INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Special Report on Renewable Energy Sources and Climate Change Mitigation

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

Chapter 3

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

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	0	-	-	-	-	-	-	(quantitative) information on distributed solar is lacking, and could be more precise and prominent (e.g. installation of 250.000 SHS in Bangladesh, ¿	Please provide reference so we can include it
Greece (National Observatory of Athens)	3	0	-	-	-	-	-	-	A list of terms used in this chapter is needed.	The report will have a Glossary and Acronims list
Australia (0)	3	0	-	-	-	-	-	-	Chapter 3 is focused on electricity generation, and could do with greater balanced discussion on efficiencies in the supply chain. The chapter would also benefit from highlighting low technology solar options, e.g. solar water heating as economically attractive solar energy options. It will be important to have input from various geographical regions about claims made around solar resource potential. The chapter should also discuss and allow for niche applications of solar technologies (e.g. OPV) other than in electricity generation. Discussion of opportunities for improved efficiencies and cost reductions should focus on the entire solar value chain, not just devices. For example, balance of systems costs and non-technical barriers to increased deployment of solar technologies are important. There is no mention total solar energy generation by country, or as a proportion of total electricity generated.	Insuffiencient referenced literature on supply chain. Any provided reference would be welcome. Other aspects found in the comment are treated accordingly to available references throughout the text
United States (U.S. Department of State)	3	0	-	-	-	-	-	-	Chapter contains too much technical detail that does not contribute to the overall message.	The chapter will be shorttened
United States (U.S. Department of State)	3	0	-	-	-	-	-	-	Currently, the Chapter includes photographs of some technologies, but not others. For example, figures 3.10 and 3.11, which take up considerable space in the chapter and don't add a lot of technical value to the chapter. Either these figures should be removed, or figures for other technologies should also be included.	Subchapter 3.3 has pictures and schematics of all technologies. Nevertheless, Fig. 3.10 and 3.11 will be changed to include schematics
David Clubb (European Environment Agency)	3	0	-	0	-	-	-	-	General comment: This chapter is too verbose, feels rather unscientific and goes into too much detail on the background issues.I am also unconvinced about the layout of the chapter (though I'm not sure how much flexibility you have with this). I wonder whether a better approach would be to cover each technology 'top-to-bottom', rather than talking about the technologies of each, then the costs, then market share....etc. The method you've currently chosen increases the risk of duplication of both background and 'detailed' material for each sub-chapter. I would cut significant amounts of text from the introductory pages, and focus on relevant physical descriptors rather than use jargon. An archetypal example of this is page 6, line 32. This temperature is not unequalled on earth (temperatures many thousands of times hotter have been achieved - http://en.wikipedia.org/wiki/Relativistic_Heavy_Ion_Collider) , and its 'special' nature is highly subjective. Another line I would remove is the 'descriptor' on p7, line 31-32. Some parts of this chapter is characterised with flowery language which doesn't add to the understanding of the issues. Many multiple-line paragraphs could be rewritten in a single sentence. I would also suggest that the end user is not well defined. Some of the detail is quasi-technical and (I think for a 'policy' document) probably irrelevant; for example, (page 18, line 37) - 'this system should be carefully designed and installed....' of course! All technical systems should be carefully designed and installed for various reasons. But is it the place of this document to point them all out?	The structure of the chapter was given to us. The chapter will be shortened. The temperature statement was changed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	0	-	-	-	-	-	-	General to entire chapter, the recommendation is to use irradiance, rather than flux, for they are essentially equivalent definitions from different camps. If authors do not want to do this, at least clarify the context. This chapter uses the term flux loosely and in some places incorrectly. Flux is sometimes equated with irradiance but the units are different. ISO and IEC standards use the term irradiance when referring to the solar output. If units are given for a solar flux they should be photons/unit area/unit time (photons/cm2/sec). The rest of the report properly uses the term flux in the context of particles/unit area/unit time. I suggest that this chapter only use the term irradiance and not incorrectly call irradiance in W/m2 a unit of flux. Wherever flux is irradiance should be substituted. In Chapter 3, p.6, lines 34-37 correctly defines the photon flux but the chapter never uses units of photon flux. It is suggested that this be deleted. This propagates to other chapters that make reference to this chapter.	The term "flux" will be taken out and will be replaced by a suitable alternative
Norway (Climate and Pollution Agency)	3	0	-	-	-	-	-	-	In general a very good and clear chapter.	Accepted
United States (U.S. Department of State)	3	0	-	-	-	-	-	-	In general, there is a lot of technical detail on the technology that does not add value to discussion of climate change. This could be condensed and the report could instead rely on appropriate references. There is quite a bit of repetition that could be addressed by a skilled technical editor.	The chapter will be shorttened
Gerrit Hansen (TSU)	3	0	-	-	-	-	-	-	In parts of this chapter, particularly in the sections on CSP and solar thermal, extensive use is made of grey literature edited by interest groups such as the DESERTEC foundation, the ESTTP, the ESTIF. It is in line with the IPCC's procedures and requirements, and, at times, unavoidable to refer to business and industry organizations' publications. However, as an independent review, the report cannot quote or paraphrase entire sections of vision statements or policy papers. Please do revisit your contributions to make sure that scientific standards are met and the impression of bias is avoided.	Parts will be rewritten
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	0	-	-	-	-	-	-	It is not easily to find the promising direction for innovative solar energy system	Section 3.7 gives the available info
Gerrit Hansen (TSU)	3	0	-	-	-	-	-	-	Overlaps of "passive solar" and "active heating and cooling (in buildings)" should be made more explicit, and crossreferences inserted to the relevant sections. Particularly when addressing passive house standards or active solar buildings, the differentiation should be stated in a consistent way.	it will be considered
Gerrit Hansen (TSU)	3	0	-	-	-	-	-	-	please consider to restructure the chapter according to the categorization used in the TS, with "passive" and "active" solar forming subchapters of solar thermal applications for heat.	The authors decided to change TS according to Chapter organisation
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	0	-	-	-	-	-	-	Please think about using solar irradiance rather than solar radiation throughout the section	To be done

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	0	-	-	-	-	-	-	The chapter includes a lot of extraneous text that does not get to the point of what the chapter is about, and could be shortened considerably. For example, section 3.2.2 on solar resource radiation is about 3 pages long--this material should be able to be covered in sufficient detail in about 1 page.	The chapter will be shorttened
United States (U.S. Department of State)	3	0	-	-	-	-	-	-	The Chapter needs to be careful with the use of terms like "must" to avoid an unsubstantiated opinion or advocacy.	it will be considered
Pekka Pirila (Aalto University)	3	0	-	-	-	-	-	-	The division of issues related to new technologies between chapters 3.3 and 3.7 is questionable and somewhat confusing as a major part of technologies are in research and development stage.	Structure has been decided to be consistent with report protocol
()	0	0	0	0	0			3.1	Discrepancy with SPM table SPM 4	Table 3.1 will be modified to include data from Nakicenovic 10% land use assumption which is more consistent with Krewitt data
()	0	0	0	0	0		3.29		out of date	This figure will be replaced by a new one, made by ourselves on the basis of the various references in page 74 line 21-23
()	0	0	0	0	0		3.8		Need a picture of a Solar cell	Figure 3.8 will have a picture of a solar cell next to the schematic shown
()	0	0	0	0	0	3.8			A new statement is needed	"Although commercial market studies are available that provide insights as to current project cost structures, for the purpose of this report, only peer reviewed cost data is used"
John Twidell (AMSET Centre)	3	4	12	-	-	-	-	-	remove 'almost'. For instance there is nowhere where passive solar energy buildings cannot trap significant heat and where PV will not benefit, even on the North and South Poles!	It was a reponse to a former comment
Greece (National Observatory of Athens)	3	4	29	-	-	-	-	-	"...requires careful engineering¿" To be replaced by the following: "...requires specialized engineering¿"	to be done
Greece (National Observatory of Athens)	3	4	17	4	18	-	-	-	"¿any material object placed in the sun will absorb thermal energy." To be replaced by the following: "¿any material object receiving solar radiation, transforms part of it into thermal energy."	Authors prefere present form
Greece (National Observatory of Athens)	3	4	33	-	-	-	-	-	alternatively, this can be written as: "...special thermodynamic sorption cycles (e.g. absorption or adsorption)."	to be done
John Twidell (AMSET Centre)	3	4	2	-	-	-	-	-	Clarify immediately at the beginning with an added sentence 'In this Report, the term 'solar energy' refers to technologies that absorb solar radiation for heat or for photon excited processes', i.e.' direct' uses. [this is necessary because the majority of renewable types are driven by solar radiation, e.g. hydopower and bioenergy, and historically, especially in the US, all such renewables were called 'solar energy'. It is to late to explain this in line 44, page 5]	To be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
STEPHANE POUFFARY (Energies 2050)	3	4	16	-	-	-	-	-	Delete ""lighting"" or add ""natural""	Add "natural"
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	3	4	5	4	6	-	-	-	Delete sentence.	to be done
United States (U.S. Department of State)	3	4	24	-	-	-	-	-	Executive summary: page 4 line 24. delete the word "solid-state" since dye sensitized are not solid state and not all PV devices are solid-state.	"solid state semiconductor" will be deleted
United States (U.S. Department of State)	3	4	33	-	-	-	-	-	Executive summary: page 4 line 33. delete "special" in front of thermodynamic cycle. It does not appear to special to me and does not add meaning to the sentence. Delete "called absorption refrigeration" since does not give any special meaning beyond that it is a type of thermodynamic cycle.	delete "special". Sentence to be rewritten as in comment 208
Jorge Bonnet Fernández-Trujillo (Agencia Canaria de Desarrollo Sostenible y Cambio Climático)	3	4	44	4	48	-	-	-	Is there any difference between GWth and Gwe apart from one is thermal and the other electricity produced from solar technology? Is it only indicating the type of energy obtained from the sun? Please add a footnote.	To be included in Glossary
John Twidell (AMSET Centre)	3	4	31	-	-	-	-	-	Serious misunderstanding of passive solar buildings. '¿on the buildings through glazing (windows, sun-spaces, conservatories) and other transparent materials (e.g. transparent insulation) without the dominant use of pumps or fans'.	Sentence will be changed
Greece (National Observatory of Athens)	3	4	18	-	-	-	-	-	These are two different goals, maximizing and maintaining. The sentence needs to be rephrased to reflect the following concepts: a. maximizing through the use of vacuum (e.g. using vacuum plate solar collectors), mirrors (e.g. concentrating solar radiation) and optical coatings to increase solar absorptance b. maintaining through the use of water storage devices (e.g. from simple hot water tanks to seasonal thermal storage tanks), the ground or even phase-change materials.	Rephrasing will be considered
Atul Raturi (The University of the South Pacific)	3	4	19	-	-	-	-	-	vacuums??	Will be clarified
Gerrit Hansen (TSU)	3	4	7	-	10	ES	-	-	The term "rate at which all energy is used on this planet", as well as the term "the world's energy consumption" which is repeatedly used throughout chapter 3's introductary part (e.g. 3.2.1 first and last paragraph, 3.1 first para) is somewhat misleading and might become clearer by adding a reference to humanity (as the non-human biosphere also processes or "uses" solar energy, but the reference here excludes, e.g. energy embodied in food, but only refers to the direct energy production and consumption for energy services like lighting, heating, cooling, mechanical work etc.)	to be done
China (China Meteorological Administration)	3	4	1	5	28	Executive Summary	-	-	Please provide a highlighted sentence for each paragraph in ES. It can attract readers' attention.	If it conformes with standard protocol for full report, it will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	5	36	-	-	-	-	-	"...it has the potential to displace large quantities of fossil fuels." To be replaced with: "...it has the potential to displace large quantities of fossil fuels (Tsilingiridis et al. 2004a)."	Reference to be added
Greece (National Observatory of Athens)	3	5	48	-	-	-	-	-	"¿for domestic water heating." To be replaced by the following: "¿for domestic water heating, as well as for solar industrial applications, e.g. large scale solar desalination."	to be done
Atul Raturi (The University of the South Pacific)	3	5	2	-	-	-	-	-	...cost savings can be incurred ¿.. - Replace incur	to be done
John Twidell (AMSET Centre)	3	5	48	-	-	-	-	-	..late 1800's... REFERENCE NEEDED	Add reference of book ISES
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	5	32	5	36	-	-	-	Numbers only make sense if the insolation value range is also given. The quoted range of 18 to 76 g/kWh for PV is too pessimistic and does not follow simply from the reference given. Range should rather be 16 to 29 @ 1700 kWh/m2 per year, which translates to 27 to 49 @ 1000 kWh/m2 per year. The range could therefore be: <15 to 50, for different technologies at typical insolation levels (1000-1800). See M.J. de Wild-Scholten (2010), 1st International Conference on PV Module Recycling, 26 January 2010, Berlin, http://www.epia.org/index.php?id=711 Moreover, it is important to note (also here) that values go down continuously as technologies develop (reduction of materials use, use of low-energy materials, increasing efficiencies.	Reference cannot be used, not peer reviewed. The range used will be checked and only southern european conditions given
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	5	32	5	36	-	-	-	Numbers only make sense if the insolation value range is also given. The quoted range of 18 to 76 g/kWh for PV is too pessimistic and does not follow simply from the reference given. Range should rather be 16 to 29 @ 1700 kWh/m2 per year, which translates to 27 to 49 @ 1000 kWh/m2 per year. The range could therefore be: <15 to 50, for different technologies at typical insolation levels (1000-1800). See M.J. de Wild-Scholten (2010), 1st International Conference on PV Module Recycling, 26 January 2010, Berlin, http://www.epia.org/index.php?id=711 Moreover, it is important to note (also here) that values go down continuously as technologies develop (reduction of materials use, use of low-energy materials, increasing efficiencies.	Reference cannot be used, not peer reviewed. The range used will be checked and only southern european conditions given
Atul Raturi (The University of the South Pacific)	3	5	46	-	-	-	-	-	Rephrase the sentence	To be done
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	3	5	28	-	-	-	-	-	Solar energy should be used mostly in countries with good solar radiation as the mediterranian countries.	It should be used everywhere
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	5	43	5	44	-	-	-	The sentence mentioned "other indirect forms.". Since the "other" form is direct, I suggest to either rephrase with a comma between other and indirect "other, indirect forms." by deleting "other".	to be done

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	6	26	-	-	-	-	-	"Above the Earth¿s atmosphere, solar radiation¿s energy rate equals 1368 watts (W) per every square meter of surface facing the sun." To be replaced by the following: "Outside the Earth's atmosphere, the intensity of solar radiation at the mean earth-sun distance is practically constant throughout the year. Its value is now adopted to be 1368 W/m²."	to be done, but eliminating the word "intensity"
Robert Pietzcker (PIK)	3	6	47	-	-	-	-	-	100MW, not 1000MW for a single installation ¿ else quote source.	To be changed by 100 MW
Wolfgang Riecke (Deutscher Wetterdienst)	3	6	3	-	-	-	-	-	addition: "In 1839 A.E. Becquerel already discovered the photo-elelectric effect."	to be done
United States (U.S. Department of State)	3	6	24	-	-	-	-	-	Change to "dwarfs the rate at which the world consumes energy by a factor of 10,000."	to be changed
Robert Pietzcker (PIK)	3	6	28	6	37	-	-	-	Delete ¿ information not very important for the rest of chapter	This section will be rewritten and shortened
United States (U.S. Department of State)	3	6	34	6	37	-	-	-	In Chapter 3, p.6, lines 34-37 delete definition of photon flux for reasons given above.	This section will be rewritten and shortened
United States (U.S. Department of State)	3	6	34	6	37	-	-	-	In Chapter 3, p.6, lines 34-37 correctly defines the photon flux but the chapter never uses units of photon flux. It is suggested that this be deleted. This propagates to other chapters that make reference to this chapter.	This section will be rewritten and shortened
David Clubb (European Environment Agency)	3	6	27	6	27	-	-	-	Incorrect phrasing: 'Facing the sun' is not accurate; it should read 'perpendicular to the sun's rays'	Put in parenthesis "perpendicular to the sun"
David Clubb (European Environment Agency)	3	6	35	6	36	-	-	-	Incorrect. The photons do not have high energy because of the high temperature of the sun. They have an energy directly proportional to the drop in energy state arising from nuclear processes where they are formed (e=hv). This is to do with the physics of nuclear fusion, not temperature. The following argument is then more or less backwards. It is the semiconductor industry which has created energy gaps to accommodate peaks in electromagnetic radiation of the correct frequency, rather than the (implied) lucky coincidence of nature and man.	This section will be rewritten and shortened
David Clubb (European Environment Agency)	3	6	25	6	25	-	-	-	Incorrect: 'Thermal rays' is not a correct physical term; this should be 'black body electromagnetic radiation'.	Change the sentence to "Every material body emits thermal radiation"
David Clubb (European Environment Agency)	3	6	33	6	33	-	-	-	Incorrect: This sentence unfortunately betrays a poor understanding of physics, biology and evolution. Sunlight 'embraces daylight'. No. Daylight is daylight in anthropogenic terms because we have evolved to access this part of the electromagnetic spectrum through our retinas.	This section will be rewritten and shortened
United States (U.S. Department of State)	3	6	47	-	-	-	-	-	Is there a reference for 1000 MW systems? This is unclear. (If not, the phrase about "approaching 1000 MW of power" should be dropped.)	To be changed by 100 MW
John Twidell (AMSET Centre)	3	6	3	-	-	-	-	-	now ' ..late 1800's device for..electricity'. Better ' in the 1880's¿...Reference needed to Smith, Day and Adams developing the selenium cell 1873 to 1883 http://www.pvresources.com/en/history.php	to be done

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	6	27	-	-	-	-	-	page 6 line 27. change 1368 to 1366. According to ASTM standard E490, ISO 15387 has 1366 for most recent I think and 1367 for the first edition. The number cited is not bogus but not a consensus standard based value either.	References will be checked and appropriate number will be used throughout the whole chapter, SPM and TS
United States (U.S. Department of State)	3	6	12	6	14	-	-	-	page 6 lines 12-14. Delete "The founders of ISES were motivated by the fact that the age of fossil fuels was limited and a sustainable replacement was needed; but it soon became clear that the mitigation of climate change was an equally important incentive for developing solar energy." This is probably true but is not helpful to the point of the paper and may distract the reader about motivations of ISES.	to be deleted
Manfred Treber (Germanwatch e.V.)	3	6	23	-	-	-	-	-	Please compare the 5.5x 10 to the power of 6 EJ per year of line 23 with the 3.2 x 10 to the power of 6 EJ per year radiation a the Earth's surface on page 8, line 9. Should these be the same numbers or is it a different variable/notion?	to be corrected
United States (U.S. Department of State)	3	6	4	-	-	-	-	-	Section 3.1: page 6 line 4. insert silicon into "The modern silicon solar cell," Other modern solar cells that are not silicon based were not the same as the Bell albs work.	to be done
Atul Raturi (The University of the South Pacific)	3	6	35	-	-	-	-	-	Sould read "" bundles of electromagnetic energy "" (in place of electromagnetic bundles of energy)	This section will be rewritten and shortened
Cédric Philibert (International Energy Agency)	3	6	2	6	4	-	-	-	Suggest rewriting this sentence as follows: Älso, the 1800s brought the discovery of two processes for converting sunlight into mechanical or electrical energy: the photovoltaic effect, discovered by Henry Becquerel (1839), and the principle of concentrating solar power to produce steam, demonstrated by Augustin Mouchot (1875).	to be done
Robert Pietzcker (PIK)	3	6	23	-	-	-	-	-	To reduce the amount of similar but not equal numbers, use the same number as on page 8, line 9 and also say ¿on Earth's surface¿	to be corrected
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	6	12	6	14	-	-	-	Unless the second part of the sentence is a statement by ISES, I suggest not to compare the importance of incentives. I would prefer to say "¿ mitigation of climate change was a more urgent motive for developing solar energy.", as CC indeed becomes a problem for mankind much earlier than the depletion of fossil fuel stocks.	sentence to be deleted (see previous comment)
John Twidell (AMSET Centre)	3	6	1	-	-	-	-	-	use of mirrors was described by th ancient Greeks!	Not relevant
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	3	6	20	6	37	3.1.2	-	-	Comment by Simon Allen, Science Officer WGI TSU, University of Bern: scientic references are needed to support the basic solar physics described here.	Reference will be looked for and added
Simon Allen (IPCC WGI TSU, University of Bern)	3	6	20	6	37	3.1.2	-	-	scientic references are needed to support the basic solar physics described here.	Reference will be looked for and added
Dave Renne (National Renewable Energy Laboratory)	3	7	-	-	-	-	-	-	Change ""Sun's"" to ""solar resource at the earth's surface"". The variability of the sun's output is very small compared with the variability on the ground due to clouds and the diurnal cycle.	will be changed
David Clubb (European Environment Agency)	3	7	33	12	44	-	-	-	I think there is way too much detail on the specifics of the resource. Of course a general idea of the average values is useful, but you don't really need to know the values to the nearest decimal point. In terms of economics, average values are fine. I think this whole section could be significantly reduced	Decimal points come from numbers in reference and cannot be changed./ Text will be condensed.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	7	38	7	39	-	-	-	page 7 line 38,39. Change "The solar energy flux at the top of the atmosphere can be evaluated with high precision because it depends essentially on astronomical parameters." to "The solar energy at the top of the atmosphere has been evaluated with high precision using multiple satellites (ASTM E490)."	include the use of satellites and reference to ASTM E490 "among other"
United States (U.S. Department of State)	3	7	44	-	-	-	-	-	page 7 line 44. remove paragraph break.	will be done
United States (U.S. Department of State)	3	7	46	-	-	-	-	-	page 7 line 46 insert "On clear days the direct-beam is 80 to 90% of the global solar radiation"	same as comment 253
United States (U.S. Department of State)	3	7	41	7	43	-	-	-	page 7, line 41-43 delete "Atmospheric conditions reduce direct-beam solar radiation by about 10% on clear, dry days and by 100% on days with thick clouds, leading to lower average solar flux. " This is true. On clear dry days the solar constant of 1366 W/m2 is reduced by about 37 % to 1000W/m2. next line fixes this issue and gets the point across. The 10% number refers to the diffuse component is 10% of the direct which is possible in the desert southwest on very clear days.	Our comment was on direct beam radiation, but we agrre that the total radiation is more relevant here. Will be changed along lines reviewer requested
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	7	38	39	-	-	-	-	Please mention the top of atmosphere observations by satellites, e.g with the follwoing sentences. ""Since 1960 the solar energy flux can be well observed by satellites, e.g. Jacobowitz et al (1984), Barkstrom et al (1986), Wielicki et al (1998), Harrries et al (2005). Satellite observations has significantly increased our knowledge of the solar energy flux at the top of atmosphere.	Satellite reference has been acknowledge (see coment 249)
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	7	42	43	-	-	-	-	Please rephrase the sentence (the cloud effect statement is not correct) and put it after the explanation of the solar radiation components starting in line 44. Please rephrase ""Atmospheric condition reduce the direct (beam) solar radiation by about 10% on clear dry days. However, the effect of clouds is agreat deal higher. Even relative optical thin clouds with a cloud optical thickness of around 10 reduce the incoming direct radiation by 100%. The effect of the Clouds on the global solar radiation is less but still pre-dominant""	will be corrected by responding to comment 252
Gerrit Hansen (TSU)	3	7	3	-	11	-	-	-	The sun's variability (please change term! It is not the sun that is variable) is not mentioned before in the chapter (please consider comment by TSU on 3.1.2). This paragraph contains valuable information but should be reformulated, as at the moment it includes too many details while (implicitly) refering to passive solar heat storage only, and is ridden by prerequisites. A more neutral description refering to the general challenge of storing spatially and temporally distributed solar energy (in form of heat and electricity) in a way that it is available on demand might be more adequate and also sufficient for an introductory section. This might be tied to a definition/introcduction of the term "solar reliability" when first used.	Section to be rewritten
David Clubb (European Environment Agency)	3	7	6	7	7	-	-	-	This should be qualified; you need the right building design for this to be true	to be considered
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	3	7	35	7	43	3.2.1	-	-	Comment by Simon Allen, Science Officer WGI TSU, University of Bern: scientic references are needed to support the solar energy flux values given here.	references be given

