



INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE



Special Report on Renewable Energy Sources and Climate Change Mitigation

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

All SRREN

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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>>

**Expert Review of First-Order Draft
Do Not Cite, Quote or Distribute**

Special Report on Renewable Energy Sources and Climate Change Mitigation, First Order Draft

Name (Institute)	Chapter	From page	From line	To page	To line	Section	Figure	Table Info	Comments	Consideration by writing team
Branche (Electricité de France (EDF))	All SRR EN	1	-	5	-	-	-	-	"Table of contents: Avoid using brackets in the table of contents. Items presented are too reductive for ""resource potential"", ""environmental and social impacts"", etc."	Accepted.
Demayo (Chevron Energy Technology Co.)	All SRR EN	-	-	-	-	-	-	-	limit case studies to examples of projects/systems that have actually been built, not conceptual ones. Using real system will provide much needed real data points on performance and costs of RE systems	Good point -- but it may be necessary to look at conceptual systems to help reader be informed about possible directions of future energy systems.
TEIXEIRA COELHO (INSTITUTTE OF ELETROTECHNICS AND ENERGY - USP)	All SRR EN	-	-	-	-	-	-	-	"ADDITIONAL IMPORTANT REFERENCES NOT INCLUDED IN THE DOCUMENT: Jos Goldemberg. The Brazilian Experience with Biofuels. Innovations. Fall 2009. Volume 4, issue 4.; J. Goldemberg, P. Guardabassi. Are Biofuels a feasible option?. Energy Policy 37 (2009) 10-14; J Goldemberg, P Guardabassi. The potential for first generation ethanol production from sugarcane. Biofuels, Bioproducts & Biorefinery. (2009). Published online in Wiley InterScience (www.interscience.wiley.com); DOI: 10.1002/bbb.186.; J. Goldemberg. The role of biomass in the world's energy system. Springer - in publication.; J. Goldemberg. Bioethanol from Sugar - The Brazilian Experience. Encyclopedia of Sustainability Science and Technology. Springer - in publication."	Thanks and references will be checked.
Twidell (AMSET Centre)	All SRR EN	-	-	-	-	-	-	-	"AL:L: I have found this a very difficult chapter. (1) The style of presentation is longwinded and verbose, (2) Reduce the length of sentences and use summaries and bullet points more often, (3) Bring more order to the discussion of models and their results by classification of types and conclusions, (4) Reduce the word total of text by 50%and make the style less dreary and more attractive. Nothing sparkles. What should be a simulating and visionary contribution to the conclusions of report has become boredom. Where is the concise summary? Where is the 'get up and go' vision?"	Which Chapter? All chapters will be made more concise and key messages of the whole report will be highlighted in the SPM.
Twidell (AMSET Centre)	All SRR EN	-	-	-	-	-	-	-	"ALL A major difficulty for the writers of this chapter is that basic information is most easilly available from national authorites as sum totals for each country. However, renewables are most applicable at scales less than those of most countries, so the discrete data becomes lost (e.g. small hydro can be exceedingly beneficial for those near appropriate waterways, but is usually minimal on a national scale; biomass and biofuels from wastes is highly dependent on local crops; tidal currents and tidal ranges are very specific and variable by site; biofuels relate to vehicle types which in turn relate to terrain, road conditions, urban and rural structures; building structures relate to local materials and local customs and cultures). So much important information for local renewables is lost in the averaging over national and global scales."	A few examples will be included in the chapter to address some of these issues, however possibility to include detailed information on regional specifics is constrained by page limitations.

