokyo) | ACC |
| 5-224 | B | 36 | 46 | 0 | 0 | Add: From a life-cycle perspective, however, the production of the vehicle itself, e. g. the power train itself, may be offsetting a (modest, but noticeable) part of the environmental advantages, because the production of fuel cell vehicles depends on more environmentally relevant materials such as Platinum and grafite (Pehnt 2003). M. Pehnt, “Assessing Future Energy and Transport Systems: The Case of Fuel Cells. Part 2: Environmental Characteristics”, Int. J. LCA 6 (2003), 365-378. (Government of Germany) | It is already mentioned that the production of FCV need more energy than that of ICE. |
| 5-530 | A | 37 | 1 | 37 | 1 | When analysing vehicle cycle and fuel cycle in the text it would be useful to refer right way to Figure 5.11. This would make the text more comprehensive. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | We did |
| 5-531 | A | 37 | 1 | 37 | 5 | fig 5.11 and fig 5.12 do not show any F-gases impacts of conditionning ? It is included in CO2 equivalent ? (Brigitte POOT, Total s.a.) | These are only on the emission of CO2, because of the limitation of data. |
| 5-532 | A | 37 | 3 | 37 | 3 | A reference is needed for Figure 5.12. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | We will add |
| 5-225 | B | 37 | 3 | 37 | 3 | A reference is needed for Figure 5.12. U.S. Government (Government of U.S. Department of State) | same |
| 5-534 | A | 38 | 0 | 0 | 0 | Figure 5.15 title: Hydrogen production and use pathways instead of Hydrogen production pathways (Stefano Caserini, Politecnico di Milano) | rejected |
| 5-533 | A | 38 | 1 | 38 | 1 | Data from the 2005 GM/ANL study (Brinkman, N., M. Wang, T. Weber and T. | We will update |

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| | | | | | | Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.) should be added to Figure 5.14, particularly for the pathways designated ICE-G-HV and FC-GH2(NG-on). (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | |
| 5-226 | B | 38 | 1 | 38 | 0 | Figure 5.14: It would be interesting to include corn-based ethanol in this figure. U.S. Government (Government of U.S. Department of State) | We will consider when we updata. |
| 5-227 | B | 38 | 1 | 38 | 1 | Data from the 2005 GM/ANL study (Brinkman, N., M. Wang, T. Weber and T. Darlington, Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions. www.transportation.anl.gov/pdfs/TA/339.pdf.) should be added to Figure 5.14, particularly for the pathways designated ICE-G-HV and FC-GH2(NG-on). U.S. Government (Government of U.S. Department of State) | same |
| 5-535 | A | 39 | 1 | 39 | 3 | Is there any figure including range of uncertainty for WTW/WTT? (Junichi Fujino, NIES) | Yes there is, but including these information make the figure messy without adding substantial value. |
| 5-536 | A | 39 | 1 | 39 | 0 | Figure 5.16 (Well….FCVs): Please explain colors brown and blue in the bars (Hein De Wilde, Energy Research Centre of the Netherlands) | We will clarify |
| 5-537 | A | 39 | 4 | 39 | 4 | Delete itself (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-538 | A | 39 | 4 | 39 | 5 | Delete But as already mentioned above and replace with As previously mentioned, (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-539 | A | 39 | 9 | 39 | 9 | Figure 5.17 is refered to as EC, 2003b but this is not in the references there are two EC 2003 which one is the figure refering too? (John Kessels, Energy Research Centre of the Netherlands) | We will cut this figure |
| 5-228 | B | 39 | 10 | 39 | 15 | Is there a standard monetary unit for this report? U.S. Government (Government of U.S. Department of State) | yes |
| 5-540 | A | 39 | 11 | 39 | 14 | The economic analysis assumes gasoline costs around 0.35 euros, which isn´t the present value (2006). Be more carefull when discussing costs considering the timing being used. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Agree, we will rephrase |

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| 5-541 | A | 39 | 11 | 0 | 0 | I recommend you to modify "energy cost" into "(its) feedstock cost". (Takayuki Takeshita, The University of Tokyo) | Rejected, including electricity cost ,too. |
| 5-542 | A | 39 | 14 | 39 | 14 | Replace report in with reported in a… (John Kessels, Energy Research Centre of the Netherlands) | Already writen in that way. |
| 5-229 | B | 39 | 14 | 39 | 0 | Replace "today" with a year. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-543 | A | 40 | 3 | 40 | 3 | Hybrid switchers (eventually using natural gas as a fuel) also have the potential to reduce diesel fuel consumption in the rail sector. Reference: Donnelly, F.W., Cousineau, R.L. and Horsley, R.N.M. (2004), "Hybrid technology for the rail industry", proceedings of the 2004 ASME/IEEE Joint Rail Conference. (Pierpaolo Cazzola, IEA) | We will add more information on fuels other than electricity |
| 5-544 | A | 40 | 3 | 41 | 6 | The discussion of rail is too cursory. It would be useful to show the sources of energy for rail transportation currently and in the future (direct fossil fuel, electric from fossil fuel, electric from non-fossil fuel sources). A discussion of the technology would also be useful. (Steven Baughcum, Boeing Company) | We will add |
| 5-545 | A | 40 | 4 | 41 | 6 | This section is unreferenced (John Kessels, Energy Research Centre of the Netherlands) | We will ad |
| 5-546 | A | 40 | 4 | 41 | 6 | Section 5.3.2 on railways is very brief, particularly when rail is more suitable for transport on high-density long hauls. The chapter does not discuss the role of light rail and heavy rail in cities, or, for freight movement. Nor does it discuss a comparison of rail with other modes, or multi-modal freight. (Government of India) | We will add more broad overview of rail. |
| 5-547 | A | 40 | 4 | 41 | 6 | For freight transport, the following areas need discussion: (a) increase capacity in rail, (b) focus on interconnectivity, multi-modalism, (c) improve truck and rail technology in developing countries, (d) improve management and information technology applications. (Government of India) | This will be discussed in other section related with public transport. |
| 5-548 | A | 40 | 5 | 5 | 7 | Although this is a scientific text it is preferable for enumerations to begin with the more important factor (in this sentence: for 'greenhouse gas mitigation' or for 'relevance in every day use in the world') and then continue with the minor important ones. With this logic in my mind we should write '... main roles are freight transportation, high density urban (metros) and commuter transportation in the city and (high speed) passenger transportation between remote cities. It is in a ...' (Manfred Treber, Germanwatch) | We will add more broad overview of rail |

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| 5-549 | A | 40 | 5 | 40 | 5 | Please remove "in the world".<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Change to developing world. |
| 5-230 | B | 40 | 5 | 40 | 9 | Explain term R&Ds. It may be useful to note that in the freight arena, bulk commodities are especially suitable for rail transport. U.S. Government<br>(Government of U.S. Department of State) | We will add more broad overview of rail |
| 5-550 | A | 40 | 6 | 40 | 7 | Replace "remote" with "large". Add to end of sentence "over long distances".<br>(Stephen Perkins, European Conference of Ministers of Transport) | ACC |
| 5-551 | A | 40 | 7 | 40 | 7 | Change word: transportation = on longer distance<br>(,) | rejected |
| 5-552 | A | 40 | 8 | 40 | 8 | Delete it is in a tough and replace with Railway transport competes with other….<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-553 | A | 40 | 9 | 40 | 9 | Comment: These topics should not be put in numerical order since no CO2 reduction potential is quantified - better use an neutral listing.<br>(Government of Germany) | rejected |
| 5-554 | A | 40 | 11 | 40 | 11 | Comment: Improving of aerodynamic resistance has - if at all - only a very small potential of CO2 reduction. Nowadays, high speed trains in Japan, Germany and France already possess optimized body shapes. Change word: running = aerodynamic<br>(Government of Germany) | disagree |
| 5-555 | A | 40 | 12 | 40 | 12 | Delete As for and replace with High Speed...<br>(John Kessels, Energy Research Centre of the Netherlands) | rejected |
| 5-556 | A | 40 | 15 | 40 | 15 | Comment: Series 0 is dating from 1964! no wonder that over 30 years later series 700 improved its aerodynamic resistance by 31 % ... .<br>(Government of Germany) | We will compare with more recent model |
| 5-557 | A | 40 | 17 | 40 | 17 | Delete many researches have and replace with research has been carried and reference what research<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-558 | A | 40 | 21 | 40 | 21 | Delete steal and replace with steel<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-559 | A | 40 | 21 | 40 | 21 | Why does the application of stainless steel carbodies reduce weight? As stainless steel is not lighter, nor necessarily stronger, as compared to other steel types.<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | We will check |
| 5-560 | A | 40 | 21 | 40 | 21 | Comment: Reducing train weight is also an important issue in freight rail and high speed trains (e.g. the development from ICE1 to ICE3 in Germany). Change word: commuter = for all kinds of | ACC |

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| | | | | | | (Government of Germany) | |
| 5-561 | A | 40 | 25 | 40 | 25 | Delete In case of and replace with In the case of…<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-562 | A | 40 | 26 | 40 | 26 | Delete brings and replace with this results in…<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-563 | A | 40 | 30 | 40 | 30 | Various countries are undertaking research but no reference is made to which countries, please include.<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add. |
| 5-564 | A | 40 | 31 | 40 | 31 | What "electric double layer capacity" means?<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | We will clarfy |
| 5-565 | A | 41 | 0 | 46 | 0 | Information on the impacts and mitigation of high altitude emissions and contrails could be added to the report.<br>(Steve Perkins, European Conference of Ministers of Transport, OECD) | See box 5.1 |
| 5-566 | A | 41 | 1 | 41 | 5 | This section needs a reference<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add. |
| 5-231 | B | 41 | 2 | 41 | 3 | Did these projections include figures account for technological improvement in fleet replacement and expected operational improvements? Does not appear as if they did, the improvement appears to be just the result of replacing older aircraft with today's technologies. U.S. Government<br>(Government of U.S. Department of State) | This does not apply here |
| 5-567 | A | 41 | 3 | 41 | 3 | Delete still and replace with steal<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-568 | A | 41 | 3 | 41 | 0 | In this sentence, "stainless still" should read "stainless steel". Correction required.<br>(Government of Japan) | same |
| 5-569 | A | 41 | 5 | 41 | 7 | What examples of recent research, reference needed<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add |
| 5-570 | A | 41 | 6 | 0 | 0 | As already mentioned in my comment on ch. 5, page 4, line 14 in Germany encouraging experiences with training of train drivers in efficient driving were made. Germanys biggest rail company draw the conclusion to train all 14.000 train drivers to realise the energy saving potential (and to save money through reduced energy consumption). We have had workshops with them and they claimed that they were the first big train operating company in the world to do this. This very innovative action deserves being mentioned in the WG 3 report. Peter Westenberger from DB AG could give precise information. His email: Peter.Westenberger@bahn.de | We will deal this in the later section. |

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| | | | | | | (Manfred Treber, Germanwatch) | |
| 5-571 | A | 41 | 8 | 0 | 0 | Section 5.3.3 (Aviation) is very well written but further shortening by reducing overlap is possible. E.g. multiple addressing of the topics: "trade off between fuel efficiency - NOx emission - sound" and new energy saving concepts like "blended wing body" and "laminar flying wing".<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Noted – will redraft |
| 5-572 | A | 41 | 9 | 46 | 31 | In section 5.3.3 subsection on Aviation emissions is too detailed and includes some material that is not especially relevant and can be considerably shortened. For example, lines 10-19 are too detailed, 22-27 and 35-38 not especially relevant.<br>(Government of India) | Noted and will redraft |
| 5-573 | A | 41 | 10 | 41 | 16 | This issue is also discussed in Chapter 4. It is necessary to cross-check information to guarantee coherence on the full AR4 text.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted |
| 5-574 | A | 41 | 10 | 41 | 11 | What is the reference for this sentence? Tyndall Centre, 2006 is not listed<br>(John Kessels, Energy Research Centre of the Netherlands) | Noted and will add in redraft |
| 5-575 | A | 41 | 10 | 41 | 10 | Do you mean Contraction and Convergence instead of contaction?<br>(John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-576 | A | 41 | 10 | 41 | 16 | Aero2k, 2004 is refered to in this paragraph but where was the report published and who wrote it? Reference needs to be expanded<br>(John Kessels, Energy Research Centre of the Netherlands) | Accepted and will add |
| 5-577 | A | 41 | 10 | 15 | 0 | Delete the first sentence or explain what the bracketed text refers to. ICAO has been using various models to estimate the emissions from aviation. The 35th Session of the ICAO Assembly requested an assessment of the evolution of aviation noise and emissions (local and global) and since then ICAO has been developing such assessments with the support of some inventory models. For global emissions, ICAO has been using AEM, AERO2k and the SAGE models (and recently has considered results from the FAST model). AEM and SAGE are not mentioned or considered in the report. Please note that information from ICAO on these models was also made available to the UNFCCC process in many occasions (FCCC/SBSTA/2004/INF.5 FCCC/SBSTA/2005/INF.2. FCCCC/SBSTA/2005/MISC.4 and presentations to SBSTA22 (ICAO introductory presentation, AERO Modelling System, AERO2K and System for assessing Aviations Global Emission (SAGE)).<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted – will give reference |
| 5-578 | A | 41 | 10 | 41 | 16 | Scenario's for future use of global transport partly overlap with predictions/scenario's presented on page 16, line 9-23. | Noted |

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| | | | | | | (Hein De Wilde, Energy Research Centre of the Netherlands) | |
| 5-579 | A | 41 | 10 | 41 | 16 | The statement in the report that "[C]ivil aviation is one of the world's fastest growing transport means" is not sufficiently substantiated and lacks context. It seems entirely based on one single study (Tyndall) and is backed up by one single set of - European - data (AERO2K). As the IPCC claims to represent the consensus view of the global sciientific community, this is not acceptable. As for context, the report should point out aviation's relative contribution vis-a-vis other transport modes and other sources. The report's exclusive focus on growth percentages is misleading if this information is not presented against the background of absolute contributions to global GHG emissions of aviation and other sources. (Andreas Hardeman, International Air Transport Association (IATA)) | Noted |
| 5-232 | B | 41 | 10 | 41 | 16 | The draft report states that "Civil aviation is one of the world's fastest growing transport means," but does not cite growth statistics for other modes and does not mention aviation's initial contribution to global GHG emissions. The Special Report concluded that aviation accounted for about 2 percent of CO2 emissions in 1992. Even assuming significant growth, aviation will remain a relatively small percentage of global emissions.<br>The draft report does not mention the internationally recognized forecast for civil aviation growth, which is the fleet forecast prepared by the Forecast and Economic Support Group (FESG) of ICAO's Committee on Aviation Environmental Protection (CAEP). FESG last prepared a forecast in 2003, projecting growth of worldwide civil aviation through 2020, and in June 2006 the CAEP Steering Group affirmed the accuracy of the forecast in light of experience to date. CAEP-SG/20063-WP/5. The drafters should address the FESG forecast in the draft report, and should explain any variance between it and any other forecast they may wish to address.<br>The draft report takes growth projections from a 2025 forecast performed for the European Commission with the Aero2K 2025 forecast. There is no explanation of the assumptions regarding constraints to growth. If the forecast assumes unconstrained growth, it does not take into account of the increasing limitations of air traffic management systems, other infrastructure constraints such as runways and airport throughput capacity that are beginning to limit the ability of the air transport industry to grow. In any event, this forecast has not received international acceptance and should not be used as a basis for the IPCC report. U.S. Government (Government of U.S. Department of State) | Noted. Redraft will address. |
| 5-233 | B | 41 | 10 | 41 | 16 | The discussion appears too UK centric; given that the US is the largest user of | Noted, but global context was |

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| | | | | | | aviation and that the Asia Pacific region has the largest growth, the discussions should be more global. U.S. Government (Government of U.S. Department of State) | made clear. |
| 5-580 | A | 41 | 13 | 41 | 13 | Please, use metric system for units. Replace ton by tonne. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accepted |
| 5-581 | A | 41 | 14 | 41 | 14 | Insert the between and UK to read and the UK Department… (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-582 | A | 41 | 16 | 41 | 16 | Please identify the reference year for the factor of 2.6 cited. (Steven Baughcum, Boeing Company) | Accepted |
| 5-583 | A | 41 | 19 | 0 | 0 | We know from IPCCs Special Report Aviation and the Global Atmosphere that the warming effects from aviation emissions are not only from CO2 but - even more important - from contrails and cirrus clouds. The aircraft turbines emit water vapour, but often this immediately condenses and forms a contrail. Therefore for the sake of completeness I suggest to write: '... water (H2O) vapour which often condensates to contrails, and from the ...' (Manfred Treber, Germanwatch) | Noted – will address in the redraft |
| 5-584 | A | 41 | 21 | 41 | 21 | Insert to between proportion the to read proportion to the amount…. (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-585 | A | 41 | 23 | 41 | 23 | "quality of the combustion process" is an odd expression. (Steven Baughcum, Boeing Company) | Noted |
| 5-234 | B | 41 | 26 | 41 | 29 | The sentence that conveys "safety" as one of many "need to consider" factors in the design conveys an inaccurate view of the process. Safety is given priority over all other considerations mentioned by the authors in certification of new products. In fact, this need for primacy of safety is recognized not only at ICAO in its standard setting, but in U.S. legislation (Clean Air Act) where specific provision is made for safety concerns in setting emission standards. U.S. Government (Government of U.S. Department of State) | Noted |
| 5-586 | A | 41 | 31 | 41 | 39 | The reference to Aero2k should state its from Quinetiq (2004) Aero2k Global Aviation Emissions Inventories 2002 to 2025. Farnborough, UK (John Kessels, Energy Research Centre of the Netherlands) | Noted with thanks |
| 5-587 | A | 41 | 31 | 41 | 35 | Define the base year. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-235 | B | 41 | 31 | 41 | 35 | Note: "Climate forcing?" not sure if this is the right term. Seems to jump from radiative forcing- to assumption of understanding how that translates into climate change. It would seem to make sense to make it "radiative forcing." U.S. | Accepted – will use consistent terms |

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| | | | | | | Government<br>(Government of U.S. Department of State) | |
| 5-236 | B | 41 | 31 | 41 | 29 | Data from other models (such as the US's SAGE) should be quoted so as to show that there is a range in predictions. U.S. Government<br>(Government of U.S. Department of State) | Accepted |
| 5-588 | A | 41 | 32 | 0 | 0 | Again: We know from the SR Aviation and the Global Atmosphere that the warming effects from aviation emissions are not only from CO2 but - even more important - from contrails and cirrus clouds. Therefore: ' ... primarily carbon dioxide (CO2), contrails and cirrus clouds and from the ozone ...'<br>(Manfred Treber, Germanwatch) | Noted |
| 5-589 | A | 41 | 32 | 41 | 5 | I suggest to drop the end of the first sentence of this para starting from ``…, primarily carbon dioxide…" because the main effect could come from indirect effects of contrails (if the authors believe Sausen et al. (2005)). Also, both O3 production and CH4 reduction is caused by aircraft NOx. It is safer just to cut this sentence as I siggest instead of diving in all related details here.<br>(Michael Danilin, The Boeing Company) | Noted and will address in the redraft |
| 5-590 | A | 41 | 32 | 41 | 40 | I suggest that the volume of aviation emissions (CO2 and NOx) include results of more than one inventory model and not only from AERO2K (see comments above) or, instead, that only the order of magnitude of the results of such inventories/models be reported here.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted and will address in the redraft |
| 5-591 | A | 41 | 34 | 41 | 34 | Write ``...for year 2002" instead of ``for the base year", which was not defined directly.<br>(Michael Danilin, The Boeing Company) | Noted |
| 5-592 | A | 41 | 37 | 41 | 39 | This issue is discussed in Chapter 4. Check if the "other part of the report" should be replaced by "Chapter 4".<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accepted |
| 5-593 | A | 41 | 37 | 41 | 39 | These two sentences refer to a report not the chapter and I wondered if they refer to the Aero21 report or the authors were refering to the chapter but made a mistake<br>(John Kessels, Energy Research Centre of the Netherlands) | Accepted – refer to Chapter |
| 5-594 | A | 41 | 37 | 41 | 37 | Suggestion to add: "See also Box 5.1, page 11, line 11-22"<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Accepted |
| 5-595 | A | 41 | 37 | 0 | 0 | Delete "etc"<br>(Danny Harvey, University of Toronto) | Noted |
| 5-596 | A | 41 | 41 | 49 | 41 | There is no IATA reference in the references, what report are you refering to, is it | Noted and will supply |

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| | | | | | | the Aero21, please be clear<br>(John Kessels, Energy Research Centre of the Netherlands) | reference |
| 5-597 | A | 41 | 41 | 41 | 47 | The authors might also note that improved fuel efficiency has value to the airlines as well in that enables longer range capability in the aircraft and more flexibility in its utilization by the airline.<br>(Steven Baughcum, Boeing Company) | Noted |
| 5-598 | A | 41 | 41 | 41 | 43 | Explain the assumptions for technology improvements. Attempts at using AERO2K (or the US's SAGE) for such predictions are still in the research phase. The figured cited in the 2OD are different than the 1OD and quoting results; it is unlikely that peer review has occurred. In fact, such work is now occurring under the auspices of ICAO/CAEP. IPCC should not rely on using results derived via non-peer reviewed computations, particularly when these were done outside of the internationally recognized process to address aviation emissions. The authors should rely on the work done under the auspices of ICAO, which should be available during the revision of the 2OD. U.S. Government<br>(Government of U.S. Department of State) | Noted. But we are being asked to provide analysis of trends that will not be done under the auspices of ICAO. |
| 5-599 | A | 41 | 46 | 41 | 46 | Although ICAO has not published fuel as a % of total operating costs, we would prefer to see the reference to IATA replaced by the following: "at around 20% in 2005 (according to ICAO estimates for the scheduled airlines of ICAO Contracting States)". Please note that all IATA figures usually refer to their membership, while our figures refer to the airlines of ICAO Contracting States which also domestic scheduled carriers.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted with thanks |
| 5-600 | A | 41 | 46 | 41 | 0 | What IATA source document is referred to for the proposition that fuel accounted for 22% of the operating cost of "modern aircraft" in 2005? What aircraft are deemed to be "modern?" The statistic is questioned because, for U.S. airlines, fuel represented 39% of direct aircraft operating costs in 2005. See http://www.airlines.org/econ/d.aspx?nid=5773. U.S. Government<br>(Government of U.S. Department of State) | Noted with thanks |
| 5-601 | A | 41 | 46 | 41 | 46 | Provide reference. U.S. Government<br>(Government of U.S. Department of State) | Noted and will address in redraft |
| 5-602 | A | 41 | 48 | 41 | 49 | This statement is untrue. It implies that all technology developments to improve fuel efficiency increase Nox. Improvements in aircraft weight and aerodynamic efficiency will reduce all pollutants. Improvements in the engine may increase Nox if higher temperatures are used but weight improvements and improved turbo machinery efficiency will reduce emissions. | Accepted |

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| | | | | | | (Steven Baughcum, Boeing Company) | |
| 5-603 | A | 41 | 48 | 41 | 49 | That technology that target fuel efficiency will- by definition- have "deleterious effects" on other pollutants seems overly broad and without basis or reference. While the NOx issue makes sense, the ability to reduce other criteria pollutants over the last 3 decades has improved fuel efficiency, appears to disprove this assertion." Also needs reference. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-604 | A | 42 | 1 | 49 | 42 | This entire page is not referenced and in line 28 mentions possibly revoluntary technology? What do you mean by this statement? (John Kessels, Energy Research Centre of the Netherlands) | Noted and will clarify |
| 5-605 | A | 42 | 1 | 45 | 7 | As drafted, the paragraph is misleading. I suggest starting the paragraph with the second phrase (in the 1960) and that the last phrase (but….) be deleted; and that a new paragraph be added as follows: ICAO has discussed the question of whether an ICAO Standard limiting CO2 would be desirable. It concluded that market pressures had already ensured that aircraft were very fuel efficient. Since CO2 production was directly related to fuel consumption, these economic pressures were also serving to minimize CO2 emissions. This situation had arisen without regulatory intervention and this would no doubt continue to be the case. The definition of a representative point or mission on which to base a CO2 certification scheme would be very difficult in view of the great diversity of aircraft operations. There is also the danger that point certification would drive manufacturers to meet compliance at the reference point at the expense of overall CO2 reduction. For the foregoing reasons, it did not consider it desirable to pursue the possibility of developing a CO2 emissions Standard. (Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted |
| 5-606 | A | 42 | 5 | 42 | 6 | The sentence "The relatively recent concerns over aviation' s contribution to global climate change has redirected the environmental focus," While Europe is focusing on aviation global emissions concerns, noise and local air quality emissions still drive the agenda elsewhere, and indeed are very influential in Europe as well. Any paragraph here should reflect the fact that the international community- through ICAO (and of course this includes Europe) have adopted 3 goals in the environmental area- and given no special weight to any of the three. This should be noted. U.S. Government (Government of U.S. Department of State) | Noted |
| 5-607 | A | 42 | 9 | 43 | 49 | 1-figure 5.18 The draft report contains a good discussion about the design tradeoffs between emissions covered by certification standards and CO2 emissions (fuel | Noted |