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
China (China Meteorological Administration)	3	7	40	7	41	3.2.1	-	-	Please add "trace gases".	to be included
Simon Allen (IPCC WGI TSU, University of Bern)	3	7	35	7	43	3.2.1	-	-	scientic references are needed to support the solar energy flux values given here.	references will be given
Atul Raturi (The University of the South Pacific)	3	8	14	-	-	-	-	-	¿27 % of the entire global land area ¿.. (insert 'global')	to be considered
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	8	17	8	18	-	-	-	0.04% is too low. Mid 2010 installed PV capacity is approx. 25 GWp. At 1 kWh/Wp per year (modest estimate) this gives 0.4 EJe, or approx. 0.08% of global primary energy. Assuming 1.2 kWh/Wp gives 0.1%.	If reviewer provides refernce, for this number, we will include it.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	8	17	8	18	-	-	-	0.04% is too low. Mid 2010 installed PV capacity is approx. 25 GWp. At 1 kWh/Wp per year (modest estimate) this gives 0.4 EJe, or approx. 0.08% of global primary energy. Assuming 1.2 kWh/Wp gives 0.1%.	If reviewer provides refernce, for this number, we will include it.
Manfred Treber (Germanwatch e.V.)	3	8	29	9	3	-	-	-	In these lines the different contributions of PV and CSP are discussed. Please make clear on line 1 of page 9 that the numbers of table 3.1 comprise contributions of PV and CSP together (if it is the case).	These nubers are relevant to all conversion technologies, including solar thermal CSP and PV
Greece (National Observatory of Athens)	3	8	3	-	-	-	-	-	Instead of a "perpendicular surface" clarify that this is a vertical surface to the incident direct-beam solar radiation, not a vertical surface e.g. a building wall	caption to be changed due to change of figure
Dave Renne (National Renewable Energy Laboratory)	3	8	-	-	-	-	-	-	It is good that ""theoretical"" and ""technical"" are defined here so well. This should be done consistently for all technologies throughout the document.	It is just comment
Robert Pietzcker (PIK)	3	8	22	8	28	-	-	-	it is good that the difference in assumptions between CSP and PV are noted ¿ however, this could be strengthened further by saying something like ¿It is unclear why the authors of the studies use different factors for determining land availability for CSP and PV. For PV, they use very small generalized usability factors of 0-5% for all land types. In contrast, for CSP, they use explicit GIS-maps to completely exclude urban, sloped, agriculture and nature conservation zones, but apply high usability factors of 80% to the rest of the area. This leads to very different total potentials for both technologies which do not seem to be due to technical differences between PV and CSP but rather to different potential calculation methods.¿	discussion is required to decide on how much details should be included in paragraph
United States (U.S. Department of State)	3	8	1	-	-	-	-	-	page 8 line 1. The definition of "global solar radiation is not correct." It is not the sum of the direct and diffuse. The standard terminology in IEC is the irradiance on a horizontal surface. Hence the definition should be "The term 'global solar radiation" is the direct irradiance times the cosine of the zenith angle plus the diffuse horizontal irradiance.	by adding in brackets "on a horizonta surface" after direct-beam radiation, we will achieve the same purpose. A reference will be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	8	2	-	-	-	-	-	page 8 line 2. consider deleting figure 3.1. I think it should be replaced with the annual global solar energy in units of kWh/m2. This is the annual energy on a horizontal surface. You may also wish to separate out the direct and global components because the resource potential of the direct component can not be determined easily from just the global. You should also probably note that higher annual energies are possible than mounting on a horizontal surface by mounting the flat-plate panel on a tracker or tilting at the latitude. Add sentence that with global horizontal, increases the light that can be captured. Add source, and include two maps: DNI (SRREN_Draft2_Review_Emery_Keith_map_pv_national_02.jpg AND SRREN_Draft2_Review_Emery_Keith_map_csp_national_03.jpg), and global horizontal (SRREN_Draft2_Review_Emery_Keith_NASA_Global_annual_horizontal_01.jpg).	An additional figure will be added giving the aaverage over the year. If reviewer can provide figures of the tilted surfaces we will insert that as well.
United States (U.S. Department of State)	3	8	26	8	28	-	-	-	page 8 line 26,28. It is confusing to mix units. Use KWhr/m2 or EJ/m2 or both but not one in one place and the other in another should especially in the same paragraph. It makes it very difficult to compare results.	to be done
Gerrit Hansen (TSU)	3	8	7	-	9	-	-	-	Please reconcile this sentence with section 3.1.2, which is titled "theoretical potential and nature of resource", and gives a different figure (5.5x10exp6 EJ) without explicitly naming it "theoretical potential". To avoid redundancy, you may consider placing the theoretical potential entirely in one of the two sections, and insert a reference to this into the other.	Section 3.1.2 will be changed to be compatible and reference will be added
Robert Pietzcker (PIK)	3	8	12	8	18	-	-	-	this could be clarified or deleted: why is first 27% of entire land area stated, and then 1% of unused land surface? How much area is 1% of unused land surface? Also, are these lines necessary when a much better and more detailed description follows in lines 19-37?	to be done
Gerrit Hansen (TSU)	3	8	10	-	18	-	-	-	This paragraph is weak and confusing to the reader, it should be restructured: The land estimate reference is not clear, please amend the information provided in the reference list. As the debate on "unused" land has intensified over the course of the last years, especially with regard to biofuel production (compare relevant sections in chapter 9 and 2), a ten year old reference might not be up to date. Also, what criteria renders a land "suitable" for solar energy in this assessment(s) does not become clear. Why you chose to report on this when later more detailed assessments are presented is not clear to the reader.	we will rely on Gloosry to define Technical Potential
China (China Meteorological Administration)	3	8	9	8	9	3.2.1	-	-	(IPCC, 2007), please specify "(i.e. IPCC WG?, 2007)"	to be done
China (China Meteorological Administration)	3	8	26	8	26	3.2.1	-	-	The minimum threshold of 2000kWh/m2/year seems too high. Please provide the source of this value.	As stated in text, this comes from Krewitt et al 2009
China (China Meteorological Administration)	3	8	3	8	6	3.2.1	3,1	-	Please give a figure of annual global solar flux and indicate the average period.	see resonse to comment 258
Dave Renne (National Renewable Energy Laboratory)	3	8	-	-	-	-	3.1	-	Mention should be made as to HOW the ECMWF determines the global solar resource: ground measurements? Satellite data? Other Models? Also, both DLR and NASA have recently put out global solar maps, and these could be mentioned as well.	Maps will be replaced. Source (from satellite data) will be given.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Dave Renne (National Renewable Energy Laboratory)	3	9	-	-	-	-	-	-	Also good to have a clear definition of economic potential, which should also be used consistently throughout the document. However, some of the constraints in ""economic potential"" (e.g. conversion efficiency) are also applied under technical potential.	discussion of economic potential will be excluded
Gerrit Hansen (TSU)	3	9	27	-	29	-	-	-	In the SRREN, the "resource potential" describes the technical potential, not the economic potential. Please rephrase sentence accordingly.	see response to comment 278
Dave Renne (National Renewable Energy Laboratory)	3	9	-	-	-	-	-	-	It is good to see a clear definition of economic potential here, and this should be done consistently throughout the document.	see reponse to commet 278
David Clubb (European Environment Agency)	3	9	18	9	25	-	-	-	Omission: I would have thought that the cost of the generating equipment also impacted on the economic potential	Discussion on economic potential is going to be deleted, as it is not really relevant to this section
United States (U.S. Department of State)	3	9	15	9	16	-	-	-	page 9 line 15,16- delete. This conversion factor is given in the executive summary and is a simple high school physics problem in SI units amounting to how many seconds in an hour. Why not state a joule is a watt-second? or the value of the prefix exactly.	units in Executive summary are wrong; will be changed to EJ
Manfred Treber (Germanwatch e.V.)	3	9	15	-	-	-	-	-	Please use the 'correct' number for the conversion: 1 TWh = 3.6 PJ = 0.0036 EJ (as one hour has 3600 seconds) instead of the 'kryptic' number 1 TWh = 1/278 EJ	Note at bottom of table 3.1 will be deleted
Robert Pietzcker (PIK)	3	9	6	9	15	-	-	-	Replace by ¿optimistic and pessimistic potential estimates vary in their assumptions about cloud cover, usable land area and conversion efficiencies as described in the text above¿	to be done
Robert Pietzcker (PIK)	3	9	1	9	3	-	-	-	Shorten to: ¿In Table 3.1, the columns show pessimistic and optimistic breakdowns of the global technical potentia for different regions¿	to be done
Dave Renne (National Renewable Energy Laboratory)	3	9	-	-	-	-	-	3.1	Athough this may not be possible, it would be good if the potentials conversion to solar conversion could be separated out from the potentials calculations, so that both electrical and thermal conversion could be shown.	The reference for this table did not make any assumtion on breakdowns per technologies.
Greece (National Observatory of Athens)	3	10	27	10	30	-	-	-	"In the case of solar PV, panels mounted on roofs of buildings located in tropical regions easily reach temperatures over 70°C (158°F), thereby reducing power output by up to 20%. This is attributed to the temperature sensitivity of solar PV modules." To be deleted, since it is not relevant in that specific place.	Sentence will be deleted
Greece (National Observatory of Athens)	3	10	20	10	25	-	-	-	"Knowledge of solar energy resource available at different locations strongly influences the assessment of the economics of solar investments. Therefore, it is very important to know the overall global solar energy available, as well as the relative magnitude of its three components: ... ...and daytime temperature..." To be replaced by the following: "Knowledge of solar energy resource available at different locations, together with air temperature, strongly influences the design and the assessment of the economics of solar investments. Therefore, it is very important to know the overall global solar energy available, as well as the air temperature. In some cases the solar radiation components are necessary, too: ... ...and daytime air temperature..."	It is undersood that other data are needed to effect a full appraisal.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Dave Renne (National Renewable Energy Laboratory)	3	10	3	10	3	-	-	-	Add the word ""typical"" before ""1-year"".	to be done
Dave Renne (National Renewable Energy Laboratory)	3	10	3	10	3	-	-	-	At the end of the sentence add ""derived by applying weighting factors to individual weather observations in long-term (up to 30 years) data sets to establish a typical year of hourly data.	to be done
Robert Pietzcker (PIK)	3	10	8	10	10	-	-	-	Delete ¿ information not very important for the rest of chapter	to be done
Robert Pietzcker (PIK)	3	10	31	10	34	-	-	-	Delete ¿ these sentences are mostly commonplace.	Sentence will be deleted
Robert Pietzcker (PIK)	3	10	27	10	30	-	-	-	Delete ¿ these sentences have only little connection to the sentences before and the header	Sentence will be deleted,
Dave Renne (National Renewable Energy Laboratory)	3	10	2	-	-	-	-	-	End sentence at (TMY) data. Delete remainder of sentence.	Comment to Page 12. to be done
Greece (National Observatory of Athens)	3	10	20	10	21	-	-	-	For clarity, test should be rephrased to reflect relative improtance of solar radiation data: first useful in order to assess the energy performance, not just the economics, although it may appear that is related. The second paragraph is actually addressing this issue, so it is repetitious. Emphasize the scarcity of measurements, and the sources for estimated / calculated values from simulation tools What are the data sources that one could use ? Some discussion follows latter on. What about sources on the web ? This coulod be of great practical importance to the reader.	second paragraph will be deleted. Statement: As is clear from Fig. 3.2,and was discussed previously there are many parts of the world with inadequate ground-based solar measuring sites. In this case heavy reliance must be made on satellite data.
Greece (National Observatory of Athens)	3	10	35	11	6	-	-	-	Not necessary. To be deleted.	This is important point out saying from which observing systems radiation data are obtained. It will be shortened
David Clubb (European Environment Agency)	3	10	29	10	30	-	-	-	Omission: This is because electricity output has an non-linear but inverse relationship with PV module temperature	Sentence will be deleted
Dave Renne (National Renewable Energy Laboratory)	3	10	-	-	-	-	-	-	On the other had, the second paragraph is more related to policy, and should be moved to a section where policies are discussed (such as Section 3.4.3)	will be done
United States (U.S. Department of State)	3	10	3	-	-	-	-	-	page 10 line 3 delete "However, due to cloud reflection and clean atmospheric conditions, the solar flux may be higher than the above value in some cases. " The global normal light does include cloud reflections and atmospheric conditions so this statement counts light twice. It is also redundant if the change in page 10 line 2 is made.	this section will be deleted annd or rewritten
United States (U.S. Department of State)	3	10	27	10	30	-	-	-	Page 10, lines 27 ¿ 30: The two sentences on PV temperature increases seems out of place here, and should be deleted.	Sentence will be deleted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	10	2	-	-	-	-	-	page 10-line 2 The following is wrong. ¿In determining the amount of solar energy reaching the Earth¿s surface, one should keep in mind that because of absorption by the atmosphere, its maximum value does not exceed 1000 W/m2 at a perpendicular surface and for clear-sky conditions." We routinely measure above 1000 W/m2 well calibrated instrumentation under these conditions and in fact on some days including today we exceed 1366 W/m2, the solar constant using as the sun was going behind a cloud on a clear day. I am not sure what is meant by perpendicular surface (to the ground or the sun). It is assumed what was meant was "global normal" or the light on a surface normal to the sun. The sentence could be fixed by the following; "In determining the amount of solar energy reaching the Earth¿s surface, one should keep in mind that because of absorption by the atmosphere, its maximum rarely exceeds 1000 W/m2 at sea level."	to be done
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	10	31	34	-	-	-	-	Please add: ""5) Control of operations and failure detection of solar energy systems (e.g. PVSAT and subsequent commercial offers) , e.g Drews et al. (2007) ""	Paragraph will be deleted as proposed above
Gerrit Hansen (TSU)	3	10	1	-	10	-	-	-	please consider moving this para to either 3.1.2 or to the front of 3.2.1, where solar radiation is discussed.	to be done
Cédric Philibert (International Energy Agency)	3	10	-	10	-	-	-	-	Please replace ""at least three times"" with ""roughly four times"". The energy received by 1 square meter perpendicular to solar rays is the energy that would be received by all square meters of a disk with the same diameter than the Earth. On average, the solar energy received per square meter on the Earth's surface is four times less, as the ratio of the surface of a sphere to the surface of a disk of same diamater is 4 to 1. ""Roughly"" accounts for positive or negative variations due to clouds and other atmospheric phenomena.	to be done
Robert Pietzcker (PIK)	3	10	18	10	21	-	-	-	Shorten to something like ¿To calculate and optimize the energy output and economical feasibility of solar energy systems such as buildings and power plants, detailed solar radiation data measured at the site of the solar installation is required¿. Then, lines 31-34 can also be deleted (mostly they are commonplace)	to be done
Ladislaus Rybach (Geowatt AG Zurich (company))	3	10	-	-	12	-	-	-	Sources of Solar Radiation Data include numerical values of incoming, absorbed, and reradiated solar fluxes.	Accepted
Robert Pietzcker (PIK)	3	10	34	10	42	-	-	-	the content is not clear. What is estimated from what? If you have a measurement station, you don't need to estimate. Or do you mean ¿interpolation between measurement stations for locations that don't have measurement stations in between¿? If yes, the results should strongly depend on how close the actual measurement locations are ¿ please say something about this. Also, the reference is VERY OLD ¿ there have to be newer and better reviews of interpolation/simulation!	to consider and improve text
Dave Renne (National Renewable Energy Laboratory)	3	10	-	-	-	-	-	-	The frst paragraph (except for the last sentence) at the top of this page seems out of place, and should be folded into the discussion on page 7.	will be done

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	10	35	42	-	-	-	-	The mentioned methods (using sunshine duration) are outdated. Nowadays satellite based solar irradiance data with a accuracy of +/- 10W/m² or merged data sets (satellite & ground based, even higher accuracy) or renanalysis data (ERA ~ +/- 15W/m² on monthly basis) must be the recommended data source for a reliable planning and monitoring of solar energy systems. These data sets are already used by several institutes and commercial companies for the planning and monitoring of solar energy systems. In order to avoid misleading paths to outdated methods I recommend to skip this paragraph and to write instead. ""In regions with a high density of well maintained ground measuremets of solar radiation sophisticated gridding of ground based measurments can be expected to provide accurate information of solar irradiance."" ..... then proceed with the text given in the next comment	paragraphs will be shortened but not eliminated, as sometimes this data approach is useful.
Greece (National Observatory of Athens)	3	10	29	10	30	-	-	-	The temperature sensitivity of PVs is out of context. Delete or at least relate to some more in depth discussion in the chapter	Sentence will be deleted
Gerrit Hansen (TSU)	3	10	11	-	16	-	-	-	The term "application potential" is not defined. This section deals with technical potential, which is widely independent of policy support. This para or its content should be cut or moved to 3.4.3 or 3.9	paragraph is being deleted as part of the shortening required for the section
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	10	43	11	2	-	-	-	There are several incorrect statements in this paragraph, please rephrase: ""Nowadays, an important source of information is provided by retrieval of solar irradiance from geostationary satellites. Solar irradiance assessment from satellites constitutes a powerful alternative to gridded surface surface data of a well maintained and dense network, e.g. Perez et. al (1998a, 1998b,2001), Drews et al.(2008), Hammer (2006). At a given location the accuracy of the satellite based solar irradiance is inherently lower than that of a well maintained and calibrated ground measurement. However, usually solar energy systems are not set up close to an existing long term measurement site. Hence, for arbitrary locations and times, especially in regions with low density of well maintained and calibrated ground measurements satelite based irradiance is a primarily source of information, whereby ERA reanalysis might get to be a good alternative. Please note that for direct irradiance and spectral resolved irradiance the density of accurate ground measurements is quite low almost everywhere. However, there is a need to validate the satellite radiation products with accurate ground based measurements (e.g BSRN network, http://www.bsrn.awi.de/). Validated satellite based irradiance products provide global irradiance and direct irradiance up to 0.03x0.03 degree resolution with an accuracy of +/- 10 W/m² on a monthly basis. In many regions the accuracy is in the range of the uncertainty of well maintained ground measurements, Mueller et al (2009) and references therein. It is important to note that satellite measures the upward reflected radiances. Therefore, retrieval algortihms are needed. Several retrieval methods exist which are based on basic physical laws and radiative transfer modelling, R. Mueller et al and references therein. Nowadays the main uncertainty is not given by the retrieval methods but on the side of atmospheric input. Concerning solar energy assessment mainly on the side of accurate information of aerosls.""	text will be appropriately modified

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	10	27	-	30	-	-	-	This para appears to be too detailed and out of context. Consider rephrasing or moving it, e.g. to the PV technology section.	Sentence will be deleted
Kristin Seyboth (IPCC WG III TSU)	3	10	11	10	16	-	-	-	This paragraph should reference Chapter 11 (specifically 11.2) in which policy trends are listed and discussed in detail.	paragraph is being deleted as part of the shortening required for the section
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	10	17	12	44	-	-	-	this section ""source of radiation data"" can be significantly shortened. E.g. by a table summarizing the sources and a short explanation text.	Table will be prepared
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	3	10	2	-	-	-	-	-	Where's this value of 1000W/m2 which will not be exceeded coming from? Add reference.	to be done
Finland (Finniah Meteorological Institute)	3	10	3	-	-	3.2.1	-	-	"perpendicular surface"; should this read "horisontal surface" ?	to be done
China (China Meteorological Administration)	3	10	27	10	29	3.2.1	-	-	Please add a reference at the end of this sentence.	Sentence will be deleted,
China (China Meteorological Administration)	3	10	1	10	3	3.2.2	-	-	Please add a reference at the end of this sentence.	to be done
Wolfgang Riecke (Deutscher Wetterdienst)	3	11	11	-	-	-	-	-	addition: " The national meteorological services can be consulted too."	to be done
Wolfgang Riecke (Deutscher Wetterdienst)	3	11	30	-	-	-	-	-	addition: addition3.doc	I am not clear. File not available (TSU to be asked)
Wolfgang Riecke (Deutscher Wetterdienst)	3	11	6	-	-	-	-	-	addition: additon2.doc; (see for further information www.cmsaf.eu)	cmsaf will be included in the list
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	11	11	-	-	-	-	-	Please add the CM-SAF in the list: ""Climate Monitoring Saetllite Application Facility (CM-SAF, www.cmsaf.eu)""	to be done
Gerrit Hansen (TSU)	3	11	7	-	11	-	-	-	Please also include information of physical location of NREL and NASA for consistency.	to be done
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	11	3	6	-	-	-	-	Please delete or rephrase these sentences it is not clear what is meant.	Last sentence will be edited
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	11	12	12	44	-	-	-	Please rearrange the order of the paragraphs and try to get a better red line for the reader, please see the specific comments below for further details.	Most of this section is going to be summarized in a table

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	11	17	-	19	-	-	-	Please, delete the sentences in order to avoid misleading and incorrect statements. E.g. it is not common practise in my country/continent, probably also not in USA. At least I know several USA companies who did it better. Where it is comon practis it might be bad practise as there exist reasonable alternatives in many regions of the world ! The same is true for interpolation in regions with low density of ground stations ! Please replace the sentences by something like: ""Because of the scarcity of measuring sites the pure use of the WRDC data is limited in many regions of the world.""	The sentence will be rewritten. Do not use the word "simple"
China (China Meteorological Administration)	3	11	7	11	11	3.2.2	-	-	Please add names of countries for each organization.	to be done
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	12	17	-	19	-	-	-	It is not clear what is meant with satellite images. The ""Deutscher Wetterdienst"" does not provide satellite image data. The main source for satellite image data in Europe is Eumetsat (European Organisation for the Exploitation of Meteorological Satellites). If satellite images meant satellite image data, please delete DWD and add EUMETSAT (http://www.eumetsat.int/Home/index.htm). Else, add Euemtsat in any case and specify for what region DWD provides images as e.g. jpg.	to be done
Manfred Treber (Germanwatch e.V.)	3	12	24	12	44	-	-	-	Nice to see these facts on Africa. Would it be also possible to give similar information on Asia and on Latin America?	in case similar information is available it will be added
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	12	0	-	-	-	-	-	Please add somewhere: ""The CM-SAF provide long term data sets of global irradiance and direct irradiance for Europe and Africa free of charge. The resolution is up to hourly data in 0.03x0.03 degree resolution. Please the CM-SAF web-page for further details about the available products (www.cmsaf.eu). The Joint Research Centre is currently working on the implementation of the CM-SAF data into the PVGIS.""	Reference to CM-SAF will be added in page 11
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	12	1	-	12	-	-	-	Please put this paragraph at the end of the text in order to improve the red line of the section.	to be done
Greece (National Observatory of Athens)	3	12	1	12	12	-	-	-	Typical Meteorological Years (TMYs) is a term mainly used in the USA, or Test Reference Years (TRYs) a term mainly used in Europe.	to be done
China (China Meteorological Administration)	3	12	45	13	3	3.2.3	-	-	Climate change such as temperature, rainfall, evaporation may influence on resource potential, and anthropogenic emissions may also change atmospheric components (e.g. aerosols, ozone, GHGs, water vapour, pollutants), which in return impact resource potential directly or indirectly. Please incorporate these thoughts into 3.2.3.	Change the sentence "have been evaluated using climate models for the…" to "have been evaluated using climate models, considering anthropogenic forcing, for the…"
China (China Meteorological Administration)	3	12	46	12	49	3.2.3	-	-	Climate warming may influence cloud cover and turbidity, please add rainfall and water vapor.	to be done
Dave Renne (National Renewable Energy Laboratory)	3	12	-	13	-	3.2.3	-	-	This section could include a brief summary of the finding of research on ""global dimming"" and ""global brightening"" based on analysis of historical data sets, since these findings can be applied to the impacts of future climate changes on solar resources.	Add a sentence like "Even though some research on global dimming and global brightening indicate a probable impact on radiation, there is no current evidence available"

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	13	10	13	11	-	-	-	"Passive solar energy technologies absorb solar energy, store and distribute it in a natural manner without using mechanical elements, but use natural ventilation (Hernandez Gonzalvez, 1996)." To be rewritten as follows: "Passive solar energy technologies absorb solar energy, store and distribute it in a natural manner, e.g. natural ventilation, without using mechanical elements (Hernandez Gonzalvez, 1996)."	to be done
Greece (National Observatory of Athens)	3	13	27	-	-	-	-	-	"sensible" thermal storage is not an acceptable term. Use a different term	Change the wording
John Twidell (AMSET Centre)	3	13	21	-	-	-	-	-	.. CONSERVATORIES, SUNSPACES AND greenhouses¿	to be added
John Twidell (AMSET Centre)	3	13	17	-	-	-	-	-	..basic elements¿windows, CONSERVATORIES AND OTHER GLAZED SPACES¿¿ ['windows' alone are insufficent]	to be added
John Twidell (AMSET Centre)	3	13	23	14	9	-	-	-	need to add another section desribing the use of conservatories and glazed spaces. Having conservatories and glazed spaces abuting and linked as closable spaces to solar buildings is an essential aspect of solar design. The use of shades outside	Will be considered if appropriate reference is found
David Clubb (European Environment Agency)	3	13	17	13	22	-	-	-	Omission: This section should also mention lighting if you go on to mention it in the following paragraphs	to be included
Greece (National Observatory of Athens)	3	13	13	-	-	-	-	-	Reference to "solar gain to reduce ¿ cooling energy" is kind of confusing; it probably refers to heat driven engines that use solar heat but it is not related to passive solar systems. If it refers to "night cooling" this is not related to "passive solar systems". In any event, need to clarify	To be rephrased
Greece (National Observatory of Athens)	3	13	45	13	46	-	-	-	starting with the term "motorized" shading (not an appropriate term anyways) in the text on passive solar is not suitable. Prioritize in a more appropriate way: natural, fixed shading devices and then "movable" shading devices that offer more flexibility Coupling solar control devices with automatic controls are often an effective way to enhance their applicability and effectiveness	to be rewritten
Greece (National Observatory of Athens)	3	13	11	-	-	-	-	-	The term natural ventilation has not been defined. Use natural means for air movement	Authors think "natural ventilation" is more acceptable technical term (see Aynsley et al. 1977)
Greece (National Observatory of Athens)	3	13	29	13	30	-	-	-	The way it is currently worded, it sounds like thermal mass/storage is arbitrarily distributed while on the contrary it is essential to link it to the overall architecture / design to properly distribute it in relation to the direct solar gains	will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	13	40	13	44	-	-	-	This component involves two concepts: Airtightness and insulation. Why does the text refer only to opaque elements ? It is even more important to transparent elements. However, care should be emphasized to use other energy efficient means / technologies to secure the appropriate IAQ and avoid shick building syndrome, a common aftermath when arbitrarily sealing the building envelope without having secured the necessary fresh air supply .... What does the term "insulated" refer to ? thermally insulated ? or "air insulated" which is already implied in the term "airtight" ? Refering to "transparent insulation" it probably implies the thermal characteristics of the thermal envelope. In any event, all this is not related to just "passive design" but it is an essential element of a proper "building design" It should refer to ALL GOOD building designs	to be checked
Greece (National Observatory of Athens)	3	13	11	-	-	-	-	-	what are these "mechanical elements" ? Rephrase	to be considered
Australia (0)	3	13	4	37	22	3,3	-	-	This section is very long - suggest shortening by defining only the main technology types and then listing the others as examples, with possibly a short sentence describing them.	text will be shortened
Robert Pietzcker (PIK)	3	13	5	13	8	3.3	-	-	Already mentioned for FOD review: Boldly state the main message in the introductory paragraph (line 5-8): ¿These technologies show different levels of maturity and economic competitiveness. Some solar technologies (e.g. solar hot water, passive solar, solar PV) are being deployed at commercial scale today in some countries, others are growing rapidly. Alternatively, state this in the first paragraph of 3.4	to be considered
Norway (Climate and Pollution Agency)	3	13	-	-	-	3.3.1	-	-	The description of passive solar is a bit outdated, as most passive solar buildings now use some "active" equipment (small fans or pumps) to enhance performance. Also, the usefulness of passive systems is a bit exaggerated, as new building codes (at least in developed countries) result in very little need for space heating - especially in seasons with significant solar gain. The whole chapter can easily be shortened.	This section to be shorten
Greece (National Observatory of Athens)	3	14	13	-	-	-	-	-	"little-used rooms" is not a suitable technical term	to be rewritten
Greece (National Observatory of Athens)	3	14	10	14	16	-	-	-	It is essential to emphasize again the need for proper solar control in summer that may be even necessary on clear winter days in some parts of the world, and intermediate (shoulder) seasons (page 15, line 21, emphasizes this). Need to converge on the same conclusions	Add "and on certain sunny days on winter" at the end of the paragraph
Robert Pietzcker (PIK)	3	14	10	14	16	-	-	-	use of bullet points instead of continuous sentences could improve readability	Authors comfortable with the present form
Greece (National Observatory of Athens)	3	14	27	14	30	-	-	3.2	Table 3.2 is not clear. In Finland and Greece, countries with too different climatic conditions, solar fraction and total solar gains are the same. In UK total solar gains are more than 6 times higher than in Greece. How can it happen? What does it mean? I suggest to be deleted.	to be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	15	24	15	30	-	-	-	Depending on the building design and employed techniques, thermally insulating the building may increase cooling loads, since the building can not "breath" and dissipate heat if there is an appropriate temperature difference to drive heat transfer. At least identify this issue to the reader The use of phase change materials in the building envelop is not described in the text. Needs to be elaborated to substantiate where and how to incorporate phase change materials (PCMs)	Define PCM. If a reference is found, acknowledment of the fact of too much insulation not good will be added
Cédric Philibert (International Energy Agency)	3	15	24	-	-	-	-	-	In hot but dry areas windcatchers typical of Persian architecture have an proven efficacy in keeping buildings cooler during hot daytime. See e.g. http://en.wikipedia.org/wiki/Windcatcher	Add "windcatcher" in the list of passive systems (look for where)
David Clubb (European Environment Agency)	3	15	11	15	12	-	-	-	Irrelevant: User activity has a major impact on energy across the board, but generally it is excluded from this sort of discussion. There are many other instances in this chapter where user activity would significantly reduce the benefit of various building designs or installations, but users are not mentioned in these other cases	Sentence to be deleted
David Clubb (European Environment Agency)	3	15	24	15	26	-	-	-	Is there a disagreement between this reference and the one in the previous paragraph? The figures don't seem to correspond (unless the 'hot' season is only a very small part of the annual cooling load, which seems counter-intuitive)	Two different references in different context
Greece (National Observatory of Athens)	3	15	1	-	-	-	-	-	Need to be careful how the word solarium is being introduced and used. Indeed, the latin word solarium is similar to a sunspace or sunroom (not the same as it is also defined on page 13, line 39), and usually have glass roofs, unlike sunspace or sunrooms. Solariums are designed for warmth, whereas sunspaces or sunrooms are designed for scenic view. Some brief explanation could be helpful to the reader.	to be considered
Greece (National Observatory of Athens)	3	15	44	-	-	-	-	-	Need to define the term "hybrid ventilation"	Put meaning in brackets
Greece (National Observatory of Athens)	3	15	41	15	45	-	-	-	Not necessary, repeats the content of previous paragraph (page 15, line 13 to line 23). To be deleted.	Contradictory with previous comment
Greece (National Observatory of Athens)	3	15	27	15	30	-	-	-	Not necessary. To be deleted.	Contradictory with other comments (see 358). Moreover, the references have no sense if this part is removed
Greece (National Observatory of Athens)	3	15	31	15	40	-	-	-	Not necessary. To be deleted.	Section will be shortened
David Clubb (European Environment Agency)	3	15	18	15	18	-	-	-	Suggested improved reference - S. Burton and Adam Fjearem, Cooling in housing in Southern Europe without chillers, Proceedings of the 25th AIVC Conference Prague, Czech Republic (2004).	Reference to be considered
David Clubb (European Environment Agency)	3	15	41	15	45	-	-	-	Suggested improved reference: Energy efficient office buildings with passive cooling ¿ Results and experiences from a research and demonstration programme, reduction of cooling load to 1/3. Karsten Voss et al, 'Solar Energy, Vol 81 Issue 3' (for example)	Reference to be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Norway (Climate and Pollution Agency)	3	15	9	-	-	-	-	-	The implication that there is more to gain in socalled Passive Houses is misleading. Passive Houses primarily use efficiency measures and therefore have very little need for space heating. Consequently, the potential 40% savings is based on a very low total need and is therefore not very significant. In general, the report does not really clarify the difference between buildings that use passive solar technologies/concepts and buildings that are built according to the Passive Houses Standard. This results in confusion.	to be considered
Australia (0)	3	15	33	15	36	-	-	-	These two dot points say exactly the same thing - needless repetition.	Section will be shortened
Robert Pietzcker (PIK)	3	15	16	15	30	-	-	-	this could be shortened and pulled together; line 16-18 use old referenece to give a much higher number than l 25-28, lines 18-20 are commonplace,	to be done
Greece (National Observatory of Athens)	3	16	4	16	18	-	-	-	Define the term net zero energy buildings (NZEB) and then narrow it down to "solar homes" or houses in general. Make some brief reference to ongoing efforts to reach NZEB in the near future, e.g. EPBD recast in Europe. In Europe, according to the EPBD recast (Directive 2010/31/EC) all new buildings must be nearly zero energy buildings by 31 December 2020, while Member States should set intermediate targets for 2015. New buildings occupied and owned by public authorities have to be nearly zero energy buildings after 31 December 2018. The nearly zero or very low amount of energy required should to a very significant level be covered by RES, including on-site energy production using combined heat and power generation or district heating and cooling, to satisfy most of their demand. Measures should also be taken to stimulate building refurbishments into nearly zero energy buildings. The Zero Energy Buildings Database of the US DOE features profiles of commercial buildings that produce as much energy as they use on an annual basis (http://zeb.buildinggreen.com).	To be considered
Gerrit Hansen (TSU)	3	16	0	-	-	-	-	-	please refrain from naming commercial products of manufacturers. Also, there is a lot of detail here on prefabricated family homes in Canada, whereas other parts of the world and other types of building are not mentioned.	Paragraph to be shortened and rewritten
John Twidell (AMSET Centre)	3	16	-	-	-	-	3.4	-	relace one of these photos with a photo of a buildin g with a sun-space/consrvatory e.g. http://www.solarinnovations.com/gallery.asp?g=13	Figure 3.4 has EcoTerra designes, and those do not have conservatories
Greece (National Observatory of Athens)	3	17	19	-	-	-	-	-	"Active solar heating and cooling technologies use the sun to provide either heating or cooling;" To be replaced by the following: "Active solar heating and cooling technologies use the sun and mechanical elements to provide either heating or cooling;"	to be done
Robert Pietzcker (PIK)	3	17	7	17	10	-	-	-	Delete or move to p.13 l 23-26	to be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	17	26	17	27	-	-	-	Page 17, lines 26 ¿ 27 and Figure 3.5: The statement ¿an evacuated-tube collector is likely to be the most suitable option for producing heat for industry¿ is not justified, and figure 3.5 does not represent the full sweet of technologies, including trough and dish collectors. Unless this can be written to be more technology-neutral, recommend deleting the statement referenced above, "an evacuated-tube collector...." and recommend deleting figure 3.5.	Delete sentence "An evacuated-tube collector (described below…"
Gerrit Hansen (TSU)	3	17	11	-	-	-	-	-	Please rephrase sentence, as it is confusing to the reader (other passive technologies are xy, that are included in the next subsection, which is active technologies¿). If there is disagreement or ambiguity in the categorization of technologies, it might be worthwhile to present this, e.g. in the beginning of chapter 3.3.1 as suggested by the TSU.	Change sentence by "Another solar passive application is natural drying."
Gerrit Hansen (TSU)	3	17	27	-	-	-	-	-	should read "limited to"?	To be done
Greece (National Observatory of Athens)	3	17	1	17	6	-	-	-	The term ¿ultra-low-energy buildings¿ is not defined. It is a fact that there are several terms used to identify energy efficient buildings. However, there is a need to be consistent throughout the chapter or at least state and link the interconnection of these terms. In the event that they may imply something specific, they should be clearly defined (e.g. NZEBs). Some suggested text: Low energy buildings are known under different names. A survey carried out by the Concerted Action supporting EPBD identified 17 different terms in use to describe such buildings used across Europe, including: low energy house, high-performance house, passive house (passivhaus), zero carbon house, zero energy house, energy savings house, energy positive house, 3-litre house etc. Concepts that take into account more parameters than energy demand again use special terms such as eco-building or green building.	To be considered
Greece (National Observatory of Athens)	3	17	7	17	10	-	-	-	This text is out of context. Discussion on the role of windows and their properties is scattered on p. 14, p. 15, Need to reorganize text. Some text is linked with other concepts elaborated in the chapter e.g. "Another possibility .." is related to solar control	see previous comment
Greece (National Observatory of Athens)	3	17	28	17	33	-	3.5	-	Figure 3.5 needs more discussion. Moreover, in the specific place adds confusion.	Add at the end to paragraph (line 29) "and typical applications for each type of collector at the top". In Caption of Fig 3.5 add "Absorbers refer to unglazed collectors"