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Twidell (AMSET Centre)	All SRR EN	-	-	-	-	-	-	-	"ALL. A major weakness of the models for this chapter is that they generally consider only a global perspective for each renewable type. However, renewables have to be optimised by regional resource opportunity (by region I mean 'local geographical region, usually on a scale of about 200 km; I do not mean countries, as in Tables 10.4.1, 10.4.2). For instance, geothermal power is (rightly) said to have minor importance globally. However for Iceland, regional parts of Kenya, Italy, New Zealand etc it is of major importance. Global carbon mitigation needs to sum the total of such regional potentials, because the particular renewables opportunities are so variable by region."	This aspect should be addressed but not much regional data are readily available in the literature. Also, some space limitations in the chapter precludes us to go into more detail
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Building up the next energy system should consider minimizing the social cost and also take into account differing national infrastructures. "	we will make the point in the text on the national circumstance
Rosinski (Electric Power Research Institute)	All SRR EN	-	-	-	-	-	-	-	"Chapters 1, 10, 11 provide mixed overall message on renewables. Chapter 1 focuses on only renewables and efficiency. Chapter 10 discusses renewables within the context of a low carbon energy portfolio (10.2.2.1), but also seems to promote 100% renewable electricity by 2050 (Executive Summary). Chapter 11 promotes renewables as the ""standard"" energy source. This report should be consistent in presenting a focus on optimum renewable energy development and expansion within the context of a low-carbon energy portfolio."	Will harmonize chapters
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Developing the smart grid sometimes requires R&D which could require significant time and leadership to be taken by governments."	will reflect the maturity of the smart grid technologies, will include in the smart grid section
Rabl (Vision & Results)	All SRR EN	-	-	-	-	-	-	-	"Each section should include a discussion of ""gaps,"" i.e. what data/information is missing and what are the major uncertainties."	Technology Chapters will include. This will inform Chapter 1.
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Electricity demand, including the extent of deployment of high efficiency equipment, and power infrastructure vary according to national circumstances, so there is a wide variety of challenges and styles of the smart grid depending on the country. "	we will include this in 8.2.1
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Energy suppliers are required to simultaneously achieve energy security, economy and environmental conservation. This principle should apply to renewable energy as well."	Agree -- renewable energy moves us toward addressing these issues. Co-benefits discussion will reflect.
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Government, experts and industries should discuss the future power supply system in consideration of the challenges of network operation and future power demand. "	A major theme of integration chapter

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Ahmed (The University of the South Pacific)	All SRR EN	-	-	-	-	-	-	-	"I feel there is scope for improving the technical content of the report. The language/grammar is also of some concern. Unfortunately, I got the login information much late (on 1st Feb), so do not have much time to make much contribution (am travelling on 5th Feb)."	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"In some cases electrification, including the use of heat energy via high efficiency heat pumps with lower carbon intensity electricity, will effectively contribute toward a low carbon society. "	discussed in section 8.3.2
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"It is essential to establish a low-carbon society on both the demand side and supply side. Renewable energy should be stressed among other non-fossil fuels in the line of establishing a low-carbon society. "	Will have brief discussion of full range of mitigation options
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	"lack of integration of policy/market issues"	Will add relevant inputs
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	"Need to consider synergies with other low-carbon technologies - some of the claims made for renewables are true for other low-carbon technologies"	Will discuss in mitigation options section
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"On the other hand, disintegrated, so-called 'unbundling', architecture could provide benefits such as introducing competition through the market, as well as fairness and transparency among generators."	section 8.2.1.1.3 does address
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Output from wind energy and photovoltaic energy depends on natural conditions. Mass introduction of these uncontrollable energy sources may cause unexpected tide flows and volatilities. "	discussed in 8.2.1
Renne (National Renewable Energy Laboratory)	All SRR EN	-	-	-	-	-	-	-	"Overall comment: I found the report to be very well organized and written, and promises to be a highly professional and extremely valuable document when finalized. Specific comments for the overall report are 1) Establish consistency in the units. EJ is used quite frequently in many places (especially when describing potentials); TW-hr is also commonly used. When using EJ, the conversion to TW-hr (or a similar unit) should always be provided in parentheses; 2) Clear definitions of theoretical and technical potential should be given in Chapter 1 as well as in the glossary (where definitions for these two terms are not provided at all)."	EJ decided as standard unit with reference to TWh wherever appropriate. Technical and theoretical potential definitions made clear in Glossary and Ch 1.