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| | | | | | | burn). As a matter of organization, the paragraph spanning pp. 42-43 and Figure 5.18 would be better placed after line 18, as both relate to design tradeoffs. U.S. Government<br>(Government of U.S. Department of State) | |
| 5-608 | A | 42 | 18 | 42 | 19 | The first sentence in this paragraph is very misleading. It leaves out the fact that ICAO's experts reviewed the issue of whether there should be a fuel efficiency or CO2 standard in 2001 and unanimously agreed (including European participants) that there was no need for such a standard given that market forces were a sufficient driver in this area. It should be further noted that this judgment was made prior to the recent escalation in fuel prices to a level where- in some parts of the world like the U.S.- fuel now exceeds labor as the single largest cost center for an airline operation. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-609 | A | 42 | 19 | 41 | 20 | Please delete first phrase. Already covered in the paragraph suggested above and in the right context.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Rejected – other text will be used |
| 5-610 | A | 42 | 19 | 42 | 20 | Change sentence to read: There are no fuel efficiency certification standards for civil aviation: market forces provide an important driver. Improved aircraft efficiency enables lower cost operation, longer range capability, and greater flexibility for the use of the airplane.<br>(Steven Baughcum, Boeing Company) | Noted and will address in the redraft |
| 5-611 | A | 42 | 19 | 42 | 20 | The draft states that, absent a fuel efficiency certification standard, "market forces provide the only driver." This description implies that market forces are insufficient to fully motivate fuel burn efficiency improvements, when, in fact, high fuel prices have made it economically imperative for carriers to maximize fuel efficiency. Suggest that the first sentence of this paragraph be changed to read: "There are no fuel efficiency certification standards for civil aviation; high fuel prices, however, provide powerful economic incentive for air carriers to demand the greatest possible fuel efficiency from manufacturers, and for manufacturers to provide such products." U.S. Government<br>(Government of U.S. Department of State) | Rejected – other text will be used |
| 5-237 | B | 42 | 19 | 42 | 20 | First sentence would be more balanced if there was added in a reference to significance of fuel costs for overall operating costs for the aviation industry.<br>(Government of Australia) | Noted – will add. |
| 5-612 | A | 42 | 32 | 42 | 42 | Rather than focus on one or two technology improvements, this section would be better and more accurate if it discussed the incremental improvements that have | Noted and will expand the section |

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| | | | | | | been made over the last 20 years as an indicator of how continuous improvements (L/D, weight, SFC, etc.) are being made and how new technology "earns" its way onto the airplane/engine. This approach was done very well in the section on road transportation in this chapter. Radical new concepts present many challenges from a technical, manufacturing, safety, and certification standpoint. In many cases, 20 years of incremental improvement may well achieve the same level of improvements as projected for the "step" change 20 years in the future. As the technologies mature, they begin to appear on the airplanes. The history of the industry is to keep improving the aerodynamics, reducing the weight, and improving the engines to produce more efficient, longer range, and more versatile airplanes. (Steven Baughcum, Boeing Company) | |
| 5-613 | A | 42 | 32 | 42 | 34 | The statement "For the airframe, laminar flow technology (reduced airframe drag through control of the boundary layer) is likely to provide the greatest aerodynamic potential." should be referenced as this is opinion, not fact. U.S. Government (Government of U.S. Department of State) | Noted |
| 5-614 | A | 42 | 37 | 42 | 43 | This issue is also discussed in Chapter 4. Check coherence of both texts. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted |
| 5-615 | A | 42 | 37 | 42 | 0 | It could be noted here that blended wing body configurations also lend themselves very well to storing liquid hydrogen onboard. U.S. Government (Government of U.S. Department of State) | Noted with thanks |
| 5-616 | A | 42 | 41 | 42 | 41 | Provide a refence confirming that BWB could provide up to 20% in fuel saving compared with existing aircraft. (Michael Danilin, The Boeing Company) | Accepted |
| 5-617 | A | 42 | 49 | 43 | 4 | The authors should note that a carpet plot study only considers the thermodynamic trades of engine design. Safety, reliability, maintenance, re-light capability, etc. are not considered. (Steven Baughcum, Boeing Company) | Accepted |
| 5-618 | A | 43 | 3 | 43 | 0 | Figure 5.18: Further explanation of this figure would be desirable. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-619 | A | 43 | 4 | 43 | 5 | In Figure 5.18 what is the meaning of FB? (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted – "fuel burn" |
| 5-620 | A | 43 | 5 | 43 | 5 | This is the place to add something on high altitude emissions and contrails. (Stephen Perkins, European Conference of Ministers of Transport) | Noted |
| 5-621 | A | 43 | 5 | 43 | 5 | Figure 5.18 where is this figure referenced? | Noted – will add |

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| | | | | | | (John Kessels, Energy Research Centre of the Netherlands) | |
| 5-622 | A | 43 | 5 | 43 | 5 | Provide a source of Figure 5.18.<br>(Michael Danilin, The Boeing Company) | As above |
| 5-623 | A | 43 | 5 | 0 | 0 | In the horizontal axis of Figure 5.18, the abbreviation LTO should be described in a complete form.<br>(Takayuki Takeshita, The University of Tokyo) | Noted – landing and takeoff |
| 5-624 | A | 43 | 5 | 43 | 5 | Figure 5.18 should be referenced. The authors should also note that the exact values are illustrative and that they would change for other engine/airframe combinations. What are the assumptions and limitations of this figure? Where we presently are and where we will be, say, in 2050 relative to this plot under 'business-as-usual' and projected scenarios. U.S. Government<br>(Government of U.S. Department of State) | Noted – the plot is not meant to suggest future performance in the text |
| 5-625 | A | 43 | 6 | 43 | 6 | Insert new paragraph on ICAO framework to address interdependencies as per the framework attached at the end of the comments. I can provide additional information if needed.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted, but not necessary |
| 5-626 | A | 43 | 8 | 43 | 24 | Where is this paragraph referenced from, you mention in line 17 a 1997 reference but do not say who? Is it the IPCC if it is then the reference should be stated and in the references there is no 1997 IPCC reference?<br>(John Kessels, Energy Research Centre of the Netherlands) | Noted and will address in the redraft |
| 5-627 | A | 43 | 8 | 43 | 24 | The draft report, in a section captioned "Aircraft Developments," appropriately sets forth the finding of the Special Report that then-current-production aircraft were 70 percent more fuel efficient than aircraft produced 40 years before. It then gives only passing mention to lightweight composite materials that it acknowledges "are beginning to appear and promise significant weight and concomitant fuel burn benefits." There is extensive publicly available data on the fuel efficiency performance data of new designs that will enter the marketplace in the near term, such as Boeing's 787 and late-model 737, and Airbus A380. There is also considerable information about strong orders for this new technology (we understand that B787 production is sold out through 2012), which has implications for the fuel efficiency of the worldwide fleet as these technologies enter service. These developments and their implications deserve far more consideration than the long-term, highly speculative new aircraft configurations to which the draft report devotes extensive discussion. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-628 | A | 43 | 12 | 43 | 15 | WEC (1998) "Global Transport and Energy Development" (please see page 26) | Noted |

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| | | | | | | pointed out the increase in load factors as one of the factors decreasing the energy intensity of airplanes. Because the energy efficiency is discussed here in terms of energy per passenger kilometer (page 43, in lines 12-13), the contribution of increased load factors should be mentioned.<br>(Takayuki Takeshita, The University of Tokyo) | |
| 5-629 | A | 43 | 13 | 43 | 14 | You have no reference for this IPCC report<br>(John Kessels, Energy Research Centre of the Netherlands) | Noted |
| 5-630 | A | 43 | 19 | 43 | 19 | Should also note safety considerations. U.S. Government<br>(Government of U.S. Department of State) | Accepted |
| 5-631 | A | 43 | 21 | 43 | 24 | The report states that "Lightweight composite materials (...) are beginning to appear". This is too modest. There is ample evidence that such materials are being extensively used in the latest aircraft type designs, including the B737, B787 and A380. Aircraft using these materials will be entering the market in significant numbers in the near term. This will have positive implications for the fuel efficiency of the worldwide fleet and therefore deserves more attention in the report. By contrast, far more distant and speculative technological solutions such as the blended wing concept are disucssed in far gretaer depth in the report. This unbalanced should be redressed.<br>(Andreas Hardeman, International Air Transport Association (IATA)) | Accepted |
| 5-632 | A | 43 | 23 | 43 | 24 | Remove the last sentence or provide a reference. Boeing will deliver the 787 in 2008 which is expected to be 20% more fuel efficient than the airplane it replaces. That uses a conventional configuration.<br>(Steven Baughcum, Boeing Company) | Noted |
| 5-633 | A | 43 | 23 | 43 | 24 | The sentence starting with “but” should be referenced. U.S. Government<br>(Government of U.S. Department of State) | Accepted |
| 5-634 | A | 43 | 26 | 44 | 39 | I think that key ideas of the GbD Report should be mentioned here in 2-3 sentences only. I never saw in official IPCC report such a lengthy (one page long!) advertisement to an individual report of this kind.<br>(Michael Danilin, The Boeing Company) | Rejected – this is not an advertisement feature |
| 5-635 | A | 43 | 26 | 44 | 39 | The authors place too much emphasis on a single study while ignoring all the other technology work that is ongoing. They should take a broader view rather than focusing on a single study or a single "solution". It is not clear that BWB designs can be applied to a broad range of airplane sizes.<br>(Steven Baughcum, Boeing Company) | Accepted – will redraft |
| 5-636 | A | 43 | 26 | 44 | 39 | This section is also very UK centric and with a few notable exceptions it is a summary of Greener by Design. The authors should rely on a more global set of | Accepted and more references are being sought |

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| | | | | | | references – the value of this Intergovernmental effort comes into question of the authors rely only on their own national findings and studies. U.S. Government (Government of U.S. Department of State) | |
| 5-637 | A | 43 | 26 | 44 | 39 | There is far too much attention devoted to alternative aircraft configurations that have no possibility to enter service within the timeframe under consideration. The discussion found at p. 42, lines 32-43 adequately covers this subject, and there is no reason to devote a full page to like content in the Greener by Design report. The Greener by Design report was intended to be a conceptual document and it is not appropriate for discussion in an IPCC assessment, which should embody global consensus. U.S. Government (Government of U.S. Department of State) | Accepted, but the long term nature of the aviation industry requires examination of long term possible mitigative developments |
| 5-638 | A | 43 | 30 | 43 | 30 | This is the place to define for the first time BWB, which is being used in Page 44, line 5. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted |
| 5-639 | A | 43 | 30 | 43 | 32 | In the GbD study, is the comparison of fuel efficiency done with an existing airplane today or did they also model a future conventional configuration which took advantage of the same improvements in engine technology improvements, weight, CFD analysis that were assumed for the BWB? (i.e., were they comparing two future planforms with similar technology improvements?) (Steven Baughcum, Boeing Company) | Noted and will clarify |
| 5-640 | A | 43 | 45 | 1 | 44 | Leifur T. Leifsson is not in the references (John Kessels, Energy Research Centre of the Netherlands) | Noted and will add |
| 5-641 | A | 44 | 5 | 44 | 5 | Define "L" and "D" (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted |
| 5-642 | A | 44 | 17 | 44 | 17 | Table 5.6 is not referenced (John Kessels, Energy Research Centre of the Netherlands) | Noted and will advise |
| 5-643 | A | 44 | 17 | 44 | 19 | Table 5.6 should be modified to be able to compare fuel efficiencies of several types of airplanes on an energy per passenger kilometer basis. (Takayuki Takeshita, The University of Tokyo) | Noted |
| 5-644 | A | 44 | 17 | 44 | 18 | Table 5.6 is confusing. The authors should identify what mission length these numbers apply to. They also need to describe the ground rules for the airplanes designed - mission range, size, payload, speed, etc. What was used as a baseline - an existing airplane or a conventional planform with technology improvements. This table is probably far too detailed for this chapter. | Noted and will reconsider |

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| | | | | | | (Steven Baughcum, Boeing Company) | |
| 5-645 | A | 44 | 17 | 44 | 0 | Table 5.6 says it is "efficiencies" but it is all "tonnes'. Add the % reductions to show the weight reductions and call the table "weights and reductions". U.S. Government (Government of U.S. Department of State) | Noted |
| 5-646 | A | 44 | 18 | 0 | 0 | Define "TOW" (Danny Harvey, University of Toronto) | Noted – take off weight |
| 5-647 | A | 44 | 20 | 44 | 21 | I don't know any study which says that global aviation emissions will not grow in the next decades. Growth in demand will more than offset the savings from increase of efficiency (or lower specific energy consumption). Consequently there is NO reduction of aviation impact on climate but an increase. To correct the wrong impression of the text as it is now I suggest: '... operational advances civil aviation do not have the potential to reduce its impact on climate in the coming decades substantially but advances in specific emissions can be expected. Reduction in ...' (Manfred Treber, Germanwatch) | Accepted |
| 5-648 | A | 44 | 20 | 44 | 20 | The GbD needs a better reference, what is the technology challenge report and where is it in the references, need to put year, source, etc (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-649 | A | 44 | 21 | 44 | 0 | The word "would" should be changed to "could". There is no documentation in Chapter 5 that has fuel economy doubling from the technologies listed here. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-650 | A | 44 | 31 | 44 | 32 | I don't believe that - due to the inertia of the sector, to the long service lifetime of aircraft, to the drivers that enhance growth in demand - this is realistic on a global scale in the next tree or four decades (and this time horizon matters because we have to reduce global emissions until then if we want to remain below 2 degrees warming, i.e. to avoid dangerous interference with the climare systen (Art 2 FCCC)). If we don't skip this summary some critical words with the just mentioned content are necessary. (Manfred Treber, Germanwatch) | Noted |
| 5-651 | A | 44 | 31 | 45 | 6 | Needs better referencing also delete paradigm and put standard, a paradigm is a world view and this is a view held by a particular sector. (John Kessels, Energy Research Centre of the Netherlands) | Noted |
| 5-652 | A | 44 | 36 | 44 | 39 | The conclusions reached in this section are not well-founded, especially relying on a single report. The heart of the issue is not the various suggestions of how contrails and cirrus could be reduced at the expense of fuel burn, or influencing NOx generation by altitude. What the authors fail to acknowledge is the more | Noted – will address in the redraft |

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| | | | | | | fundamental issue that it is premature to suggest particular trades until there is further scientific research to identify in an actionable manner the directly attributable damage from various aviation GHG emissions so that regulators and engine designers are in a position to make judgments on what would be a beneficial trade in both the aircraft design and operation. U.S. Government (Government of U.S. Department of State) | |
| 5-653 | A | 44 | 38 | 44 | 39 | To reduce contrail formation is the most effective mitigation measure for aircraft - this should be written: " ... will produce contrails). The last sentence describes the effect with highest global warming mitigation potential for aircraft." (Manfred Treber, Germanwatch) | Noted |
| 5-654 | A | 44 | 41 | 45 | 6 | I suggest to drop the whole section about Large Aircraft. I do not see a much value of this section. (Michael Danilin, The Boeing Company) | Accepted |
| 5-655 | A | 44 | 41 | 45 | 6 | The section entitled Large Aircraft should be omitted. It is based on flawed premises about economies of scale in airline operations. While large aircraft may be more fuel efficient per passenger mile on some long flights, they would be highly inefficient on shorter missions. Airlines determine the right mix of aircraft sizes to serve the range of missions they fly, and it is simply incorrect to assume that larger aircraft are always more cost-efficient or fuel-efficient. Any statement regarding potential fares is unwarranted and outside the scope of the IPCC's assessment. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-656 | A | 44 | 42 | 45 | 6 | The authors need to present data and cite references for their assumptions or drop this discussion. They imply that large airplanes have better fuel efficiency, which is unclear. They also say that large airplanes have lower fares, which is not true in my experience. All the low fare airlines in the US and Europe are flying smaller airplanes. (Steven Baughcum, Boeing Company) | Accepted |
| 5-657 | A | 44 | 45 | 45 | 5 | The choice of the size of the aircraft is affected by many factors not mentioned in this paragraph. It is, for example, highly dependent on the type of mission and frequency requested by the route. For that reason they might not be efficient in short routes. This is not covered in the text. (Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted |
| 5-658 | A | 44 | 45 | 45 | 6 | This an incorrect discussion of the cost efficiency of large aircraft with little understanding of the economics of the airline industry. Based on the current language, one would assume the proper aircraft for use between Wichita, Kansas | Accepted |

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| | | | | | | and Amarillo Texas would be an A380 or B747. Suggest the authors talk to some airline economists to get an informed view of how the actual markets work for aircraft choice. U.S. Government (Government of U.S. Department of State) | |
| 5-659 | A | 44 | 45 | 44 | 45 | The term "huge" is too subjective for a scientific report. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-660 | A | 45 | 1 | 0 | 0 | "Larger aircraft" should today mean A380 rather than Boeing 747. (Government of Sweden) | Noted |
| 5-661 | A | 45 | 3 | 0 | 0 | Lower prices for plane tickets mean more demand and thus more flights (and more emissions). This should be written down: ' ... is a reduced fare for passengers which leads to higher demand, thus more passengers, more flights and more emissions.' (Manfred Treber, Germanwatch) | Noted |
| 5-662 | A | 45 | 5 | 45 | 0 | It would be more correct to say, "… infrastructure requirements, safety, technical factors as well as the market are considerations in determining the largest acceptable size." U.S. Government (Government of U.S. Department of State) | Noted |
| 5-663 | A | 45 | 8 | 45 | 28 | This section is merely a summary of the Presav study. The authors should rely on a more global set of references – the value of this Intergovernmental effort comes into question of the authors rely only on their own national findings and studies. Important work has occurred and is occurring in the US and Brazil, for example, that should be noted. U.S. Government (Government of U.S. Department of State) | Noted |
| 5-664 | A | 45 | 8 | 45 | 28 | This section is inaccurate in many respects and needs revision. It is headed "Biofuels for Aviation," yet most of the alternative fuels it mentions are not biofuels. Fischer-Tropsch products, including SASOL, are produced from coal or natural gas. High jet fuel prices have spurred commercial interest in alternative fuels, and such products may become a practical alternative for aviation sooner than envisioned in the Special Report. Biofuels are a more speculative, longer-term possibility for aviation than other alternative fuels because of issues relating to thermal stability, as noted in the draft report. This section does not address the effect of biofuels or other alternative fuels on GHG emissions. Since several sections of the Transport chapter discuss the possible use of biofuels, the draft report should contain a definition of the term to prevent confusion (e.g., Biofuel is any fuel that derives from biomass - recently living organisms or their metabolic byproducts, such as manure from cows. It is a renewable energy, unlike other natural resources such as petroleum, coal and nuclear fuels. The carbon in biofuels was recently extracted from atmospheric | Accepted – will be addressed in the redraft and reflect in the Exec Summ. |

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| | | | | | | carbon dioxide by growing plants, so burning it does not result in a net increase of carbon dioxide in the Earth's atmosphere. U.S. Government (Government of U.S. Department of State) | |
| 5-665 | A | 45 | 9 | 45 | 28 | What are you referencing this section from Presav? Also, in Line 23-25 you mention studies but do not say which studies, please include (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-666 | A | 45 | 9 | 45 | 9 | Presav 2003 is not in the references (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-667 | A | 45 | 9 | 45 | 28 | The section on "Biofuels for Aviation" is confusing in that it mostly addresses alternative fuels that are not actually biofuels but either synthetic fuels or hydrogen. While synthetic fuels, such the Fischer-Tropsch products mentioned in the report, may become a viable option in the not-too-distant future, the commercial use of biofuels is far more speculative. Further, it should be noted that certification of 100% synthetic fuel is expected soon. Finally, what is missing in this section is an assessment of the environmental effects, including climate change and local air quality effects, of biofuels and other alternative fuels. (Andreas Hardeman, International Air Transport Association (IATA)) | Accepted |
| 5-668 | A | 45 | 10 | 45 | 25 | EMBRAER has experience with alcohol-based aircraft ( "Ipanema" version alcohol was certified by NEIVA a few years ago). Other experiences around the world are also worth being mentioned here. (Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted, but this relates to piston engines, not gas turbines |
| 5-669 | A | 45 | 21 | 45 | 0 | The statement that "hydrogen may be unsuitable for low NOx combustors" may not be true. While the combustor temperature may be higher for stoichiometric mixtures, current research is focused on running aircraft combustors with partially premixed and/or diluted mixtures to lower the temperature and reduce NOx emissions. U.S. Government (Government of U.S. Department of State) | Noted |
| 5-670 | A | 45 | 25 | 45 | 28 | While kerosine specification is comprehensive, it is nevertheless a performance specification. The real issue is that a biofuel may appear to meet the kerosene specification, but lead to issues that are not covered by the performance spec. This should be clarified. U.S. Government (Government of U.S. Department of State) | Accepted |
| 5-671 | A | 45 | 25 | 45 | 28 | It is difficult to understand the basis for the assertion that hydrogen technology could be implemented within 15-20 years- at least if the authors are referring to large commercial aircraft. A certification project for a new transport aircraft can take 5-7 years. How to get to a certificated hydrogen aircraft – having no mature technology | Accepted |

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| | | | | | | today and having never certificated such an aircraft in the timeframe envisioned by the authors seems highly unrealistic. U.S. Government (Government of U.S. Department of State) | |
| 5-672 | A | 45 | 30 | 0 | 0 | p. 45, line 30: what is a cryoplane? Is the title related to the content below? (Bert van Wee, Delft University of Technology) | Accepted |
| 5-673 | A | 45 | 30 | 6 | 46 | Need to include the reference, I assumed it was from the 2004 EC study which you have not listed in your references (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-674 | A | 45 | 30 | 45 | 33 | Authors mention a 2004, EC study which is not in the references, please include (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-675 | A | 45 | 30 | 45 | 0 | The results of the cryoplane work are accurate as stated. However, the cryoplane report contained no engineering details on the tankage or the weight of fuel carried in their design aircraft; the internal trends in their data are not explained. To provide a more comprehensive statement of hydrogen aircraft, this report should review the work that Lockheed did in the 1970's, which provides much more engineering detail, complete numbers on fuel load and performance, and much more sensible trends in the internal data. The Lockheed work shows that greater benefits accrue in the use of hydrogen than indicated by the Airbus study. The report should reference the book: Hydrogen Aircraft Technology by G. Daniel Brewer. U.S. Government (Government of U.S. Department of State) | Noted |
| 5-676 | A | 45 | 31 | 45 | 32 | Give a full reference for this report, so that the reader can find it. (Danny Harvey, University of Toronto) | Noted |
| 5-677 | A | 45 | 46 | 45 | 48 | The authors should mentioned that CO2 emissions during production of hydrogen fuel should also be taken into account. It means that a cryoplane will have some CO2 emissions (albeit, indirectly). My understanding is that current technology level of H2 production is quite energy expensive giving relatively high indirect CO2 emissions from cryoplane. (Michael Danilin, The Boeing Company) | Accepted |
| 5-678 | A | 45 | 49 | 46 | 1 | One should be very careful providing here residence time of H2O and CO2. H2O residence time is very sensitive to a flight altitude and its location with respect to the tropopause. CO2 has several removal mechanisms with different time scales (see IPCC WG1 4AR). I suggest to re-write this entce as follows: However, H2O from subsonic aircraft remains in the atmosphere for dayss or weeks (depending on flight altitude), while CO2 residence time is much longer (at least several decades). (Michael Danilin, The Boeing Company) | Noted – will address in the redraft |
| 5-679 | A | 45 | 49 | 0 | 0 | The average lifespan of H2O molecules in the troposphere is 8 days, in the | Noted |

