INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Special Report on Renewable Energy Sources and Climate Change Mitigation

Expert Review of the First Order Draft
Dec 14, 2009 – Feb 8, 2010

Chapter 10

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

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Maria Argiri (International Energy Agency)	10	1	1	106	33	ES	-	-	"General comment: You need to define the different uses of ""potential"" in the text."	These concepts are to be addressed in chapter 1 and subchapter 10.3 consistently
Maria Argiri (International Energy Agency)	10	1	1	106	33	ES	-	-	Overall comment: over 90% of this chapter is about electricity. There is a small discussion on heating but the discussion on biofuels is non-existent (the word biofuels is mentioned 3 times in the main text). You need to make it more balanced.	Unfortunatelly most of the published literature is on electricity only, and as such authors of the chapter were limited on what is available
Daniel Kammen (University of California, Berkeley)	10	1	-	-	-	-	-	-	"In terms of addressing mitigation potential, Property Assessed clean energy (PACE) financing is not discussed in the text. It is an important and new financing mechanism that is growing rapidly in use. A website devoted to this mechanism is http://rael.berkeley.edu/financing A set of references on this is: Fuller, M, Portis, S. and Kammen, D. M. (2009) 'Towards a low-carbon economy: municipal financing for energy efficiency and solar power', Environment, 51 (1), 22 □ 32; Fuller, M., Kunkel, C., and Kammen, D. M. (2009) Guide to Energy Efficiency and Renewable Energy Financing Districts for Local Governments (The City of Berkeley, CA and the University of California, Berkeley); Kammen, D. M. (2009) 'Financing energy efficiency', Earth 3.0 (Scientific American), 21. "	This issue is probably out of the scope of the chapter, and as such should possibly be addressed in chapter 11
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	1	-	-	-	-	-	-	Comments on the amendments: the amendments are in order because in that way the ideas are connected, and they flow.	Comment could not be understood
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	2	-	-	-	-	-	-	150? Before you say 137	Chapter is being revised
John Kessels (International Energy Agency Clean Coal Centre)	10	5	1	8	22	-	-	-	Executive summary needs to be rewritten to be more consise and focus on the major conclusions of the chapter	Executive summary will be revised
□vind Christophersen (Climate and Pollution Agency)	10	5	1	8	-	-	-	-	The summary is too long and to much of a textbook. Focus more on the keyfindings on the most relevant questions. Such as. What are the potential and the projections for REs contribution to combat climate change. What are the costs? What are the co-benefits? Eg. in deeveloping countries cobenefits relatied to air quality may be a key to implement RE.	Executive summary will be revised
Ralph Sims (Massey University)	10	5	2	-	12	-	-	-	Applies to whole report - not needed for one chapter	Executive summary will be revised
John Kessels (International Energy Agency Clean Coal Centre)	10	5	2	5	8	-	-	-	Delete paragraph as already used in introductory paragraph in chapter	Executive summary will be revised
John Kessels (International Energy Agency Clean Coal Centre)	10	5	9	5	18	-	-	-	Delete paragraphs not needed	Authors of the chapter believe this paragraph is important, as it sets renewables in a broader context of the energy system
Maria Argiri (International Energy Agency)	10	5	9	5	10	ES	-	-	"Please add: together with energy efficiency, ""nuclear power and CO2 capture and storage""."	As far as possible, new sensitivity analyses that will be incorporated in section 10.2 will try to reflect this concern

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Vicente Schmall (Petrobras S.A.)	10	5	10	5	11	-	-	-	"Insert the text between commas: ""Although many RE technologies are becoming increasingly market competitive, specially in biofuels case, many innovative technologies...""""	Authors do not think they should be specific to any RE source in the Executive Summary
Mark Fulton (Deutsche Bank)	10	5	11	5	12	-	-	-	Some RE is more mature than you suggest (i.e. - onshore wind, solar PV)	Authors do not think they should be specific to any RE source in the Executive Summary
Ralph Sims (Massey University)	10	5	12	-	-	-	-	-	"Start chapter Exec Summary at ""Assessing□"" and add this sentence to next paragraph."	Comment is truncated
John Twidell (AMSET Centre)	10	5	14	-	-	-	-	-	Add sentence 'Governments worldwide have always supported as a duty essential developments with institutional support mechanisms. Such support and directive has been and is common for all forms of energy supply, e.g. RD&D funding, educational funding, nationalisation, grants, taxation relief, exploration licences,obligations, tariff structures, regulation etc. Such mechanisms are essential for renewable energy also.	Authors disagree that this text should be part of the Executive Summary. Also, the reviewer did not provide any references to support to the phrase.
Seth Dunn (GE Energy)	10	5	19	5	22	-	-	-	"Recognizing that the modeling is still in progress, it will be important not to ""bury"" key messages in the ES, such as the potential for RE deployment rates ""many times□larger than those of today.""""	In the redrafting of the chapter, the executive summary will be revised, using the full range scenario results
Douglas Arent (NREL)	10	5	19	5	38	-	-	-	"should discuss basic trade offs re EE/ overall demand, and competition amoung low C techs; re, ccs; and nucl, use of bio; exec summary should also include mention of dependence on assumptions for ALL techs, not just RE, and fuel prices, and model structures."	As the chapter develops, this will be better reflected in the Summary
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	19	-	-	-	-	-	...137 scenarios). Include 'from x different models'.	Subchapter 10.2 will update the number of models and scenarios revised
Juan Roberto Paredes (Inter-American Development Bank)	10	5	19	5	19	-	-	-	150, instead of 137, different scenarios re mentioned later in the text. If other scenarios came later for analysis please clarify.	This informatiom will be updated
Christiano Pires de Campos (Petrobras)	10	5	19	-	38	-	-	-	Rephrase paragraph to half size in order to shorten the introduction.	Accepted
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	19	-	38	-	-	-	What is the main message from the scenario analysis? This is not clear.	Chapter will be revised and messages will become clearer
Jussi Uusivuori (Finnish Forest Research Institute)	10	5	20	35	-	-	-	-	"Could add the uncertainty related to the development of cross-over technologies between RE and competing technologies."	As the chapter develops, this will be better reflected in the Summary
Maria Argiri (International Energy Agency)	10	5	22	5	24	ES	-	-	"This sentence sounds a bit too simplistic. I suggest you cut the part ""simply by virtue of growing energy demand"". You may add a range of increase instead."	We will revise
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	24	-	-	-	-	-	...energy demand. Include '...and of growing fossil fuel prices.'	Text will be substantially modified
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	27	-	-	-	-	-	assuring instead of 'increasing'	Text will be substantially modified

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Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	37	-	-	-	-	-	...overcome costs and performance' is already said two lines before	Text will be substantially modified
Christiano Pires de Campos (Petrobras)	10	5	39	-	41	-	-	-	Is so, what is the main limiting factor?	More more space would be needed to be able to present a comprhensive discussion of the limiting factors
Maria Argiri (International Energy Agency)	10	5	39	5	41	ES	-	-	"Please delete the word ""generation"" since this chapter is about renewable energy across all uses."	Text will be substantially modified
Seth Dunn (GE Energy)	10	5	40	5	41	-	-	-	Another theme to highlight: technical potential is not the limiting factor for RE.	Text already says that
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	5	42	6	22	-	-	-	"These quantitative results can hardly be considered really ""robust"", maybe they could be presented in the Ex. Sum. with less emphasis, or in a more qualitative way. At least, it should be said that they are not based on the whole set of 137 scenarios cited at line 19, but on a much smaller set. "	This will be made consistent across chapter 10, but he number will change anyway in SOD.
Christiano Pires de Campos (Petrobras)	10	5	42	-	46	-	-	-	Delete paragraph in order to shorten the introduction.	Text will be deleted
Seth Dunn (GE Energy)	10	5	42	5	46	-	-	-	Does this refer to all RE power technologies? If so, this is a powerful finding that should be highlighted in the ES (and eventually the Summary for Policymakers).	Text will be deleted
Marc Darras (GDF SUEZ)	10	5	42	-	46	-	-	-	Present growth rate of RE cannot be extrapolated, because when starting from low figures in the take off phase with public support the growth rate might be very high. This is partly explained in a subsequent part (p81 with fig 10.5.9). Therefore it should not be under this form in the E.S.	Text will be deleted
William Kyte (E.ON AG)	10	5	42	5	46	-	-	-	This is conjecture - historic growth rates in the early stages may not be sustainable	Text will be deleted
Maria Argiri (International Energy Agency)	10	5	42	6	7	ES	-	-	In these two paragraphs, you talk about renewables for electricity and for heating and cooling. You need to say something about renewables for transport.	Paragraph will be deleted to save space
Maria Argiri (International Energy Agency)	10	5	42	5	46	ES	-	-	Please delete this paragraph. It is not based on the scenarios reviewed.	Text will be deleted
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	43	-	-	-	-	-	...all combined power...'. Should it be '...all combined REN power'?	Text will be deleted
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	45	-	-	-	-	-	A 69% growth rate seems to be high and not 'moderate' to me	Text will be deleted
Emmanuel Branche (Electricit□ de France (EDF))	10	5	-	8	-	-	-	-	Several references are missing	Text will be revised
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	5	-	8	-	-	-	-	The executive summary is not very precise and informative. What are the main messages? How important are REN ? Which REN are the most important? Is there a fundamental difference in the analysis of top-down and bottom-up approaches? Are there any conclusions on the regional level? One message, e.g.: There is a large discrepancy between the RES technical potential and what is used in the models and in the bottom-up scenarios.	Executive summary will be substantially revised to reflect key messages

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Smail Khennas (Independent consultant,lead author chapt 8)	10	5	-	8	-	1	t	-	In the executive summary, it could be useful to include a few lines highlighting the dfferences between the regions.	Page limitations will not allow that
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	6	7	7	24	-	-	-	What about bioenergy?	Text will be revised
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	6	14	6	15	-	-	-	Check the conclusion based in figures.	Text will be revised
Harald Winkler (Energy Research Centre, University of Cape Town)	10	6	16	6	22	-	-	-	Some comment on the reference levels against which reduction potentials have been assessed would be helpful. It may be that some studies of mitigaiton potential have considered reduction against reference years (e.g. 1990), and others against reference levels (BAU projections or baselines). If they are from different sources, then the implications for comparison shoudl be spelled out. If they all derive from a single model, the reference case should be briefly explained (with detail in the body)	Text will be revised
Christiano Pires de Campos (Petrobras)	10	6	23	-	27	-	-	-	Delete paragraph in order to shorten the introduction.	Text will be revised
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	6	23	-	-	-	-	-	include 'in reality' after 'pathway'	Text will be revised
mario contaldi (ISPRA, Institute for Environmental Protection and Research)	10	6	23	-	27	-	-	-	It is not clear to which scenario the statement is refferring to, the medium or high as defined in the previous para.	Text will be revised
Douglas Arent (NREL)	10	6	23	6	46	-	-	-	shorten to summarize with ranges	Text will be revised
Maria Argiri (International Energy Agency)	10	6	23	6	27	ES	-	-	Please delete this paragraph. It talks only about the power sector again. Also, the last sentence sounds too much like coming from lobbyists.	Text will be revised
Christiano Pires de Campos (Petrobras)	10	6	34	-	40	-	-	-	Delete paragraph in order to shorten the introduction.	Paragraph will be revised but its spirit will stay, as this is an important contribution of subchapter 10.4
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	6	34	6	46	-	-	-	Executive Summary: could be shortened from this ranges	Text will be revised
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	6	34	-	40	-	-	-	This is a detailed discussion of abatement curves, this should not come in the summary.	Paragraph will be revised but its spirit will stay, as this is an important contribution of subchapter 10.4
Andries Kruger (South African Weather Service)	10	6	36	6	40	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Paragraph will be revised but its spirit will stay, as this is an important contribution of subchapter 10.4
William Kyte (E.ON AG)	10	6	41	6	46	-	-	-	This point need to be much more explicit	Space limitations in the executive summary do not allow a more detailed discussion of these issues
Andries Kruger (South African Weather Service)	10	6	42	7	6	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Text will be revised

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Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	7	3	-	-	-	-	-	13% emission REDUCTION? Compared to what?	Text will be revised
Douglas Arent (NREL)	10	7	7	7	24	-	-	-	cost curves are dependent on tech costs, fuel costs and model structures with then lead to projections based on scenario□.	Text will be revised in line with the revision of section 10.4
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	7	7	7	41	-	-	-	Executive Summary: could be shortened from this ranges	Text will be revised
Marc Darras (GDF SUEZ)	10	7	7	-	30	-	-	-	This applies only to the electricity sector. Fig 10.2.7 shows a different conclusion which includes heat production.	Text will be revised
Maria Argiri (International Energy Agency)	10	7	7	7	24	ES	-	-	This paragraph and the relevant section in the chapter (10.4.4) are too weak and I suggest to cut them. One of the strengths of the report is that it has analysed 137 scenarios. This strength is lost here as the discussion focuses on two scenarios only. This will reduce the size of the chapter by 12 pages.	Text will be revised
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	7	8	7	9	-	-	-	Why the choice of these scenarios and not others? We are doing an assessment report from the available literature.	Text will be revised in line with the revision of section 10.4
Vicente Schmall (Petrobras S.A.)	10	7	14	7	24	-	-	-	The paragraph emphasizes some RE technologies that will be competitive by 2030 and ignores the current competitiveness of some biofuels.	Text will be revised
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	7	14	7	15	-	-	-	This should be expected since by 2050 we have used more than 50% of the economic hydroelectric potential.	Text will be revised
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	7	15	-	24	-	-	-	I think this discussion is a bit too detailed for an executive summary	Text will be revised
Andries Kruger (South African Weather Service)	10	7	19	7	24	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Text will be revised
chris campbell (Ocean Renewable Energy Group)	10	7	21	-	-	-	-	-	ref to overall low contribution of Ocean at odds with table 10.3.1???	Text will be revised
Christiano Pires de Campos (Petrobras)	10	7	25	-	30	-	-	-	Delete paragraph in order to shorten the introduction.	Text will be revised
Christiano Pires de Campos (Petrobras)	10	7	31	-	37	-	-	-	Delete paragraph in order to shorten the introduction.	Text will be revised
Andries Kruger (South African Weather Service)	10	7	34	7	37	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Text will be revised

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	7	38	41	-	-	-	-	"Why calculated learning rates are widely differed? Add methodological limitations (or pitfalls)of learning curve analysis: assumed system boundaries, e.g. whether production cost or price based analysis, calculated time period, etc. See Junginger, M. et.al.(2008), Nemet, G.(2009). Junginger, M. et.al., 2008, Technological learning in the energy sector, ECN. Nemet, 2009, Interim monitoring of cost dynamics for publicly supported energy technologies, Energy Policy, 37, pp.825-835."	Executive summary will be revised, in line with the changes that will made in section 10.5
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	7	40	73	15	-	-	-	Define clear definitions between learning curve and experience curve. Those two are intermingled in this chapter(p.7, l.40) , (p,28, l.36)(p.73,l.15) etc	Executive summary will be revised, in line with the changes that will made in section 10.5
Andries Kruger (South African Weather Service)	10	7	43	7	45	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Text will be revised
Mark Fulton (Deutsche Bank)	10	7	44	-	-	-	-	-	"$100 billion scale-up looks low compared to many industry estimates, see IEA's ""How the Energy Sector can deliver on a climate agreement in Copenhagen.""""	Executive summary will be revised, in line with the changes that will made in section 10.5
Christiano Pires de Campos (Petrobras)	10	8	3	-	9	-	-	-	Delete paragraph in order to shorten the introduction.	Text will be revised
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	8	3	8	22	-	-	-	Executive Summary: could be shortened from this ranges	Text will be revised
Emmanuel Branche (Electricit□ de France (EDF))	10	8	3	8	9	-	-	-	Investors need long term signals to build new power plants (PP). Indeed the PP lifetime is sometimes 30, 40, 50 years or more, but the information is not available for such a long period. Other incentives (such as green certificates in addition to market prices) may also play an important role for the RES development. Feed-in-tariffs (FIT) are not the only solution	Executive summary will be revised, in line with the changes that will made in section 10.5
Marc Darras (GDF SUEZ)	10	8	3	-	9	-	-	-	These are general points. In order to internalise some of the externalities different scheme may be applied: norms, quotas, feed-in tariff or call for tenders... They do not internalised fully external costs but only up to the level implied by the policy in place. The last point on feed in tariff (which is one of the ways of internalisation of externalities) is not quantitatively proven.	Executive summary will be revised, in line with the changes that will made in section 10.5
Andries Kruger (South African Weather Service)	10	8	5	8	9	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Text will be revised
Andries Kruger (South African Weather Service)	10	8	12	8	22	-	-	-	If the Executive Summary must be shortened, these sentences can be removed.	Text will be revised
Takashi Hongo (Japan Bank for International Cooperation)	10	8	14	-	-	-	-	-	RE sources have clearly lower external cost' shall be carfully described, like adding 'in many case7 and delete 'cleary' RE also has pros and cons. If we will say'clrary, we need to show evidence. External ccost hevily depending on the location antd types of technologies.	Text will be revised
Smail Khennas (Independent consultant,lead author chapt 8)	10	8	15	8	16	-	-	-	"""Some RE production cases [mention which one] can cause etc.""""	Lack space is a barrier to be more specific and precise in the executive summary
John Kessels (International Energy Agency Clean Coal Centre)	10	9	1	10	9	-	-	-	Rewrite introduction not so much detail needed	Text will be revised

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	9	1	-	14	-	-	-	This is an exact repetition of the first two paragraphs of the Ex Summary	Text will be revised
Marc Darras (GDF SUEZ)	10	9	2	-	3	-	-	-	The evolution of future ghg emissions is highly depending of the demand of energy and of the availability of mitigation technologies. And their implementation... policy incentives.	Text will be revised
Christiano Pires de Campos (Petrobras)	10	9	3	-	-	-	-	-	"Delete the word ""mitigation"" because it depends from much other factors."	Text will be revised
Christiano Pires de Campos (Petrobras)	10	9	9	-	-	-	-	-	"Delete the ""together with energy efficiency"" because there are few evidences of energy efficiency in the chapter 10 or in the rest of the special report. If maintained, we should cite other options."	This assertion is supported by the scenarios results
Emmanuel Branche (Electricit de France (EDF))	10	9	10	9	12	-	-	-	"Add ""In addition some RES existing mature technologies are market competitive (for instance hydro, biomass)"" after ""to-non renewable technologies."" in the line 12"	Text should not be too specific at this point
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	9	27	-	-	-	-	-	You refer to a statistical analysis. I think it is questionable whether a pure statistical analysis of different model results is justified. At least this issue should be mentioned here or in 10.2.	The statistical analysis of a large set of scenarios is the starting point of chapter 10.2, but we agree that in depth analysis is needed to complement this overview.
Douglas Arent (NREL)	10	10	2	-	-	10.2	-	-	agree with TSU that section should be on methods	A more detailed description of the methods will be added to each of the individual sections within Chapter 10 rather than having a central methodology section for the whole Chapter 10. Note that this change needs approval by the IPCC plenary.
John Kessels (International Energy Agency Clean Coal Centre)	10	10	10	11	4	-	-	-	Rewrite to two paragraphs include the first line 12-19 and shorten the theme explaination	Will be rewritten toward SOD in the process of harmonizing the structure of the individual sections of Chapter 10.
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	10	12	41	23	-	-	-	Areas that needs to be looked at for possible reduction or shortened.	A better integration of section 10.2 and 10.3 is needed which also involves reducing the overlap between the two sections and streamlining the information flow between the more statistical analysis in 10.2 with the more in depth analysis in 10.3. Will be addressed in SOD.
Vicente Schmall (Petrobras S.A.)	10	10	19	-	-	-	-	-	"Insert chapter in the phrase ""The scenarios explored in this chapter.....""""	Will be added.
John Kessels (International Energy Agency Clean Coal Centre)	10	11	6	11	15	-	-	-	Delete paragraph not needed	There is not introduction to scenario analysis elsewhere in the report.