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Dunn (GE Energy)	All SRR EN	-	-	-	-	-	-	-	"Overall, the draft is an exhaustive compilation of the current literature on renewable energy. As noted in the expert review meeting, the next steps will be to coordinate across chapters and synthesize the material into policy-relevant messages and themes. Above all, I hope that this report can arrive at a succinct summary for policymakers that makes definitive statements in the vein of ""discernable human influence on global climate."" This will ensure the report transcends the role of reference guide and becomes an influential guide for decisionmaking."	SPM will do this
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Promoting renewable energy should be considered not only from the point of environmental conservation, but also from those of energy security and economy as well."	Chapter 1 noted this co-benefit
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Promoting renewable energy should take into account its cost effectiveness including the cost of reinforcing the network for stabilizing the power supply."	covered in 8.2.1
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Promotion of renewable energy should be considered together with the future power supply system. Mass introduction should also be thoroughly examined in advance, to avoid affecting electric power reliability."	Public awareness is an important policy issue addressed in several chapters. Mass introduction addressed in Chapter 8.
Perrels (Finnish Meteorological Institute (FMI) & Government Institute for Economic Research (VATT))	All SRR EN	-	-	-	-	-	-	-	"Purpose and objectives of the report (and chapter) The remit of the report is not entirely clear, and seems to sway between a constructive but neutral review of all main types of renewable energy options in the context of a greatly needed upswing of world wide deployment and a more radical strategic agenda in which a swift and more or less unconditional expansion of renewable energy deployment is argued. For example in Chapter 1 page 6 lines 19-20 is stated ""As long as the rate of extraction of this energy does not exceed the natural energy flow rate, then the resource is sustainable"". In the next few lines this statement is somewhat moderated with sideconditions, referring to energy flow balances. However, ecological energy flows should be distinguished from extractable energy flows useful in man made / managed processes, otherwise still too optimistic (i.e. non-sustainable guidelines may be the result). e.g. Galucci, V. F. (1973) On the principles of thermodynamics in ecology. Annual Review of Ecology and Systematics. 4,:329-357. "	Accept in general -- see page 6 comment responses below
Christophersen (Climate and Pollution Agency)	All SRR EN	-	-	-	-	-	-	-	"References to literature sources are frequently used also for basic ""text book style"" information. We propose that references are generally only used for new or more advanced scientific findings."	Peer reviewed literature will be used as references for new or more advanced scientific findings. More basic references are provided where relevant to give reader back ground information.

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Rybach (Geowatt AG)	All SRR EN	-	-	-	-	-	-	-	"Remark to Annex I, lines 36-41: this paragraph is incomplete and partly wrong. □ Ground source heat □ is by no means stored solar energy. Ground source heat is nowadays harvested from depths up to 400 meters; solar influence is absent below a depth of 10-20 m. The paragraph (lines 36-41) must be replaced by □ Geothermal resources consist of the heat stored beneath the earth □s surface, with the main sources being the heat flow from the earth □s core and mantle , and that generated by the gradual decay of radioactive isotopes in the earth □s crust. Together, these result in an average terrestrial heat flow rate of 44 TWth (1,400 EJ/yr). A wide range of proven technologies exists to extract the heat and convey it to the earth □s surface. □"	Revisions to chapter 4 will clarify all issues regarding GHP. Chapter 4 has no Annex I. (Chapter 4 LAs will provide feedback on Annex1 glossary)
Akimoto (Research Institute of Innovative Technology for the Earth (RITE))	All SRR EN	-	-	-	-	-	-	-	"Scientific-based descriptions are needed. Descriptions with author's opinion can be often seen particularly in Chapters 1 and 8, and such descriptions should be changed following the IPCC rule. In contrast, Chapters 10 and 11 are generally reasonable and their Executive Summaries are well written." "	Will address during edits to Chapter
Piernavieja (Instituto Tecnológico de Canarias (ITC))	All SRR EN	-	-	-	-	-	-	-	"Since the overall goal is to shorten the length of most of the chapters, I generally suggest to shorten a) projections/future scenarios/forecast issues, as well as b) resource potentials and similar data (this information is relevant when referred to specific areas or regions). Arguments: these rather ""obvious"" or more or less well known aspects are, in my opinion, less critical than specific technological issues (their regional adaptation is particularly important) as well as cost issues. The focus on developing countries is also of particular interest and should be emphasized "	Issues are not obvious to all readers. But length is an issue. Trying to achieve balance