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| | | | | | | stratosphere it is 2 years, so you must talking about the lower stratosphere. This should be specified.<br>(Danny Harvey, University of Toronto) | |
| 5-680 | A | 46 | 5 | 46 | 47 | The authors should note that - There are significant technical challenges and enormous infrastructure issues associated with introducing a hydrogen fueled airplanes. It's not just a cost issue. Aircraft seem like one of the last places to implement hydrogen fuel because of the infrastructure issues, importance of high density fuels, and challenges of working with cryogenic fuels.<br>(Steven Baughcum, Boeing Company) | Accepted |
| 5-681 | A | 46 | 8 | 46 | 31 | The authors make a number of statements and claims about the supersonic airplane market, technology, and environmental impact. They fail to cite the studies upon which they base their comments. Please add your references. Previous supersonic airplane programs assumed that supersonic flight over land would not be permitted. You seem to base your discussion on other sources.<br>(Steven Baughcum, Boeing Company) | Accepted |
| 5-682 | A | 46 | 9 | 45 | 31 | The section on supersonic needs rewriting it is repetitive Line 15 is repeat Line 26-27 plus references should be included<br>(John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-683 | A | 46 | 30 | 46 | 6 | The discussion of hydrogen fuel airplanes references a single study and neglects important work done elsewhere. As this is an international product the sources cited should reflect a broader cross section of the community. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-684 | A | 46 | 30 | 46 | 31 | Are the authors implying that supersonic aircraft pose little environmental impact (beyond sonic boom annoyance) because the fleet is projected to be small? This seems at odds with the previous statements of concern about where emissions are released. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-685 | A | 46 | 32 | 46 | 32 | Please insert text. "ICAO CAEP is currently assessing the public acceptance of future supersonic operations including sonic boom and emissions." I can provide further information on that activity if necessary.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted |
| 5-686 | A | 46 | 33 | 46 | 33 | Is there anything mentioning the possibility to used grid electricty to displace engine idling fo ships during port operations (relying on the decarbonisation of electricty in the long term, but also on the better efficiency of stationary generators and in the diversified electricty mix, in the short term)?<br>(Pierpaolo Cazzola, IEA) | Tia, will be checked, but potential is small |

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| 5-687 | A | 46 | 34 | 47 | 45 | The first two paragraphs of the Shipping section 5.3.4 contradict each other. While in the first Para the report highlights considerable short-term carbon mitigation potential, followed by a discussion in the second Para concluding there is very little short term potential.<br>(Government of India) | Noted, small text changes will be done |
| 5-688 | A | 46 | 35 | 46 | 35 | This section should start, as the aviation section, with some considerations on absolute volumes and rate of growth of related CO2 emissions. Indeed, emissions from international marine bunker fuels are greater than that of aviation bunker fuels (463 Mt CO2 against 354 MT CO2) and have been growing more rapidly (+27.6% against +23.9% between 1990 and 2002). (see IEA 2005, CO2 emissions from fuel combustion, IEA/OECD, Paris<br>(Cédric PHILIBERT, International Energy Agency) | Rejected, this is already treated in 5.2.3.However, we will include there the IEA reference.The aviation intro in this section will also be skipped as it also discussed in 5.2.3 |
| 5-695 | A | 47 | 0 | 0 | 0 | What is footnote 17 refering too, who is the reference, the OECD?<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc, will be clarified |
| 5-689 | A | 47 | 2 | 47 | 2 | Route speed optimization software for (inland) navigation is already on the market (Advising Tempomaat; http://www.hme.nl/companies/news.asp?NewsID=767)<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Noted |
| 5-690 | A | 47 | 16 | 47 | 17 | In discussing speed reductions as a way for reducing shipping CO2, the discussion neglects the lost productivity of using slower ships. Will that just mean that more ships are needed?<br>(Steven Baughcum, Boeing Company) | Noted, indeed |
| 5-691 | A | 47 | 17 | 0 | 0 | Sea transports are mainly energyeffective in relation to speed. The specific transport energy demand for a fast ferry is usually higher than with low speed and can even need more energy than road or air transport.This is a beginning problem. Facts from a draft report from the Swedish Maritime Administration and Isensee, Jurgen (2005) Presentation "Better fuel quality for ships" (juergen-isensee@t-online.de)<br>(Government of Sweden) | Tia, we will assess whether this source can be added. |
| 5-692 | A | 47 | 23 | 47 | 23 | Delete this and replace with these<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-693 | A | 47 | 25 | 47 | 25 | Switch from diesel to natural gas in shipping is especially effective for CNG tankerships in reducing GHG emissions, when these ships use the 'boil-off' of the cryogenic stored gas, that would otherwise escape to the atmosphere as CH4 which is a powerful greenhouse gas (~20 x GWP of CO2). E.g. example of the vessel Pioneer Knudsen (http://www.knutsenoas.no/ITNet/notis.aspx?do=visaararkivnotis&notisside=News2 | Acc |

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| | | | | | | 003)<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | |
| 5-694 | A | 47 | 33 | 47 | 37 | The use of large sail, and also kites, for fuel saving on ships does not belong to this long term perspective. Quite to the contrary, it does not require fleet turnover but can be added to existing vessels (retrofit) - and shipping companies already prepare this for in case oil prices continue to soar. Cuts in consumption and emissions are expected up to one third. The first system of this kind is expected to be demonstrated in 2007 by the German company SkySail after installation on an existing vessel that belongs to the Beluga (shipping) Company in Bremen.<br>(Cédric PHILIBERT, International Energy Agency) | Acc |
| 5-696 | A | 48 | 0 | 0 | 0 | The section on 'modal split' should have a paragraph on the congestion charge in London (and the examples following this innovation, e.g. in Stockholm) because there are real effects in modal split from it.<br>(Manfred Treber, Germanwatch) | TIA, covered in other section. |
| 5-697 | A | 48 | 1 | 0 | 0 | 5.3.5 Maintenance practices: This should be elaborated in a more detailed way in order to really indentify all low-hanging fruits.<br>(Sandra Cointreau, World Bank) | noted |
| 5-698 | A | 48 | 3 | 48 | 13 | It could be appropriate in this section also to mention FEAT-technology that gives a cost effective method to scan the status of the vehicle fleet. For more information see for example http://www.feat.biochem.du.edu/index.html<br>(Government of Sweden) | ACC, check the source. |
| 5-699 | A | 48 | 7 | 0 | 0 | It would be useful to compare such reduction in fuel use with the reduction due to smaller vehicle or eco-driving<br>(Stefano Caserini, Politecnico di Milano) | Noted, but no space. |
| 5-700 | A | 48 | 15 | 48 | 18 | The description of ecodriving could be discussed. In one way it is not correct to say that fuel economy could be enhanced by reducing rates of acceleration since to slow acceleration results in low engine efficiency. A short quick acceleration up to a given speed is better than a slow acceleration to the same speed. But this is not so simple since a higher rate of acceleration often gives a higher speed between the stops. And then of course also higher fuel consumption. In Netherlands they have developed some "golden tips" for ecodriving that have been proven to work: http://www.hetnieuwerijden.nl/english2.html<br>(Government of Sweden) | ACC, modify the text. |
| 5-701 | A | 48 | 15 | 48 | 32 | In Sweden, knowledge both in practice and in theory of ecodriving is mandatory from year 2005 for getting a passenger car driving licence (besides knowledge of the impact of road transport on environment in general) and therefore also included | ACC, check the source. |

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| | | | | | | as part of the driving school training. This will in the coming years be expanded to other vehicle types.<br>(Government of Sweden) | |
| 5-702 | A | 48 | 15 | 48 | 32 | For companies with professional drivers motivation programs should be used to maintain the knowledge and interest for ecodriving. Some information of this can be found on Swedish Road Administration web site http://www.vv.se/filer/8897/drivkraft.pdf (in Swedish) Board computer and especially gear shift indicator are technical measures that can help to maintain ecodriving. Gear shift indicator has during the last years been a point of discussion both in EU Commission and ECE.<br>(Government of Sweden) | Noted. |
| 5-703 | A | 48 | 29 | 48 | 29 | ECCJ, 2003 is missing from the references<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, add the ref. |
| 5-704 | A | 48 | 36 | 0 | 0 | We know that aircraft are the most climate damaging transport mode. Don't neglect that: '... Intensive modes such as cars and aircraft to carbon-efficient ...'<br>(Manfred Treber, Germanwatch) | ACC, restructure the text. |
| 5-705 | A | 48 | 40 | 48 | 40 | ORNL, 2006 and JMLIT, 2005 missing from the references<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, add the ref. |
| 5-238 | B | 48 | 40 | 48 | 45 | The meaning of this section is unclear. The authors should redraft to provide a more clear analysis.<br>(Government of Australia) | ACC, modify the text. |
| 5-706 | A | 48 | 42 | 48 | 45 | According to the data on page 154 of Landwehr, M. and Lilliu, C.M. (2002) "Transportation Projections in OECD Regions.", although they are not for the US but for North America, the average energy use per passenger kilometer for cars in 1997 is approximately 2.5 times as large as that for bus and rail. It is worth confirming the accuracy of the data and description.<br>(Takayuki Takeshita, The University of Tokyo) | ACC, check the source. |
| 5-707 | A | 48 | 44 | 48 | 44 | Suggest replace manifested with evident<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-708 | A | 48 | 44 | 48 | 44 | Delete then before occupancy<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-709 | A | 48 | 45 | 48 | 45 | The sentence should read "when occupancy rate is quite low and the electricity mix carbon-intensive is manifested in the US".<br>(Cédric PHILIBERT, International Energy Agency) | ACC, modify the text. |
| 5-710 | A | 48 | 47 | 48 | 48 | I think that the sentence "It hardly entails … to cars" does not make sense. In particular, "such as the case if … to cars" is difficult to understand. If "such as" is | ACC, modify the text. |

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| | | | | | | replaced with "in contrast to", I can understand this sentence.<br>(Takayuki Takeshita, The University of Tokyo) | |
| 5-711 | A | 49 | 13 | 0 | 0 | From Germany (Karlsruhe) we also have data on the attractiveness of their 'Stadtbahn' (light rail). A study on the light rail passengers has shown that every second passenger has a car available at the time when he oder she uses the Stadtbahn (see e.g. Treber, 2006: 16; http://www.germanwatch.org/rio/mt06verk.htm). Because the effect is that high this could be included: ' ... used their cars for their trips (Mackett, R.L., et al., 1998), in the German city Karlsruhe every second passenger of the light rail has a car available when he or she is in the light rail train, while a Japanese ...' P.S.: It was not possible to find reviewed literature which stated that every second light rail user had a car availability. If you doubt get in contact with the people in Karlsruhe: http://www.kvv.de/kvv/<br>(Manfred Treber, Germanwatch) | ACC, check the source. |
| 5-712 | A | 49 | 28 | 49 | 29 | Most of the new european LRT projects that I know have outbalanced the projected ridership. Therefore please add: '... worldwide. The projects reached and outbalanced ridership target ...'<br>(Manfred Treber, Germanwatch) | TIA, covered in other section. |
| 5-713 | A | 49 | 29 | 0 | 0 | The renaissance of light rail trams deserves due to their big success in Europe a little more space. ' ... in some European cities (with France as successful pioneer country in installing completely new tramway systems) and others (Hylen, B., et al., 2002), ...' . Background (see also page 2 of http://forum.europa.eu.int/Public/irc/env/eccp_2/library?l=/eccp_transport_measures/material-background/eccp_transportation/_EN_1.0_): In the year 2000 alone three new french systems were inaugurated in Montpellier, Lyon and Orléans and have had big success. E.g. in Montpellier although every 5 minutes a tram came the trams were that crowded so that they had to be elongated.<br>(Manfred Treber, Germanwatch) | Noted, but no space. |
| 5-714 | A | 49 | 33 | 49 | 46 | A reference study on bus rapid transit systems is IEA (2002) Bus Systems for the Future.<br>(Cédric PHILIBERT, International Energy Agency) | Noted. |
| 5-715 | A | 49 | 48 | 0 | 0 | If there is so much space for North American BRT systems (which seem to have limited sucess) then there should be equal space for the introduction of new tram systems (see also comment for line 29 on this page) in France (after 2000: Bordeaux, Toulouse, Mulhouse), in Germany (Oberhausen, Heilbronn, Saarbrücken), in Athens, Istanbul, Dublin, Madrid and much many more cities. I doubt that there is enough space available to bring text on the expansion of already existing systems in | Noted, but no space. |

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| | | | | | | Strasbourg, Grenoble, Geneva and much many more.<br>(Manfred Treber, Germanwatch) | |
| 5-716 | A | 49 | 48 | 49 | 49 | "BRT systems in MANY cities throughout North America" not in line with "ABOUT 20 systems in service, under construction, or in planning in the US and Canada"<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-717 | A | 50 | 8 | 50 | 10 | Line 8-10 "Although ….. Sector" not related to previous section. Skip or put into a separate paragraph<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-239 | B | 50 | 12 | 50 | 24 | While these examples are interesting surely the overall impact of NMT in the developed world is minimal.<br>(Government of Australia) | Noted. |
| 5-718 | A | 50 | 25 | 0 | 0 | p. 50, line 25: how is this share expressed? I guess the number of trips. Now unclear / misleading.<br>(Bert van Wee, Delft University of Technology) | ACC, modify the text. |
| 5-719 | A | 50 | 29 | 50 | 31 | It is important to clearly specify that, in particular for developed countries, health benefits due to NMT are far larger than increased risk due to accidents. As an example in USA (Ulrich, 2006) each year of bicycling increasing longevity by an average of 0.029 years (10.6 days), and a year of physical exercise without the accident risk of bicycling increasing longevity by 0.034 years (12.4 days). So accident risk decrease longevity only by 0,005 years, compared to the increase of 0,029 due to better health. In developing countries with less sedentary people health benefits are lower but it depend on the context<br>(Stefano Caserini, Politecnico di Milano) | TIA, covered in other section. |
| 5-720 | A | 50 | 36 | 0 | 0 | Please add other positive effects: ' ... important worldwide mitigation potential accompanied by improved health and less accidents if public transport ..'<br>(Manfred Treber, Germanwatch) | TIA, covered in other section. |
| 5-721 | A | 50 | 40 | 50 | 40 | Delete Bus rapid Transit as you have defined it earlier on page 49<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-722 | A | 50 | 48 | 50 | 49 | because of….. motorized mode share': please explain more clearly<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-723 | A | 51 | 4 | 51 | 34 | No references stated<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, check the text. |
| 5-724 | A | 51 | 5 | 51 | 5 | Delete GNG and replace with GHG<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-725 | A | 51 | 5 | 51 | 5 | "….could decrease GNG and …….". Replace "GNG"with "GHG" | ACC, modify the text. |

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| | | | | | | (Government of India) | |
| 5-726 | A | 51 | 6 | 0 | 0 | We need 'Push and Pull'. Please add therefore: ' ...at both ends of the transport chain and introduction of road pricing for trucks (infrastructure pricing exists in Europe already for the rail), would be a way to ...' See also page 1 of http://forum.europa.eu.int/Public/irc/env/eccp_2/library?l=/eccp_transport_measures/material-background/eccp_transportation/_EN_1.0_ (Manfred Treber, Germanwatch) | TIA, covered in other section. |
| 5-727 | A | 51 | 8 | 51 | 8 | move reference to the reference paragraph, as usual (Stefano Caserini, Politecnico di Milano) | ACC, modify the text. |
| 5-728 | A | 51 | 16 | 0 | 0 | Change Commission with EU Commission (Stefano Caserini, Politecnico di Milano) | ACC, modify the text. |
| 5-729 | A | 51 | 22 | 51 | 22 | Add: This adjustment is desireable up to a degree as under central planning the transport system was overly rail-intensive. However, the viability of freight services is being rapidly destroyed through requiring freight profits to cross subsidise loss making passenger services required by politicians that fail to fund them from public money. (Stephen Perkins, European Conference of Ministers of Transport) | Rejected, the comment is too simple. |
| 5-730 | A | 51 | 31 | 51 | 31 | After "Europe" add : if liberalisation of the market is pursued to the point where continental scale freight operators emerge to offer end-to-end sevices that reap the advantages of rail for long distance transport. (Stephen Perkins, European Conference of Ministers of Transport) | ACC, modify the text. |
| 5-731 | A | 51 | 34 | 51 | 0 | ECOLOGICAL issues; change to ENVIRONMENTAL issues? (Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, check the text. |
| 5-732 | A | 52 | 1 | 52 | 1 | What is the source of Figure 5.19? (John Kessels, Energy Research Centre of the Netherlands) | ACC, add the ref. |
| 5-733 | A | 52 | 3 | 52 | 27 | Page 52, lines 3-27: this is all part of the section of modal shift. But most effects from pricing relate to the direct effects. And pricing is only one of several options for modal split policies. Next, (line 17-18): there is no basis for the conclusion that there is some potential for modal shift provided that adequate service is provided: the text above does not elaborate on service. (Bert van Wee, Delft University of Technology) | ACC, modify the text. |
| 5-734 | A | 52 | 5 | 52 | 31 | All this paragraphs are repeated at pag. 52 line 5-31. I suggest to delete them at pag. 52 (Stefano Caserini, Politecnico di Milano) | (page 53), ACC, restructure the text. |
| 5-735 | A | 52 | 6 | 0 | 0 | Change “superior to” to “greater than” (Danny Harvey, University of Toronto) | ACC, check the text. |

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| 5-736 | A | 52 | 9 | 0 | 0 | transport (singular)<br>(Danny Harvey, University of Toronto) | ACC, check the text. |
| 5-737 | A | 52 | 13 | 0 | 0 | container (singular, no possessive)<br>(Danny Harvey, University of Toronto) | ACC, check the text. |
| 5-738 | A | 52 | 17 | 52 | 17 | Delete Again and begin Sentence with These results…<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, check the text. |
| 5-739 | A | 52 | 23 | 0 | 0 | infrastructure, service (singular)<br>(Danny Harvey, University of Toronto) | ACC, check the text. |
| 5-740 | A | 52 | 24 | 0 | 0 | delete “connection”<br>(Danny Harvey, University of Toronto) | ACC, check the text. |
| 5-741 | A | 52 | 29 | 53 | 31 | Nothing is written on traffic calming. All the paragraph deals with urban transport planning and intermodality issues. I would like to see more on this point, on how traffic calming (a set of strategies used by urban planners and traffic engineers which aim to slow down or reduce traffic, thereby improving safety for pedestrians and bicyclists as well as improving the environment for residents) could decrease GHG emissions due to a better eco-driving. I would like to see a connection between eco driving paragraph (pag. 48) and traffic calming. See www.trafficcalming.org form programs and references<br>(Stefano Caserini, Politecnico di Milano) | ACC, check the source. |
| 5-742 | A | 52 | 29 | 52 | 0 | In this heading, drop the words in parentheses, they are not mentioned in the text. U.S. Government<br>(Government of U.S. Department of State) | ACC, modify the text. |
| 5-743 | A | 52 | 32 | 0 | 0 | Should be “gives” (present tense because the literature still exists)<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-744 | A | 53 | 1 | 0 | 0 | In all the chapter, sometimes the authors are quoted only whit the family name (i.e. pag. 17 line8), other times also with the initial of family name (i.e. pag 53 line 1).<br>(Stefano Caserini, Politecnico di Milano) | ACC, modify the text. |
| 5-745 | A | 53 | 5 | 53 | 31 | Overlap with page 57 line 16-44<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, restructure the text. |
| 5-746 | A | 53 | 5 | 53 | 32 | These sections appear to be repeated, suggest you delete one redundant section, or summarise one, so that it isn't repeated.<br>(Michael Taylor, International Energy Agency) | ACC, restructure the text. |
| 5-747 | A | 53 | 17 | 53 | 18 | P. 53, line 17-18: these results are difficult to interpret. What are the initial prices? At most places the price is zero. What then does the elasticity mean? The effects of pricing for parking now are difficult to understand.<br>(Bert van Wee, Delft University of Technology) | ACC, modify the text. |

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| 5-748 | A | 53 | 27 | 0 | 0 | "are limited"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-749 | A | 53 | 28 | 0 | 0 | Insert "that" after "estimated"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-750 | A | 53 | 30 | 0 | 0 | Insert "that" after "suggested"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-751 | A | 53 | 33 | 54 | 37 | RVSM is only one of the many CNS/ATM concepts with respect to ATM Environmental Benefits. In relation to the - on page 53 mentioned - air traffic management constraints, one could add that the CNS/ATM concepts, included in the accompanying MS-Word document called BROK_Green CNS/ATM enhancements.doc, could improve aviation fuel efficiency up to 10% (between 2010 and 2020 compared to the situation in 2000). Amongst others, two major ATM programs in Europe - SESAR - and in the US - NGATS - are addressing these efficiency and environmental impact improvements.<br>(Paul Brok, National Aerospace Laboratory NLR) | Noted – will consider for the redraft |
| 5-752 | A | 53 | 34 | 53 | 39 | We suggest that this entire paragraph be replaced by the following text:<br>Air traffic management (ATM) considerations have a substantial impact on aircraft operations. The International Civil Aviation Organization (ICAO) has recently endorsed and published its Global Air Traffic Management Operational Concept (Doc 9854 AN/458, First Edition – 2005), which presents the ICAO vision of an integrated, harmonized and globally interoperable ATM system, with a planning horizon up to and beyond 2025. In order to facilitate the realization of the Concept, a Global Air Navigation Plan as well as an Implementation Programme Plan have been developed. The enhancements envisaged by the Concept will significantly alleviate current ATM constraints imposed upon air traffic. Taxi-time will be minimized; optimum cruising levels (for load and mission distance) will be assigned; the route structure will be more flexible, allowing maximum benefit from prevailing winds; and holding/stacking patterns will not normally be necessary. All these improvements will minimize fuel usage, and hence CO2 emissions.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted – will consider for the redraft |
| 5-753 | A | 53 | 34 | 54 | 17 | Rather than discussing the science issues, shouldn't the authors be referring to the WG1 volume of the FAR? It is their job to do the science. That would provide more room to describe the technology options better.<br>(Steven Baughcum, Boeing Company) | Rejected – a science overview is appropriate |
| 5-754 | A | 53 | 35 | 53 | 39 | The authors make sweeping statements about how to optimally operate aircraft without being clear that they are only focused on greenhouse gas emissions- not the | Noted – the competing environmental trades will be |

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| | | | | | | overall environmental impact from aviation. Given that ICAO believes that noise and local air quality issues are as important as greenhouse gas emissions, then any optimization problem for the environmental impact of aviation would have to careful consider all three objectives. Depending on ongoing scientific research, it may be, especially when weighted by time and health impact, that GHG emissions and their potential impact on climate change may not be the top priority. The authors, at minimum, should rewrite this section to more accurately state what is being optimized (GHG emission reductions). Further, they should provide references to support their conclusions on what constitutes optimal air traffic management practices for reducing fuel usage. U.S. Government (Government of U.S. Department of State) | mentioned |
| 5-755 | A | 53 | 39 | 53 | 39 | Please insert text. "ICAO Circular 303 - Operational Opportunities to Minimize Fuel Use and Reduce Emissions emissions identifies and reviews various operational opportunities and techniques for minimizing fuel consumption, and therefore emissions, in civil aviation operations. The Circular addresses opportunities for improvements at airports, historical record of fuel saving in the civil aircraft fleet and the anticipated continued improvement in aircraft fuel efficiency in future, identifies fuel-saving opportunities during ground-based activities before flight, including both maintenance and the reduction of aircraft mass, and the possibilities for in-flight fuel saving with particular focus on the input from airlines and air traffic services providers and the potential for increased efficiency through load factor improvement. Some specific examples are provided of changes that each stakeholder (airlines, airports, ATC providers, airworthiness authorities, environmental agencies and other government bodies, and other interested parties) could consider in order to minimize the amount of fuel used. (Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted – but the text does not quantify the benefits suggested. They are recommendations and we should consider the points offered and offer the reference |
| 5-756 | A | 53 | 41 | 53 | 41 | Suggestion to add: "See also Box 5.1, page 11, line 11-22" (Hein De Wilde, Energy Research Centre of the Netherlands) | Accepted |
| 5-757 | A | 53 | 41 | 53 | 42 | Has "major European project 'TRADEOFF'" been major than other projects like AERO2K or CONSAVE? Suggestion to remove the additive "major". (Paul Brok, National Aerospace Laboratory NLR) | Noted |
| 5-758 | A | 53 | 43 | 53 | 44 | Insert “and” after “formation” and delete “all” (Danny Harvey, University of Toronto) | Accepted – will cover in the redraft |
| 5-759 | A | 53 | 44 | 53 | 44 | Scientists acknowledge that radiative forcing is not an appropriate parameter to weigh the impacts of aviation emissions that greatly differ in time scale of influence. As such implying that radiative forcing could be used to weigh the impacts of | Accepted |