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	18	1	18	2	-	-	-	"A solar collector can incorporate many different materials and be manufactured using a variety of techniques. Its design is influenced by the system in which it will operate and by the region." To be rewritten as: "A solar collector can incorporate many different components and materials and be manufactured using a variety of techniques. Its design is influenced by the system in which it will operate and by the climatic conditions of the installation location."	to be done
Greece (National Observatory of Athens)	3	18	29	18	35	-	-	-	"Active solar water heaters rely on electric pumps and controllers to circulate the carrier fluid through the collectors (Figure 7b). Three types of active solar water-heating systems are available. Direct circulation systems use pumps to circulate pressurized potable water directly through the collectors. These systems are appropriate in areas that do not freeze for long periods and do not have hard or acidic water. Antifreeze indirect-circulation systems pump heat-transfer fluid, which is usually a glycol-water mixture, through collectors. Heat exchangers transfer the heat from the fluid to the water for use." To be replaced by the following: "Active solar water heaters rely on electric pumps and controllers to circulate the carrier fluid through the collectors. Three types of active solar water-heating systems are available. Direct circulation systems use pumps to circulate pressurized potable water directly through the collectors. These systems are appropriate in areas that do not freeze for long periods and do not have hard or acidic water. Antifreeze indirect-circulation systems pump heat-transfer fluid, which is usually a glycol-water mixture, through collectors. Heat exchangers transfer the heat from the fluid to the water for use (Figure 3.7b)."	to be considered
Greece (National Observatory of Athens)	3	18	12	-	-	-	-	-	"Evacuated-tube collectors are usually made of parallel rows of transparent glass tubes¿" To be replaced by the following: "Evacuated-tube collectors are usually made of parallel rows of transparent glass tubes, in which the absorbers are enclosed,..."	to be done
Greece (National Observatory of Athens)	3	18	6	18	7	-	-	-	"For low-temperature applications, such as the heating of swimming pools, only a single plate is used as an absorber, with the fluid trickling over its surface." a) the meaning is not clear. b) In swimming pool heating, collectors usually used are unglazed flat plate collectors.	paragraph to be rewritten (delete "with the fluid trickling over its surface")

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	18	19	18	28	-	-	-	"Passive solar water heaters can be either integral collector-storage systems or thermosyphon systems (Figure 3.7). Integral collector-storage systems, also known as ICS or "batch" systems, are made of one or more black tanks or tubes in an insulated glazed box. Cold water first passes through the solar collector, which preheats the water, and then continues to the conventional backup water heater. In climates where freezing temperatures are unlikely, many evacuated-tube collectors include an integrated storage tank at the top of the collector. This design has many cost and userfriendly advantages compared to a system that uses a separate standalone heat-exchanger tank. It is also appropriate in households with significant daytime and evening hot-water needs; but they do not work well in households with predominantly morning draws because they lose most of the collected energy overnight." To be replaced by the following: "Passive solar water heaters can be either integral collector-storage systems or thermosyphon systems. Integral collector-storage systems, also known as ICS or "batch" systems store the heated water inside the collector itself. They are made of one or more black tanks or tubes in an insulated glazed box. Cold water first passes through the solar collector, which preheats the water, and then continues to the conventional backup water heater. Thermosiphon systems have a separate storage tank directly above the collector. In direct (open-loop) thermosiphon systems, the heated water rises from the collector to the tank and cool water from the tank sinks back into the collector. In indirect (closed-loop) thermosiphon systems (Figure 3.7a), heated fluid (usually a glycol-water mixture) rises from the collector to an outer tank that surrounds the water storage tank and acts as a heat exchanger (double-wall heat exchangers) for separation from water. In climates where freezing temperatures are unlikely, many evacuated-tube collectors include an integrated storage tank at the top of the collector. This design has many cost and userfriendly advantages compared to a system that uses a separate standalone heat-exchanger tank. It is also appropriate in households with significant daytime and evening hot-water needs; but they do not work well in households with predominantly morning draws because they lose most of the collected energy overnight.	to be done
United States (U.S. Department of State)	3	18	7	-	-	-	-	-	In the U.S., pool heating is typically done with water flowing through plastic tubes in typical swimming pool collectors and does not trickle over a surface.	paragraph to be rewritten (delete "with the fluid trickling over its surface")
Herbert Wade (none)	3	18	-	18	-	-	-	-	No mention of the ""heat pipe"" type of vacuum tube collector system used in millions of Chinese installations. Good efficiency, relatively low cost and works well in environments with some temperature dips below freezing and is very low maintenance. This is different from the vacuum type collectors that have the water flowing through the tubes which makes them subject to freezing and much more difficult to maintain.	to be included
United States (U.S. Department of State)	3	18	15	-	-	-	-	-	Page 18, line 15: Achieving > 150 C in an evacuated-tube collector will be very difficult. A more reasonable number is > 120 C. Please provide reference for what is reasonable here.	to be considered. Reference to be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	18	26	18	28	-	-	-	Passive SWHs "lose most of the collected energy overnight". This seems unlikely. My own passive SWH tank is reasonably well insulated and provides quite hot water for 3+ days of cloudy or rainy weather.	Change sentence to "…because sometimes they can lose part of the collected energy overnight"
Greece (National Observatory of Athens)	3	18	19	-	-	-	-	-	Reference to "storage" is out of context since there has been no discussion on the need for hot water storage. Need to introduce the concept and the need for hot water storage in previous discussion.	Reference to storage is in page 17, line 22-23
Greece (National Observatory of Athens)	3	18	5	18	9	-	-	-	The description is missing an essential component, namely the glass cover over the absorber. Commonly, the main charactristic of low-temperature collectors for solar heating of swimming pools is that they have no cover and no absorber plate, using instead plastic tubes to circulate the heat transfer medium. Provide temperature ranges for flat plate collectors, as it is done in the paragraph on evacuated tube. There is some relevant data on p. 22, line 20-22.	to be considered
Greece (National Observatory of Athens)	3	18	24	18	25	-	-	-	The design of an integrated storage tank is also true for flat plate collectors, not just evacuated tube	to be considered
Greece (National Observatory of Athens)	3	18	25	-	-	-	-	-	There are also draw backs in terms of aesthetics that introduce building integration problems. However, they are practical for single end users.	Acknoledged
Greece (National Observatory of Athens)	3	19	5	19	8	-	-	-	"Solar cooling can be broadly categorized into solar electric refrigeration, solar thermal refrigeration, and solar thermal air-conditioning. In the first category, the solar electric compression refrigeration uses photovoltaic panels to power a conventional refrigeration machine (Fong et al., 2010). In the second category, the refrigeration effect can be produced through solar thermal gain; solar mechanical compression refrigeration, solar absorption refrigeration, and solar adsorption refrigeration are the three common options. In the third category, the conditioned air..." Solar electric refrigeration is a PV application, not a solar cooling one. The paragraph should be rewritten as: "Solar cooling can be broadly categorized into solar thermal refrigeration, and solar thermal air-conditioning. In the first category, the refrigeration effect can be produced through solar thermal gain; solar mechanical compression refrigeration, solar absorption refrigeration, and solar adsorption refrigeration are the three common options. In the second category, the conditioned air..."	to be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	19	13	19	15	-	-	-	A very good reference that should be included in the discussion on solar cooling is (there is a reference on p. 40 but need to update with 2nd edition) Henning, H.-M. (Ed.). Solar Assisted Air-Conditioning in Buildings ¿ A Handbook for Planners, 2nd edition, Springer-Verlag, (ISBN 978-3-211-73095-9), Vienna, p. 150, (2007). Identify also relevant IEA Tasks that provide a wealth of practical and technical information IEA 2005. Task 25 on Solar assisted air-conditioning of buildings, Solar Heating & Cooling (SHC) program, International Energy Agency. www.iea-shc-task25.org IEA 2009. Task 38 on Solar air-conditioning and refrigeration, Solar Heating & Cooling (SHC) program, International Energy Agency. www.iea-shc.org/task38	To be included
Robert Pietzcker (PIK)	3	19	14	19	15	-	-	-	Already mentioned for FOD review: Why do you need industrial deployment of small-power absorption pumps in ¿any building¿? If the hurdle right now is costs, say so more directly.	Change "in any building" by "in buildings"
Robert Pietzcker (PIK)	3	19	5	19	15	-	-	-	I don't understand the distinctin between the headers ¿Solar cooling¿ and ¿Active thermal solar cooling¿. Is the latter one of the three categories named in lines 5-6? If yes, why is a different name used? If no, how does active thermal solar cooling fit in with the above-mentioned principles? Or is ¿solar thermal refrigeration¿ the same as ¿open cooling cycle¿? If yes, stick to one name to reduce the chance for misunderstandings in people new to this field.	to be considered
Greece (National Observatory of Athens)	3	19	32	-	-	-	-	-	Need to define COP The ratio of the cooling capacity of the system and the heating power delivered to the system by the solar collectors - directly or indirectly through a heat storage Identify the main components of solar cooling systems and possibly include a schematic layout. This will give the opportunity to also identify the need for heat storage and/or cold storage, backup systems etc. The reader should understand the advantages but also the limitations of this technology. Could also provide some general information on average solar collector area required per installed kWc for the different technologies, initial cost etc	Too detailed, info can be found in the references. Include that COP is efficiency in refrigeration systems

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	19	16	20	6	-	-	-	Rearrange text; given that closed-cycle systems are more common, they should be listed first in terms of importance. Main characterization for the main heat driven cooling technologies should be uniform, e.g. Closed-cycle systems and open-cycle systems. Also identify the main working pairs, the differences with the absorbent, etc. Add some references with example installations / plants Solair 2009. Increasing the market implementation of solar air-conditioning systems for small and medium applications in residential and commercial buildings, Intelligent Energy Europe programme, European Commission, Brussels. www.solair-project.eu Solco 2009. Removal of non-technological barriers to solar cooling technology across southern European islands, Intelligent Energy Europe programme, European Commission, Brussels. www.solcoproject.net	to be considered
Greece (National Observatory of Athens)	3	19	13	19	15	-	-	-	The discussion on solar cooling is not well balanced. When the fundamental PV phenomena and even production methods are discussed in detail (section 3.3.3) this ¿new¿ technology should not be handled in such a horizontal manner. It is essential to provide some more information and relevant data. On the other hand, section 3.3.3 is a good example of how relevant and practical data for existing, emerging and then novel technologies, an then an overview of ¿PV System¿, ¿Applications¿ with some pictures etc, can be incorporated in the text to substantiate the current technical status and development, provide some useful guidance and typical values on performance, etc, and the necessary references to find more information on specific issues. Similar treatment should also be included in the text on solar cooling. Try to emphasize the fact that solar cooling is an emerging market with a huge growth potential.	See comment 391
Robert Pietzcker (PIK)	3	19	16	19	26	-	-	-	what are typical COP values for open cycle systems?	To be incuded
Janne Halme (Aalto University School of Science and Technology)	3	19	-	-	-	-	3.7	-	Replace "passive (a)" with "passive (thermosyphon) (a)"	to be done
Robert Pietzcker (PIK)	3	20	7	20	29	-	-	-	Is ¿Hadorn, 2005¿ an exhaustive source for all the mentioned storage systems? I would expect that in such a field in which lots of research has happened over the last 5 years, newer references detailing the different methods and the newest results should be available.	More references will be added
United States (U.S. Department of State)	3	20	25	-	-	-	-	-	Most solar experts classify the solar resource into direct and diffuse. Ground reflection is typically included in the diffuse component of this. Please modify paragraph accordingly.	to be done

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	21	14	21	19	-	-	-	Combining solar heating and cooling is usually referred to as a solar combi-plus (or solar combi+) system that can increase the total solar fraction defined as: SFtotal = 1 ¿(Eaux/Edemand) where Eaux is the energy supplied from the auxiliary heater and Edemand is the sum of the energy needed to meet the heating and cooling building loads and the energy to produce the sanitary hot water. Include some references, e.g. Solarcombi+ 2010. Identification of most promising markets and promotion of standardised system configurations for the market entry of small scale combined solar heating & cooling applications, Intelligent Energy Europe programme, European Commission, Brussels. www.solarcombiplus.eu	It will be changed if a appropriate reference is found
Robert Pietzcker (PIK)	3	21	45	22	2	-	-	-	Delete ¿ these sentences are mostly commonplace or have been stated before.	to be deleted
Australia (0)	3	21	33	21	36	-	-	-	Either high-efficiency flat plates, evacuated tubes or parabolic troughs (A Solar Cities project involves solar thermal air conditioning with parabolic troughs as the solar thermal collection technology)	to be added
United States (U.S. Department of State)	3	21	14	21	19	-	-	-	Material in paragraph beginning line 14 is repetitive. The same basic material is found elsewhere in the report.	It will be reviewed and if necessary deleted
Robert Pietzcker (PIK)	3	21	30	21	44	-	-	-	Name this section ¿solar cooling applications¿	To be considered
Greece (National Observatory of Athens)	3	21	14	21	19	-	-	-	Should introduce the term/concept of solar combi-plus systems. The main ¿drawback¿ of solar combi systems has been the fact that during summer the available high solar radiation and the heat produced from the solar collectors could not be fully utilized, thus making the system financially less attractive, limiting its use to the low SHW summer demand. In addition, there are some technical problems related to stagnation (i.e. the condition when the medium in the solar collector loop vaporizes as a result of high solar radiation availability and low thermal demand). Since high building cooling loads generally coincide with high solar radiation, the readily available solar heat from the existing solar collectors can be exploited by a heat driven cooling machine, thus extending the use of the solar field throughout the year; SHW and space heating in winter and SHW and cooling in summer.	To be considered
Greece (National Observatory of Athens)	3	21	33	21	44	-	-	-	solar cooling was first elaborated on p. 19, line 5, providing details on closed- and open-cycle systems. It is rather awkward to come back again on this topic. Need to delete from here and combine / merge any new text with previous discussion. Need to provide some refs where the reader could have access to examples of real operating plants, technical guidelines etc The main obstacles for wide scale applications, beside the currently high first cost, are the lack of practical experience with the design, control, installation and maintenance of these systems.	This section will be rewritten and shortened
Greece (National Observatory of Athens)	3	21	14	-	-	-	-	-	The term "solar heater" is not consistent with the terminology used in this chapter.	This section will be rewritten and shortened

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	21	14	21	47	-	-	-	This section is a random assortment of information and commonplaces without clear ordering ¿ it strongly needs restructuring!	To be done
Robert Pietzcker (PIK)	3	21	4	21	13	-	-	-	This section seems misplaced ¿ it would better fit into chapter 3.8 as it discusses future developments and improvements of active solar. If it is kept here, it needs an introductory sentence ¿ all the paragraphs before dealt with individual technologies, while in this paragraph you talk about active solar in general.	the paragraph will be put in section 3.8
Robert Pietzcker (PIK)	3	21	14	21	29	-	-	-	This section seems to talk mostly about ¿Heat for Industry¿. It could be improved by changing the header accordingly, moving lines 1-24 from page 64 here (all about SHIP) and deleting the commonplaces, e.g., l. 16-19 on page 21.	To be done
Greece (National Observatory of Athens)	3	22	16	-	-	-	-	-	"...but depending on the environmental conditions their efficiency can be..." To be replaced by the following: "...but their efficiency is..."	to be considered
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	22	40	-	-	-	-	-	"Solar cooking is one of the most widely used solar applications in developing countries" Source? Can you document this? I have seen many parabolic direct & box-type solar cookers in tropical less-developed countries but have seldom seen them actually used in housholds. I doubt that your statement is true.	to be considered
Robert Pietzcker (PIK)	3	22	40	22	46	-	-	-	Give a reference about the scale of use of solar cookers	References will be added
United States (U.S. Department of State)	3	22	0	-	-	-	-	-	It is not clear that the various other applications can make a significant contribution to energy/climate, although they can have local impact. Should condense the material on page 22 (on Other Solar Applications) to at most 1/3 of a page.	To be shortened
Gerrit Hansen (TSU)	3	22	3	-	46	-	-	-	sections lacks references	References will be added
Robert Pietzcker (PIK)	3	22	18	22	22	-	-	-	Sources needed.	References will be added
Cédric Philibert (International Energy Agency)	3	22	43	22	44	-	-	-	This statement is incorrect, for most solar cookers do NOT concentrate the sunlight. Please correct! Amongst solar cooking devices that do concentrate sunlight, the sheffler dishes used in India for large collective dwellings are worth mentioning. They produce steam.	to be corrected
Robert Pietzcker (PIK)	3	22	15	22	17	-	-	-	What is the connection between ¿used in developping countries¿ and ¿low efficiency¿? Is the message really ¿solar stills should not be used as their efficiency is low¿? If yes, please cite a source.	to be considered
John Twidell (AMSET Centre)	3	23	12	-	-	-	-	-	replace 'stacking' by 'forming' [it is important not to give the impression that separate sheets are piled on top of each other]	to be rewritten
Wolfgang Riecke (Deutscher Wetterdienst)	3	23	-	-	-	-	-	-	compare: "5.5 x 10^6 EJ/year" with section 3.2.1, page 8, line 9, "3.2 x 10^6 EJ/year"	Comment missplaced. The figures will be corrected
Greece (National Observatory of Athens)	3	23	34	24	2	-	-	-	delete text - not of real relevance to this text	deleted
Gerrit Hansen (TSU)	3	23	4	-	6	-	-	-	Please consider to change the title (photovoltaic technologies) of this paragraph, either to "photovoltaic effect" or "photovoltaic cell" or "electricity generation in PV cells" or something similar, as this is what it describes. The first two sentences of the para could be merged into one: PV cells take advantage of the photovoltaic effect to generate electricity directly from solar radiation.	to be changed to "Electricity generation in photovoltaic cells"

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	23	16	-	-	-	-	-	Since there is a note on the impurities (dopants), be a bit more specific and provide some common examples of these additives and emphasize the small quantities necessary.	to be rewritten
Greece (National Observatory of Athens)	3	23	13	-	-	-	-	-	the positive and negative charged layers are not defined to understand the terms "p-type" and "n-type"	to be rewritten
Greece (National Observatory of Athens)	3	24	22	24	23	-	-	-	"...range from 12% to 20%." To be replaced with: "...range from 12% to 14% for polycrystalline silicon and from 14% to 16% for monocrystalline silicon."	to be rewritten
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	24	18	-	-	-	-	-	Best performers are above 18% or even 19% (Sanyo/Panasonic and SunPower)	to be changed
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	24	18	-	-	-	-	-	Best performers are above 18% or even 19% (Sanyo/Panasonic and SunPower)	to be changed
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	24	25	-	-	-	-	-	Comma missing after "-germanium"	to be done
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	24	25	-	-	-	-	-	Comma missing after "-germanium"	to be done
Gerrit Hansen (TSU)	3	24	3	-	-	-	-	-	It might be helpful to the reader to provide a definition and maybe a short discussion of the term "conversion efficiency" in the context of PV at this point	Add 1 sentence defining "convesrion efficiency" on section 3.3.3 page 23
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	24	22	24	23	-	-	-	Numbers seem inconsistent with lines before	to be rewritten
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	24	22	24	23	-	-	-	Numbers seem inconsistent with lines before	to be rewritten
United States (U.S. Department of State)	3	24	16	24	23	-	-	-	page 24 line 16-23. A lot of numbers without a reference. A citation is needed.	to be added
Atul Raturi (The University of the South Pacific)	3	24	28	-	-	-	-	-	Reference needed	to be added
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	24	29	24	40	-	-	-	Section countains more physical details than that of wafer silicon, which gives a somewhat unbalanced picture. Readers may not know about indirect and direct gaps. Probably better to just distinguish between weak and strong absorbers (as an example).	to be rewritten
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	24	29	24	40	-	-	-	Section countains more physical details than that of wafer silicon, which gives a somewhat unbalanced picture. Readers may not know about indirect and direct gaps. Probably better to just distinguish between weak and strong absorbers (as an example).	to be rewritten

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	24	9	24	15	-	-	-	Wording is very confusing, especially since the preceding paragraph end with Schockley & Queisser and Swanson's upper limit of 29%. Variations compared to what? References need to be updated. Best IBC cell is now 24.2% (Peter Cousins, SunPower, IEEE PVSC35, 2010)	to be rewritten
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	24	9	24	15	-	-	-	Wording is very confusing, especially since the preceding paragraph end with Schockley & Queisser and Swanson's upper limit of 29%. Variations compared to what? References need to be updated. Best IBC cell is now 24.2% (Peter Cousins, SunPower, IEEE PVSC35, 2010)	to be rewritten
Greece (National Observatory of Athens)	3	25	11	25	16	-	-	-	"The currently known toxic health effects of CdTe described on a typical material safety data sheet are limited to dust inhalation and ingestion. Recent investigations on CdTe by Zayed et al. on the acute oral and inhalation toxicity of CdTe in rats show that the toxicity potential is much lower than that of cadmium (Zayed and Philippe, 2009). But this potential hazard is mitigated by using a glass-sandwiched module design and by recycling the entire module and any industrial waste (Sinha et al., 2008)." Not necessary. To be deleted.	It was requested in a comment from FOD
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	25	6	25	7	-	-	-	$0.83/W in 2009? I suppose it is clear in context but perhaps explain that this is for the module, not the system.	add "module cost". The text will be moved to 3.8 costs
Atul Raturi (The University of the South Pacific)	3	25	38	-	-	-	-	-	..the solution is to use ¿. (insert to	to be revised
United States (U.S. Department of State)	3	25	31	25	32	-	-	-	Comment refers to Line 31. Insert language "Double and triple junction units have been used in space applications for about 20 years and are currently being commercialized for terrestrial applications."	To be revised
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	25	5	-	-	-	-	-	I consider the accuracy of 17.6% (i.e. not 18%, for instance) totally unphysical. Also: does it refer to cells or modules?	to be rewritten
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	25	5	-	-	-	-	-	I consider the accuracy of 17.6% (i.e. not 18%, for instance) totally unphysical. Also: does it refer to cells or modules?	to be rewritten
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	25	19	25	29	-	-	-	I miss a (short) discussion on earth-abundant alternatives for In: ZnSn ("CZTS" technologies)	To be included in section 3.7.3
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	25	19	25	29	-	-	-	I miss a (short) discussion on earth-abundant alternatives for In: ZnSn ("CZTS" technologies)	To be included in section 3.7.3
United States (U.S. Department of State)	3	25	0	-	-	-	-	-	More on the availability of materials is warranted. It is understood that materials are often co-produced or are byproducts of mining other materials. That may have an impact on price or availability.	To be addressed in the Cost section 3.8.3 (Include a reference that if the industry demand grows the price will go up, as happened with the Si market. If a reference can be found)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Kristie Ebi (Department of Global Ecology)	3	25	8	-	18	-	-	-	p 425, lines 8-18. There is extensive literature on the toxicity of cadmium and tellurium. The authors could cite one of the major reviews.	Add a reference to a review
Atul Raturi (The University of the South Pacific)	3	25	7	-	-	-	-	-	Reference needed	add reference. Text to be moved to 3.8 cost
Gerrit Hansen (TSU)	3	25	8	-	18	-	-	-	some of this information might be expected in other subsections (e.g. 3.6.1 environmental impacts, and 3.4.2 supply chain). If you prefer to keep it here, please consider to insert a reference in the according sections	Add reference in the mentioned sections
United States (U.S. Department of State)	3	25	36	-	-	-	-	-	Strike the phrase in parenthesis "(may be 30% from Amonix)."	deleted
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	3	25	21	25	26	-	-	-	The transportation sector should also look at non motorized vehicles for developing and least developing countries rather than just looking at biofuels, battery/hybrid transport, etc	out of scope
Greece (National Observatory of Athens)	3	25	7	-	-	-	-	-	this is the only actual cost related data given in this section; however, this should be moved from here to the corresponding section with cost related specific information	to be moved
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	26	46	26	47	-	-	-	"increased to around 10 years"? Unclear: increased from what to 10 years?	to be rewritten
Greece (National Observatory of Athens)	3	26	36	26	37	-	-	-	"PV Systems: A photovoltaic system is composed of the PV module, as well as the balance of systems (BOS), which includes storage, system utilization, and the energy network." A better description is required. It could be the following one. "PV Systems: A photovoltaic system is composed of three subsystems, a) the PV devices (cells, modules, arrays, etc.) that convert sunlight into direct-current (dc) electricity, b) the load, or the application for which the PV electricity is intended, c) the "balance of system" (BOS), which enables the PV electricity to be properly applied to the load. The BOS typically consists of structures for mounting the PV arrays or modules and the power-conditioning equipment that adjusts and converts the dc electricity to the proper form and magnitude required by an alternating-current (ac) load. If required, the BOS also includes storage devices, such as batteries, for storing PV-generated electricity to be used during cloudy days or at night."	to be revised
Atul Raturi (The University of the South Pacific)	3	26	38	-	-	-	-	-	¿reliable, cost effective , attractive (???)- not clear	to be revised
United States (U.S. Department of State)	3	26	18	-	-	-	-	-	Change word "predictions" to "modeling" and add "is possible" after "higher".	to be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	26	36	26	41	-	-	-	Discussion of storage is too vague. Here and elsewhere, a vague need for storage is asserted, but the situation is far more complex. Yes, PV output varies and does not always match the load. But, the load varies, even though the output of some plants (nuclear) does not but no one claims that nuclear is similarly unsuitable. Sophisticated inverters can manage loads and storage to increase value for DG. For large systems, a combination of some storage may be needed to mitigate ramp rates in combination with improved short-term (minutes) and day-ahead forecasting. See for example http://www.sandia.gov/SAI/files/SEGIS%20Concept%20Paper-071025.pdf .	to be rewritten
Atul Raturi (The University of the South Pacific)	3	26	5	-	-	-	-	-	Newer reference required here	to be revised
Gerrit Hansen (TSU)	3	26	36	29	5	-	-	-	parts of this section is literally repeated in 3.7.3. Please reconcile the two sections. You might also consider to move some of the information on PV systems and grid-connection to a subsection of 3.5.	to be considered
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	26	9	-	-	-	-	-	Polymers are NOT stacked, they are used in a 3D bulk nanostructure and this is an essential ingredient for their successful use so far. More general: lines 9-16 and 17-27 seem to be disconnected. A better overall text is needed.	to be rewritten
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	26	9	-	-	-	-	-	Polymers are NOT stacked, they are used in a 3D bulk nanostructure and this is an essential ingredient for their successful use so far. More general: lines 9-16 and 17-27 seem to be disconnected. A better overall text is needed.	to be rewritten
Janne Halme (Aalto University School of Science and Technology)	3	26	5	-	-	-	-	-	Replace "10.4% (Chiba et al., 2005)" with "11.4% (Green et al., 2010)"	to be revised
Janne Halme (Aalto University School of Science and Technology)	3	26	5	26	8	-	-	-	Replace "Despite¿ these PV cells" with: "Since its discovery in 1991 (O'Regan and Gratzel, 1991) long term stability of DSSCs has improved considereably. Well sealed cells built on glass substrates pass now routinely several accelerated aging tests used for commercial PV modules. However, the combination of high temperatures (above 80 degree-Celsius) and light intensity (1000 W/m^2) remaining still a challenge to be tackled with chemical engineeging and imprived encapsulation of the cells. (Reference: Asghar, M.I., Miettunen, K., Halme, J., Vahermaa, P., Toivola, M., Aitola, K., and Lund, P., Review of stability for advanced dye solar cells, Energy & Environmental Science 3, pp. 418-426 (2010)." (The original statement was too pessimistic. An end use life time of 25 years has already been etimated by Dyesol, but in stricly taken non-peer-reviewd conference contributions).	Abbreviated version of paragraph. Reference to be included
United States (U.S. Department of State)	3	26	42	-	-	-	-	-	The assertion that longer life times are needed for BOS is too simplistic. For example, cheap, easily replaceable inverters with a 10 year life may have lower Levelized cost of energy than a 30 year life inverter that costs more. The key metric is cost of energy, not lifetime.	to be rewritten
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	26	17	26	18	-	-	-	These statement are outdated (very old refs)	to be rewritten