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Rybach (Geowatt AG)	All SRR EN	-	-	-	-	-	-	-	<p>"The 1062 pages in SRREN contain a vast amount of data and information about renewable energies. So far the reader is left with the Executive Summaries of Chapters 1 to 11. It will be pivotal to extract and summarize the key findings in chapters 0.1 □ Summary for Policy Makers□ and 0.2 □ Technical summary□, especially to enable a comparison of the different Renewables. The most relevant factors like potential, land use, currently installed capacity and production, availability factors, installation and production costs, development trends (e.g. annual rate of increase) etc. need to be assembled in a synoptic Table.</p> <p>Numerical values of these factors are rarely given in the so far existing Executive Summaries; they can only be found in the chapter texts. Therefore the informative power of the Executive Summaries (as they stand now) is quite different: it ranges from all key numbers given to no numbers given at all. Potential estimates are important. However, only few renewable energy chapters specify the potential in the categories theoretical, technical, economic potential."</p>	TSU will provide templates. SPM and TS chapters will address these issues. Deployment potential is being addressed and Chapter 1 will summarize.
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	<p>"The SR should answer the following questions: What are my options? What is the potential of the options? - both theoretical & practical What do I need to do to achieve the potential? How do I get from here to there?"</p>	Chapter 1 has implemented a narrative structure designed to give an overview of these key questions. Will refine in SOD

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Hamilton (Chatham House)	All SRR EN	-	-	-	-	-	-	-	<p>"The SR would benefit from greater coherence between the chapters and a clearer overall thread. In terms of the role of RE in climate change mitigation, all the technical and academic literature is most probably included in the report, or will be through further input from review, and yet this needs to have greater focus to be more useful, readable and relevant for policymakers.</p> <p>One suggestion: it may be very useful for policymakers to have a stronger common understanding of the consequence of the Integration chapter (8) plus the scenarios (Ch10) for policy decisions. In particular linked into the timeframe of decisions around the delivery infrastructure (meaning delivery systems required to deliver energy to end-users or purchasers) in order to enable significant penetration of both individual technologies, and also integration/optimisation of the system.</p> <p>Ch8 is a critical chapter and of considerable use for policymakers as it deals with the overall energy system. Although I have not read all of the FOD, I would suggest that the importance of strategic long term planning for network infrastructure and integrated analysis (Ch8 lines 14-16 on page 21; and lines 43-45 on page 28 respectively) are central messages for policymakers in the overall document, and need clearly reflected in Ch11 considerations and drawn out both in Ch1 and the SPM.</p> <p>Policymakers also need to incentivise the uptake of the range of renewable energy (RE) technologies, and market based policies may be one approach for doing that (lots of material in Ch11 on incentive options), but a stronger and more strategic approach by governments to new infrastructure (and its regulatory consequences) as captured in Chapter 8 needs reflected in both the technology chapters (what delivery infra is required; regulatory consequences; any track record of how long this takes) and through into policy; linked to the timelines and scale in the scenario range in chapter 10.</p> <p>This makes the SR more practically useful in increasing understanding of critical points in decisionmaking to enable RE to play its role in the mitigation of CC (as well as enabling the importance of EE to be more integrated); this will help foreground very near term decisions required linked to infrastructure.</p> <p>I realise that this is awkward if the starting point is to simply present all the literature available in each chapter, however as raised by many people at the workshop in DC (1-2 Feb 2010) a stronger linking 'narrative' is needed to help the SR cohere, and be more useful (as alot of this information is already available). The technical information in the tech chapters may be of great practical use to policymakers, but the valuable contribution of this SR can be the greater practical understanding between the technical options, the critical Ch8 on systems integration, and the consequence for policymakers managing the energy system, of decision timetables. The timing set of issues are the critical element in RE as an effective mitigation tool for climate change (versus energy security of supply) and links through to the scenarios, many of which demonstrate that RE can play a very substantial role in the mitigation of climate change.</p> <p>As it was raised at the DC workshop, I believe it would not be helpful for the SR to get sidetracked into reiterating the need for/importance of other energy forms; as this is directly implicit in any scenario prior to 100% renewables.</p> <p>"</p> <p style="text-align: center;">Expert Review of First Order Draft Do Not Cite, Quote, or Distribute</p>	<p>Agree coherence is a major issue as is integration of RE. This will be addressed as part of producing SOD . Relevant policy information will be addressed in Chapter 11 and SPM -- but this needs to be neutral.</p>