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| | | | | | | contrails vs CO2 vs O3 formation. Authors should acknowledge that presently the right metrics are not available to weigh the impacts of various aviation emissions on climate and that introducing operational measures that increase CO2 may in fact be harmful. The rest of the discussion appropriately acknowledges uncertainties. U.S. Government<br>(Government of U.S. Department of State) | |
| 5-760 | A | 54 | 5 | 54 | 6 | I did not find in Fichter et al. (2005) that to a first order, one might expect aviation-indiced cirrus cloud to scale with contrails. Are you sure they said this?<br>(Michael Danilin, The Boeing Company) | Noted and will confirm |
| 5-761 | A | 54 | 7 | 0 | 0 | Change "being an integral" to "with effects integrated"<br>(Danny Harvey, University of Toronto) | Noted |
| 5-762 | A | 54 | 10 | 54 | 14 | I strongly disagree that contrails can be rather easily avoided. It is not as easy as Mannstein et al. (2005) claimed. First, no airplane have onboard an instrument measuring relative humidity accurately. Second, the vertical thickness of ice-supersaturated area is not a universal constant of 0.5 km as one may think after reading Mannstein et al. (2005) and changes widely from one location to another with a poorly understood seasonal and inter-annual modulation. For example, Sassen referred the mean cirrus layer thickness of 1.6 km over Salt-Lake City (In Cirrus, p.11-40, Oxford Univ. Press, 2002). Third, existing weather prediction models doing a very poor job predicting RH in the upper troposphere. Forth, ATM may not allow to change altitude for every airplane trying to avoid contrail areas. Fifth, claiming that contrails can be easily avoided hints that there is some sort of conspiracy from airlines who can easily avoid contrails and refused to do so, which is not true. I suggest to rewrite this sentence clearly pointing out these practical limitations.<br>(Michael Danilin, The Boeing Company) | Noted – delete "rather easily" |
| 5-763 | A | 54 | 12 | 0 | 0 | Delete "one"<br>(Danny Harvey, University of Toronto) | Noted |
| 5-764 | A | 54 | 13 | 0 | 0 | Insert "only" after "level"<br>(Danny Harvey, University of Toronto) | Noted |
| 5-765 | A | 54 | 15 | 0 | 0 | Change "magnitude" to "production of O3" and delete from "rather than" to the end of the sentence.<br>(Danny Harvey, University of Toronto) | Noted |
| 5-766 | A | 54 | 20 | 54 | 20 | Please, quote RVSM when it is first used, which is here and not in line 28. Also, what is the meaning of (FL) 290.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Accepted |

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| 5-767 | A | 54 | 20 | 54 | 38 | Needs a reference, where were the numbers for 2003 obtained?<br>(John Kessels, Energy Research Centre of the Netherlands) | Accepted – will provide reference |
| 5-768 | A | 54 | 20 | 54 | 32 | We suggest that this text be replaced by the following: Under the auspices of ICAO, the Reduced Vertical Separation Minimum (RVSM), involving a reduction from 2000 ft to 1000 ft minimum separation between FL 290 (Flight Level 290, 29000 ft) and FL 410, has been implemented throughout most of the world, with well over 80% of commercial global en-route air traffic now benefiting from six additional cruising levels. This allows aircraft to safely fly more optimum profiles with resulting fuel savings and airspace capacity increases.<br>A Eurocontrol study has tested the hypothesis that implementation of RVSM would lead to reduced fuel burn and aviation emissions, since RVSM offers the possibility to optimize flight profiles more readily than in the pre-existing ATM regime. The study …….<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted – will consider |
| 5-769 | A | 54 | 20 | 54 | 28 | Explain abbreviation 'RVSM' in line 20 (first use) and not in line 28<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Accepted |
| 5-770 | A | 54 | 20 | 0 | 0 | It is clearer if written as "flight level 290 (FL290)"<br>(Danny Harvey, University of Toronto) | Noted |
| 5-771 | A | 54 | 20 | 0 | 0 | Define RVSM here, not on lines 28-29<br>(Danny Harvey, University of Toronto) | Noted |
| 5-772 | A | 54 | 20 | 54 | 37 | The discussion continues to demonstrate the consistent bias in this document toward few and primarily European based studies. In the case of operational procedures for environment benefit, this is particularly egregious given the extensive work that has taken place and that is ongoing at ICAO to promote changes in air traffic management procedures to reduce environmental benefit. For example, ICAO has published Circular 303 Operational Opportunities to Minimize Fuel Use and Reduce Emissions to offer best practice and practical solutions to reduce emissions. Further, ICAO has ongoing work in expert panels and continues to host workshops to promote improved operational approaches among airlines, air navigation service providers, and airports. This section should be re-written to provide information on the extensive international- not simply European- endeavors ongoing in this area. Concerning the European study cited, the authors should also comment on whether the EUROCONTROL study appropriately accounted for the impact of wind and whether three days of traffic are scalable. Further, if the authors are going to highlight RVSM, it would make sense to note that it has also been applied in the largest aviation market in the world- the U.S. U.S. Government | Noted – so far as I can see the Circ. 303 does not quantify benefits, nor offer a technical analysis of the recommended practices that it suggests. The Eurocontrol study did quantify emissions (fuel) savings, admittedly for the European area, and these have been quoted. There is no reason to believe that similar benefits would not result from the adoption of the practices elsewhere, but |

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| | | | | | | (Government of U.S. Department of State) | the scale of the benefit might be different. Are other studies needed here? But they will be sought. |
| 5-773 | A | 54 | 28 | 0 | 0 | As regards "A Eurocontrol study", the exact name of literature should be inserted. (Takayuki Takeshita, The University of Tokyo) | Noted |
| 5-774 | A | 54 | 29 | 0 | 0 | The explanation of RVSM should be moved o the earlie paragraph (line 20). (Government of Sweden) | Noted |
| 5-775 | A | 54 | 34 | 54 | 34 | Typo error. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted |
| 5-776 | A | 54 | 36 | 0 | 0 | Delete “per year” (Danny Harvey, University of Toronto) | Noted |
| 5-777 | A | 54 | 37 | 0 | 0 | Delete “annual” (Danny Harvey, University of Toronto) | Noted |
| 5-778 | A | 54 | 38 | 54 | 38 | We suggest that the following paragraph be inserted: Additional environmental benefits in terms of reduced aviation emissions are now increasingly being derived from the concept of performance-based navigation (PBN). This major enhancement allows a safe reduction of the lateral spacing between routes, which results in a larger number of aircraft being assigned optimum cruising levels. (Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Noted and will consider |
| 5-779 | A | 54 | 39 | 55 | 6 | The discussion of lower flight speeds only focuses on the engine. The airplane would change as well. A slower airplane reduces the productivity of the airplane (flights per day) and could mean the airplane experiences severe weather conditions more often. (Steven Baughcum, Boeing Company) | Accepted |
| 5-780 | A | 54 | 40 | 55 | 6 | Needs a reference, for example who perceives propellor driven aircraft as dangerous, reference.. (John Kessels, Energy Research Centre of the Netherlands) | Accepted |
| 5-781 | A | 54 | 40 | 55 | 6 | Given all the potential aviation practices, it is not clear why the authors chose to focus on lower flight speeds. They offer no context for this choice, plus they offer no information on what quantifiable benefits would be achieved from moving to such aircraft, especially given the nature of the aviation market- and its influence on other segments of the economy. Simply talking about the engineering of “scimitar | Noted. There was no greater “focus” in lower speeds than any other mitigation technology. Will address in redraft |

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| | | | | | | shaped blades" offers nothing about fuel benefits- especially if such technology and aircraft were adopted into the system. It is not clear what basis they have for asserting such aircraft "might be suitable for short haul operations where speed is less important." They do, at least, acknowledge the problem of passenger perception on safety. This section should be dropped unless the authors can develop much better supporting information covering the aircraft, the environmental benefit, and ability to support such aircraft in commercial market. Without that, this appears more like a brainstorming idea of a particular author rather than thoughtful analysis based on broad international consensus. U.S. Government (Government of U.S. Department of State) | |
| 5-782 | A | 55 | 0 | 72 | 0 | References: Reducing NOx Emissions on the Road: Ensuring Future Emission Limits Deliver Air Quality Standards www.cemt.org/pub/pubpdf/NOx%202006E.pdf CO2 Abatement Policies for the Transport Sector, ECMT 2006, forthcoming. Available from ECMT as a report submitted to Ministers in May 2006, reference CEMT/CM(2006)15/FINAL. (,) | Acc |
| 5-783 | A | 55 | 0 | 72 | 0 | Cost effectiveness was highlighted in the Paris presentation, but material needs to be added in the text. Information given on the negative costs of some passenger car technologies (taken from EMCT/IEA) is potentially misleading taken out of context. A more complete treatment is provided in (ECMT 2006 forthcoming pp 25-26; and CE 2006 ).References: Cost Effectiveness of CO2 Mitigation in Transport. An outlook and comparison with measures in other sectors, Report prepared by Bettina Kampman, Sander de Bruyn and Eelco den Boer (CE Netherlands) for ECMT, April 2006 www.cemt.org/topics/env/CO2mitigation.pdf (Steve Perkins, European Conference of Ministers of Transport, OECD) | Accepted (ron) |
| 5-784 | A | 55 | 0 | 72 | 0 | A small section should be added on the impacts of truck-km charges in Switzerland, Germany and Austria in stimulating better truck loading and logistics organization and on the London congestion and Stockholm congestion charges. (Steve Perkins, European Conference of Ministers of Transport, OECD) | Acc ron |
| 5-785 | A | 55 | 8 | 0 | 0 | Section 5.4 would benefit from discussion of the role of transportation in broader economy-wide or multi-sectoral climate policies (e.g., cap and trade design). (Jason Mark, Union of Concerned Scientists) | Acc, section will be added |
| 5-786 | A | 55 | 8 | 69 | 40 | Comment: Measures to shift freight transport from road to rail and shipping are missed totally. | Acc, is already in section 5.3.5., so we will cross- |

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| | | | | | | (Government of Germany) | reference and add some policies: 1) CO2-effect from modal shift of pricing and 2) other policies aimed at modal shift that generate CO2-reduction.>>> Michel writes and Ron coordinates in policy part |
| 5-787 | A | 55 | 12 | 0 | 0 | Reads better as "policy consideration at the national and international levels"<br>(Danny Harvey, University of Toronto) | Acc |
| 5-788 | A | 55 | 17 | 55 | 19 | p. 55: the subdivision as presented in line 17-19 is not reflected in the texts below. Even the very first policy that is described , urban and transport planning is missing.<br>(Bert van Wee, Delft University of Technology) | Acc |
| 5-789 | A | 55 | 19 | 0 | 0 | Add the following bullets:<br>• Appropriate land use planning, coupled with<br>• Provision of high-quality, rail-based transportation infrastructure<br><br>(Danny Harvey, University of Toronto) | Acc, michel and Muro will coordinate and organize |
| 5-240 | B | 55 | 23 | 55 | 23 | The authors need to provide further explanation as to why international coordination is necessary for transport measures.<br>(Government of Australia) | acc |
| 5-790 | A | 55 | 28 | 0 | 0 | Surface transport policies could also include market mechanisms (tradable standards) and consumer information efforts.<br>(Joanna Lewis, Pew Center on Global Climate Change) | Tia, tradable standards already mentioned on page 61. cons info will be added in 5.4.1.5. |
| 5-791 | A | 55 | 28 | 0 | 0 | 5.4.1.1 Urban and transport planning: This should be discussed in more detail. The general statement that " there is liitle evidence that higher densities have much impact on automobile ownership or vehicle kilometres travelled" is hard to believe.<br>(Sandra Cointreau, World Bank) | ACC, modify the text. |
| 5-792 | A | 55 | 36 | 0 | 0 | Almost nowhere has urban transport planning and policy placed more weight on sustainable development than on economic considerations, so why do you make such a strange statement?<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-793 | A | 56 | 2 | 56 | 9 | Presumably Gordon et al. and Ewing et al represent two sides to the argument about whether density makes any difference to automobile use, but you then go on to | ACC, modify the text. |

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| | | | | | | summarize only those papers that argue that it makes little difference. A more balanced discussion is called for, especially since it is obvious that at some point (dependent on culture) it will make a big difference. The data from Kenworthy and Newman's book should be discussed here. The difference in both density and private automobile use between the US and Europe, and between Europe and wealthy Asian cities, is enormous. The level of car ownership itself will be shaped by density and the amount of parking available.<br>(Danny Harvey, University of Toronto) | |
| 5-794 | A | 56 | 3 | 56 | 3 | Delete from before that the settlement patterns..<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-795 | A | 56 | 3 | 0 | 0 | Delete "from"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-796 | A | 56 | 4 | 0 | 0 | Should read "are marginal, or that …"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-797 | A | 56 | 8 | 0 | 0 | Change "unlikely" to "rarely". Convert density to persons per hectare.<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-798 | A | 56 | 9 | 0 | 0 | Change "somewhere else" to "elsewhere"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-799 | A | 56 | 18 | 0 | 0 | Change "deterministic" to "determining"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-800 | A | 56 | 20 | 0 | 0 | What is meant by "derogations to"? Use some other wording.<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-801 | A | 56 | 24 | 56 | 26 | Institutional interaction within and between national and local governments is also a central issue currently being explored by the UNECE/WHO Joint Pan-European Programme on Transport, Health and Environment (see www.thepep.org). A recent report (ECE/AC.21/2006/7 - EUR/06/THEPEPST/7) from April 2006 sets out Guidance on Institutional Arrangements for Integrated Policy and Decision-making on Transport, Environment and Health (http://www.thepep.org/en/commitee/committee_fourth.htm).<br>(Dominic Stead, Delft University of Technology) | Noted, check the source. |
| 5-802 | A | 56 | 35 | 56 | 36 | Delete "they may avoid" and insert "might be avoided" after "projects"<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-803 | A | 57 | 13 | 57 | 14 | This sentence was already used in Page 53, lines 2 to 4.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC, restructure the text. |
| 5-804 | A | 57 | 15 | 57 | 45 | These sections appear to be repeated, suggest you delete one redundant section, or | ACC, restructure the text. |

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| | | | | | | summarise one, so that it isn't repeated.<br>(Michael Taylor, International Energy Agency) | |
| 5-805 | A | 57 | 16 | 57 | 37 | This paragraph was already presented in page 53, line 5 to 26.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC, restructure the text. |
| 5-806 | A | 57 | 16 | 57 | 43 | This section is an exact replication of page 53 line 5 to line 31???Delete<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, restructure the text. |
| 5-807 | A | 57 | 16 | 57 | 43 | Overlap with page 53 line 5-31<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, restructure the text. |
| 5-808 | A | 57 | 16 | 57 | 43 | This segment is an exact duplicate of page 53 lines 5-31<br>(Danny Harvey, University of Toronto) | ACC, restructure the text. |
| 5-809 | A | 57 | 16 | 57 | 43 | All this paragraphs are repeted at pag. 52 line 5-31. I suggest to delete them at pag. 52<br>(Stefano Caserini, Politecnico di Milano) | ACC, restructure the text. |
| 5-810 | A | 57 | 16 | 57 | 43 | Same text as page 53 line 5 - 31<br>(Government of Sweden) | ACC, restructure the text. |
| 5-241 | B | 57 | 16 | 57 | 37 | This is a repeat of page 53, and should be deleted.<br>(Government of Australia) | ACC, restructure the text. |
| 5-811 | A | 57 | 18 | 57 | 43 | These sentences are just the same as the sentences in lines 7-31 on page 53. Each of them should be deleted.<br>(Takayuki Takeshita, The University of Tokyo) | ACC, restructure the text. |
| 5-812 | A | 57 | 28 | 57 | 37 | p. 57, lines 28-37 and 39-43 do strongly overlap with texts a few pages back.<br>(Bert van Wee, Delft University of Technology) | ACC, restructure the text. |
| 5-813 | A | 57 | 39 | 57 | 43 | This paragraph was already presented in page 53, line 26 to 31<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC, restructure the text. |
| 5-814 | A | 58 | 1 | 58 | 15 | It is appropriate to mention Ken Livingston's charge for driving into central London year, although it is also mentioned later.<br>(Danny Harvey, University of Toronto) | TIA, covered in other section. |
| 5-815 | A | 58 | 17 | 0 | 0 | Should read "fuel economy and greenhouse gas emission standards".<br>(Joanna Lewis, Pew Center on Global Climate Change) | ACC |
| 5-816 | A | 58 | 17 | 61 | 11 | This section should include a discussion of how fuel economy standards in the U.S. (and perhaps elsewhere) include credits for vehicle operated on alternative fuels. The discussion should indicate the problem of providing credit to flex-fuel or bi-fuel vehicles which may not use the alternative fuels, but also discuss how combing these credits with incentives for production of alternative fuels and alternative fuel stations | REJ; minor issue |

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| | | | | | | might be used to encourage the sales of vehicles that reduce GHG emissions. U.S. Government<br>(Government of U.S. Department of State) | |
| 5-817 | A | 58 | 19 | 58 | 40 | No reference, where is this information from?<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-818 | A | 58 | 24 | 58 | 25 | Whereas the light truck standard has recently been increased from 22.2 mpg (10.59l/100km) in MY 2007 to 23.5 mpg (10.01 l/100km) in MY 2010. In MY 2011, manufacturers must comply with a reformed system where required CAFE levels depend on the manufacturer's fleet mix. The standard set in that year is approximately equal to 24.0 mpg (9.80 l/100km) over the light truck fleet. U.S. Government<br>(Government of U.S. Department of State) | TIA, will draft discussion |
| 5-819 | A | 58 | 24 | 58 | 25 | Need to update the discussion of light truck standards to reflect the recent US rulemaking. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-820 | A | 58 | 24 | 0 | 0 | CAFE standards in the US for light trucks have been increased (~ 24 MPG by 2011). Need to update what is written. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-821 | A | 58 | 25 | 58 | 0 | The U.S. Light truck standards have been increased to 23.5 mpg by 2010. See: http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99aefa80569eea57529cdba046a0/ U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-822 | A | 58 | 25 | 58 | 25 | Additional programs include: (comment - the voluntary programs do not constitute mandatory standards) U.S. Government<br>(Government of U.S. Department of State) | TIA, will discuss |
| 5-823 | A | 58 | 26 | 58 | 28 | Korean and Japanese manufacturers have the 140 gCO2/km as a target for 2009, not 2008 (only for EU manufacturers).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC |
| 5-824 | A | 58 | 26 | 58 | 28 | Note that the EU requirement is not a traditional standard but the result of an agreement with the car manufacturers' associations. You may also be more precise about the status of the targets, standards, etc. quoted for the other regions.<br>(Government of European Community / European Commission) | TIA, as above |
| 5-825 | A | 58 | 26 | 58 | 28 | The European standards are being implemented under a voluntary agreement which is much different that the regulatory requirement in the US. Should check with EU to determine status of "compliance" with their voluntary standard. U.S. Government<br>(Government of U.S. Department of State) | TIA, as above, and discuss limited success |

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| 5-826 | A | 58 | 29 | 58 | 30 | This standard is representative of a small passenger car. U.S. Government (Government of U.S. Department of State) | REJ, it's a fleet average |
| 5-827 | A | 58 | 31 | 58 | 33 | This standard seems high even allowing for the correction factor to the US CAFE cycle. U.S. Government (Government of U.S. Department of State) | TIA, will check |
| 5-828 | A | 58 | 36 | 0 | 0 | Add an additional bullet:<br>• Canada: A 25% voluntary reduction in CO2 emissions from standards equivalent to the US CAFÉ standard.<br><br>(Danny Harvey, University of Toronto) | TIA, will check |
| 5-829 | A | 58 | 37 | 58 | 46 | Compared to previous lines, only the last region California does not show consumption absolute figure in l/100 km, only a reduction target. As it is available to build the figure 5.20, should it be possible to give the current data before reduction , for comparison ?<br>(Brigitte POOT, Total s.a.) | TIA, if possible |
| 5-830 | A | 58 | 40 | 0 | 0 | After "industry" insert "and the US federal government" and change "was" to "were"<br>(Danny Harvey, University of Toronto) | ACC |
| 5-831 | A | 58 | 42 | 59 | 2 | The point made here is that the official driving cycle used for fuel economy compliance programs differs across nations. A more important point that should be made is the extent to which these somewhat artificial driving cycles represent in-use driving, therefore actual reductions in fleet fuel consumption. In the US, in-use fleet fuel consumption is about 15% greater than would be predicted by the fuel economy standards alone. U.S. Government (Government of U.S. Department of State) | TIA, add a sentence on this |
| 5-832 | A | 58 | 45 | 0 | 0 | Insert "better" before "fuel economies" and delete "higher" after [whether it is higher or lower depends on whether one is thinking in terms of mpg or L/100 km).<br>(Danny Harvey, University of Toronto) | REJ, fuel economy is a clear term |
| 5-833 | A | 59 | 3 | 59 | 0 | This graph has to be made easier to read. It also has to have a jagged line at the bottom of the y-axis and start with zero. It is a deceptive graph. It looks like Japan's mpg is four times that of the U.S. U.S. Government (Government of U.S. Department of State) | ACC, if possible |
| 5-834 | A | 59 | 3 | 59 | 0 | Figure 5.20 should footnote that the California standards are GHG standards, rather than fuel economy standards. U.S. Government (Government of U.S. Department of State) | ACC |
| 5-835 | A | 59 | 4 | 59 | 4 | Figure 5.20 is the source of this figure An and Sauer, 2004? Make clearer | ACC |

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| | | | | | | (John Kessels, Energy Research Centre of the Netherlands) | |
| 5-836 | A | 59 | 6 | 59 | 22 | The studies cited here reflect world oil prices substantially lower than today and substantially lower than prices now projected for the coming decades. Thus, arguments around cost-effectiveness and small consumer benefits should be re-evaluated or caveated.<br>(Jason Mark, Union of Concerned Scientists) | ACC |
| 5-837 | A | 59 | 8 | 59 | 10 | Should note that the NRC study used fuel prices significantly lower than those currently prevailing. Greater increases than those discussed would pay for themselves if current fuel prices are maintained. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-838 | A | 59 | 10 | 59 | 0 | The cost is less than the value of the fuel saved if a 15-year payback is assumed. The industry believes that new vehicle buyers desire a 3-year payback which changes the results a lot. U.S. Government<br>(Government of U.S. Department of State) | REJ, ALREADY EXPLAINED IN TEXT |
| 5-839 | A | 59 | 12 | 59 | 13 | How is it possible a 38% reduction in CO2 emissions with a 61% increase in fuel economy?<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Noted, but one is the inverse of the other |
| 5-840 | A | 59 | 14 | 0 | 0 | Please give the equivalent of 92 g/km in terms of L/100 km.<br>(Danny Harvey, University of Toronto) | ACC |
| 5-242 | B | 59 | 14 | 59 | 18 | It would be of assistance if the authors could include some discussion of discount rates in this section.<br>(Government of Australia) | ACC |
| 5-841 | A | 59 | 21 | 59 | 22 | Neither purchasers or manufacturers currently take climate effects into account--shouldn't imply they never will.<br>(Joanna Lewis, Pew Center on Global Climate Change) | ACC, will add qualifier |
| 5-842 | A | 59 | 24 | 59 | 25 | Insert “supposed” before “adverse” and delete “supposedly” before “demanded” because weight reduction really is one way of meeting better standards (and if the standards are tough enough to help the climate, all techniques – including weight reduction – will be needed) but weight reductions need not compromise safety (some experts argue that they don’t at all)<br>(Danny Harvey, University of Toronto) | TIA, but depending on stringency, weight reduction may not be required |
| 5-843 | A | 59 | 25 | 0 | 0 | Insert a comma after “standards”<br>(Danny Harvey, University of Toronto) | REJ |
| 5-844 | A | 59 | 54 | 59 | 26 | These criticisms are an old chestnut roundly refuted many times on both sides of the Atlantic, to put it bluntly there is no evidence to support them. I would not give | REJ, NHTSA studies are not “no evidence” |

