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

Chapter 10

Disclaimer:
As part of its commitment to openness and transparency, the IPCC releases drafts that have been submitted for formal expert and/or government review, review comments on these drafts, and author responses to these comments after publication of the associated IPCC Report or Technical Paper. During the multi-stage review process, expert reviewers and governments are invited to comment on the accuracy and completeness of the scientific/technical/socioeconomic content and the overall balance of the drafts. Therefore, review comments and author responses should be considered within the context of the final report. Drafts, review comments, and author responses are pre-decisional materials that are confidential until publication of the final Report or Technical Paper; they are not the results of the assessment and may not be cited, quoted, or distributed as such1. Only the approved, adopted, and accepted Reports or Technical Papers may be cited or quoted as the results of the assessment.

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

### Expert Review of First Order Draft

Do Not Cite, Quote, or Distribute

<table>
<thead>
<tr>
<th>Name/Institute</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table Info</th>
<th>Comments Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Insert the text between commas. &quot;Although many RE technologies are becoming increasingly market competitive, specially in biofuels case, many innovative technologies...&quot;</td>
</tr>
<tr>
<td>Mark Fulton (Deutsche Bank)</td>
<td>10</td>
<td>5</td>
<td>11</td>
<td>5</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Some RE is more mature than you suggest (i.e. - onshore wind, solar PV)</td>
</tr>
<tr>
<td>Ralph Sims (Massey University)</td>
<td>10</td>
<td>5</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Start chapter Exec Summary at &quot;Assessing&quot; and add this sentence to next paragraph.</td>
</tr>
<tr>
<td>John Twidell (AMSET Centre)</td>
<td>10</td>
<td>5</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Add sentence 'Governments worldwide have always supported as a duty essential developments with institutional support mechanisms. Such support and directive has and is common for all forms of energy supply, e.g. RD&amp;D funding, educational funding, nationalisation, grants, taxation relief, exploration licences, obligations, tariff structures, regulation etc. Such mechanisms are essential for renewable energy also.</td>
</tr>
<tr>
<td>Seth Dunn (GE Energy)</td>
<td>10</td>
<td>5</td>
<td>19</td>
<td>5</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Recognizing that the modeling is still in progress, it will be important not to bury key messages in the ES, such as the potential for RE deployment rates many times larger than those of today.&quot;</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>5</td>
<td>19</td>
<td>5</td>
<td>38</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Should discuss basic trade offs re EE/overall demand, and competition among low C techs; re, ccs; and nucl, use of bio; exec summary should also include mention of dependence on assumptions for ALL techs, not just RE, and fuel prices, and model structures.&quot;</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Insert 'from x different models'.</td>
</tr>
<tr>
<td>Juan Roberto Paredes (Inter-American Development Bank)</td>
<td>10</td>
<td>5</td>
<td>19</td>
<td>5</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>150, instead of 137, different scenarios re mentioned later in the text. If other scenarios came later for analysis please clarify.</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>5</td>
<td>19</td>
<td>-</td>
<td>38</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Rephrase paragraph to half size in order to shorten the introduction.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>19</td>
<td>-</td>
<td>38</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>What is the main message from the scenario analysis? This is not clear.</td>
</tr>
<tr>
<td>Jussi Uusivuori (Finnish Forest Research Institute)</td>
<td>10</td>
<td>5</td>
<td>20</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>&quot;Could add the uncertainty related to the development of cross-over technologies between RE and competing technologies.&quot;</td>
</tr>
<tr>
<td>Maria Argiri (International Energy Agency)</td>
<td>10</td>
<td>5</td>
<td>22</td>
<td>5</td>
<td>34</td>
<td>ES</td>
<td>-</td>
<td>-</td>
<td>This sentence sounds a bit too simplistic. I suggest you cut the part &quot;simply by virtue of growing energy demand&quot;. You may add a range of increase instead.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Energy demand. Include '...and of growing fossil fuel prices.'</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Assuring instead of 'increasing'</td>
</tr>
</tbody>
</table>

Authors do not think they should be specific to any RE source in the Executive Summary
Authors do not think they should be specific to any RE source in the Executive Summary
Authors disagree that this text should be part of the Executive Summary. Also, the reviewer did not provide any references to support to the phrase.
Authors disagree that this text should be part of the Executive Summary. Also, the reviewer did not provide any references to support to the phrase.
In the redrafting of the chapter, the executive summary will be revised, using the full range scenario results
As the chapter develops, this will be better reflected in the Summary
Subchapter 10.2 will update the number of models and scenarios revised
This information will be updated
Accepted
Chapter will be revised and messages will become clearer
As the chapter develops, this will be better reflected in the Summary
We will revise
Text will be substantially modified
Text will be substantially modified
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>...overcome costs and performance’ is already said two lines before</td>
<td>Text will be substantially modified</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>5</td>
<td>39</td>
<td>-</td>
<td>41</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Is so, what is the main limiting factor?</td>
<td>More more space would be needed to be able to present a comprehensive discussion of the limiting factors</td>
</tr>
<tr>
<td>Maria Argiri (International Energy Agency)</td>
<td>10</td>
<td>5</td>
<td>39</td>
<td>5</td>
<td>41</td>
<td>ES</td>
<td>-</td>
<td>-</td>
<td>‘Please delete the word “generation”’ since this chapter is about renewable energy across all uses.”</td>
<td>Text will be substantially modified</td>
</tr>
<tr>
<td>Seth Dunn (GE Energy)</td>
<td>10</td>
<td>5</td>
<td>40</td>
<td>5</td>
<td>41</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Another theme to highlight: technical potential is not the limiting factor for RE.</td>
<td>Text already says that</td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>6</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>These quantitative results can hardly be considered really “robust”, maybe they could be presented in the Ex. Sum. with less emphasis, or in a more qualitative way. At least, it should be said that they are not based on the whole set of 137 scenarios cited at line 19, but on a much smaller set.</td>
<td>This will be made consistent across chapter 10, but the number will change anyway in SOD.</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>-</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Delete paragraph in order to shorten the introduction.</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>Seth Dunn (GE Energy)</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>5</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Does this refer to all RE power technologies? If so, this is a powerful finding that should be highlighted in the ES (and eventually the Summary for Policymakers).</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>-</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Present growth rate of RE cannot be extrapolated, because when starting from low figures in the take off phase with public support the growth rate might be very high. This is partly explained in a subsequent part (p.81 with fig 10.5.9). Therefore it should not be under this form in the E.S.</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>5</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This is conjecture - historic growth rates in the early stages may not be sustainable</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>Maria Argiri (International Energy Agency)</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>6</td>
<td>7</td>
<td>ES</td>
<td>-</td>
<td>-</td>
<td>In these two paragraphs, you talk about renewables for electricity and for heating and cooling. You need to say something about renewables for transport.</td>
<td>Paragraph will be deleted to save space</td>
</tr>
<tr>
<td>Maria Argiri (International Energy Agency)</td>
<td>10</td>
<td>5</td>
<td>42</td>
<td>5</td>
<td>46</td>
<td>ES</td>
<td>-</td>
<td>-</td>
<td>Please delete this paragraph. It is not based on the scenarios reviewed.</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>‘...all combined power...’. Should it be ‘...all combined REN power’?</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>A 69% growth rate seems to be high and not ‘moderate’ to me</td>
<td>Text will be deleted</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>5</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Several references are missing</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>5</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The executive summary is not very precise and informative. What are the main messages? How important are REN? Which REN are the most important? Is there a fundamental difference in the analysis of top-down and bottom-up approaches? Are there any conclusions on the regional level? One message, e.g.: There is a large discrepancy between the RES technical potential and what is used in the models and in the bottom-up scenarios.</td>
<td>Executive summary will be substantially revised to reflect key messages</td>
</tr>
<tr>
<td>Name and Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>In the executive summary, it could be useful to include a few lines highlighting the differences between the regions.</td>
<td>Page limitations will not allow that</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass - University of S Paulo)</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>What about bioenergy?</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass - University of S Paulo)</td>
<td>10</td>
<td>6</td>
<td>14</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Check the conclusion based in figures.</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Harald Winkler (Energy Research Centre, University of Cape Town)</td>
<td>10</td>
<td>6</td>
<td>16</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Some comment on the reference levels against which reduction potentials have been assessed would be helpful. It may be that some studies of mitigation potential have considered reduction against reference years (e.g. 1990), and others against reference levels (BAU projections or baselines). If they are from different sources, then the implications for comparison should be spelled out. If they all derive from a single model, the reference case should be briefly explained (with detail in the body)</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>6</td>
<td>23</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Delete paragraph in order to shorten the introduction.</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>6</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Include ‘in reality’ after ‘pathway’</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Mario Contaldi (ISPRA, Institute for Environmental Protection and Research)</td>
<td>10</td>
<td>6</td>
<td>23</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>It is not clear to which scenario the statement is referring to, the medium or high, as defined in the previous para.</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>6</td>
<td>23</td>
<td>146</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Shorten to summarize with ranges</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Maria Argiri (International Energy Agency)</td>
<td>10</td>
<td>6</td>
<td>23</td>
<td>27</td>
<td>ES</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Please delete this paragraph. It talks only about the power sector again. Also, the last sentence sounds too much like coming from lobbyists.</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>6</td>
<td>34</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Delete paragraph in order to shorten the introduction.</td>
<td>Paragraph will be revised but its spirit will stay, as this is an important contribution of subchapter 10.4</td>
</tr>
<tr>
<td>PA Abduoltie Manneh (Ministry of Finance and Economic Affairs)</td>
<td>10</td>
<td>6</td>
<td>34</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Executive Summary: could be shortened from this ranges</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>6</td>
<td>34</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This is a detailed discussion of abatement curves, this should not come in the summary.</td>
<td>Paragraph will be revised but its spirit will stay, as this is an important contribution of subchapter 10.4</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>6</td>
<td>38</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>If the Executive Summary must be shortened, these sentences can be removed.</td>
<td>Paragraph will be revised but its spirit will stay, as this is an important contribution of subchapter 10.4</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>6</td>
<td>41</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This point need to be much more explicit</td>
<td>Space limitations in the executive summary do not allow a more detailed discussion of these issues</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>6</td>
<td>42</td>
<td>7</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>If the Executive Summary must be shortened, these sentences can be removed.</td>
<td>Text will be revised</td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>Comments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>13% emission REDUCTION? Compared to what? Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>Cost curves are dependent on tech costs, fuel costs and model structures with then lead to projections based on scenario. Text will be revised in line with the revision of section 10.4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)</td>
<td>10</td>
<td>Executive Summary: could be shortened from this ranges Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>This applies only to the electricity sector. Fig 10.2.7 shows a different conclusion which includes heat production. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maria Argiri (International Energy Agency)</td>
<td>10</td>
<td>This paragraph and the relevant section in the chapter (10.4.4) are too weak and I suggest to cut them. One of the strengths of the report is that it has analysed 137 scenarios. This strength is lost here as the discussion focuses on two scenarios only. This will reduce the size of the chapter by 12 pages. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>Why the choice of these scenarios and not others? We are doing an assessment report from the available literature. Text will be revised in line with the revision of section 10.4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>The paragraph emphasizes some RE technologies that will be competitive by 2030 and ignores the current competitiveness of some biofuels. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>This should be expected since by 2050 we have used more than 50% of the economic hydroelectric potential. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>I think this discussion is a bit too detailed for an executive summary Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>If the Executive Summary must be shortened, these sentences can be removed. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chris Campbell (Ocean Renewable Energy Group)</td>
<td>10</td>
<td>Ref to overall low contribution of Ocean at odds with table 10.3.1. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>Delete paragraph in order to shorten the introduction. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>Delete paragraph in order to shorten the introduction. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>If the Executive Summary must be shortened, these sentences can be removed. Text will be revised.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Osamu Kimura (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>7</td>
<td>38</td>
<td>41</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Why calculated learning rates are widely differed? Add methodological limitations (or pitfalls) of learning curve analysis: assumed system boundaries, e.g. whether production cost or price based analysis, calculated time period, etc. See Junginger, M. et al. (2008). Nemet, G. (2009). Junginger, M. et al., 2008. Technological learning in the energy sector, ECN. Nemet, 2009, Interim monitoring of cost dynamics for publicly supported energy technologies, Energy Policy, 37, pp.825-835. Executive summary will be revised, in line with the changes that will made in section 10.5</td>
<td></td>
</tr>
<tr>
<td>Osamu Kimura (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>7</td>
<td>40</td>
<td>73</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Define clear definitions between learning curve and experience curve. Those two are intermingled in this chapter(p.7, l.40), (p.28, l.36)(p.73,l.15) etc. Executive summary will be revised, in line with the changes that will made in section 10.5</td>
<td></td>
</tr>
<tr>
<td>Mark Fulton (Deutsche Bank)</td>
<td>10</td>
<td>7</td>
<td>44</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$100 billion scale-up looks low compared to many industry estimates, see IEA's &quot;How the Energy Sector can deliver on a climate agreement in Copenhagen.&quot; Executive summary will be revised, in line with the changes that will made in section 10.5</td>
<td></td>
</tr>
<tr>
<td>Cristiano Pires de Campos (PETROBRAS)</td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Delete paragraph in order to shorten the introduction. Text will be revised</td>
<td></td>
</tr>
<tr>
<td>PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)</td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>8</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Executive Summary: could be shortened from this ranges Text will be revised</td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Investors need long term signals to build new power plants (PP). Indeed the PP lifetime is sometimes 30, 40, 50 years or more, but the information is not available for such a long period. Other incentives (such as green certificates in addition to market prices) may also play an important role for the RES development. Feed-in-tariffs (FIT) are not the only solution. Executive summary will be revised, in line with the changes that will made in section 10.5</td>
<td></td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>These are general points. In order to internalise some of the externalities different scheme may be applied: norms, quotas, feed-in tariff or call for tenders... They do not internalised fully external costs but only up to the level implied by the policy in place. The last point on feed in tariff (which is one of the ways of internalisation of externalities) is not quantitatively proven. Executive summary will be revised, in line with the changes that will made in section 10.5</td>
<td></td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>If the Executive Summary must be shortened, these sentences can be removed. Text will be revised</td>
<td></td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>8</td>
<td>12</td>
<td>9</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>If the Executive Summary must be shortened, these sentences can be removed. Text will be revised</td>
<td></td>
</tr>
<tr>
<td>Takashi Hongo (Japan Bank for International Cooperation)</td>
<td>10</td>
<td>8</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>RE sources have clearly lower external cost shall be carefully described, like adding 'in many case?' and delete 'clearly' RE also has pros and cons. If we will say 'crystal', we need to show evidence. External cost heavily depending on the location and types of technologies. Text will be revised</td>
<td></td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>8</td>
<td>15</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><em><strong>Some RE production cases [mention which one] can cause etc.</strong></em> Lack space is a barrier to be more specific and precise in the executive summary</td>
<td></td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Rewrite introduction not so much detail needed Text will be revised</td>
<td></td>
</tr>
<tr>
<td>Name of Reviewer</td>
<td>Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>Potsdam Institute for Climate Impact Research</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>14</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>This is an exact repetition of the first two paragraphs of the Ex Summary</td>
</tr>
<tr>
<td>Marc Darras</td>
<td>GDF SUEZ</td>
<td>10</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The evolution of future ghg emissions is highly depending of the demand of energy and of the availability of mitigation technologies. And their implementation... policy incentives.</td>
</tr>
<tr>
<td>Christiano Pires de Campos</td>
<td>Petrobras</td>
<td>10</td>
<td>9</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&quot;Delete the word &quot;mitigation&quot; because it depends from much other factors.&quot;</td>
</tr>
<tr>
<td>Christiano Pires de Campos</td>
<td>Petrobras</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&quot;Delete the &quot;together with energy efficiency&quot; because there are few evidences of energy efficiency in the chapter 10 or in the rest of the special report. If maintained, we should cite other options.&quot;</td>
<td>This assertion is supported by the scenarios results</td>
</tr>
<tr>
<td>Emmanuel Branche</td>
<td>Electricit de France (EDF)</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>9</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td>&quot;Add &quot;In addition some RES existing mature technologies are market competitive (for instance hydro, biomass)&quot; after &quot;&quot;to-non renewable technologies.&quot; in the line 12&quot;</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>Potsdam Institute for Climate Impact Research</td>
<td>10</td>
<td>9</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>You refer to a statistical analysis. I think it is questionable whether a pure statistical analysis of different model results is justified. At least this issue should be mentioned here or in 10.2.</td>
</tr>
<tr>
<td>Douglas Arent</td>
<td>NREL</td>
<td>10</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>agree with TSU that section should be on methods</td>
</tr>
<tr>
<td>John Kessels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rewrite to two paragraphs include the first line 12-19 and shorten the theme explanation</td>
</tr>
<tr>
<td>PA ABDoulie Maneh</td>
<td>Ministry of Finance and Economic Affairs</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>41</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td>Areas that needs to be looked at for possible reduction or shortened.</td>
</tr>
<tr>
<td>Vicente Schmall</td>
<td>Petrobras S.A.</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&quot;Insert chapter in the phrase &quot;The scenarios explored in this chapter.....&quot;&quot;</td>
</tr>
<tr>
<td>John Kessels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>11</td>
<td>3</td>
<td>11</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>Delete paragraph not needed</td>
</tr>
</tbody>
</table>