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Kheshgi (ExxonMobil Research and Engineering Company)	All SRR EN	-	-	-	-	-	-	-	"There are many places in the draft where the cost-competitive nature of RE is claimed. This appears to be inconsistent with the recent US NRC (2009) report 'Electricity from Renewable Resources' which was part of the America's Energy Future study found that primary current barriers to renewable energy include cost-competitiveness. Suggest that the document quantitatively and clearly, based on a comprehensive balance of literature, assess the cost-competitiveness of RE."	Mainly Chapter 10 will summarize findings of technology chapters
Kheshgi (ExxonMobil Research and Engineering Company)	All SRR EN	-	-	-	-	-	-	-	"There are many places in the draft where the low cost and high potential of currently non-commercial technologies are touted. Suggest that the draft clearly state which technologies are commercial, and which are based on estimates of performance. Care is needed in claiming cost-competitiveness of non-commercial technologies as their costs are often underestimated. In some cases further innovation leads to reductions in their costs, but prior to actual experience, claims of competitiveness are unfounded."	Issue for Technology Chapters and TS (summary table).
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Vertical integration and disintegration of the electric utility industry have different advantages in adopting more renewable energy into national grids. These merits must be recognized in the discussion of introducing large-scale renewable energy."	section 8.2.1.1.3 does address this
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"Vertical integration could provide benefits such as allowing system operators to control the grid and easily adjust other generators' output at the same time. "	we discussed institutional issues in section 8.2.1.1.3 literature does not unambiguously support this opinion
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	"We believe a smart energy network will provide electricity and heat energy effectively, thus achieving energy security, economy and environmental conservation. "	we note this opinion
Treber (Germanwatch)	All SRR EN	-	-	-	-	-	-	-	"we know the law of energy conservation since Einstein: energy can only be transformed and not produced. Therefore write 'energy supply' (or: 'energy can be supplied') or energy transformation (or 'energy is transformed') instead of 'energy production' (or 'energy is produced'). Of course, electricity can be produced (or generated)."	Will correct throughout
Llanes-Requeiro (University of Havana)	All SRR EN	-	-	-	-	-	-	-	A general remark for the report: unbalance regional and national focus. Important lessons learnt and information could have been added for the Mediterranean countries	Will try to balance geography of examples. Expert reviewers could provide examples and references.
Kutscher (National Renewable Energy Laboratory)	All SRR EN	-	-	-	-	-	-	-	A major oversight of this report is that there is very little mention of biopower with CCS and biochar. I see it in Chapter 10 but virtually nowhere else. It's important to develop technologies that are carbon-negative and not just carbon-neutral. I believe a section should be written on this.	Ch02 already have a text on CCS and we intend to expand the discussion.

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Rabl (Vision & Results)	All SRR EN	-	-	-	-	-	-	-	Add dictionary of acronyms	Accepted
Twidell (AMSET Centre)	All SRR EN	-	-	-	-	-	-	-	ALL Why are the EFFICIENT USE OF ENERGY and improvement in the efficiency of transforming energy not considered as major scenarios for modelling? Chapter 1 rightly lists efficient use of energy alongside renewables as cooperative developments. THIS IS A MAJOR WEAKNESS OF THIS CHAPTER AND SHOULD BE RECTIFIED. Otherwise business as usual by the supply and generation industries will continue with no reduction in demands.	Text will be improved, so as to better portray the interactions between energy efficiency and RE. This will be dealt with in the revision of section 10.2, using sensitivity analysis
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	Annex 1 Capacity factor is also known as load factor	Will be refined in definitions
Gagnon (Hydro-Quebec)	All SRR EN	-	-	-	-	-	-	-	Anyway, I think that the authors have not received any mandate to debate the future of electric car versus fuel cell vehicles. I therefore strongly suggest that all sections on hydrogen or electric transportation be removed.	It is an important part of the integration chapter
Demayo (Chevron Energy Technology Co.)	All SRR EN	-	-	-	-	-	-	-	At a minimum all CLAs should read the full report to identify overlaps and inconsistencies where other chapters reference their chapter's topics.	Accepted
Driesen (K.U.Leuven)	All SRR EN	-	-	-	-	-	-	-	British and US English are sometimes mixed	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	Case studies - need to describe success & failures	Case studies across chapters will attempt to highlight both positive and negative experiences.
Rahimi (IRIMO)	All SRR EN	-	-	-	-	-	-	-	Case studies from west Asia are very few. Please use more literature from this part of the World.	Will try to balance geography of examples. Expert reviewers could provide examples and references.