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| | | | | | | credit to the argument and start the sentence: Criticisms are sometimes raised over fuel economy standards ...<br>(Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-243 | B | 60 | 1 | 60 | 12 | This section seems misplaced as the safety discussion occurs earlier in the chapter.<br>(Government of Australia) | REJ, safety is NOT treated earlier |
| 5-845 | A | 60 | 6 | 0 | 0 | Insert "(NHTSA)" after "administration"<br>(Danny Harvey, University of Toronto) | ACC |
| 5-846 | A | 60 | 6 | 60 | 8 | The U.S. National Highway Traffic Safety Administration has generally claimed that fleetwide weight reductions reduce fleet safety, (Kahane, 2003) but this conclusion is strongly disputed (DRI, 2004 NRC, 2002). The Kahane study also calculates a "crossover weight," a point above which weight reductions have a net benefit rather than harm when all road users are taken into account U.S. Government<br>(Government of U.S. Department of State) | Not clear what is wanted here |
| 5-847 | A | 60 | 23 | 60 | 23 | Delete types of and sizes of to read as types and sizes of…<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-848 | A | 60 | 40 | 0 | 40 | Taiwan should be corrected as Taiwan of China.<br>(Government of China Meteorological Administration) | REJ, unless IPCC doesn't accept this |
| 5-849 | A | 60 | 48 | 0 | 0 | After "on" insert "(however, the risk of regulations to reduce climate impacts is something that prudent manufacturers will have already taken into account in developing their market segments and product lines)"<br>(Danny Harvey, University of Toronto) | REJ, this is just a slap at some manufacturers |
| 5-850 | A | 61 | 6 | 61 | 0 | The best recent analysis on feebates was done by David Greene, et al which can be found at: http://www-cta.ornl.gov/cta/Publications/Reports/FeebateEnergyPolicy_FINAL.pdf This should be added to the References. U.S. Government<br>(Government of U.S. Department of State) | ACC,will be noted |
| 5-851 | A | 61 | 13 | 61 | 13 | Many EU Member States have implemented or are considering policies to stimulate the use of biofuels (e.g. tax exemptions of obligations). These could also be discussed in this section.<br>(Government of European Community / European Commission) | Acc, ron could add recent policies |
| 5-852 | A | 62 | 0 | 0 | 0 | Table 5.7 This table should be updated. For EU you can find new information on DG Environments web site for the EU strategy on CO2 and Cars. Se supporting studies http://ec.europa.eu/environment/co2/co2_studies.htm , Report on the effectiveness of the car fuel efficiency labelling directive 1999/94/EC, and options | Acc |

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| | | | | | | for improvement: Annex 1<br>(Government of Sweden) | |
| 5-853 | A | 62 | 1 | 0 | 0 | Table 5.7. There is an interesting policy instrument adopted in Shanghai, China. People's Daily Online reported on July 12, 2006 that the price of a licence plate reached at almost 40,000 yuan (US$5,000) at auction as a result of Shanghai government's efforts to limit the number of new vehicles. More details can be seen via Internet, http://english.people.com.cn/200607/12/eng20060712_282250.html.<br>(Takanobu Kosugi, Ritsumeikan University) | Tia, source will be checked and added if ok |
| 5-854 | A | 62 | 1 | 62 | 1 | In the table in the congestion pricing row I would give London and Stockholm as examples not Norway and Belgium (always strikes me as odd to call Singapore a developing country).<br>(Stephen Perkins, European Conference of Ministers of Transport) | Acc |
| 5-855 | A | 62 | 1 | 62 | 5 | Add in the third column, 2nd row of Table 5.7 "Brazil" . Tax incentive for the use of Natural Gas is available in some states.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Acc |
| 5-244 | B | 62 | 1 | 62 | 5 | Table 5.7 is not comprehensive it should at least include the other examples included in table 5.9.<br>(Government of Australia) | Acc, will be harmonized |
| 5-856 | A | 62 | 5 | 62 | 5 | Table 5.7. Ameliorate the information contained column 3: “Developed countries”. More EU countries should be mentioned in rows.<br>(ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN)) | acc |
| 5-857 | A | 62 | 5 | 62 | 5 | What is meaning of "Pricing". Does this refers to the price of the car or is some policy.that the government can apply? It is important to understand since a few lines below it is stated that through pricing the welfare gains is 20 £billion per year. Is this amount of money saved by the English society or is it collected by some organization?<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Rejected, already defined in lines above |
| 5-858 | A | 62 | 21 | 0 | 0 | Change “proved beneficiary” to “beneficial”<br>(Danny Harvey, University of Toronto) | Acc |
| 5-859 | A | 62 | 22 | 62 | 22 | Add a note on truck km charges introduced in Switzerland, Germany and Austria which have resulted in load consolidation and optimisation of routing and distribution patterns with significant fuel savings (2-5%). | Acc |

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| | | | | | | (Stephen Perkins, European Conference of Ministers of Transport) | |
| 5-860 | A | 62 | 23 | 29 | 0 | This paragraph is misleading. Taxes are a factor, not necessarily the primary reason for fuel economy differences between the identified regions. U.S. Government (Government of U.S. Department of State) | Tia, text will be adapted, incl new reference:article from The energy journal that confirms it. Als income elasticity point will be sttronger |
| 5-245 | B | 62 | 24 | 62 | 26 | The authors need to provide references for their assertion that low fuel prices in the US, Canada and Australia have led to low fuel economy. (Government of Australia) | Aleady referenced, but more will be added, See above |
| 5-861 | A | 62 | 30 | 0 | 0 | Insert “the” before “long” (Danny Harvey, University of Toronto) | TIA(same as below 5-864) |
| 5-862 | A | 62 | 32 | 62 | 34 | It should be better to change sentence as: "Based on the price ... as a result of 1% (or 10%??) permanent increase in the real ...(Table 5.8)" (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-863 | A | 62 | 32 | 0 | 0 | Change the last “on” to “in” (Danny Harvey, University of Toronto) | ACC-will adopt suggestion |
| 5-864 | A | 62 | 32 | 62 | 34 | I have thoroughly read Goodwin, P., Dargay, J., and Hanly, M. "Elasticities of Road Traffic and Fuel Consumption with Respect to Price and Income: A Review." Transport Reviews 24, pp. 275-292. As a result, I recommend you to revise the sentence in lines 32-34, on page 62, such that "Based on the price elasticities Goodwin et al. (2004) judged to be the best defined results for developed countries, if the real price of fuel rises by 10% and stays at that level, the volume of fuel consumed by road vehicles will fall by about 2.5% within a year, building up to a reduction of over 6% in the longer run (about 5 years or so), as shown in Table 5.8. (Takayuki Takeshita, The University of Tokyo) | ACC |
| 5-865 | A | 63 | 1 | 63 | 5 | Heading of Tabele 5.8 should read: "Table 5.8 - Impact of a % permanent increase in real ...". Also check the figure on vehicle fuel efficiency. I suspect it should be positive, that is +1.5%, instead of -1.5%. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-866 | A | 63 | 1 | 63 | 4 | Table 5.8 should be revised. The first row should be modified into "Short run (within about a year)" and "Long run (about 5 years or so)". The second row should be modified into "Road traffic volume (vehicle-km)", "-1.0%", and "-2.9%". The | TIA-need the US reference |

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| | | | | | | third row should be modified into "Fuel consumption by road transport (total)", "-2.5%", and "-6.4%". The fourth row should be modified into "Road vehicle fuel efficiency (per vehicle-km)", "1.5%", and "3.5%". The fifth row should be modified into "Road vehicle ownership", "-0.8%", and "-2.5%".<br>(Takayuki Takeshita, The University of Tokyo) | |
| 5-867 | A | 63 | 1 | 63 | 0 | Table 5.8: The short-run elasticities in this table seem very high, at least for developed countries. Estimates of short-run elasticity of demand for fuel consumption in the US run in the 0.03 to 0.1 range. In developing countries, where incomes are lower, the demand response to price changes may be significantly more elastic. It would be worth noting this point in the text. U.S. Government<br>(Government of U.S. Department of State) | ACC |
| 5-868 | A | 63 | 6 | 63 | 6 | Check the word "incentivise".<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC |
| 5-869 | A | 63 | 6 | 0 | 0 | Change “incentivise” [a word that does not exist in proper English] with “create incentives for”<br>(Danny Harvey, University of Toronto) | Will check again |
| 5-870 | A | 63 | 15 | 63 | 15 | Reference ADAC, 2005 should be 2003?<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC |
| 5-871 | A | 63 | 21 | 0 | 0 | p. 63, line 23: Do not refer to the journal (Transport Policy) but to the author, please.<br>(Bert van Wee, Delft University of Technology) | TIA |
| 5-872 | A | 63 | 29 | 63 | 29 | Check the world "incentivise".<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA |
| 5-873 | A | 63 | 29 | 0 | 0 | Change “incentivise” [a word that does not exist in proper English] with “create incentives for”<br>(Danny Harvey, University of Toronto) | ACC |
| 5-874 | A | 63 | 30 | 0 | 0 | Insert “more” before “credible”<br>(Danny Harvey, University of Toronto) | TIA- will check |
| 5-875 | A | 63 | 31 | 63 | 31 | What do you mean by tank tourism?<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA (same) |
| 5-876 | A | 63 | 31 | 0 | 0 | Define “tank tourism” or use clearer words<br>(Danny Harvey, University of Toronto) | ACC |
| 5-877 | A | 63 | 39 | 0 | 0 | Comma after “savings”<br>(Danny Harvey, University of Toronto) | ACC |
| 5-878 | A | 63 | 40 | 0 | 0 | Change “reducing” to “reduced” | ACC |

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| | | | | | | (Danny Harvey, University of Toronto) | |
| 5-879 | A | 63 | 42 | 63 | 42 | change currently lack of data to currently a lack of data…<br>(John Kessels, Energy Research Centre of the Netherlands) | TIA |
| 5-880 | A | 63 | 42 | 63 | 43 | Garbled sentence<br>(Danny Harvey, University of Toronto) | TIA |
| 5-881 | A | 64 | 0 | 0 | 0 | The Swedish road administration have in their Climate strategy calculated the effect of regulatory measures on speed. Exceedance of speed limits on Swedish road network give an extra CO2 emission of 700 000 ton CO2 on annual basis (compared to total emissions of 20 million tons). Large portion of this can be tackled using speed cameras and in the future intelligent speed adaptation in vehicles. Besides this, reduction of speed limits (with 10 km/h except for the least densely populated areas where there is no alternative to private car ) could give similar amount of CO2 reduction.<br>(Government of Sweden) | TIA ( repeated) |
| 5-882 | A | 64 | 0 | 0 | 0 | Table 5.9 Between 22 August 2005 and 31 July 2006 a full scale trail with congestion charges were conducted in Stockholm. The trial was evaluated in detail. CO2 reduction for inner city was 13 percent. For more information see http://www.stockholmsforsoket.se/templates/page.aspx?id=2453<br>(Government of Sweden) | TIA-will check and rephrase |
| 5-883 | A | 64 | 1 | 64 | 2 | The description "General estimates of reduction in use of private vehicle operators" is quite ambiguous. At least, you should make it clear that "General estimates" are for developed or developing countries or for the whole world.<br>(Takayuki Takeshita, The University of Tokyo) | TIA |
| 5-884 | A | 64 | 3 | 64 | 3 | It should be useful to add an experience implemented in Brazil up to 5 years ago. Cars with engine smaller than 1.0 liter had a reduction on VAT as compared with larger engine cars. Sales of such small engine size car exploded and consequently CO2 emissions was abated. There is a good paper prepared by Roberto Schaeffer et al produced in the same institution as Suzana Khan.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Reject-already listed |
| 5-885 | A | 64 | 4 | 64 | 4 | List references for Table 5.9<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC-will use :REALIZED |
| 5-246 | B | 64 | 5 | 64 | 10 | Table 5.9: the authors should provide details of where the fuel pricing and taxation study is focussed.<br>(Government of Australia) | Rejected, space limitation |
| 5-886 | A | 64 | 11 | 0 | 0 | Change “potential” to “actual” | ACC-will use :REALIZED |

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| | | | | | | (Danny Harvey, University of Toronto) | |
| 5-887 | A | 64 | 12 | 0 | 0 | Change “in an oil crises” to “in combination”<br>(Danny Harvey, University of Toronto) | ACC |
| 5-247 | B | 64 | 12 | 64 | 12 | (Government of Australia) | No comments |
| 5-888 | A | 64 | 20 | 0 | 0 | p. 64: line 20: free public transport leads (in most cases) to an increase of CO2 emissions, due to induced demand having a stronger negative impact than the positive impact of a shift from car to public transport.<br>(Bert van Wee, Delft University of Technology) | TIA-need references |
| 5-889 | A | 65 | 14 | 65 | 15 | Delete the material in brackets<br>(Danny Harvey, University of Toronto) | Reject-will indicate where measures have been implemented and worked. |
| 5-248 | B | 65 | 14 | 65 | 16 | It is hard to assess the significance of the regulatory methods if they are not separated from the fuel blending. The authors should provide a note addressing this concern.<br>(Government of Australia) | We will |
| 5-890 | A | 65 | 18 | 65 | 21 | In OECD countries vehicles consume 10-20% more fuel per km than indicated by their rated efficiency. Comment: First here some reference should be given. Second this can not be connected to the next sentence. The reason for the difference comes from that the driving pattern, climate etc in real world differs from the standardised driving cycles. The difference between rated fuel consumption and real world consumption will for this reason also differ between countries. For example in Sweden the difference between rated fuel consumption and real world consumption are very small. For new Registered cars in Sweden 2003 the rated fuel consumption is 8,2 l/100km and according to enquiry made by the automobile club "Motormännen" to 14 000 vehicle owners the real world consumption was 8,3 l/100 km. Similar differences could be seen for other registration years.<br>(Government of Sweden) | TIA |
| 5-891 | A | 65 | 25 | 65 | 25 | There is a whole missing section here: inclusion of the emissions from the transport sector in emissions trading schemes - which is in this chapter only considered in the case of aviation. For terrestrial transportation several possibilities have been considered in the literature, from "upstream" or hybrid "upstream-downstream" regimes (Hargrave, 1998; KPMG, 2002; Niizawa et al. 2003) to allocation to local authorities (Raux and Fricker 2001) to making vehicle manufacturers liable under a CO2 cap-and-trade system. This system has been considered in some details by Baron and Philibert, 2005, Act Locally Trade Globally, IEA Paris, where all | TIA |

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| | | | | | | references mentioned can also be found. In a nutshell, car makers would have to cover with allowances an average amount of emissions for each vehicle they sell on the basis of an estimate over its lifetime. Such a system would provide them with a strong incentive to develop and market less carbon-emitting vehicles, but it would not give a signal to drivers. In other words, such a system would facilitate the introduction of CO2 emissions standards for new vehicles by giving carmakers some flexibility while ensuring the overal result.<br>(Cédric PHILIBERT, International Energy Agency) | |
| 5-892 | A | 65 | 27 | 65 | 0 | Aviation people are misinterpreting the term "bunkering". This results in confusion over what is presented in this section. A definition of its meaning in this report is needed at the beginning of the section. U.S. Government<br>(Government of U.S. Department of State) | Accepted |
| 5-249 | B | 65 | 29 | 67 | 45 | Subsection 5.4.2.1 needs to be significantly amended. Presently it is largely policy prescriptive and is substantially based in a discussion of aviation emissions trading. In particular, by providing comment on specific policy proposals that are under development the authors are over stepping the mandate of the IPCC. The subsection needs to be reviewed to ensure that it remains policy neutral. The key message of this section should be that the capacity for this sector to mitigate its emissions are limited, and that demand side measures such as offsets and emissions trading offer the most likely potential for emissions reductions.<br>(Government of Australia) | TIA, the text will be checked on policy descriptive language |
| 5-893 | A | 65 | 30 | 66 | 5 | The authors are incorrect in their characterization of the work ICAO has undertaken to address greenhouse gases and potential climate change. ICAO has sought to tackle this issue through a variety of measures. The authors- by equating mitigation approaches with market-based measures- give a very partial and misleading view. MBOs are being explored at ICAO as a supplement to its normal approach of standard setting, operational procedures, and recommended practice in addressing emissions. The authors ignore the fact that ICAO has adopted as a goal of the organization to "limit or reduce the impact of aviation greenhouse gas emissions on the global climate." Second, as noted in an earlier comment, ICAO has published Circular 303 Operational Opportunities to Minimize Fuel Use and Reduce Emissions to offer best practice and practical solutions to reduce fuel burn and greenhouse gas emissions. They have taken the further step of holding workshops to assist the aviation community to take these practices onboard as well as integrated these practices into regional air navigation plans. Third, even in their discussion on market-based measures (MBOs), basic facts are incorrect and significant | Accepted |

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| | | | | | | information is left out. For example, the reason ICAO decided not to set-up an emissions trading system under their own auspices is that all experts agreed it would require modification of the Chicago Convention (ICAO's governing document) which could take decades. Given the importance of potentially using MBOs, it was agreed that ICAO should develop guidance to foster the ability of States or regions to undertake appropriate action having resolved the many policy and legal issues MBOs raise when being applied to international aviation. In many ways, this is similar to ICAO's traditional role in standard setting- where States adopt ICAO standards to ensure harmonization of requirements in international aviation. U.S. Government<br>(Government of U.S. Department of State) | |
| 5-894 | A | 65 | 31 | 65 | 34 | Delete existing text and replace with the following:<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Rejected - replace by what? |
| 5-895 | A | 65 | 31 | 66 | 5 | The statement that ICAO "has not been able to agree on any action to ensure effective implementation of mitigation policies aiming at reducing greenhouse has emissions from international aviation" is inappropriate and should be deleted. Even if it were true (which it isn't) it is not for IPCC, through WMO and UNEP, to direct criticism, whether implied or not, at a sister UN-body. In fact, ICAO's 189 member states have adopted guidance on voluntary agreements to address greenhouse gas emissions and will further address international aviation emissions in the course of 2007.<br>(Andreas Hardeman, International Air Transport Association (IATA)) | Rejected, it is no criticism but an observation which is also included in literature. However we will rewrite it a little and a source will be added. |
| 5-896 | A | 65 | 31 | 66 | 13 | [This comment also pertains to pg 67, lines 5-19] The statement that ICAO "has not been able to agree on any action to ensure effective implementation of mitigation policies aiming at reducing greenhouse has emissions from international aviation" is false and misleading. ICAO and, hence, all 189 member states of ICAO have agreed to guidance on voluntary agreements to address GHGs. At the same time, ICAO (and all its member states) agreed at the 2004 ICAO Assembly that GHG charges did not make sense at that juncture. ICAO's CAEP has continued to work intensively on draft guidance concerning aviation-specific issues relating to emissions trading under "integrated" systems such as the EU emissions trading system (ETS) and other, "voluntary" trading systems. CAEP, and the ICAO Council and Assembly, will further address GHG emissions of international aviation in their 2007 meetings, including issues relating to emissions trading and charges. This work is part of the complex task of discharging the responsibility placed on ICAO by section 2.2 of the Kyoto Protocol to consider how to address emissions that | Taken into account. Some points will be accepted and some are rejected. Rejected are:- developing guidance is indeed an effort, but supports the idea that still no internationale coordination have been agreed on with respect to the implementation of concrete and effective policy instruments.- The statement that charges do not make any |

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| | | | | | | cannot be readily assigned to a national inventory. It is inappropriate and unwarranted for the IPCC to characterize this ongoing work as a "hurdle" to global and regional mitigation policies, or to speculate about "not expecting global action by ICAO."<br>Judgements about regional policies that do not respect ICAO's primary role such as the European Commission's 2005 communication proposing to incorporate international aviation into the EU ETS irrespeictve of ICAO action are inappropriate. The draft report states, with apparent approval, that the EC issued the Communication "[s]ince ICAO has not been able to agree on mitigation policies to reduce greenhouse gas emissions from international aviation." That phrase should be removed. Furthermore, it is outside the remit of the IPCC to make policy judgments, and the suggestion that measures such as the Communication might be a "bottom-up" way to develop global emissions trading systems should be removed.<br>U.S. Government<br>(Government of U.S. Department of State) | sense is indeed mentioned by a report of a working group of ICAO. However the analysis is based on a model that cannot be validated on this point. |
| 5-250 | B | 65 | 31 | 65 | 34 | Drafting of first sentence carries an incorrect inference that ICAO was obligated to have in place by now internationally standardised controls on aviation ghgs.<br>(Government of Australia) | Taken into account, text will be rephrased |
| 5-251 | B | 65 | 34 | 65 | 34 | Delete "emissions-related levies" as further study on this point has been vetoed at ICAO.<br>(Government of Australia) | Rejected, because ICAO still have to decide on that point (planned for 2007) as stated by the official report of the latest ICAO Assembly of 2004 |
| 5-897 | A | 66 | 1 | 66 | 5 | The International Civil Aviation Organization (ICAO) has been studying the following policy options: voluntary measures, emission-related levies and emissions trading.<br>Following studies conducted by the Committee on Aviation Environmental Protection (CAEP), ICAO has reached the conclusion that the development of an emissions trading system would be the most cost-effective approach to address the environmental impact of aircraft engine emissions. It also decided to encourage short-term action by States through voluntary measures, and to develop guidance on the possible use of emission-related charges.<br>At its 35th Session in October 2004, the ICAO Assembly encouraged States to take action in the most cost-effective manner within the following framework:<br>• States should limit or reduce international aviation emissions through voluntary measures (a template voluntary agreement for use by States and other interested | Noted, try to include more in the text |

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| | | | | | | parties has been adopted to that effect and is available at http://www.icao.int/icao/en/env/Caep_Template.pdf ).<br>• States should refrain from unilateral implementation of greenhouse gas emission charges prior to the next Assembly in 2007, where this matter will be considered again;<br>• The Assembly endorsed the development of an open emissions trading system for international aviation, focussing on two approaches (one consisting in a voluntary trading system, and the other incorporating emissions from international aviation into States's emissions trading schemes consistent with the UNFCCC process).<br>ICAO's approach to emission-related charges was subsequently refined by separating greenhouse gas (GHG) emissions from local air quality (LAQ) emissions, and guidance is currently being developed on the latter.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | |
| 5-898 | A | 66 | 1 | 66 | 1 | ICAO session October 2004: no emission trading; Any more recent viewpoints from ICAO?<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Noted |
| 5-899 | A | 66 | 3 | 66 | 3 | change will be left to the states to will be left to individual states…<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-252 | B | 66 | 3 | 66 | 5 | Delete the last two sentences of this paragraph as it makes unreferenced and unwarranted assumptions, (i.e. that emissions trading in the aviation sector should be set up; and that the UNFCCC or regional organisations are the best placed to do this).<br>(Government of Australia) | Rejected, but statements will be referenced |
| 5-900 | A | 66 | 5 | 66 | 7 | Replace the existing text with the following:<br>In view of the difficulty of reaching global consensus on mitigation policies to reduce greenhouse gas emissions from international aviation bunker fuels, the European Commission decided to advance its own policies for aviation.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Taken into account, similar wordings will be added |
| 5-901 | A | 66 | 7 | 66 | 13 | The content of this section is based on biased suppositions and unfounded inferences and is therefore entirely inappropriate. The first sentence only considers the inclusion of emissions in Kyoto Protocol targets as mitigation policies. In the second sentence the IPCC claims to know what UNFCCC Parties "feel". In the third sentence, a supposition of what to expect from ICAO does not belong in a scientific report and IPCC should not be second-guessing the motivations of governments.<br>(Andreas Hardeman, International Air Transport Association (IATA)) | Rejected, most text and statements are based on literature. However, a check will be done on policy descriptive langage |
| 5-902 | A | 66 | 7 | 66 | 14 | Should be clear authors are talking about market based options (MBOs)- not | First point rejected, it has |

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| | | | | | | mitigation policies. Also, the hurdle is not the fact they are not included in national inventories; rather, the issue on MBOs is that States have agreed to consider the use of MBOs if they are found to be the most cost-beneficial measure to address emissions. Hence, the real issue is that some MBOs may not be cost-effective measures to limit or reduce GHG emissions. Further, concerning the developing countries, their concern may be due to measures favored by some industrialized countries THAT could disproportionately impact their air carriers in a manner where poor countries would be paying rich countries to improve the latter's environment.<br>U.S. Government<br>(Government of U.S. Department of State) | been made clear in the text that it is about levies, taxes and emission trading.Point on cost-effectiveness will be discussed, but not as suggested here.Comment on developing countries is not supported by literature. However, non-annex 1 countries have difficulties with accepting PAMs given their status. Therefore ICAO explores the possibilities of exemptions for those countries (see e.g. MBO WG5 report) |
| 5-253 | B | 66 | 7 | 66 | 10 | The first two sentences of this paragraph should be deleted as the authors imply that mitigation at a global or regional level only takes place when mandated by either the UNFCCC or Kyoto Protocol.<br>(Government of Australia) | Rejected, this is not suggested in the text |
| 5-254 | B | 66 | 7 | 66 | 9 | First sentence is incorrect. International bunker fuel emissions are contained in national inventories but are presented separately from those emissions that occur from other activities within national boundaries. Delete "not included in national inventories and hence" .<br>(Government of Australia) | Tia, text will not deleted but adapted. |
| 5-255 | B | 66 | 9 | 66 | 13 | Delete the last two sentences as the authors have engaged in policy comment and have drawn (unreferenced) implications concerning national action.<br>(Government of Australia) | Tia, will be checked |
| 5-903 | A | 66 | 11 | 66 | 13 | Another reason for the difficulty in reaching consensus on global action, i.e. specific measures to be implemented by all States, is the reluctance of developing States to commit themselves to measures that could hurt their development.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Accepted, see also comment 902 |
| 5-256 | B | 66 | 15 | 66 | 17 | The authors need to explain why they have included this list of studies without | accepted |