**Expert Review of First Order Draft**
**Do Not Cite, Quote, or Distribute**
<table>
<thead>
<tr>
<th>Name/Mail (Institute)</th>
<th>Chapter/From line</th>
<th>To line</th>
<th>Scenario</th>
<th>Section</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emmanuel Branche</td>
<td>10 11</td>
<td>11 11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>“Avoid the verb “compete”. Proposition: “RES must be part of the solution, with nuclear energy, CCS, energy efficiency. “”. All these technologies should be part of the solution to address climate change”</td>
<td>This is a normative statement that cannot be supported by the literature. Among the analyzed scenarios there are futures without nuclear and/or CCS that largely rely on RES in the long-term as well as those scenarios that have little contribution from RES and/or nuclear, but continue to rely on high fossil fuel shares (baselines). More balanced approaches that include contributions from all these sources are in fact in the majority, but the literature indicates that different choices are possible.</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>10 11</td>
<td>- 11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>ADAM modeling comparison project</td>
<td>Will be added (p. 12, l. 11).</td>
</tr>
<tr>
<td>Smail Khennas</td>
<td>10 11</td>
<td>- 11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>because of [delete of]</td>
<td>Will be changed.</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>10 12</td>
<td>1 -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Box: This box contains a good classification. But what about the macro-economy models? Isn’t this discussion needed as well to relate the costs? You should also say a bit more on the models and their philosophies used in this model review, e.g. that they implement a least-cost approach or an optimization approach. This is in contrast to many bottom-up models that e.g. test if 100% REN in the electricity sector are feasible. To understand the differences in the results, this should be made explicit. Moreover it should be considered to give at least the most fundamental assumptions/classifications of the models, otherwise the results are hard to interpret.</td>
<td>Additional discussions will be added within the limited space available.</td>
</tr>
<tr>
<td>Juan Roberto Paredes</td>
<td>10 12</td>
<td>2 12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>137 different scenarios are mentions earlier in the text. 150 different scenarios? Please clarify</td>
<td>This will be made consistent across chapter 10, but the number will change anyway in SOD.</td>
</tr>
</tbody>
</table>