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Emmanuel Branche (Electricit□ de France (EDF))	10	11	11	11	11	-	-	-	"Avoid the verb ""compete"". Proposition: ""RES must be part of the solution, with nuclear energy, CCS, energy efficiency, □"". All these technologies should be part of the solution to address climate change"	This is a normative statement that cannot be supported by the literature. Among the analyzed scenarios there are futures without nuclear and/or CCS that largely rely on RES in the long-term as well as those scenarios that have little contribution from RES and/or nuclear, but continue to rely on high fossil fuel shares (baselines). More balanced approaches that include contributions from all these sources are in fact in the majority, but the literature indicates that different choices are possible.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	11	-	-	-	-	-	-	ADAM modeling comparison project	Will be added (p. 12, l. 11).
Smail Khennas (Independent consultant,lead author chapt 8)	10	11	-	11	-	-	-	-	because of [delete of]	Will be changed.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	11	-	-	-	-	-	-	Ref for ADAM: Edenhofer et al. 2010: Edenhofer, O., Knopf, B., Barker, T., Baumstark, L., Bellevrat, E., Chateau, B., Criqui, P., Isaac, M., Kitous, A., Kypreos, S., Leimbach, M., Lessmann, K., Magn□B., Scrieciu, S., Turton, H., van Vuuren, D.P. (2010): The economics of low stabili□sation: exploring its implications for mitigation costs and strategies. The Energy Journal, Volume 31 (Special Issue 1). The Economics of Low Stabilization, 2010, in press (will be available in March 2010). Please also include: Knopf, B., O. Edenhofer, T. Barker, N. Bauer, L. Baumstark, B. Chateau, P. Criqui, A. Held, M. Isaac, M. Jakob, E. Jochem, A. Kitous, S. Kypreos, M. Leimbach, B. Magn□S. Mima, W. Schade, S. Scrieciu, H. Turton, D. van Vuuren (2009): The economics of low stabilisation: implications for technological change and policy. In M. Hulme, H. Neufeldt (Eds) Making climate change work for us - ADAM synthesis book, pp. 291-318, Cambridge University Press.	Article was not published by FOD submission, but will be corrected.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	12	1	-	-	-	-	-	Box: This box contains a good classification. But what about the macro-economy models? Isn't this discussion needed as well to relate the costs? You should also say a bit more on the models and their philosophies used in this model review, e.g. that they implement a least-cost approach or an optimization approach. This is in contrast to many bottom-up models that e.g. test if 100% REN in the electricity sector are feasible. To understand the differences in the results, this should be made explicit. Moreover it should be considered to give at least the most fundamental assumptions/classifications of the models, otherwise the results are hard to interpret.	Additional discussions will be added within the limited space available.
Juan Roberto Paredes (Inter-American Development Bank)	10	12	2	12	2	-	-	-	137 diferent scenarios are mentiones earlier in the text. 150 different scenarios? Please clarify	This will be made consistent across chapter 10, but he number will change anyway in SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	12	6	12	9	-	-	-	Why to discriminate against scenarios based in only one technology? SRREN has the purpose to assess all the literature. Are you sure that this option is not discriminatory?	Obtaining a holisitc picture of RES is the main task of chapter 10, while the individual technology chapters should look at single technology assessments.
John Kessels (International Energy Agency Clean Coal Centre)	10	12	9	12	15	-	-	-	Why was MARKAL not assessed? This seems odd given how many countries use it for their planning?	MARKAL is a model generator, not a model. Among the assessed scenarios are several developed with MARKALfamily models (IEA ETP, MARKAL/AIM CGE India, TIAM). The ability to assess country specific literature is very limited due to space constraints.
Emmanuel Branche (Electricit de France (EDF))	10	12	-	12	-	-	-	-	Box 10.1, references are missing	The references cited in Box 10.1 are included in the References section of chapter 10. It is acknowledged that additional citations are required to support some of the statements made.
John Kessels (International Energy Agency Clean Coal Centre)	10	12	-	-	-	Box 10.1	-	-	techology detail and level of integration where is this in the literature or have the authors developed their own methodology, I would like to see more references in the Box on where this is coming from?	Recent publications indicate that the traditional bottom-up vs. top-down classifiaction is not adequate for most modeling frameworks assessed in this report (Hourcade et al., 2006; van Vuuren et al., 2009a). However, recent IPCC assessment reports used the traditional classification in a not coherent way. Therefore it seems necessary to justify the deviation from previous practice. It is acknowledged that additional citations are required to support some of the statements made.
John Kessels (International Energy Agency Clean Coal Centre)	10	12	-	-	-	Box 10.1	-	-	This could be shortened to just an explaination of why the authors are not using traditional modelling.	Recent publications indicate that the traditional bottom-up vs. top-down classifiaction is not adequate for most modeling frameworks assessed in this report (Hourcade et al., 2006; van Vuuren et al., 2009a). However, recent IPCC assessment reports used the traditional classification in a not coherent way. Therefore it seems necessary to justify the deviation from previous practice.
William Kyte (E.ON AG)	10	13	1	13	15	-	-	-	the phrase '2nd best scenario' has emotive overtones and should be avoided	The term is used in the scenario literature (e.g. Clarke et al, 2009).
John Kessels (International Energy Agency Clean Coal Centre)	10	13	1	13	2	-	-	-	This sentence seems to state that the scenarios used were selected because they gave RES as the best option, selective modelling?	This is not the case. The explanation of why these scenarios are suitable follows immediately.
John Kessels (International Energy Agency Clean Coal Centre)	10	13	4	13	7	-	-	-	Second best scenarios??? Language and why include them the reasons given seem to indicate a bias that the models give favourable results for RES	The term is used in the scenario literature (e.g. Clarke et al, 2009). However, we will provide a more explicit explanation of the term and make an attempt to more explicitly address why second best scenarios are assessed in the SRREN.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
John Kessels (International Energy Agency Clean Coal Centre)	10	13	7	13	15	-	-	-	Second best assumptions, second best scenarios this would not read well for any policy analyst or planner, needs to be written and take out second best terminology it does not read well	The term is used in the scenario literature (e.g. Clarke et al, 2009).
Emmanuel Branche (Electricit□ de France (EDF))	10	13	9	13	9	-	-	-	"Replace ""Table 1"" by ""Table 10.2.1"""	Will be done in SOD (see other tables and figures).
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	13	22	-	24	-	-	-	Refernces for Kitous, Leimbach and Magne are 2010. All: The Energy Journal, Volume 31 (Special Issue 1). The Economics of Low Stabilization, 2010	Article was not published by FOD submission, but will be corrected.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	13	26	-	-	-	-	-	This table should make explicit how many models were used. 17? In fact there is a bias towards some of the models (e.g. REMIND). This should be stated somewhere. And how many models are in which category? It should also be explained why there are more baseline runs than models	A scenario database with all quantitative data will be made available by the time of the SRREN's publication.
Steve Sawyer (Global Wind Energy Council)	10	13	27	14	9	-	10.2.1	-	For these scenarios if 'baseline' and 'refs' are equivalent, please say so	Harmonization of language is required throughout chapter, including the consistent use of "baseline".
Ralph Sims (Massey University)	10	13	36	-	-	-	-	-	Comment about CO2 concentrations versus CO2-equivalent concentrations to clarify. There is often confusion between 450 CO2 and 450 CO2 equivalent.	Additional discussion will be added and reference to the literature, e.g. (Clarke et al, 2009), will be provided.
Ralph Sims (Massey University)	10	13	-	-	-	-	-	10.2.1	"First column should be ""Category I+II"" ""Category III+IV"" Reference. Delete rest as repeats column 2"	Table will be adjusted.
Steve Sawyer (Global Wind Energy Council)	10	13	-	13	-	-	-	10.2.1	It would be useful here if the scenarios were all listed somewhere, along with their references. It gets difficult to wade through these references without knowing really what they are for□this applies to all such charts/graphs/tables/figures where a large number of scenarios are listed....a central list in the beginning of the scenarios section or as an Appendix would be helpful.	A scenario database with all quantitative data will be made available by the time of the SRREN's publication.
John Kessels (International Energy Agency Clean Coal Centre)	10	13	-	-	-	Box 10.2	-	-	Either delete or reword the second best headings	The term is used in the scenario literature (e.g. Clarke et al, 2009).
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	14	1	-	-	-	-	-	It should be stated why there is already a deviation between the models in 2010. (Because the models were calibrated to 2000 or 2005 values)	Possible reasons for the deviations are poor calibration, different accounting (e.g. traditional biomass) and a smaller number of reporting errors have been identified since the FOD submission. The authors will continue to check the material.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	14	2	-	-	-	10.2.1	-	What you mean by global fossil and industrial CO2 emissions? Shall I understand that the curves describe the emissions due the use of fossil fuel used in industrial sector?	Standard definition in the literature (emissions from fossil fuel combustion and industrial processes that have C02 emissions directly such as cement)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Marc Darras (GDF SUEZ)	10	14	12	-	21	-	-	-	10.2.2: 1. The two sentences are pertinent: one set the volume of demand, the other one the competition within low carbon energies. However, a third term is missing in between: the competition within the energy mix where the prices of energies, including fossil fuels, are key. 2. This paragraph shows one of the weaknesses of the analysis (which starts in chapter 1) which does not establish criteria for the analysis of energy systems. The energy system and its components should be assessed on various angles: the availability of energy, its affordability, the security of supply (technical, economical and contractual) at global and local scale, its impact on environment at large (GHG, air quality, water, land use, waste...). See for instance UN-CSD 14.	More discussion of the underlying methodology will be added toward the SOD. In this context the limitations of mitigation scenarios will be discussed, including the fact that many do not explicitly consider energy security and anciallary environmental issues (e.g. water, waste). At the same time, availability of supply, costs and non-CO2 GHGs are in most cases covered.
John Kessels (International Energy Agency Clean Coal Centre)	10	14	15	14	23	-	-	-	Rewrite to shorten, just say the following sections cover and then list them	Can be shortened if necessary due to space limitations, however, short introductions to sections are often useful.
John Kessels (International Energy Agency Clean Coal Centre)	10	14	-	-	-	Figure 10.2.1	-	-	Delete, its nearly impossible to differentiate the different coloured lines and if you did it would take considerable time, perhaps remove all the different lines or use an average line or some method to reduce the number of lines	Without the figure the weak correlation between total primary energy and stabilization case would not be visible. However, the figure needs editing for better readability.
Manfred Treber (Germanwatch)	10	15	5	15	6	-	-	-	Energy security is equally an important force! Please add this.	This may be true in reality, however, the assessed literature does not support this statement as there is little explicit analysis of energy security in the context of climate change mitigation done. We will try to address this more explicitly toward the SOD within space limitations.
Marc Darras (GDF SUEZ)	10	15	7	-	8	-	-	-	10.2.2.1: The authors recognize a weak correlation. However from fig. 10.2.2 one cannot mention correlation: orange, green, red lines are all over the figure.	A quantitative statistical measure will be used to support this statement. In addition, it is aimed to improve the figure regarding readibility.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	15	10	-	-	-	-	-	...economic growth... please include: 'and population'.	Will be added.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	15	10	-	11	-	-	-	Why more variation with more stringent target? Is is because there are more different models in this category?	Additional explanation (and analysis) is needed. Partly, this is related to using fixed bins to achieve consistence with the AR4. In this way, common stabilization levels (e.g. 450 ppm, 550 ppm, 650 ppm) end up in certain bins which distorts the balance in the analysis.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	15	11	-	12	-	-	-	referring to the fact that the baseline are less varied. There is a bias (and a reason), as in ADAM and RECIPE the models agreed on a common baseline for GDP, pop, and partly for emissions. So it is clear that the baseline are somehow less varied.	Bias may be reduced due to wider model coverage toward SOD, however, large numbers of model runs from partly harmonized modeling comparison projects are unavaidable, but should be made more explict (footnote?)
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	15	20	-	24	-	-	-	I think it makes sense to define an SRREN Scenario set so that you do not have to put all references again and again (e.g. for Fig. 10.2.2., 2.3, 2.4, □)	Will be done in SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Christiano Pires de Campos (Petrobras)	10	15	25	16	14	-	-	-	Delete paragraph since it is too specific for the chapter and is better explored in other reports.	This is important background information which defiines the context of the RES and low-carbon technology deployment. However, it is agreed that this is relevant not just for RES, but for climate change miitigation in general.
Ralph Sims (Massey University)	10	15	27	-	-	-	-	-	Is not just CO2 but other gases too.	This will be mentioned, however, RES are (with the exception of bioenergy) mostly relevant for CO2 mitigation.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	16	6	-	-	-	-	-	must necessarily be reduced ...' For what? For keeping a 2□C goal?	Sentence will be adjusted.
Emmanuel Branche (Electricit□ de France (EDF))	10	16	8	16	8	-	-	-	"Replace ""Figure 3"" by ""Figure 10.2.3"""	Will be changed.
John Twidell (AMSET Centre)	10	16	9	-	-	-	-	-	should be 'per unit of energy delivered, natural gas produces less carbon emission than coal'	"per unit of energy" will be added
Marc Darras (GDF SUEZ)	10	16	15	-	-	-	-	-	10.2.2.1: 1. A similar panel showing the dispersion of the global energy demand should be interesting to understand the range of variation of energy demand, and later on the role of the various energy sources. 2. In term of scale, one of the difficulty in reading is the adaptation of scale for each panel in this series of graphs (as it is the case some places else). Could we be consistent? This comment applies to this picture and the family of it: 10.2.4, 10.2.6.	We will explore adding asimilar panel to the SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	16	15	-	-	-	-	-	Figure: x-Axis should end at 600. This holds also for Fig. 10.2.4.: only the left part of each figure is used. Scales should be changed.	Will be adjusted in SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	16	24	-	-	-	-	-	reductions BY end use' instead of 'reductions FROM end use'.	Will be changed.
Ralph Sims (Massey University)	10	16	-	-	-	-	10.2.3	-	Draw Figs 10.2.3, and 10.2.4 (both) with same y axis of 1000EJ to better show share of RE of total low C.	Will be adjusted in SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	17	1	17	6	-	-	-	It could be interesting to give a range for RES deployment regarding a 450ppm scenario (between +50 EJ and + 400EJ for instance if I can read the figure in an appropriate way)	We will explore the possibility of supllying such information.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	17	1	-	-	-	-	-	please include 'in 2050' after the second '...RES deployment'...	Will be added.
John Kessels (International Energy Agency Clean Coal Centre)	10	17	2	17	2	-	-	-	Which scenarios and how many?	Citing each individual scenario will be impossible, but the scenario database used in the assessment will be made available once the SRREN is published.
Ralph Sims (Massey University)	10	17	3	-	-	-	-	-	"Footnote number? Delete up to ""but"" from footnote starting ""Note that□.""""	Footnote number will be corrected.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	17	4	-	5	-	-	-	extraodinary expansion': the numbers should be compared to the overall PE increase, better use percentages.	Additional quantitative information to support the statement will be given.
John Kessels (International Energy Agency Clean Coal Centre)	10	17	11	17	14	-	-	-	Already said this, delete repetitive	Will be adjusted in SOD.
John Twidell (AMSET Centre)	10	17	26	-	-	-	-	-	"(regarding here and elsewhere, see comment ALL at th start of this chapter). Note here that CCS is not available now and hardly exists in even small scale demonstration. You are comparing chalk with cheese! For instance you do not include, or mention, fusion power because it too has not been demonstrated. The comparisons in these and other sentences are completely unrealistic; CCS is unknown and unproven, whereas most renewables are now commercially available and fully demonstrated. For nuclear fission power, it should be made clear that this is only available for centralised elecricity in a relativley small number of countries. Multicountry use would never be allowed for reasons of weapons production and security. The models need to be based on reality, not conjecture."	In a significant fraction of the scenario literature CCS plays an important role as a transition technology in a climate constrained world which cannot be ignored in this assessment to obtain a holistic picture of climate change mititgation. In addition, some of the renewable energy technologies assessed in this report share the same lack of deployment at larger scales.
John Kessels (International Energy Agency Clean Coal Centre)	10	17	26	17	26	-	-	-	There is also increasing energy efficiency measures on both the supply and demand side	Efficiency on the demand side is excluded in the statement ("meeting the energy demands"), but conversion efficiency improvements on the supply side can be mentioned in addition, although they are not sufficient to reach low stabilization targets. Will bemade more explicit in SOD.
Marc Darras (GDF SUEZ)	10	17	30	-	31	-	-	-	10.2.2.1: Add at the end: □in constrained scenarios.□ Because the situation is different in baseline.	Will be added in SOD.
Steve Sawyer (Global Wind Energy Council)	10	17	30	31	14	-	-	-	A third explanation could be offered: that large, inflexible power stations such as nuclear or large coal fired coal stations are incompatible with a diverse, flexible system which utilises the maximum variety and maximum quantity of variable renewable sources.	Systems integration aspect of scenarios is discussed in section 10.2.3 which will need to be improved toward SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	17	30	17	31	-	-	-	At what time CCS will be available (industrialised?), and at what is the cost for this technology ? What about CO2 storage issue ?	These assumptions are different across the scenarios and/or models and also the storage issue is handled differently in different scenarios. As RES are in the focus of this Special Report, the details of CCS modeling cannot be discussed. However, scenario database will be made available by the time of publication of the SRREN.
John Kessels (International Energy Agency Clean Coal Centre)	10	17	-	17	-	Figure 10.2.4	-	-	Delete and again a confusing figure for the reader to decipher	The figure shows relevant information, i.e. the amount of low crbon energy and the amount of renewable energy asa function of CO2 concentration level. In particular the former reveals a correlation while this is weaker developed for the latter, because of other low carbon alternatves (e.g. nuclear and CCS)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Marc Darras (GDF SUEZ)	10	18	1	-	3	-	-	-	10.2.2.1: Delete this sentence: Because GHG is not the sole factor to determine an energy system (which can be seen from the dispersion of fig 10.2.4 for instance) the CO2 price mention here is not well funded as the determinant factor: if there is a low consumption because of a very weak growth or recession, or a policy based on energy security... the GHG price whatever its way of determination might be kept low.	We will insert "all other things being" to indicate that this is the direction of the effect, but not the sole determinant.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	1	-	3	-	-	-	I am not sure if this interpretation concerning increased energy eff and reduced demand is correct. I think that many of the models are not well equipped to model demand-side options. At least in REMIND it is the case that without CCS e.g. there is simply no other option than reducing energy demand, what is in fact quite costly.	It is correct that models deal differently with demand side responses, but some have actually considerable detail on the demand side or at least an elastic demand that responds to price changes. To clarify, the paragraph is highlighting that in addition to a substitution on the supply side, a demand side reponse is induced because of higher energy prices.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	5	-	-	-	-	-	...nuclear power OR CCS instead of nuc power AND CCS	It should read "nuclear and/or CCS".
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	8	-	-	-	-	-	...the unavailability of nuclear power'. This is a misinterpretation of the scenario 'nonuke' (for REMIND, POLES, IMACLIM): nonuce means that nuclear power is fixed to its baseline values. And NOT a phase-out.	As indicated in the caption to figure 10.2.5 the implementation of "no Nuclear" differs between model runs. Language will be clarified for SOD.
Marc Darras (GDF SUEZ)	10	18	8	-	10	-	-	-	10.2.2.1: Bioenergy with CCS as a factor of explanation here is interesting. However, since we have not any evaluation of its weight in the energy mix (and it might be very modest) this sentence should be deleted. The report should avoid sentences such as One possible explanation.	There is significant evidence in the literature that bio energy with CCS has a significant impact on the timing of mitigation (e.g. Krey & Riahi, 2009), leading to more mitigation before 2050 to achieve a certain concentration target. This typically leads to additional deployment of renewables and energy efficiency in the first half of the century.
Charles Kutscher (National Renewable Energy Laboaratory)	10	18	9	-	-	-	-	-	This mentions coupling biomass with CCS to achieve negative emissions. This is a critically important possibility and deserves more attention.	Literature and possibly more discussion will be added on this issue.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	10	-	12	-	-	-	as far as I know, none of the models has considered this.	In many models there are implicit representations of these effects, either through explicit constraints or through base year calibrations that decrease the competitiveness of nuclear. However, we will highlight that most models do not explicitly address these issues.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	10	-	12	-	-	-	I think an additional point why nuclear is less important is that it is solely used in the electricity sector. But for the electricity sector there are many possibilities to decarbonize. Moreover, CCS is also important in the transport sector, e.g. by producing H2 in combination with biomass+CCS. So CCS is more flexible than nuclear in the models.	More analysis will be added.
Smail Khennas (Independent consultant,lead author chapt 8)	10	18	14	18	27	-	10.2.5	-	In the caption, no CSS+nuclear should be made clear. Is it no CSS+NO nuclear which seems to be according to the narrative. If so, better to clarify in the caption.	Will be clarified.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	18	14	18	15	-	10.2.5	-	When the scenarios does not consider the option it is better to write N/A than to leave blank. This is the case for ReMIND ADAM for no CCS + Nuclear.	Will be clarified.
Marc Darras (GDF SUEZ)	10	18	15	-	-	-	-	-	10.2.2.1: Figure 10.2.5 and its comment are very interesting. It should be more effective if for each vertical line, one adds in different colours the share of CCS and the share of nuclear.	The possibilty of adding nuclear and CCS shares will be explored.
Andries Kruger (South African Weather Service)	10	18	15	18	21	10.2.2.1	10.2.5	-	The CO2 concentrations should be stated clearer on the X-axis	Will be clarified.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	18	-	-	-	-	-	explain the scenario definition, this is important. At least for REMIND, POLES, IMACLIM, the definition of 'no CCS', 'nonuce' and 'no CCS + nuclear' is for all models the same. And 'no CCS' should be the same in all models	Will be clarified.
Smail Khennas (Independent consultant,lead author chapt 8)	10	18	-	18	-	-	10.2.5	-	A concern regarding this figure is the sharp differences between the various scenarii (e.g. More than 40 % increase in the case of ReMIND RECIPE scenario and less than 15 % in the case of IMALMIM-R. Further explanation could be useful.	We will try to improve on the explanation.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	18	-	-	-	-	10.2.5	-	I like this figure very much. More of this kind of figures would make the model evaluation more useful.	Thanks, we are aiming at increasing the scope of this analysis.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	18	-	-	-	10.2.2.1	-	-	Some second-best studies have also analyzed scenarios with constraints on the expansion of renewables (e.g. ADAM Knopf et al., 2009). They should be included in the this analysis, as they provide insights on the economics of mitigation if RES expansion does not occur either due to technological difficulties or implementation barriers.	The restricted renewable scenarios will be added to the analysis.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	18	-	-	-	10.2.2.1	10.2.5	-	This figure and subsection present second best scenarios, in which the availability of competing low-carbon alternatives (CCS and Nuclear) are restricted. The analysis only addresses the effect of the technology constraints on renewable deployment. In view of externalities and limited public acceptance of nuclear and CCS stakeholders will be interested in a quantification of the cost markups of such noCCS or noNuclear scenarios relative to the default scenario with all options. Such an analysis would be thus a very valuable contribution.	An attempt will be made to address the economic dimension of the second best scenarios. However, it needs to be explored which metric turns out to be available across a larger set of scenarios and is robust at the same time. Therefore, it may not be useful to implement this effectively.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	19	1	-	4	-	-	-	So what is the main determinant? Is it about model biases? About costs assumptions?	Additional analysis will be made toward the SOD.
Douglas Arent (NREL)	10	19	1	19	4	-	-	-	what are principal determinants for RE vs other techs?	Additional analysis will be made toward the SOD.
Manfred Treber (Germanwatch)	10	19	2	19	3	-	-	-	"Please include one further 'NOT': ""CCS or nuclear are not the only or perhaps NOT even the most critical determinants of future RES deployments to address climate change"""	Will be corrected.
Stan Rosinski (Electric Power Research Institute)	10	19	2	19	4	-	10.2.6	-	Conclusions regarding impact of nuclear and CCS availability are not evident from Figure 10.2.6.	"No nuclear" case will be added to Figure 10.2.6. Additional analysis will be made toward SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	19	3	-	-	-	-	-	"perhaps even□ I think it should read ""perhaps NOT even□""?"	Will be corrected.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
John Kessels (International Energy Agency Clean Coal Centre)	10	19	27	20	2	-	-	-	References on who is saying this on the scales of deployment is needed. Also why is the growth limited?	This is an observation from the scenario analysis which in the vast majority of scenarios shows for most renewable energy sources, but certainly for the sum of all RES a higher deployment level than today.
Douglas Arent (NREL)	10	19	29	-	30	-	-	-	report different assumptions on tech costs, capabilities that lead to different long erm potentials□..	We acknowledge that making this data available and including it into the analysis would be desirable. However, this data is not available in most cases and therefore cannot be assessed across a larger set of scenarios.
Smail Khennas (Independent consultant,lead author chapt 8)	10	19	30	19	31	-	-	-	"The fact that ""bioenergy development is of a dramaticall higher scale etc"" may deserve further development given the environmental concern surrounding biofuels."	The bioenergy chapter deals with these issues in detail and therefore should be consulted.
Marc Darras (GDF SUEZ)	10	19	30	-	31	-	-	-	10.2.2.2: The importance of bioenergy underlined here is not included in the summary part which is more electricity production oriented.	Executive summary will be adjusted accordingly.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	19	30	-	32	-	-	-	This is e.g. something that I would expect to find in the executive summary, but it is missing there	Executive summary will be adjusted accordingly.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	19	32	19	33	-	-	-	"Hydroelectric power importance has to decrease in the long term (after 2050) since most of the potential will be explored. Is not an option of the modeler; it is a real cap."	The current text says that hydroelectric is not as significantly expanded by 2050 as the other RES.
Marc Darras (GDF SUEZ)	10	19	35	20	8	-	-	-	10.2.2.2: Biomass is by large the biggest contributor, solar might be important only in non annex 1 countries by 2050 (fig 10.2.7). Why not respect in the presentation the order of importance. For biomass, cellulosic approach refers to biomass to liquid technologies, while biomass can be directly used (including all cellulose) in direct heat system. Therefore the note is not pertinent. Solar is not the surpassing other contribution, a fortiori in term of order of scale. This sentence should be rephrased.	It is mentioned in the text (p. 19, l. 30/31) that biomass is the largest contributor.
chris campbell (Ocean Renewable Energy Group)	10	19	35	20	36	-	-	-	no ref to ocean at all cf tabel 10.3.3	Ocean energy is - with very few exclusions - almost not captured in global long-term scenarios (see section 10.2.3).
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	19	-	-	-	-	10.2.6	-	again: scaling of figure is strange on the x-axis	Will be improved.
Steve Sawyer (Global Wind Energy Council)	10	20	3	20	27	-	-	-	It is impossible to tell which scenarios are being referred to here.	The scenarios that the figures and descriptions are based on are cited in the captions of figures 10.2.7 and 8.
Douglas Arent (NREL)	10	20	6	-	7	-	-	-	bio for fuels and power?	This statement refers to deployed bioenergy-based technologies, i.e. for electricity, biofuel (1st generation) and heat supply, with the exception of 2nd generation biofuels.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	20	7	-	-	-	-	-	There should be a cross-reference to the biomass chapter about the potentials. Are the model assumptions in range of what is given there?	The reference to the biomass chapter is made in section 10.2.3 where the link to technology chapters is made.
Smail Khennas (Independent consultant,lead author chapt 8)	10	20	12	20	12	-	-	-	I assume it should be as instead of at	Typo will be corrected.
Smail Khennas (Independent consultant,lead author chapt 8)	10	20	14	20	14	-	-	-	The word non commercial could be misleading. In almost all developing countries, the turn over for traditional fuels is huge and mainly driven by the urban consumption which share is much higher than rural consumption	The use of traditional vs. non-commercial biomass will be clarified and streamlined throughout the chapter.
John Kessels (International Energy Agency Clean Coal Centre)	10	20	15	20	20	-	-	-	Who says this, references	This is a pure observation based on figure 10.2.8 (first row of panel) which indicates that direct biomass use in the end-use sectors declines while biomass primary energy consumption increases. The difference between the two undergoes some conversion process. (Have Keywan check)
Emmanuel Branche (Electricit□ de France (EDF))	10	20	21	20	27	-	-	-	These lines are not clear	Will be improved.
Manfred Treber (Germanwatch)	10	20	21	20	27	-	-	-	Why no mentioning of Oil Gap and Peak Oil (irrespective if that is 2030 or soon) and the consequences of it?	The relative price increase of gas and oil is one of the driving forces (Krey and Riahi, 2009) which will be added here.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	20	24	-	27	-	-	-	This does not explain, why hydro decreases in absolute terms (see comment above)	The absolute decrease of hydro in the lowest case will need to be checked toward the SOD.
Ralph Sims (Massey University)	10	20	27	-	-	-	-	-	"Define ""advanced bioenergy""."	Will be added.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	20	27	20	28	-	10.2.7	-	The figures are very small in size and difficult to read. They must be bigger.	Will be adjusted in SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	20	29	-	-	-	-	-	include abbreviation for AnnexI and nA1	Will be added.
Marc Darras (GDF SUEZ)	10	20	-	-	-	-	10.2.7	-	10.2.2.2: It is surprising that some scenarios show no contribution of biomass: could this be checked?	As it turns out, some scenarios do not inlcude traditional biomass in their reporting (and modeling) which is particularly visible in base year data. This will need to be corrected for in the reporting of the scenario data.
Steve Sawyer (Global Wind Energy Council)	10	20	-	-	-	-	10.2.7	-	This figure references 18 scenarios, yet only presents results from 5□or amalgamates them somehow. This is not clear. The same can be said for figure 10.2.8	The figures are boxplots that provide statistical information across the whole set of 150 scenarios that are documented in 18 publications (see footnote 3 for explanation of the boxplots). However, we will try to make this clearer in the SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	20	-	-	-	-	10.2.7.	-	"x-Label: perhaps switch to ""A1"" and ""nA1"", this makes it easier to read"	Will be changed.
Douglas Arent (NREL)	10	21	1	21	9	-	-	-	policy structure: add footnote to explain what is used. Any national policies used or just global, with regional delay/timing?	Additional discussions to be added toward SOD.
John Kessels (International Energy Agency Clean Coal Centre)	10	21	-	21	-	-	-	-	General comment I think the distribution of RES is also driven on the availability of fossil fuels as well, this is a key element that should be at least mentioned as depleting fossil fuels will need to be replaced with alternatives	The assumptions on the resource bases of various fossil fuels is relevant for the deployment of RES, in particular in the baseline scenarios. However, in stabilization scenarios the limited possibility of emitting CO2 and other GHG is the main constraint on the use of fossil fuels (with the exception of CCS). We areaiming at adding a corresponding statement into the SOD.\
Ralph Sims (Massey University)	10	21	-	-	-	-	10.2.8	-	"Discuss why Biomass is also shown as FE (definiton of final energy needed in caption and better called ""Bioenergy"") and rest are shown as primary energy. Could also keep Y axis standard at 350 EJ max to show proportions of each technology. Could merge Biomass TPES and Bioenergy FE into one graph. Clarify if the latter includes biofuels."	FE biomass refers to direct biomass use in the end-use sectors as opposed to all bioenergy based primary and secondary energy carriers. This will be made more clear in the SOD. Keeping the y-axis at a standard value of 350 EJ across all graphs will make some of them unreadable.
Marc Darras (GDF SUEZ)	10	21	-	-	-	-	10.2.8	-	10.2.2.2: For clarity sake, could we harmonise the scale so one can compare the various panel.	Keeping the y-axis at e.g. a standard value of 350 EJ (biomass) across all graphs will make some of them unreadable. In addition, Figure 10.2.7 exactly puts the various technologies into context (without separation of different stabilization levels).
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	21	-	-	-	-	10.2.8	-	Third picture: It seems to be that hydro has a larger amount in the baseline compared to the CATIII/IV mitigation cases in 2030 and 2050. Why is this so? This should be addressed. And why is it used and increased again for CATI/II scenarios? There seem to be a model bias. Same question for FE Biomass.	The scenario sample is not completely unbiased which will improve toward the SOD due to additional scenarios included, but additional discussions of the potentially remaining bias will be added.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	21	-	-	-	-	10.2.8	-	This figure is very interesting. But for readability and comparison issues, the scales should be the same or at least a multiple of each other. Moreover, a vertical bar each separating 2020 from 2030 from 2050 would be good. Was the abbrev TPES explained somwhere?	Keeping the y-axis at e.g. a standard value of 350 EJ (biomass) across all graphs will make some of them unreadable. In addition, Figure 10.2.7 exactly puts the various technologies into context (without separation of different stabilization levels). Abbrevation TPES will be explained or removed and figures will be revised for better readability.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	21	-	-	-	-	10.2.8	-	this figure should be made comparable to figure 10.3.3. (I prefer the style of 10.2.8).	Comparability across chapter 10 will be improved toward SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	22	6	-	-	-	-	-	□deployment□ of RES?	Will be inserted.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
John Kessels (International Energy Agency Clean Coal Centre)	10	22	6	22	29	-	-	-	This section could delete the figure and sate the key message which is more RES deployment will be influenced by mitigation efforts and illustrate with a paragraph on China's efforts	We will consider whether the material can be explained sufficiently well using only text. However, at present our plan is to continue to use the figures, but to present the material in a more intuitive way.
Steve Sawyer (Global Wind Energy Council)	10	22	6	22	26	-	10.2.9	-	This is not a good example, as it is so obviously counter-factual with what is happening at present in China, leading the world in solar thermal, pv manufacturing, wind turbine manufacturing and small hydro deployment, while it is at the same time non-committal on absolute emissions reductions. The point is clear, but a better example should be found.	The figure shows that RES deployment in China is mostly reduced in case of a delayed participation in a global climate regime compared to the case when China would join a global climate regime immediately after 2012. This can (and typically does) still imply a strong increase in RES deployment in the delayed participation case compared to today (see Clarke et al, 2009 and references therein). However, we might consider to present the material in more intuitive way.
Andries Kruger (South African Weather Service)	10	22	12	22	12	10.2.2.2	-	-	"Insert ""(EMF 22)"" after ""Energy Modeling Forum 22""."	EMF22 as an abbrevation is introduced on page 12. Therefore, only EMF22 will be used here.
Douglas Arent (NREL)	10	22	30	22	34	-	-	-	add note that this section does not attempt to quanitify benefits, but that is addressed in section 10.x.x.	Cross reference to chapter 10.6 will be added.
Smail Khennas (Independent consultant,lead author chapt 8)	10	22	33	22	22	-	-	-	Last sentence should be reformulated	Cross reference to chapter 10.6 which deals with co-benefits of RES deployment will be added.
Vicente Schmall (Petrobras S.A.)	10	22	36	-	-	-	-	-	"Change ""reduced"" by ""reduces""."	Will be changed.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	22	-	-	-	-	10.2.9	-	percentage change against what? Against baseline? Against year 2005? What does N.T.E., O.S. mean?	Improved explanation will be added toward SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	22	-	-	-	-	10.2.9.	-	sorry, I did not get the clou of this figure. What is the main message: the longer you wait the less RES are deployed?	Improved explanation will be added toward SOD.
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	23	2	23	2	-	-	-	"This result about the correlation between GDP and stabilization level seems different from the results of IPCC AR4 (SPM WG III). Some more discussion of this point could be interesting. "	To clarify: The literature indicates that mitigation and also the deployment of RES have limited impact on GDP compared to broader socio-economic assumption in the scenarios. This is inline with the AR4 WG3 SPM. Within the space limitations in the report, we will aim at explicitly showing relative GDP changes compred to the baselines.
Douglas Arent (NREL)	10	23	6	-	-	-	-	-	and benefits?	Cross reference to chapter 10.6 which deals with co-benefits of RES deployment will be added to this or the previous paragraph.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	23	6	23	9	-	-	-	See also Figure 10.2.10 - We must be very careful when discussing this issue. A reader can have the impression that due to the use of RE world gross domestic production will change from as low as 250 trillion to as right as 450 trillion. This is a wrong message. The reader must be aware that baseline and RES Scenarios differ for each model and the changes are mainly due these assumptions than due these assumptions than due the use of RES. I suggest what has to be plotted is the difference between WGD Production in the baseline as in the RES Scenario.	A more careful discussion will be added, however, the literature indicates that mitigation and also the deployment of RES have limited impact on GDP compared to broader socio-economic assumption in the scenarios.
Marc Darras (GDF SUEZ)	10	23	8	-	9	-	-	-	10.2.2.3: The comment here is opposite to the fig. 10.2.10 which shows very low level of CO2 price in many cases associated with yellow and orange scenarios. Note that one could rather mention □CO2 cost□ rather than price, because it is not in all cases a primary variable. It may result from other policies, and not come from a pricing approach.	We agree that the correlation is weak at best. We will adjust the text, or perhaps the figures, appropriately to capture the reasons for limited correlation.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	23	9	-	-	-	-	-	variation in this correlation: I do not see any correlation at all in this figure	A quantitative statistical measure will be used to support this statement. In addition, it is aimed to improve the figure regarding readibility.
Marc Darras (GDF SUEZ)	10	23	13	-	14	-	-	-	10.2.2.3: □And this may further increase the CO2 price□ Should be replaced by: □and this may further increase the CO2 price at which the GHG constrain is reached.□	Not all scenarios include a GHG constraint, some also operate with a carbon tax or a mixed approach.
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	23	18	23	19	-	-	-	"It is said that the scenarios reviewed here do not indicate a clear correlation between RES deployments and carbon prices. This seems not completely coherent with the results of the previuos pages (page 16, line 27 for instance). Some more discussion of this point could be interesting. "	The earlier statement on page 16, line 27 does not refer to RES, but to low-carbon energy which includes nuclear and CCS which correlates much better with the climate target than RES deployment. In addition, models show an even wider range for the carbon price (equivalent to the marginal abatement costs). For that reason, we will explore using a different economic metric such as GDP or total mitigation costs if available for a wider set of scenarios.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	23	19	-	-	-	-	-	not indicate a clear correlation. Again: I do not see any correlation at all in this figure	A quantitative statistical measure will be used to support this statement. In addition, it is aimed to improve the figure regarding readibility.
Vicente Schmall (Petrobras S.A.)	10	23	35	24	5	-	-	-	It's important to mention that once sustainability criteria be reached by bioenergy production it can play a very important role in a transition period from fossil to RE technologies.	Sections 10.2.2 clearly indicates that biomass is one of the most important RES, if the most important one. Section 10.2.3 was still tentative and will be majorly revied toward the SOD.
John Kessels (International Energy Agency Clean Coal Centre)	10	23	35	25	5	-	-	-	This section has no references, eg page 24 line 28 mentions recent scenario literature but no reference. Do not need to go over individual chapters just mention that previous chapters go into more detail on specific technologies	The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	23	-	-	-	-	10.2.10	-	the x-scale of the right figure is strange.	The scale of the x-axis will be adjusted.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	24	1	-	-	-	-	-	"400 EJ seems to be a very high potential. Is this in line with the biomass chapter? Give references for that number. See e.g. van Vuuren et al. (2010) ""Bio-Energy Use and Low Stabilization Scenarios"" or Beringer and Lucht (2008). "	The 400 EJ refer to Section 2.8, i.e. "Potential Deployment" of bioenergy to ensure consistency across the SRREN. However, section 10.2.3 will be majorly revised in an attempt to harmonize the "Potential Deployment" sections of the technology chapters and their relation to chapter 10.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	24	1	-	5	-	-	-	It could be an idea to evaluate the biomass scenario where the potential is varied. But I do not know how many models provided results for this.	The ADAM project bioenergy sensitivity analysis is included in the set of scenarios evaluated here. The objective of the discussion here is to put the levels of RES deployment into the context of the technology chapters, in this particular case the bioenergy chapter.
Douglas Arent (NREL)	10	24	6	-	9	-	-	-	opinion vs fact or historical or comparisions to other industries??	The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	24	7	-	-	-	-	-	□relatively low□ compared to what? To the potential? To the other RES?	The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	24	35	24	38	-	-	-	Most wind energy projects are subsidized presently and they will be like that for some time. When discussing wind supply of the order of 10 EJ it makes sense to proper evaluate the total amount of subsidy and try to infer if society is willing to pay for that. Do not forget that some societies (like in Denmark) are willing to pay for the subside due commercial gains with the sales of technology, self proudness of the population and, probably a minor component, due to environmental reasons.	High wind energy deployments are mostly observed in climate stabilization scenarios, i.e. the subsidies that are currently granted are substituted by a price on carbon that penalizes fossil fuels. In addition, wind power is competitive under favorable resource conditions currently (consult wind chapter).
Marc Darras (GDF SUEZ)	10	24	40	-	42	-	-	-	10.2.3: For a question of homogeneity, this sentence should be deleted, because wind is the only technology where investment and incentives are mentioned. To note that is as well the technology which is nearer of the energy market level.	The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Ralph Sims (Massey University)	10	24	43	-	4	-	-	-	"Could shorten and just refer to Chap. 8 - Change ""fluctuating"" to ""variable"""	Will be changed.
Marc Darras (GDF SUEZ)	10	24	43	25	5	-	-	-	10.2.3: Integration should concern heat and transport as well. Conclusion should be taken from the pertinent chapter in the SRREN.	The harmonization of how the RES deployment levels are put into the context of the technology chapters and the systems integration chapter is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Douglas Arent (NREL)	10	24	43	-	48	-	-	-	shorten and simplify to chpt 8	The harmonization of how the RES deployment levels are put into the context of the technology chapters and the systems integration chapter is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	24	43	25	5	-	-	-	This can be deleted. All this discussion is present in Chapter 3 and Chapter 9.	The harmonization of how the RES deployment levels are put into the context of the technology chapters and the systems integration chapter is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Vicente Schmall (Petrobras S.A.)	10	24	44	-	-	-	-	-	"Insert bioenergy between brackets: ""(bioenergy, wind, solar, wave, tidal and run-of-river hydropower)""."	Bioenergy-based electricity generation is dispatchable and therefore does not count as a fluctuating source. (Sounds like you are rejecting)
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	25	10	25	10	-	-	-	"Should read: ""□energy demand, such as economic growth, might evolve over this century.□"	Will be changed.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	25	13	-	14	-	-	-	□from neglegible up to dominant. Can you somehow attribute this to the models? Are energy system models more rigid compared to hybrid models? Are some of the models (independent of their set-up) very REN-friendly, some not? It would be very important and informative to know why we see such a wide span here.	In case space limitations permit such an analysis, an attempt will be made to address this (modeling focused) question which is more driven by methodology than by the actual questions that chapter 10 tries to answer. An additional concern is that models cannot unambigiously attributed to well defined categories.
John Kessels (International Energy Agency Clean Coal Centre)	10	25	23	25	32	-	-	-	Delete paragraph to save page space	Strength and weaknesses of scenario analysis need to be discussed in the section.
John Kessels (International Energy Agency Clean Coal Centre)	10	25	33	28	38	-	-	-	These are selected mitigation scenarios and not an assessment or synthesis of scenarios for different renewable eenrgy strategies, too much bias this section needs to be rewritten with more balance	this is a more in depth analysis of the scenario from 10.2 - explaination will be added why and these scenarios have been selected - 2 new scenario will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	26	3	-	10	-	-	-	I did not get the point how many studies are analysed here? WEO, ETP and ER? And they are all based on the one database of IEA? This should be made explicit	more information will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	26	5	-	-	-	-	-	explain what backcasting process means. What is the objective? Meeting a climate target?	more information will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	26	9	-	-	-	-	-	ETP is not explained	more information will be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	26	9	-	-	-	-	-	Where does DLR2008 refer to? To the IEA database?	DLR 2008 source will be explained better
Vicente Schmall (Petrobras S.A.)	10	26	16	26	18	-	-	-	"To omit the circumstances on which the total (global) technical potencial for all renewable energies sources were predicted, makes the scenario too optimist and absolutely unreal when the author says that the offer ""exceed the demand by a factor of 32""."	will be rephrased -" compared to the global primary energy demand the technical renewable energy potential (UBA 2009) exceeds over 30 times"
Smail Khennas (Independent consultant,lead author chapt 8)	10	26	17	26	17	-	-	-	2.477 EJ/a should be 2,477	will be changed
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	26	17	-	18	-	-	-	this variation is nearly from zero to infinity. Is there a midian that could be given?	more information will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	26	34	-	-	-	-	-	does WI, ecofys need to be mentioned here?	unclear what the point is
Antoine Bonduelle (EE Consultant)	10	26	34	27	7	-	-	-	It is very useful to use such integrated figures	Accepted
Christiano Pires de Campos (Petrobras)	10	26	-	-	-	-	-	-	For question of logic, item 10.3.1 could be swapped with the 10.3.2	see above
mario contaldi (ISPRA, Institute for Environmental Protection and Research)	10	26	-	27	-	-	-	-	The entire para 10.3.1 repeat numbers and considerations already present in the report, see ch1 and ch 8. It can be deleted.	10.3.1 is part of the agreed structure and puts the analysis into the context of the further analysis of selected scenarios
Douglas Arent (NREL)	10	27	5	-	-	-	-	-	any error estimates or ranges or confidence level of estimates?	more information will be added
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	27	8	27	9	-	-	10.3.1	What is the meaning for electric power (EJ/yr), with heat (EJ/yr) and biomass primary energy (EJ/a)? Unless figures for electric power and heat are also primary energy the addition has no meaning.	Table will be reviewed and relationships explained
Douglas Arent (NREL)	10	27	10	27	22	-	-	-	language challenges here. Could be simplified.	further editing will take place
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	27	13	27	17	-	-	-	The expectation that breakthrough or technological improvement can change the cost suddenly was never confirmed by learning curves available for most of the technologies. Prices decreases are identified but usually the rate is around a few percent.	break through technologies are not part of this analysis. Both Wind and pv price developments of the past 10 years are in line with their learning curves
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	27	23	-	-	-	-	-	"regional and sectoral should be changed to ""sectoral and regional"" because sectoral comes first. Moreover, regional analysis comes in 10.3.3., so skip ""regional"" here?"	Accepted
Marc Darras (GDF SUEZ)	10	27	24	28	16	-	-	-	10.3.2: This 2 para could be shortened. The question of market is more detailed in section 10.5	Will shorten or delete and refer to other sections
Douglas Arent (NREL)	10	27	24	27	30	-	-	-	covered elsewhere? Chapter 8 delete?	Will shorten or delete and refer to other sections
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	27	24	28	2	-	-	-	This is a good paragraph but it is lost a bit here. Perhaps it should better be included in 10.6?	Will shorten or delete and refer to other sections