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| | | | | | | providing further explanation of what the studies have actually found.<br>(Government of Australia) | |
| 5-904 | A | 66 | 16 | 66 | 16 | Delete "obviously" in line 16 of page 66.<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Acc |
| 5-905 | A | 66 | 19 | 66 | 20 | To be more accurate, it should be noted that fuel taxation policy has been called into question only by European States (with one exception). U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-257 | B | 66 | 19 | 66 | 26 | The authors need to delete the first sentence of this paragraph to make it more clear that the ICAO / Chicago Convention exemption of aviation fuel from taxation is one of the reasons why aviation fuel taxes have not been adopted by individual states.<br>(Government of Australia) | Rejected, this is not in the Chicago Convention (CC). CC only includes an exemption on fuel in transit, not on fuel bunkering. The CC also has no direct legal consequences. |
| 5-906 | A | 66 | 28 | 66 | 35 | The authors take the approach of providing a European answer to what is suppose to be an international document. This whole section could be much improved and ensure better international balance if the authors called upon the ICAO CAEP Secretariat to provide input. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-907 | A | 66 | 28 | 66 | 0 | Fixed value (current $, £…) fees, charges, or taxes are, at best, effective for reducing emissions in the short term. When the value of a currency is degraded due to inflation the effectiveness of the non-productive charges to control demand decreases over time. Assumptions that inflation will not occur are not valid since non-productive charges are inflation drivers. U.S. Government<br>(Government of U.S. Department of State) | Tia, a ixed value is not assumed. . see also CH 13 on this issue |
| 5-908 | A | 66 | 31 | 66 | 0 | "Gigatonnes" should be used and "megatonnes" should not be accepted. U.S. Government<br>(Government of U.S. Department of State) | Rejected, the ipcc guidelines are followed |
| 5-909 | A | 66 | 32 | 0 | 0 | Change "the other half" to "and partly"<br>(Danny Harvey, University of Toronto) | Accepted |
| 5-910 | A | 66 | 36 | 66 | 43 | The authors leave out important information on charges- that they were found not to be cost-effective relative to emissions trading and that they could not achieve any of the targeted reductions in the exercise undertaken. This discussion also ignores the "real world experiment" over the last two years- as fuel prices have over doubled. U.S. Government<br>(Government of U.S. Department of State) | Tia, see earlier comments |

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| 5-911 | A | 66 | 37 | 66 | 37 | Replace "In its report to" by "In a study prepared for".<br>(Jane Hupe, ICAO - International Civil Aviation Organization (UN)) | Acc |
| 5-258 | B | 66 | 37 | 66 | 42 | The authors need to redraft this paragraph to make it more clear that the mitigation potential in the international aviation sector is mainly through demand-side effects and that the capacity of the aviation industry to reduce emissions through new technology is significantly more limited than in other sectors.<br>(Government of Australia) | Rejected, this is not supported by available literature which indicates substantial supply side effects in the long run |
| 5-912 | A | 66 | 39 | 66 | 41 | Does "global CO2 reduction from 1% to 18%" apply to the total emission level or to emissions from the aviation sector? I doubt whether a global CO2-charge on jet fuel can reduce the total global CO2 emissions by 18%.<br>(Takayuki Takeshita, The University of Tokyo) | Accepted, from global aviation |
| 5-913 | A | 66 | 40 | 66 | 41 | Delete “level” and reword further on to read: “…jet fuel show a reduction in global CO2 emissions of 1% to 18%”.<br>(Danny Harvey, University of Toronto) | Acc |
| 5-914 | A | 66 | 44 | 67 | 3 | The draft report implies that trading, if applied to aviation, somehow would not be as effective as charges because a significant percentage of the emissions reduction under emissions trading would not come from the aviation sector. Free trading among sectors is an inherent feature of an open emissions trading system, and if a policymaker decides to adopt such a system, it should be irrelevant where the reductions come from. The observation that abatement costs are relatively high in the aviation sector is important, however, because the lack of abatement opportunities like those available in other sectors means that aviation would overwhelmingly be buyers of credits. Because of the importance of aviation to national and global economies, there is good reason why policy-makers in many states might avoid this predictable burden on the industry by choosing to address aviation GHGs differently from other sectors. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-915 | A | 66 | 47 | 66 | 47 | With (FESG2010) are you refering to the scenario or the reference in which case it should be FESG, 2003) it is unclear<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-916 | A | 66 | 47 | 67 | 52 | "In this calculation….3.3 billion US$" being deleted. First, the calcuation is based on reduction target for both developed and developing nations. This is a political issue and not appropriate to use that in research. Secondly, it is not correct to state "more developed non-Annex I parties". Lastly, Hongkong should be changed tp "Hongkong of China". | Rejected, is result of literature and is not a political issue in itself, although it may have distributional consequences. |

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| | | | | | | (Government of China Meteorological Administration) | |
| 5-917 | A | 67 | 5 | 67 | 24 | The style and language chosen for this section is unfortunate and offensive. The first sentence contains a thinly veiled stab at ICAO. It is not for IPCC, through WMO and UNEP, to direct criticism, whether implied or not, at a sister UN-body. Nor is it appropriate for IPCC to blow the EC's trumpet at ICAO's expense. In the second sentence it seems unnecessary to mention an exact date. Neither does it seem desirable in the third sentence, for a report that will be published in 2007, to state that the Commission intends to present a legislative proposal towards the end of 2006. Further, it is unclear which observations are ascribed to Wit et al and which are IPCC's own. Finally, it is unclear why it is suggested that governments "may consider" to a) adopt national ETS; b) use domestic fuel taxes and c) improve ATM systems. Are these recommendations by the IPCC? If so, on what basis? In fact, governments may consider many other things as well such a voluntary agreements, infrastructure improvements, R&D, subsidies to promote alternative fuel use, etc., so it would be appropriate to also mention these here.<br>(Andreas Hardeman, International Air Transport Association (IATA)) | Tia, suggestions will be assessed and possibly be included. |
| 5-918 | A | 67 | 5 | 67 | 15 | The authors mischaracterized the work ongoing at ICAO. At the ICAO Assembly in 2004 all States- including Europe- agreed that guidance dealing with market-based options should be ready for consideration by the ICAO Assembly in 2007. Despite this agreement, the European Commission has decided to act unilaterally- not awaiting for the international experts to report back to the ICAO Assembly as previously agreed. What the authors also leave out is the fact that there remain divergent views among ICAO States on the appropriateness of various market-based measures. There is significant and widespread opposition to any unilateral application of a European system on foreign airlines and this arises from both developed and developing countries as well as both Kyoto and non-Kyoto signatories. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-259 | B | 67 | 11 | 67 | 15 | The last two sentences of this paragraph need to be deleted as the authors should not comment on specific policy proposals that are under development.<br>(Government of Australia) | Tia, text will be adapted |
| 5-919 | A | 67 | 15 | 0 | 0 | Change “caused” to “emitted”<br>(Danny Harvey, University of Toronto) | Acc |
| 5-920 | A | 67 | 16 | 67 | 19 | The authors demonstrate a Eurocentric bias by assuming it is a foregone conclusion that an emissions trading system is the right mitigation approach. U.S. Government<br>(Government of U.S. Department of State) | Noted, check on bias will be done |

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| 5-260 | B | 67 | 16 | 67 | 19 | This paragraph needs to be deleted. It is not the role of IPCC authors to advocate for a certain type of mitigation policy, and particularly to suggest that one region's policy be a template for a global policy. (Government of Australia) | See same comment above |
| 5-921 | A | 67 | 17 | 0 | 0 | Change "to set" to "setting" (Danny Harvey, University of Toronto) | Acc |
| 5-922 | A | 67 | 20 | 67 | 24 | The authors show a Eurocentric view in only describing fuel taxation as an alternative policy instrument. There are a much broader range of policy instruments that could be undertaken. For example, Japan and Canada already have in place agreements between government and industry for voluntary measures to limit or reduce aviation emissions. The U.S. has promoted adoption of clean ground support equipment at U.S. airports and spends hundreds of millions of dollars each year on mitigating environmental impacts of the aviation system (with funds raised through the fuel charge). U.S. Government (Government of U.S. Department of State) | Tia, first point see above. Other instruments are treated alreadySecond point on Vas will be checked |
| 5-261 | B | 67 | 20 | 67 | 25 | As part of their consideration of alternative policy instruments such as fuel surcharges, the authors should consider the possible mitigative impact of the imposition of private sector fuel surcharges. (Government of Australia) | Rejected, is already done, see page 65, line 23 |
| 5-923 | A | 67 | 21 | 0 | 0 | Change "for" to "to" (Danny Harvey, University of Toronto) | Acc |
| 5-924 | A | 67 | 22 | 67 | 22 | It would help if the authors used ICAO terms when describing levies- as there are specific considerations when characterizing something as a tax or charge. In the case of the U.S., the fuel levy is a charge, not a tax, as the revenue from the levy is used to pay for infrastructure and mitigate environmental costs of the aviation system. U.S. Government (Government of U.S. Department of State) | Acc |
| 5-925 | A | 67 | 24 | 67 | 24 | There is no section 5.4.2.3, what are you refering too? (John Kessels, Energy Research Centre of the Netherlands) | Acc, section 5.3.3 |
| 5-926 | A | 67 | 26 | 67 | 32 | Authors should acknowledge that the primary obstacle to defining appropriate action to deal with non-CO2 aviation emissions is the uncertainty surrounding those emissions (this was in the FOD; and has been removed) U.S. Government (Government of U.S. Department of State) | Tia |
| 5-927 | A | 67 | 27 | 67 | 29 | I think that the main problem in developing a mitigation policy for aviation climate impact is our poor understanding what metrics should be used. Situation here is further complicated by how properly account for non-CO2 emissions (like NOx and | Tia, text wil be partly adapted |

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| | | | | | | contrails). I suggest to re-write this sentence is follows: A major difficulty in developing an adequate policy for anthropogenic impact on climate in general and its aviation component in particular lies with our poor understanding of what metrics of the climate impact should be used. For aviation, this problem is further complicated by the lack of agreement among climate experts how to account for non-CO2 perturbations (such as NOx and contrails) (e.g., Shine et al., 2005; Forster et al., 2006).<br>(Michael Danilin, The Boeing Company) | |
| 5-928 | A | 67 | 27 | 67 | 32 | The authors are confusing radiative forcing and climate impact. IPCC (1999) calculated the radiative forcing but not the climatic impact. It is now accepted within the climate community that you can not just add the radiative forcings. The IPCC FAR WGI has concluded that we don't know how to define a climate metric yet for non-well mixed perturbations such as those due to NOx emissions (from the ground or from aircraft) or to other short-lived perturbations such as contrails. As noted by Shine and co-workers, aviation is not the only sector with non-CO2 climate impacts. Surface emissions of NOx, soot, and other species also can contribute to climatic impact. This discussion should base its science on the WG1 volume.<br>(Steven Baughcum, Boeing Company) | Rejected, see SPM IPCC 1999.Check will be made with SOD WG 1 |
| 5-929 | A | 67 | 27 | 67 | 0 | 5.4.2 The international bunkers discussion is a summary of action by other bodies; the scientific and technical contribution to this report is questionable. Question the appropriateness of including it in the Fourth Assessment while debate is ongoing.<br>U.S. Government<br>(Government of U.S. Department of State) | Rejected, analysis is based on literature that has been peer reviewed, by scientific researchers, ICAO working groups, many states and the EC |
| 5-262 | B | 67 | 28 | 67 | 28 | Insert "and unregulated-gases" after "non-CO2 climate impacts"<br>(Government of Australia) | Rejected, Nox is not an unregulated gas. |
| 5-930 | A | 67 | 29 | 67 | 29 | It is not true that IPCC (1999) estimated these effects to be about 2 to 4 times greater than those of CO2 alone. If the authors read carefully the IPCC (1999) Chapter 6 Executive Summary (p.188), it gave the value of 2.7 for RFI in 1992 and the range of 2.2-3.4 for RFI in 2050. It is a mistake to round 3.4 to 4. Please re-write this sentence as follows: IPCC (1999) estimated these effects to be greater than the CO2 emissions impact alone by about 2.7 and 2.2-3.4 in 1992 and 2050 (without considering indirect effects of contrails), respectively.<br>(Michael Danilin, The Boeing Company) | Rejected, see SPM IPCC 1999 |
| 5-931 | A | 67 | 29 | 67 | 29 | Suggestion to add: "See also Box 5.1, page 11, line 11-22" | Acc |

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| | | | | | | (Hein De Wilde, Energy Research Centre of the Netherlands) | |
| 5-932 | A | 67 | 29 | 0 | 0 | It is stated that non-CO2-effects is 2-4 times greater than the CO2-effect alone accordig to IPCC 1999 which is corect but there should also be a reference to the study by Sausen et. al 2005 that showed a factor of 1,9, see also Box 5.1, page 10-11 where this number is listed.<br>(Government of Sweden) | Acc, SOD WG1 will be added (was already planned, but was not available) |
| 5-933 | A | 67 | 31 | 0 | 0 | Should read "This means THAT the PERCEIVED environmental …"<br>(Danny Harvey, University of Toronto) | Acc |
| 5-934 | A | 67 | 34 | 0 | 0 | Change "capture" to "account for"<br>(Danny Harvey, University of Toronto) | Acc |
| 5-935 | A | 68 | 6 | 68 | 10 | Overlap: The sentence on line 9-10 "The basis …. Mile" is almost identical to footnote 20 referred to in line 6<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | Acc, footnote will be deleted |
| 5-936 | A | 68 | 9 | 68 | 12 | Footnote 20 covers this paragaph, delete<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-937 | A | 68 | 10 | 0 | 0 | Change "nautical mile" to "kilometer"<br>(Danny Harvey, University of Toronto) | Acc |
| 5-938 | A | 68 | 23 | 68 | 23 | Delete fair<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-939 | A | 69 | 3 | 69 | 3 | Delete second the standard<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-940 | A | 69 | 11 | 69 | 17 | Reference needed for Green award scheme and 35 ports, etc..<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-941 | A | 69 | 14 | 69 | 15 | The Green Shippin bonus in the Port of Hamburg has been abolished since 1 June 2003 (see press-release of the City of Hamburg of 14 May 2003: http://fhh.hamburg.de/stadt/Aktuell/pressemeldungen/2003/mai/14/pressemeldung-2003-05-14-bug-01.html<br>(Government of Germany) | Acc |
| 5-942 | A | 69 | 43 | 0 | 0 | Another action area that would produce climatic benefits as a co-benefit, and which should be discussed in Section 5.4.3.1, is to reduce dependence of transportation on oil (through mandated improvements in fuel economy and modal shifting) as a hedge against large future increases in the price of oil after the rate of oil extraction peaks.<br>(Danny Harvey, University of Toronto) | Tia, is already briefly mentioned |
| 5-943 | A | 69 | 46 | 69 | 46 | May be benefits U.S. Government<br>(Government of U.S. Department of State) | Acc |

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| 5-944 | A | 69 | 49 | 0 | 0 | pollution instead of polution<br>(Stefano Caserini, Politecnico di Milano) | Acc |
| 5-945 | A | 69 | 49 | 69 | 49 | Pollution U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-946 | A | 70 | 2 | 70 | 7 | These are accurate observations that should be retained in future drafts.<br>(Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.) | Noted |
| 5-947 | A | 70 | 2 | 70 | 7 | These are accurate observations that should be retained in future drafts. U.S. Government<br>(Government of U.S. Department of State) | Noted |
| 5-948 | A | 70 | 7 | 0 | 0 | It seems that "substantial ancillary benefits with respect to air quality and climate policy" is excessive. I suggest the use of the term "interesting" instead of "substantial". The net reductions NOx and PM10 emissions due to the charging scheme used in London is 12 % (Beevers e Carslaw, 2005; see Table 2 and Table 3). If you put these date in the context of all the city of London traffic emissions, the reduction, though importan, is still lower. Reference: Beevers Sean D., Carslaw David C. (2005) The impact of congestion charging on vehicle emissions in London. Atmospheric Environment 39, 1–5.<br>(Stefano Caserini, Politecnico di Milano) | Acc, this refers to line 45 |
| 5-949 | A | 70 | 19 | 70 | 21 | "for China,….particulate matter"being deleted.<br>(Government of China Meteorological Administration) | Rejected, this is factual from a reference. We will check again the validity of this comment in the reference. >> Michel |
| 5-950 | A | 70 | 32 | 70 | 32 | 15.4 U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-263 | B | 70 | 37 | 0 | 0 | Other freight transport policy measures are discussed and implemented in European cities. The Swiss heavy vehicle fee was leading to better loaded vehicles and a net decrese of 7% in CO2 emissions (ARE 2004: Die Schwerverkehrsabgabe der Schweiz). The Cities of Goeteborg and Linköpping in Sweden, Bristol in UK and other, are implementing city logistics concepts with "environmental" zones, allowing the entrance to the inner city only to better loaded vehicles, thus leading to higher vehicle use and CO2 efficiency (START project http://www.start-project.org/). The programme "transportbesparing" in Holland is implementing a best practice awareness programm, diffusing information for shippers that are leading to freight transport demand reduction through higher truck load factors (up | Tia, some examples will be added |

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| | | | | | | to 40%), higher truck weight (50 tonnes), better truck empty weight/full weight ratio beeing one leading positive effect on CO2 efficiency (www.transportbesparing.nl). The UK programm on freight best practices is diffusing all measures to the businesses by making the impacts and the cost-benefits of investments transparent (www.freightbestpractice.org). The project BESTUFFS 2 is showing other EU examples of successful urban freight policies leading to positive climate impacts. The diffusion of the efficient practices to businesses remaining a generic challenge for all policies. The measurement of the impacts in terms of economic and CO2 efficiency is a scientific challenge (Leonardi and Baumgartner, Transportation Research D 2004, 451-464), as assessed by the EU scientific network of excellence COST355 WG1 freight and energy (COST355.inrets.fr). Many European model studies assessed policy impacts in terms of CO2 reduction, and a Scientific forum on transport forecast validation and policy assessment was producing differenciated analyses on the effect of the past EU White paper policy and drafting possible future European policy options (Transforum reports at www.transforum-eu.net).<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | |
| 5-951 | A | 70 | 42 | 70 | 48 | Table 5.9 Between 22 August 2005 and 31 July 2006 a full scale trail with congestion charges were conducted in Stockholm. The trial was evaluated in detail. CO2 reduction for inner city was 13 percent. For more information see http://www.stockholmsforsoket.se/templates/page.aspx?id=2453<br>(Government of Sweden) | Acc |
| 5-264 | B | 70 | 43 | 70 | 49 | This section contradicts numbers presented in table 5.9. The authors should review the section and the table to address the discrepancy.<br>(Government of Australia) | Acc, will be harmonized |
| 5-952 | A | 70 | 46 | 70 | 46 | An U.S. Government<br>(Government of U.S. Department of State) | Acc |
| 5-953 | A | 71 | 8 | 71 | 10 | Figure 5.2.1 should be fully translated to English. More explanation must be added regarding the terms: Downtown $1000; Tarificacion AU$1000; Tarificacion AU$2000 + VE; COI Health benefits.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | Acc |
| 5-265 | B | 71 | 8 | 71 | 10 | Figure 5.21 is not clearly explained. The authors should explain both the methodology and the significance of the Figure.<br>(Government of Australia) | Acc |
| 5-954 | A | 71 | 9 | 71 | 9 | At various places various notations have been used to represent the same parameter | acc |

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| | | | | | | e.g. Million t/ M t has been used alternatively.<br>(Muhammad Latif, Applied Systems Analysis Group) | |
| 5-955 | A | 71 | 13 | 71 | 17 | Third sentence, not always true. The extra fuel consumption of passenger cars with diesel particle filters are marginal (few percent) and SCR-NOx on HDV gives the possibility to tune the engine to more fuel efficient compared to only in-engine measures to reduce NOx.<br>(Government of Sweden) | Acc |
| 5-956 | A | 71 | 15 | 0 | 0 | Change “like” to “such as”<br>(Danny Harvey, University of Toronto) | Acc |
| 5-957 | A | 71 | 19 | 72 | 7 | Subsidies on fuell are critical especially on developing countries.<br>(Junichi Fujino, NIES) | Noted |
| 5-958 | A | 71 | 21 | 71 | 22 | Van Beers and Van den Bergh 2001 not listed in references<br>(John Kessels, Energy Research Centre of the Netherlands) | Acc |
| 5-959 | A | 71 | 21 | 71 | 28 | Definition of “subsidy” may be helpful, or cite definition from Van Beers. US does not view fuel excise taxes used for infrastructure as subsidies, but some may. U.S. Government<br>(Government of U.S. Department of State) | Acc, will be added |
| 5-960 | A | 72 | 22 | 72 | 22 | End first sentence with : notably suburban and regional passenger rail services.<br>(Stephen Perkins, European Conference of Ministers of Transport) | acc |
| 5-961 | A | 72 | 29 | 0 | 0 | 5.5 Infrastructure: Here more work needs to be done - in particular to indentify a set of measures to "upgrade" infrastructure projects for GHG mitigation (e.g. use of fuel saving road pavement in the framework of a road construction project).<br>(Sandra Cointreau, World Bank) | TIA-will be restructured and distributed in relevant sections |
| 5-962 | A | 72 | 29 | 73 | 18 | § Infrastructure is weak. No study of combined transportation means: passengers high speed rail, trucks on high speed rail on separate track, waterways for heavy freight, in terms of CO2 mitigation and oil saving.<br>(Government of France) | Same |
| 5-963 | A | 72 | 30 | 73 | 18 | The chapter should also include the improvement of rail infrastructure as a prerequisite to shift road and air transport (passenger and freight) to rail. Currently in most cases road infrastructure is given priority meanwhile rail infrastructure improves at a much slower rate or even impairs. This circumstance encourages to shift much more to road.<br>(Government of Germany) | Same-under Public transport |
| 5-266 | B | 72 | 30 | 73 | 21 | Section 5.5 on infrastructure seems to be significantly underdeveloped. It fails to provide any detailed discussion of infrastructure impacts in developed countries including how long-term infrastructure planning decisions can affect GHG | TIA-will be restructured and redistributed in relevant |

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| | | | | | | emissions. In addition the discussion of rail and road infrastructure could be significantly increased.<br>(Government of Australia) | sections |
| 5-964 | A | 72 | 34 | 0 | 0 | Define NMT<br>(Danny Harvey, University of Toronto) | ACC |
| 5-965 | A | 72 | 37 | 72 | 37 | Delete At and start sentence With the introduction…<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-966 | A | 72 | 37 | 0 | 0 | After "managed" add "as well as traffic calming policies". The sentence is "Construction of NMT lanes and pathways that are secure, convenient, well maintained and managed, as well as traffic calming policies, can reduce the number of trips made on motorized vehicles". Calming measures are very common in Europe, especially Northern Europe; often they are alternative to the construction of separated NMT lanes<br>(Stefano Caserini, Politecnico di Milano) | TIA-literature permiting |
| 5-967 | A | 72 | 39 | 0 | 0 | p. 72 line 39: in which period, and why did bicycle use in the Netherlands increase? Due to the introduction of NMT? Certainly not because the country introduces NMT very long ago.<br>(Bert van Wee, Delft University of Technology) | Will check if reason is given in the literature-other than NMT introduction- This section to go to public transport |
| 5-968 | A | 72 | 42 | 0 | 0 | Should read: "There is a need …"<br>(Danny Harvey, University of Toronto) | Acc/prescriptive? |
| 5-969 | A | 72 | 43 | 0 | 0 | Delete "are in demand". Put commas before and after "however" and add "often perceived as" after "however".<br>(Danny Harvey, University of Toronto) | ACC |
| 5-267 | B | 73 | 1 | 73 | 1 | The table on mitigation potentials for public transport should be included in the section on costs and potentials (section 5.8)<br>(Jan-Anne Annema, MNP) | TIA |
| 5-970 | A | 73 | 7 | 73 | 10 | table 5.11: why is a stronger increase of BRT cheaper than a smaller increase (first two lines)?<br>(Bert van Wee, Delft University of Technology) | Will check but economies of scale |
| 5-971 | A | 73 | 14 | 73 | 16 | As described in Ogden, J.M. (1999) "Prospects for Buidling a Hydrogen Energy Infrastructure." Annual Review of Energy and the Environment 24, pp.227-279, the natural gas utility network has already been widespread and reached individual homes as well as industrial customers in many countries. One advantage of introducing natural gas to the transportation sector is that such established pipeline | TIA- when restructuring Infrastructure under alternative fuels |