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Hamilton (Chatham House)	All SRR EN	-	-	-	-	-	-	-	Clarity over vocabulary. I make this point in more detail in the review of Ch11, but as a general point greater consistency and specificity needs to be attached to the use of terms like technology development, technology diffusion/deployment, policies for innovation and infrastructure. It is important to ensure these terms are used consistently to ensure a common understanding of what is being referred to. The reason is that from an investment point of view each stage in the technology chain would require different risks and returns, would attract different investors, and would require quite precise defined policy incentives to accelerate investment at each stage (and at the 'deployment' stage ie increasing RE in the overall energy mix, the energy system is essential). Academic literature clearly uses these terms in different ways, often overlapping depending on the starting points of researchers, however as this is a document for policymakers authors can help by clarifying terms. For a backdrop on finance issues relevant to this comment, please see 'Private Finance of Renewable Energy - A Guide for Policymakers', Chatham House, Bloomberg New Energy Finance and UNEP, December 2009. This explains how financiers and investors make decisions.	Cross cutting authors to address
Treber (Germanwatch)	All SRR EN	-	-	-	-	-	-	-	Decide to quantify CO2-emissions always in t CO2 and not in t C as this irritates the lay readership (e.g. Fig 1.1 and Fig 1.4)	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	diagrams & tables are of a very poor standard	Diagrams will be refined in SOD
Rabl (Vision & Results)	All SRR EN	-	-	-	-	-	-	-	Distinguish between modeling results and data obtained from field/market experience	Will implement as appropriate -- relying on technology chapters to differentiate
Rabl (Vision & Results)	All SRR EN	-	-	-	-	-	-	-	Efficiency statements for thermal processes should state whether the data is based on HHV or LHV. It would be best to adopt a single convention.	The cross cutting metrics group will specify which to use
de Campos (Petrobras)	All SRR EN	-	-	-	-	-	-	-	Every RE technology chapter could have na explicit item summarizing the CC impacts on that RE technology and its interactions with RE mitigation.	Accepted.
Pokharel (SNV Netherlands Development Organisation, Nepal)	All SRR EN	-	-	-	-	-	-	-	Except solar Chapter, technology chapters have given less focus on small scale/decentralized application of RE technologies which will enhance the access to cleaner form of energy in under developed and least developed countries. Enhancing access means avoiding dirty path in future.	Chapter 1 covers this, and more focus on benefits of decentralized nature will also be covered in Ch 9.
Rybach (Geowatt AG)	All SRR EN	-	-	-	-	-	-	-	Global warming and its consequences like cloud, precipitation, or wind pattern changes can influence renewable energy resources and utilization. Considerations along this line are generally missing in chapters 2 □ 7 (with two notable exceptions: sections 5.2.2 in Hydropower and 7.2.3 in Wind energy address this issue).	Chapter 1 highlights this point. All technology chapters have also included a section on the impacts of climate change on RE resources.

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Hegde (Suzlon Energy Ltd)	All SRR EN	-	-	-	-	-	-	-	I specifically have gone through Ch 1, 7 -11. I have reviewed the report from the wind industry's perspective. The overall draft report is very comprehensive and presents the right perspective on wind and other renewables. The report refers to all the right documents and most of the references are benchmark studies referred to by the wind community. You may consider improving the chapters based on the following comments in order to make this document handy for both policy makers and businesses	No action required
MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)	All SRR EN	-	-	-	-	-	-	-	In general I find the draft Chapters1 to Chapter 11 precise, rigorous, and comprehensive in totality in terms of Scientific/Technical/Socio-economic content, and overall the Chapters are poised or balanced in terms of Scientific/Technical/Socio-economic substance	Accepted
Kutscher (National Renewable Energy Laboaratory)	All SRR EN	-	-	-	-	-	-	-	In general you can probably cut down the text by reducing the number of second-level sections in the chapters and combining the contents into fewer sections. However there is a lot of good information in this report so you might want to consider adding more appendices or supplementary material to retain this information.	Second level headings in the SRREN are plenary approved and therefore cannot be amended. An effort will be made to make information more concise to bring across key messages.
Paredes (Inter-American Development Bank)	All SRR EN	-	-	-	-	-	-	-	It is important , specially in the technology chapters, to make the proper references to citations, but on some chapters (e.g.11) too many references lead to confusion and after reading one paragraph the main idea or message is not clear. Citations should be avoided in introductory paragraphs or in the executive summary.	Accepted
Paredes (Inter-American Development Bank)	All SRR EN	-	-	-	-	-	-	-	It is important to highlight as a key message the importance of RE as an important option to mitigate climate change impacts but should not be the central message. It should be mentioned in the same context that diversification of fossil fuel based energy matrices through RE implementation is the most cost effective measure TO ADAPT to the impacts of climate change while MITIGATING them. This makes an important difference for the case of Latin America, where energy matrices already show a high percentage of RE in energy generation, due to high reliance on hydro resources (specially large hydro, which may not be sustainable). At least for policymakers in the region renewable energy is NOT a priority option to contribute to emission reductions and climate change due to the mentioned -maybe not sustainable, but- clean energy matrix. This is the reason why not only the link to climate change should be a key message but in an equal manner all other side benefits of RE implementation. So at the end the key message(s) of the report should address the characteristics of the different environments, not just the developed world.	RE in the context of mitigating climate change is main purpose of this report
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	key messages are lost in verbiage	Will refine with a focus on key messages.