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)	10	27	26	27	29	-	-	-	More than only public acceptance, we need to underline the willingness of public to participate in market transformation. This is a prerequisite both for policy makers to be supported by citizens and to economical stackeholders to have a long term economical perspective. This will be also a crucial item in order to size the appropriate support scheme and associated penalties.	while we agree with your comment, there is no room in this section to go into further details. This will be covered in Chapter 9 and 11
Vicente Schmall (Petrobras S.A.)	10	27	29	27	30	-	-	-	"""Especially the use of biomass has been controvertial in the past years as competition with other land use, food production, nature conservation needs etc. accrued.""To affirm it without any reference makes it an assumption and it should only be in the text if the intention of the author was clarified."	reference will be added
Smail Khennas (Independent consultant,lead author chapt 8)	10	27	29	27	29	-	-	-	Suggest to add biofuels after biomass. Indeed the controversy surrounding biomass is mainly due to biofuels	while we agree with your comment, there is no room in this section to go into further details - this will be cover in the technology chapter for biomass
Vicente Schmall (Petrobras S.A.)	10	27	30	28	2	-	-	-	"Insert the phrase between commas, as follow: ""Sustainability criteria, associated with positive energy policies, have a huge influence on the overall market potential and whether bioenergy can play a crucial role in future energy supply""."	we will address this topic within this subsection
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	27	-	-	-	-	-	10.3.1	"last line: ""percentage"" should be added in the last line. "	will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	27	-	-	-	-	-	10.3.1	Interpretation: 32% of the total world energy demand in 2007 could be covered by REN? And here mainly by CSP and Geothermal. This should be mentioned in the text.	we will address this topic within this subsection
Smail Khennas (Independent consultant,lead author chapt 8)	10	27	-	27	-	-	-	10.3.1	This table is important and may deserve further comments	Accepted
Antoine Bonduelle (EE Consultant)	10	28	3	28	16	-	-	-	This paragraph does not bring much in content and clarity	Will be deleted, see above.
STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)	10	28	11	-	-	-	-	-	PV technology can be considered not as a younger technologies with comparision with CSP and ocean energy even if the productivity and the cost are expected to increase for the 1st and to decrease for the 2nde in the next decade.	not part of this analysis in this section
Andries Kruger (South African Weather Service)	10	28	26	28	27	10.3.2	10.3.2	-	Refer to figure in text, and references to sources should be given in the caption.	Accepted
John Kessels (International Energy Agency Clean Coal Centre)	10	28	28	28	38	-	-	-	These numbers are meaningless unless you state from what baseline, average annual growth rate of 35% from what baseline, etc	the paragraph explains the context of these growth rates
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	28	-	-	-	-	-	10.2.3	WEO, ETP, IEA are all based on IEA data. So they are not independent, or are they? The table suggests that you use 4 different sources but in fact these are only two (or not?). This should be mentioned in the caption	criteria explaination, data availability, add two more for the range
Smail Khennas (Independent consultant,lead author chapt 8)	10	28	-	28	-	-	-	10.3.2	WEO outlook 2008 scenario gives a RE share of 14 %in 2030 and just 13 % in 2050. Is it correct?Even so it seems a bit odd that RE share will decrease between 2030 and 2050	while we agree with your comment, there is no room in this section to go into further details