**Expert Review of First Order Draft**

**Do Not Cite, Quote, or Distribute**

8/62
### 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

<table>
<thead>
<tr>
<th>Name/Institute</th>
<th>Chapter</th>
<th>Page</th>
<th>Line</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of São Paulo)</td>
<td>10</td>
<td>12</td>
<td>8</td>
<td>Why to discriminate against scenarios based in only one technology? SRREN has the purpose to assess all the literature. Are you sure that this option is not discriminatory?</td>
<td>Obtaining a holistic picture of RES is the main task of chapter 10, while the individual technology chapters should look at single technology assessments.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>12</td>
<td>9</td>
<td>Why was MARKAL not assessed? This seems odd given how many countries use it for their planning?</td>
<td>MARKAL is a model generator, not a model. Among the assessed scenarios are several developed with MARKAL-family models (IEA ETP, MARKAL/AIM-CGE India, TIAM). The ability to assess country specific literature is very limited due to space constraints.</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>12</td>
<td>-</td>
<td>Box 10.1, references are missing</td>
<td>The references cited in Box 10.1 are included in the References section of chapter 10. It is acknowledged that additional citations are required to support some of the statements made.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>12</td>
<td>-</td>
<td>Technology detail and level of integration where is this in the literature or have the authors developed their own methodology, I would like to see more references in the Box on where this is coming from?</td>
<td>Recent publications indicate that the traditional bottom-up vs. top-down classification is not adequate for most modeling frameworks assessed in this report (Hourcade et al., 2006; van Vuuren et al., 2009a). However, recent IPCC assessment reports used the traditional classification in a not coherent way. Therefore it seems necessary to justify the deviation from previous practice. It is acknowledged that additional citations are required to support some of the statements made.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>12</td>
<td>-</td>
<td>Box 10.1</td>
<td>This could be shortened to just an explanation of why the authors are not using traditional modelling.</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>13</td>
<td>1</td>
<td>Box 10.1</td>
<td>the phrase ‘2nd best scenario’ has emotive overtones and should be avoided</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>13</td>
<td>1</td>
<td>Box 10.1</td>
<td>This sentence seems to state that the scenarios used were selected because they gave RES as the best option, selective modelling?</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>13</td>
<td>4</td>
<td>Box 10.1</td>
<td>Second best scenarios?? Language and why include them the reasons given seem to indicate a bias that the models give favourable results for RES</td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>13</td>
<td>7</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>13</td>
<td>9</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>13</td>
<td>22</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>13</td>
<td>26</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>13</td>
<td>27</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Ralph Sims (Massey University)</td>
<td>10</td>
<td>13</td>
<td>36</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ralph Sims (Massey University)</td>
<td>10</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>13</td>
<td>-</td>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>13</td>
<td>-</td>
<td>Box</td>
<td>10.2</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>14</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>14</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>14</td>
<td>12</td>
<td>-</td>
<td>21</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>Figure 10.2.1</td>
</tr>
<tr>
<td>Manfred Treber (Germanwatch)</td>
<td>10</td>
<td>15</td>
<td>5</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>15</td>
<td>7</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam institute for Climate Impact Research)</td>
<td>10</td>
<td>15</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam institute for Climate Impact Research)</td>
<td>10</td>
<td>15</td>
<td>10</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam institute for Climate Impact Research)</td>
<td>10</td>
<td>15</td>
<td>11</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam institute for Climate Impact Research)</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>Name</td>
<td>Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>To page</td>
<td>From line</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>Christiano Pires</td>
<td>Petrobras</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ralph Sims</td>
<td>Massey University</td>
<td>10</td>
<td>15</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>Potsdam Institute for Climate Impact</td>
<td>10</td>
<td>16</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Research Institute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Emmanuel Branche     | Electricité de France (EDF)               | 10      | 16        | 6       | 16        | 8      | -      | -      |             | Replace ""Figure 3"" by ""Figure 10.2.3""
                                                                                                                                             | Will be changed.                                                                            |
|                      |                                          |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| John Twidell         | AMSET Centre                              | 10      | 16        | 9       | -         | -       | -      | -      |             | should be 'per unit of energy delivered, natural gas produces less carbon emission than coal'
                                                                                                                                             | 'per unit of energy' will be added                                                                                                                        |
| Marc Darras          | GDF SUEZ                                  | 10      | 16        | 15      | -         | -       | -      | -      |             | 10.2.2.1. 1. A similar panel showing the dispersion of the global energy demand should be interesting to understand the range of variation of energy demand, and later on the role of the various energy sources. 2. In term of scale, one of the difficulty in reading is the adaptation of scale for each panel in this series of graphs (as it is the case some places else). Could we be consistent? This comment applies to this picture and the family of it: 10.2.4, 10.2.6. We will explore adding asimilar panel to the SOD.
                                                                                                                                             |                                                                                              |
| Brigitte Knopf       | Potsdam Institute for Climate Impact      | 10      | 16        | 15      | -         | -       | -      | -      |             | Figure: x-Axis should end at 600. This holds also for Fig. 10.2.4.: only the left part of each figure is used. Scales should be changed.     | Will be added in SOD.                                                                                                                                    |
|                      | Research Institute                        |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| Brigitte Knopf       | Potsdam Institute for Climate Impact      | 10      | 16        | 24      | -         | -       | -      | -      |             | Reductions BY end use' instead of 'reductions FROM end use'.                                                                           | Will be changed.                                                                            |
|                      | Research Institute                        |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| Ralph Sims           | Massey University                        | 10      | 16        | -       | -         | -       | 10.2.3 |        |             | Draw Figs 10.2.3, and 10.2.4 (both) with same y axis of 1000EJ to better show share of RE of total low C.                                | Will be added in SOD.                                                                                                                                    |
|                      |                                          |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| Emmanuel Branche     | Electricité de France (EDF)               | 10      | 17        | 1       | 17        | 6      | -      | -      |             | It could be interesting to give a range for RES deployment regarding a 450ppm scenario (between +50 EJ and + 400EJ for instance if I can read the figure in an appropriate way) We will explore the possibility of supplying such information. | Citing each individual scenario will be impossible, but the scenario database used in the assessment will be made available once the SRREN is published. |
|                      |                                          |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| Brigitte Knopf       | Potsdam Institute for Climate Impact      | 10      | 17        | 1       | -         | -       | -      | -      |             | Please include 'in 2050' after the second '...RES deployment'...                                                                           | Will be added.                                                                            |
|                      | Research Institute                        |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| John Kessels         | International Energy Agency               | 10      | 17        | 2       | 17        | 2      | -      | -      |             | Which scenarios and how many?                                                                                                          | Citing each individual scenario will be impossible, but the scenario database used in the assessment will be made available once the SRREN is published. |
|                      | Clean Coal Centre                         |         |           |         |           |         |        |        |             |                                                                                                                                           |                                                                                              |
| Ralph Sims           | Massey University                        | 10      | 17        | 3       | -         | -       | -      | -      |             | Footnote number? Delete up to "but" from footnote starting ""Note that ...""
<pre><code>                                                                                                                                         | Footnote number will be corrected.                                                                |
</code></pre>
<table>
<thead>
<tr>
<th>Name and (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>17</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>extraordinary expansion: the numbers should be compared to the overall PE increase, better use percentages.</td>
<td>Additional quantitative information to support the statement will be given.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>17</td>
<td>11</td>
<td>17</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Already said this, delete repetitive</td>
<td>Will be adjusted in SOD.</td>
</tr>
<tr>
<td>John Twidell (AMSET Centre)</td>
<td>10</td>
<td>17</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>(regarding here and elsewhere, see comment ALL at th start of this chapter). Note here that CCS is not available now and hardly exists in even small scale demonstration. You are comparing chalk with cheese! For instance you do not include, or mention, fusion power because it too has not been demonstrated. The comparisons in these and other sentences are completely unrealistic; CCS is unknown and unproven, whereas most renewables are now commercially available and fully demonstrated. For nuclear fission power, it should be made clear that this is only available for centralised electricity in a relatively small number of countries. Multicountry use would never be allowed for reasons of weapons production and security. The models need to be based on reality, not conjecture.&quot;</td>
<td>In a significant fraction of the scenario literature CCS plays an important role as a transition technology in a climate constrained world which cannot be ignored in this assessment to obtain a holistic picture of climate change mitigation. In addition, some of the renewable energy technologies assessed in this report share the same lack of deployment at larger scales.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>17</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>There is also increasing energy efficiency measures on both the supply and demand side</td>
<td>Efficiency on the demand side is excluded in the statement (&quot;meeting the energy demands&quot;), but conversion efficiency improvements on the supply side can be mentioned in addition, although they are not sufficient to reach low stabilization targets. Will bemade more explicit in SOD.</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>17</td>
<td>30</td>
<td>31</td>
<td>31</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>10.2.2.1: Add at the end: in constrained scenarios. Because the situation is different in baseline.</td>
<td>Will be added in SOD.</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>17</td>
<td>30</td>
<td>31</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>A third explanation could be offered: that large, inflexible power stations such as nuclear or large coal fired coal stations are incompatible with a diverse, flexible system which utilises the maximum variety and maximum quantity of variable renewable sources.</td>
<td>Systems integration aspect of scenarios is discussed in section 10.2.3 which will need to be improved toward SOD.</td>
</tr>
<tr>
<td>Emmanuel Branche Electricité de France (EDF)</td>
<td>10</td>
<td>17</td>
<td>30</td>
<td>31</td>
<td>31</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>At what time CCS will be available (industrialised?), and at what is the cost for this technology ? What about CO2 storage issue ?</td>
<td>These assumptions are different across the scenarios and/or models and also the storage issue is handled differently in different scenarios. As RES are in the focus of this Special Report, the details of CCS modeling cannot be discussed. However, scenario database will be made available by the time of publication of the SRREN.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>17</td>
<td>-</td>
<td>17</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Figure</td>
<td>10.2.4</td>
</tr>
</tbody>
</table>

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

---

13/62
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Sector</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>18</td>
<td>1 - 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.2.1: Delete this sentence: Because GHG is not the sole factor to determine an energy system (which can be seen from the dispersion of fig 10.2.4 for instance) the CO2 price mention here is not well funded as the determinant factor, if there is a low consumption because of a very weak growth or recession, or a policy based on energy security... the GHG price whatever its way of determination might be kept low.</td>
<td>We will insert &quot;all other things being&quot; to indicate that this is the direction of the effect, but not the sole determinant.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>1 - 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>I am not sure if this interpretation concerning increased energy eff and reduced demand is correct. I think that many of the models are not well equipped to model demand-side options. At least in REMIND it is the case that without CCS e.g. there is simply no other option than reducing energy demand, what is in fact quite costly.</td>
<td>It is correct that models deal differently with demand side responses, but some have actually considerable detail on the demand side or at least an elastic demand that responds to price changes. To clarify, the paragraph is highlighting that in addition to a substitution on the supply side, a demand side reponse is induced because of higher energy prices.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>5 -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.2.1: Bioenergy with CCS as a factor of explanation here is interesting. However, since we have not any evaluation of its weight in the energy mix (and it might be very modest) this sentence should be deleted. The report should avoid sentences such as One possible explanation.</td>
<td>There is significant evidence in the literature that bio energy with CCS has a significant impact on the timing of mitigation (e.g. Krey &amp; Riahi, 2009), leading to more mitigation before 2050 to achieve a certain concentration target. This typically leads to additional deployment of renewables and energy efficiency in the first half of the century.</td>
</tr>
<tr>
<td>Charles Kutscher (National Renewable Energy Laboratory)</td>
<td>10</td>
<td>18</td>
<td>9 -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This mentions coupling biomass with CCS to achieve negative emissions. This is a critically important possibility and deserves more attention.</td>
<td>Literature and possibly more discussion will be added on this issue.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>10 -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>as far as I know, none of the models has considered this.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>10 -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>I think an additional point why nuclear is less important is that it is solely used in the electricity sector. But for the electricity sector there are many possibilities to decarbonize. Moreover, CCS is also important in the transport sector, e.g. by producing H2 in combination with biomass+CCS. So CCS is more flexible than nuclear in the models.</td>
<td>More analysis will be added.</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 6)</td>
<td>10</td>
<td>18</td>
<td>14 - 27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>In the caption, no CSS+nuclear should be made clear. Is it no CSS+NO nuclear which seems to be according to the narrative. If so, better to clarify in the caption.</td>
<td>Will be clarified.</td>
</tr>
</tbody>
</table>
Special Report on Renewable Energy Sources and Climate Change Mitigation, First Order Draft