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Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	Lack of engineering/business references	Will use these references as appropriate following the policies of IPCC to ensure robustness. However, peer reviewed references are preferred
Gagnon (Hydro-Quebec)	All SRR EN	-	-	-	-	-	-	-	Many other studies conclude that, in the transportation sector, the short term future belongs to plug-in hybrid electric vehicles and, in the long term, to battery powered electric vehicles. This is due to their high life-cycle efficiency, relative to hydrogen/ fuel cell vehicles.	the chapter gives a balance treatment of all the options
Gagnon (Hydro-Quebec)	All SRR EN	-	-	-	-	-	-	-	Portions of the report are dedicated at showing that the future belongs to a hydrogen economy. There is a large bulk of scientific research that concludes otherwise and that is neglected. 'Energy Business Reports' have recently produced a detailed assessment entitled 'Electrical Energy Storage □ Economics and Potential' that concludes that 'Capacitors are the most efficient of existing electrical energy storage technologies with a round trip efficiency of >95%, while hydrogen storage is, by far, the least efficient technology'.	working towards balance view of hydrogen and other vectors. Reference on storgae could be useful
Rahimi (IRIMO)	All SRR EN	-	-	-	-	-	-	-	Recently in some areas people use fog collection as a non-conventional method for water supply. I suppose this could be a kind of renewable Energy. It needs neither energy to pull out underground water nor to transport. It uses wind energy to move droplets in fog and gravity energy of Earth to transport low level places. it is free. I suggest considering it in the text also.	Rejected unless reviewer can also provide literature on the subject. It is typically not considered a RE source.
campbell (Ocean Renewable Energy Group)	All SRR EN	-	-	-	-	-	-	-	simple message - not resource limited, tech limits will be fixed with time, money and paradigm shift, it all comes down to political will, policy, regulations and public/private effort to develop market pull	An effort is made in Chapter 11 to emphasize the importance of political will and market pull mechanisms.
Sims (Massey University)	All SRR EN	-	-	-	-	-	-	-	Some sub-headings too wordy	The final draft of the SRREN will be processed by a professional copy-editor. All editorial comments such as this will be resolved at that time.
Fulton (Deutsche Bank)	All SRR EN	-	-	-	-	-	-	-	State a story line up front in an overview - the technologies exist, the scale up is starting and that policy design has been proven up in many areas. But maturity of technology, economy and policy framework requires a tailored set of responses and pathways. Energy Efficiency is tackled through demand forecasts it seems, but in general this key area should be addressed more directly.	Accepted
Rabl (Vision & Results)	All SRR EN	-	-	-	-	-	-	-	Technology sections should include an indicator(s) of technology maturity.	Technology chapters need to address
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	Techology chapters (2-7): Highly relevant information and sources, important examples, but practicality and focus are missing. The chapters evokes the impression of an unreflected amassation of data and the respective sources. This makes it unnecessarily difficult to understand and to absorb the key messages.	More coherence between technical chapters will be provided through the X-cut meetings.