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Marc Darras (GDF SUEZ)	10	29	1	-	2	-	-	-	10.3.2: It is not too often cost effective in term of market deployment because of the transformation of the technology needed to improve efficiency, thus the effective final energy delivered. The up-front investment question is often not solved. The Stag programme in Tunisia for SWH, supported by UNPD is such an example.	while we agree with your comment, there is no room in this section to go into further details
Ralph Sims (Massey University)	10	29	2	-	-	-	-	-	"Add reference IEA, 2007, Renewable Energy Heating and Cooling, www.iea.org (free download). Less ""grey"" tha ISIS reference."	will be added
John Kessels (International Energy Agency Clean Coal Centre)	10	29	9	29	27	-	-	-	This section does not cover any factors aside from price, rename to Price factor or perhaps delete and move the costs to another section	Will Remove title
Marc Darras (GDF SUEZ)	10	29	10	-	27	-	-	-	10.3.2.1: This is an analysis of the projected cost of technologies, not an analysis of all factors for market development as the title indicates.	Will remove title
Douglas Arent (NREL)	10	29	10	29	27	-	-	-	include nucelar, fossil prices, fuel prices□.	this is out of the scope of this report
Emmanuel Branche (Electricit□ de France (EDF))	10	29	11	29	11	-	-	-	"Replace ""table 4"" by ""table 10.3.3"""	see above
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	29	11	-	-	-	-	-	Where is table 4?	the correct table number will be added
Steve Sawyer (Global Wind Energy Council)	10	29	14	29	14	-	-	-	I think you will find that Suntech of China is already delivering photovoltaics at close to or even below 2 USD/watt, i.e., less than 2000 USD/kw...	this is only a reflection of the analysed published scenarios
Emmanuel Branche (Electricit□ de France (EDF))	10	29	24	29	27	-	-	-	The generation cost (USD/kWh) is also very important for an investor point of view	this is part of the further analysis in 10.4
John Kessels (International Energy Agency Clean Coal Centre)	10	30	-	-	30	-	-	-	Delete table 10.3.3 as this is an overview of possible market shares and not based on actual market shares, alternative is to redo table based on acutal market shares, etc	future market shares are taken from the analysed scenarios. To give actual market shares for the future is not possible
Smail Khennas (Independent consultant,lead author chapt 8)	10	30	-	30	-	-	-	10.3.3	Should be TWh instead of Twh	Accepted
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	30	-	-	-	-	-	10.3.3	third column: is this % of total demand or of power demand? How to interpret the number > 100% in 2050 (for total renewables)? Is this % of the possible generation or of generation in the scenario?	will be made clearer
John Kessels (International Energy Agency Clean Coal Centre)	10	31	6	31	6	-	-	-	I think if you are going to use the Energy (R)evolution scenario you need to outline its assumptions and its analysis is in my view questionable.	explain - add general storyline
John Kessels (International Energy Agency Clean Coal Centre)	10	31	8	31	12	-	-	-	IPCC reports have to be based on published literature that has been peer reviewed and to have a table based on theoritical exercises is disturbing and should be deleted unless based on published literature.	The table will be redone to ensure that the table includes only data from peer reviewed literature.
Steve Sawyer (Global Wind Energy Council)	10	31	17	31	17	-	-	-	should be 27GW in 2008, and 37GW in 2009 -see http://www.gwec.net/index.php?id=30&no_cache=1&tx_ttnews[tt_news]=247&tx_ttnews[backPid]=4&cHash=1196e940a0	will be changed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
John Kessels (International Energy Agency Clean Coal Centre)	10	31	23	31	30	31	-	-	Where is this referenced from, who said it??? Which scenario?	this is an outcome of the scenario analysis
Steve Sawyer (Global Wind Energy Council)	10	31	25	31	25	-	-	-	As per the chart on p. 30, this is 13% of global electricity by 2020, not 33%. 33% is the number for 2050.	will be changed
John Kessels (International Energy Agency Clean Coal Centre)	10	31	31	31	31	-	-	-	Define CSP the acronymn as been mentioned several times in the chapter but not defined as concentrated solar power	will be added
Smail Khennas (Independent consultant,lead author chapt 8)	10	31	33	31	33	-	-	-	now?? Is this word appropriate?	will be edited
John Kessels (International Energy Agency Clean Coal Centre)	10	31	36	32	19	-	-	-	No references for any of the numbers mentioned?	We will be more clear in SOD about where the data is coming from.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	31	45	32	2	-	-	-	What is poorly considered is the synergy between sugar cane ethanol and electricity generation from sugar cane residues. In Brazil, the most efficient thermoelectric plant fed with sugar cane residue is able to generate 160 kWh/t of processed cane from which 90% is surplus. Almost all new sugar mill (70) are able to export surplus electricity to the grid at the lowest cost between all RES. With a sugar cane production of 1000M tonnes by 2014, this means that 160TWh could be generated. Thus, if a scenario assumes a significant share of 1st generation biofuels (the lowest cost source of ethanol today and for the future), where sugar cane has a significant share, then electricity generation from biomass has enough space to grow. See Pacca and Moreira, Energy Policy 2009.	too specific as this is the analysis of global not national scenarios
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	32	4	-	-	-	-	-	different demand projections I did not get the point here: where do these demand projections come from? From the scenarios? From your own judgment?	will be made clearer

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	32	6	32	8	-	-	-	"It is very interesting the huge share of hydroelectricity when so much concern for water shortage is discussed in the literature. To generate power, through hydroelectricity, 1kg of water falling from 40m high produces 400J. Thus, 1kWh requires 9m3 of water. As discussed in earlier comment, one tonne of sugarcane, on top of ethanol produced, can generate 160kWh. To achieve these results, some extremists claim that it is necessary rainfall of the order of 1,500mm/yr, which means that in one hectare of land, 15,000m3 of water has to be made available, mainly by mother nature, through rainfall. Since in 1ha of sugar cane crop it is possible to produce 100 tonnes of sugar cane, the most extreme calculation claims that 150m3 of water was needed per tonne of sugar cane. With this tonne it is possible to generate 160kWh or it is necessary to use 0.94m3 of water/kWh. Compare this value with the 9m3 of water from hydro. Even, considering that the same amount of water flows through hydro plants installed in cascade (assuming an average of 4 plants) the water volume is 2.25 m3/kWh. And, more interesting, is that hydroelectricity grew and is still growing significantly, with modest criticism about water shortage, if compared with biofuels. "	authors appreaciate the comment
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	33	1	-	-	-	-	-	"Heading: should be in the same style as 10.3.2.1: ""Renewable heating and cooling """	will be changed
Marc Darras (GDF SUEZ)	10	33	1	-	-	-	-	-	10.3.2.2: Renewable technologies cannot all be used for cooling. It is mostly considered for solar, and in some cases for geothermal low-temperature together with passive technologies. Could the discussion be by order of magnitude: bio energy, then solar and geothermal.	information will be provided
John Kessels (International Energy Agency Clean Coal Centre)	10	33	1	34	15	-	-	-	I suggest you combine these three sections into one and shorten it to a page, delete Table 10.3.4	We will combine and shorten and re-do table with different data
Marc Darras (GDF SUEZ)	10	33	2	-	13	-	-	-	10.3.2.2: One of the question not mentioned here is the transformation of the biomass system in order to gain efficiency.	while we agree with your comment, there is no room in this section to go into further details
Ralph Sims (Massey University)	10	33	2	-	13	-	-	-	Again IEA's REHC reference could be added.	will be added
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	33	7	-	8	-	-	-	Basis of the cost projection of solar thermal technology by ESTIF (2009) should be described in order to show that the ESTIF (2009)'s projection is not a mere propaganda by an industry organization but a scientific assessment baed on expert judgements. For example, cost of solar water heaters in Japan, one of the major markets of solar thermal technology, has not been reduced since the mid 1980s (Kimura 2008).	information will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	33	12	-	13	-	-	-	dependence on oil price: but this holds in general, not only for heating sector	while we agree with your comment, there is no room in this section to go into further details
Douglas Arent (NREL)	10	33	15	-	-	-	-	-	"add ""within caveats above"" or similar language"	editing will take place

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	33	15	33	16	-	-	-	It is worthwhile to examine the real world, before the conclusion from this text is fully acceptable. In the last 5 to 7 years the use of wood pellets has increased significantly in some EU countries (Austria, Germany, Italy) and a huge exportation market from Scandinavian, Canada and USA has been established to feed the EU demand.	this section provides an overview of the analysed and published peer-reviewed scenarios
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	33	20	33	21	-	-	-	Typo error.	Accepted
Ralph Sims (Massey University)	10	33	33	-	-	-	-	-	Why just pellet systems mentioned? Is more combustion of biomass as logs, wood chips, bark etc.	more information will be added
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	33	36	33	36	-	-	-	Typo error.	Accepted
Marc Darras (GDF SUEZ)	10	33	-	-	-	-	-	-	10.3.2.2.2: In this para, only pellets are mentioned. This is one technology but not the only one. Other should be mentioned.	see above
Marc Darras (GDF SUEZ)	10	33	-	-	-	-	-	-	10.3.2.2: One has to make a difference between market size and growth, notably for bioenergy where the primary energy can be used at some cost (production, distribution). This later market is under transformation.	while we agree with your comment, there is no room in this section to go into further details
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	34	1	34	2	-	-	-	The numbers in the text are different (by a factor 10) from the values in the following table (10.3.4)	will be corrected
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	34	2	34	4	-	-	-	Please, consider that biomass energy can be used as source of high temperature heating and it is natural that this high quality energy be better used for electricity generation or cogeneration of heat and power. Thus, this may explain the low share of biomass in the heating and cooling systems. It would be better to investigation the demand for high temperature heat and for low temperature heat and them identify RES suitable for these purposes.	while we agree with your comment, there is no room in this section to go into further details
Smail Khennas (Independent consultant,lead author chapt 8)	10	34	4	34	4	-	-	-	should be of instead of on	Accepted
Vicente Schmall (Petrobras S.A.)	10	34	10	-	-	-	-	-	"Change ""many"" by ""some""."	this is referenced

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	34	10	34	11	-	-	-	I recommend to say: "which is mainly due to traditional use of biomass and in several cases not sustainable□ There are no reliable studies concluding that more than half of biomass used in traditional activities is from unsustainable origin.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;137;10;35;12;35;15;;;;Here it should be mentioned the very important aspect that some biomass feedstocks have the capability to produce liquid biofuels and electricity. See Pacca and Moreira, Energy Police 2009.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;138;10;35;18;35;19;;;;All electricity generated in sugar mill is derived from co-generation.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;139;10;35;39;35;40;;;;A reliable reference is needed to support this conclusion, which is not stated in Chapter 2.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;140;10;36;;;;;10.3.2;;And Figure 10.3.3 - The only way the numbers shown in these figures can be compared is if the different energy sources contribution are quoted as primary energy. It has no meaning to compare electricity generated from hydro with direct heating bioenergy. Please, confirm and make clear in the figures that all numbers refer to primary energy.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;141;10;37;13;37;14;;;;Bioenergy is not included in Table 10.3.5. Probably, the source quoted did not include it. But, considering data from Chapter 2, the table could be expanded to include bioenergy.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;142;10;39;2;39;3;;10.3.7;;It would be nice to include bioenergy. How Chapter 2 can collaborate?;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;143;10;39;10;39;11;;;;Shall we understand 0.58 percent? Unfortunatelly, bioenergy isn't included.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;144;10;40;5;40;6;;;;Please, add in the heading of Figure 10.3.4 the following: "IEA REFERENCE versus Energy Revolution (ER)□. Also, it is unclear the caption for Firgure 10.3.4. What do you means by Reference (>600ppm) versus Category II (<440ppm)? In this Figure is bioenergy included?	this is referenced
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	34	12	34	12	-	-	-	From the table 10.3.4 it seems that the minimum share of RES is 23% (not 21%)	will be corrected
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	34	16	-	-	-	-	-	"Heading: should be in the same style as 10.3.2.1: ""Renewable energies □ """	Accepted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Manfred Treber (Germanwatch)	10	34	-	-	-	-	-	10.3.4	It is ridiculous to quantify with 6 digits accurateness until 2050 (e.g. total renewables 106 652) - what understanding lies behind this?	this reflects specific scenario outcomes (take from literature) - we might move to a higher unit (EJ/a) where appropriate
John Kessels (International Energy Agency Clean Coal Centre)	10	35	7	43	-	-	-	-	I suggest you keep tables 10.3.6 and 10.3.7 and delete the unreferenced ones. I would also reduce the pages to around 2-3 with the acutal reference numbers of total renewable energy share on a global and regional basis.	this section provides an overview of the analysed and published peer-reviewed scenarios
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	35	7	-	-	-	-	-	this heading is strange. Shouldn't it be 10.3.3.?	headings will be reviewed again
Andries Kruger (South African Weather Service)	10	35	7	35	7	10.3.2.4	-	-	"Change title to ""Contribution of renewable primary to global primary energy contribution""?"	editing will take place
Steve Sawyer (Global Wind Energy Council)	10	35	22	35	23	-	-	-	Neither wind nor hydro is used exclusively in the electricity sector, i.e., it is used for both heat and to supply transport in both Norway and Denmark, and as the electrification of transport on the one hand and the need/desire to integrate large quantities of variable RE into energy systems becomes more prevalent, more and more 'surplus' wind will be converted to heat or stored for transport.	will be made clearer
Christiano Pires de Campos (Petrobras)	10	35	33	-	35	-	-	-	The link to energy efficiency looks an author guess than a conclusion from the references. The whole sentence should be deleted.	will be modified
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	35	34	24	34	-	-	-	Typo error.	Accepted
Steve Sawyer (Global Wind Energy Council)	10	35	-	-	-	10.3.2.4	-	-	this section begs the question of the suitability of the TPES metric for RE sources□as systems become more and more integrated and variable RE (wind) and hydro resources are used more in both heating and transport it becomes even more inappropriate.	while we agree with your comment, there is no room in this section to go into further details
Luc Gagnon (Hydro-Quebec)	10	35	-	35	-	10.3.2.4	10.2.7	-	The true performance of renewable sources is better expressed in FINAL ENERGY, instead of primary energy. Primary energy is well adapted to showing fossil fuel reserves, no matter the efficiency of combustion. Using primary energy data gives excessive importance to options with low energy efficiency, such as fossil fuels or biomass combustion.	Agree with this point, but no data for final energy from all analysed scenarios is available
Vicente Schmall (Petrobras S.A.)	10	36	7	37	2	-	-	-	It's important to mention that the overview in section 10.3.3 is limited because there are no data about bioenergy.	will be made clearer
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	36	-	-	-	-	10.3.2.	-	It would be good, if this nice figure could be directly compared to the model results of 10.2.	Substantial adjustments will be made to the section to link it better to 10.2
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	36	-	-	-	-	10.3.3	-	Is it right that this figure shows in principle the same content as figure 10.2.8? Then these two should be made comparable, use the same style, otherwise a lot of information is lost.	connection between 10.2 and 10.3 will be made clearer
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	36	-	-	-	-	10.3.3	-	what does this table on the right mean??? It is not readable at all	layout will be changed to make it clearer