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	26	17	26	18	-	-	-	These statement are outdated (very old refs)	to be rewritten
Richard Mueller (Climate Monitoring Satellite Application Facility, DWD)	3	26	17	27	-	-	-	-	To my knowledge the relative high efficiency of the organic cells is still only given at low irradiances (mWatts). For realistic irradiances (e.g. 50-300 Watts/m²) the efficiency drops down dramatically (below 1%). It should be clarified that the numbers might be not realistic for solar energy applications. It would be better to give only numbers prooven / tested in practise. Also for other materiels some of the given numbers seems to high in these terms.	Rewrite paragraph in the present form (avoid future tense). Section will be shortened. Efficiency improvements will be moved to section 3.7
Finland (Finniah Meteorological Institute)	3	26	4	26	6	3.3.3	-	-	author name in two references ; Gratzel, should read Grätzel	to be revised
China (China Meteorological Administration)	3	26	36	26	37	3.3.3	-	-	It is suggested that "system utilization" be changed into "inverter, control system".	to be revised
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	27	23	27	24	-	-	-	" 5.5% of the cumulative installed PV capacity of the IEA"? Can you add the (higher) percentage in non IEA developing countries?	No avaiable peer reviewed literature
Greece (National Observatory of Athens)	3	27	32	-	-	-	-	-	"¿ with houses not separated by too great a distance." The meaning is not clear.	to be revised
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	27	32	-	-	-	-	-	"not separated by too great a distance" is quite vague: 10 metres or 200 metres?	to be revised
United States (U.S. Department of State)	3	27	1	-	-	-	-	-	The idea that storage should be integrated with the module is needed is unproven. It would be nice, but would also require that storage have the same life as the module. Storage is quite often separate from the energy source and it may always be that way for PV. This point is also repeated later in the chapter.	to be considered
United States (U.S. Department of State)	3	27	10	27	15	-	-	-	This section is vague. (See comments on page 26). Also, on line 13 inverters CAN improve the quality of the grid, but MUST is an overstatement. Ignored, however, is that today¿s inverters are designed without ride-through capability per IEEE 1547. As penetration grows, it will be necessary to actively control when inverters disconnect for safety vs. when they stay on-line to support the grid during voltage or frequency excursions.	to be revised
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	27	-	-	-	-	3.9	-	2009 data is now available; please update	to be revised
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	27	-	-	-	-	3.9	-	2009 data is now available; please update	to be revised
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	28	14	-	-	-	-	-	"average annual performance ratio" explanation is not clear	capacity factor ?

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	28	22	-	-	-	-	-	"motorway sound barriers" What is that? Seems like an odd example.	to be revised
Greece (National Observatory of Athens)	3	28	11	28	17	-	-	-	"The annual output yield ranges from 300 to 2000 kWh/kW (Clavadetscher and Nordmann, 2007; Gaiddon and Jedliczka, 2007; Kurokawa et al., 2007; PVGIS Photovoltaic Geographic Information System, 2008) for several installation conditions in the world. The average annual performance ratio¿the ratio between average AC system efficiency and standard DC module efficiency¿ranges from 0.7 to 0.8 (Clavadetscher and Nordmann, 2007) and gradually increases further to about 0.9 for specific technologies and applications." Not necessary. To be deleted.	to be deleted
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	28	25	28	29	-	-	-	It is important to note that "multiple use of physical space" is the key here. It is crucial for the success of PV in densely populated areas and countries. This obviously includes all kinds of buildings, but also "infrastructural objects" (sound barriers, rail- and highways, dikes, etc. etc.) It requires the development of dedicated PV-elements for integration in a variety of situations, for easy installation, high reliability, good aesthetics, etc.. And for low cost, of course.	to be considered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	28	25	28	29	-	-	-	It is important to note that "multiple use of physical space" is the key here. It is crucial for the success of PV in densely populated areas and countries. This obviously includes all kinds of buildings, but also "infrastructural objects" (sound barriers, rail- and highways, dikes, etc. etc.) It requires the development of dedicated PV-elements for integration in a variety of situations, for easy installation, high reliability, good aesthetics, etc.. And for low cost, of course.	to be considered
Greece (National Observatory of Athens)	3	28	45	29	5	-	-	-	It would greatly enhance the presentation to add some pictures to illustrate different BIPV or other examples from real buildings etc.	difficult for shorter section
United States (U.S. Department of State)	3	28	11	-	-	-	-	-	Modify to "Greater than 2000 kWh/kW is possible for flat-plate systems with tracking." Also, tracking is never mentioned as part of BOS, etc. in the report. It should be addressed.	to be revised
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	28	30	28	34	-	-	-	Perhaps explain that "islanding" is generation from (for example) a PV system to the grid even when power from electric utility has stopped	to be revised
Gerrit Hansen (TSU)	3	28	25	-	29	-	-	-	please add a reference to 3.5.1	Reference to be added

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	28	10	28	18	-	-	-	This is a very important section in relation to the IPCC (actually much more important than the sections on individual technologies). Yet it is quite superficial, does not explain the basic features sufficiently clear and gives some misleading data. I think we need a short discussion on typical insolation levels (e.g. 800 - 2400 kWh/m2 per year for almost all places on earth and for most useful installation sites, incl. effects of orientation and inclination). Combine this with the performance ratio of 0.7 - 0.8 (moving to 0.9) and you get (rounded figures): 600 - 1900 kWhac/Wp per year (up to 2100). Compare this with actual numbers down to 300 and explain why they are so low (namely, that something was wrong in the system or the location). Then the reader can better appreciate the values and ranges and it becomes clear (e.g.) that only well performing PV systems have to (and will) form the basis for multi GW/TW-scale application.	to be cnsidered
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	28	10	28	18	-	-	-	This is a very important section in relation to the IPCC (actually much more important than the sections on individual technologies). Yet it is quite superficial, does not explain the basic features sufficiently clear and gives some misleading data. I think we need a short discussion on typical insolation levels (e.g. 800 - 2400 kWh/m2 per year for almost all places on earth and for most useful installation sites, incl. effects of orientation and inclination). Combine this with the performance ratio of 0.7 - 0.8 (moving to 0.9) and you get (rounded figures): 600 - 1900 kWhac/Wp per year (up to 2100). Compare this with actual numbers down to 300 and explain why they are so low (namely, that something was wrong in the system or the location). Then the reader can better appreciate the values and ranges and it becomes clear (e.g.) that only well performing PV systems have to (and will) form the basis for multi GW/TW-scale application.	to be considered
Gerrit Hansen (TSU)	3	28	30	-	34	-	-	-	this para is confusing, is the cited standard (IEEE) an international standard? IEEE is missing from reference list	to be considered
China (China Meteorological Administration)	3	28	28	28	28	3.3.3	-	-	It is suggested that "the PV array" be changed into "some PV array".	to be considered
Greece (National Observatory of Athens)	3	29	39	29	45	-	-	-	"Linear Fresnel reflectors use long lines of flat or nearly flat mirrors, which allow the moving parts to be mounted closer to the ground, thus reducing structural costs. (In contrast, large trough reflectors presently use thermal bending to achieve the curve required in the glass surface.) The receiver is a fixed inverted cavity that can have a simpler construction than evacuated tubes and be more flexible in sizing. The attraction of linear Fresnel reflectors is that the installed costs on a m2 basis can be lower than trough systems. However, the annual optical performance is less than a trough." This paragraph is not relevant to the section and not necessary generally. To be deleted.	to be improved relavant

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	29	16	29	22	-	-	-	"Some of the key advantages of CSP include the following: 1) Can be installed in a range of capacities to suit varying applications and conditions, including tens of kW (dish/Stirling systems) through multiple MWs (tower Brayton systems) to large centralized plants (tower and trough systems); 2) Can integrate thermal storage for operational purposes (less than 1 hour), through medium-size storage for peaking and intermediate loads (3 to 6 hours), and ultimately, for full dispatchability through thermochemical systems; 3) Modular and scalable components; and 4) Does not require exotic materials." This paragraph must be rewritten, since the meaning is not clear.	rewritten
Greece (National Observatory of Athens)	3	29	24	-	-	-	-	-	Delete the erroneous statement "concentrate sunlight" since the term sunlight implies total solar radiation, including diffuse, which can not be reflected and replace with "concentrating the direct-beam solar radiation" since these these terms have been defined in previous section	delete the term "sunlght"
Greece (National Observatory of Athens)	3	29	28	-	-	-	-	-	Delete the vague statement "concentrate the sun" with "concentrating the direct-beam solar radiation" since these these terms have been defined in previous section	delete the term "the sun"
Greece (National Observatory of Athens)	3	29	9	-	-	-	-	-	Delete the vague statement "concentrating the sun" and replace with "concentrating the direct-beam solar radiation" since these terms have been defined in previous section	delete
Greece (National Observatory of Athens)	3	29	30	-	-	-	-	-	need to clarify the "one-axis" concept, in view of the following reference to "two-axis" tracking. Link it to daily sun movement (solar azimuth)	change to "linked to daily sun movement (solar azimuth)"
Gerrit Hansen (TSU)	3	29	35	-	36	-	-	-	solar multiple should be explained at least shortly (sth. Like: "the ratio of the thermal capacity of the mirror field to the thermal requirement of the steam generator"), and for a more detailed reference the IEA can be cited	explained by "the ratio of the thermal capacity of the mirro field to the thermal requiredment of the steam generator"
Gerrit Hansen (TSU)	3	30	15	-	19	-	-	-	as this is not a CSP technology, it could be placed either in the subsection "other apllications" with solarthermal, of maybe put in a box with a drawing?	to be deleted
Cédric Philibert (International Energy Agency)	3	30	37	30	38	-	-	-	Compressed air storage bears no particular affinity with CSP. It is not a form of thermal storage, but allows storing mechanical/electrical energy, so it could work for any source of electricity. Nowhere in the world has a CSP plant be linked with CAES. PLEASE DELETE.	to be deleted
Greece (National Observatory of Athens)	3	30	15	30	19	-	-	-	Delete this paragraph; it is too vague and out of context.	to be deleted
Greece (National Observatory of Athens)	3	30	1	-	-	-	-	-	need to clarify the "two-axis" concept, in view of the previous reference to "one-axis" tracking. Link it to daily sun movement (solar azimuth) and seasonal variation (solar elevation).	to be clarified
Gerrit Hansen (TSU)	3	30	20	-	40	-	-	-	reverse paragraph order: definition of thermal storage should be placed before the more precise information on applications	reverse the order
Cédric Philibert (International Energy Agency)	3	30	19	-	-	-	-	-	You may want to add that several start-ups are developing the concept of non-concentrating solar thermal electricity, based on efficient solar thermal evacuated tubes receiver. The relatively low temperature level will only offer small efficiencies but cheap, integrated thermal storage may give this technology a firm capacity and allow round the clock operations.	to be deleted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Cédric Philibert (International Energy Agency)	3	31	6	-	-	-	-	-	It would be useful to recall that dish technology is the less apt to integrate thermal storage	recall
Robert Pietzcker (PIK)	3	32	7	-	-	-	-	-	Already mentioned for FOD review: Add a small paragraph here to name and shortly describe the fuels that can be produced (e.g.: Syngas: gas, mix of CO and H2; H2, pure gas, difficult to store and transport; ;DME: gas, similar to LPG, easy to store; Methanol: liquid, can use existing gasoline infrastructure ...). Even better, write a paragraph that gives a more concise picture: which solar fuels can replace which normal fuels, and how easy is this shift? e.g.: ¿Methanol can easily replace gasoline without changing the engine or the infrastructure, while h2 requires major shifts from internal combustion engine to fuel cells and new distribution infrastructures, etc.¿	to be rewritten
Gerrit Hansen (TSU)	3	32	9	-	10	-	-	-	sentence not clear (processes being combusted?)	to be clear
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	32	19	-	-	-	-	-	The solar thermochemical route uses solar heat at "middle and/or" high temperaturers followed by an endothermic thermochemical process;	to be improved
Robert Pietzcker (PIK)	3	33	19	33	26	-	-	-	This paragraph does not fit in here ¿ from the headings before and after, it seems that you are describing the four routes mentioned in line 16-16 on p 32. Here, you talk about a more general aspect of subgroups of several of the routes (if I understand it correctly) ¿ put it further to the back after the full description of all four routes.(possibly on page 36 under ¿solar applications¿)	to be imroved
Gerrit Hansen (TSU)	3	35	23	-	28	-	-	-	information should be rather included in other sections (e.g. 3.6), and is presented in confusing manner (% efficiency figures appear out of context). Also, according to the OOA, it should be refrained from comparisons with other (RE) technologies.	to be icluded
David Clubb (European Environment Agency)	3	35	23	35	24	-	-	-	Phrasing: Change 'no limitation' to 'the same range as fossil fuels', compared with the generally reduced range of electric vehicles	to be changed
David Clubb (European Environment Agency)	3	35	21	35	28	-	-	-	Very interesting - I would perhaps expand this section considering the issues and controversy related to existing biofuels	rewritten
Robert Pietzcker (PIK)	3	36	12	36	16	-	-	-	Already mentioned for FOD review: you could greatly improve this paragraph by adding a few sentences about the numbers of alternative energy storage. e.g., compare hydrogen with battery storage and compare energy density (h2 wins) with round-trip-efficiency (battery ~85-95%, h2 maybe 30-50%??batteries win). In contrast, cut the ¿50% more efficient than rankine cycles¿ - the individual steps of a conversion chain are not so important, important is the efficiency of the total conversion chain!	to be improved
Greece (National Observatory of Athens)	3	36	28	37	22	-	-	-	correct subscripts	to be corredted
Robert Pietzcker (PIK)	3	36	6	36	11	-	-	-	Delete ¿ these sentences are mostly commonplace or have been stated before.	to be deleted

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Cédric Philibert (International Energy Agency)	3	36	19	-	-	-	-	-	Solar fuels can also remain gaseous. Solar hydrogen can be mixed with naural gas and transported with it in existing pipelines and distribution networks to customers, thus enhancing the solar ratio of the global energy mix. For example, the IEA Technology Roadmap for CSP envisions that 3% of the energy in the global NG consumption will be from solar hydrogen in 2050 (IEA, 2010)	to be improved
Robert Pietzcker (PIK)	3	37	35	-	-	-	-	-	Already mentioned for FOD review: The term ¿unglazed¿ is not once used in the section 3.3 about solar thermal. Stick to either ¿absorber¿ or ¿unglazed¿ throughout all of chapter 3	will be changed
David Clubb (European Environment Agency)	3	37	33	37	47	-	-	-	Clarification needed between the first paragraph and the second - there is apparent (though not actual) contradiction	new data will be inserted and harmonised
Greece (National Observatory of Athens)	3	37	35	37	36	-	-	-	he term "unglazed collectors" has not been defined. This should be included in section 3.3.2	will be changed
Robert Pietzcker (PIK)	3	37	10	37	22	-	-	-	If I understand correctly, ¿solar cracking¿ is one of the routes described in Figure 3.12. It should thus appear together with the other routes on page 33-35 BEFORE the heading ¿solar fuel applications¿	to be done
Gerrit Hansen (TSU)	3	37	33	-	38	-	-	-	numbers need to be reconciled (Fig. 3.16 does not seem to display 19.9 GW in 2007), it might be helpful to point out more clearly that numbers concern annual additional installation/market volume.	new data will be inserted and harmonised
Greece (National Observatory of Athens)	3	37	41	-	-	-	-	-	The "combined water-heating and space-heating system" should be also referenced as "(solar combi)" systems.	will be changed
Robert Pietzcker (PIK)	3	37	1	37	9	-	-	-	This is maybe the most insightful and important paragraph of this section. It should be either put right at the beginning of 3.3.5, or at least right under the heading ¿solar fuel applications¿ on page 36. Highlight the main outputs H2, DME, etc) by using bold font	to be improved
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	37	-	52	-	-	-	-	This section is rather long, maybe it is possible to group some of the facts in tables.	new data will be inserted and the text condensed
Greece (National Observatory of Athens)	3	37	45	37	47	-	-	-	What is implied by "one operating solar water heater" ? One square meter ? The term "solar water heater" should be replaced or use it as it is being defined in the chapter. Need to be consistent In terms of capacity in operation per capita, Cyprus, where more than 90% of all buildings are equipped with solar collectors, leads Europe with 562 kWth/1,000 capita, followed by Austria at 244 and Greece at about 220 kWth/1,000 capita, almost 8 times as high as the European average at 30.7 kWth/1,000 capita.	new data will be inserted and the text condensed
Greece (National Observatory of Athens)	3	38	7	-	-	-	-	-	"...to convert square meters of collector area into kWth." To be replaced with: "...to convert square meters of collector area into installed thermal capacity (kWth)."	will be changed
Greece (National Observatory of Athens)	3	38	11	39	14	-	-	-	According to the European Solar Thermal Industry (ESTIF), at the end of 2007 the total capacity in operation in the EU reached 15.4 GWth (about 22 million m2). Germany is the leader in terms of market volume, with 35% of the European market, followed by Greece, Austria, and Spain by 10% each.	new data will be inserted and the text condensed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	38	28	38	31	-	-	-	Delete ¿ information has been stated before on page 37 l36	new data will be inserted and the text condensed
Robert Pietzcker (PIK)	3	38	8	38	15	-	-	-	Delete ¿ these sentences are mostly commonplace or have been stated before.	new data will be inserted and the text condensed
China (China Meteorological Administration)	3	38	1	38	3	3.4.1	3,16	-	Please delete "Taiwan" and relevant data.	Taiwan will be changed for "Chinese Taipei"
Dave Renne (National Renewable Energy Laboratory)	3	38	-	-	-	-	3.16	-	This information has recently been updated by Weiss et al. in their 2010 edition of Solar Heating Worldwide	new data will be inserted and the text condensed
China (China Meteorological Administration)	3	38	19	38	19	3.4.1	-	3,3	China added 21.7GWth in 2008 (source: China Association of Rural Energy Industry, CAREI)	Please provide reference so we can include it
()	3	38	8	0	10				Sentence contains word "popular"	Needs to be removed
Greece (National Observatory of Athens)	3	39	21	-	-	-	-	-	air collectors are not defined / described in section 3.3.2 on solar collectors	will be changed
Greece (National Observatory of Athens)	3	39	12	39	14	-	-	-	In Greece, Solar Hot Water Systems are used by more than 850000 Greek households, roughly 25% of the total (ESTIF, 2003).	new data will be inserted and the text condensed
Greece (National Observatory of Athens)	3	39	19	-	-	-	-	-	Not defined "unglazed plastic collectors"	will be changed
Gerrit Hansen (TSU)	3	39	2	41	18	-	-	-	references missing, information not always clear ("the new concept of heat-and-power-engineering"). Section in general carries too much detail (e.g. on european market shares) and should be shortened. There is also some redundancy, and the numbers are not presented it a structured way, which is confusing to the reader. TSU suggest to cut the following paragraphs: pp 40, ln 4-17; 28-31; and rephrase and shorten the paragraph pp 41 ln 3-18, to a sentence or two mentioning ambitious goal by business associations, and expected policy incentives.	new data will be inserted and the text condensed
George Gogolev (Geography of the Russian Academy of Sciences)	3	39	6	39	10	-	-	-	There's no consistent data of the use of solar heating or any other form of solar power, nor are there any significant government or regional programs in place, therefore this paragrath seems rather exagerated. Most of water heating in the afforementioned regions is done with gas or electricity, therefore the statement that the use of solar heat can replace 50% or organic fuel is not quiet accurate.	new data will be inserted and the text condensed
China (China Meteorological Administration)	3	39	2	39	2	3.4.1	-	-	In 2007, solar water heaters in capacity of about 16.1 GWth (23 million m2) were sold in China.	new data will be inserted and the text condensed
China (China Meteorological Administration)	3	39	3	39	5	3.4.1	-	-	In 2009, solar water heating systems constitute 57.2% of the national water-heater market in the country. Note: China added 29.4GWth in 2009 (source: CAREI)	Please provide reference so we can include it
China (China Meteorological Administration)	3	39	15	39	16	3.4.1	-	-	Please delete "Taiwan" and relevant data. .	Taiwan will be changed for "Chinese Taipei"
China (China Meteorological Administration)	3	39	1	39	1	3.4.1	-	3,3	In line 3: China added 16.1 GWth in 2007, and total existing capacity was 75.6 GWth in 2007 (source: CAREI)	new data will be inserted and the text condensed
Atul Raturi (The University of the South Pacific)	3	40	23	-	-	-	-	-	reference needed	new data will be inserted and the text condensed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	40	30	-	-	-	-	-	Relevant data on installed capacity etc needs to be pulled together in a comprehensive manner. They appear scattered throughout this section	new data will be inserted and the text condensed
United States (U.S. Department of State)	3	40	28	40	31	-	-	-	Repeated material--should be removed.	new data will be inserted and the text condensed
Greece (National Observatory of Athens)	3	40	28	-	-	-	-	-	The term "plastic unglazed absorbers" is not defined / described in section 3.3.2 on solar collectors In any event avoid using different terms, "unglazed absorbers" "unglazed solar collectors" "unglazed plastic collectors". Should use one consistent term. All these types of solar collectors need to be defined in section 3.3.2	will be changed
Atul Raturi (The University of the South Pacific)	3	40	-	41	-	-	3.18	-	Figure caption- move to the same page as the fig.	will be changed
Greece (National Observatory of Athens)	3	41	13	-	-	-	-	-	Architects, engineers and planners are also to benefit from member state 'guidance' when planning new construction projects, while local and regional administrative bodies should be recommended to "ensure equipment and systems are installed for the use of heating, cooling and electricity from RES, and for district heating and cooling when planning, designing, building and refurbishing industrial or residential areas". In addition, EU Member States must stipulate the ¿use of minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation¿. The city of Barcelona, Spain that pioneered the mandatory use of renewables in building through its ¿Solar Ordinance¿, and several countries have already enacted similar obligations, while even more regions and municipalities are adopting analogous support measures.	new data will be inserted and the text condensed
Greece (National Observatory of Athens)	3	41	13	-	-	-	-	-	The European Directive 2009/28/EC on the promotion of the use of energy from renewables mandates that each EU Member State should increase its use of RES in an effort to reach an ambitious 20% share of energy from renewables in the Community¿s gross final consumption of energy by 2020. Each country is required to increase its share of RES by 5.5% from 2005 levels, with the remaining increase calculated on the basis of per capita gross domestic product; for example, to reach by 2020 a share of 10% in Malta up to 49% in Sweden. The Directive focuses on the promotion of large scale RES installations, but member states are also requested to use "minimum levels for the use of energy from renewable sources in buildings".	new data will be inserted and the text condensed
Robert Pietzcker (PIK)	3	41	19	44	5	-	-	-	The US DOE targets should be stated in the ¿costs¿ chapter (3.8), not here	new data will be inserted and the text condensed
Greece (National Observatory of Athens)	3	42	20	-	-	-	-	-	"RE in 20020¿" To be corrected: "RE in 2020¿"	to be changed
Australia (0)	3	42	26	42	27	-	-	-	As discussed above, the TS states that 'by 2015 the US DoE projects the price of PV generated¿'; in this solar chapter it is stated as a 'goal' not a projection.	to be changed in the TS
Greece (National Observatory of Athens)	3	42	19	-	-	-	-	-	European Directive 2009/28/EC	Add in brackets