<table>
<thead>
<tr>
<th>Name and Institute</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure/Table Info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>18</td>
<td>14</td>
<td>18</td>
<td>15</td>
<td>10.2.5</td>
<td>When the scenarios does not consider the option it is better to write N/A than to leave blank. This is the case for ReMIND ADAM for no CCS + Nuclear.</td>
<td>Will be clarified.</td>
<td></td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>18</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.2.1: Figure 10.2.5 and its comment are very interesting. It should be more effective if for each vertical line, one adds in different colours the share of CCS and the share of nuclear.</td>
<td>Will be clarified.</td>
<td></td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>18</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>10.2.2.1</td>
<td>The CO2 concentrations should be stated clearer on the X-axis</td>
<td>Will be clarified.</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Explain the scenario definition, this is important. At least for REMIND, POLES, MAELIM, the definition of 'no CCS', 'nuence' and 'no CCS + nuclear' is for all models the same. And 'no CCS' should be the same in all models.</td>
<td>Will be clarified.</td>
<td></td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 6)</td>
<td>10</td>
<td>18</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>A concern regarding this figure is the sharp differences between the various scenarios (e.g. More than 40% increase in the case of ReMIND RECIPE scenario and less than 15% in the case of IMALIM-R. Further explanation could be useful.</td>
<td>We will try to improve on the explanation.</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.5</td>
<td>I like this figure very much. More of this kind of figures would make the model evaluation more useful.</td>
<td>Thanks, we are aiming at increasing the scope of this analysis.</td>
<td></td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.2.1</td>
<td>Some second-best studies have also analyzed scenarios with constraints on the expansion of renewables (e.g. ADAM Knopf et al., 2009). They should be included in the this analysis, as they provide insights on the economics of mitigation if RES expansion does not occur either due to technological difficulties or implementation barriers.</td>
<td>The restricted renewable scenarios will be added to the analysis.</td>
<td></td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.2.1</td>
<td>This figure and subsection present second best scenarios, in which the availability of competing low-carbon alternatives (CCS and Nuclear) are restricted. The analysis only addresses the effect of the technology constraints on renewable deployment. In view of externalities and limited public acceptance of nuclear and CCS stakeholders will be interested in a quantification of the cost markups of such noCCS or noNuclear scenarios relative to the default scenario with all options. Such an analysis would be thus a very valuable contribution.</td>
<td>An attempt will be made to address the economic dimension of the second best scenarios. However, it needs to be explored which metric turns out to be available across a larger set of scenarios and is most robust at the same time. Therefore, it may not be useful to implement this effectively.</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>19</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>So what is the main determinant? Is it about model biases? About costs assumptions?</td>
<td>Additional analysis will be made toward the SOD.</td>
<td></td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>19</td>
<td>1</td>
<td>19</td>
<td>4</td>
<td>-</td>
<td>Please include one further ‘NOT’: “CCS or nuclear are not the only or perhaps even the most critical determinants of future RES deployments to address climate change”.</td>
<td>Additional analysis will be made toward the SOD.</td>
<td></td>
</tr>
<tr>
<td>Manfred Treber (Germanwatch)</td>
<td>10</td>
<td>19</td>
<td>2</td>
<td>19</td>
<td>3</td>
<td>-</td>
<td>“Perhaps even” I think it should read “perhaps NOT even”</td>
<td>Will be corrected.</td>
<td></td>
</tr>
<tr>
<td>Stan Rosinski (Electric Power Research Institute)</td>
<td>10</td>
<td>19</td>
<td>2</td>
<td>19</td>
<td>4</td>
<td>-</td>
<td>Conclusions regarding impact of nuclear and CCS availability are not evident from Figure 10.2.6.</td>
<td>No nuclear case will be added to Figure 10.2.6. Additional analysis will be made toward SOD.</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>19</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Perhaps even I think it should read “perhaps NOT even”</td>
<td>Will be corrected.</td>
<td></td>
</tr>
<tr>
<td>Name and Institution</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>19</td>
<td>27</td>
<td>20</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>References on who is saying this on the scales of deployment is needed. Also why is the growth limited?</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>19</td>
<td>29</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>report different assumptions on tech costs, capabilities that lead to different long term potentials ..</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>19</td>
<td>30</td>
<td>31</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>&quot;The fact that &quot;bioenergy development is of a dramatically higher scale etc&quot; may deserve further development given the environmental concern surrounding biofuels.&quot;</td>
<td>The bioenergy chapter deals with these issues in detail and therefore should be consulted.</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>19</td>
<td>30</td>
<td>-</td>
<td>31</td>
<td>-</td>
<td>-</td>
<td>10.2.2.2: The importance of bioenergy underlined here is not included in the summary part which is more electricity production oriented.</td>
<td>Executive summary will be adjusted accordingly.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>19</td>
<td>30</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>This is e.g. something that I would expect to find in the executive summary, but it is missing there</td>
<td>Executive summary will be adjusted accordingly.</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>19</td>
<td>32</td>
<td>33</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>&quot;Hydroelectric power importance has to decrease in the long term (after 2050) since most of the potential will be explored. Is not an option of the modeler; it is a real cap.&quot;</td>
<td>The current text says that hydroelectric is not as significantly expanded by 2050 as the other RES.</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>19</td>
<td>35</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.2.2: Biomass is by large the biggest contributor, solar might be important only in non annex 1 countries by 2050 (fig 10.2.7). Why not respect in the presentation the order of importance. For biomass, cellulose approach refers to biomass to liquid technologies, while biomass can be directly used (including all cellulose) in direct heat system. Therefore the note is not pertinent. Solar is not the surpassing other contribution, a fortiori in term of order of scale. This sentence should be rephrased.</td>
<td>It is mentioned in the text (p. 19, l. 30/31) that biomass is the largest contributor.</td>
</tr>
<tr>
<td>Chris Campbell (Ocean Renewable Energy Group)</td>
<td>10</td>
<td>19</td>
<td>35</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>no ref to ocean at all cf tabel 10.3.3</td>
<td>Ocean energy is - with very few exclusions - almost not captured in global long-term scenarios (see section 10.2.3).</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>10.2.6</td>
<td>-</td>
<td>again: scaling of figure is strange on the x-axis</td>
<td>Will be improved.</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>20</td>
<td>3</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>It is impossible to tell which scenarios are being referred to here.</td>
<td>The scenarios that the figures and descriptions are based on are cited in the captions of figures 10.2.7 and 8.</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>20</td>
<td>3</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>Do for fuels and power?</td>
<td>This statement refers to deployed bioenergy-based technologies, i.e. for electricity, biofuel (1st generation) and heat supply, with the exception of 2nd generation biofuels.</td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>20</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>There should be a cross-reference to the biomass chapter about the potentials. Are the model assumptions in range of what is given there?</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapter 8)</td>
<td>10</td>
<td>20</td>
<td>12</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>I assume it should be as instead of at</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapter 8)</td>
<td>10</td>
<td>20</td>
<td>14</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The word non commercial could be misleading. In almost all developing countries, the turn over for traditional fuels is huge and mainly driven by the urban consumption which share is much higher than rural consumption</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Who says this, references</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>20</td>
<td>21</td>
<td>20</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>These lines are not clear</td>
</tr>
<tr>
<td>Manfred Treber (Germanwatch)</td>
<td>10</td>
<td>20</td>
<td>21</td>
<td>20</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Why no mentioning of Oil Gap and Peak Oil (irrespective if that is 2030 or soon) and the consequences of it?</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>20</td>
<td>24</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This does not explain, why hydro decreases in absolute terms (see comment above)</td>
</tr>
<tr>
<td>Ralph Sims (Massey University)</td>
<td>10</td>
<td>20</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>‘Define “advanced bioenergy”.’</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of São Paulo)</td>
<td>10</td>
<td>20</td>
<td>27</td>
<td>20</td>
<td>28</td>
<td>10.2.7</td>
<td>-</td>
<td>-</td>
<td>The figures are very small in size and difficult to read. They must be bigger.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>20</td>
<td>29</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Include abbreviation for Annex I and nA1</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.7</td>
<td>-</td>
<td>10.2.2.2: It is surprising that some scenarios show no contribution of biomass: could this be checked?</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.7</td>
<td>-</td>
<td>This figure references 18 scenarios, yet only presents results from 5 or amalgamates them somehow. This is not clear. The same can be said for figure 10.2.8</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>10.2.7</td>
<td>-</td>
<td>-</td>
<td>“x-Label: perhaps switch to “A1” and “rA1”, this makes it easier to read”</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>21</td>
<td>1</td>
<td>21</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Policy structure: add footnote to explain what is used. Any national policies used or just global, with regional delay/timing?</td>
</tr>
</tbody>
</table>
| John Kessels (International Energy Agency Clean Coal Centre) | 10 | 21 | - | 21 | - | - | - | - | General comment I think the distribution of RES is also driven on the availability of fossil fuels as well, this is a key element that should be at least mentioned as depleting fossil fuels will need to be replaced with alternatives. | The assumptions on the resource bases of various fossil fuels is relevant for the deployment of RES in particular in the baseline scenarios. However, in stabilization scenarios the limited possibility of emitting CO2 and other GHG is the main constraint on the use of fossil fuels (with the exception of CCS). We are aiming at adding a corresponding statement into the SOD.
<p>|
| Ralph Sims (Massey University) | 10 | 21 | - | - | - | 10.2.8 | - | - | “Discuss why Biomass is also shown as FE (definition of final energy needed in caption and better called “Bioenergy”) and rest are shown as primary energy. Could also keep Y axis standard at 350 EJ max to show proportions of each technology. Could merge Biomass TPES and Bioenergy FE into one graph. Clarify if the latter includes biofuels.” | FE biomass refers to direct biomass use in the end-use sectors as opposed to all bioenergy based primary and secondary energy carriers. This will be made more clear in the SOD. Keeping the y-axis at a standard value of 350 EJ across all graphs will make some of them unreadable. |
| Marc Darras (GDF SUEZ) | 10 | 21 | - | - | - | 10.2.8 | - | - | 10.2.2.2: For clarity sake, could we harmonise the scale so one can compare the various panel. | Keeping the y-axis at e.g. a standard value of 350 EJ (biomass) across all graphs will make some of them unreadable. In addition, Figure 10.2.7 exactly puts the various technologies into context (without separation of different stabilization levels). |
| Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 21 | - | - | - | 10.2.8 | - | - | Third picture: It seems to be that hydro has a larger amount in the baseline compared to the CATIII/IV mitigation cases in 2030 and 2050. Why is this so? This should be addressed. And why is it used and increased again for CATI/II scenarios? There seem to be a model bias. Same question for FE Biomass. | The scenario sample is not completely unbiased which will improve toward the SOD due to additional scenarios included, but additional discussions of the potentially remaining bias will be added. |
| Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 21 | - | - | - | 10.2.8 | - | - | This figure is very interesting. But for readability and comparison issues, the scales should be the same or at least a multiple of each other. Moreover, a vertical bar each separating 2020 from 2030 from 2050 would be good. Was the abbrev TPES explained somewhere? | Keeping the y-axis at e.g. a standard value of 350 EJ (biomass) across all graphs will make some of them unreadable. In addition, Figure 10.2.7 exactly puts the various technologies into context (without separation of different stabilization levels). Abbreviation TPES will be explained or removed and figures will be revised for better readability. |
| Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 21 | - | - | - | 10.2.8 | - | - | This figure should be made comparable to figure 10.3.3. (I prefer the style of 10.2.8). | Comparability across chapter 10 will be improved toward SOD. |
| Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 22 | b | - | - | - | - | - | deployment of RES? | Will be inserted. |</p>
<table>
<thead>
<tr>
<th>Name/Institute</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table Info</th>
<th>Comments Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>22</td>
<td>6</td>
<td>22</td>
<td>29</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This section could delete the figure and save the key message which is more RES deployment will be influenced by mitigation efforts and illustrate with a paragraph on China’s efforts. We will consider whether the material can be explained sufficiently well using only text. However, at present our plan is to continue to use the figures, but to present the material in a more intuitive way.</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>22</td>
<td>6</td>
<td>22</td>
<td>26</td>
<td>10.2.9</td>
<td>-</td>
<td>-</td>
<td>This is not a good example, as it is so obviously counter-factual with what is happening at present in China, leading the world in solar thermal, pv manufacturing, wind turbine manufacturing and small hydro deployment, while it is at the same time non-committal on absolute emissions reductions. The point is clear, but a better example should be found. The figure shows that RES deployment in China is mostly reduced in case of a delayed participation in a global climate regime compared to the case when China would join a global climate regime immediately after 2012. This can (and typically does) still imply a strong increase in RES deployment in the delayed participation case, compared to today (see Clarke et al. 2009 and references therein). However, we might consider to present the material in a more intuitive way.</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>22</td>
<td>12</td>
<td>22</td>
<td>12</td>
<td>10.2.2</td>
<td>2</td>
<td>-</td>
<td>Insert “<strong>(EMF 22)</strong>” after <strong>“Energy Modeling Forum 22”</strong>.* EMF22 as an abbreviation is introduced on page 12. Therefore, only EMF22 will be used here.</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>22</td>
<td>30</td>
<td>22</td>
<td>34</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Cross reference to chapter 10.6 will be added.</td>
</tr>
<tr>
<td>Smal Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>22</td>
<td>33</td>
<td>22</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Last sentence should be reformulated Cross reference to chapter 10.6 which deals with co-benefits of RES deployment will be added.</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>22</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>“Change “<strong>reduced</strong>” by “<strong>reduces</strong>”.” Will be changed.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.9</td>
<td>-</td>
<td>-</td>
<td>“Percentage change against what? Against baseline? Against year 2005? What does N.T.E., O.S. mean? Improved explanation will be added toward SOD.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.9</td>
<td>-</td>
<td>-</td>
<td>Sorry, I did not get the clue of this figure. What is the main message: the longer you wait the less RES are deployed? Improved explanation will be added toward SOD.</td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development)</td>
<td>10</td>
<td>23</td>
<td>2</td>
<td>23</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This result about the correlation between GDP and stabilization level seems different from the results of IPCC AR4 (SPM WG III). Some more discussion of this point could be interesting. To clarify: The literature indicates that mitigation and also the deployment of RES have limited impact on GDP compared to broader socio-economic assumptions in the scenarios. This is inline with the AR4 WG3 SPM. Within the space limitations in the report, we will aim at explicitly showing relative GDP changes compared to the baselines.</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>23</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Cross reference to chapter 10.6 which deals with co-benefits of RES deployment will be added to this or the previous paragraph.</td>
</tr>
</tbody>
</table>
Special Report on Renewable Energy Sources and Climate Change Mitigation, First Order Draft

Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)

Section 10.2.2 clearly indicates that biomass is one of the most important RES, if the most important one. Section 10.2.3 was still tentative and will be majorly reviewed toward the SOD.