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Douglas Arent (NREL)	10	37	1	37	20	-	-	-	given few studies, what is error, or confidence in results? Ranges of possible outcomes?	will be addressed both in chapter 1 and 10 -> presentation of technical potentials a
Smail Khennas (Independent consultant,lead author chapt 8)	10	37	4	37	28	10.3.3.1	-	-	Apart from hydro, in the case of Africa the quality of data is too poor to draw meaningful results.	this section provides an overview of the analysed and published peer-reviewed scenarios
Christiano Pires de Campos (Petrobras)	10	37	7	-	9	-	-	-	"The sentence ""In general there are .... developing countries"" can be deleted since it is written in other words in the same paragraph."	editing will take place
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	37	19	-	-	-	-	-	This is an important message for the exec. summary: Large discrepancy between technical potential and deployment in the scenarios	Accepted
Smail Khennas (Independent consultant,lead author chapt 8)	10	37	-	37	-	-	10.3.5	-	How can we explain a market potential higher thhan the technical potential (103 % in China and 102 % in India)?	this will be revised
Steve Sawyer (Global Wind Energy Council)	10	37	-	-	-	-	-	10.3.5	"The technical potential for China wind in these studies is ridiculously low. See, for instance; Michael B. McElroy, et al. 'potential for wind-generated electricity in China', Science 325, 1378 (2009);DOI: 10.1126/science.1175706; and Xi Lu, Michael B. McElroy, and Juha Kiviluomac, 'Global potential for wind-generated electricity' www.pnas.org cgi doi 10.1073 pnas.0904101106; which give potentials 15-25 times higher than those implied in this chart. "	new published informations will be added
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	37	-	-	-	-	-	10.3.5.	"last line for world: a year is missing or what do the three different ""world"" rows mean?"	editing will take place
Andries Kruger (South African Weather Service)	10	38	1	38	1	10.3.3.2	-	10.3.6	Refer to references [1] and [2] as 1n table?	will be made clearer
Douglas Arent (NREL)	10	38	10	38	25	-	-	-	needed? Reduce text and state how Primary Energy was calculated for table.	will be made clearer
Christiano Pires de Campos (Petrobras)	10	39	12	40	5	-	-	-	Delete paragraph, it is confusing and does not bring sectorial information.	part of the agreed structure & analysis
Smail Khennas (Independent consultant,lead author chapt 8)	10	39	-	39	-	-	10.3.7	-	It seems odd that solar MP in Africa is 0.00 % in 2020 and 0.08 % in 2050 when we know that there are huge projects in this region particularly Desertec.	in introducing the scenarios we will discuss their general limitations and issues, but not specific projects such as desertec)
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	39	-	-	-	-	-	10.3.7	only wind and hydro seems to be important. But hydro is not important in the models (cf Fig. 10.2.8)	will reflect this in the texts more in detaile
Andries Kruger (South African Weather Service)	10	40	7	40	8	10.3.3.3	10.3.4	-	References should be given for information in table.	figure will be reworked
Douglas Arent (NREL)	10	40	11	42	17	-	-	-	shorten, simplify to ranges of totals and refer to table.	new calculation method will be added
Emmanuel Branche (Electricit□ de France (EDF))	10	40	16	40	16	-	-	-	603gCO2/kWh is an average world value with significant differences between area and country. It could be interesting to have regional specific CO2 emissions to better address this issue (especially in an IPCC SR)	see above
Douglas Arent (NREL)	10	40	20	-	-	-	-	-	units? Kt t CO2/PJ	unit is Kt CO2/PJ

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	40	-	-	-	-	10.3.4	-	introduce abbreviation RE for the legend	Accepted
Taishi Sugiyama (CRIEPI)	10	40	-	-	-	-	10.3.4	-	Only 2 analyses? I think there are many literature available.	more scenarios will be added
Emmanuel Branche (Electricit□ de France (EDF))	10	41	1	41	23	-	-	-	Regarding the importance that hydropower will play in the future energy mix, it will be interesting to add a paragraph on hydropower (from CO2 emission reduction between -2.9 GtCO2/a to -4 GtCO2/a)	We will work to balance the discussion of the different technologies within space constraints
Christiano Pires de Campos (Petrobras)	10	41	2	-	-	-	-	-	20 or 30%?	will clarify
Christiano Pires de Campos (Petrobras)	10	41	2	-	-	-	-	-	The standart for this report is /a or /yr? Check in whole chapter.	will be checked - author assumes "/a"
Michael Jack (Scion (New Zealand Forest Research Institute))	10	41	16	41	17	10.3.4	-	-	"Either a decimal point is missin in the ""low"" figure or there is decimal point in the wrong place on the ""high"" figure."	a decimal point in the "low" figures is missing, will be changed
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	41	18	41	20	-	-	-	Reference are all showing bioenergy risks. Please, add references in favour of bioenergy, as Pacca and Moreira, Energy Policy 2009, to be fair.	Will be considered if section stays, or will refer to ch 2
Michael Jack (Scion (New Zealand Forest Research Institute))	10	41	20	41	23	10.3.4	-	-	I could not understand what this sentence was trying to say.	editing will take place
Michael Jack (Scion (New Zealand Forest Research Institute))	10	41	20	41	20	10.3.4	-	-	Incomplete reference.	will be completed
Christiano Pires de Campos (Petrobras)	10	41	21	-	-	-	-	-	"What is the difference among ""modern biomass versus modern biomass in the 'direct heating category""", the sentence should be rephrased"	editing will take place
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	41	21	41	21	-	-	-	Please, check the sentence.	see above
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	41	-	-	-	-	10.3.5	-	can you give a more handy interpretation of the figure? Can ~10-30% of CO2 be avoided by each technology?	CO2 calculation method will be expaneded
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	42	11	-	18	-	-	-	an own section for these 5 lines are a bit exaggerated, same for 10.3.4.2	will be changed
Smail Khennas (Independent consultant,lead author chapt 8)	10	42	-	42	-	10.3.4.1 and 10.3.4.2	-	-	These sections are too short and could be conclusions of 10.3.4	see above

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	43	6	43	6	-	-	-	Typo error.	Accepted
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	43	11	-	-	-	-	-	"I think this sentence is wrong and should read: ""□in the high and MEDIUM case within the integrated models AND SUBSTANTIALLY LOWER IN THE LOW CASE""."	will be edited
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	43	11	43	12	-	-	-	I suggest something should be added here explaining what integrated models means. Furthermore, some explanation could be provided why biomass has higher share in these integrated model. This is a real advantage of biomass and should be highlighted. Furthermore, the statement is not straighforward. Examining Table 10.3.8 it is possible to note that integrated models forecast higher bioenergy share than technical detail models for High and Medium penetration scenarios. The reverse happens for low penetration scenarios. A better discussion is needed.	will be expanded
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	43	-	-	-	-	-	10.3.8	are you referring here to a mean of the models? This is not clear.	will be made clearer
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	43	-	-	-	-	-	10.3.8	"Interpretaion of this table: hydro and wind are in the same order for both types of models, solar is too small and geothermal far too small in the integration models. Is it possible to check some of the costs in the integration models if these are assumed to be very high for solar and geothermal? Or is it the potential? Concerning biomass: how many models are in the ""low demand"" category? If there are only 1-2 models, this could also be a model bias."	will be made clearer
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	43	-	-	-	10.3.5.	-	-	This section has to be extended essentially. More comparisons should be shown here. What do we learn from these two different viewpoints? Where are the main differences between technological detail and integration models? Are these differences related to model assumptions, to modelling approaches (e.g. optimization or least-cost)?	will be expanded
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	43	-	-	-	10.3.6	-	-	"The category ""knowledge gaps"" is very good and important, but perhaps they should be all put together and not one section for 5 lines."	Accepted
John Kessels (International Energy Agency Clean Coal Centre)	10	44	1	44	3	-	-	-	Go back to the agreed structure and focus on Cost curves for mitigation with renewable energy	The text explains why the author team decided not to present MITIGATION cost curves.
John Kessels (International Energy Agency Clean Coal Centre)	10	44	5	44	18	-	-	-	Delete just introduce the section and bring in Mckinsey and Co, etc later.	Partially Accepted. Some of the text is cut, parts remain because the concept is not clear to all readers, and also we need to justify why we devote so much attention to a method that has so many limitations as described below.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	44	-	-	-	10.4.2.	-	-	The discussion of concept and methodology of abatement cost curves is very useful	Thanks, that is very kind!!

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Antoine Bonduelle (EE Consultant)	10	45	4	46	34	-	-	-	This is a very interesting part on methodology. But this could be supplemented (or replaced in some cases) by a list or a table of the possible limitations. Among those limitations, there is not much on the importance of timescale between measures	I will consider if some of the text can be put into a table, it is a very good idea (OK, I have also been considering it earlier…;-) but it is good to get an extra push for it!)
John Kessels (International Energy Agency Clean Coal Centre)	10	45	5	46	34	-	-	-	Delete from page 46 line 1 to 34 the preceding paragraphs are enough to explain the limitations on cost curves	The cost curves receive significant attention from policy makers, and it is important to document their limitations.
Douglas Arent (NREL)	10	45	33	45	45	-	-	-	add das gupta, RFF book on Intergenerational Equity as key refs (and their argument for low rates??)	Will add it if paper is found. TSU: please send the paper if reviewer has sent it! Unfly citation is not sufficient to easily locate the material.
John Kessels (International Energy Agency Clean Coal Centre)	10	46	35	51	21	-	-	-	To be blunt this is not what was asked for in the outline and agreed upon so delete	Structure of section is being revised
Smail Khennas (Independent consultant,lead author chapt 8)	10	46	-	51	-	10.4.3.2	-	-	This section is entitled Regional RE cost curves but there is nothing on the Africa and Asia regions. Title should be changed to reflect the content of this section.	There is nothing in the title that claims to review every region - coverage is determined here by the available literature. However, there are studies also on Asian region. Nevertheless, section title changed to "regional/national…"
William Kyte (E.ON AG)	10	48	-	49	-	-	-	-	Structure from small subnational, country, etc. Is not so clear?	Inclusion of studies is determined by literature availability and thus there is no regional structure. This will be explained in the text.
William Kyte (E.ON AG)	10	48	-	66	-	-	-	-	Unclear structure. Why is there a difference between cost curve and supply curve? In the cost curve one mentions the potential volumes (TWh) that can be delivered at that cost. The supply curve does the same and even with further detail on the costs	Cost curves and supply curves are the same. Nevertheless, in order to avoid confusion, I decided to consistently refer to energy ones as "renewable energy supply curves" while "abatement (or mitigation) cost curves" are the other category.
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	48	-	-	-	-	-	10.4.1	Reduce the size of the table	Table will be revised with respect to grey lit and organization, but may not be significantly reduced in size.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	50	27	-	-	-	-	-	Reference to Scholz 2008: this is only a presentation!!! Please check with the TSU if this is allowed.	will check if I can find the report/paper behind the presentation and use that as the reference. If not, respective table lines and refs to it will be deleted.
Vicente Schmall (Petrobras S.A.)	10	51	24	-	-	-	-	-	"Change ""Table 10.2"" by ""Table 10.4.2""."	Accepted
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	52	1	52	2	-	-	10.4.2	You can add to this table data for Brazil. See Pacca and Moreira, Energy Policy 2009.	Thank you!! Will add.
William Kyte (E.ON AG)	10	52	-	53	-	-	-	-	Why no other sources used? New Energy Finance? Ecofys? McKinsey for Italy? Project Catalyst?	will check if we find more reports from these authors - perhaps more became available in the last year

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	52	-	-	-	-	-	10.4.2	Reduce the size of the table	The table will be reviewed to reduce grey literature and re-organized, but may not be significantly reduced in size.
John Kessels (International Energy Agency Clean Coal Centre)	10	52	-	52	-	-	-	10.4.2	Would be good to add more than just one developing countriy such as SA if there is literature avaliable. Such as from China, India, Brazil, etc.	Actually China is included. Have not found more lit on this to review, but will make another round of effort, perhaps new curves have become available in the last year
Christiano Pires de Campos (Petrobras)	10	54	4	-	-	-	-	-	a%??	corrected
Smail Khennas (Independent consultant,lead author chapt 8)	10	54	12	54	18	-	-	-	If the conclusions refer t0 table 10.4.2 then South Africa and the US should be added to the list as their mitigation potential is higher than Poland.	The text referred to largest potential as % of baseline and then this comment is not valid. .Now this has been made more clear in the text to avoid confusion.
Emmanuel Branche (Electricit□ de France (EDF))	10	54	17	54	18	-	-	-	Australia, China and Poland are very interesting because most of their electricity is based on coal power plants, and that they have a carbon factor (gCO2/kWk) very high compared to other countries	Noted, but no room to discuss in text.
Andries Kruger (South African Weather Service)	10	54	26	54	27	10.4.3.3	10.4.1	-	Figures too small.	Actually I think these figures can be deleted, but will read through the text again to make sure.
John Kessels (International Energy Agency Clean Coal Centre)	10	55	11	56	12	-	-	-	Delete and begin with just a short one paragraph introduction before proceeding to Africa	which text does this refer to? The line numbers refer to half a sentence and for those the comment does not make too much sense.
PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	10	55	13	80	34	-	-	-	Areas that needs to be looked at for possible reduction or shortened.	comment refers to a huge area not only for my section. But we need to discuss cuts anyway.
Marc Darras (GDF SUEZ)	10	55	-	67	-	-	-	-	10.4.4: 1. This chapter covers only Power generation. 2.□□□□□□ The supply curve concept is interesting. However it lacks the time approach with penetration first in niche market then in broader markets. Then is the cost mentioned the one pertinent for the power generated? Or is it a mean level over the investment period? 3. Global technology, such as PV, show large differences (i.e. from 75 to 120 approximatively) between the regions. Since local labour is not the main factor of cost, how this is explained? 4.□□□□□□ The graphs title should recall that this is just the power generation sector	lack of data do not permit inclusion of non-electric RES, now better explained in text. Time approach is included in these curves. Rest of the comment missing so I cannot react fully on the point.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	55	-	93	-	-	-	-	I did not go through the second part of the chapter	No response possible.
Luc Gagnon (Hydro-Quebec)	10	55	-	67	-	10.4.4	-	-	Cost curves can be a useful tool. However, the cost curves presented here are not realistic and could be misleading. They do not meet usual IPCC standards and the whole section should be removed. Numerous arguments can be used to show that the data is not realistic:	Section is being re-written, curves are being moved and renamed.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	55	-	67	-	10.4.4	-	-	This section deals only with renewable 'electricity' supply curve, while the titles of the section and figures all described as renewable 'energy' supply curve. Why not renewable 'heat' as well, which seems to offer large, low-cost energy supply? If renewable heat is not included in the analysis then the titles should be as renewable 'electricity'.	good point. Lack of data for doing this has already been explained in :"gaps", but now two sentences have been added on this here, too.
John Kessels (International Energy Agency Clean Coal Centre)	10	56	13	66	9	-	-	-	Delete or rewrite it is to reliant on one source which in my view is questionable the E revolution and there are several figures without references	The scenario is in the peer reviewed literature, and is illustrative of scenarios assuming more aggressive deployment of RES. Figures will move to 10.3; but these are all based on own calculations based on peer-reviewed data documented earlier in the section. (Changed to reject. Add -- this is from peer reviewed lit)
Smail Khennas (Independent consultant,lead author chapt 8)	10	56	13	56	23	-	10.4.2	-	The huge differences between WEO scenario and Energy [R]evolution might be due to Desertec project. It should be useful to provide if only rough guidelines of the discrepancy between the 2 scenarios	These are not discrepancies but differences in future scenarios. The main underlying assumptions causing the differences will be outlined. WEO 2009 will be used.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	56	21	57	1	-	-	-	The absence of bioenergy data for Africa probably limits the conclusion. Why bioenergy isn t included?	In the shorter term (by 2050) there is not that large potential for biomass based electricity. We will either clarify this in the text, but also may try to illustrate another scenario in the cost curves that shows a stronger role for bio-electricity
Taishi Sugiyama (CRIEPI)	10	56	-	62	-	-	-	-	Include cost curve for Japan. See (SRREN_Draft1_Review_Sugiyama_04, i.e. Imanaka and Sugiyama_Taishi 2009) as attached.	study will be reviewed (if located, TSU please provide it!!), but not for the marked section (that is based on a consistent dataset), but for the reviewed lit table
Taishi Sugiyama (CRIEPI)	10	56	-	62	-	-	-	-	There is increasing recognition that heat pumps are renewable. Include, if possible, heat pumps to the cost curves.	We are reviewing literature here and the literature has not considered them, thus we cannot either.
Smail Khennas (Independent consultant,lead author chapt 8)	10	57	1	57	6	-	10.4.3	-	Comments seem necessary on why huge increase of CSP in Africa and why hydro lose its share. To which scenario figure 10.4.3 refers	explanation will try to be added
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	57	7	66	6	-	-	-	Absence of bioenergy is a serious limitation in this discussion.	we will see if it is needed to provide an explanation why bio-power has not been considered in these scenarios.
Vicente Schmall (Petrobras S.A.)	10	61	-	-	-	-	10.4.1 1	-	"Change ""2030"" by ""2050"" (in the title)."	Accepted
Vicente Schmall (Petrobras S.A.)	10	64	-	-	-	-	10.4.1 6	-	"Include the year 2030 in the title, as follow: ""OECD Pacific 2030""."	Accepted
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)	10	67	24	67	47	-	-	-	Please, add in knowledge gaps the lack of information regarding bioenergy.	it is already mentioned that heat and fuels are not covered in sc and this is serious limitation. Not sure if bioenergy needs to be singled out.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
John Kessels (International Energy Agency Clean Coal Centre)	10	68	28	69	2	-	-	-	Delete the first paragrah is enough	This paragraph provides information needed to understand the nature of the numbers that are shown in Table 10.5.1.
William Kyte (E.ON AG)	10	70	1	71	4	-	-	-	This statement conflicts with statements else where that renewables are competitive	The other parts of the chapter will be modified in order to be consistent with the statement mentioned here.
Emmanuel Branche (Electricit□ de France (EDF))	10	70	2	70	2	-	-	-	"Add examples. Proposition: ""with few exceptions (biomass, hydro and geothermal power), renewable □"""	Text will be modified according to the comment.
Richard Taylor (International Hydropower Association (IHA))	10	70	-	-	-	-	-	10.5.1	"Annotate ""large hydro"" and other hydro as being categorised by scale for political rather than technical/scientific reasons. Reason: See reason given for ""5, 5, 16, 5, 16"" above and c.f. comment for ""9, 55, 1, 55, 11, 9.6.3""."	As the table shows "Large" and "Small hydro" are used by IEA as well. Chapter 10 will follow the wording used by the hydro technology chapter. A respective consistency check will be carried out.
Smail Khennas (Independent consultant,lead author chapt 8)	10	70	-	70	-	-	-	10.5.1	Rural off grid. The cost per kW of micro is too low. It should in the range of 1000-4000 US$/kW. The 1000 is rather for sites limited to mechanical power. For instance see Khennas best practices for sustainable development of micro hydro power, ESMAP, World Bank.	The data provided here will be compared with the data from the hydro chapter. If the data given by the reviewer are confirmed the text will be changed accordingly.
Douglas Arent (NREL)	10	71	1	71	4	-	10.5.1	-	other refs? EIA? EPA? EMF? Wind 20% US study	The final figure will be based on data provided by the technology chapters.
Smail Khennas (Independent consultant,lead author chapt 8)	10	71	14	71	14	-	-	-	Should be energy efficiency and not energetic efficiency	Text will be modified according to the comment.
mario contaldi (ISPRA, Institute for Environmental Protection and Research)	10	71	-	-	-	-	10,5,2	-	The figure reiterates concepts already analized in ch 1 and ch 11. It can be dropped.	The figure will be deleted.
Smail Khennas (Independent consultant,lead author chapt 8)	10	71	-	71	-	-	10.5.1	-	Units for X axis	Text will be modified according to the comment.
Taishi Sugiyama (CRIEPI)	10	71	-	-	-	-	10.5.2	-	The figure does not incorporate technological spillover from other technologies and so redrafting is desireable. For example PV is benefited from silicon computer technologies.	As the figure will be deleted (see above), the comment is obsolete.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	72	4	-	25	-	-	-	"""Spillovers"" is lacking in the list of the mechanisms of cost reductions. Spillover is refereed to as an important driver of technological change in many literatures including IPCC AR4 (chap 2, p.153), Clarke et al.(2006), Bresnahan and Trajtenbergb (1995), and Rosenberg (1982). Imanaka (2009) also shows that inter-industry spillovers were the major drivers for improving energy efficiency and cost reduction of fluorescent lamps in Japan. See: Rosenberg, N., 1982, Inside the Black Box: Technology and Economics, Cambridge University Press. Imanaka, T., 2009, What led to the rapid diffusion of energy efficient fluorescent lamp systems?, CRIEPI Research Report Y08053, Central Research Institute of Electric Power Industry. http://criepi.denken.or.jp/jp/kenkikaku/cgi-bin/report_download.cgi?download_name=Y08053&report_cde=Y08053 Bresnahan T., Trajtenbergb, M., 1995, General purpose technologies: □Engines of growth□?, Journal of Econometrics, 65, pp.83-108. Clarke, L., Weyant, J., Birky, A., 2006, On the sources of technological change: Assessing the evidence, Energy Economics, 28, pp.579-595."	Technological spillover will be included in the bullet list (page 72).
John Kessels (International Energy Agency Clean Coal Centre)	10	72	26	72	28	-	-	-	Delete manna from heaven sentence	Text will be modified according to the comment.
Vicente Schmall (Petrobras S.A.)	10	72	-	-	-	-	10.5.3	-	The figure excludes traditional biofuels/biomass that are both in commercialisation stage. As data are showed geothermal, onshore wind and solar heating are the more advanced and competitive technologies. It's not true.	Biomass will be included in the figure.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	73	1	73	6	-	-	-	This kind of figure is very traditional. It should be nice to try the incorporation of RD&D costs from developing countries. Considering the rate of implementation in same of these countries the amount of RD&D should not be negligible.	In principle, it would be nice to incorporate that data. However, the author is not aware about a comprehensive assessment of theses expenditures referring to the group of all developing countries.
Marc Darras (GDF SUEZ)	10	73	7	-	9	-	-	-	10.5.2: They are more ways to incentive the market for technology deployment alternative to feed-in tariffs notably for heating decentralised technology: norms, tax credit, bonus malus...	Other incentives will be taken into account.
Douglas Arent (NREL)	10	73	-	74	-	-	-	-	is learning not covered in tech chapters? It is I Chpt 11 (not appropriately)	Learning is discussed in the technology chapters. The purpose of chapter 10.5. is to summarize these data in order to allow for a comparison.
Marc Darras (GDF SUEZ)	10	74	6	-	23	-	-	-	10.5.2: All this paragraph is related to classical market dis-functionment. Why address this question here?	The illustrative learning curves show the market disfunctionment. In order to avoid confusion, the issue is adressed in the text.
Taishi Sugiyama (CRIEPI)	10	74	-	-	-	-	10.5.5	-	Learning curve analysis needs sensitivity analysis and further discussion.	As mentioned there, figure 10.5.5. only shows illustrative results. The range of uncertainty is shown by the numbers given in table 10.5.2.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	76	-	-	-	-	-	10.5.2	"Nemet(2009) indicates range of PV learning rates, 15-21%(median rates). Rewrite from 21% to 15-21% in Nemet(2009)'s LR column of the table. Nemet, G., 2009, Interim monitoring of cost dynamics for publicly supported energy technologies, Energy Policy, 37, pp.825-835."	The source will be revisited and the numbers will be changed if necessary.
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	76	-	-	-	-	-	10.5.2	Add PV learning rates calculations in Japan, one of the largest cumulative production and installation in the world.The followings are PV learning rates in Japan from 1993 to 2008: module 13-16%, inverter 20-25%, other materials 16-20%, construction costs 11-12%. See: Asano, K., 2010, Learning curve analysis of PV in Japan, CRIEPI Research Report, Central Research Institute of Electric Power Industry (forthcoming, available by March 2010).	Additional data will be included if the reviewer provides infomration concerning a respective peer-reviewed source.
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	76	-	-	-	-	-	10.5.2	What is the coefficient of determinations(R2) of each LRs in the table?	Most publications do not provide the coefficient of determination. Solution: The still existing uncertainty will be highlighted in the text (based on peer-reviewed publications which discuss the sensitivity of learning rates).
Emmanuel Branche (Electricit□ de France (EDF))	10	77	3	77	3	-	-	-	"Replace ""figure 6"" by ""figure 10.5.6"""	Text will be modified according to the comment.
Marc Darras (GDF SUEZ)	10	78	1	-	2	-	-	-	10-5-4: The question of externalities (economics, social, environmental) is treated more fully in 10.6. However, this question (as the question of incentives) comes back and forth trough the paragraphs. Could this question be clearly treated for instance at the end of each para where pertinent, in order to appreciate the case of market prices, then of the influence of externalities, which will result for some part of social choices.	10.6. will discuss externalities in detail. Nevertheless, it is worth to mention it here again.
Marc Darras (GDF SUEZ)	10	78	16	-	19	-	-	-	10.5.4: Could the discussion of the fig. 7 precise where this fit with the analysis of scenarios in the previous section?	Due to the renumbering of the sections the refernce point got lost. The correct reference is: "will be depicted similar to Fig. 10.2.8."
Marc Darras (GDF SUEZ)	10	78	20	-	28	-	-	-	10.5.4: This question may be treated within global economics models. In the scenarios previously mentioned one should have such model.	The models used to calculate the scenarios are able to take into account the avoided fuel cost and avoided investments in the fossil sector. The text will be reformulated in order to confirm that ability. However, most model often do not show the wedges that would be needed in order to attribute avoided fuel cost and avoided investments in the fossil sector to the deployment of renewable energies.
Smail Khennas (Independent consultant,lead author chapt 8)	10	78	20	78	22	-	-	-	Investing in RE will certainly reduce the relative of investment of conventional energy technologies howevver the need for financial capital and investment infrastructure might be higher.	The text will express this in a more precise manner.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	78	20	78	28	-	-	-	This discussion is quite interesting. You could add a real example from Brazil. The increase in the cost of gasoline has been much lower than diesel because gasoline faces competition with ethanol. A plot showing the cost of gasoline and diesel over the last 10 years should be enough to provide a good example. This example can be also very useful for the discussion on Page 79, line 15 to 25.	The discussion in that part is intended to be general. An additional example would be considered to be abitrarily selected. In addition, the comment does not clearly distinguish cost and price effects.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Takashi Hongo (Japan Bank for International Cooperation)	10	78	-	-	-	10.5.7	-	-	Are these amout for every 10 years or single year? It is better to expain abiut the assupation and metodology for forecast.	The given data are decadal ones. The selection of the specific scenarios will be explained.
Mark Fulton (Deutsche Bank)	10	79	1	79	3	-	-	-	The point about avoided costs should be brought out more aggressively and the need for this to be done in a full Cost Benefit Analysis.	The respective knowledge gap will be highlighted.
Emmanuel Branche (Electricit□ de France (EDF))	10	79	8	79	10	-	-	-	With one example we couldn't conclude anything according to me. A benchmark analysis will be more relevant □	The purpose of this example is to show that upfront investments *could* result in later savings. It is meant to emphasize the possibility; it is not meant in a sense that this will happen in any conceivable case. The text will be modified in order to make this clear.
Marc Darras (GDF SUEZ)	10	80	1	-	2	-	-	-	10.5.5: Rather than the □selected atmospheric...related policies)□ a more pertinent phrasing should be □The level of allowed GHG emissions□. The deployed discount rate is not understandable. If it means only the discount rate, then one has to recall that in a model one makes the choice of discount rate for testing its effect. While in reality, the discount rate is given by the long term cost of inflation, the mean cost of money and the risk level associated with the project. This remark applies wherever the discount rate is mentioned.	Text will be modified according to the comment.
John Kessels (International Energy Agency Clean Coal Centre)	10	80	7	82	22	-	-	-	Delete this is qualatative	The respective part will be shortened considerably in order to provide additional space for Section 10.3 an 10.4.
Kirsty Hamilton (Chatham House)	10	80	27	80	34	10.5.5	-	-	-	No comment provided.
Christiano Pires de Campos (Petrobras)	10	81	1	82	22	-	-	-	Delete whole paragraphs, it is too teorethical for the SR.	The respective part will be deleted in order to provide additional space for Section 10.3 an 10.4.
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	81	4	81	18	-	-	-	The cost of RE can follow the S-shape shown in Figure 10.5.9. Nevertheless, the price will have a different behaviour. Even if RE cost decreases below conventional energy cost for electricity production private utilities have no motivation to bring its price further below the traditional electricity price.	The comment is correct, but not in contradiction to Figure 10.5.9. The entire paragraph will be deleted. The comment therefore is obsolete.
Maria Argiri (International Energy Agency)	10	82	33	93	26	ES	-	-	You can significantly reduce this section as it repeats things said in Ch 9	Structure of IPCC requires the section. However we will clearly define the objectives of this section to distinguish them from those in Chapter 9
mario contaldi (ISPRA, Institute for Environmental Protection and Research)	10	82	-	93	-	-	-	-	The entire para 10.6 reiterates concepts already enalized in ch 9. To avoid repetitions in the SRREN report this para should be dropped or integrated in chapter 9.	Structure of IPCC requires the section. However we will clearly define the objectives of this section to distinguish them from those in Chapter 9
STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)	10	83	17	-	-	-	-	-	"Maybe somewhere a special item has to be made on nuclear regarding some criteria such as health concerns. Some models can create opposition between nuclear and renewable at the end. It has been one concern during the NEEDS project implementation. Even if a low carbon energy society needs to take into account all sources of energy in its energy mix, RES and nuclear do not respond to the same objectives (externalities). "	Outside the scope of the report