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	42	3	-	-	-	-	-	The technology of concentrating photovoltaics is not defined in the PV section or the concentrating solar section In any event, it is awkward to come before presenting general information/data on PV installed capacity etc Should move this paragraph in a more appropriate position in the chapter/document	to be inserted
Robert Pietzcker (PIK)	3	42	19	42	22	-	-	-	what does the sentence ¿is calling for electricity in Europe for up to 12%¿ mean?	See wording of reference.
Herbert Wade (none)	3	42	-	-	-	-	-	-	When discussing CSP, there is no mention of the requirement for minimal interruption due to clouds. Concentrating systems function uneconomically (in comparison with PV) in areas where the usual sky condition is partly cloudy (e.g. most wet, tropical areas of the developing world). They work most economically in desert areas that have over 90% of access to direct sunlight. Should be noted that such high insolation areas are often areas distant from load centres.	to be inserted in 3.3.4
Gerrit Hansen (TSU)	3	42	26	-	35	-	-	-	you may consider to move this para or part of the information it contains to the cost section (3.8)	TO BE CONSIDERED
Finland (Finniah Meteorological Institute)	3	42	20	-	-	3.4.1	-	-	"RE in 20020" ; should this read "RE in 2020" ?	to be changed
China (China Meteorological Administration)	3	42	14	42	18	3.4.1	-	-	It is suggested that "10000MW or more" be changed into "20GW", which is consist with the data on page 84, line 8-9.	new data will be inserted and the text condensed
United States (U.S. Department of State)	3	43	12	-	-	-	-	-	More than fifty CSP¿ True but many large PV plants are also proposed, but that is not mentioned in the PV section.	new data will be inserted and the text condensed
Cédric Philibert (International Energy Agency)	3	43	18	43	19	-	-	-	The ""project"" at Ain Beni Mathar (Morocco) has been put on line already. Please check re the other comparable ""projects"" at Kuraymat and Hassi R'Mel.	new data will be inserted and the text condensed
Gerrit Hansen (TSU)	3	43	27	44	10	-	-	-	you may consider to move this para or part of the information it contains to the cost section (3.8)	to be consisered
Gerrit Hansen (TSU)	3	44	28	-	33	-	-	-	information presented seems out of context and is partly phrased in unscientific language	to be changed
Gerrit Hansen (TSU)	3	44	39	-	46	-	-	-	information provided seems out of context and might be better placed in other subsections.	to be moved
Robert Pietzcker (PIK)	3	44	39	44	46	-	-	-	this paragraph does not fit in here ¿ it belongs to the ¿technologies¿ chapter 3.3, not the market chapter 3.4. Furthermore: what percentage of total transport fuel use would these 33PJ be?	to be moved
Robert Pietzcker (PIK)	3	45	26	45	36	-	-	-	Already mentioned for FOD review: Little information that fits the heading ¿industry capacity and supply chain¿. Shorten, rewrite	to be rewritten and shortened
Gerrit Hansen (TSU)	3	45	37	46	8	-	-	-	para focuses on technology information rather than supply chain or capacity issues	No more market data available
Gerrit Hansen (TSU)	3	45	7	-	25	-	-	-	please consider to restructure this paragraph stressing the vital role that eduation, cooperation and planning are playing in the passive solar sector - the paragraph contains important information that could be presented in a more clear cut manner.	to be rewritten (check building industry capacity!!)
Gerrit Hansen (TSU)	3	45	33	-	-	-	-	-	please refrain from presenting trademarked products	eliminate trademark

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	45	24	-	-	-	-	-	Similar concepts are introduced in France (i.e. Effinergie) and Switzerland (i.e. Minergie). The role of the European Directives and the European Standards that are changing how new buildings are being constructed, should also be recognized.	look at it (European directiva, china adopting germany standard)
Greece (National Observatory of Athens)	3	45	43	45	47	-	-	-	The capacity of the PCM industry is not really addressed in the text. Actually some information presented is a very brief overview of fundamental operating principle, application related information; definitely not industry capacity related.	No more market data available
Greece (National Observatory of Athens)	3	45	7	45	25	-	-	-	This part of the section needs to be re-written. The capacity of the building industry is not really addressed in the text.	to be rewritten (check building industry capacity!!)
Greece (National Observatory of Athens)	3	45	26	45	36	-	-	-	This part of the section needs to be re-written. The capacity of the Glazing and Window industry is not really addressed in the text. Providing a 10 year old reference is rather awkward to substantiate the tremendous progress over the past twenty years and the new-generation windows.	to be rewritten and shortened
Greece (National Observatory of Athens)	3	45	37	45	47	-	-	-	This part of the section needs to be re-written. The capacity of the thermal storage industry is not really addressed in the text.	If peer review market data is available it will be included
Greece (National Observatory of Athens)	3	46	42	46	45	-	-	-	"Therefore, scientific and peer-reviewed papers can be several years behind the actual market developments due to the nature of statistical time delays and data consolidation. The only way to keep track of such a dynamic market is to use commercial market data." To be deleted. Not necessary.	Delete "Therefore, scientific and peer-reviewed papers can be several years behind the actual market developments due to the nature of statistical time delays and data consolidation." Keep the rest
Gerrit Hansen (TSU)	3	46	37	49	41	-	-	-	besides the detailed information on polysilicon, a reference to supposed shortages of or competition for metals used in thinfilm cells (e.g. Te, In) would be expected by the reader (compare also section on CdTe cells in 3.3.3)	new data will be inserted and the text condensed
Robert Pietzcker (PIK)	3	46	4	46	8	-	-	-	Delete ¿ this would fit (and maybe is already stated) in Chapter 3.3, but not in ¿industry chain¿	moving to 3.3. will be considered (Luisa move or delete)
Greece (National Observatory of Athens)	3	46	14	46	16	-	-	-	Delete; similar information has already been presented already provided previously with the discussion on "Active solar heating" p. 37 in section 3.4.1	this part will be shortened
Cédric Philibert (International Energy Agency)	3	46	33	46	34	-	-	-	France cannot ""export"" anything to its own overseas territories, but to foreign countries.	change "exports" by "sends"
David Clubb (European Environment Agency)	3	46	17	46	20	-	-	-	Irrelevant: This statement is a consequence of the growth in the market in China, rather than (necessarily) a commentary on the technology; its relevance here is therefore questionable.	this part will be shortened
Gerrit Hansen (TSU)	3	46	14	-	36	-	-	-	paragraphs contain a lot of information on markets, which partly overlaps with 3.4.1. you might consider to focus more on information relevant for prospects of upscaling.	this part will be shortened
Gerrit Hansen (TSU)	3	46	9	-	13	-	-	-	please rephrase sentence (cut ln 12-13)	to be done
Greece (National Observatory of Athens)	3	46	32	-	-	-	-	-	The term "solar heaters" is not consistent with the terminology used in this chapter.	to be considered
Greece (National Observatory of Athens)	3	46	9	-	-	-	-	-	There is no information presented on the solar cooling market	No data market available

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	46	9	46	36	-	-	-	This material would be more appropriate to be incorporated in the previous section 3.4.1 and the discussion on "Active solar heating" p. 37	Move this part shortened to 3.4.1 and add something on industry
China (China Meteorological Administration)	3	46	45	47	2	3.4.2	-	-	It should use the available new data in stead of estimations. Please refer to 'PV News, May, 2010'. World Solar Cell Shipment in 2009, mainland China: 4.011GW, World Total: 10.66GW.	new data will be inserted and the text condensed
Gerrit Hansen (TSU)	3	47	15	-	21	-	-	-	listing brandnames and corporations should be avoided in the SRREN	new data will be inserted and the text condensed
Gerrit Hansen (TSU)	3	47	19	-	21	-	-	-	please refrain from naming companies and commercial products in the SRREN	new data will be inserted and the text condensed
China (China Meteorological Administration)	3	47	16	47	17	3.4.2	-	-	Please delete "Taiwan" and relevant data.	Taiwan will be changed for "Chinese Taipei"
China (China Meteorological Administration)	3	47	22	47	23	3.4.2	-	-	Please delete "Taiwan" and relevant data.	Taiwan will be changed for "Chinese Taipei"
China (China Meteorological Administration)	3	47	15	47	18	3.4.2	-	-	Please use the available dada in stead of estimations. Please refer to 'PV News, May, 2010'. World Solar Cell Shipment in 2009, mainland China: 4.011GW, World Total: 10.66GW.	new data will be inserted and the text condensed
China (China Meteorological Administration)	3	47	5	47	6	3.4.2	3,2	-	Please delete "Taiwan" and relevant data.	Taiwan will be changed for "Chinese Taipei"
David Clubb (European Environment Agency)	3	48	13	48	15	-	-	-	I am not convinced by this justification. I would consider that the reduced transport cost is probably the main reason; labour costs on highly technology and capital-intensive products are proportionally lower, which is why China has not quite cornered the global manufacturing market (yet). Policies in this sector are driven less by employment considerations than top-level renewable energy and CO2 targets	Cut "..to demonstrate the local job creation potential and ensure ther current policy support." Any policy factor to be discussed in Chapter 11 Policy
Robert Pietzcker (PIK)	3	48	11	48	15	-	-	-	Move this paragraph (which is very interesting and actually fits this section!) to page 49, after line 9. Thus, there is an uninterrupted discussion of polysilicon cells followed by thin film cells, with a general discussion of market behaviour afterwards	to be moved
Gerrit Hansen (TSU)	3	48	12	-	-	-	-	-	please consider removing the Abbreviation (ODM), as it is used only once in the chapter	to be deleted
David Clubb (European Environment Agency)	3	48	6	48	7	-	-	-	Unclear: The meaning of this sentence is not clear to me. If it's saying that thin film will become an increasing part of the market, that's only true up until 2012 (according to p49, line 7)	rephrased
China (China Meteorological Administration)	3	48	1	48	3	3.4.2	3,21	-	Please delete "Taiwan" and relevant data.	Taiwan will be changed for "Chinese Taipei"
Greece (National Observatory of Athens)	3	48	-	-	-	-	3.21	-	In X-axis "Estimated Production 2009" is written twice.	to be changed
Robert Pietzcker (PIK)	3	49	12	-	-	-	-	-	Already mentioned for FOD review: State normal silicon price, else the reader cannot know if 500$ is a ten-fold or 2-fold increase	new data will be inserted and the text condensed
Robert Pietzcker (PIK)	3	49	32	49	37	-	-	-	Interesting, but the last logical step is missing: Please state what the upper (250,000MT and 6g/W) and lower (140,000MT and 8g/W) bounds on cell production would be in 2012 (in GWp)?	will be changed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	49	42	51	2	-	-	-	Paragraph shows redundancies with other sections (e.g. history of CSP plants) and generally is too colloquial in style. Section might be shortened without loss of information.	new data will be inserted and the text condensed
Gerrit Hansen (TSU)	3	49	0	-	-	-	-	-	There is public debate on possible material shortages and competition regarding some (semi-)metals used in thin film cell production, like e.g. In and Te. You might therefore consider to include information on possible material shortages for thin film solar cells, as e.g. mentioned in 3.3 for CdTe.	new data will be inserted and the text condensed
David Clubb (European Environment Agency)	3	49	2	49	2	-	-	-	Which company is this?	Company names were requested to be removed
China (China Meteorological Administration)	3	49	31	49	31	3.4.2	-	-	It is suggested that "or 20%" be changed into "or 20% of world production"	to be changed
Greece (National Observatory of Athens)	3	50	19	-	-	-	-	-	"Linear Fresnel and central receiver systems comprise¿" "Linear Fresnel and" should be omitted.	new data will be inserted and the text condensed
Gerrit Hansen (TSU)	3	50	43	-	45	-	-	-	Sentence is not clear, could be cut or moved	new data will be inserted and the text condensed
United States (U.S. Department of State)	3	50	46	-	-	-	-	-	Should discuss whether the supply of molten salt is adequate.	new data will be inserted and the text condensed
Cédric Philibert (International Energy Agency)	3	50	4	-	-	-	-	-	Two commercial plants were commissioned in 2006, ie after Luz but before Nevada Solar One: the Sarraguo 1-MW plant in Arizona and, more importantly, A bengoa's PS-10 tower plant in Sanlucar la Mayor, Spain.	new data will be inserted and the text condensed
Robert Pietzcker (PIK)	3	50	9	50	12	-	-	-	Which companies? This seems to be a bottleneck ¿ state so more clearly. If there are only 2 or three companies, they might have large monopoly might, and the bankruptcy of one of the firms might severely endanger the expansion plans for CSP for a few years...	new data will be inserted and the text condensed
Kristin Seyboth (IPCC WG III TSU)	3	51	17	-	-	-	-	-	"Energy efficiency" - again, why does this section on solar H/C begin with energy efficiency technologies? Focus here on solar thermal.	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	34	51	38	-	-	-	Are these barriers specific to PV or do they apply to all RE technologies? Please specify and focus only on those specific to PV here. Please also assure a consistent categorization of barriers as outlined in Ch. 1	will be considered
Greece (National Observatory of Athens)	3	51	18	51	19	-	-	-	Avoid using the well known abbreviation of renewable energy sources - RES for other kind of definitions. It could easily confuse the reader. It is appropriate to refer to the European Directive 2009/28/EC on renewables Could also include relevant information to similar legislation in other parts of the world. The message should be clear: THINGS ARE CHANGING	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	23	51	32	-	-	-	Do not define policies here - rather refer to definitions in Chapter 11 (section 11.2) and focus instead on policy options that are especially useful for PV, e.g. key design features that facilitate support for solar PV and are recommended.	will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	51	17	51	22	-	-	-	especially for solar heating and cooling, existing buildings are difficult to retrofit ¿ heating systems and fenestration have to be incorporated from the beginning. Thus, it is very important that regulations encourage or enforce (through standards) the use of passive and active solar technologies. Furthermore, these technologies are strongly hindered by the fact that the person using a building often is not the person designing a building ¿ thus interests differ, and design&construction firms have difficulties selling more expensive buildings with solar technologies, although life cycle costs might be much cheaper. This market failure needs to be adressed by governments.	will be considered
Christoph von Stechow (IPCC WGIII TSU)	3	51	23	51	32	-	-	-	Please adjust the abbrevations to the way they are used in Chapter 11, which is currently not the case (e.g. RES).	will be considered
Christoph von Stechow (IPCC WGIII TSU)	3	51	11	51	16	-	-	-	Please consider elaborating on these barriers	will be considered
Christoph von Stechow (IPCC WGIII TSU)	3	51	35	-	-	-	-	-	Please insert "lack of" at the beginning of the line.	will be considered
Christoph von Stechow (IPCC WGIII TSU)	3	51	33	51	38	-	-	-	Please rephrase "lack of financing mechanisms" (line 37/8), since 'financing mechanisms' is commonly used to denote policy instruments for the promotion of renewables; this would however be illogical, since the paragraph lists challenges to policy design. Please reword "Lagging" in line 36 into "Lacking".	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	33	-	-	-	-	-	Rather than reference a single literature source here, please refer to complete discussion of effectiveness/efficiency of policies in Chapter 11 (Section 11.5)	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	17	51	22	-	-	-	See IEA 2007 publication 'Renewables for Heating and Cooling - Untapped Potential' for a full discussion of policies to support solar H/C. Rewrite this paragraph to focus 1) on solar H/C technologies only (NOT electricity nor energy efficiency) 2) on policies that have been successfully implemented to support those policies, which should be in line with the conclusions in 11.5.5	will be considered
Robert Pietzcker (PIK)	3	51	23	51	38	-	-	-	studies seem to come to the conclusion that often the risk reduction from FITs through guaranteed power prices for renawble power for time spans of 5 to 20 years is more important to investors than the height of the FITs (up to a certain limit)	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	12	51	14	-	-	-	This sentence describing policy targets is inconsistent with the categorization of policies in Ch. 11 (see 11.2) and has no reference. Either delete, or make consistent with Ch. 11	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	17	-	-	-	-	-	Why are you including electricity in a discussion of solar H/C? Delete 'and Lighting' from title, and focus discussion on heating/cooling.	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	51	-	-	-	3.4.3	-	-	A reader would expect this section to answer the questions 1) What policies have been put into place specifically to support solar energy? 2) What key design features are recommended in policies to successfully support solar based on the experience with existing policy options? The second point is completely missed, as is any coherence with Ch. 11. Recommend rewriting to focus on these points. See e.g. wind and geothermal sections 7.4.4 and 4.4.4 respectively.	will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Kristin Seyboth (IPCC WG III TSU)	3	52	19	52	20	-	-	-	"¿integrating the solar components into the building." such as? Expand on this and focus the entire section less on futuristic models that are not yet well developed.	will be considered
Greece (National Observatory of Athens)	3	52	35	-	-	-	-	-	It is awkward that "central heating" refers only on line 35 of p. 53, in a section that is entitled "3.5.3 District Heating and Other Thermal Loads". Relevant text on district heating needs to be enhanced.	Try to include in Section 3.5.1 the concept of "central heating" due to solar energy
Robert Pietzcker (PIK)	3	52	12	52	18	-	-	-	please state a source for recent developments in hybrid cells	will be considered
Robert Pietzcker (PIK)	3	52	43	52	44	-	-	-	state more clearly: ¿however, this would increase the dependence on oil imports and strongly increase the vulnerability of these villages towards international oil price bubbles, as was seen in the 2008 oil price hike.¿	will be considered
Greece (National Observatory of Athens)	3	52	10	52	18	-	-	-	The term "PV cells" are used for two different type of applications. First on the absorber of a solar collector, probably using "normal" PV cells in order to also exploit the heat generated at the back of the modules (however, this concept has not been described in detail, especially as it relates to the PV performance); or could it be semitransparent cells? This is defineitely the case for the second application described, refering to windows and daylighting. In bothe cases though they refer to as "PV cells" without differentiating whether they are opaque or semitransparent elements.	Change "PV cells have also been developed…" by "Semitransparent PV cells …."
Kristin Seyboth (IPCC WG III TSU)	3	52	-	-	-	3.5	-	-	This whole section should be closely coordinated with Ch. 8 authors to avoid contradictions and overlap. Specific sections: 3.5.1 should coordinate with 8.3.2 Buildings and Households 3.5.2 should coordinate with 8.2.5 Autonomous Systems 3.5.3 should coordinate with 8.2.2 Integration into Heating and Cooling Networks 3.5.4 and 3.5.5 should coordinate with 8.2.1 Integration of RE into Supply Systems	will be considered
Greece (National Observatory of Athens)	3	53	33	-	-	-	-	-	"...solar water heating will displace the marginal and most-polluting generating plant used to produce peak-load power." Peak-load in a lot of cases is covered by Natural Gas power stations or hydropower, which are not of "the most-polluting" generating plants.	will be considered
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	53	9	53	11	-	-	-	"Applications ... More profitable." Unclear. I don't understand the argument being made.	will be considered
Greece (National Observatory of Athens)	3	53	17	-	-	-	-	-	"In China, Greece, and Israel, solar water heaters¿" Cyprus must be added.	will be considered
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	53	1	53	2	-	-	-	"most appropriate" based on what criteria? Cost per unit of energy provided to end-user? Unclear.	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	53	17	53	22	-	-	-	Delete these lines. Capacity and output should have already been covered in the chapter. Focus here on integrating solar into district heating systems.	will be considered
Robert Pietzcker (PIK)	3	53	21	53	21	-	-	-	In 3.3, it is said that international standard was 0.7W/m^2	will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
David Clubb (European Environment Agency)	3	53	46	53	48	-	-	-	Suggested reference: Greater interconnectivity definitely provides greater stability of supply; see ENTSOE's pilot 10-year development plan (https://www.entsoe.eu/index.php?id=232), page 138 and others	will be considered
Kristin Seyboth (IPCC WG III TSU)	3	53	23	53	34	-	-	-	The majority of this section is discussing the displacement of electricity load. The heading of 3.5.3. is District heating - NOT displacement of electricity load. Therefore the reader expects a discussion first of the possibilitiy of integrating solar into district heating systems, and how this is possible (or not). THEN, a discussion of displaced electricity load could be mentioned.	will be considered
Gerrit Hansen (TSU)	3	53	38	-	48	-	-	-	This section is confusing in structure and content. Please rewrite and give references.	will be considered
Robert Pietzcker (PIK)	3	53	3	53	8	-	3.4	-	Delete	will be considered
Greece (National Observatory of Athens)	3	54	18	54	22	-	-	-	"Oozeki et al. (2010) quantitatively evaluated the smoothing effect in a load dispatch control area in Japan to determine the importance of data accumulation and analysis. The study also proposed a methodology to calculate the total PV output from a limited number of measurement data using Voronoi Tessellation, which assumes the total PV generation as the weighted sum of the each measurement by the Voronoi cell area." Not necessary. To be deleted.	To be considered. The section is rewritten
Greece (National Observatory of Athens)	3	54	11	54	15	-	-	-	"Otani et al. (1998) analyzed the non-correlational irradiation/generation characteristics of several PV systems/sites that are dispersed spatially. (Ramachandran et al., 2004) analyzed the reduction in power output fluctuation for spatially dispersed PV systems and for different time periods, and they proposed a cluster model to represent very large numbers of small, geographically dispersed PV systems. However," Not necessary. To be deleted.	To be considered. The section is rewritten
Robert Pietzcker (PIK)	3	54	18	54	25	-	-	-	Already mentioned for FOD review: this paragraph describes what Oozeki does in the paper, but it does not give any results ¿ the opposite would be better! Give some results. How strong is the variability? How much can it be reduced through combination with spatially distant PV plants?	To be considered. The section is rewritten
David Clubb (European Environment Agency)	3	54	3	54	4	-	-	-	Does PV impact really have a large impact, or is it just 'supposed to'? The wording here implies uncertainty	will be considered
John Twidell (AMSET Centre)	3	54	3	-	-	-	-	-	now ' The variation of PV generation is supposed to have..', change to 'The variation of PV generation CAN, IN SOME INSTANCES, have..'	To be considered. The section is rewritten
China (China Meteorological Administration)	3	54	46	62	16	3,6	-	-	Add a paragraph at the end of 3.6 to emphasize that more attention should be given to environmental and social impacts. It is lack of studies in present time. For example, the impacts of the build-ups of the heliostat fields and other facilities on the local climate have never been investigated.	section will be edited and shortened
Cédric Philibert (International Energy Agency)	3	54	27	54	28	e	-	-	This sentence is odd, as it opposes ""solar-only"" to ""100% solar share"". Furthermore, there are clear cases where covering peak requires mid-size or large-size storage. In Algeria and Morocco, the peak demand starts after sun set as it is driven by lighting, not air conditioning.	To be considered. The section is rewritten

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
David Clubb (European Environment Agency)	3	55	2	55	4	-	-	-	Suggested improved reference: The reference suggests that studies have not taken place in recent years (reference is 2001). Would the ExternE project be a more useful, slightly more recent reference?	section will be edited and shortened
China (China Meteorological Administration)	3	55	12	56	10	3.6.1	-	-	Author should evaluate the reliabilities of Table 3.4, Table 3.5 and Table 3.6.	section will be edited and shortened
China (China Meteorological Administration)	3	55	3	55	4	3.6.1	-	-	Delete "thanks to".	section will be edited and shortened
Australia (0)	3	55	-	-	-	3.6.1	-	-	Much of this discussion is general - suggest rewriting to be more relevant to solar only. This information could be moved to an overview chapter.	section will be edited and shortened
China (China Meteorological Administration)	3	55	1	60	13	3.6.1	-	-	Please breakdown 3.6.1 into several sub-sections. Current text is not legible.	section will be edited and shortened
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	55	-	-	-	-	3.4	-	This table is potentially important and should be kept here - but not readable now.	section will be edited and shortened
China (China Meteorological Administration)	3	55	12	55	13	3.6.1	-	3,4	Does it mean global or regional? It should be clarified.	section will be edited and shortened
Gerrit Hansen (TSU)	3	56	19	57	9	-	-	-	According to the OOA comparison between RE technologies or with fossil fuel technologies are not to be included in the technology chapter, but conducted by chapter 9. Please reconcile with chapter 9, and consider to include only information relevant for solar in this section. As LCA results tend to span a large range, it might be also valuable to the reader to discuss or comment assumptions and outcome of (Fthenakis and Kim, 2009), which is quite prominently placed here.	section will be edited and shortened
Matt Davison (University of Western Ontario)	3	56	5	56	10	-	-	-	Agreed! One reason for this is that it is hard to quantify, in a way that can be agreed by all or most stakeholders, on how to quantify these benefits, and on ¿how large to draw the circle¿ including these benefits. A solution to this is cap and trade systems, which provide an actual market price for avoided carbon, or NOx, or SOx, emissions. I feel this could be mentioned at this juncture.	section will be edited and shortened
Gerrit Hansen (TSU)	3	56	5	-	18	-	-	-	please reconcile with chapter 9 and 10 (and 1) for general discussion of factoring in social and environmental costs	section will be edited and shortened
Gerrit Hansen (TSU)	3	56	13	-	15	-	-	-	sentence not clear	section will be edited and shortened
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	56	-	-	-	-	3.5	-	This table is potentially important and should be kept here. But, can you find more analyses on the same subject? ExternE and many other LCA studies have been done to identify the externatility of RE, to my knowledge.	section will be edited and shortened

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	57	18	57	23	-	-	-	"For active solar heating and cooling, the environmental impact of solar water-heating schemes in the UK would be very small according to (Boyle, 1996). For example, in the UK, the materials used are those of everyday building and plumbing. Solar collectors are installed to be almost indistinguishable visually from normal roof lights. In Mediterranean countries, the use of freestanding thermosyphon systems on flat roofs can be visually intrusive. However, the collector is not the problem, but rather, the storage tank above it." The example of Greece could be added (after "...plumbing." and before "Solar collectors are installed...". "In Greece a more favoured country for solar applications, has been proved that environmental impact of Domestic Solar Hot Water Systems (DSHWS) use is very small compared to electricity or Natural Gas use (Tsilingiridis et al., 2004a), and for all climatic conditions prevailing in the country (Tsilingiridis et al., 2004b). The use of DSHWS in Greece during the 1978¿2007 period had as a result the conservation of electricity, as well as the abatement of air pollutant emissions. CO2 reduction exceeded by 44.7% the objectives that were placed by the Greek program of ¿¿Climatic Change¿¿, as DSHWS penetration and technical characteristics changes exceeded the expectations. Future perspectives are encouraging and DSHWS can play an important role in energy and environmental policy of the country. The avoided emissions of CO2 from the maximum feasible potential could be 5428 kt CO2, 5% of total CO2 emission in Greece for 2003 (Tsilingiridis et al., 2010)."	section will be edited and shortened
John Twidell (AMSET Centre)	3	57	12	-	-	-	-	-	¿ of insulatiuon COMBINED WITH LARGE INTERNAL THERMAL MASS creats a more comfortable building [with small thermal mass, the temperature swings can be uncomfortable!]	section will be edited and shortened
Robert Pietzcker (PIK)	3	57	10	57	17	-	-	-	Rewrite. Please give information about the energy/material needed for passive solar design ¿ e.g., more energy for double-glazed windows, large amount of concrete for thermal storage ¿ all in comparison to the amount of energy saved by this passive solar technology. Imagine doing a life-cycle-analysis of a passive solar and a normal building ¿ energy use during the construction will probably be higher for passive solar, while energy use during the use of the building will be lower for passive solar. What are the numbers from real world experiments?	section will be edited and shortened
Greece (National Observatory of Athens)	3	57	10	57	17	-	-	-	This part of the section needs to be re-written. The text is missing relevant information on the environmental impact for the production and LCA data on different thermal insulation material (e.g. see how it is treated in the subsection on PVs)	section will be edited and shortened
Greece (National Observatory of Athens)	3	57	18	57	23	-	-	-	This part of the section needs to be re-written. The text is missing relevant information on the environmental impact for the production and LCA data on solar collectors and solar cooling equipment (e.g. see how it is treated in the subsection on PVs)	section will be edited and shortened
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	57	-	-	-	-	3.23	-	This diagram coveys very important informtation. It should apprear in SPM.	section will be edited and shortened

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	57	-	-	-	-	3.6	-	This table is potentially important and should be kept here. But, can you find more analyses on the same subject? ExternE and many other LCA studies have been done to identify the externatility of RE, to my knowledge.	section will be edited and shortened
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	58	6	10	-	-	-	-	Gases like NF3 are greenhouse gases, greenhouse gases should be added to the list in line 6	section will be edited and shortened
Gerrit Hansen (TSU)	3	58	11	-	14	-	-	-	please reformulate last sentence. In 3.3, the availability and toxicity of CdTe is briefly discussed, and might be either included or referenced her.	section will be edited and shortened
China (China Meteorological Administration)	3	58	2	58	5	3.6.1	3,24	-	What's meaning of a and b in figure 3.24? Author should add: a: Energy payback time; b: GHG emissions.	section will be edited and shortened
Cédric Philibert (International Energy Agency)	3	59	27	59	28	-	-	-	In the list of appropriate regions for CSP, please include Mexico, Chile, Peru, south-african countries (RSA and neighbours), possibly Central Asian Countries, and Rajasthan and Gujarat States in India. Write Tibet and Xinjan in China. Uncertainties remain about the potential of inner Mongolia)	section will be edited and shortened
United States (U.S. Department of State)	3	59	24	-	-	-	-	-	Site may be arid and not suitable for agriculture, but may still have protected or sensitive species.	section will be edited and shortened
David Clubb (European Environment Agency)	3	60	14	62	16	-	-	-	Omission/suggested improved reference: Employment opportunities are also a strongly relevant item for this section. Solar PV provides more jobs/kWh than any other energy source (http://rael.berkeley.edu/node/585)	section will be edited and shortened
()	0	60	34	0	0				Change sentence to: "Recent studies comparing job impacts across… job-generation job impacts. E.g. in the US at an average…" and add reference for the study in Europe	to do
Greece (National Observatory of Athens)	3	61	13	-	-	-	-	-	A 15 year old reference seems out of date; adding a more recent reference with more up-to-date technologies put in good service, could reflect a similar message and make a stronger case.	section will be edited and shortened
Atul Raturi (The University of the South Pacific)	3	61	13	-	-	-	-	-	A newer reference required here.	section will be edited and shortened
Robert Pietzcker (PIK)	3	62	6	62	16	-	-	-	Already mentioned for FOD review: Are there any success stories/successful studies of donor programs or financing schemes?Has there been research what went wrong/well, and development of new ideas? If yes, please cite ¿ if no, say that this is a field which definitely needs research!	section will be edited and shortened
Greece (National Observatory of Athens)	3	62	34	62	35	-	-	-	What is so technically innovative about "high solar reflectivity and emissivity" materials ?	Clarification: the text provides areas of possible technical imrprovements, this one been one of them
Greece (National Observatory of Athens)	3	62	29	-	-	-	-	-	What is so technically innovative about "night shutters"? or evacuated glazing ?	Clarification: what it is innovative is the "dynamic night shutters", "evacuated glazing" idea not new, but its commercial use is