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| | | | | | | and storage facilities can also be used for this purpose, reducing the need for building additional infrastructure. Therefore, I think that the sentence "e.g. to use natural gas ... will require gas pipelines and storage facilities" should be deleted. (Takayuki Takeshita, The University of Tokyo) | |
| 5-972 | A | 73 | 16 | 73 | 17 | Some biofuels such as gasohol are compatible with existing infrastructure for petroleum products. Therefore, I think that the sentence "Production of biofuels … and distribution" is not always true. Instead, I recommend you to mention such an advantage of biofuels. (Takayuki Takeshita, The University of Tokyo) | Will be treated under Alternative fuels |
| 5-973 | A | 73 | 21 | 74 | 29 | Why a separate (main) paragraph for 5.6, technology research, development/diffusion/transfer? (Bert van Wee, Delft University of Technology) | We will cut whole this section |
| 5-974 | A | 73 | 21 | 74 | 27 | p. 73-74, paragraph 5.6: this paragraph is very poor. (Bert van Wee, Delft University of Technology) | We will cut whole this section |
| 5-975 | A | 74 | 7 | 74 | 9 | "Comment. I suggest to modify the phrase: This is exactly applied to the commercialisation of fuel cell vehicles. Not only auto makers but also other all players including governments should participate to enhance the commercialisation of FCVs. In this way: - This is exactly applied to the commercialisation of fuel cell vehicles. Not only auto makers but also other all players including governments should participate to enhance the commercialisation of FCVs, with initiatives like the U.S. ones.- Motivation: I think it colud be important to underline into the 4AR WGIII IPCC Report the role of the U.S. President's Hydrogen Fuel Initiative, launched in 2003, the U.S. Policy Energy Act of 2005 (Public Law 109-58, Title VIII Hydrogen) and the recent DOE's Hydrogen Goal-Setting Methodologies Report to Congress (August 2006). From my point of view, the most important aspects of these documents are: For the Energy Policy Act of 2005: The purpose of the act. Section 802 (Purposes) states: The purposes of this title are— (1) to enable and promote comprehensive development, demonstration, and commercialization of hydrogen and fuel cell technology in partnership with industry; (2) to make critical public investments in building strong links to private industry, institutions of higher education, National Laboratories, and research institutions to expand innovation and industrial growth; (3) to build a mature hydrogen economy that creates fuel diversity in the massive transportation sector of | We will cut whole this section |

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| | | | | | | the United States; (4) to sharply decrease the dependency of the United States on imported oil, eliminate most emissions from the transportation sector, and greatly enhance our energy security; and (5) to create, strengthen, and protect a sustainable national energy economy.<br>The reports to the Congress and the FCV diffusion goals. Section 811 (Reports): -(a) Secretary.—Subject to subsection (c), not later than 2 years after the date of enactment of this Act, and triennially thereafter, the Secretary shall submit to Congress a report describing— (…) (4) progress, including progress in infrastructure, made toward achieving the goal of producing and deploying not less than— (A) 100,000 hydrogen-fueled vehicles in the United States by 2010; and (B) 2,500,000 hydrogen-fueled vehicles in the United States by 2020; (…).<br>The appropriation. Different Sections (805, 808, 809 and 811) of the Energy Policy Act of 2005 define appropriation for hydrogen and fuel cell RD&D activities for more than 3.2 billion dollars for the period 2006-2010.<br>For the Hydrogen Goal-Setting Methodologies Report to Congress, August 2006: The Technology-Specific 2010 and 2015 research goals. To ensure reliable systems for future fuel cell powertrains with costs comparable to conventional internal combustion engine/automatic transmission systems, the goals are: A) Electric Propulsion System with a 15-year life capable of delivering at least 55kW for 18 seconds, and 30kW continuous at a system cost of $12/kW peak. B) 60% peak energy-efficient, durable fuel cell power system (including hydrogen storage) that achieves a 325 W/kg power density and 220 W/L operating on hydrogen. Cost targets are at $45/kW by 2010 ($30/kW by 2015).<br>To enable the transition to a hydrogen economy, ensure widespread availability of hydrogen fuels, and retain the functional characteristics of current vehicles, the goals are: A) Demonstrated hydrogen refueling with developed commercial codes and standards and diverse renewable and non-renewable energy sources with a cost of energy from hydrogen equivalent to gasoline at market price, assumed to be $2.00-3.00 per gallon gasoline equivalent produced and delivered to the consumer independent of pathway by 2015. B) On-board Hydrogen Storage Systems demonstrating specific energy of 2.0 kWh/kg (6 weight percent hydrogen), and energy density of 1.5 kWh/liter at a cost of $4/kWh by 2010 and specific energy of 3.0 kWh/kg (9 weight percent hydrogen), 2.7 kWh/liter, and $2.00/kWh by 2015.<br>Reference:<br>1) U.S. President's Hydrogen Fuel Iniziative: Office of the President. Hydrogen Fuel: A Clean and Secure Energy Future. 30 Jan. 2003. Available on the Web at | |

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| | | | | | | <http://www.whitehouse.gov/news/releases/2003/01/20030130-20.html>.<br>2) U.S. Policy Energy Act of 2005, Public Law 109-58. 8 Aug. 2005. Available on the Web at <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109.pdf>.<br>3) Hydrogen Goal-Setting Methodologies Report to Congress. U.S. Department of Energy. Hydrogen Program. August 2006. Available on the Web at <http://www.hydrogen.energy.gov/pdfs/goal_setting_report_congress.pdf>."<br>(Mario Valentino Romeri, none - private Italian citizen) | |
| 5-976 | A | 74 | 8 | 74 | 8 | remove the word "all"<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | We will cut whole this section |
| 5-977 | A | 74 | 10 | 74 | 16 | Reference needed who said more than 1 billion per year?<br>(John Kessels, Energy Research Centre of the Netherlands) | We will cut whole this section |
| 5-978 | A | 74 | 18 | 74 | 18 | Change or limit the technology diffusion to limit technology diffusion<br>(John Kessels, Energy Research Centre of the Netherlands) | We will cut whole this section |
| 5-979 | A | 74 | 19 | 74 | 19 | Delete his affiliates to read to affiliates<br>(John Kessels, Energy Research Centre of the Netherlands) | We will cut whole this section |
| 5-980 | A | 74 | 21 | 74 | 21 | Delete and so on<br>(John Kessels, Energy Research Centre of the Netherlands) | We will cut whole this section |
| 5-981 | A | 74 | 30 | 75 | 14 | p. 74-75, paragraph 5.7: this paragraph is very poor. Differences in what? No introduction, no conclusions….<br>(Bert van Wee, Delft University of Technology) | ACC, restructure the text. |
| 5-982 | A | 74 | 30 | 75 | 15 | I suggest the deletion of all this paragraph, and Table 5,13; it is difficult to understand if the situation are comparable and the related uncertainties.<br>(Stefano Caserini, Politecnico di Milano) | ACC, restructure the text. |
| 5-983 | A | 74 | 30 | 75 | 15 | the entire part of 5.7 being deleted, because the whole chapter is too long and need to be cut.<br>(Government of China Meteorological Administration) | ACC, restructure the text. |
| 5-984 | A | 74 | 30 | 75 | 18 | A single comparison of eight Asian cites is presented here. There are so many other regional differences that should be included here. Examples are domestic biomass potential, mass transit potential, geography (which affects annual miles of travel, marine potential, terrain differences, etc.), and built infrastructure differences. U.S. Government<br>(Government of U.S. Department of State) | ACC, restructure the text. |
| 5-268 | B | 74 | 30 | 75 | 15 | This section could be expanded to incorporated differences between developed and developing countries. | ACC, restructure the text. |

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| | | | | | | (Government of Australia) | |
| 5-985 | A | 74 | 31 | 0 | 0 | You should describe "those measures" specifically. Looking at the first order draft, they may be alternative fuels and modes.<br>(Takayuki Takeshita, The University of Tokyo) | ACC, modify the text. |
| 5-986 | A | 74 | 32 | 74 | 32 | Add for clarity that the 'mitigation potential' is for TRANSPORT RELATED GHG EMISSIONS or something similar<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-987 | A | 74 | 32 | 74 | 48 | For the description of regional differences, the current draft has three serious problems. First, the current draft focuses only on eight Asian cities with similar level of development. It is necessary to also describe regional differences between developed and developing countries. Secondly, although this research used a LP based vehicle-mix model, the simulation results for the transportation sector are not described at all. Thirdly, the current draft does not explain why the regional differences in the total cumulative CO2 emissions and MAC occur in this research. Regional characteristics which cause such regional differences should be mentioned.<br>(Takayuki Takeshita, The University of Tokyo) | ACC, restructure the text. |
| 5-988 | A | 74 | 34 | 74 | 34 | Delete is to analyze to was to analyze..<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-989 | A | 74 | 35 | 74 | 37 | Do cities need to be mentioned would read better to write eight Asian cities, namely Beijing, Hangzhou, Bandung, Jakarta, Delhi, Mumbai, Manila and Ho Chi Minh City.<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-990 | A | 74 | 42 | 74 | 42 | Need to include Table number<br>(John Kessels, Energy Research Centre of the Netherlands) | ACC, modify the text. |
| 5-991 | A | 74 | 43 | 74 | 45 | According to line 43, the period is from 2001 to 2020, while line 45 says that it is from 2000 to 2020. Which is true?<br>(Takayuki Takeshita, The University of Tokyo) | ACC, modify the text. |
| 5-992 | A | 74 | 44 | 0 | 0 | Change “of” to “at”<br>(Danny Harvey, University of Toronto) | ACC, modify the text. |
| 5-1001 | A | 75 | 0 | 75 | 0 | Table 5.13, first row, second cell: Add 2001-2010 (as the period for the total cumulative emission)<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | ACC |
| 5-993 | A | 75 | 1 | 75 | 15 | Check figures on Table 5.13. In particular the MACost of 20% for Bandung (132503) and 40% for Jakarta(245215??)<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | ACC, check the source. |

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| 5-994 | A | 75 | 1 | 75 | 1 | Table 5.13 does not have a source is it from the ARRPEEC-II, 2003 report? (John Kessels, Energy Research Centre of the Netherlands) | ACC, check the source. |
| 5-995 | A | 75 | 1 | 0 | 0 | Table 5,13 132503 for Bandung seems strange, out of order of magnitude (Stefano Caserini, Politecnico di Milano) | ACC, check the source. |
| 5-996 | A | 75 | 5 | 0 | 0 | In Table 5.13, the 6-digit numbers must surely be typographical errors (otherwise, I absolutely do not believe them!) (Danny Harvey, University of Toronto) | ACC, check the source. |
| 5-269 | B | 75 | 20 | 95 | 15 | This section starts with an overview of different studies on the total mitigation potentials. This is interesting overview. HOWEVER, the overall table is not clear PLUS there is no link with the assessment based on the information presented on the potential based on the background information of Section 5.3. The chapter would be very much helped with a (qualitative) description on the linkage between the integrated studies and the bottom up assessment from the chapter it selves. (Jan-Anne Annema, MNP) | TIA; the current version of the bottom-up assessment is only about LDVs; the other estimates were not developed by the writing team. The assessment IS assoiated with the costs discussed earlier. |
| 5-270 | B | 75 | 20 | 95 | 15 | This section lacks information on the related costs of the mitigation potential. Earlier sections presented costs and these should be integrated in this section. The approach as was chosen by the other chapters with the use of a table with maximum technical potential and shares in different cost classes seems very clear and helpful. Even if you have no exact cost number, semi-qualitative information on whether the costs are (partly) below 50 $/tCO2 or above 100 $/tCO2 should be available. This information would make the chapters much stronger. The table is a must have because now the maximum potentials needs to be looked up in the text and that is unclear at the moment. (Jan-Anne Annema, MNP) | TIA; this section was written in parallel with the other sections and did not have access to the values added in the drafting process; this will be corrected in the next draft |
| 5-271 | B | 75 | 20 | 95 | 15 | This section deals with the overall added potential of GHG emission reductions in the transport sector. To be consistent with the other chapters the mitigation potential could be best presented in the context of a scenario. Other chapters have used the SRES B2 and A1 scenarios. These differ extremely in terms of social preferences and technological change. B2 is a scenario where behavioural change may be expected in terms of the purchase of lighter cars. In a A1scenario this cannot be expected but in this high tech scenario, H2 can be expected to be implemented more rapidly and the purchasing of smaller cars cannot be expected in this society focused on economic growth. This qualitative description could improve the consistency with other chapters and the insight in the factors that play an important role in the mitigation potential and is very helpful. | . TIA; the assessment did not use the SRES baselines, but instead used an IEA baseline. This will be better described and compared to the SRES scenarios, if possible.. |

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| | | | | | | (Jan-Anne Annema, MNP) | |
| 5-272 | B | 75 | 20 | 95 | 15 | The option of biofuels is weakly mentioned in the chapter. The only figure that is given is that the potential is 12% of the road transport. There is much more known about the potential on biofuels and the potential costs. As indicated earlier, the PhD Thesis of Carlo Hamelinck is interesting to use when more is needed on teh costs and the difference between different biofuel options. In addition a better and more underpined discussion of the maximum technical potential is needed. The maximum potential of biofuels unto the year 2030 can be high. Take e.g. the policies implemented in the EU. Whether this will be implemented is different as the costs may be high. When using the Table with the potential and the costs separately, this could be nicey reflected. In addition literature as from Christian Azar on an integrated approach of the difefrent options in the transport chapter could help explaining the differences between the options qualitatively.<br>(Jan-Anne Annema, MNP) | We will address this in 5.3. |
| 5-273 | B | 75 | 20 | 95 | 15 | The mitigation option of public transport is not included in this section whereas a nice table is presented at page 73, including costs. Please insert that information in here<br>(Jan-Anne Annema, MNP) | we will try to add |
| 5-274 | B | 75 | 20 | 95 | 15 | The assessment of the mitigation potential is not clearly described. To start, the reference case is not described. Where does it come from, how does it link with the SRES B2 and A1 scenarios? How is it treated. Please use tables to clarify the baseline scenario in more detail.<br>(Jan-Anne Annema, MNP) | this is already explained in the text. |
| 5-275 | B | 75 | 20 | 95 | 15 | Over freight transport is not much information, please make this explicitly clear and when known explain the main reasons for this lack of information. There is sufficient information and literature on the consideration between rail and road transport. This could be mentioned here.<br>(Jan-Anne Annema, MNP) | we will improve |
| 5-997 | A | 75 | 23 | 85 | 0 | The serious bias in the chapter is sited in the mitigation potential page 75 to 85, which gives the impression that most potentials in the world are in the improvement of motor vehicles. Sentence line 27 tends to accredit that the authors have only been able to use referenced studies at the vehicule or fleet level 'in the absence of other studies' which is outrageous. This part is too biased to be even worthy of comment. Sorry.<br>(ANTOINE BONDUELLE, Université Lille II) | we will add the estimate for biofuel and modal shift. |
| 5-998 | A | 75 | 31 | 75 | 31 | You refer to Tabel 3.16 in the TAR on page 204. The table did not refer to 2010 to | only one data refer to 2030. |

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| | | | | | | 2020 it refered to estimates of the costs of reducing carbon emissions from transport based on various studies 2010-2030, please correct<br>(John Kessels, Energy Research Centre of the Netherlands) | |
| 5-999 | A | 75 | 36 | 75 | 36 | Authors refer to studies undertaken since the TAR,which studies, need to reference<br>(John Kessels, Energy Research Centre of the Netherlands) | rather general statement. |
| 5-1000 | A | 75 | 42 | 0 | 0 | The IEA has recently released in June this year the publication "Energy Technology Perspectives: Scenarios and Strategies to 2050", this includes a discussion of the mitigation potential if globally an incentive to reduce CO2 emissions of USD 25/t CO2 was introduced. Chapter two presents the results of the scenario analysis (including trasnport), most of the data is presented for 2030, but Chapter Three (which deals with Technologu Strategies) presents ranges for mitigation potentials by technology in 2030. It would be worthwhile including some comment on this study, as it builds on the WBCSD and IEA Technology brief, and provides a well balanced and uptodate assesment of mitigation options in transport.<br>(Michael Taylor, International Energy Agency) | TIA, we will reference this report |
| 5-1002 | A | 76 | 6 | 76 | 13 | The assumed fuel efficiency improvements are all small compared to what the literature reviewed earlier indicates is possible. This should be pointed out.<br>(Danny Harvey, University of Toronto) | ACC |
| 5-1003 | A | 77 | 23 | 77 | 23 | Substantial use of biofuels (up to 30%), a key factor in transport GHG reduction, is many times mentioned in this chapter. Biomass availability, however, is not even briefly discussed anywhere in chapter 5. At least refer to literature (and/or to other chapters in the SOD).<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | this is covered in other chapter, but we will address this briefly. |
| 5-1008 | A | 78 | 0 | 0 | 0 | Differences between the analyses of this chapter and those stated in pag. … unite them?<br>(Stefano Caserini, Politecnico di Milano) | ACC |
| 5-1004 | A | 78 | 4 | 0 | 0 | In Figure 5.23, the meaning of the abbreviation MDTs (maybe Medium-Duty Trucks) should be explained.<br>(Takayuki Takeshita, The University of Tokyo) | ACC |
| 5-1005 | A | 78 | 4 | 78 | 4 | fig 5.23: CO2 mitigation by plug-in hybrids underestimated, due to electricity produced with high carbon content, valid for US, Germany...not valid for France where nuclear electricity is a large part of production<br>(Government of France) | REJ, plugins are not considered in 5.23 |
| 5-1006 | A | 78 | 16 | 82 | 14 | paragraph 5.8.2: is this the right place in chapter 5?<br>(Bert van Wee, Delft University of Technology) | TIA, section will be moved |
| 5-1007 | A | 78 | 17 | 0 | 0 | Section 5.8.2 The well to wheel section does not really fit here. Move instead | As above |

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| | | | | | | selected parts of this to 5.3.1.4. The section mitigation potential should be more complete packages of measures and strategies as the 5.8.1. and 5.8.3-5.8.4. (Government of Sweden) | |
| 5-1009 | A | 80 | 1 | 0 | 0 | Table 5,14 unit of measure: change mpg to km/l gasoline. Mpg is not a S.I. unit and is not understood by many. Or else add specification on the conversion factor (Stefano Caserini, Politecnico di Milano) | ACC |
| 5-1010 | A | 80 | 26 | 80 | 29 | When mentioning that renewable fuels may yield even lower net emission than the natural gas-sourced hydrogen fuel cell vehicle it is necessary to change line 29 and line 1 on page 81 to read: "conventional drivetrains and spark-ignited engines, but here the key is using ethanol from sugar cane, cellulosic ethanol or similar fuel rather than corn-based ethanol". (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA, will clarify |
| 5-1011 | A | 81 | 2 | 81 | 2 | unit of measure: change g/mile to g/km. Mile is not a S.I. unit. Also change g/mi to g/km in Table 5,24 (Stefano Caserini, Politecnico di Milano) | ACC for text, will try for figure |
| 5-1012 | A | 81 | 5 | 81 | 6 | Should read: "gasoline vehicle - but the same vehicle fueled by E-85 ethanol derived from sugar cane (with the same energy efficiency as in Brazil), at 158g/mi (Macedo, 2003) while fueled by cellulosic ethanol, at 154g/mi, both have GMG emissions more than 70% lower than gasoline..." [Macedo, 2003 - Macedo, I.E. et al, 2003. "Greenhouse Gas Emissions in the Production and Use of Ethanol in Brazil", prepared for the Secretariat of the Environment, São Paulo, Brazil] (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | TIA, will check |
| 5-1013 | A | 81 | 21 | 81 | 0 | The 38% reduction needs to shown in Table 5.15 by adding % change columns. U.S. Government (Government of U.S. Department of State) | TIA, will consider doing this |
| 5-1014 | A | 81 | 23 | 81 | 23 | Which table are you refering too? (John Kessels, Energy Research Centre of the Netherlands) | 5.14..will edit to clarify |
| 5-1015 | A | 81 | 23 | 81 | 0 | Table 5.14. The 19% improvement needs to shown in Table 5.15 by adding % change columns. The 19% is for the “best estimate”. The “best case” is 45% which is closer to the 62%. U.S. Government (Government of U.S. Department of State) | TIA, will check |
| 5-1016 | A | 82 | 11 | 82 | 12 | I doubt that "hydrogen 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 | REJ; this reports results of Ricardo analysis (and other sources confirm this as quite |

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| | | | | | | diesel hybrids. The first example is Figure 3.12 in IEA (2005) "Prospects for Hydrogen and Fuel Cells". The second example is Table 5.3 in Weiss et al. (2000) "On the Road in 2020." Energy Laboratory Report #MIT EL 00-003. (Takayuki Takeshita, The University of Tokyo) | possible) |
| 5-1017 | A | 82 | 15 | 85 | 32 | section 5.8.3: is this the right place in chapter 5? (Bert van Wee, Delft University of Technology) | Yes |
| 5-1018 | A | 82 | 15 | 85 | 33 | part 5.8.3 being deleted,because the whole chapter is too long and need to be cut. (Government of China Meteorological Administration) | REJ |
| 5-1019 | A | 82 | 26 | 82 | 30 | Which nine cities and countries are referered to, please list (John Kessels, Energy Research Centre of the Netherlands) | ACC |
| 5-1020 | A | 84 | 1 | 91 | 0 | Difficult to read the tables, perhaps would read better as separate tables, also need to list all the sources and references at the bottom of the final table (John Kessels, Energy Research Centre of the Netherlands) | TIA; this table may be dropped |
| 5-1021 | A | 85 | 20 | 85 | 23 | The existing concluding sentence should be deleted. What you have shown is that far more aggressive and comprehensive measures than considered in these scenarios will be required in order to achieve absolute reductions in CO2 emissions. For example, the overwhelming majority of transportation investments will have to be in rapid transit, and land use planning will have to directed toward an essentially car-free society. This is possible. Thus, you have not shown at all that it is impossible to reduce emissions. Given the risk of very high future oil prices, it is especially important for poor developing countries to aim for the lowest possible car use. (Danny Harvey, University of Toronto) | REJ, very extreme position |
| 5-1022 | A | 85 | 24 | 0 | 0 | Add a specific title for this paragraph: 5,8,4 Summary of mitigation option. Otherwise it seems a part of 5,4,7 and valid only for developing nations (Stefano Caserini, Politecnico di Milano) | TIA; paragraph and table may be removed |
| 5-1023 | A | 85 | 25 | 85 | 32 | p. 85, lines 25-32 and table up to page 91: this is general information, but positioned under 5.8.3, technical potential in developing countries….. (Bert van Wee, Delft University of Technology) | Same as above |
| 5-1024 | A | 85 | 25 | 91 | 0 | Text comes very abrupt within the section 5.8.3. It deals with mitigation options for transport sector in general and not only with developing nations. Some more text to discuss the findings in the tables is also needed. Maybe the tables should be in appendix and here only have a text or simpler table/s. (Government of Sweden) | Same as above |
| 5-1027 | A | 86 | 0 | 91 | 0 | Table 5.17. Add all abbreviations used in the table in caption or footnotes, allowing 'stand alone' use of this table (Hein De Wilde, Energy Research Centre of the Netherlands) | Same as above |

| Chapter-Comment | Batch | From Page | From Line | To Page | To line | Comments | Considerations by the writing team |
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| 5-1025 | A | 86 | 1 | 88 | 1 | Table 5.17 has been splitted into Portrait and Landscape pages. (Muhammad Latif, Applied Systems Analysis Group) | Same as above |
| 5-1026 | A | 86 | 1 | 86 | 0 | Table 5.17 has to have column headings on each page. On page 90, the numbers in parentheses need to be explained and the units defined. On page 91, the numbers look like they are cumulative values. Is this correct? U.S. Government (Government of U.S. Department of State) | Same as above |
| 5-276 | B | 86 | 1 | 91 | 0 | The table 5,17 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 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) (Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | Same as above |
| 5-277 | B | 86 | 1 | 91 | 0 | Table 5.17, column 1, Sources citations are unclear (Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | Same as above |
| 5-1028 | A | 87 | 1 | 0 | 0 | You could add a discussion of the IEAs Energy Technology Perspectives publication 2006 here. (Michael Taylor, International Energy Agency) | TIA, will have to examine reference |
| 5-1029 | A | 90 | 1 | 90 | 0 | Table 5.17: Should explain what figures in parentheses represent. U.S. Government (Government of U.S. Department of State) | Table may be removed |
| 5-1037 | A | 92 | 0 | 0 | 0 | Section 5.8.4 offers a very interesting global scenario. It deserves much greater documentation as to the scenario details. (Jason Mark, Union of Concerned Scientists) | ACC |
| 5-1030 | A | 92 | 1 | 92 | 12 | Box 5.3 - In this box there is reference that bio energy (excluding production) is neutral concerning social aspects and uncertain for the economic and environmental | rejected, we are a user of BF, not producer. |