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	83	17	83	18	-	-	-	As stated, the reader get information that for biomass the pollutant emissions will never be reduced compared with fossil fuel. This is not the message author are willing to provide. Please, change the sentences.	Will rephrase
William Kyte (E.ON AG)	10	83	-	-	-	-	10.6.1	-	Strong picture, very good message! Even though the picture is a qualitative representation I believe the external benefits of conventional energy should be lower	But other commentaries recommend deletion
Douglas Arent (NREL)	10	84	3	84	10	-	-	-	"might review NAS study ""Research at DOE : Was it worth it""? In which they do monetize some benefits."	Sentence will be modified. Will add reference to page 83 line 26
John Kessels (International Energy Agency Clean Coal Centre)	10	84	11	85	15	-	-	-	Delete does not add anything substantial	Paragraphs boost expected contents of the section
Vicente Schmall (Petrobras S.A.)	10	84	15	84	16	-	-	-	"Insert the phrase, as follow: ""For example, biomass, if extended widely, can be controversial as an energy source because of competition on land use. On the other hand, anthropized areas not favorable for food production can be used to some energy crops with social and environmental benefits."	Will do
Vicente Schmall (Petrobras S.A.)	10	84	25	-	-	-	-	-	"Complement the discussion and the paragraph with the phrase: ""However, it's necessary to analyze case by case, avoiding the misjudgement of general biomass production based on hypothetical case"". Fargione's article was very criticized because described a particular an unusual case to evaluate impacts of biofuels production. "	Will do
Emmanuel Branche (Electricit□ de France (EDF))	10	84	32	84	32	-	-	-	"Replace ""run-off into rivers"" by ""run-of-river"""	Will change clause
□vind Christophersen (Climate and Pollution Agency)	10	85	20	88	4	-	-	-	sec 10.6.2 does not describe the co-benefits in relation to other environmental problems such as air quality. It only discuss the impact on air quality in sec. 10.6.2.2 But not the benefits connected to reduced emissions from fossile energy (NOx, SOx, particles etc.) if substituted by RE. This should be covered some where in sec. 10.6.2 since it is a very important factor and may be a key for implementation of RE in some regions.	Benefits discussed in other paragraphs of the section e.g. 10.6.1, 10.6.4 and 10.6.5
William Kyte (E.ON AG)	10	85	-	-	-	-	10.6.1	-	From figure title it does not become clear that this is an example of social costs of renewable energy, it seems to be misplaced from the chapter on sustainable development	Figure will be deleted
Philippe Marbaix (Universit□ atholique de Louvain)	10	86	29	86	37	-	-	-	This paragraph does not appear to be very clear □ in particular, methods used in the Stern Review regarding damage cost accounting are a choice, does it only deserves critics ?	Paragraph will be rephrased
Emmanuel Branche (Electricit□ de France (EDF))	10	86	38	86	43	-	-	-	Convert EUR to USD2005, and □ to USD2005	Will do
John Kessels (International Energy Agency Clean Coal Centre)	10	86	38	87	21	-	-	-	The example and reference to the Stern report is enough information.	Paragraph has added information beyond Stern report
Vicente Schmall (Petrobras S.A.)	10	87	6	87	21	-	-	-	Paragraph repeats the discussion based on the controversial Fargione's article. It's not necessary to repeat that.	Reference will be removed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Christiano Pires de Campos (Petrobras)	10	87	10	-	13	-	-	-	Indirect and direct land use change can increase, but the studies are very beginning and will evolute in the years.	Statement will be modified
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	87	10	87	16	-	-	-	It is unfair only present references, most of then based in dubious theoretical hypothesis. Please, add some references showing that the negative impact may not be so severe, depending of the biomass feedstock and technology used. See Pacca and Moreira, Energy Policy 2009.	References will be reviewed
Emmanuel Branche (Electricit□ de France (EDF))	10	87	14	87	14	-	-	-	"Refer to section 5.6 for adequate and peer-reviewed information regarding GHG emissions from hydropower reservoirs (it will allow consistency all across the SR). Proposition: ""can cause methane emissions during the first years after impoundment, which can be significant. However in many cases no GHG emissions are emitted (see section 5.6 of this special report).""""	Will refer to the appropriate technology chapter
Douglas Arent (NREL)	10	87	23	-	-	-	-	-	add key msgs and ref of Lancet 2009 by Kirk Smith.	Will review the reference
Christiano Pires de Campos (Petrobras)	10	87	36	-	-	-	-	-	What is ExternE?	It is a project that will be explained
Emmanuel Branche (Electricit□ de France (EDF))	10	87	43	87	44	-	-	-	Convert EUR(□) to USD2005	Will do
Emmanuel Branche (Electricit□ de France (EDF))	10	88	13	88	-	-	-	-	"Refer to section 5.6 for adequate and peer-reviewed information regarding water impacts from hydropower. Furthermore it will allow consistency all across the SR. Proposition: ""□livelihoods. However these impacts can be mitigated (see section 5.6 of this special report).""""	Will do for consistency of the report
Richard Taylor (International Hydropower Association (IHA))	10	88	15	88	18	-	-	-	"Add ""The internationalisation of sustainability assessment for hydro has been advanced over the past 15 years. The International Hydropower Association's Hydropower Sustainability Assessment Protocol and its current cross-sectoral review is the leading initiative at the international level."". Reason: For consistency with chapter 5."	Will review the protocol

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	88	15	88	26	-	-	-	I understand that SRREN could quote a number regarding bioenergy use expansion, instead of providing a vague statement "large increase in bioenergy use□.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;159;10;89;38;89;40;;;;"It should read: ""Biomass plantation □ negative impacts on biodiversity, if not properly planned.""";;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;160;10;90;15;90;25;;;;The figure caption is incomplete. Probably, the different colors refer to other parameters than GCC and LAP. Check it, please. Also, it is unclear the meaning of Discounted Consumption.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;161;10;91;18;91;19;;;;Bioenergy not considered in Table 10.6.1. It could be included, at least through a range of values.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;162;10;92;1;92;8;;;;It may be useful to provide typical prices of electricity to the final consumer. This gives a metric for the reader to properly understand the magnitude of the external costs. One possible way is to draw a vertical line around 10.00 showing the consumer cost of electricity.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;163;10;93;1;93;4;;10.6.5;;Is misleading through the operation of small -scale biomass fired CHP it is impossible to produce significant amount of electricity. Furthermore, small-size CHP is very costly. Most of the commercially competitive CHP plants using biomass will be in the range of 30 - 100MW. At this scale particle emission must be properly controlled even in developing countries.;;;;; Jose Roberto;Moreira;Brazilian Reference Center on Biomass- University of S□Paulo;Brazil;164;10;93;9;93;10;;;;Sorry, but I am fed up of criticism. Can you say something positive regarding biomass? Please, remember that scientists must be fair.;;;;;	
Emmanuel Branche (Electricit□ de France (EDF))	10	88	20	88	23	-	-	-	Refer to section 5.6 in order to be consistent for the whole SR. Do not discriminate large vs. small hydro. Hundreds of small hydro power plants generating the same energy amount than a large one, may have more significant negative impacts (both environmental and social). The most important thing is moving from renewable to sustainable, whatever the size	Will do for consistency of the report
Richard Taylor (International Hydropower Association (IHA))	10	88	20	88	22	10.6.2.4	-	-	"Rewrite paragraph as follows ""Reservoir hydropower can have a impact on land use depending on geographic context; run-of-river usually less so"". Reason: See reason given for ""5, 5, 16, 5, 16"" above and c.f. comment for ""9, 55, 1, 55, 11, 9.6.3""."	Will do
Douglas Arent (NREL)	10	88	-	-	-	10.6.2.3.	-	-	review publications of Robert Wilkinson of UCSD on CA water impacts, also EPRI. Should this section also consider risks of water supply under climate change?	Wilkinson papers will be accessed and relevant points incorporated into the text
John Kessels (International Energy Agency Clean Coal Centre)	10	89	10	89	15	-	-	-	Already been said in previous chapters	Will be moved to appropriate section

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	89	16	89	27	-	-	-	"Due to the complexity of these issues, here (like in other part of chapter 10.6.2) what it is said in the first sentences (line 16-23) seems partly contradicted in the second sentence (line 24). For an assessment it would be useful some quantitative estimations of the two possible effects. "	Text will be rewritten to reflect complexities and case-dependency of issues
Naoto Tagashira (Central Research Institute of Electric Power Industry)	10	89	16	-	27	-	-	-	"The author may quote the debates on job creation shown in ""NREL Response to the Report Study of the Effects on Employment of Public Aid to Renewable Energy Sources from King Juan Carlos University (Spain)"" , NREL/TP-6A2-46261, 2009."	We will consider if the reference is found relevant to a controversial topic
Emmanuel Branche (Electricit□ de France (EDF))	10	89	24	89	24	-	-	-	"Why to focus the number of new jobs on hydropower ? I do not understand (what are the assumed statements ?). According to me, as a project developer and operator of power plants, it is the same for other RES (wind, large solar, etc.). Refer to chapter 5, and look at ""multiplier effects"" of hydropower to be more accurate."	Sentence will be modified
John Kessels (International Energy Agency Clean Coal Centre)	10	89	32	89	40	-	-	-	Delete covered in wind chapter	Wind power has landscape aspects
□vind Christophersen (Climate and Pollution Agency)	10	91	6	93	23	-	-	-	sec 10.6.5 fous only on the external costs not on the benefits e.g. the co-benefits. This should be included.	Benefits will be expanded and relationships between external costs and benefits included
William Kyte (E.ON AG)	10	91	-	93	-	-	-	-	10.6.5 provides best visual representation compared to 10.6.1 and 10.6.4. Also strong that nuclear is included but the absence of some key technologies in all figures is regrettable. Merger desirable	Regrettable but text limited by published data
Mark Fulton (Deutsche Bank)	10	91	-	-	-	-	10.6.1	-	With the development of efficient extraction of shale gas, natural gas has greater security, certainly in the US, perhaps Europe.	Table 10.6.1 from published article but additional comments may be made in the text
Takashi Hongo (Japan Bank for International Cooperation)	10	91	-	-	-	10.6.1	-	-	Cost for ecosystem for geothermal is green? Also cost for health by wind is very small but low frequenct noise is seriou issene if its location close to houses. I am afraid this table is too simplified.	We think there is relevant science in the publication although it is not peer-reviewed. Will send it to TSU for advise.
Emmanuel Branche (Electricit□ de France (EDF))	10	92	6	92	13	-	-	-	Convert EUR(□) to USD2005	Will do
STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)	10	92	23	-	-	-	-	-	Introducing nuclear only here in this chapter is maybe a little bit too late. See previous comment.	Authors mindful of the scope of report limited to renewables
Mark Fulton (Deutsche Bank)	10	92	-	-	-	-	10.6.4	-	Gas seems to be underestimated - natural gas seems to be treated too negatively, compared to figure 10.6.5, which seems more intuitively correct.	Sentence will be added on the precise positive effects on emission by the use of natural gas either by numbers or comparative percentages
STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)	10	93	-	-	-	-	10.6.5	-	"See the previous comments regarding risk to deliver ""opposition message"" between different technologies based on a strictely sensus common agreed externalities method (RES versus nuclear). To reinforce RES benefits, uncertainties have to be quantified somewhere."	Issues addressed on page 92 line 24-25
William Kyte (E.ON AG)	10	104	31	104	32	-	-	-	This is a value driven political statement - 'renewables will have to compete with other low carbon technologies	Text will be revised

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Luc Gagnon (Hydro-Quebec)	10	-	-	-	-	-	-	-	- The cost curves assume that all kWh provide the same service. A kWh from an intermittent source does not have the same value as a dispatchable kWh.	The entire 10.4 subchapter willl be revised
Luc Gagnon (Hydro-Quebec)	10	-	-	-	-	-	-	-	- The cost ranges of options shown in Figure 10.5.1 (IEA 2007) are probably among the most reliable. The previous cost curves are in serious contradiction with Figure 10.5.1.	Table will be revised and we will provide a new table based on data from the technology chapters
Luc Gagnon (Hydro-Quebec)	10	-	-	-	-	-	-	-	- The costs of hydropower projects are affected by other services than electric generation. The reason China is developing much more hydropower than windpower is because of services such as flood control, irrigation, water supply. By not considering these issues, the cost curves for China imply that they will do mainly windpower in the future, which is not realistic.	The entire 10.4 subchapter willl be revised
Luc Gagnon (Hydro-Quebec)	10	-	-	-	-	-	-	-	- The future costs of wind and hydro are flat (constant) over their whole potential. This is far from the reality, as there are large cost differences between the best and worst sites included in the potential.	The entire 10.4 subchapter willl be revised
Luc Gagnon (Hydro-Quebec)	10	-	-	-	-	-	-	-	- The PV costs are similar in cloudy Europe than in North African deserts. The true costs should vary by a factor of 3 or 4.	The entire 10.4 subchapter willl be revised
Luc Gagnon (Hydro-Quebec)	10	-	-	-	-	-	-	-	- There is strong indication that Concentrated solar power will be cheaper than PV, but the cost curves show otherwise.	The entire 10.4 subchapter willl be revised
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	"10.4.4: The potential in the Mediterranean area and development strategy in the same area have been assessed in various EU sponsored studies. REMAP project: www.remap-ec.eu. See as well www.ome.org; Milano Med Forum 2009, Economic and financial forum for the Mediterranean. 20-21 juillet 2009. The Mediterranean solar plan."	Will include study in the table (but not in curves as the comment refers to it) if found and if acceptable for IPCC (i.e. peer-reviewed or acceptable grey lit)
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	"10.5.2: This paragraph addresses the question of technological change and improvement. It has been discussed in 4AR WG III 2.7 included the figure. It might be the good reference to start, and precise what is original or not concerning RE. This will help reduce the chapter. Furthermore, key technological barriers could be identified from various reports: World Energy Assessment, UNDP, 2000 and 2004; the previous IEA report and ETP, 2008."	The text will contain an appropriate refence to AR4
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	"10.5.5: Market support and RDDD are bounds but if it is treating only RD&D, the cost such as present figure 10.5.4 are pertinent here. The question of internalisation of externalities might not be pertinent on RD&D, but more on deployment. The debate of the learning curve is unclear, and is better treated in other place. Instrument to foster RE may be feed-in tariff or emission trading scheme in electricity, but in other sector as in electricity they are many other instruments: norms, tags, bonus-malus,.... And before all the question of a whished demand is essential: this goes beyond quantitative market economy to behaviour. There, education instrument might be instrument as well."	Figure 10.5.4 will be moved to section 10.5.5. The debate on the learning curves will be shortened considerably. The figure 10.5.9 will be deleted.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	"10.5: This chapter includes various items which are not directly related to the title, □costs of commercialization and deployment□, notably elements which refer to the cost of the production of the system to capture energy from renewable sources. These elements should be addressed in the preceding section under its original title: □Cost curves...□ A better understanding will be obtained if the value chain of each technology is presented (more pertinently in 10.4). Attached some example from internal document I developed for Gaz de France, biomass and wind. (See materials darras_marc_picture_2.gif and darras_marc_picture_3.gif) Ref□: Marc Darras, Barbara Pichayrou, Fiches □rgies renouvelables. Gaz de France, 2007. Unpublished. From there, one understand better□: □□□□□□□□□□ The element of cost □□□□□□□□□□ The role of actors □□□□□□□□□□ The technological barriers, as for instance analysed in □□Renewable energy□: RD&D Priorities□□, IEA 2006. For instance, in the case of biomass 2 value chains are mixed: the chain for equipment and the chain for biomass supply. The 2 chains have to be analysed before to conclude anything in term of potential, cost, barriers... Interesting review can be found, mostly on the European market, in special issues of □Syst□s Solaires, le journal des energies renouvelables□ edited by Observ□ER, Paris, France and their annual review for the EU commission □Barom□e des energies renouvelables□ (www.energiesrenouvelables.org)."	The information provided by the reviewer will be considered for inclusion. The informationj referring to generation costs however will stay in order to provide a starting point for cost reduction necessities