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Osamu Kimura (Central Research Institute of Electric Power Industry)	3	63	39	63	39	3.7.2	-	-	How heat-storage technology becomes widely available is an important point but described in a very abstract way. More literature other than ESTTP should be reviewed here to show what kind of technology and/or materials will be a key. It should be recognized that heat-storage technology has already been tested for decades and there is yet no good prospects for commercial deployment.	More references will be added if found
Osamu Kimura (Central Research Institute of Electric Power Industry)	3	63	40	63	48	3.7.2	-	-	Interesting but very abstract descriptions. More articles should be reviewed here in order to explain in more detail the technologies and materials that might increase efficiency and reduce cost of active solar H&C.	More references will be added if found
United States (U.S. Department of State)	3	64	4	-	-	-	-	-	Change the word "great" to "significant" at end of line 4.	to be done
Gerrit Hansen (TSU)	3	64	1	-	2	-	-	-	if an almost ten year old source is used to portray the current stage of development, this needs to be framed by an explanatory note.	this part will be moved to section 3.3
United States (U.S. Department of State)	3	64	26	64	30	-	-	-	Please consider adding an introduction similar to the introduction in the CSP section (3.7.4). For example, covering topics like "PV has over three decades; operation and maintenance (O&M) aspects are understood; and there is enough operational experience to have enabled O&M cost-reduction studies to not only recommend, but also to test, those improvements."	To be considered
Gerrit Hansen (TSU)	3	64	36	-	41	-	-	-	reference for this para is confusing	Move the reference to after "…roadmaps" not after the example
Robert Pietzcker (PIK)	3	64	1	64	20	-	-	-	This paragraph should go into section 3.3, it is mostly a description of how solar can be used for process heat	to be done
Gerrit Hansen (TSU)	3	65	11	-	13	-	-	-	rephrase sentence!	Sentence will be changed
United States (U.S. Department of State)	3	65	11	65	24	-	-	-	This material says nothing--should be deleted.	Transform both paragraphs into one paragraph with just a list of PV technologies (avoid opinions)
United States (U.S. Department of State)	3	66	9	66	19	-	-	-	Inadequate discussion of storage. The idea that storage should be integrated with the module is needed is unproven. It would be nice, but would also require that storage have the same life as the module. Large systems may need power storage to mitigate transients but large amounts of energy storage may not be practical. Reliance on other energy sources (gas turbines) and/or load management may make more sense.	To be considered
Cédric Philibert (International Energy Agency)	3	66	31	66	35	-	-	-	It is doubtful that very large PV in desert will prove a superior option to CSP - where DNI is excellent CSP allows for firm and dispatchable electricity while PV does not, and the impact of very large and centralised PV plants on grids could prove rather difficult to handle. Suggest rewriting these lines with a much more cautious assessment. Furthermore, it is quite odd that the only mention of the DESERTEC concept appears in a PV section.	To be considered
China (China Meteorological Administration)	3	66	9	66	31	3.7.3	-	-	These lines just simply repeat the lines from line 42 on page 26 to line 15 on page 27. They should be reorganized.	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	67	13	67	21	-	-	-	Already mentioned for FOD review: There has been much research on CSP over the last years, so please add at least one newer study, e.g., ¿Characterisation of Solar Electricity Import Corridors from MENA to Europe¿ (DLR 2009) or from the NEEDS project : ¿""Final report on technical data, costs, and life cycle inventories of solar thermal power plants"" by Viebahn 2008	To be considered
United States (U.S. Department of State)	3	67	35	67	44	-	-	-	Page 67 line 35,36 and 44 a citation should be given for the efficiency claims.	To be considered
United States (U.S. Department of State)	3	67	5	-	-	-	-	-	Recommend deleting entire paragraph. Note that recycling programs do exist for some companies, such as First Solar.	paragraph to be rewritten
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	69	2	-	-	-	-	-	It is necessary to add one sentence, ""A challenge for solar fuel is to develop cost-effective solar thermochemicl process. An innovative approach using mid-temperature solar heat at around 200-300 oC to drive methanol decomposition or reforming for hydrogen production was proposed by Hongguang Jin. And the prototype of receiver/reactor whose the design-point efficiency of solar heat into fuel may achieve by 60% was manufactured orginally. (Hongguang Jin, et at, ASME, J. Solar Energy Engineering, 2007,Vol.(129) 378-381)""	If appropriate, the reference will be added in Section 3.3.5 (take into account the efficiency of 60% that the reviewer is claiming)
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	69	19	-	-	-	-	-	It is necessary to add one sentence, ""In addition, it is important to integrate the solar thermochemcial process and CO2 capture. A solar thermochemical cycle inherent CO2 separation, hybridizing the the metal oxide with CH4 with solar heat at around 500 oC, was proposed (Hongguang Jin, 2006). This route not only can lower temperature of solar thermochemical reaction for producing solar fuel, but also simultaneously resolve the problem of CO2 separation without extra energy penalty. (Hongguang JIn, et at, ASME, J. Solar Energy Engineering, 2006,Vol.(128) 275-284)""	will be added
Gerrit Hansen (TSU)	3	69	28	-	29	-	-	-	sormulation is misleading, as biogas is not a direct product of photosynthesis	To be done
United States (U.S. Department of State)	3	70	4	70	6	-	-	-	Add text addressing the need to overcome potential barriers to public acceptance. If possible, include reference.	to be added
Greece (National Observatory of Athens)	3	70	16	70	23	-	-	-	Additional thermal insulation some times may be difficult because it exceeds common building practices and may even have to alter common building practices in some countries to account for additional bearing loads. The discussion should also provide some relevant information on these practical issues.	Section to be deleted
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	70	7	-	-	-	-	-	Cost or price?	The heading was given to the authors and cannot be changed. On the other hand the section needs to include some price discussion because the cost for the consumer is the price he pays
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	70	7	-	-	-	-	-	Cost or price?	The heading was given to the authors and cannot be changed. On the other hand the section needs to include some price discussion because the cost for the consumer is the price he pays

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	70	-	72	-	-	-	-	This part is very important, need more elaboration, and should appear in SPM. Hydro, in particular large ones, contributes to economic development, HEHAB, adaptation, and power systems management.	The comment is assigned to the wrong chapter. To be sent to the proper chapter
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	70	-	-	-	-	3.26	-	In Japan the insulations are costly options as CC mitigation, typically $1000/tCO2. It must be reviewed.	The section will be rewritten and the figure may be deleted. The comment will be considered
Gerrit Hansen (TSU)	3	71	6	-	8	-	-	-	conclusion not clear	to be looked at
Gerrit Hansen (TSU)	3	71	27	-	-	-	-	-	please provide source	Reference will be added
Robert Pietzcker (PIK)	3	72	19	72	20	-	-	-	Already mentioned for FOD review: A reference is needed for these values. Also, the values seem extremely high (wrong?) ¿ 20% cost decrease for each 50% capacity increase would equal a learn rate >30%, which is way higher than learn rates of other technolo	Reference will be added
Robert Pietzcker (PIK)	3	72	15	72	18	-	-	-	Delete ¿ or explain why some numbers in table 3.7 for solar thermal prices in 2030 (without knowing any of the assumptions behind these numbers) ¿show why ESTTP's priority is to enable the large-scale use of solar¿	delete table and text related
Gerrit Hansen (TSU)	3	72	1	-	18	-	-	-	the cost table has little informative value and should be omitted. The resulting conclusion in ln 15-18 is no evident.	delete table and text related
Osamu Kimura (Central Research Institute of Electric Power Industry)	3	72	22	72	25	3.8.2	-	-	The text on the sources of cost reduction is very good, but is too abstract and lacks reference. Does building integration really reduce the cost? To what extent? Are there really promising new materials? To what extent can the polymers reduce the cost of collectors? A couple of articles that deals with those questions should be reviewed here, at least.	If reference found it will be included (if the reviewer has the reference, please send it to us)
China (China Meteorological Administration)	3	72	5	72	7	-	-	3,7	Table 3.7 shows that the cost in eurocents per kwh for solar thermal electricity is 5-12 in southern Europe. It is cheaper than that of PV electricity (17-20 eurocents per kwh on page 77). Why does solar thermal power develop so slowly? Please explain it and describe technical pathways for achieving cost reduction.	delete table and text related
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	72	-	-	-	-	-	3.7	The table is very ridiculous - are you sure that CSP will be the cheapest among all electricity? Then we do not need any policy after 2030! I suggest to remove this table.	delete table and text related
Greece (National Observatory of Athens)	3	73	7	-	-	-	-	-	These R&D efforts should have been specified and elaborated in section 3.7	It is already done
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	74	15	74	23	-	-	-	I miss a discussion on the learning curve of BoS or complete systems. Obviously more complicated and diverse that that of modules, but there is certainly some information (and extrapolations) available (Winfried Hoffmann has published on this, I think). This is quite important to make statements on the development of turn-key system prices.	This section will be rewritten and the comments will be taken into consideration

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	74	15	74	23	-	-	-	I miss a discussion on the learning curve of BoS or complete systems. Obviously more complicated and diverse that that of modules, but there is certainly some information (and extrapolations) available (Winfried Hoffmann has published on this, I think). This is quite important to make statements on the development of turn-key system prices.	This section will be rewritten and the comments will be taken into consideration
Australia (0)	3	74	9	74	11	-	-	-	Reference missing for this statement	Reference will be added
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	74	14	77	22	-	-	-	The section is to some part not consistent and does partly not consider latest data. Especially the Figures 3.29 and 3.30 as well as table 3.10 do not contain latest data. There is also some room to shorten the section.	This section will be rewritten and the comments will be taken into consideration
Osamu Kimura (Central Research Institute of Electric Power Industry)	3	74	15	77	22	3.8.3	-	-	Balance of system (BOS) costs, including installation cost and miscellaneous cost, should be treated separately from module cost. As BOS costs are higher than module cost in many PV applications, it is important to analyse the potential of reducing BOS costs. A good discussion on this point can be found in Chapter 4 of the Solar Vision Study by US DOE, available at http://www1.eere.energy.gov/solar/vision_study.html. Also, Yang (2010) raises an important point, saying "a great deal of the installation and miscellaneous cost is labor cost. As installers gain experience, they may be able to work more efficiently, but a labor cost reduction of over 80 percent in the near-term is likely optimistic." Yang, Chi-Jen, 2010, Reconsidering solar grid parity, Energy Policy, 38, 3270-3273.	This section will be rewritten and the comments will be taken into consideration
Ole Grimsrud (Scatec AS)	3	74	-	-	-	3.8.3	-	-	The information on PV module prices is severely out of date: In the first sentence it is said that PV module prices have dropped "to the current level of less than 4 USD/W", whereas in reality the current PV module prices are at less than 2 USD/W (for sources, see e.g. Photon International, and/or analyst reports from Deutsche Bank or Morgan Stanley, with good channel checks. I can also be contacted directly for source information, if needed.)	This section will be rewritten and the comments will be taken into consideration
Dave Renne (National Renewable Energy Laboratory)	3	75	-	-	-	-	3.29	-	NREL has much clearer figures on the PV learning curve that should be used here.	This section will be rewritten and the comments will be taken into consideration
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	75	-	-	-	-	3.29	-	The "guide to the eye" line reminds me of notorious hockey stick diagram of so-called IPCC scandal. To me, the costs look saturating after 2000. I recommend you put two lines in the diagram to accommodate two different views - one line as it stands, and the other line which bends in 2000 and remains flat afterward up to 2008.	This section will be rewritten and the comments will be taken into consideration
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	75	-	-	-	-	3.29	-	There are better (more recent) figures available, including the drastic price drop due to lifting of silicon shortage and increase of manufacturing capacity, but also showing the initial part of the "separate" curve for thin-film PV. Ref.: EPIA.	This section will be rewritten and the comments will be taken into consideration
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	75	-	-	-	-	3.29	-	There are better (more recent) figures available, including the drastic price drop due to lifting of silicon shortage and increase of manufacturing capacity, but also showing the initial part of the "separate" curve for thin-film PV. Ref.: EPIA.	This section will be rewritten and the comments will be taken into consideration

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	75	-	-	-	-	3.30	-	You need the caveat that the module costs are only half of installed PV costs. BOS is more formidable.	This section will be rewritten and the comments will be taken into consideration
Robert Pietzcker (PIK)	3	76	15	76	17	-	-	-	please add the information that the systems analyzed for figure 3.31 are 3-5kWp and thus quite small ¿ for average prices in Germany in 2008 for larger systems, see the annual report from Germany which reports the 2008¿-prices for residential PV 2-10kWpeak= 3.9-4.1¿/W(~5.6$2008), 10-50kWpeak: 3.6¿/W(~5.1$2008), see http://www.iea-pvps.org/countries/download/nsr08/NSR%20Germany%202008.pdf	This section will be rewritten and the comments will be taken into consideration
Steffen Schlömer (IPCC WGIII)	3	76	16	-	-	-	-	-	The figure does not correspond to the one presented in the TS, p. 36, l. 40.	This section will be rewritten and the comments will be taken into consideration
Ole Grimsrud (Scatec AS)	3	76	9	76	19	-	-	-	This information refers to 2007, which is not relevant any more - therefore, I propose taking out these lines. (More recent data for the same parameters is presented on the next page, lines 4 to 10.)	This section will be rewritten and the comments will be taken into consideration
Norway (Climate and Pollution Agency)	3	76	9	76	19	-	-	-	This information refers to 2007, which is not relevant any more - we propose taking out these lines. (More recent data for the same parameters is presented on page 77, lines 4 to 10.)	This section will be rewritten and the comments will be taken into consideration
Ole Grimsrud (Scatec AS)	3	76	-	-	-	-	-	3.10	Table 3.10 is somewhat unclear, but I assume the first number refers to the cost, and the second number refers to the price. In my opinion, it would be much cleaner for this table to refer to the cost only. Also, the distinction between the various technologies and locations does not seem to be needed - it would siffice to consider only two technologies, namely crystalline silicon (location of production facility is irrelevant) and CdTe-based thin film (CIGS is not yet commercialized to the same degree, and the large amorphous silicon players are going out of business.) Furthermore, the cost levels listed in the table are severly outdated: For instance, CdTe cost is projected at $1.13/W in 2010 and $0.89/W in 2015 - but First Solar is already producing CdTe modules at a cost of $0.76/W! (reference: First Solar Q2'2010 report). Also, the best crystalline silicon players within each part of the value chain have cost levels that add up to about $1/W, and with Suntech's CEO stating at InterSolar this year that the cost without profit of producing a PV panel is around $0.80/W - less than half of the cost levels indicated in 2010 for the crystalline silicon technologies. (This comment also relates to the text preceeding table 3.10)	This section will be rewritten and the comments will be taken into consideration
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	76	-	-	-	-	-	3.10	This table is highly debatable and should better be removed. I don't believe any double-digit 5-year forecast, not about cost, but certainly not about price (unclear what is what, by the way). Moreoever: what do we learn from this?	This section will be rewritten and the comments will be taken into consideration
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	76	-	-	-	-	-	3.10	This table is highly debatable and should better be removed. I don't believe any double-digit 5-year forecast, not about cost, but certainly not about price (unclear what is what, by the way). Moreoever: what do we learn from this?	This section will be rewritten and the comments will be taken into consideration

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	76	-	-	-	-	-	3.30	You need the caveat that the module costs are only half of installed PV costs. BOS is more formidable.	This section will be rewritten and the comments will be taken into consideration
Peter Johnston (Environmental & Energy Consultants, Ltd)	3	77	9	77	10	-	-	-	"levelized cost of energy ... 0.145 to 0.363 $/Wp" but Wp is power, not energy. Should be kWh, not Wp??	This section will be rewritten and the comments will be taken into consideration
Rainer Walz (Fraunhofer Systems and Innovation Research)	3	77	6	77	7	-	-	-	check wording and dates; the reader will be surprised to see that prices in the first quarter of 2010 are quoted in a publication from 2009	This section will be rewritten and the comments will be taken into consideration
Robert Pietzcker (PIK)	3	77	11	77	13	-	-	-	Give a value for which irradiance these numbers were calculated (e.g., ¿ca 1500 kWh/yr¿)	This section will be rewritten and the comments will be taken into consideration
Steffen Schlömer (IPCC WGIII)	3	77	6	-	7	-	-	-	How can you get cost data for the first quarter of 2010 from a source that has been published in 2009?	This section will be rewritten and the comments will be taken into consideration
Ole Grimsrud (Scatec AS)	3	77	8	77	13	-	-	-	In line 9, a LCOE of $0.145/kWh is mentioned - a lower number than the ¿0.17/kWh in line 12 (note: different currencies means the $ difference is larger). In areas with high solar irradiation, the LCOE is even lower than that - may be a good idea to have more recent data here as well, and in sunnier areas. Photon International's 2010 report "The true cost of Solar Power" may be a good reference.	This section will be rewritten and the comments will be taken into consideration
Norway (Climate and Pollution Agency)	3	77	8	77	13	-	-	-	In line 9, a LCOE of $0.145/kWh is mentioned - a lower number than the ¿0.17/kWh in line 12 (note: different currencies means the $ difference is larger). In areas with high solar irradiation, the LCOE is even lower than that - may be a good idea to have more recent data here as well, and in sunnier areas. Photon International's 2010 report "The true cost of Solar Power" may be a good reference.	This section will be rewritten and the comments will be taken into consideration
Robert Pietzcker (PIK)	3	77	6	77	7	-	-	-	It is interesting/ troubling that a reference from 2009 can give exact values for 2010 prices ?!?	This section will be rewritten and the comments will be taken into consideration
Robert Pietzcker (PIK)	3	77	14	77	18	-	-	-	Please comment that these targets seem very optimistic when contrasted with reality	This section will be rewritten and the comments will be taken into consideration
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	77	4	6	7	-	-	-	the first quarter 2010 data have a citation being of 2009. Either it is a forecast or the reference should be from 2010	This section will be rewritten and the comments will be taken into consideration
Oluf Ulseth (Statkraft AS)	3	77	11	-	12	-	-	-	When projecting costs, it could be good to mention that the cost reduction is dependent on a heavy build out of PV (same pace as in 2009-2010). The reference is to a source within the supply industry for PV. It could be wise to consider a different and more independent reference, to reconsider the statement of cost reductions, or to mention that the assumptions require a very extensive increase of installed PV. Image quality figure 3.8 and 3.9 could be improved.	This section will be rewritten and the comments will be taken into consideration
Robert Pietzcker (PIK)	3	77	9	77	10	-	-	-	you probably mean kWh, not Wp	This section will be rewritten and the comments will be taken into consideration

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	77	-	-	-	-	3.31	-	This figure conveys important and reliable information with regard to the current status of PV costs and it should appear in SPM.	This section will be rewritten and the comments will be taken into consideration
Norway (Climate and Pollution Agency)	3	77	-	-	-	-	3.31	-	This information refers to 2007, which is not relevant any more - therefore, I propose taking out this figure. (More recent data for the same parameters is presented on page 78, lines 4 to 10.)	This section will be rewritten and the comments will be taken into consideration
Robert Pietzcker (PIK)	3	78	28	78	30	-	-	-	Please state the current price for hydrogen produced conventionally so the reader can compare	to be done
Robert Pietzcker (PIK)	3	78	28	78	30	-	-	-	Please state the current price for hydrogen produced conventionally so the reader can compare	to be done
China (China Meteorological Administration)	3	78	1	78	3	-	3,32	-	Confused by the data. PV cost is about double of the tower solar thermal cost. Are these theoretical data or practical data? If PV is more expensive than solar thermal power, why has PV been developed so rapidly?	The figure has to be considered and other references will be looked for
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	78	-	-	-	-	3.32	-	Delete this diagram. This overly optimistic forecast is already outdated.	The figure has to be considered and other references will be looked for
Gerrit Hansen (TSU)	3	79	10	-	14	-	-	-	both sentences are not clear and should be rephrased.	This paragraph will be rewritten and part will go to Ch 1 and 10
Gerrit Hansen (TSU)	3	79	7	-	27	-	-	-	please rephrase paragraph, it uses unscientific language and its content does not become very clear to the reader. The different accounting methods are explained in length in the methodoly Annex, which should be referenced.	This paragraph will be rewritten and part will go to Ch 1 and 11
Robert Pietzcker (PIK)	3	79	2	79	3	-	-	-	What does ¿with renewable power costs of 2-4ct/kWh¿ mean? Which renewable power generates on average such cheap electricity?	to be considered
Robert Pietzcker (PIK)	3	79	2	79	3	-	-	-	What does ¿with renewable power costs of 2-4ct/kWh¿ mean? Which renewable power generates on average such cheap electricity?	to be considered
Norway (Climate and Pollution Agency)	3	80	-	-	-	3.9.2	-	-	The deployment scenarios described herein are extremely conservative given the recent development in PV cost, and the rapid scaling of the industry. This should be updated.	Graphs come from Ch 10, if new figures are provided, they will be included here
Ole Grimsrud (Scatec AS)	3	80	-	-	-	-	-	3.11	This table includes total solar installations in 2000 and 2010, relying on estimates from 2008 (which probably again were based on data older than 2008). The range of forecasted PV installations in 2010 is stated as 10 - 27 GW. In fact, the cumulative installed capacity at the end of 2009 was around 21 GW (source: SolarBuzz), and expected installations for 2010 are commonly expected to be around 15 GW, so that the cumulative installations at the end of 2010 should be around 36GW, higher than even the most optimistic scenario given in table 3.11. Please consult SolarBuzz for updated forecasts for 2010. In the table, therefore, 2000 is an irrelevant reference year, use instead 2009 since data are available for this year, and perhaps add in forecasts for e.g. 2020.	Table will be updated

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Taishi Sugiyama (Central Research Institute of Electric Power Industry (CRIEPI))	3	81	-	83	-	-	-	-	This diagram is highly missleading. Remove the error bars and error boxes. This diagram misleads the readers that the box bars show the conclusion by the report and error bars are not important. However, the frequency of the reports are nothing to do with the probability. To avoid such confusion, just show the range by lines and shadows to show the range of reports, remove boxes and bars that look like probability range.	Graphs come from Ch 10, if new figures are provided, they will be included here
Gerrit Hansen (TSU)	3	83	20	85	19	-	-	-	according to the OOA, this sections should discuss the conditions and policies needed for the feasibility of high deployment pathways. While the text does stick to the required bold subheadings, it does not seem to follow a stringent argument, but rather present new facts and repeats conclusions from the text in an unconnected way. TSU urgently recommends to rewrite these pages with a clear line of argument. the industry-driven scenarios that are introduced under "regonal deployment" might be better placed in the (so far missing) discussion of chapter 10 results vs. even higher scenarios.	Missing: discuss "conditions/policies" more accurately
Robert Pietzcker (PIK)	3	83	22	84	2	-	-	-	Delete ¿ it seems as if a paragraph from the introduction was suddenly transferred to this chapter ¿ for no apparent reasons	The paragraph will be rewritten
Robert Pietzcker (PIK)	3	83	22	84	2	-	-	-	Delete ¿ it seems as if a paragraph from the introduction was suddenly transferred to this chapter ¿ for no apparent reasons	The paragraph will be rewritten
Dave Renne (National Renewable Energy Laboratory)	3	83	22	84	2	-	-	-	Repeats information already given at the beginning of the chapter	The paragraph will be rewritten
()	0	84	32	0	0				text ourdated	change text to "The results of the …. Are expected by end 2010"
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	86	-	98	-	-	-	-	In Chapter 3, the references having 12 pages are too long, at least the references from the same author's may be removed .	References standardly used across the report
Dave Renne (National Renewable Energy Laboratory)	3	86	-	98	-	-	-	-	References are missing citations to IEA/SHC Task 36 and SWERA.	References will be added
Dave Renne (National Renewable Energy Laboratory)	3	86	-	98	-	-	-	-	The formatting of the references in this section makes them hard to distinguish, compared with the formatting of references in other sections	References will be formatted
Greece (National Observatory of Athens)	3	87	47	87	50	-	-	-	Is it necessary to have two references on two editions of the same book ?	Just the newer edition will be left
Greece (National Observatory of Athens)	3	89	12	89	13	-	-	-	Incomplete reference	Reference will be completed
Finland (Finniah Meteorological Institute)	3	89	45	-	-	Refer.	-	-	author name in the reference ; Gratzel, should read Grätzel	to be done
Greece (National Observatory of Athens)	3	90	18	90	19	-	-	-	A more recent second edition is available	to be updated