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| | | | | | | aspects. I don't agree with this statement. First why are we ignoring the production sector? Bio energy is extremely important as a way of creating large number of employment in rural areas, where it is mainly needed. In particular, production of biodiesel creates million of jobs for low and medium qualification people, that is the largest fraction of people living in rural areas in Developing Countries. Second, economic and environmental aspects may be uncertain for ethanol derived from starches but for ethanol derived from sugar cane examples of Brazil, Colombia, India, etc show that it is commercially feasible and has a significant impact on CO2 abatement since with one unit of fossil energy it is possible to produce 8 to 10 units of renewable energy.<br>(Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP) | |
| 5-1031 | A | 92 | 14 | 95 | 16 | It would be worth to mention that several technologies have the potential to deliver energy savings at negative costs over the life cycle of the vehicles. Some improvemnts, in particular, have an extremely low payback period. This is the case for - amongst other options - improved control systems for on-board air conditioning devices (Benouali, J. et al. (2003), "Fuel consumption of mobile air conditioning. Method of testing and results", paper presented at the Earth Technology Forum, Washington, DC) and low rolling resistance tyres (Penant, C. (2005), "The challenge of energy efficienct tyres", presentation to the IEA Workshop on Energy efficient tyres: improving the on-road performance of motor vehicles, IEA, Paris).<br>(Pierpaolo Cazzola, IEA) | TIA, will examine sources |
| 5-1032 | A | 92 | 14 | 95 | 14 | This could be another place to insert references to the World energy outlook 2005. I thus repeat a comment re p.25: IEA's World Energy Outlook 2005 indicates in its Alternative Policy Scenario that consumers would have to invest some $1.1trillion over the scenario's timeframe (2005-2030) to get more energy-efficient capital goods, mostly more efficient cars and vehicles . Cumulative oil savings over the same period would be about 52 billion barrels (p.275). This would provide financial savings (not discounted, but nor are the investments) of $ 2.028 trillions with the assumption of a price averaging 39 $/barrel over the period. This would suffice to make such a policy a "negative cost" potential. The WEO goes further in assuming that reduced demand for oil would drive the oil price down to $33 per barrel in this scenario. The gross savings over the entire period would thus be the difference between the cost of 935 billion barrels at 39$ each and the cost of 883 billion barrels at 33$ each, or $ 7.326 trillion.The negative cost of the associated emission reductions would thus be over 6 trillion dollars. | TIA, will examine reference |

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| | | | | | | (Cédric PHILIBERT, International Energy Agency) | |
| 5-1033 | A | 92 | 15 | 95 | 14 | Recommend adding PHEVs into this mitigation cost estimate. U.S. Government (Government of U.S. Department of State) | REJ, costs uncertain, ghg benefits small in 2030 time frame (because of electricity sources, except in a few areas) |
| 5-1034 | A | 92 | 20 | 92 | 25 | No information is given on the specific cost assumptions made, so the reader as no way of judging the credibility of the final cost numbers. The required information needs to be supplied. (Danny Harvey, University of Toronto) | ACC |
| 5-1035 | A | 92 | 37 | 0 | 0 | Insert "perceived" before "cost" (Danny Harvey, University of Toronto) | TIA, we'll consider |
| 5-1036 | A | 92 | 42 | 0 | 0 | Change "are" to "is" [the subject is "penetration"] (Danny Harvey, University of Toronto) | ACC |
| 5-1038 | A | 93 | 0 | 93 | 0 | Relation between emission reduction figures quoted here and in the SPM is not transparent. (Government of European Community / European Commission) | TIA, values will be reconciled |
| 5-1039 | A | 93 | 1 | 93 | 9 | This section is actually a table, but a table number is missing (Hein De Wilde, Energy Research Centre of the Netherlands) | ACC |
| 5-1040 | A | 93 | 12 | 93 | 17 | The statement regarding hydrogen fuel cell vehicles might be more appropriately generalized to alternative fuels more generally. Furthermore, your own LCA demonstrates that hydrogen fuel cell per vehicle GHG benefits are in fact signficant, so that statement itself needs to be revisited. (Jason Mark, Union of Concerned Scientists) | TIA; will reexamine wtw estimates, but it appears that fcv wtw if natural gas is the hydrogen source is not better than diesel hybrids |
| 5-1041 | A | 93 | 25 | 0 | 0 | I would suggest the following sentence. "This maybe a low estimate of the mitigation potential, as recent IEA analysis that vehicle technologies witha cost up to $25/t Co2 could result in mitigation potential in 2030 of between 1.6 Gt CO2 and perhaps as much as 2.5 to 3 Gt CO2 in 2030, depending on a wide range of factors including the timing and sequencing of policies. The potential by 2050 could be around 6.2 GT CO2 in 2050 if breakthroughs in hydrogen and fuel cells are made (IEA 2006, Energy Technology Perspectives). (Michael Taylor, International Energy Agency) | TIA; we will examine IEA analysis |
| 5-1042 | A | 93 | 28 | 93 | 33 | The cost analyses given in Table 5.19 are invalid because they are based on the assumption that measures to improve fuel economy have no effect on the price of oil (the price of oil is treated as an exogenous variable). This may be true if a single | TIA; the reviewer ignores OPEC reaction to demand changes, which may well |

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| | | | | | | small country alone were to introduce fuel economy measures, but the USA and China alone are probably large enough to influence the global price of oil (when supply and demand are in a tight balance, as will always be the case now, the price is highly sensitive to slight changes in demand), and even more so if a number of large countries were to simultaneously significantly improve the fuel efficiency of their fleets. Thus, the cost savings from fuel efficiency measures are far larger than assumed in Table 5.19 and probably in every single analysis that has been published to date (none of which I believe, therefore). These points should be discussed in some commentary on Table 5.19.<br>(Danny Harvey, University of Toronto) | negate the price "benefit." In fact, oil price models simply don't know how to handle this issue. |
| 5-1043 | A | 93 | 28 | 95 | 30 | Please provide mitigation costs be provided for higher oil price levels.<br>(Government of European Community / European Commission) | ACC, if possible |
| 5-278 | B | 93 | 28 | 93 | 32 | The oil price figures used for possible emissions reductions out to 2030 are already significantly outdated. The authors, where possible, should incorporate some assessment of how the higher oil price may affect mitigation potentials.<br>(Government of Australia) | ACC, if possible |
| 5-1044 | A | 93 | 29 | 0 | 0 | oil prices have are now 70 $ per barrel. This paragraph and following table 5,18 or 5,19 table has to be update, or else some consideration has to be added. otherwise it isn't so useful.<br>(Stefano Caserini, Politecnico di Milano) | ACC, if possible |
| 5-1046 | A | 94 | 0 | 0 | 0 | Table 5.19. The projection of substantial costs for CO2 reduction in the LDV runs counter to many recent assessments. Some explanation of the results, with additional analytical detail, would be helpful to support the conclusion. Our calculations based on MIT or NAS values suggests strongly negative lifecycle costs on a net present value basis. Is the result due to presenting results on an annual basis, rather than net present value? Does it ignore lifetime savings?<br>(Jason Mark, Union of Concerned Scientists) | TIA; Likely cause is using (lower) untaxed fuel cost; will try to discuss qualitatively |
| 5-1045 | A | 94 | 6 | 0 | 0 | Even without the macroeconomic feedback on the price of oil discussed in my previous comment, I find the particularly high costs given in Table 5.19 for India and many other developing countries to be implausible. These countries are starting almost from a clean slate and have the opportunity to develop in a climate-friendly way by investing in light rail transit rather than freeways (as they have done in Beijing for some strange reason), with much of the incremental cost (if there is any) assigned to pollution and congestion benefits rather than treated as a cost of CO2 emission reduction. So --- please at least give alternative estimates that reflect this approach. | TIA, but this estimate is for LDV technologies only. We wil try to discuss qualitatively. |

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| | | | | | | (Danny Harvey, University of Toronto) | |
| 5-1047 | A | 95 | 1 | 95 | 3 | Is the active Case in Figure 5.26 the same as the Efficiency Case quoted before? (Government of European Community / European Commission) | TIA; yes; we will edit to clarify |
| 5-1048 | A | 95 | 1 | 95 | 0 | Figure 5.26 should be expanded to show the carbon reductions by technologies. The y-axis should start at zero. A table with the carbon reductions should be added. This figure might be better for inclusion in the TS than the one that is there now. U.S. Government (Government of U.S. Department of State) | REJ, impossible to do this |
| 5-1049 | A | 95 | 11 | 95 | 0 | How can biofuels supply up to 50% of the aviation fuel and still play a big role in light vehicle fuels as well? U.S. Government (Government of U.S. Department of State) | TIA; aviation analysis was put into text by TSU, was rejected by writing team. |
| 5-1050 | A | 95 | 16 | 97 | 35 | section 5.9: the text is very general (Bert van Wee, Delft University of Technology) | We will move this section to 5.2 or 5.8 and redraft |
| 5-1051 | A | 95 | 17 | 97 | 35 | This subchapter on long term outlook of transport reads as if it was part of a report from world car industry (in fact it is mainly based on WBCSD - see page 95, line 27 - which is not that far away from car industry) on how to make their products more climate friendly. Where are scenarios on a development which is not that car centered? See also my general comments 5 - 0 - i), and ii), and iii) for this chapter. (Manfred Treber, Germanwatch) | We will discuss this in 5.4 |
| 5-1052 | A | 95 | 17 | 0 | 0 | Section 5.9 Long term outlook. Does not seem to be finished. (Government of Sweden) | We will move this section to 5.2 or 5.8 and redraft |
| 5-1053 | A | 95 | 17 | 99 | 0 | Recommend adding PHEVs into the single technology scenario discussed in long term outlook section and Figure 5.31. U.S. Government (Government of U.S. Department of State) | This report does not contain PHEV. |
| 5-1054 | A | 95 | 18 | 0 | 0 | This paragraph doesn't consider the importance of NMT (non-motorized transport) on the long-term outlook, for the relevance GHG emission increase due to a reduction in NMT in developing countries. (Stefano Caserini, Politecnico di Milano) | We will discuss this in 5.4 |
| 5-1055 | A | 95 | 21 | 95 | 26 | It is important to clearly specify the uncertainties of this projection to 2100, in particular for the possibilities of increase in fuel -oil prices. Projection to 2030 are difficult, we can imagine projection to 2100… (Stefano Caserini, Politecnico di Milano) | These are not projections, but senarios. |
| 5-1056 | A | 95 | 22 | 0 | 0 | After "future" insert "in the absence of strong counteracting policies or dramatic increases in the price of oil once the peak in extraction rate is passed". (Danny Harvey, University of Toronto) | agree |

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| 5-1057 | A | 95 | 24 | 0 | 0 | I would add the following sentence "transport energy demand in a Baseline scenario is projected to incerase by 1.8% per year out to 2050; growth is faster in the early years before slowing as population and GDP growth begins to slow (IEA 2006, Energy Technology Perspectives).<br>(Michael Taylor, International Energy Agency) | ACC |
| 5-1058 | A | 95 | 26 | 95 | 26 | Scenarios A, B and C unclear / insufficiently explained.<br>(Hein De Wilde, Energy Research Centre of the Netherlands) | We will clarify |
| 5-1059 | A | 95 | 27 | 0 | 0 | Should read “In the following, an overview of the future of the transport sector will be presented, mostly ….”<br>(Danny Harvey, University of Toronto) | ACC |
| 5-1060 | A | 95 | 30 | 0 | 0 | Should read “growth RATE of air TRAVEL is highest (2.6%/YR) …. (2.1%/YR)<br>(Danny Harvey, University of Toronto) | ACC |
| 5-1061 | A | 95 | 33 | 0 | 0 | Insert “that” after “indicates”<br>(Danny Harvey, University of Toronto) | ACC |
| 5-1062 | A | 95 | 35 | 0 | 0 | Should read “improvements in LDVs”<br>(Danny Harvey, University of Toronto) | ACC |
| 5-1063 | A | 96 | 23 | 96 | 26 | It is absolutely essential that likely constraints on the size of a fuel cell automobile fleet that can be created due to limited supplies of Platinum be discussed. Details are provided in the attached excerpt from a draft textbook that I am writing. Quite simply, it is very likely that there is not enough platinum to create a global fleet of fuel-cell powered vehicles (given that PEM fuel cells are the only viable fuel cell technology for automobiles, due to the need for essentially instant starting ability). Thus, the only viable longterm transportation solution is compact urban form with rail-based electric transit. This is a really important point that needs to be stressed. You place far too much emphasis on hydrogen fuelled vehicles as a long term solution. The smart developing countries will aim to develop their urban centers as essentially car-free cities.<br>(Danny Harvey, University of Toronto) | Importance of material resources is noted, but total amount of Pt is still controversial. |
| 5-1064 | A | 96 | 31 | 0 | 0 | I would add the following sentence "Assuming that all co2 mitigation options up to $25/t CO2 are taken up, fuel efficiency and the use of biofuels cannot contain the growth in CO2 emissions due to trasnport demand growth to 2050. Even if breakthroughs in fuel cells and biofuels from ligno-cellulosic occur in the coming decades, these will still only, by 2050, be able to reduce CO2 emissions from the trasnport sector to a level 21% higher in 2050 than in 2003 (IEA 2006, Energy Technology Perspectives), with further de-carbonisation of the transport sector only occuring after 2050. You may want to include figure 2.31 from the report to help | ACC, if we come up the final conclusion on the cost & potentials of various options, we will include |

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| | | | | | | illustrate this point.<br>(Michael Taylor, International Energy Agency) | |
| 5-1065 | A | 97 | 8 | 97 | 10 | Statement that trucks are principal carriers of freight needs to reference significant amount of freight transported by rail and by water. 2002 US domestic freight ton-miles were 29% truck; 37% railroad; 14% water; 20% pipeline and less than 1% air. U.S. Government<br>(Government of U.S. Department of State) | We will clarify |
| 5-1066 | A | 97 | 14 | 0 | 0 | Use the usual reference and not footnotes<br>(Stefano Caserini, Politecnico di Milano) | noted |
| 5-1067 | A | 97 | 19 | 97 | 21 | Authors need to show evidence for this assertion. The scenarios considered to date do not appear to take into account full technological and operational benefits. This also ignores the rapid structural changes in the airline industry, at least in the U.S., since 2000 which has produced significant reductions in the level and growth of aviation emissions. U.S. Government<br>(Government of U.S. Department of State) | We will clarify |
| 5-1068 | A | 97 | 22 | 0 | 0 | Use the usual reference and not footnotes<br>(Stefano Caserini, Politecnico di Milano) | same |
| 5-1069 | A | 97 | 22 | 97 | 23 | Authors here characterize hydrogen for commercial aircraft as 2050 and later- which seems much more realistic than their earlier assertions of 15-20 years from today. U.S. Government<br>(Government of U.S. Department of State) | noted |
| 5-1070 | A | 97 | 33 | 97 | 35 | "Turton and Barreto (2006) have examined the role of the passenger car sector in greenhouse gases mitigation strategy and present scenarios of automobile technology choices when a price on greenhouse gas emissions is imposed on the global energy system. The analysis has been conducted with ERIS, a multi-regional energy-systems “bottom-up” optimization model that endogenizes technology learning and allows a detailed technology representation, in addition to capturing competing demands for transportation fuels, including hydrogen. These results illustrate the potential for hydrogen to contribute to climate change mitigation, but show that fuel cell cars are a long-term option for climate policy. Moreover, these results suggest that GHG taxes may not be effective in promoting the uptake of fuel-cell vehicles. Only high GHG tax rates ($200/ton C-e and above) provide an adequate and consistent incentive to fuel-cell vehicles. From a policy perspective, this indicates that promoting fuel-cell vehicles is not a cost-effective way of reducing GHG emissions except in the long term or where deep cuts in emissions are required. In other words there are cheaper alternative abatement options across | noted |

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| | | | | | | all sectors, including in the passenger car sector where the use of hybrid-electric vehicles and a shift to gas or alcohol is preferable from the point of view of cost-effectiveness.". References: 1. Turton, H., and Barreto., L., 2006: Automobile technology, hydrogen and climate change: A long-term modelling analysis. International Journal of Energy Technology and Policy (in press).<br><br>(Leonardo Barreto, Paul Scherrer Institute) | |
| 5-1071 | A | 98 | 1 | 100 | 0 | All the figures require sources with year and reference<br>(John Kessels, Energy Research Centre of the Netherlands) | We will add |
| 5-1072 | A | 98 | 1 | 100 | 5 | These figures should be placed in the text where first mentioned. The figures are confusing. 5.30 shows LDV carbon emissions of about 2.2 GT in 2000. 5.31 shows about 4.8 GT in 2000, but it is not clear what this represents. 5.32 shows 6.5 GT in 2000 for all transportation. But LDVs look like they are close to 3 GT in 2000. A table with the data from Figure 5.32 is needed. U.S. Government<br>(Government of U.S. Department of State) | We will clarify |
| 5-279 | B | 100 | 10 | 0 | 0 | An element of conclusion could be added, like "a suite of policies combining promotion of advanced 'conventional' technologies and alternative fuels with interventions to reduce demand for transport would be most suitable to address the variety of sustainability issues. In the analysis presented here, however, it should be kept in mind that the welfare impacts of the different policies have not been evaluated; this is an element<br>of future work and can be crucial to the outcome of cost-effectiveness analyses for the policy options" Theodoros Zachariadis, Assessing policies towards sustainable transport in Europe: an integrated model, Energy Policy 33 (2005) 1509–1525<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | We will take this into consideration when we redraft this portion. |
| 5-280 | B | 100 | 10 | 0 | 0 | A sub-chapter on economic and political 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. | We will try to make a table containing those |

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| | | | | | | (Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | |
| 5-1073 | A | 101 | 1 | 112 | 2 | The authors should check their reference list and update those already published. The reference Eyring et al. (2005a) mentioned twice. Likely, Eyring et al. (manuscript in preparation for ACP) should be dropped. (Michael Danilin, The Boeing Company) | We will |
| 5-1074 | A | 101 | 1 | 0 | 0 | More attention is required to the format of references. I just list references that do not seem complete, or formatted in the usual way: Akerman (title?) Arrilaga ("(" and ")" with the year, also in there references). Boeing (current). ECMT/IEA (other?). ECCI (energy .. At the end), IEA 2001 (other?), IIASA/WEC (other?) , Ribeiro (&amp ?) (Stefano Caserini, Politecnico di Milano) | We will improve |
| 5-1075 | A | 101 | 38 | 101 | 39 | Add the following reference: Baughcum, S.L, S.C. Henderson, and T.G. Tritz, and D.C. Pickett, Scheduled civil aircrfat emission inventories for 1992: database development and analysis, NASA CR-4700, NASA LaRC, Hampton, VA, USA, 196pp, 1996. (Michael Danilin, The Boeing Company) | We will check |
| 5-1076 | A | 102 | 43 | 102 | 0 | This is a 2001 edition of the same reference as on page 108 line 27. They should be sourced the same way. Suggest the one with Davis as the author. U.S. Government (Government of U.S. Department of State) | We will change |
| 5-1077 | A | 103 | 25 | 103 | 25 | Add reference: CO2 Abatement Policies for the Transport Sector, ECMT 2006, forthcoming. Available from ECMT as a report submitted to Ministers in May 2006, reference CEMT/CM(2006)15/FINAL. (Stephen Perkins, European Conference of Ministers of Transport) | We will add |
| 5-1078 | A | 104 | 24 | 104 | 25 | Add the reference: Forster, P.M., K.P. Shine, and N. Stuber, It is premature to include non-CO2 effects of aviation in emission tading schemes, Atm. Env., 40, 1117-1121, 2006. (Michael Danilin, The Boeing Company) | We will check |
| 5-1079 | A | 104 | 43 | 104 | 44 | Add the following reference: Gardner, D.L., ANCAT/EC2 global aircraft emissions inventories for 1991/92 and 2015: Final report, EUR-18179, ANCAT/EC working group, ISBN-92-828-2914-6, 84pp, 1998.. (Michael Danilin, The Boeing Company) | We will check |
| 5-1080 | A | 106 | 19 | 0 | 0 | "Comment on reference title: Firstly, the reference names in these chapters are different, i.e.' IPCC' in Chapter 5, 'Metz, B., L. Kuipers, et al' in Chapter 6, and 'IPCC/TEAP' in Chapter 7. These three names are the same literature. I think 'IPCC/TEAP' described in Chapter 7 is better. Secondly, reference titles in the text | We will change |

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| | | | | | | should also be identical. Thirdly, please check other reference titles which might have the same confusion.<br>(Koichi Mizuno, National Institute of Advanced Industrial Science and Technology) | |
| 5-1081 | A | 108 | 31 | 108 | 31 | Move OECD reference to ECMT references as we produced the report.<br>(Stephen Perkins, European Conference of Ministers of Transport) | We will |
| 5-1082 | A | 109 | 27 | 109 | 28 | "... European Commission, Delft, Netherlands." should probably be " ... European Commission, Brussels, Belgium." Resource Analysis, used to be located in Delft, does not exist anymore.<br>(Paul Brok, National Aerospace Laboratory NLR) | We will check |
| 5-1083 | A | 110 | 15 | 110 | 17 | Add the following reference: Schmitt, A. and B. Brunner, Emissions from aviation and their development over time: In Final Report on the BMBF Verbundprogramm, Schadstoffe in der Luftfahrt, DLR-Mitteilung 97-04, p.37-52, 1997.<br>(Michael Danilin, The Boeing Company) | We will check |
| 5-281 | B | 110 | 15 | 110 | 16 | Schultz M.G., Feichter. J. and Leonardi J. 2004: Climatic impact of surface transport. In 'Issues in Environmental Science and Technology' 20 Transport and the Environment, 111-127<br>(Leonardi Jacques, INRETS Institut National de Recherche sur les Transports et leur Sécurité) | We will change |
| 5-1084 | A | 110 | 17 | 110 | 18 | Add the reference: Shine, K.P., T.K. Berntsen, J.S. Fuglestvedt, and R. Sausen, Scientific issues in design of metrics for inclusion of oxides of nitroen in global climate agreements, Proc.Nat.Acad.Sci., 102, 15768-15773, 2005.<br>(Michael Danilin, The Boeing Company) | We will check |
| 5-1085 | A | 110 | 33 | 110 | 34 | Add the following Reference: Sutkus, D.J. Jr., S.L. Baughcum, and D.P. Dubois, Scheduled civil aircraft emission inventories for 1999: Database development and analysis, NASA CR-2001-211216, NASA Glenn RC, October 2001.<br>(Michael Danilin, The Boeing Company) | We will check |
| 5-1086 | A | 112 | 3 | 112 | 3 | Additional references: Cost Effectiveness of CO2 Mitigation in Transport. An outlook and comparison with measures in other sectors, Report prepared by Bettina Kampman, Sander de Bruyn and Eelco den Boer (CE Netherlands) for ECMT, April 2006 www.cemt.org/topics/env/CO2mitigation.pdf<br>Reducing NOx Emissions on the Road: Ensuring Future Emission Limits Deliver Air Quality Standards www.cemt.org/pub/pubpdf/NOx%202006E.pdf<br>(Stephen Perkins, European Conference of Ministers of Transport) | We will check |