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	"10.6.1: This issue is a very complex one and figure 10.6.1 does not give credit to many aspects of the question. Some elements are addressed in various part of the text. It is essential in such a debate to clarify the perimeter of the analysis and of the various actors. The gross comparison of the conventional energy versus renewable energy does not give full understanding of the issue. One should clarify what is □private□: in some lines it means identified by the actor, and some others it means a financial/market value. The private benefit of conventional or renewable energy should be equal in the first sense because it is for instance hot water for a given consumer, or power for an industry. The source of energy has no impact on the benefit here. For private costs: the market value depends on the value chain, and its organisation, the costs of production and the competition. It should be compared to the revenue of the potential consumer (therefore the question of benefit for access on p.83 line 19 is not proven, and if the footnote is true it is in no case pertinent). But now for traditional biomass the cost is the time spent to collect it (if available), it may be outside a monetary economy. In figure 10.6.1. it is difficult from the text to imagine why external benefits are bigger for renewable Energy than for conventional one. I wonder if one does not make double counting in some cases between external costs and external benefits. What is included in external benefits: security of supply? Access? Externalities can be express in market value (monetary) or not. This rise a lengthy debate on monetarisation. This is slightly touched in section 10.6.2.1, therefore it is important in the analysis to mention the perimeter used and the economics condition: ex for section 10.6.2.2. Some aspects as wastes, dismantling, should not be omitted. In conclusion, to be useful this chapter should be based on a stronger clarification of the concepts, and treat in a similar manner all RE. One may chose or not to make a comparison with conventional energy. One should recall that the approach should be multidimensional rather than single-valued."	Figure 10.6.1 will be deleted and associated text will be modified accordingly. Comment will be taken into consideration in full

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Kirsty Hamilton (Chatham House)	10	-	-	-	-	-	-	-	"As per comment to Ch1, useful references on cost-related issues include: Extensive work done by Shimon Awerbuch, whose work examined the matter of using finance portfolio theory to better understand the role of renewable energy in reducing risks associated with fossil fuel price volatility. A series of references can be provided (Shimon Awerbuch was invited to be a Contributing Author to AR4); and an academic book was published by Elsevier Science in 2008 to mark his untimely death: ""Analytical methods for energy diversity and security : portfolio optimization in the energy sector, a tribute to the work of Dr. Shimon Awerbuch / Morgan Bazilian and Fabien Roques, editors. Dr Awerbuch's website and publications remain active: www.awerbuch.com {this reference may also be relevant for Chapter 10]. Also of relevance may be: Gross, R., Heptonstall, P., Blyth, W., Risks, revenues and investment in electricity generation: Why policy needs to look beyond costs, Energy Economics (2009), doi:10.1016/j.eneco.2009.09.017. [A relevant background paper for the report preceding this Energy Economics article: Hamilton, K., November 2006, □Investment: Risk, Return and the Role of Policy□, Working Paper for Imperial College, London, commissioned for, and referenced in Annex II of Gross, R. et al UK Energy Research Centre report 'Investing in Electricity Generation: The Role of Costs, Incentives and Risks', May 2007]. "	Will be taken into consideration in 10.5
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	-	-	-	"Different sets of scenarios are analysed throughout the chapter. It could be useful a list of all these scenarios (in the Ex. Sum. it is said 137, at page 12 it is said 150) with a clarification on the different subsets used in the different part of the chapter. "	This will be made consistent across chapter 10, but he number will change anyway in SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Jean-Yves Caneill (Electricit□ de France (EDF-SA))	10	-	-	-	-	-	-	-	"I think that a study that was made in France in the last three years could be valuably quoted in this report either in Chapter 1 or 10 . It is called ""Scenarios for transition tpwards a low carbon world in 2050 : What's at stake for heavy industries ?"". In particular two scenarios of mitigation to lower by 2 the global emissions are presented one called ""mimetic"" that reproduces the habits of the past and one ""non mimetic"" where more renewable energy is introduced at the decentralised level, together with transport and towns infrastructure looked at appropriately. The study was done by a consortium composed by : IDDRI, EPE and industrial companies. The reports can be found at : http://www.iddri.org/L'iddri/Fondation/Programme-de-recherche-Scenarios-sous-contrainte-carbone and a publication is in course of writing."	We will review this publication and see if it is suitable for the chapter
Steve Sawyer (Global Wind Energy Council)	10	-	-	-	-	-	-	-	"In general this chapter is very good and although it still needs work, that's largely depending on editing and info from other chapters. The only general criticism is the use of the TPES metric when looking at largely electricity generating resources□it makes comparisons between hydro and nuclear nonsensical, as it does for comparisons between geothermal and wind, for instance. Perhaps electricity could have it's own section; and perhaps you could consider final energy consumption as a much more useful metric."	Will revise
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	"Many general points discussed in this chapter have already been discussed in detail in the previous AR□s. Taking into account AR4 WGIII report as the starting point, the description of concept should be taken from it (ex Cost and Benefit: 2.4.1 Definitions; the role of actors and instruments: fig 2.3, which is basically Fig 10.5.2 of present SRREN; ...). This will allow streamlining of chapters and underline the incremental added value of SRREN."	Chapter will revisit AR4 to check for consistency

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	-	-	-	"The general impression is that the chapter does not completely meet the expectations of a IPCC Report. This is due to some perplexities about the accuracy and completeness of some analyses, which on the other hand receive much attention in the chapter: a) while the ""general"" scenario analysis of subchapter 10.2 seems methodologically correct (and informative in terms of results), some analyses included in 10.3 are based on quite strong semplifications, so that the results can hardly be considered robust; b) apart from some perplexities about the review included in subchapter 10.4, the regional RES supply curves presented in 10.4.4 seem based on a questionable methodology. "	Subchapter 10.3 and 10.4 will be re-written and methodology will be included
John Twidell (AMSET Centre)	10	-	-	-	-	-	-	-	"This chapter ends without any summary and conclusions, which are much needed. Reduce the central text by 50% and then make a very clear and crisp conclusion. A conclusion might be that global modelling tells you little for the future of renewables unless a sum is made of many thousands of distinct parts."	Comments will be taken into consideration as we move to the second order draft
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	10.3: The purpose of this chapter is not clear. From its analysis it seems to be a bottom up approach versus the top down approach of the scenarios in the previous chapter. Some of the point discussed as the beginning of sub chapter 10.3.2 is general and may be better presented in a specific sub section. The structure power/heat & cooling /transport is one choice which does not necessarily correspondent to the repartition of demand in volume, but more on the availability of analysis.	Section 10.3 will be revised and these points will be taken into consideration
John Twidell (AMSET Centre)	10	-	-	-	-	-	-	-	ALL THIS CHAPTER The impression is gained by the reader that renewables, CCS and nuclear fission are treated as equal variants for all energy supplies now and into the future. The models seemed to be based on this premis. But, you are comparing chalk with cheese! Why include CCS when, sensibly, you do not include, or mention, fusion power because it has not been demonstrated? CCS is unproven even at demonstation level and is far from reality. How do you capture carbon from transport and building heating emissions? Whereas most renewables are now commercially available and fully demonstrated. For nuclear fission power, it should be made clear that this is only available for centralised elecricity in a relativley small number of countries. Multicountry use would never be allowed for reasons of weapons production and security. The models need to be based on reality, not conjecture. At the least present this discussion at the beginning of this chapter. Modelling for mitigation needs to be practically realistic and therefore applicable.	Analyses undertaken in the chapter is limited by approaches available in the scenarios literature
Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S□ Paulo)	10	-	-	-	-	-	-	-	Box 10.1, end of second paragraph. The conclusion regarding bottom-up and top-down models for engineering science is new for me. Please, add reference to clarify the statement.	We acknowledge that additional references are needed to support some of the statements on the use of the terms bottom-up and top-down in other scientific communities in box 10.1.
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	Context is needed in terms of reasons for policies and what are the consequences (intended & unintended)	No actions needed. Comment is too general

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	Explicit distinction must be made between theoretical, practical and economic potentials	These concepts are to be addressed in chapter 1 and subchapter 10.3 consistently
John Kessels (International Energy Agency Clean Coal Centre)	10	-	-	-	-	-	-	-	General comment the IPCC AR4 did not use the Energy {R}evolution scenario for good reasons and to base this chapter on it is going to be seen as very bias an unbalanced.	Although the Energy Revolution scenario has now been peer reviewed, subchapter 10.3 will incorporate additional scenarios
mario contaldi (ISPRA, Institute for Environmental Protection and Research)	10	-	-	-	-	-	-	-	General comment: I found this chapter very well done and quite interesting to read. I fully support the actual structura of the chapter. The reported regional data and cost curves are a good contribution to the knowledge of actual potential of RE in various parts of the word. I suggest to keep al parts of this chapter (with the exceptions below) and cut text in other chapters, expecially ch11 .	No actions needed
John Kessels (International Energy Agency Clean Coal Centre)	10	-	-	-	-	-	-	-	General comments: The chapter to me is reliant on too few scenarios and would benefit from looking at MARKAL the tool governments use in their energy planning which is not mentioned at all?	MARKAL is a platform and not a model, and as such it could not be directly reflected in the scenarios overview
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	Globally the chapter is presented as standalone RE. A systemic integration is essential for development, in order to take into account intermittence notably (see the present debate on wind and coal power generation). One section should concern a co-development approach, and a global cost approach.	This topic should be covered in chapter 8
Taishi Sugiyama (CRIEPI)	10	-	-	-	-	-	-	-	Heatpumps are renewable energy.Their costs and potential have to be assessed in this report. See (SRREN_Draft1_Review_Sugiyama_Taishi_01, i.e. Nishio_Kenichiro 2010) for a global estimate of heat pump potential. (This paper will be finalized and available by March 2010)	We will make clear that heatpumps our covered in our chapter withing geothermal energy.
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	In too many places comments are mixed with facts. The place of the various elements should be clarified, notably the cost/technology analysis and the financing (extra financing by feed-in tariffs, or regulations).	Analyses undertaken in subchapter 10.5 will revisit some of these issues, as others belong to chapter 11
Mark Fulton (Deutsche Bank)	10	-	-	-	-	-	-	-	Learning rates are crucial to understanding pathways, exposing assumptions (or lack of) is critical. Included in this is the question of overall grid development and whether transmission and storage or fossil fuel back up is addressed. Indeed, Cost Benefit Analysis seems haphazard in the renewable analysis. Avoided cost from merit order run is critical as per German BMU analysis but frequently ignored. Another example is fossil fuel subsidies. More could be cited here and I believe IEA is doing a new study on this topic. Overall establishing a full cost benefit framework would be valuable. Should more comment on competing low carbon technologies be included? Is gas given enough emphasis particularly following potential shale gas breakthroughs? Energy efficiency affects the demand side of the pathways, but could be made more transparent.	Analyses undertaken in subchapter 10.5 will revisit some of these issues, as others belong to chapter 8
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	-	-	Missing references when citing many numbers and affirmations.	Comment is too general
Peter de Haan (Ernst Basler + Partner AG)	10	-	-	-	-	-	-	-	No comments from this expert to chapter 10 mitigation potential and costs	No actions needed
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	On biomass, many comments are related to the development of specific biomass for biofuel, and not on biomass for heat more generally.	Comment should be more specific

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	-	Over budget : sorry, no time to suggest cuts	Text will be revised and reduced, as our page limit has been exceeded already
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	Over emphasis on feed in tariffs of which 'must run' or 'priority connection' are important facets	Discussions about feed in tariffs will me revised
John Kessels (International Energy Agency Clean Coal Centre)	10	-	-	-	-	-	-	-	References needed to be checked and ones not used deleted.	Chapter will be revised
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	Scenarios from EPRI (Merge & Prism), Eurelectric (Role of Electricity & Power Choices) and WEC missing	In 10.2, The authors have attempted to obtain enough scenarios to ilustrate the key lessons that have emerged from the scenarios work over the recent past. It was not feasible to include all published scenarios for several reasons: contacted teams did not supply scenario data (e.g., EPRI), the scenarios lacked sufficient detail on renewable energy deployments, and the authors simply could not collect every scenario available. In 10.3 and beyond, the authors will be focusing in the coming draft on a small set (two to four scenarios) that are illustrative of key issues associated with renewable deployment. Because 10.3 will focus on only a small set of scenarios, the vast majority of published scenarios will, of course, not find their way into 10.3
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	-	Starting from the demand, it consists of energy for transport, heating & cooling, electricity. Electricity represents 17% of the demand in 2006 (21% in 2030), WEO 2009, baseline. Therefore, attention should be given to the 2 first items. Many comments apply only to the electricity sector, sometime without mentioning it. For biomass heat, the development of heat distribution system is essential either at very local scale (few buildings) or town level (Danish energy system for CHP as example).	Chapter 10 already tried to address these issues, but we limited to the data available in the literature. However, an effort will be made to make more explicit when electricity only is being addressed, and when other final uses are being addressed as well
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	-	The chapter is well written and coherent. Maybe it relies to much on institutions such as IEA, that have a history of underrepresenting RE	Chapter tried to use the best literature available on deteiled technology information
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	the chapter needs updating to take account of IEA WEO 2009	This will be done
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	the diagrams in this chapter are unhelpful	Comment should be more specific
Taishi Sugiyama (CRIEPI)	10	-	-	-	-	-	-	-	The report needs a sistemic description of heat pumps. I suggest ch1 introduce heatpumps, ch8 discuss integration with energy systems, and ch 10 and 11 discuss mitigation and policy aspect of heatpumps.	We will make clear that heatpumps our covered in our chapter withing geothermal energy.
Dr. Ishwar Hegde (Suzlon Energy Ltd)	10	-	-	-	-	-	-	-	This is the most important chaper of the lot where some disconnect can be observed from the individual chapters and this one. This chapter must have a comparitive assessment of all the RE and their asssociated cost for per ton of CO2 reduction. Most tables and graphs are not readable and need to be improved substantially. All RE is not scalable & competitive and so it is important to evaluate the potential that each RE can contribute.	An effort will be made in this direction, but limited to the data available in the literature

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
William Kyte (E.ON AG)	10	-	-	-	-	-	-	-	This is the weakest chapter in the report - cost are unreliable, out of date and not comparable - needs to be a major caveat in executive summary	Data in the chapter is based on peer-reviewed literature and cross-check with technology chapters are being performed to assure consistency
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	10,2,4	-	Is this figure really useful with such a long range?	The figure represents the range from the literature - whether this is useful or not. An attempt will be made to better separate out the determinants of RES deployment.
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	10,5,9	-	Very interesting addition	Accepted
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.1	-	Delete graph in orther to shorten the chapter and is better explored in other reports.	We believe this is critical to the exposition and it is not covered anywhere else in this report.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.1	-	Why the value is so different in 2010? e.g. about 15 GtCO2 (between 19 and 34 GtCO2). It would be interesting to have historical data since mid 20th century for instance ?	Historial CO2 emissions will be added to the figure. In addition, it will be double checked whether accounting is consistent across all scenarios.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.10	-	Very difficult to ready the graph, it should be simplified the number of scenarios.	The number of scenarios will not be reduced, but the readability of the figure will be improved.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.10	-	Why such a big difference in 2010 ? According to me it is not possible to compare these scenarios with such a huge difference in 2010 ? Furthermore the figure is too small and not readable	The figure will be improved for readability. In addition, it will be double checked whether accounting is consistent across all scenarios.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.2	-	Delete since does not affect the context, the information about the uncertainty of the graph can be detailed in the page 15, line 8.	The overall size of the energy system is an important determinant of RES deployment which need to be viewed in this context.
Douglas Arent (NREL)	10	-	-	-	-	-	10.2.2	-	should add note as to how primary energy is calculated for RETs.	As mentioned in footnote 2 and the caption of figure 10.2.2, direct equivalent accounting for all non-fossil energy sources.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.2	-	Why the value is so different in 2010? e.g. about 280 EJ (between 400 and 680 GtCO2). It would be interesting to have historical data since mid 20th century for instance ?	Historial primary energy consumption will be added to the figure. In addition, it will be double checked whether accounting is consistent across all scenarios.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.3	-	Delete graph.	No substantive reason provided for deleting graph.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.3	-	This figure is too small to be read. It could be interesting to resize it and limit the maximal CO2 concentration to 600ppm ?	Will be adjusted in SOD.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.4	-	Re scale graph, from 300 to 700 ppm, and resize the legends	Will be adjusted in SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.4	-	Same comments than for Figure 10.2.3 of this chapter (too small, not easy to read). It may also be interesting to have 2 different figures 10.2.4.1 (for low carbon primary energy consumption) and 10.2.4.2 (for renewable primary energy consumption). Or maybe to give a percentage for RES in comparison to primary energy ?	Figures will be adjusted in SOD for better readability.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Stan Rosinski (Electric Power Research Institute)	10	-	-	-	-	-	10.2.5	-	"For MESSAGE, how is it possible that the ""Standard"" scenario has more renewables than ""No Nuclear""?"	The demand repsonse, in particular for electricity, seems to overcompensate the gap left by nuclear that RES can fill (e.g. most of the renewables are not able to provide baseload). This exception will be discussed in context of the figure.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.6	-	Re scale graph, from 300 to 700 ppm, and resize the legends	Will be adjusted in SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.6	-	This figure is too small to be understood. It could be interesting to limit the maximal CO2 concentration to 600ppm and the total primary energy consumption to 1200 EJ ? With and without CCS are not easily readable in the figure	Will be adjusted in SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.7	-	"Add explanations ""an1 = Annex 1 countries"" and ""na1 = non-Annex 1 countries"". It could be interesting to have a reference year (2005 ?) to compare these 2 tables"	Will be adjusted in SOD.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.2.7	-	Resize the legends	Will be adjusted in SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.2.8	-	In this figure several value could reach 0 (zero). How can it be possible ?	As mentioned several times in the section, RES are competing with other low carbon options to supply energy in the carbon-constrained scenarios. Also, the systems perspective is lost in these figures, i.e. all the very low cases are not necessarily from the same scenario. While some scenarios may include higher deployment of e.g. wind, they may have less deployment of solar and vice versa.
Stan Rosinski (Electric Power Research Institute)	10	-	-	-	-	-	10.3.3	-	65-75% capacity factors for CCP imply a large amount of thermal storage relative to the CSP plant size.	Accepted
Stan Rosinski (Electric Power Research Institute)	10	-	-	-	-	-	10.3.3	-	Under Max. column of % of Global Demand, renewables percentages add up to more than 100%.	Text will be revised
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.3.4	-	Delete graph or move to 10.3.4	Content of the different sections will be revised
Stan Rosinski (Electric Power Research Institute)	10	-	-	-	-	-	10.3.8	-	It's not evident why solar energy exceeds wind in the high/medium scenarios with wind less expensive than solar.	Table will be revised with different data
Juan Roberto Paredes (Inter-American Development Bank)	10	-	-	-	-	-	10.4.11	-	Header for Fig. 10.4.11 shows 2030. According to the note at the bottom of the figure it should read 2050.	Will be changed
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	10.5.1	-	10.5.1: It might be interesting in the total cost to specify the part due to investment and the part due to operation and maintenance.	Due to the high uncertainty involved, a separation of both aspects will have only limited value.
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.5.2	-	Delete figure	The figure will be deleted.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.5.3	-	Note that tidal (rise and fall) is a mature technology (example La Rance in France)	The information will be taken into account.
Naoto Tagashira (Central Research Institute of Electric Power Industry)	10	-	-	-	-	-	10.5.8b	-	Because an additional cost in 2010 by the German FIT is estimated to be over a peak of this figure, this figure is not appropriate. I recommend to replace this with the latest result to be published in 2010.	A comparison with actual data will be carried out. If necessary, any deviation will be discussed.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.6.1	-	"Add ""illustrative"" in order not to need extra explanation"	Figure deleted
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	-	10.6.1	-	"In the chapter 10.6 it said several times that the assessment of cost and benefits of different technologies requires to consider the character of the energy system in which they are applied. This representation of the concept is not coherent with that, it seems it could be misleading. "	Figure deleted
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.6.1	-	Delete figure, it is an author guess that convenvional energy and renewable energy have these shapes.	Figure deleted
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.6.2	-	Delete texts in the figure nor related to RE and fill with examples of CC impacts on RE.	Texts in figure will be modified
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	10.6.2	-	This figure is used several times in different chapters of this SR. It may be interesting to have only one and to refer to this adopted section ?	Final editorial review will determine appropriate placement of this figure
Philippe Marbaix (Universit□ athollique de Louvain)	10	-	-	-	-	-	10.6.4	-	This figure contains relatively suprising data □ for example health effects of PV electricity appear similar to those of coal. Is this supported by litterature outside the Krewitt & Schlomman 2006 report (which does not seems to have been peer reviewed, and is not easy access since iin german)?	Contents will be compared with peer-reviewed literature
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	10.6.5	-	Delete figure, it is not a comprehensive study.	Study considered comprehensive
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	-	12.4.1	-	Unreadably graph, resize	Accepted
Douglas Arent (NREL)	10	-	-	-	-	-	all	-	too small	Accepted
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	10,3,4	This table is essential for the overall report.	Table will be revised
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	10,3,5	The percentage of the technical potential is very interesting. But it could be complemented by a comparison with present figures or a baseline, in order to understand the scale of change from present.	Table will be revised if space allows
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	10,5,1	Some lines concern different actors and this could alter results. For example, household scale generation has to be compared with energy delivered to the final consumer, with a much higher cost. Thus potentials should not be only matched with the grid.	Comment is not referring to table 10.5.1., because there are no lines in table 10.5.1.
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	10,5,1	Use of discount rate of 10% is misleading, because the users are not the same depending on the scale of the projects. Some States use a much lower rate of 4% to 5% for large scale projects and thus the table may alter comparisons with other energy.	A comparison of different costs requires to establish a common reference.
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	-	-	10,5,2	Excellent synthesis and very useful tool for future work	Comment is highly appreciated.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	-	10.2.1	Explain Cat I to Cat IV before the table (e.g.. CO2 concentrations by 2100: Cat I = 300-400ppm, Cat II = 400-440ppm, Cat III = 440-485ppm, Cat IV=485-570ppm, etc.) Note that Cat V is defined after in Figure 10.2.1, which leads to a different definition of references (>600ppm or >660ppm)	Will be adjusted in SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	10.3.1	10.3.1: Attention should be given to the number of significant decimals	Accepted
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	-	10.3.3	2 questions regarding the 2050 generation high scenario. How can the generation in 2050 be lower than in 2030 for geothermal CHP, and for hydropower. For instance the value for hydropower 6027 TWh/a (~22 EJ) is not consistent with table 10.3.5 of this chapter (24 EJ, e.g. ~6650 TWh). This mistake is very important regarding all the following sub-sections of 10.3 as this value for 2050 will used to estimate CO2 emission reductions for instance. One should mention that IEA, WEO scenarios are limited to year 2030	Text will be revised with the table
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	-	-	10.3.7	"It's not clear if this table gives an overview of the ""overall"" RES share on primary energy, i.e. calculated as sum of power generation+heating/cooling. If yes, why the data for 2050 are the same of table 10.3.5 (which refers only to power generation)? If on the contrary table 10.3.7 refers only to power generation one of the two table should be eliminated. "	Table will be revised
chris campbell (Ocean Renewable Energy Group)	10	-	-	-	-	-	-	10.4.1	Publications of National Roundtable on the Environment and the economy? 2050 scenario	Study will be tried to be located and incorporated if space permits
Harald Winkler (Energy Research Centre, University of Cape Town)	10	-	-	-	-	-	-	10.4.2	The aggregation of Africa is problematic, see comment on section 10.3.3.1 above	We agree this is a problem but this is what the data allow us to do
Harald Winkler (Energy Research Centre, University of Cape Town)	10	-	-	-	-	-	-	10.4.2	The report cited for South Africa (Hughes et al 2007) is the original source, but is a technical report that fed into a larger study. Would suggest adding (in addition to the correct reference to the original source), reference to a peer-reviewed book version of the larger study: Winkler, H 2010. Taking action on climate change: Long-term mitigation scenarios for South Africa. Cape Town, UCT Press.	Study will be tried to be located and incorporated if space permits
C□ic Philibert (International Energy Agecy)	10	-	-	-	-	-	-	10.5.1	At first glance, looks identical to Table 2.5 in Deploying Renewables □ IEA, 2008a, not simply 'based on'	Currently, the table is almost identical. It is intended to add numbers from the technology chapters in the SOD.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	-	10.5.1	In this table, it could be also interesting to have the load factor (capacity factor) for all RES. This is a very useful indicator	A comprehensive overview of technical aspects will be part of the Technical Summary.
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	10.5.1	This figure could be complemented with the range and heating technologies from the previous table. Could you make the units coherent with the previous table? Finally, the original IEA figure did show the range of retail energy prices, which is a very important element for decentralized energy. Heating range prices might be useful too. (See for instance: □□Renewable energy: RD&D Priorities□□, IEA 2006.)	Heating technologies and electricity generation systems have quite different costs. A direct comparison is not useful. The range given in figure 10.5.1. will be adapted to the ranges discussed in the technology chapters.
Marc Darras (GDF SUEZ)	10	-	-	-	-	-	-	10.5.4	This does not seem pertinent here. An analysis of the coherence of research money to solve barriers is the pertinent one.	The section has to provide information about R&D costs in order to be consistent with the section heading ("cost of commercialization").
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	-	-	10.6.1	Convert EUR(□) to USD2005	Will do