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	92	37	92	40	-	-	-	What's so unique about these refs that they are repeated/referenced sequentially ? Is it justifiable to include all of them ?	It a monthly newletter with industry letter. All of the are needed. Reference ot 2001 has to be checked
Finland (Finniah Meteorological Institute)	3	94	1	-	-	-	-	-	author name in the reference ; Gratzel, should read Grätzel	to be done
Greece (National Observatory of Athens)	3	94	33	94	35	-	-	-	What's so unique about these refs that they are repeated/referenced sequentially ? Is it justifiable to include all of them ?	It a monthly newletter with industry letter. All of the are needed. Reference ot 2001 has to be checked
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	98	9	-	-	-	-	-	Needs to add a reference, "Hongguang Jin, J. Sui, H.Hong, Z. Wang, D. Zheng, Z.Hou,2007; Prototype of middele-temperature solar receiver/reactor with parabolic trough concentrator. ASME, J. Solar Energy Engineering, 2007,Vol.(129) 378-381)"	Reference will be considered and if appropriate added
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	98	10	-	-	-	-	-	Needs to add a reference,"H.Hong, Hongguang Jin, B. Liu, 2006; A novel solar-hybrid gas turbine combined cycle with inherent CO2 using chemical-looping combustion by solar heat source. ASME, J. Solar Energy Engineering, 2006,Vol.(128) 275-284)"	Reference will be considered and if appropriate added
Australia (0)	3	-	-	-	-	-	-	-	A number of differing solar PV technologies appear to be considered collectively in terms of maturity and economic analysis, whereas this may not be the case.	Done across the chapter
Cédric Philibert (International Energy Agency)	3	-	-	-	-	-	-	-	Also missing in this report are the possible uses of solar energy for artworks, such as cooking potteries with lower problems created by ashes. See, e.g., http://four-solaire.fr/marocains.htm	In the framework of this report this means too much detail
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	-	-	-	Another key omission from this chapter is any reference to the IEA/SHC Task 36 ""Solar Resource Knowledge Management"", an ongoing program of the IEA that produces and disseminates a variety of solar products, and the recently-completed MESoR (Management and Exploitation of the Solar Resource) Project funded by the EU and managed by DLR, and which mirrored the work being done in Task 36.	it will be checked
Gonzalo Piernavieja (Instituto Tecnológico de Canarias (ITC))	3	-	-	-	-	-	-	-	As stated above, I would suggest to almost eliminate descriptive technical parts (e.g. description of the physical operation of a solar cell) as well as exhaustive references about solar radiation resource potentials	The chapter will be shorttened
Patrick Matschoss (TSU)	3	-	-	-	-	-	-	-	check definitions in glossary: p. 6, l.1-2; p. 7, l. 23-30; liaise with chapter 1 if not consistent	it will be checked
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	-	Congratulations to the authors: Some parts of chapter 3 have greatly improved since FOD, e.g., the synthesis, solar fuel chapters, ...! However, several others still could be significantly improved, e.g., 3.2.1?, 3.3.2, 3.5, 3.5.2, 3.5.4, 3.8.2, 3.8.4, while others could benefit from better structuring: 3.3.3, 3.3.5, 3.4.1, 3.6.2, 3.7.2,	The parts commented will be reviewed, most of them need rewriting and shortening, structure will be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	-	Delete	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Cédric Philibert (International Energy Agency)	3	-	-	-	-	-	-	-	Direct solar represents the largest renewable energy resources by several orders of magnitude and includes three technology areas - solar heating and cooling, photovoltaics and concentrating solar power (and fuels), which are each very important. Therefore, this reviewer is unwilling to make suggestions on how to shorten the current draft. Furthermore, this draft lacks any appropriate reference to long-range in-borders and cross-borders transportation of solar electricity as illustrated by the DESERTEC and Transgreen industry initiative, and the Mediterranean Solar Plan of the Union for the Mediterranean. However, some paragaphs relating to the externalities of competing energy sources could be cut and find their way in other chapters.	The chapter has to be shorttened and any integration issue are dealt in Chapter 8
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	-	Executive Summary: Good!	Accepted
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	-	-	-	General comments: This chapter is much improved over the SRREN Draft 1. Some work is still required to harmonize the chapter better to avoid duplication and to assure important topics have not been missed. More recent references could be used in many places. Nevertheless, I appreciate the challenges in producing a current up-to-date document given the prolifieration of publications on the subject, and especially with other key documents, such as the World Energy Outlook 2010 and the Global Energy Assessment soon to come out, in parallel with this document.	This very new reference that came after the submission of SOD will be put in now
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	-	-	-	I do not see much information on how solar resources are derived (either direct measurements or use of models applied to satellite images or cloud cover data sets).	Put a reference on where to find this info (paper or text books). Put like "The details on how they are measured and calculated can be found in …"
Herbert Wade (none)	3	-	40	46	-	-	-	-	I question the validity of the ""widely used"" statement for solar cooking. In a very few countries this appears to be true but most developing countries do not embrace this technology. Only those countries with severe shortages of biomass have done so.	Page missing. Will be considered
Herbert Wade (none)	3	-	-	-	-	-	-	-	Little mention of the need for energy storage to support PV installations both in off-grid situations and in massive grid-connected systems where penetration exceeds 20%. The lack of cost effective storage is a major barrier to developing country integration oflarge scale solar PV into grids.	For the grid issue belongs to Chapter 8 "Integration". Off-grid PV will be checked
Ladislaus Rybach (Geowatt AG Zurich (company))	3	-	-	-	-	-	-	-	My comments to Chapter 3 of the FOD have been considered, except: The Executive Summary still needs to include more numbers, especially about costs.	it will be considered
Peter de Haan (Ernst Basler + Partner AG)	3	-	-	-	-	-	-	-	no comments from Reviewer P de Haan	Accepted
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	-	Often, there are sentences with a) ¿ b).... c).... Readability would be increased if you used numbered lists or bullet points	it will be done when possible
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	-	Shortening the text: There are many instances in which information is given repeatedly, or commonplaces are stated. These could be removed to achieve the required shortening of the chapter by 16 pages	the chapter has to be shorttened

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	-	Structuring: As Solar technologies comprise so different technologies and end-products (electricity, heat, light), it would greatly improve readability to return to more (at least 4, possibly 5) levels of headings! Right now, only 3 levels are used and further subdivisions are formatted by using bold or italic print, making the distinction between higher and lower hierarchy difficult. (the 4th level need not appear in the TOC, but it should be more distinct in format style than simply bold within a normal sentence)	TSU requested less headings in previous edits
Cédric Philibert (International Energy Agency)	3	-	-	-	-	-	-	-	The quasi absence of any mention to the DESERTEC, Mediterranean Solar Plan and Transgreen concepts (except for a misplaced mention about VLPV systems) is an important shortcoming of the current draft. One possibility would be to include a para not only on the EU-MENA export possibilities (although likely the largest ones in the world) but also some others, say, in the case of CSP, as it calls for very good DNI more concentrated on earth than global radiation usabble for PV. The IEA r-oadmap for CSP provides for various mentions of possible long-range transportation of CSP electricity, some inside large countries (the US, China, India), other cross-borders (from NA and ME to EU, of course, but also from NA and SA countries to equatorial Africa, from Chile and Peru to Brazil and Argentina, from Mexico to the USA, from Central Asian Countries to Russia, from Australia to Indonesia...)	Integration is treated in Chapter 8
Gian-Kasper Plattner (IPCC WGI TSU, University of Bern)	3	-	-	-	-	-	-	-	very lengthy sections on fundamentals of solar physics etc. -- are those needed in a Special Report? Why not just referring to textbooks?	the chapter has to be shorttened
Greece (National Observatory of Athens)	3	-	-	-	-	3.1.1	-	-	Add a brief note on solar cooling.	Already mentioned in the introduction
Gerrit Hansen (TSU)	3	-	-	-	-	3.1.1	-	-	Section needs some editorial work on language; Intuitively, a reference to the origin and use of PV in space research, to the first CSP plants and to the use of "passive solar" e.g. in agricultural processing seems to be missing.	The text is being shorttened and edited. The references given are too detailed for the purpose of the Report
Gerrit Hansen (TSU)	3	-	-	-	-	3.1.2	-	-	Following the heading "theoretical potential and nature of resource", the reader might expect a reference to variability, seasonality and spatial distribution of solar energy, and possibly a reference to direct and diffuse irradiation (as delivered in 3.2.1 on page 7, 44-47 and page 10, ln 1-10 and in 3.2.2). Authors might consider to amend this section or to move the relevant information from the mentioned parts of 3.2 to 3.1.2.	The authors are confortable with present structure. The ides of direct and diffuse irradiation will be checked and if necessary will be included
United States (U.S. Department of State)	3	-	-	-	-	3.1.2	-	-	The three paragraphs in section 3.1.2 should be condensed into a single, shorter paragraph of about half the length of the three.	Text will be shorten
Gerrit Hansen (TSU)	3	-	-	-	-	3.1.3	-	-	Please consider changing the title of this section (e.g. cutting the "various")	Will be done
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	3	-	-	-	-	3.1.4	-	-	Whole section 3.1.4 probable not necessary.	All the technology chapters agreed to have it as part of the OOA

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	-	-	-	-	3.2.1	-	-	In this section only solar electricity technical potential is presented, i.e. PV and CSV technologies. On the other hand Domestic Solar Hot Water Systems (DSHWS) are the most widespread, easy to use, cost and environmental effective solar technology with a vast technical potential. In the case of Greece, one of the leading countries in DSHWS use, the maximum technical solar DSHWS potential has been estimated (Tsilingiridis et al, 2010) at 9.73 million m² of solar collectors, 2.7 times the 2007 installed collectors area, which was 3.57 million m².	To be included
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	3	-	-	-	-	3.2.1	-	-	The section is very complete and could be shortened.	will be shortened
Gerrit Hansen (TSU)	3	-	-	-	-	3.2.1	-	-	This section would benefit greatly from a clearer structure (e.g. an overview table for all studies cited), and introduction of terms/assumptions (e.g. what renders a land suitable for PV/CSP, are distributed/roof-top installations included, (how) is solar heat represented) before they are discussed in detail with regard to a particular study's outcome. The section contains a lot of valuable information which is not easily accessible to the reader. If the Nakicenovic et al. 1998 assessment is used, it might be helpful to insert a short note on why it is still up to date and chosen as a basis for own calculation. How (and by whom) the values in table 3.1 have been derived could be explained more clearly. According to the OOA, this section should cover technical potential, not economic potential. If economic potential is discussed, it should be made clear why this is particularly relevant for solar energy, and also referenced to chapter 10 and 3.4/3.9.	Table 3.1 will be changed. The assessment used is a very generic approach and still valid (used for AR4 of IPCC). Comparison of the different studies will be put in a Table, and the text shortened. The economic potential will be given to Chapter 10 (page 9 line 18 to 29)
Robert Pietzcker (PIK)	3	-	-	-	-	3.2.2	-	-	Better explain the differences between satellite measurements in contrast to the interpolation of ground measurements ¿ what are the relative accuracies (on an hourly, daily, weekly, monthly, yearly level)? What are adcvantages, disadvantages of the two techniques?	A reference with explanaition will be included
Robert Pietzcker (PIK)	3	-	-	-	-	3.2.2	-	-	Improve structuring by using two subheadings: ¿3.2.2.1 Measurement/Calculation methods¿ and ¿3.2.2.2 Data bases and data collecting institutes¿	No new subheading. Text will be shorten
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	3.2.2	-	-	It is quite surprising that the Solar and Wind Energy Resource Assessment Project (SWERA) is not mentioned in this chapter, although it is mentioned in the wind chapter. SWERA was a major program funded by the GEF to remove information barriers on solar resource potential for 13 countries as well as major regions around the world, and should clearly be highlighted and referenced here.	It will be added as a reference
HONGGUANG JIN (Thermophysics engineering ,Chinese Academy of Scinces)	3	-	-	-	-	3.2.2	-	-	The description of source of solar radiation data is too long, and the expression for the typical examples may be shorten.	Text will be shorten

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	3.2.2	-	-	This section contains a lot of valuable information, but is very detailed and might profit from shortening. A table presenting the different sources of solar energy data, time and spatial range of coverage, resolution etc. could greatly improve readibility and shorten the text. Information on Asia seems to be lacking. Also, it is not entirely clear to the reader, why "sources of solar radiation data" is a subsection of "resource potential". Intuitively, it appears to be more rightly placed in the technology section.	Text will be shorten
United States (U.S. Department of State)	3	-	-	-	-	3.2.3	-	-	Section is unclear and poorly written. Need to clarify the distinction between local vs global impacts of increased cloud cover and other factors.	it will be considered
Gerrit Hansen (TSU)	3	-	-	-	-	3.2.3	-	-	The section is quite short. If there is not more valid information on CC impacts on the resource base, it might still be of value to the reader if a short note on uncertainty of information and current status of research.	it will be considered
Gerrit Hansen (TSU)	3	-	-	-	-	3.3	-	-	for better readibility, you might consider introducing a 4th level (e.g. 3.3.2 active solar H&C, 3.3.2.1 Solar Heating, 3.3.2.2 solar cooling, 3.3.2.3 thermal storage, 3.3.2.4 other solar heat applications) to the technology section - TSU is conscious that we are generally encouraging a limit of 3 levels, but given the fact that solar has to cover many different technology application, this might be necessary to make the text userfriendly	No more subheadings will be considered
Gerrit Hansen (TSU)	3	-	-	-	-	3.3	-	-	The order of subsections - placing passive solar first - might be a bit confusing to the reader, as starting with the exception (passive solar not being part of the energy supply chain currently considered) makes it harder to identify and follow the general pattern of the chapter. If this order is to be kept, TSU strongly encourages clear statement on the distinctive features of passive solar in comparison to (all) other active solar technologies, in the introductory para of 3.3 and/or in the beginning of 3.3.1 (please consider also statement of TSU on subsection 3.3.1). TSU encourages authors to use the same structure as in the TS, subsumming passive solar under solar thermal (active, passive).	the authors will keep this structure and change TS
Fritz Vahrenholt (Prof. Dr.) (RWE Innogy GmbH)	3	-	-	-	-	3.3	-	-	The technical description is very extensive and sufficient.	Accepted
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.1	-	-	most of the references seem relatively old. Was there so little new work in the last years? I thought the RMI worked strongly in this field ¿ don't they have newer studies on the impact of passive solar?	If newer peer reviewed references are made available would be considered
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.1	-	-	most of the references seem relatively old. Was there so little new work in the last years? I thought the RMI worked strongly in this field ¿ don't they have newer studies on the impact of passive solar?	If newer references are made available would be considered
Greece (National Observatory of Athens)	3	-	-	-	-	3.3.1	-	-	Section 3.3.1 Passive Solar+N20 need improvement. Technologies description should be better.	Check if the reference in the text about CO2 emissions also talks about N2O. Translate N2O to CO2 equivalents (multiply by 310)

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	3.3.1	-	-	This section contains a lot of very valuable and precise information, but could greatly profit from a clearer structure, guiding the reader by giving some overview information first, followed by more technology specific detail. E.g. it would be very helpful to start with the distinctive features of passive solar technologies in comparison with the conventional, "active" energy technologies (passive gain vs. demand reduction vs. active supply). It should be clearly stated if passive solar concerns the building and heat sector only. Currently, "Passive solar" and "passive solar heating" is sometimes used as a synonym, without explicitly stating this. There is ample detail on solar architecture for moderate and cold climates, and relatively little information on design options for hot climates, which might be perceived as unbalanced by the majority of developing countries with hot climates and according energy needs for cooling rather than heating. Generally, including some detail on the different energy needs of different climates (and the passive solar potential to contribute accordingly) might be helpful as well. There is also some redundancy regarding certain topics, e.g. the importance of large equatorial-facing windows. The boundaries between energy saving technologies (e.g insulation) and passive gain (e.g. large windows) and storage (thermal masses) could be led out more clearly.	it will be considered
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.1	-	-	This section should be improved: It could benefit from a clearer structure. Also, there is lots of information given, but most of them very specific to two or three individual case studies (¿Equilibrium in Canada ¿) ¿ try to be more abstract, to generalize, to state the main messages	it will be considered
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.2	-	-	Already mentioned for FOD review: In Figure 3.5, 3 types of collectors are named (absorbers, flat-plate, evacuated). In the text and in figure 3.6, only flat-plate and evacuated-tube are shown & discussed. Later (3.	it will be considered
United States (U.S. Department of State)	3	-	-	-	-	3.3.2	-	-	Lacks discussion of troughs and dishes and applications for industrial process heating and cooling to achieve higher temperatures.	Add reference to the description of these type of collectors in CSP section
Greece (National Observatory of Athens)	3	-	-	-	-	3.3.2	-	-	Section 3.3.2 Active solar Heating and Cooling need improvement. Technologies description should be better.	Other comments required shortening or agreed with present text
Gerrit Hansen (TSU)	3	-	-	-	-	3.3.2	-	-	section generally lacks references.	it will be reviewed

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	-	-	-	-	3.3.2	-	-	Typically, solar combi systems need a specific design in order to avoid operating problems during summer, due to the oversize of the solar system compared to the low thermal demand, resulting to overheating. To handle this problem, it is possible to use a specific solar collector field configuration and connection with an expansion vessel, collector drainback, cooling devices in the collector loop, and a heat discharge loop. To reach a high solar collector efficiency, a low return temperature from the space heating loop is desirable. For example, an average increase of 10 K in the return temperature from radiators will require a 25 to 40% larger solar collector area in order to reach the same performance. Special care should also be exercised for proper thermal insulation of the large water storage tanks. Include a reference to: International Energy Agency (IEA) Task 26 on Solar Combisystems for houses and residential buildings, Solar Heating & Cooling (SHC) program, International Energy Agency. www.iea-shc.org/task26	Reference to Task 26 book will be included
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	-	-	-	-	3.3.3	-	-	Subtitles not consistent: "Wafer-based silicon technology" should have its own subtitle, like "Commercial thin-film.."	To be considered. No more subheading will be added
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	-	-	-	-	3.3.3	-	-	Subtitles not consistent: "Wafer-based silicon technology" should have its own subtitle, like "Commercial thin-film.."	To be considered. No more subheading will be added
Gerrit Hansen (TSU)	3	-	-	-	-	3.3.3	-	-	The PV chapter contains a lot of well researched (technical) detail which might be condensed to some extent to shorten the overall text. Some of the information here would be expected to appear in 3.5, 3.6 or 3.7. you might consider moving relevant sections, or else inserting a reference in sections 3.5, 3.6, 3.7 as in general in subsection 3.3, the introduction of a 4th level of heading might prove useful to increase readibility, e.g. 3.3.3.1 photovoltaic effect, 3.3.3.2 existing PV technologies, 3.3.3.3 Emerging technologies etc	To be considered. No more subheading will be added
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.4	-	-	In general, this section was much improved. What is still missing is a short discussion of ¿solar multiples¿ (on page 29, l 35, it is only said ¿see IEA 2010a). A place where this could be explained would be the section about thermal storage, p30, lines 29-40 ¿ there you could add something like ¿introducing thermal storage increases the land use per MW capacity, as larger solar collector areas are needed. However, total energy output increases likewise. As thermal storage increases load hours and thus the installed turbine is used longer, storage may actually decrease the cost per kWh of electricity.¿ . The ¿thermal storage¿ part has much improved since the last draft.	it will be considered
United States (U.S. Department of State)	3	-	-	-	-	3.3.4	-	-	Recommend a sentence saying it's possible, after line 14, page 31.	It will be included
Greece (National Observatory of Athens)	3	-	-	-	-	3.3.4	-	-	This section discuses only solar power generation. Thermal energy of high temperatures for industrial applications are excluded, as well as solar furnaces. Is that omission on purpose?	Industrial applications are in section 3.3.2. Solar furnaces were not included because they are research only
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.5	-	-	add a reference to chapter 8.2.3/8.2.4, where liquid/gaseous fuels are discussed	It will be shortened and restructured

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	3.3.5	-	-	Current order of text is slightly confusing, it might be helpful to the reader if consistent names for processes were used, and the order of appearance in the text conincide with the structure suggested by Figure 3.12 (e.g first all water based processes, than decarbonization).	It will be shortened and restructured
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	-	-	-	-	3.3.5	-	-	I find this a confusing and perhaps a bit biased section. It is probably useful to start by explaining that we do have commercial technologies for solar heat and for solar electricity (PV and CSP), but not yet for solar fuel generation. This is thus the "missing link" in the basic set of forms in which we use energy. The section is missing a clear structure and none of the figures gives a comprehensive overview of options and routes. Further, it mixes truly sustainable and quasi-sustainable options (involving fossil fuels) . It is unclear and should thus be explained (although experts may have a clue) why we need concentrated (i.e. not 1 sun) solar energy. Further, the photochemical and photobiological routes are not discussed in any detail. Why is that? Etc. Comments also apply to section on page 44 and 68/69.	it will be considered. Nevertheless photochemical and photobiological production is in Section 3.7.5.
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	-	-	-	-	3.3.5	-	-	I find this a confusing and perhaps a bit biased section. It is probably useful to start by explaining that we do have commercial technologies for solar heat and for solar electricity (PV and CSP), but not yet for solar fuel generation. This is thus the "missing link" in the basic set of forms in which we use energy. The section is missing a clear structure and none of the figures gives a comprehensive overview of options and routes. Further, it mixes truly sustainable and quasi-sustainable options (involving fossil fuels) . It is unclear and should thus be explained (although experts may have a clue) why we need concentrated (i.e. not 1 sun) solar energy. Further, the photochemical and photobiological routes are not discussed in any detail. Why is that? Etc. Comments also apply to section on page 44 and 68/69.	It will be shortened and restructured
Greece (National Observatory of Athens)	3	-	-	-	-	3.3.5	-	-	Text in section 3.3.5 should be reduced; it is too lengthy	It will be shortened and restructured
Janne Halme (Aalto University School of Science and Technology)	3	-	-	-	-	3.3.5	-	-	This section has expanded quite a bit and should be shortened.	It will be shortened and restructured
Robert Pietzcker (PIK)	3	-	-	-	-	3.3.5	-	-	this section has much improved since FOD, but it still could be improved by using a clearer structure. Try using the same words when talking about the same thing ¿ why switch between ¿eletrochemical route¿ and ¿eletrolysis¿, why switch from ¿thermochemical¿ to ¿thermolysis and thermochemical cycles¿?	It will be shortened and restructured
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.1	-	-	Already mentioned for FOD: It is good that you give numbers for installed power (MW, GW) ¿ however, it would also be very interesting to have some numbers on energy (Mwh) ¿ how much of the total current (domestic) heat energy is supplied by solar water heaters? What capacity factors do solar heating systems show in practice? You state a projection by ESTIF for 2020, but what is the current status?	No peer reviewed data available

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.1	-	-	In general, this section is ok. The weighting seems somewhat surprising: 3.5 pages for active solar, 1.5pages for PV, 1.5 pages for CSP ¿ maybe shorten the active solar part (several paragraphs repeat information given before). Also, state (estimated) numbers for the total market volume at the beginning of each subsection ¿ how many billion US$ are the 19GW solar thermal, the 10GW PV, the 0.3GW CSP market worth in 2009?	Text will be shortened and updated
Gerrit Hansen (TSU)	3	-	-	-	-	3.4.1	-	-	Section generally bears a lot of detail, which might be condensed. It would also profit from presenting numbers in a more structured way, and cut redundant information. Please make sure to reconcile with information in 3.3 and 3.8 to avoid overlaps. Numbers from REN21 should generally be updated with the latest available data (REN21 2010). To include some information for passive solar; e.g. market share of solar buildings might be considered. if omitted, you may opt to shortly notice that this technology rather reduces demand than producing energy. you might also consider to move the according information from section 3.3 to this section. The section of solar thermal applications has considerable redundancies and could be shortened without loss of information. Section on PV is concise. Section on CSP should be checked for overlaps, Solar fuels contains concise information, but also displays some details that seem out of context and are phrased in unscientific language.	Text will be shortened and updated
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.1	-	-	Subsection ¿active solar¿: This section should be shortened! Most of page 40 can be deleted -it provides too much detail information about individual small markets. Reformulate so that the main message is clearly stated: different countries (even in the EU) have very different market sizes and very different usage rates for solar thermal. This is not primarily due to different solar radiation, but rather to differing local policies, regulations and market stimulation programs.	Text will be shortened and updated
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.1	-	-	Subsection ¿passive solar¿: add a sentence like ¿the concepts presented are widely used, but they are rarely the focus of architecture, thus they are still not implemented as comprehensive as could be, and little monitoring exists¿. Do you maybe have some numbers on installed capacities for high insulation windows?	No peer reviewed data available
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.1	-	-	Use subheadings (3.4.1.1 for passive, 3.4.1.2 for active, ¿)	No more subheadings will be considered
Greece (National Observatory of Athens)	3	-	-	-	-	3.4.2	-	-	Section 3.4.2 does not provide much new information related to the main section title. Actually, some of the material presented in this section are very closely related to similar information presented in section 3.4.1 On the other hand, a good example of how this section should be written is the part on PVs	The installation data will be moved to section 3.4.1

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.2	-	-	This section has improved, but it still needs some work! I would advise to reduce the statements of MW and GW for final products (this information has been given in 3.4.1) and state more clearly information about the current industry status (few large/many small players, large growth, flexible/static industry, are completely new production technologies required or can existing technologies be adapted after minor changes) as well as possible bottlenecks in the production, especially given the near-term scaleup plans. Very little of these information are given.	The installation data will be moved to section 3.4.1
Gerrit Hansen (TSU)	3	-	-	-	-	3.4.2	-	-	This subsection is mainly aimed at providing information about the industry's capacity and readiness to upscale production, and identify potential bottlenecks in the (material) supply chains. Some of the information presented here by authors seems out of context, meaning it is valuable information on, e.g., materials used, or factors that influence the market, that might be better placed in other subsections.	The installation data will be moved to section 3.4.1
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.2	-	-	Use subheadings (3.4.2.1 for passive, 3.4.2.2 for active, ¿)	No more subheading will be added
Robert Pietzcker (PIK)	3	-	-	-	-	3.4.3	-	-	Adding this subsection has improved section 3.4!	Accepted
Robert Pietzcker (PIK)	3	-	-	-	-	3.5	-	-	It is important that you add a section about the question of standards and regulation for connecting small-scale PV to the grid! This has a very strong influence on the development of PV markets. If one compares the German and Italian PV markets from 2005-2009, the economical conditions were similarly good in both countries, but the process of connecting a PV system to the grid was not well standardized and enforced in Italy ¿ thus, very few installations took place! It is of utmost importance that regulators are aware of this problem and address it right from the beginning.	We agree with the statement but there is no peer review literature on this
Gerrit Hansen (TSU)	3	-	-	-	-	3.5	-	-	please reconcile this section with the according section(s) in 3.3, e.g in the PV text there are long paragraphs on off grid and grid systems that might be better placed here.	Difference between technology description and integration was made
Robert Pietzcker (PIK)	3	-	-	-	-	3.5	-	-	This section has somewhat improved, but still needs work. It is missing a short section 3.5.6 ¿Solar and Wind¿ describing that in several regions of the world, the seasonal availability of solar and wind is shifted, so that a combination of both can lead to a relatively even energy production. (see, e.g., ¿Seasonal optimal mix of wind and solar power in a future, highly renewable Europe¿ by Dominik Heide et al. in ¿Renewable Energy¿ 2010)	This is for Chapter 8 Integration