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Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	The chapter Executive Summaries need to bring out the key messages	All chapter executive summaries will be revised to better follow TSU provided Executive Summary template
Somogyi (Hungarian Forest Research Institute)	All SRR EN	-	-	-	-	-	-	-	The draft is a very good effort to cover an area with lots of new results. There are, however, some additional issues - some general, some concerning biomass - that may be worth further attention.	Comments must be more specific for author team to know which issues they wish to see in more detail.
Marques (The Plantar Group)	All SRR EN	-	-	-	-	-	-	-	The draft neglects the inclusion of ambient (renewable) heat, as utilised by heat pumps, except for a limited consideration in the case of geothermal heat pumps. Heat pumps can utilise heat from air, water or ground - the correspondent energy therefore described as aerothermal, hydrothermal & geothermal. Ambient heat is effectively indirect solar energy, except in the case of deep geothermal. We would note that the definition of ambient heat as a renewable energy source is enshrined in the EC 2009 directive on promotion of energy renewable sources, with the definition reading as follows ""Energy from renewable sources" means energy from renewables non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal...." (EC 2009 Art 2(1)). Heat pumps can be used not only to provide heating, but also cooling. We would suggest a new section on use of ambient energy by heat pumps, and would be happy to provide detailed references for this.	will be addressed in section 8.3.2
Maeda (The Federation of Electric Power Companies, Japan)	All SRR EN	-	-	-	-	-	-	-	The portfolio of promoting renewable energy should consider national circumstances.	Chapter 1 does discuss -- may add sentence to emphasize
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	the report is complex, overlong & repetitive making it unreadable and not fit for purpose	Will refine in SOD
Sugiyama (CRIEPI)	All SRR EN	-	-	-	-	-	-	-	The report needs a systemic description of heat pumps. I suggest ch1 introduce heatpumps, ch8 discuss integration with energy systems, and ch 10 and 11 discuss mitigation and policy aspect of heatpumps.	Heat pumps are in the geothermal and integration chapters.
Treber (Germanwatch)	All SRR EN	-	-	-	-	-	-	-	The term 'Carbon free technologies' is misleading (at least in the context of CCS).It should be replaced by 'low carbon' technologies. The term 'Carbon free` suggests, that technologies exist that produce electricity without greenhouse gas emissions/C emissions.	Language will be improved
Rabl (Vision & Results)	All SRR EN	-	-	-	-	-	-	-	The tone of the report is that of advocacy - working hard to convince the reader of the merit of renewables, even when the data speaks for itself. In fact, the hyperbolae are likely to damage the credibility of the document.	Will ensure balance

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Treber (Germanwatch)	All SRR EN	-	-	-	-	-	-	-	there are two methods to quantify the electricity from renewables in terms of primary energy: either by calculating I. the heat (if the electricity is transformed to heat) or II. by calculating the primary energy needed in fossil power plants to produce the electricity. The results of these methods to quantify the 'energy from renewables' can differ up to a factor 3. I suggest to explain these methods at a prominent place or in a footnote (e.g. Chapter 1, page 14) and of course if there are data on energy from renewables with electricity as primary energy it is necessary to explain whether Option I or Option II is applied to quantify the renewable electricity as primary energy.	All chapters need to make this distinction -- overarching theme will be captured in Chapter 1
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	there is a lack of coherent structure	Chapter structures have been preapproved by plenary. A clear storyline will also be presented in the SPM.
Coulibaly (International Institute fo Water and Environmental Engineering (2IE))	All SRR EN	-	-	-	-	-	-	-	This report had been widely corrected before, at least the first chapters and had few mistakes especially the very first chapter. The only general problem is the lack of list of acronym. The time I had (only 1 week) could not allow further review	Report will have list of acronyms
Kyte (E.ON AG)	All SRR EN	-	-	-	-	-	-	-	too many value judgements/political statements/emotional outbursts	An effort will be made to remove any value judgements, etc.
Treber (Germanwatch)	All SRR EN	-	-	-	-	-	-	-	Use the word 'Agrofuels' instead of 'biofuels' as the notion 'bio' in the European Union is proprietary to food grown respecting organic farming ruling - using 'bio' could lead to misinterpretations	Biofuel is a standard term across most of the world - but a distinction will be noted in footnote
Kleidon (Max-Planck-Institute for Biogeochemistry)	All SRR EN	-	-	-	-	-	-	-	Whole report: The units of energy vs. power are inconsistent throughout the whole report. Sometimes, energy rates are given as EJ (which is an energy content, not a rate) while the correct unit would be EJ/yr (or TW). EJ/a is used alternatively as well. The same applies to the use of the unit TWh, where in most cases TWh/yr is meant. For consistency, either EJ/yr or TWh/yr should be used. Close attention should be paid to the distinction when energy content or energy fluxes are referred to. This is particularly important as some estimates (e.g. Table 1.1, see also comments below) are in reference to the size of a reservoir of heat, which is not a rate and which cannot be used sustainable, while other rates reported refer to sustainable rates.	Will correct units