A more careful discussion will be added, however, the literature indicates that mitigation and also the deployment of RES have limited impact on GDP compared to broader socio-economic assumption in the scenarios.

Marc Darras (GDF SUEZ)

View this correlation: I do not see any correlation at all in this figure

We agree that the correlation is weak at best. We will adjust the text, or perhaps the figures, appropriately to capture the reasons for limited correlation.

Brigitte Knopf (Potsdam Institute for Climate Impact Research)

Variation in this correlation: I do not see any correlation at all in this figure

A quantitative statistical measure will be used to support this statement. In addition, it is aimed to improve the figure regarding readability.


It is said that the scenarios reviewed here do not indicate a clear correlation between RES deployments and carbon prices. This seems not completely coherent with the results of the previous pages (page 16, line 27 for instance).

The earlier statement on page 16, line 27 does not refer to RES, but to low-carbon energy which includes nuclear and CCS which correlates much better with the climate target than RES deployment. In addition, models show an even wider range for the carbon price (equivalent to the marginal abatement costs). For that reason, we will explore using a different economic metric such as GDP or total mitigation costs if available for a wider set of scenarios.

Brigitte Knopf (Potsdam Institute for Climate Impact Research)

Not indicate a clear correlation. Again: I do not see any correlation at all in this figure

A quantitative statistical measure will be used to support this statement. In addition, it is aimed to improve the figure regarding readability.

Vicente Schmall (Petrobras S.A.)

It's important to mention that once sustainability criteria be reached by bioenergy production it can play a very important role in a transition period from fossil to RE technologies.

Sections 10.2.2 clearly indicates that biomass is one of the most important RES, if the most important one. Section 10.2.3 was still tentative and will be majorly revised toward the SOD.

John Kessels (International Energy Agency Clean Coal Centre)

This section has no references, eg page 24 line 28 mentions recent scenario literature but no reference. Do not need to go over individual chapters just mention that previous chapters go into more detail on specific technologies

The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.

Brigitte Knopf (Potsdam Institute for Climate Impact Research)

The x-scale of the right figure is strange.

The scale of the x-axis will be adjusted.
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>400 EJ seems to be a very high potential. Is this in line with the biomass chapter? Give references for that number. See e.g. van Vuuren et al. (2010) “Bio-Energy Use and Low Stabilization Scenarios” or Beringer and Lucht (2008).</td>
<td>The 400 EJ refer to Section 2.8, i.e. “Potential Deployment” of bioenergy to ensure consistency across the SRREN. However, section 10.2.3 will be majorly revised in an attempt to harmonize the “Potential Deployment” sections of the technology chapters and their relation to chapter 10.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>It could be an idea to evaluate the biomass scenario where the potential is varied. But I do not know how many models provided results for this.</td>
<td>The ADAM project bioenergy sensitivity analysis is included in the set of scenarios evaluated here. The objective of the discussion here is to put the levels of RES deployment into the context of the technology chapters, in this particular case the bioenergy chapter.</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>opinion vs fact or historical or comparisons to other industries??</td>
<td>The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>relatively low compared to what? To the potential? To the other RES?</td>
<td>The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>Most wind energy projects are subsidized presently and they will be like that for some time. When discussing wind supply of the order of 10 EJ it makes sense to further evaluate the total amount of subsidy and try to infer if society is willing to pay for that. Do not forget that some societies (like in Denmark) are willing to pay for the subsidy due commercial gains with the sales of technology, self pride and, probably a minor component, due to environmental reasons.</td>
<td>High wind energy deployments are mostly observed in climate stabilization scenarios, i.e. the subsidies that are currently granted are substituted by a price on carbon that penalizes fossil fuels. In addition, wind power is competitive under favorable resource conditions currently (consult wind chapter).</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10.2.3: For a question of homogeneity, this sentence should be deleted, because wind is the only technology where investment and incentives are mentioned. To note that is as well the technology which is nearer of the energy market level.</td>
<td>The harmonization of how the RES deployment levels are put into the context of the technology chapters is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.</td>
</tr>
<tr>
<td>Ralph Sims (Massey University)</td>
<td>Could shorten and just refer to Chap. 8 - Change “fluctuating” to “variable”</td>
<td>Will be changed.</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10.2.3: Integration should concern heat and transport as well. Conclusion should be taken from the pertinent chapter in the SRREN.</td>
<td>The harmonization of how the RES deployment levels are put into the context of the technology chapters and the systems integration chapter is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.</td>
</tr>
<tr>
<td>Name</td>
<td>Institute</td>
<td>Chapter</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| Douglas Arent              | (NREL)                                     | 10      | 24        | 43        | 48      | -       | -       | -      | -          | The harmonization of how the RES deployment levels are put into the context of the technology chapters and the systems integration chapter is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.  
|                             | José Roberto Moreira                       | (Brazilian Reference Center on Biomass- University of São Paulo) | 10 | 24 | 43 | 25 | 3 | - | - | This can be deleted. All this discussion is present in Chapter 3 and Chapter 9. The harmonization of how the RES deployment levels are put into the context of the technology chapters and the systems integration chapter is currently ongoing. This issue will be addressed in this context and should therefore be resolved in the SOD.  
| Vicente Schmall             | (Petrobras S.A.)                           | 10      | 24        | 44        | -       | -       | -       | -      | -          | Bioenergy-based electricity generation is dispatchable and therefore does not count as a fluctuating source. (Sounds like you are rejecting)  
|                             | José Roberto Moreira                       | (Brazilian Reference Center on Biomass- University of São Paulo) | 10 | 25 | 10 | 25 | 10 | - | - | Will be changed.  
|                             | Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 25 | 13 | - | 14 | - | - | - | In case space limitations permit such an analysis, an attempt will be made to address this (modeling focused) question which is more driven by methodology than by the actual questions that chapter 10 tries to answer. An additional concern is that models cannot unambiguously attributed to well defined categories.  
| John Kessels               | (International Energy Agency Clean Coal Centre) | 10 | 25 | 23 | 25 | 32 | - | - | - | Strength and weaknesses of scenario analysis need to be discussed in the section.  
|                             | Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 25 | 33 | 28 | 38 | - | - | - | This is a more in depth analysis of the scenario from 10.2 - explanation will be added why and these scenarios have been selected - 2 new scenario will be added more information will be added  
|                             | Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 26 | 3 | - | 10 | - | - | - | I did not get the point how many studies are analysed here? WEO, ETP and ER? And they are all based on the one database of IEA? This should be made explicit more information will be added  
|                             | Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 26 | 3 | - | - | - | - | - | Explain what backcasting process means. What is the objective? Meeting a climate target? more information will be added  
|                             | Brigitte Knopf (Potsdam Institute for Climate Impact Research) | 10 | 26 | 3 | - | - | - | - | - | ETP is not explained more information will be added  