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Robert Pietzcker (PIK)	3	-	-	-	-	3.5	-	-	This section needs restructuring. One possibility (as mentioned for FOD review): The main problem/question of integration of solar electricity into the energy system is ¿intermittence/variability¿ and the resulting needs for storage, demand side management and larger spatial interconnection. This is almost not discussed. I would advise to restructure the text into 4 new subsections: a) connection to the grid (including standards and problems), b) intermittency and demand fluctuations c) overcoming these problems through i)storage ii).through demand side management iii) ...through spatial linking. Here you can include some of the text/data from 3.5.4, and also talk about HVDC transmission lines and the DESERTEC project. d) Off-grid applications & low-capacity electricity demand	It was agreed that the general integration issues were dealt in Chapter 8 Integration
Gerrit Hansen (TSU)	3	-	-	-	-	3.5.1	-	-	This section is confusing in structure and content. From the heading, one would expect an emphasis on the integration of passive solar technologies into the broader energy system - this issue is barely addressed. Instead more detailed information on integrating PV and other solar components into the building envelope are given. It is strongly suggested to either restructure this section to include both tops, or move the technical details to section 3.3 and amend here some information on demand-side effects of solar buildings on the utility level. please make sure this is reconciled with 3.5.3.	The general things are dealt in Chapter 8, only specific issues are considered here
Robert Pietzcker (PIK)	3	-	-	-	-	3.5.2	-	-	Already mentioned for FOD review: This section should be rewritten. The topic is really important, but in my view, in the current text the main messages are hidden under lots of unimportant information (who cares if PV can also be used as a cetntralized source in a section that specifically talks about low-capacity use?) or formulated in a way that I as a reader do not understand them. As far as I have read in other sources, the logic for off-grid systems usually is ¿it would be more expensive to build a grid to some remote village than to install local PV/CSP¿ (or that you don't have the required capital for building a grid). Why not state this? It is ¿ in my opinion ¿ a very strong argument for off-grid PV installations. What other metric would you use to come to a decision? What are the benefits local people get from a PV installation that they would not get from grid connection? I think building a PV installation does not create much more local jobs than setting up a grid. You pose it as if the decision would be ¿local PV vs. coal-power-plants¿ when it is in fact two decisions ¿local PV vs. grid-connected¿ and ¿Solar vs. fossil power plants/energy imports¿. Stick here to the discussion of the first decision.	Section to be rewritten
Gerrit Hansen (TSU)	3	-	-	-	-	3.5.2	-	-	section lacks reference and is partly confusing, needs to be restructured	Reference will be added
Greece (National Observatory of Athens)	3	-	-	-	-	3.5.3	-	-	It may be appropriate to also include address "district cooling"	If an refence can be found it will be added. Please provide reference if you have it
Gerrit Hansen (TSU)	3	-	-	-	-	3.5.4	-	-	Smoothing effect needs to be more clearly defined at the beginning. Many studies are being presented, without information on their outcome being provided. This is somewhat confusing and should be either explained more clearly, or section should be amended.	It will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	-	-	-	-	3.5.4	-	-	This section is cryptic and incomplete. Needs to be cross-checked with solar material in the Integration Chapter (8). It is an important topic and needs more complete discussion. See comments on pages 26 and 27. Seek input from grid integration experts (Kroposki at NREL and Ellis at Sandia.)	It will be considered
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	3.5.4	-	-	This section seems to lack any reference to the extensive work on PV variability and grid integration that has been done in the U.S. over the past 3-5 years (see for example Kroposki's Renewable Systems Integration study, which is referenced elsewhere in this chapter).	It will be considered
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	3.5.5	-	-	As mentioned in previous sections, modern-day CSP plants are being designed with storage systems derived from the solar resource, and this type of storage should be mentioned in this section as well, not just ICS.	It will be considered
Gerrit Hansen (TSU)	3	-	-	-	-	3.5.5	-	-	first sentence is not clear.	To be rephrased
Pekka Pirila (Aalto University)	3	-	-	-	-	3.6.1	-	-	The existence of environmental and social benefits is the principal motivation for considering RE. They are typically the main goal in switching to RE and are included in considerations in this manner. Including them at the same time in another way would be double counting. Comparison with non-solar technologies belongs mainly to other parts of this report, where it can be presented in more uniformly objective manner. The related Figure 3.23 may be grossly misleading due the extremely large variability in the form and extent of land use of other forms of energy generation. These problems cannot be properly addressed in a chapter on solar energy.	Authors will try to put this in another chapter. If this is not possible, it will be kept here
United States (U.S. Department of State)	3	-	-	-	-	3.6.1	-	-	This section 3.6.1 on Environmental Impacts is poorly written and organized. Recommend removing table 3.4--it does not belong here. Also remove the notes about the table (lines 9-11). This section needs to open with a discussion of benefits of displacing fossil fuels, second: the potential impacts associated with land-use, and lastly the impacts of toxic materials. Recommend substituting tables 3.5 and 3.6 with estimates of emissions displacement.	Done. Deleted
Robert Pietzcker (PIK)	3	-	-	-	-	3.6.1	-	-	This section has improved, but it can still be improved further. Remove commonplaces and results about general environmental impacts that do not influence the discussion of environmental impacts of solar technologies, e.g., table 3.4	Table 3.4 will be changed to include only materials that are important for solar
Robert Pietzcker (PIK)	3	-	-	-	-	3.6.2	-	-	Already mentioned for FOD review: please introduce subsections to structure the text for the reader, e.g., ¿off-grid PV electricity¿, ¿solar cooking¿, maybe ¿solar desalination¿	The authors considers no subsections are needed
Gerrit Hansen (TSU)	3	-	-	-	-	3.6.2	-	-	please reconcile this section with chapter 9, esp. for the discussion of indoor air pollution and distributed solar in DC context. You might consider to revisit the topics of a) passive solar and behaviour/social acceptance, that is briefly touched upon in 3.3, b) vulnerability and challenges of cross-country/undersea HVDC lines associated with CSP in some areas of the globe. The section might profit from a clearer structure, sorting content either (as before) by technology, or by impact.	Reconcile with Chapter 9: it will done. Vulnerability is an integration issue (chapter 8). The text is already sorted by impacts.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Pekka Pirila (Aalto University)	3	-	-	-	-	3.6.2	-	-	Social impacts are in the subject area of Chapter 9, where they can be presented in right context. The fact that low-power isolated solar energy systems may have great social value not proportional to the amount of energy produced should be emphasized more clearly in the report even if its influence on GHG emissions may be small. In such cases the relevant cost is the total cost of the service not the unit cost of energy.	We were specifically asked to add this Section.
Greece (National Observatory of Athens)	3	-	-	-	-	3.6.2	-	-	This section should be shortened.	will be shortened
Greece (National Observatory of Athens)	3	-	-	-	-	3.7	-	-	The section is missing the technology improvements and innovative character as its title implies, in several of its subsections. Section 3.7 needs to be carefully revised and provide relevant references.	To be revised and refered
Gerrit Hansen (TSU)	3	-	-	-	-	3.7.1	-	-	it is not entirely clear on what basis technologies are presented here (as "prospects for improvement and innovation) or in the underlying tech chapter. If both sections could be reconciled with the aim to categorize "established" vs. "future" technologies, that would add considerable value to the section.	The section wil be reviewed and if needed part will be moved to section 3.3.
United States (U.S. Department of State)	3	-	-	-	-	3.7.1	-	-	Some discussion is provided of passive solar buildings, but what is needed are smart buildings with energy generation and use optimized. This is not mentioned, but is likely to be very important to the future of distributed PV and solar space heating and cooling.	It will be considered
Greece (National Observatory of Athens)	3	-	-	-	-	3.7.1	-	-	This section presents the possible near future application fields, rather than the technology improvements, and somehow repeats section 3.2. Needs to be re-written. In addition, the section is really missing the technology improvements and innovative character (as the section 3.7 title implies) and lists issues that are limited to rather fundamental design principles like, for example, night shutters, materials with high solar reflectivity and emissivity, using ground and water as a heat sink etc. The section should also include some relevant references.	Authors can only use peer reviewed literature (were the work is already "old"). More references will be looked for.
Gerrit Hansen (TSU)	3	-	-	-	-	3.7.2	-	-	first para is confusing, as the "active solar building" would considerably rely on technologies that are described in the "passive solar" section. Please try to make those overlaps more explicit, and crossreference the relevant passive solar sections. Also, the repeated reference to the ESTTP is not an appropriate nor comprehensive way of presenting this subject.	Line 28 to 35 of page 63 will be reconsidered
Greece (National Observatory of Athens)	3	-	-	-	-	3.7.2	-	-	Needs to be enhanced to cover the technology improvements and innovation necessary for solar cooling. A good source is to look at relevant IEA tasks and currently ongoing efforts.	It will be considered
Gerrit Hansen (TSU)	3	-	-	-	-	3.7.3	-	-	This section needs to be rewritten. Please refrain from "listing" and narrative style (first, we look at, second¿), and include scientific references. Parts of the section are literally repeating text from subsection 3.3.3 (PV systems), and the section uses unscientific language over wide parts without giving appropriate if any references for statements.	Section to be rewritten
Gerrit Hansen (TSU)	3	-	-	-	-	3.7.4	-	-	this section is concise. However, it might be helpful to shorten overall length and improve readability if authors could reconcile all relevant sections and minimize the overlaps and redundancies	to be shortened

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	3.8	-	-	Section should be structured more closely to the requirements of the OOA, reporting a) factors that affect costs, b) historical trends (e.g. capital costs, O&M costs, performance etc.), c) current conditions and d) potential for further reductions in the cost of Energy (e.g. learning curves, engineering models, LCOE...) and explicitly state where this is not viable!	The section has to be rewritten and the structure required will be applied for each technology
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.1	-	-	Already mentioned for FOD review: This section needs to be improved! The figures are of bad quality & missing references. The whole text uses only two references (one old from 1991) ¿ there have to be more studies on this subject. The Rocky Mountains Institute has been working and publishing for decades on passive solar.	There is no peer reviewed data available
Greece (National Observatory of Athens)	3	-	-	-	-	3.8.1	-	-	The section is too extensive on the topic of wall thermal insulation. It needs to be enhanced to cover all relevant areas of passive solar technologies. In addition, it needs to provide some practical values on relevant costs and associated financial data, e.g. increased design, building and possible maintenance costs of passive solar technologies	No peer reviewed data available
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.2	-	-	Already mentioned for FOD review: this section has to few references, almost none of the figures has a reference.	Authors will make sure that all figures have the appropriate reference. No more references are available. It reviewer has references, please provide
Greece (National Observatory of Athens)	3	-	-	-	-	3.8.2	-	-	Needs to be enhanced to cover solar cooling and provide some practical values on relevant costs	No peer reviewed data available. Please provide data
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.2	-	-	This section needs a re-check of the numbers given.	Number will be re-checked
Steffen Schlömer (IPCC WGIII)	3	-	-	-	-	3.8.3	-	-	Change the order of discussing "average installed cost of PV systems" and "PV system prices", since the latter is only one component of the former.	it will be considered
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.3	-	-	please state that module prices should be treated with care: retail prices like those reported by solarbuzz are often twice as expensive as the wholesale price seen by the firms building whole PV systems	Already included. Please see page 74, line 17 and 18
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.3	-	-	say something about the proportions of module and BOS costs ¿ e.g., from Wiser 2009, p.17: in the US, modules made up ~50-60% of total system costs.	It will be included
Norway (Climate and Pollution Agency)	3	-	-	-	-	3.8.3	-	-	The information on PV module prices is severely out of date: In the first sentence it is said that PV module prices have dropped "to the current level of less than 4 USD/W", whereas in reality the current PV module prices are at less than 2 USD/W (for sources, see e.g. Photon International, and/or analyst reports from Deutsche Bank or Morgan Stanley, with good channel checks. I can also be contacted directly for source information, if needed.)	Out of factory prices are not retail prices. It is true and it is stated that for power applications the price is below $2, but this is not true for all applications. Deutsche Bank and Morgan Stanley studies were ruled out by TSU
Wim Sinke (Energy research Centre of the Netherlands (ECN))	3	-	-	-	-	3.8.3	-	-	The PV part is missing a thorough discussion of possible long term trends: it is really much more interesting to know what the generation cost range in 2030 and 2050 might be than to make statements about module production costs in 2015¿ Why don't we discuss or even include the figures and tables from the brand new IEA PV Roadmap? That really has added value for the IPCC. This also relates to 3.9.2 (p.98).	The reference is very new. It will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Netherlands (KNMI (Royal Dutch Meteorological Institute))	3	-	-	-	-	3.8.3	-	-	The PV part is missing a thorough discussion of possible long term trends: it is really much more interesting to know what the generation cost range in 2030 and 2050 might be than to make statements about module production costs in 2015¿ Why don't we discuss or even include the figures and tables from the brand new IEA PV Roadmap? That really has added value for the IPCC. This also relates to 3.9.2 (p.98).	The reference is very new. It will be considered
Steffen Schlömer (IPCC WGIII)	3	-	-	-	-	3.8.3	-	-	The share of BOS cost in system costs should be discussed more generally, since you mention the decline in BOS cost as one of the main drivers of cost reductions in the US, but do not mention the impact of BOS cost otherwise.	it will be considered
Steffen Schlömer (IPCC WGIII)	3	-	-	-	-	3.8.3	-	-	There's lots of information on costs of PV modules, but it could be structured more clearly. It is confusing to the reader that you quote studies using different cost measures disconnected from each other throughout the section, e.g. on p.74, first paragraph you quote Liebreich (2009) with "average global module prices in 2009" (not differentiated by technology). Then on p. 76 you present "module manufacturing cost ranges" in 2008 and forecasts until 2015 for various technologies. Then you talk about "average installed cost of PV systems" (differentiated by country), continue with "PV system prices" and finish with the cost of PV electricity generation by regions with different solar irradiation. In principle, this makes good sense. It does, however, hardly become clear how these costs and prices relate to each other. I would recommend to start the section with a short introduction into the cost components of PV systems. Separate discussions of the individual cost components can then be understood more easily. E.g. start with: "The LCOE of PV systems depend on a variety of factors: (1) the upfront cost of installing the ready-to-use PV system, which include (1a) the cost of the module, (1b) the cost of the balance of system (BOS) (1_footnote), (1c) the non-material cost such as technicians installing the respective PV system, (2) the O&M cost that occur during the lifetime of the system, (3) the cost of decommissioning, (4) the total output of the system, which depends on (4a) its lifetime, (4b) its conversion efficiency and (4c) its capacity utilization." (1_footnote): Cost components 1a and 1b together are usually called the cost of the PV system. I would also recommend to refer to cost concepts explained in the Annexes of the SRREN.	it will be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	3.8.3	-	-	This section contains a lot of valuable information, that is not easily accessible to the reader. Subsection would benefit greatly from restructuring. Information in table 3.10 needs to be specified more clearly (global average prices? and converted to 2005 US $) and conciled with information contained in the first paragraph (average global modul prices) as well as discussed with reference to later statements in price devlopments. Fig. 3.30 is not readable, some cost information is in 2006 US $, other still needs to be converted. A more general statement on the ratio and development of Module costs vs. BOS costs might be helpful to guide the reader.	Section to be rewritten
Steffen Schlömer (IPCC WGIII)	3	-	-	-	-	3.8.4	-	-	Aren't there more studies on costs. E.g. what about the Desertec studies by the German Aerospace Center (DLR)? This website, for instance, provides an overview on studies and articles containing cost estimates for CSP: http://www.trec-uk.org.uk/csp/costs.htm	To be considered.
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.4	-	-	Please do not forget to state for which solar multiple you are stating power plant investment cost numbers	To be considered.
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.4	-	-	Please do not forget to state for which solar multiple you are stating power plant investment cost numbers	To be considered.
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.4	-	-	Where is the information? Where are plant costs, solar field costs, storage costs? Possible studies to use include: Neij, L., Borup, M., Blesl, M. and Mayer-Spohn, O: ¿Cost Development¿an Analysis Based on Experience Curves¿. Deliverable 3.3¿RS1A of the NEEDS (New Energy Externalities Development for Sustainability) project, 2006.**** Neji, L.: ¿Cost Development of Future Technologies for Power Generation ¿ A Study Based on Experience Curves and Complementary Bottom-Up Assessments¿. Energy Policy, 36(6), 2200-2211, 2008 *** Sargent&Lundy LLC Consulting Group Chicago: ¿1. Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts¿. National Renewable Energy Laboratory, 2003.**** Viebahn, P., Kronshage, S., Trieb, F. and Lechon, Y.: ¿Final Report on Technical Data, Costs, and Life Cycle Inventories of Solar Thermal Power Plants¿. Deliverable 12.2-RS Ia of the NEEDS Project, 2008,.	To be considered.
Robert Pietzcker (PIK)	3	-	-	-	-	3.8.4	-	-	Where is the information? Where are plant costs, solar field costs, storage costs? Possible studies to use include: Neij, L., Borup, M., Blesl, M. and Mayer-Spohn, O: ¿Cost Development¿an Analysis Based on Experience Curves¿. Deliverable 3.3¿RS1A of the NEEDS (New Energy Externalities Development for Sustainability) project, 2006.**** Neji, L.: ¿Cost Development of Future Technologies for Power Generation ¿ A Study Based on Experience Curves and Complementary Bottom-Up Assessments¿. Energy Policy, 36(6), 2200-2211, 2008 *** Sargent&Lundy LLC Consulting Group Chicago: ¿1. Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts¿. National Renewable Energy Laboratory, 2003.**** Viebahn, P., Kronshage, S., Trieb, F. and Lechon, Y.: ¿Final Report on Technical Data, Costs, and Life Cycle Inventories of Solar Thermal Power Plants¿. Deliverable 12.2-RS Ia of the NEEDS Project, 2008,.	To be considered.

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	3.9	-	-	According to the OA, opening section should state potential for near to long term for carbon emission reductions, and potential growth over time, summarizing following text and linking back to earlier statements	Accepted, rewritten
Gerrit Hansen (TSU)	3	-	-	-	-	3.9.1	-	-	according to the OOA, near term forecasts should be reported up to 2015. table 3.11 reports data up to 2010 instead, please reconcile.	will be redone
Gerrit Hansen (TSU)	3	-	-	-	-	3.9.2	-	-	statement on technical potential should be moved to 3.2.1. Discussion of chapter 10 results is not focussed, and their feasibility is not properly stated.	It will be considered
Ole Grimsrud (Scatec AS)	3	-	-	-	-	3.9.2	-	-	The deployment scenarios described herein are extremely conservative given the recent development in PV cost, and the rapid scaling of the industry. This should be updated as well.	It is for Chapter 10 to update these graphs
Steffen Schlömer (IPCC WGIII)	3	-	-	-	-	Costs	-	-	Please make sure that all cost concepts used here, e.g. life-cycle costs, cost of installation, module costs, BOS costs etc. are used consistently in your chapter and throughout the report.	to be checked
Arieta Gonelevu (International Union for Conservation of Nature (Oceania Office))	3	-	-	-	-	General Comment	-	-	There is no discussion on the possibility of producing solar modules & accessories in least developed & developing countries so as to reduce capital costs. Can this be covered in this chapter? Is it economical & achievable??	Beyond the scope of the present chapter
Greece (National Observatory of Athens)	3	-	-	-	-	REFERENCES	-	-	"Fthenakis, V.M., and H.C. Kim, 2010: Photovoltaics: Life-Cycle Analysis Solar Energy" The full description is missing.	It will be completed
Greece (National Observatory of Athens)	3	-	-	-	-	REFERENCES	-	-	To be added: ESTIF (2003): European Solar Thermal Industry Federation. Sun in action II, vol. 2; April 2003.	To be added
Greece (National Observatory of Athens)	3	-	-	-	-	REFERENCES	-	-	To be added: Tsilingiridis G., and Martinopoulos G., 2010: Thirty years of domestic solar hot water systems use in Greece ¿ energy and environmental benefits ¿ future perspectives. Renewable Energy 35 (2010) 490¿497.	To be added
Greece (National Observatory of Athens)	3	-	-	-	-	REFERENCES	-	-	To be added: Tsilingiridis G., Martinopoulos G., and Kyriakis N., 2004a: Life cycle environmental impact of a thermosyphonic domestic solar hot water system in comparison with electrical and gas water heating: Renewable Energy 29 (2004) 1277-1288.	To be added if appropriate
Greece (National Observatory of Athens)	3	-	-	-	-	REFERENCES	-	-	To be added: Tsilingiridis G., Martinopoulos G., and Kyriakis N., 2004b: Environmental performance of thermosyphonic domestic solar hot water systems under different climatic conditions: A case study for Greece. Global NEST, the Int. J., Vol. 6, No.3, pp 183-195.	To be added
United States (U.S. Department of State)	3	-	-	-	-	-	3,18	-	Some colors are indistinguishable. E.g. Germany and France lines are nearly identical.	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
United States (U.S. Department of State)	3	-	-	-	-	-	3,23	-	Suggest using log scale for clarity.	To be considered
United States (U.S. Department of State)	3	-	-	-	-	-	3,6	-	In the interest of saving space, this figure could be deleted.	To be considered
Gerrit Hansen (TSU)	3	-	-	-	-	-	3.10	-	placement of figures under the subheading "distributed generation" is confusing - are solar towers generally considered "distributed"? The text refers to Fig.3.10a as a 800 MW installation - doesn't this rather qualify as large? This section should provide clearer definition of the terms (large/distributed) and be restructured accordingly.	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.11	-	use only 2 pictures, maybe a and d. the others don't show anything new. Also. You have similar photos in Figure 3.10	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.12	-	Would it be possible to show which of the products (H2, syngas) come out of which conversion route? This would increase the information content of this figure.	To be considered
Gerrit Hansen (TSU)	3	-	-	-	-	-	3.13	-	both figures are slightly confusing as they seem to suggest that from a "black box process" the only output was H2 and C (with "fossil fuels" as input) or H2 and CO. The full material flow should be at least indicated. Also, the "sequestration" in the left drawing is not explained and somewhat misleading. TSU suggest also, to either rename figures 3.13 a and 3.13 b or make two seperate figures.	To be considered
Gerrit Hansen (TSU)	3	-	-	-	-	-	3.16	-	numbers need to be reconciled with text, it might be helpful to point out more clearly that numbers concern annual additional installation/market turnover, not total capacity (rephrase caption).	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	3.16	-	What is the name "Macedonia" referring to ? The acceptable UN name is "FYROM" PLEASE CORRECT	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.24	-	When is ¿future¿?	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	3.26	-	poor quality figure	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.29	-	Already mentioned for FOD review: Isn't there a figure which extends the data to 2009? it should be available by now ¿ and very interesting for the reader due to the economic crash and price drop in 2009!	To be considered
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	-	-	-	-	-	3.29	-	This figure may be missleading. Hoffmann et al. already mentioned that the ASP in $/W reached around 2 $,(¿)/W in 2009 and the graph is also existing including the data point for 2009 and corresponding higfher accumulated MW. This is important because it shows that the costs of PV modules still follow the learning curve. Fig. 3.3 in the current form may give the wrong impression that the ASP is stagnating. I strongly recommend to change or modify the Fig. according to the information given in the cited paper of Hoffmann et al.	To be considered
Gerrit Hansen (TSU)	3	-	-	-	-	-	3.3.4	-	For better guidance to the reader, a definition of "large" and "centralized" vs. Distributed CSP should be provided, as these terms are used repeatedly. One would expect to find a short reference to the ambient conditions (DNI) suitable for CSP in the introductory part, maybe connected to a line on (mandatory) thermal storage and average capacity factors.	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Greece (National Observatory of Athens)	3	-	-	-	-	-	3.3(a)	-	Need to properly adapt the abbreviations used on figure 3.3(a). The abbreviation BIPV that is given on the figure is not defined till p. 28, line 29, and then on p. 45 is referred to as "roof integrated". Need to revise for consistency The abbreviations HRV, DHW are not defined in this chapter The concept of ventilated slab is not clearly defined/explained; there is some reference on p. 47, but it is not clear.	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	3.3(b)	-	Need to revise Fig 3.3(b) to address the following discrepancies: Does not imply the concept that external shading is a priority. The fixed building shading devices as the overhang and side fin are not elaborated in the text. The term "overhang" is only referred once on p. 18 and then as "photovoltaic overhangs". The concept of the "rolling shutters" is elaborated on p. 63 and then refrred as "night shutters" being used as exterior night insulation. Otherwise the term "rolling shutters" is not being used in this chapter qsolar is not defined	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.30	-	Delete ¿ quality is bad, and you have the main information already in figure 3.29	To be considered
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	-	-	-	-	-	3.30	-	figure is missleading see comment 8 and has to be changed or at least needs a clear comment. Module prices have significantly dropped in the last year as compared to the given data	To be considered
Dave Renne (National Renewable Energy Laboratory)	3	-	-	-	-	-	3.30	-	There are ""3-Dimensional"" versions of this graph available at NREL that are much clearer	To be considered
Ole Grimsrud (Scatec AS)	3	-	-	-	-	-	3.31	-	This information refers to 2007, which is not relevant any more - therefore, I propose taking out this figure. (More recent data for the same parameters is presented on the next page, lines 4 to 10.)	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.32	-	What year US$ are you using? 13 cts/kWh is below todays cost for CSP ¿ where do you get these numbers from?	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	3.32	-	What year US$ are you using? 13 cts/kWh is below todays cost for CSP ¿ where do you get these numbers from?	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	3.6(a)	-	Need a new fig 3.6a, with a cross section, to relate to the text describing the components. Using this picture with a blue colored absorber may also imply that this is the standard color for absorbers.	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	3.79(a)	-	Poor quality figure, needs to be replaced. In addition, need to identify the backup heat source, e.g. usually an electric heat resistance, or at least include some kind of a hx inside the hot water storage tank	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	-	3.9	-	Figure and text need some reconciliation: it is not clear, if the figure refers to the IEA PVPS countries (definition needed!), and why the sentence "off grid systems have a significant potential in unelectrified areas of developing countries" should be followed by a figure displaying the share of off-grid PV in OECD countries. One might rather expect information on SHS or rural electrification programs (you may consider to insert an according reference to that information in 3.4.1)	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.1	Is a source from 1998 really the best source for these numbers? The UBA 2009 study is discussed in the text ¿ why not include their numbers and use them as source? Better use ¿pessimistic¿ and ¿optimistic¿ as headers ¿ as there are several well-made studies (Trieb, Hoffman) giving more than 10.000 EJ of global technical potential, 5000 EJ does not seem to be a maximum.	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	-	3.1	it is awkward to refer to technical solutions with a ref from 1998. Were they updated for technical developments ? How were they modified ? Maybe a short discussion could help the reader	To be considered
United States (U.S. Department of State)	3	-	-	-	-	-	-	3.10	Add a note that in late 2008, First Solar CdTe became the first company to break the $1 per watt manufacturing cost barrier, and continues to drive down costs for residential and commercial users. Add a reference for this.	To be considered
Gerrit Hansen (TSU)	3	-	-	-	-	-	-	3.10	please improve/include table row headings to clarify table content	To be considered
Norway (Climate and Pollution Agency)	3	-	-	-	-	-	-	3.10	Table 3.10 is somewhat unclear, but I assume the first number refers to the cost, and the second number refers to the price. In my opinion, it would be much cleaner for this table to refer to the cost only. Also, the distinction between the various technologies and locations does not seem to be needed - it would siffice to consider only two technologies, namely crystalline silicon (location of production facility is irrelevant) and CdTe-based thin film (CIGS is not yet commercialized to the same degree, and the large amorphous silicon players are going out of business.) Furthermore, the cost levels listed in the table are severly outdated: For instance, CdTe cost is projected at $1.13/W in 2010 and $0.89/W in 2015 - but First Solar is already producing CdTe modules at a cost of $0.76/W! (reference: First Solar Q2'2010 report). Also, the best crystalline silicon players within each part of the value chain have cost levels that add up to about $1/W, and with Suntech's CEO stating at InterSolar this year that the cost without profit of producing a PV panel is around $0.80/W - less than half of the cost levels indicated in 2010 for the crystalline silicon technologies. (This comment also relates to the text preceeding table 3.10)	To be considered
Bernd Rech (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)	3	-	-	-	-	-	-	3.10	the table give production cost data and price forecast - looking at recent publications of production cost and solar module prices - the data for 2010 seem to be already too high (e.g. first solar reports $ 0.76 module production costs 2010 in their second quarter 2010 financial report - see www.firstsolar.com). I would skip the table and describe the current situation, which has be done already for system prices on page 77 line 4 to 10.	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Gerrit Hansen (TSU)	3	-	-	-	-	-	-	3.11	if scenario figures for 2010 are presented, it might be interesting to compare them to actual 2010 data. E.g., solar PV installations are reported to reach 22 GW in 2010 elsewhere in this chapter. Please include data for 2015.	To be considered
Norway (Climate and Pollution Agency)	3	-	-	-	-	-	-	3.11	This table includes total solar installations in 2000 and 2010, relying on estimates from 2008 (which probably again were based on data older than 2008). The range of forecasted PV installations in 2010 is stated as 10 - 27 GW. In fact, the cumulative installed capacity at the end of 2009 was around 21 GW (source: SolarBuzz), and expected installations for 2010 are commonly expected to be around 15 GW, so that the cumulative installations at the end of 2010 should be around 36GW, higher than even the most optimistic scenario given in table 3.11. Please consult SolarBuzz for updated forecasts for 2010. In the table, therefore, 2000 is an irrelevant reference year, use instead 2009 since data are available for this year, and perhaps add in forecasts for e.g. 2020.	To be considered
Cédric Philibert (International Energy Agency)	3	-	-	-	-	-	-	3.11	This table is outdated. References to IEA ETP 2008 should be replaced with references to IEA ETP 2010 and in particular its Hi-Ren scenario variant. Alternatively, references could be made to both IEA Technology roadmaps for solar PV and CSP, whose projections are in line with the Hi-Ren variant of ETP 2010.	To be considered
Gerrit Hansen (TSU)	3	-	-	-	-	-	-	3.2	table content is not entirely clear, "solar fraction" is not defined/explained.	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	-	3.2	The "solar fraction (%)" used in the table heading of the second column, is not defined	To be considered
Ladislaus Rybach (Geowatt AG Zurich (company))	3	-	-	-	-	-	-	3.2	The Table caption has ¿emission saving¿, the heading of the last column ¿CO2 reduction¿. It must be stressed also here that new installations of solar systems do not reduce CO2 emissions; only additional emission can be avoided (¿saving¿). Real CO2 emission reduction (the goal of the Kyoto Protocol and of other international endeavors) is achieved only when conventional systems with combustible fuel get replaced simultaneously.	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.2	what does ¿solar fraction¿ mean in this context?	To be considered
Osamu Kimura (Central Research Institute of Electric Power Industry)	3	-	-	-	-	-	-	3.28	The figure shows a remarkable cost reduction achieved in the 1980's and 1990'. Sources of the cost data should be noted in order to maintain the credibility of the figure. Does the cost include installation and maintenance cost? Or does it include only panel cost?	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.3	Delete this table ¿ all the information is already in Figure 3.16 and 3.17	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.4	Delete ¿ information not important for the rest of chapter. these are just general results, not at all linked to solar technologies.	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.6	Already mentioned for FOD review: write something to explain the results you quote ¿ why are todays costs for CSP so high, why are there no land use figures for CSP?	To be considered

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Explanation
Osamu Kimura (Central Research Institute of Electric Power Industry)	3	-	-	-	-	-	-	3.7	The table shows a large reduction of cost. Reasons of such large cost reduction should be explained in the note of the table or in the text.	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.8	what are average system efficiencies in an installed system? Without this information, it is impossible to know which row is important	To be considered
Greece (National Observatory of Athens)	3	-	-	-	-	-	-	3.9	The term "combisystem" that appears in the table under the "system" column heading has not being defined/used in the chapter. See relevant earlier comment	To be considered
Robert Pietzcker (PIK)	3	-	-	-	-	-	-	3.9	What does ¿solar fraction¿ and ¿solar utilization¿ mean?	To be considered