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Antoine Bonduelle (EE Consultant)	10	-	-	-	-	10,4,4	-	-	Supply curves of regional projections are very interesting, but maybe they could be joined in some cases in the same graphs for comparisons of continents (and a gain of space)	will be considered
John Twidell (AMSET Centre)	10	-	-	-	-	10.1	-	-	I am surprised that support mechanisms are not mentioned in this section and were not mentioned in the introduction. If they are discussed elsewhere, then a link should be made here.	will be done in chapter 11
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2	-	-	"General comment on this section: it is a good first step, but perhaps some more analyses could be performed:e.g. dependence of RES on fossil fuel prices; how do RES contribute to CO2 savings; differentiation between first best and second best scenarios could be intensified (is only done in Fig. 10.2.5); It would also be helpful to learn a bit more on the models that are used in this comparison (e.g. by including a table which model runs which scenarios, and which model follows which modelling approach)"	It will be attempted to improve the analysis of the collected scenario data and move into the directions suggested within the space limitations imposed by the overall chapter.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2	-	-	An analysis of the contribution of RES to the overall mitigation effort is missing. From the data collected for this analysis it should be possible to roughly estimate the emission reductions delivered by RES expansion and to compare them to the contribution of competing options such as nuclear, CCS and efficiency. Such a wedge-analysis would be very helpful to estimate RES's overall economic mitigation potential.	There are strong methodological issues connected to the allocation of overall CO2 (and other GHG) emission reductions to individual technologies or technology clusters. There will be an attempt to make such an allocation in section 10.3 for a few representative scenarios that also takes into account the ambiguities in the allocation of emission reductions.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2	-	-	General comment: The section provides a good overview of the levels of renewable deployment in the pertinent IAM scenario literature. For the most part, a statistical analysis of the entire scenario set grouped into baseline and various mitigation categories is provided. In this structure, the relation between policy scenario and the respective baseline is are lost. For instance, due to the large differences in baseline development across models, the type of analysis chosen does not provide much information about the structural changes required relative to baseline development.	The statistical analysis of a large set of scenarios is the starting point of chapter 10.2, but we agree that in depth analysis is needed to complement this overview. Within the space limitations we will try to add analysis that links baselines and mitigation cases as suggested here (similar analysis as in Figure 10.2.5).
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2	-	-	I miss an analysis of the CO2 savings from REN, similar as it is done in the bottom-up analysis in 10.3.4 (Figs 10.3.5 and 10.3.6.).	There are strong methodological issues connected to the allocation of overall CO2 (and other GHG) emission reductions to individual technologies or technology clusters. There will be an attempt to make such an allocation in section 10.3 for a few representative scenarios that also takes into account the ambiguities in the allocation of emission reductions.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2	-	-	This analysis is based on a large number of scenarios. It would be helpful to provide an overview of the models involved, and the scenario settings. Given that some models submitted a larger number of scenarios than others (e.g. ReMIND), is there a selection bias? It would be very helpful to include some information on model structure and key assumption in this overview.	An improved overview of the models, scenarios and underlying publications will be provided in the SOD.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2 and 10.3	-	-	General comment: It would be very useful to have the same format of tables and analyses in 10.2. as well as in 10.3. Otherwise the two parts stay very separated and a coherent picture does not evolve. Can Fig. 10.3.4, e.g. also be given for the model scenarios? Fig. 10.3.3 and 10.2.8 should be given in the same style.	Harmonization and better integration of 10.2 and 10.3 is ongoing and will be improved toward the SOD.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2 and 10.3	-	-	Sections 10.2 and 10.3 have a very similar scope, but large differences in methodology. These two sections need to be integrated beyond the brief discussion of differences in 10.3.5, and ideally merged. The Chapter could also be significantly shortened by merging these two sections.	Harmonization and better integration of 10.2 and 10.3 is ongoing and will be improved toward the SOD.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.2 and 10.3	-	-	The methodological differences between the scenarios presented in section 10.3 compared to those in 10.2 remain largely unclear. The overall description and discussion of methods remains inadequate, particularly for Section 10.3. The authors should go back to the original outline with a separate section on methods followed by a section presenting scenarios.	The sections will explicitly address methodology within the space limitations toward the SOD.
Stan Rosinski (Electric Power Research Institute)	10	-	-	-	-	10.2.2.1	-	-	This section appropriately discusses renewable energy within the broader context of a low-carbon energy portfolio.	Thanks.
Philippe Marbaix (Universit□ athollique de Louvain)	10	-	-	-	-	10.2.2.1	-	-	What is the definition of □□baseline□□ or □□refs□□ (is it the same?) scenarios in this section ? Could it be that, in current litterature, only the □□refs□□ scenarios have no climate policy, and thus compares to the SRES, which did not include climate mitigation ? (if so, it would suggest that eg. SRES-B1 is no longer a type of scenario appearing in the literatture, as it has emissions lower than in the □□ref□□ category here ?).	The term baseline will be included in the glossary as in previous IPCC report. Also, reference (refs) scenarios will be consistently replaced by baseline.
Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	10.2.3	-	-	Homogeneity of these different technical potential is required in order to be consistent in the long run. It should be noted that only hydro deployment has an economically feasible potential reference, but other RES references are based on technical potential	The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.
Brigitte Knopf (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.3	-	-	In the whole chapter there are many references that are not peer-reviewed, e.g. DLR, UBA (and also IEA). I think you should check with the TSU if there are any problems.	Many of these references are peer reviewed
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.3	-	-	The methodological differences between the scenarios presented in section 10.3 compared to those in 10.2 remain largely unclear. An extended explanation of methodology should be provided here.	Text will be revised and we will clarify if spaces permits
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.3	-	10.3.3	In particular, it is not clear to what extent the deployment of RES is exogenous assumption to the scenario analysis (e.g. for the Energy [R]evolution scenario) or a result of some kind of economic optimization. This needs to be clarified. What carbon prices are required to make the deployment economically viable at the projected scale? What are other assumptions, e.g. with respect to investment costs and learning rates?	Text will be revised and we will clarify if spaces permits
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.3.1	-	-	This section on renewable potentials seems to overlap with the discussion in Chapter 1 (p. 18, Table 1.2)	Integration between chapters 1 and 10 will be further improved

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Considerations by writing team
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	10.3.2	-	-	"As stated more than once in the SRREN, to produce robust insights a comparative analysis of different scenarios should be based on a large and differentiated set of internally coherent and consistent scenarios. The analysis carried out in 10.3.2 seems based on a quite limited set of scenarios, in fact two main sources, IEA and Greenpeace. And it seems questionable the combination of the results of different scenarios, each produced with different methodologies and assumptions: all the potential shares of RES included in tab. 10.3.3, tab. 10.3.4 and fig. 10.3.3 are calculated by combining absolute numbers form different scenarios, this means that coherence and consistency of scenarios is no more granted. Maybe there is too much emphasis on the results of what it is defined no more than a ""theoretical excercise"" (page 31, line 11)? "	New scenarios will be added, if data are available
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.3.2	-	-	The discussion of RES deployment potential by end-use sector is very important and welcome. Some work on sectoral mitigation potentials from the perspective of integrated energy-economic modeling was presented by Luderer et al. 2009 and could be of interest for this section.	We will look at the document and see if it fits in the chapter
Douglas Arent (NREL)	10	-	-	-	-	10.3.2.4	-	-	"rename subsection to clarify ""by technology""?"	Title will be revised
Harald Winkler (Energy Research Centre, University of Cape Town)	10	-	-	-	-	10.3.3.1	-	-	The aggregation of Africa as a region is problematic, hiding very signficant differences in potential across the region. The situation in South Africa (and to a lesser extent, Nigeria and Egypt) is dramatically different to the 51 other countries on the continent.	Data available provides this level of desagregation
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	10.3.3.3	-	-	"should delete ""and sector"" since there is no mention later in this section."	We will consider revising
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	10.3.5	-	-	"It is said that the analysis of chapter 10.2, based on integration model scenarios, and the analysis of chapter 10.3, based on 'bottom up' scenarios, differ significantly by source. But from tables/figures of chapter 10.2 it seems that the technical detail models analysed in 10.3 (IEA and Greenpeace) are included also in the analysis of 10.2. It's not completely clear how the 'bottom up' scenarios used in 10.3 have been selected, they don't seem to be the only 'bottom up' scenarios of the wider set of scenarios considered in 10.2 (some of the models cited in figure 10.2.9 are bottom-up models). "	We will make clear how the scenarios for 10.3 were selected. We will no longer distinguish between top down and bottom up models
Christiano Pires de Campos (Petrobras)	10	-	-	-	-	10.3.5	-	-	Poor analysis. Should be rethinked or deleted.	Whole section will be removed and replaced by a new section
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.3.5	-	-	This section presents a brief comparison between the results from bottom-up models and top-down models. Some explanations or hypothesis on the substantial differences should be provided.	We will no longer distinguish between top down and bottom up models
Douglas Arent (NREL)	10	-	-	-	-	10.4.2	-	-	introduce stylized figure/example to clarify difference of abatement curve and supply curve	will inlcude technology cost curves
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.4.2	-	-	This discussion on the supply cost concept and its limitations is very helpful.	thank you!!

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Douglas Arent (NREL)	10	-	-	-	-	10.4.3	-	-	section confuses supply curves and abatement curves. Move supply curves elsewhere and keep this section focused on abatement curves.	How does it confuse them? Not clear to me. We will restructure the section and focus here on supply cost curves for individual technologies, but the lit review will still cover both types of curves.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.4.3	-	10.4.1	This table provides an overview of renewable energy supply. For each study, it should be indicated which year the deployment potential refers to.	will be added into the table, thank you
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	10.4.3.3	-	-	"Some doubts about the completeness of the review: for instance, there is no reference to abatement cost curves for Italy, produced by at least a couple of different sources. "	will note that the table is not complete but illustrative.
Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))	10	-	-	-	-	10.4.4	-	-	"As said at the beginning of this subchapter, the regional energy supply curves presented here are based on just two datasets, one of which uses two different sources of data. This implies that for the longer term (2050) this last one is the only dataset on which the curves are builded. Furthermore, the Energy [R]evolution scenario is a target oriented scenario (CO_2 emissions limited to 10 Gt) developed in a back-casting process (through different models) and based on political exogenous assumptions (among others, no CCS, no nuclear). And also with regard to IEA data, for what I see in WEO 2008 the information on the assumed generation costs by region in 2030 is quite limited. It seems that for the authoritativeness of IPCC it could be questionable to dedicate so much relevance to analyses which cannot be so robust. On the contrary, if it is considered methodologically acceptable to associate (regional) RES generation derived from a model based scenario with cost data derived from other sources, maybe it should be possible to extend the curves presented in chapter 10.4 to some other sources, so to obtain a wider comparison. "	Noted. It is explained in the text that this is due to shortage of app. Datasets.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.4.4	-	-	In principle, the renewable supply cost concept is good and helpful. The data presented here, however, give a very simplistic picture. Levelized energy supply costs are assumed to be uniform across entire macro-regions, despite the fact that there is much heterogeneity in the potential for different sites within one region. This is a major short-coming, which compromises the usefulness of the analysis.	this limitation is due to data availability, and has been explained in the text as a strong limitation. In addition, now fewer such curves will be presented and only as illustrative examples.
Gunnar Luderer (Potsdam Institute for Climate Impact Research)	10	-	-	-	-	10.4.4	-	-	Substantial differences exist between the WEO and Energy Revolution cost estimates, in particular for PV. Since the analysis is only based on these two studies, the authors should track down these differences and attribute them to differences in the underlying assumptions.	true. A selection of these curves will be moved to 10.3, and such differences will be included.

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Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	10.4.4	-	-	This section is not clear. IEA and FRS scenarios use different assumptions regarding potential and cost. IEA (WEO) is peer-reviewed. What about the Energy [R]evolution scenario ? For instance, how can PV cost be so low (e.g. the cheapest RES !) in 2030 for Africa in the Energy [R]evolution scenario (Figure 10.4.2)? Precise that these energy supply curves only address remaining potential (e.g. in addition to existing one). It could be interesting to have more infomation regarding models used for this report	The ER scenario is also peer-reviewed. For future cost developments, it is normal and even beneficial to present different cost evolutions. 10.3 will reflect on this difference to some extent.
Douglas Arent (NREL)	10	-	-	-	-	10.4.4.	-	-	combine curves into a few to reduce space, and allow for comparisions. Also, reemphasize caveats and limitations!	Accepted
Stan Rosinski (Electric Power Research Institute)	10	-	-	-	-	10.5	-	-	Section 10.5 should address costs for grid integration or reference appropriate discussion in Chapter 8.	A reference to the integration chapter will be made.
Harald Winkler (Energy Research Centre, University of Cape Town)	10	-	-	-	-	10.5.2	-	-	"Energy modeling for mitigation potential for South Africa showed a dramatic shift in the mitigation costs, depend signficinatly whether learning is assumed or not. Two scenarios were modelled, assuming 27% and 50% of renewable electricity by 2050, respectively. In the less ambitious scenario. Instead of imposing a cost of Rand 52/t CO2-eq (ZAR, at 10% discount rate), reduced costs due to technology learning turn renewables into negative cost option. The results show that technology learning flips the costs, saving R143. At higher penetration rate, the incremental costs added beyond the base case decline from R92 per ton to R3. Winkler, H, Hughes, A & Haw, M 2009. Technology learning for renewable energy: Implications for South Africa□s long-term mitigation scenarios. Energy Policy 37: 4987□4996. doi:10.1016/j.enpol.2009.06.062 "	The information provided by the reviewer will be considered for inclusion.
William Kyte (E.ON AG)	10	-	-	-	-	10.5.2	-	-	Other technologies have cost reduction potential - renewables cannot be considered in isolation	The cost reduction potential of other technologies (e.g. CCS) will be mentioned as well.
Osamu Kimura (Central Research Institute of Electric Power Industry)	10	-	-	-	-	10.5.2	-	-	There are theoretical and methodological limitations for learning curve analysis.Theoretical analysis shows that 'initial concavity', 'irregularity of improvement' and 'plateau phenomenon' can cause deviation of typical log-log scale learing curves. See: Takahashi, N., 2001, The basics of learning curve analysis, Tokyo University Keizaigaku Ronshu, 66, pp.2-23.	The limitations will be discussed in the text.
Seth Dunn (GE Energy)	10	-	-	-	-	10.6.2	-	-	"The US National Academy of Sciences has just released a study on the ""hidden costs of energy."" See http://www.nap.edu/catalog.php?record_id=12794."	Already referenced page 92 line 17 but details can be expended and harmonised with other citations
Harald Winkler (Energy Research Centre, University of Cape Town)	10	-	-	-	-	10.6.2	-	-	A seminal work on the external costs of power generation in South Africa should be assessed: Van Horen, C 1996. Counting the social costs: Electricity and externalities in South Africa. Cape Town, University of Cape Town Press and Elan Press. The original study was updated and published in peer-reviewed form in Spalding-Fecher, R & Matibe, D K 2003. Electricity and externalities in South Africa. Energy Policy 31 (8): 721-734. (perhaps more easily accessible to teh author team).	Although reference relatively old, it will be accessed because of pausity of information from Africa

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Emmanuel Branche (Electricit□ de France (EDF))	10	-	-	-	-	10.6.2	-	-	Refer to environmental and social section of the different technology chapters, rather than simplifying and writing wrong elements. Most of the time for each negative impact there is a mitigation measure that will reduce this impact, and that may in some cases set positive impacts. But all the mitigation and positie impacts are not written in this section	Text will utilise summary information from technology chapters
Harald Winkler (Energy Research Centre, University of Cape Town)	10	-	-	-	-	10.6.2.2	-	-	There are also health BENEFITS to electrification. In South AFrica, a study found that one of the major benefits of electrification, but one that is not included in traditional cost-benefit analysis, is the avoided health costs of fuels such as wood, coal and paraffin. The paper looks at the South African electrification programme, and presents estimates for these avoided health costs. The resulting benefits are of the same order of magnitude as the local air pollution damages from the power stations that produce electricity. Spalding-Fecher, R & Matibe, D K 2003. Electricity and externalities in South Africa. Energy Policy 31 (8): 721-734. If electrification is carried out with RETs, this would have significant synergies - so perhaps this would also be relevant in section 10.6.4	A generic statement will be inserted to incorporate this idea