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

Expert Review of First Order Draft
Do Not Cite, Quote, or Distribute
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>26</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Where does DLR2008 refer to? To the IEA database? DLR 2008 source will be explained better</td>
</tr>
<tr>
<td>Vicente Schmalt (Petrobras S.A.)</td>
<td>10</td>
<td>26</td>
<td>16</td>
<td>26</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>“To omit the circumstances on which the total (global) technical potential for all renewable energies sources were predicted, makes the scenario too optimist and absolutely unreal when the author says that the offer “exceed the demand by a factor of 32”.” will be rephrased - “compared to the global primary energy demand the technical renewable energy potential (UBA 2005) exceeds over 30 times”</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>26</td>
<td>17</td>
<td>26</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,477 EJ/a should be 2,477 will be changed</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>26</td>
<td>17</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>this variation is nearly from zero to infinity. Is there a median that could be given? more information will be added</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>26</td>
<td>34</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>does WI, ecofys need to be mentioned here? unclear what the point is</td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10</td>
<td>26</td>
<td>34</td>
<td>27</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>it is very useful to use such integrated figures Accepted</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>26</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>For question of logic, item 10.3.1 could be swapped with the 10.3.2 see above</td>
</tr>
<tr>
<td>mario contaldi (ISPRA, Institute for Environmental Protection and Research)</td>
<td>10</td>
<td>26</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The entire para 10.3.1 repeat numbers and considerations already present in the report, see ch1 and ch 8. It can be deleted. 10.3.1 is part of the agreed structure and puts the analysis into the context of the further analysis of selected scenarios</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>27</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>any error estimates or ranges or confidence level of estimates? more information will be added</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>27</td>
<td>8</td>
<td>27</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.1 is part of the agreed structure and puts the analysis into the context of the further analysis of selected scenarios</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>27</td>
<td>10</td>
<td>27</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>language challenges here. Could be simplified. Further editing will take place</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>27</td>
<td>13</td>
<td>27</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The expectation that breakthrough or technological improvement can change the cost suddenly was never confirmed by learning curves available for most of the technologies. Prices decreases are identified but usually the rate is around a few percent. Break through technologies are not part of this analysis. Both Wind and pv price developments of the past 10 years are in line with their learning curves</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>27</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>‘regional and sectoral should be changed to “sectoral and regional”’ because sectoral comes first. Moreover, regional analysis comes in 10.3.3., so skip “regional” here?” Accepted</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>27</td>
<td>24</td>
<td>28</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.2. This 2 para could be shortened. The question of market is more detailed in section 10.5 Will shorten or delete and refer to other sections</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>27</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>covered elsewhere? Chapter 8 delete? Will shorten or delete and refer to other sections</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>27</td>
<td>24</td>
<td>28</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This is a good paragraph but it is lost a bit here. Perhaps it should better be included in 10.6? Will shorten or delete and refer to other sections</td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)</td>
<td>10</td>
<td>27</td>
<td>26</td>
<td>27</td>
<td>29</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>More than only public acceptance, we need to underline the willingness of public to participate in market transformation. This is a prerequisite both for policy makers to be supported by citizens and to economical stackholders to have a long term economical perspective. This will be also a crucial item in order to size the appropriate support scheme and associated penalties.</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>27</td>
<td>29</td>
<td>27</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><strong>Especially the use of biomass has been controversial in the past years as competition with other land use, food production, nature conservation needs etc. accrued.</strong> <strong>To affirm it without any reference makes it an assumption and it should only be in the text if the intention of the author was clarified.</strong></td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>27</td>
<td>29</td>
<td>27</td>
<td>29</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Suggest to add biofuels after biomass. Indeed the controversy surrounding biomass is mainly due to biofuels</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>27</td>
<td>30</td>
<td>28</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Insert the phrase between commas, as follow: <strong>“Sustainability criteria, associated with positive energy policies, have a huge influence on the overall market potential and whether bioenergy can play a crucial role in future energy supply”</strong>.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.1</td>
<td>Last line: <strong>“percentage”</strong> should be added in the last line. “</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.1</td>
<td>Interpretation: 32% of the total world energy demand in 2007 could be covered by REN? And here mainly by CSP and Geothermal. This should be mentioned in the text.</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>27</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.1</td>
<td>This table is important and may deserve further comments</td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10</td>
<td>28</td>
<td>3</td>
<td>28</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This paragraph does not bring much in content and clarity</td>
</tr>
<tr>
<td>STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)</td>
<td>10</td>
<td>28</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>PV technology can be considered not as a younger technologies with comparison with CSP and ocean energy even if the productivity and the cost are expected to increase for the 1st and to decrease for the 2nde in the next decade.</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>28</td>
<td>26</td>
<td>28</td>
<td>27</td>
<td>10.3.2</td>
<td>10.3.2</td>
<td>-</td>
<td>Refer to figure in text, and references to sources should be given in the caption.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>38</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>These numbers are meaningless unless you state from what baseline, average annual growth rate of 35% from what baseline, etc</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.2.3</td>
<td>-</td>
<td>WEO, ETP, IEA are all based on IEA data. So they are not independent, or are they? The table suggests that you use 4 different sources but in fact these are only two (or not?). This should be mentioned in the caption</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>28</td>
<td>-</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>10.3.2</td>
<td>-</td>
<td>WEO outlook 2008 scenario gives a RE share of 14 %un 2030 and just 13 % in 2050. Is it correct? Even so it seems a bit odd that RE share will decrease between 2030 and 2050.</td>
</tr>
<tr>
<td>Name</td>
<td>Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table info</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>Marc Darras</td>
<td>GDF SUEZ</td>
<td>10</td>
<td>29</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Table 10.3.2: It is not too often cost effective in term of market deployment because of the transformation of the technology needed to improve efficiency, thus the effective final energy delivered. The up-front investment question is often not solved. The Stag programme in Tunisia for SWH, supported by UNPD is such an example.</td>
</tr>
<tr>
<td>Ralph Sims</td>
<td>Massey University</td>
<td>10</td>
<td>29</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Add reference IEA, 2007, Renewable Energy Heating and Cooling, <a href="http://www.iea.org">www.iea.org</a> (free download). Less &quot;grey&quot; than ISIS reference.</td>
</tr>
<tr>
<td>John Kessels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>29</td>
<td>9</td>
<td>29</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>This section does not cover any factors aside from price, rename to Price factor or perhaps delete and move the costs to another section</td>
</tr>
<tr>
<td>Marc Darras</td>
<td>GDF SUEZ</td>
<td>10</td>
<td>29</td>
<td>10</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>10.3.2.1: This is an analysis of the projected cost of technologies, not an analysis of all factors for market development as the title indicates.</td>
</tr>
<tr>
<td>Douglas Arent</td>
<td>NREL</td>
<td>10</td>
<td>29</td>
<td>10</td>
<td>29</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>Include nuclear, fossil prices, fuel prices...</td>
</tr>
<tr>
<td>Emmanuel Branche</td>
<td>Electricité de France (EDF)</td>
<td>10</td>
<td>29</td>
<td>11</td>
<td>29</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>Replace &quot;table 4&quot; by &quot;table 10.3.3&quot;</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>Potsdam Institute for Climate Impact Research</td>
<td>10</td>
<td>29</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Where is table 4?</td>
</tr>
<tr>
<td>Steve Sawyer</td>
<td>Global Wind Energy Council</td>
<td>10</td>
<td>29</td>
<td>14</td>
<td>29</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>I think you will find that Suntech of China is already delivering photovoltaics at close to or even below 2 USD/watt, i.e., less than 2000 USD/kW...</td>
</tr>
<tr>
<td>Emmanuel Branche</td>
<td>Electricité de France (EDF)</td>
<td>10</td>
<td>29</td>
<td>24</td>
<td>29</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>The generation cost (USD/kWh) is also very important for an investor point of view</td>
</tr>
<tr>
<td>John Kessels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>Delete table 10.3.3 as this is an overview of possible market shares and not based on actual market shares, alternative is to redo table based on actual market shares, etc</td>
</tr>
<tr>
<td>Small Khennas</td>
<td>Independent consultant, lead author chap 8</td>
<td>10</td>
<td>30</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.3 Should be TWh instead of Tw</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>Potsdam Institute for Climate Impact Research</td>
<td>10</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Third column: is this % of total demand or of power demand? How to interpret the number &gt; 100% in 2050 (for total renewables)? Is this % of the possible generation or of generation in the scenario?</td>
</tr>
<tr>
<td>John Kessels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>31</td>
<td>8</td>
<td>31</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>I think if you are going to use the Energy (R)evolution scenario you need to outline its assumptions and its analysis is in my view questionable.</td>
</tr>
<tr>
<td>John Kessels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>31</td>
<td>8</td>
<td>31</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>IPCC reports have to be based on published literature that has been peer reviewed and to have a table based on theoretical exercises is disturbing and should be deleted unless based on published literature.</td>
</tr>
<tr>
<td>Name</td>
<td>Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>John Kessels</td>
<td>(International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>31</td>
<td>23</td>
<td>31</td>
<td>30</td>
<td>31</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steve Sawyer</td>
<td>(Global Wind Energy Council)</td>
<td>10</td>
<td>31</td>
<td>25</td>
<td>31</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels</td>
<td>(International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Smail Khennas</td>
<td>(Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>31</td>
<td>33</td>
<td>31</td>
<td>33</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels</td>
<td>(International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>31</td>
<td>36</td>
<td>32</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira</td>
<td>(Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>31</td>
<td>45</td>
<td>32</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brigitte Knopf</td>
<td>(Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>32</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Jose Roberto Moreira (Brazilian Reference Center on Biomass - University of Sao Paulo)

Chapter 10, From page 32 to page 32, Section 3.2.1, Figure - , Table -

- It is very interesting the huge share of hydroelectricity when so much concern for water shortage is discussed in the literature. To generate power, through hydroelectricity, 1kg of water falling from 40m high produces 400J. Thus, 1kWh requires 9m3 of water. As discussed in earlier comment, one tonne of sugarcane, on top of ethanol produced, can generate 160kWh. To achieve these results, some extremists claim that it is necessary rainfall of the order of 1,500mm/yr, which means that in one hectare of land, 15,000m3 of water has to be made available, mainly by mother nature, through rainfall. Since in 1ha of sugar cane it is possible to produce 100 tonnes of sugar cane, the most extreme calculation claims that 150m3 of water was needed per tonne of sugar cane. With this tonne it is possible to generate 160kWh or it is necessary to use 0.94m3 of water/kWh. Compare this value with the 9m3 of water from hydro. Even, considering that the same amount of water flows through hydro plants installed in cascade (assuming an average of 4 plants) the water volume is 2.25 m3/kWh. And, more interesting, is that hydroelectricity grew and is still growing significantly, with modest criticism about water shortage, if compared with biofuels.

Authors appreciate the comment.

### Brigitte Knopf (Potsdam Institute for Climate Impact Research)

Chapter 10, From page 33 to page 33, Section 3.2.1, Figure - , Table -

- Headings: should be in the same style as 10.3.2.1: "Renewable heating and cooling".

Will be changed.

### Marc Darras (GDF SUEZ)

Chapter 10, From page 33 to page 33, Section 3.2.2, Figure - , Table -

- 10.3.2.2: Renewable technologies cannot all be used for cooling. It is mostly considered for solar, and in some cases for geothermal low-temperature together with passive technologies. Could the discussion be by order of magnitude: bio-energy, then solar and geothermal.

Information will be provided.

### John Kessels (International Energy Agency Clean Coal Centre)

Chapter 10, From page 33 to page 34, Section 3.2.2, Figure - , Table 10.3.4

- I suggest you combine these three sections into one and shorten it to a page, delete Table 10.3.4

We will combine and shorten and re-do table with different data.

### Marc Darras (GDF SUEZ)

Chapter 10, From page 33 to page 33, Section 3.2.2, Figure - , Table -

- 10.3.2.2: One of the question not mentioned here is the transformation of the biomass system in order to gain efficiency.

While we agree with your comment, there is no room in this section to go into further details.

### Ralph Sims (Massey University)

Chapter 10, From page 33 to page 33, Section 3.2.2, Figure - , Table -

- Again IEA's REHC reference could be added.

Will be added.

### Osamu Kimura (Central Research Institute of Electric Power Industry)

Chapter 10, From page 33 to page 34, Section 3.2.2, Figure - , Table -

- Basis of the cost projection of solar thermal technology by ESTIF (2009) should be described in order to show that the ESTIF (2009)'s projection is not a mere propaganda by an industry organization but a scientific assessment based on expert judgements. For example, cost of solar water heaters in Japan, one of the major markets of solar thermal technology, has not been reduced since the mid 1980s (Kimura 2008).

Information will be added.

### Brigitte Knopf (Potsdam Institute for Climate Impact Research)

Chapter 10, From page 33 to page 34, Section 3.2.2, Figure - , Table -

- Dependence on oil price: but this holds in general, not only for heating sector

While we agree with your comment, there is no room in this section to go into further details.

### Douglas Arent (NREL)

Chapter 10, From page 33 to page 34, Section 3.2.2, Figure - , Table -

- add "within caveats above" or similar language

Editing will take place.
### Chapter 10: Wood Pellets and Biomass Combustion

It is worthwhile to examine the real world, before the conclusion from this text is fully acceptable. In the last 5 to 7 years the use of wood pellets has increased significantly in some EU countries (Austria, Germany, Italy) and a huge exportation market from Scandinavian, Canada and USA has been established to feed the EU demand.

From page 33 to page 36, section 10.3.2.2.2: In this para, only pellets are mentioned. This is one technology but not the only one. Other should be mentioned.

While we agree with your comment, there is no room in this section to go into further details.

The numbers in the text are different (by a factor 10) from the values in the following table (10.3.4)

Please, consider that biomass energy can be used as source of high temperature heating and it is natural that this high quality energy be better used for electricity generation or cogeneration of heat and power. Thus, this may explain the low share of biomass in the heating and cooling systems. It would be better to investigate the demand for high temperature heat and for low temperature heat and then identify RES suitable for these purposes.

While we agree with your comment, there is no room in this section to go into further details.

The list of contributors and their comments is provided below:

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

## Expert Review of First Order Draft

Do Not Cite, Quote, or Distribute

### Comments Considerations by writing team

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

---

**Expert Review of First Order Draft**

**Do Not Cite, Quote, or Distribute**

---

29/62
<table>
<thead>
<tr>
<th>Name/Institute</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manfred Treber (Germanwatch)</td>
<td>10</td>
<td>34</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.4</td>
<td>-</td>
<td>It is ridiculous to quantify with 6 digits accurateness until 2050 (e.g. total renewables 106 652) - what understanding lies behind this?</td>
<td>this reflects specific scenario outcomes (take from literature) - we might move to a higher unit (EJ/a) where appropriate</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>35</td>
<td>7</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.6 and 10.3.7 and delete the unreferenced ones. I would also reduce the pages to around 2-3 with the actual reference numbers of total renewable energy share on a global and regional basis.</td>
<td>this section provides an overview of the analysed and published peer-reviewed scenarios</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>35</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>this heading is strange. Shouldn't it be 10.3.3?</td>
<td>headings will be reviewed again</td>
<td></td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>35</td>
<td>7</td>
<td>35</td>
<td>7</td>
<td>10.3.2.4</td>
<td>-</td>
<td>Change title to &quot;Contribution of renewable primary to global primary energy contribution&quot;***</td>
<td>editing will take place</td>
<td></td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>35</td>
<td>22</td>
<td>35</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>Neither wind nor hydro is used exclusively in the electricity sector, i.e., it is used for both heat and to supply transport in both Norway and Denmark, and as the electrification of transport on the one hand and the need/desire to integrate large quantities of variable RE into energy systems becomes more prevalent, more and more 'surplus' wind will be converted to heat or stored for transport.</td>
<td>will be made clearer</td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>35</td>
<td>33</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.3</td>
<td>-</td>
<td>The link to energy efficiency looks an author guess than a conclusion from the references. The whole sentence should be deleted.</td>
<td>will be modified</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>35</td>
<td>34</td>
<td>24</td>
<td>34</td>
<td>-</td>
<td>-</td>
<td>Typo error.</td>
<td>Accepted</td>
<td></td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.2.4</td>
<td>-</td>
<td>This section begs the question of the suitability of the TPES metric for RE sources, as systems become more and more integrated and variable RE (wind) and hydro resources are used more in both heating and transport it becomes even more inappropriate.</td>
<td>while we agree with your comment, there is no room in this section to go into further details</td>
</tr>
<tr>
<td>Luc Gagnon (Hydro-Quebec)</td>
<td>10</td>
<td>35</td>
<td>-</td>
<td>35</td>
<td>-</td>
<td>10.3.2.4</td>
<td>10.2.7</td>
<td>The true performance of renewable sources is better expressed in FINAL ENERGY, instead of primary energy. Primary energy is well adapted to showing fossil fuel reserves, no matter the efficiency of combustion. Using primary energy data gives excessive importance to options with low energy efficiency, such as fossil fuels or biomass combustion.</td>
<td>Agree with this point, but no data for final energy from all analysed scenarios is available</td>
<td></td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>36</td>
<td>7</td>
<td>37</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>It's important to mention that the overview in section 10.3.3 is limited because there are no data about bioenergy.</td>
<td>will be made clearer</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.2</td>
<td>-</td>
<td>It would be good, if this nice figure could be directly compared to the model results of 10.2.</td>
<td>Substantial adjustments will be made to the section to link it better to 10.2</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.3</td>
<td>-</td>
<td>Is it right that this figure shows in principle the same content as figure 10.2.8? Then these two should be made comparable, use the same style, otherwise a lot of information is lost.</td>
<td>Connection between 10.2 and 10.3 will be made clearer</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.3</td>
<td>-</td>
<td>what does this table on the right mean??? It is not readable at all</td>
<td>layout will be changed to make it clearer</td>
<td></td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table/Info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>37</td>
<td>1</td>
<td>37</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>will be addressed both in chapter 1 and 10 -&gt; presentation of technical potentials a</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>37</td>
<td>4</td>
<td>37</td>
<td>28</td>
<td>10.3.3.</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>37</td>
<td>7</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>37</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>editing will take place</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>37</td>
<td>-</td>
<td>37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.5</td>
<td>How can we explain a market potential higher than the technical potential (103 % in China and 102 % in India)?</td>
<td>this will be revised</td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.5</td>
<td>The technical potential for China wind in these studies is ridiculously low. See, for instance; Michael B. McElroy, et al. 'potential for wind-generated electricity in China', Science 325, 1378 (2000)(DOI: 10.1126/science.1175706; and Xu, Michael B. McElroy, and Juha Kiviluomac, Global potential for wind-generated electricity/ <a href="http://www.pnas.org">www.pnas.org</a> cgi doi 10.1073 pnas.0904101106; which give potentials 15-25 times higher than those implied in this chart. *</td>
<td>new published informations will be added</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.5</td>
<td>Last line for world: a year is missing or what do the three different &quot;world&quot; rows mean?</td>
<td>editing will take place</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>38</td>
<td>1</td>
<td>38</td>
<td>1</td>
<td>10.3.3.</td>
<td>2</td>
<td>-</td>
<td></td>
<td>will be made clearer</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>38</td>
<td>10</td>
<td>38</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>Remove? Reduce text and state how Primary Energy was calculated for table. will be made clearer</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>39</td>
<td>12</td>
<td>40</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>Delete paragraph, it is confusing and does not bring sectorial information. part of the agreed structure &amp; analysis</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>39</td>
<td>-</td>
<td>39</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.7</td>
<td>It seems odd that solar MP in Africa is 0.00 % in 2020 and 0.08 % in 2050 when we know that there are huge projects in this region particularly Desertec. In introducing the scenarios we will discuss their general limitations and issues, but not specific projects such as desertec)</td>
<td></td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>39</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.7</td>
<td>Only wind and hydro seems to be important. But hydro is not important in the models (cf Fig. 10.2.8)</td>
<td>will reflect this in the texts more in details</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>40</td>
<td>7</td>
<td>40</td>
<td>8</td>
<td>10.3.3.</td>
<td>9</td>
<td>-</td>
<td></td>
<td>References should be given for information in table. figure will be reworked</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>40</td>
<td>11</td>
<td>42</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>shorten, simplify to ranges of totals and refer to table. will be added</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>40</td>
<td>16</td>
<td>40</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>603gCO2/kWh is an average world value with significant differences between area and country. It could be interesting to have regional specific CO2 emissions to better address this issue (especially in an IPCC SR) see above</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>40</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>------------</td>
<td>----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.4</td>
<td>-</td>
<td>-</td>
<td>Introduce abbreviation RE for the legend</td>
<td>Accepted</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.4</td>
<td>-</td>
<td>-</td>
<td>Only 2 analyses? I think there are many literature available.</td>
<td>more scenarios will be added</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Regarding the importance that hydropower will play in the future energy mix, it will be interesting to add a paragraph on hydropower (from CO2 emission reduction between -2.9 GtCO2/a to -4 GtCO2/a)</td>
<td>We will work to balance the discussion of the different technologies within space constraints</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>41</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20 or 30%?</td>
<td>will clarify</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>41</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The standard for this report is /a or /yr? Check in whole chapter.</td>
<td>will be checked - author assumes &quot;/a&quot;</td>
</tr>
<tr>
<td>Michael Jack (Scion (New Zealand Forest Research Institute))</td>
<td>10</td>
<td>41</td>
<td>16</td>
<td>41</td>
<td>17</td>
<td>10.3.4</td>
<td>-</td>
<td>-</td>
<td>Either a decimal point is missing in the &quot;low&quot; figure or there is decimal point in the wrong place on the &quot;high&quot; figure.</td>
<td>A decimal point in the &quot;low&quot; figures is missing, will be changed</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass-University of São Paulo)</td>
<td>10</td>
<td>41</td>
<td>18</td>
<td>41</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Reference are all showing bioenergy risks. Please, add references in favour of bioenergy, as Pacca and Moreira, Energy Policy 2009, to be fair.</td>
<td>Will be considered if section stays, or will refer to ch 2</td>
</tr>
<tr>
<td>Michael Jack (Scion (New Zealand Forest Research Institute))</td>
<td>10</td>
<td>41</td>
<td>20</td>
<td>41</td>
<td>23</td>
<td>10.3.4</td>
<td>-</td>
<td>-</td>
<td>I could not understand what this sentence was trying to say.</td>
<td>Editing will take place</td>
</tr>
<tr>
<td>Michael Jack (Scion (New Zealand Forest Research Institute))</td>
<td>10</td>
<td>41</td>
<td>20</td>
<td>41</td>
<td>20</td>
<td>10.3.4</td>
<td>-</td>
<td>-</td>
<td>Incomplete reference.</td>
<td>Will be completed</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>41</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>What is the difference among &quot;modern biomass versus modern biomass in the direct heating category&quot;, the sentence should be rephrased</td>
<td>Editing will take place</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass-University of São Paulo)</td>
<td>10</td>
<td>41</td>
<td>21</td>
<td>41</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Please, check the sentence.</td>
<td>See above</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>41</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.5</td>
<td>-</td>
<td>-</td>
<td>Can you give a more handy interpretation of the figure? Can ~10-30% of CO2 be avoided by each technology?</td>
<td>CO2 calculation method will be expanded</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>42</td>
<td>11</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>An own section for these 5 lines are a bit exaggerated, same for 10.3.4.2</td>
<td>Will be changed</td>
</tr>
<tr>
<td>SMail Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>42</td>
<td>-</td>
<td>42</td>
<td>-</td>
<td>10.3.4</td>
<td>-</td>
<td>-</td>
<td>These sections are too short and could be conclusions of 10.3.4</td>
<td>See above</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>43</td>
<td>8</td>
<td>43</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>Typo error.</td>
<td>Accepted</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>43</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>I think this sentence is wrong and should read: &quot;&quot; in the high and MEDIUM case within the integrated models AND SUBSTANTIALLY LOWER IN THE LOW CASE&quot;&quot;</td>
<td>will be edited</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>43</td>
<td>11</td>
<td>43</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td>I suggest something should be added here explaining what integrated models means. Furthermore, some explanation could be provided why biomass has higher share in these integrated model. This is a real advantage of biomass and should be highlighted. Furthermore, the statement is not straightforward. Examining Table 10.3.8 it is possible to note that integrated models forecast higher bioenergy share than technical detail models for High and Medium penetration scenarios. The reverse happens for low penetration scenarios. A better discussion is needed.</td>
<td>will be expanded</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.8</td>
<td></td>
<td>Are you referring here to a mean of the models? This is not clear.</td>
<td>will be made clearer</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.8</td>
<td></td>
<td>Interpretation of this table: hydro and wind are in the same order for both types of models, solar is too small and geothermal far too small in the integration models. Is it possible to check some of the costs in the integration models if these are assumed to be very high for solar and geothermal? Or is it the potential? Concerning biomass: how many models are in the &quot;low demand&quot; category? If there are only 1-2 models, this could also be a model bias.&quot;</td>
<td>will be made clearer</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.5</td>
<td></td>
<td>This section has to be extended essentially. More comparisons should be shown here. What do we learn from these two different viewpoints? Where are the main differences between technological detail and integration models? Are these differences related to model assumptions, to modelling approaches (e.g. optimization or least-cost)?</td>
<td>will be expanded</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.3.6</td>
<td></td>
<td>The category &quot;knowledge gaps&quot; is very good and important, but perhaps they should be all put together and not one section for 5 lines.&quot;</td>
<td>Accepted</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>44</td>
<td>1</td>
<td>44</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>Go back to the agreed structure and focus on Cost curves for mitigation with renewable energy</td>
<td>The text explains why the author team decided not to present MITIGATION cost curves.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>44</td>
<td>5</td>
<td>44</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>Delete just introduce the section and bring in Mckinsey and Co, etc later.</td>
<td>Partially Accepted. Some of the text is cut, parts remain because the concept is not clear to all readers, and also we need to justify why we devote so much attention to a method that has so many limitations as described below.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>44</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.4.2</td>
<td></td>
<td>The discussion of concept and methodology of abatement cost curves is very useful</td>
<td>Thanks, that is very kind!!</td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table Info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10</td>
<td>45</td>
<td>4</td>
<td>46</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td>This is a very interesting part on methodology. But this could be supplemented (or replaced in some cases) by a list or a table of the possible limitations. Among those limitations, there is not much on the importance of timescale between measures.</td>
<td>I will consider if some of the text can be put into a table. It is a very good idea (OK, I have also been considering it earlier….:-) but it is good to get an extra push for it!</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>45</td>
<td>3</td>
<td>46</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td>Delete from page 46 line 1 to 34 the preceding paragraphs are enough to explain the limitations on cost curves.</td>
<td>The cost curves receive significant attention from policy makers, and it is important to document their limitations.</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>45</td>
<td>33</td>
<td>45</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td>Add Das Gupta, RFF book on Intergenerational Equity as key refs (and their argument for low rates??)</td>
<td>Will add it if paper is found. TSU: please send the paper if reviewer has sent it! Unify citation is not sufficient to easily locate the material.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>46</td>
<td>35</td>
<td>51</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td>To be blunt this is not what was asked for in the outline and agreed upon so delete. Structure of section is being revised.</td>
<td></td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>46</td>
<td>-</td>
<td>51</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>This section is entitled Regional RE cost curves but there is nothing on the Africa and Asia regions. Title should be changed to reflect the content of this section.</td>
<td>There is nothing in the title that claims to review every region - coverage is determined here by the available literature. However, there are studies also on Asian region. Nevertheless, section title changed to “regional/national…”</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>48</td>
<td>-</td>
<td>49</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>Structure from small subnational, country, etc. Is not so clear?</td>
<td>Inclusion of studies is determined by literature availability and thus there is no regional structure. This will be explained in the text.</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>48</td>
<td>-</td>
<td>66</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>Unclear structure. Why is there a difference between cost curve and supply curve? In the cost curve one mentions the potential volumes (TWh) that can be delivered at that cost. The supply curve does the same and even with further detail on the costs.</td>
<td>Cost curves and supply curves are the same. Nevertheless, in order to avoid confusion, I decided to consistently refer to energy ones as “renewable energy supply curves” while “abatement (or mitigation) cost curves” are the other category.</td>
</tr>
<tr>
<td>PA ABDULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)</td>
<td>10</td>
<td>48</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.4.1</td>
<td></td>
<td></td>
<td>Reduce the size of the table.</td>
<td>Table will be revised with respect to grey lit and organization, but may not be significantly reduced in size.</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>50</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>Reference to Scholz 2008: this is only a presentation!!! Please check with the TSU if this is allowed.</td>
<td>Will check if I can find the report/paper behind the presentation and use that as the reference. If not, respect the table lines and refs to it will be deleted.</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>51</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>Change “Table 10.2” by “Table 10.4.2”,.</td>
<td>Accepted</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>52</td>
<td>1</td>
<td>52</td>
<td>2</td>
<td>10.4.2</td>
<td></td>
<td></td>
<td>You can add to this table data for Brazil. See Pacca and Moreira, Energy Policy 2009.</td>
<td>Thank you! Will add.</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>52</td>
<td>-</td>
<td>53</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>Why no other sources used? New Energy Finance? Ecofys? McKinsey for Italy? Project Catalyst?</td>
<td>Will check if we find more reports from these authors - perhaps more became available in the last year</td>
</tr>
</tbody>
</table>
## Special Report on Renewable Energy Sources and Climate Change Mitigation, First Order Draft

### Expert Review of First Order Draft

**Do Not Cite, Quote, or Distribute**

<table>
<thead>
<tr>
<th>Name and Institute</th>
<th>Chapter</th>
<th>From page</th>
<th>To page</th>
<th>From line</th>
<th>To line</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)</td>
<td>10</td>
<td>52</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.4.2</td>
<td>Reduce the size of the table</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>52</td>
<td>-</td>
<td>52</td>
<td>-</td>
<td>-</td>
<td>10.4.2</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>54</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>54</td>
<td>12</td>
<td>54</td>
<td>18</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>54</td>
<td>17</td>
<td>54</td>
<td>18</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Andries Kruger (South African Weather Service)</td>
<td>10</td>
<td>54</td>
<td>28</td>
<td>54</td>
<td>27</td>
<td>10.4.3</td>
<td>Figures too small.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>55</td>
<td>11</td>
<td>56</td>
<td>12</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PA ABDOULIE MANNEH (MINISTRY OF FINANCE AND ECONOMIC AFFAIRS)</td>
<td>10</td>
<td>55</td>
<td>13</td>
<td>50</td>
<td>34</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>55</td>
<td>-</td>
<td>87</td>
<td>-</td>
<td>-</td>
<td>10.4.4</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>55</td>
<td>-</td>
<td>93</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Luc Gagnon (Hydro-Quebec)</td>
<td>10</td>
<td>55</td>
<td>-</td>
<td>87</td>
<td>-</td>
<td>10.4.4</td>
<td>-</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>55</td>
<td>67</td>
<td>67.4</td>
<td>-</td>
<td>10.4.4</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>56</td>
<td>66.9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>56</td>
<td>56.23</td>
<td>-</td>
<td>10.4.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>56</td>
<td>57.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>56</td>
<td>62</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>56</td>
<td>62</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chap 8)</td>
<td>10</td>
<td>57</td>
<td>57.6</td>
<td>-</td>
<td>10.4.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>57</td>
<td>66.5</td>
<td>-</td>
<td>10.4.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>61</td>
<td>-</td>
<td>-</td>
<td>10.4.1.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>64</td>
<td>-</td>
<td>-</td>
<td>10.4.1.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>67</td>
<td>67.47</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Name and Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
<td>-----------</td>
<td>----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>68</td>
<td>28</td>
<td>69</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>70</td>
<td>1</td>
<td>71</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricite de France (EDF))</td>
<td>10</td>
<td>70</td>
<td>2</td>
<td>70</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Richard Taylor (International Hydropower Association (IHA))</td>
<td>10</td>
<td>70</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>70</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>71</td>
<td>1</td>
<td>71</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>71</td>
<td>14</td>
<td>71</td>
<td>14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mario Contaldi (ISPRA, Institute for Environmental Protection and Research)</td>
<td>10</td>
<td>71</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Smail Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>71</td>
<td>-</td>
<td>71</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>71</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Special Report on Renewable Energy Sources and Climate Change Mitigation, First Order Draft

#### Comments

<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter From page</th>
<th>To line</th>
<th>Section</th>
<th>Figure From page</th>
<th>To line</th>
<th>Table Info</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10 72</td>
<td>26</td>
<td>72 28</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Delete manna from heaven sentence Text will be modified according to the comment.</td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10 72</td>
<td>-</td>
<td>-</td>
<td>10.5.3</td>
<td>-</td>
<td>-</td>
<td>The figure excludes traditional biofuels/biomass that are both in commercialisation stage. As data are showed geothermal, onshore wind and solar heating are the more advanced and competitive technologies. It's not true.</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10 73</td>
<td>1 73 8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This kind of figure is very traditional. It should be nice to try the incorporation of RD&amp;D costs from developing countries. Considering the rate of implementation in some of these countries the amount of RD&amp;D should not be negligible.</td>
</tr>
<tr>
<td>Taishi Sugiyma (CRIEPI)</td>
<td>10 74</td>
<td>-</td>
<td>-</td>
<td>10.5.5</td>
<td>-</td>
<td>-</td>
<td>Learning curve analysis needs sensitivity analysis and further discussion.</td>
</tr>
<tr>
<td>Technological spillover will be included in the bullet list (page 72).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Text

<table>
<thead>
<tr>
<th>Name and Institute</th>
<th>Chapter</th>
<th>Section</th>
<th>From page</th>
<th>To page</th>
<th>From line</th>
<th>To line</th>
<th>Figure</th>
<th>Table info</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osamu Kimura (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>10.5.2</td>
<td>76</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Nemet(2009) indicates range of PV learning rates, 15-21%(median rates). Rewrite from 21% to 15-21% in Nemet(2009)'s LR column of the table. Nemet, G., 2009, Interim monitoring of cost dynamics for publicly supported energy technologies, Energy Policy, 37, pp.825-836.</td>
<td>The source will be revisited and the numbers will be changed if necessary.</td>
</tr>
<tr>
<td>Osamu Kimura (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>10.5.2</td>
<td>76</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Add PV learning rates calculations in Japan, one of the largest cumulative production and installation in the world. The followings are PV learning rates in Japan from 1993 to 2008: module 13-16%, inverter 20-25%, other materials 15-20%, construction costs 11-12%. See: Asano, K., 2010, Learning curve analysis of PV in Japan, CRIEPI Research Report, Central Research Institute of Electric Power Industry (forthcoming, available by March 2010).</td>
<td>Additional data will be included if the reviewer provides information concerning a respective peer-reviewed source.</td>
</tr>
<tr>
<td>Osamu Kimura (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>10.5.2</td>
<td>76</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>What is the coefficient of determinations(R2) of each LRs in the table?</td>
<td>Most publications do not provide the coefficient of determination. Solution: The still existing uncertainty will be highlighted in the text (based on peer-reviewed publications which discuss the sensitivity of learning rates).</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>10.5.2</td>
<td>77</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Replace &quot;figure 6.1&quot; by &quot;figure 10.5.6&quot;</td>
<td>Text will be modified according to the comment.</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>10.5.2</td>
<td>78</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10-5-4: The question of externalities (economics, social, environmental) is treated more fully in 10.6. However, this question (as the question of incentives) comes back and forth through the paragraphs. Could this question be clearly treated for instance at the end of each para where pertinent, in order to appreciate the case of market prices, then of the influence of externalities, which will result for some part of social choices.</td>
<td>10.6. will discuss externalities in detail. Nevertheless, it is worth to mention it here again.</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>10.5.4</td>
<td>78</td>
<td>16</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10-5-4: Could the discussion of the fig. 7 precise where this fit with the analysis of scenarios in the previous section?</td>
<td>Due to the renumbering of the sections the reference point got lost. The correct reference is: &quot;will be depicted similar to Fig. 10.2.8.&quot;</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>10.5.4</td>
<td>78</td>
<td>20</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10-5-4: This question may be treated within global economics models. In the scenarios previously mentioned one should have such model.</td>
<td>The models used to calculate the scenarios are able to take into account the avoided fuel cost and avoided investments in the fossil sector. The text will be reformulated in order to confirm that ability. However, most model often do not show the wedges that would be needed in order to attribute avoided fuel cost and avoided investments in the fossil sector to the deployment of renewable energies.</td>
</tr>
<tr>
<td>Small Khennas (Independent consultant, lead author chapt 8)</td>
<td>10</td>
<td>10.5.4</td>
<td>78</td>
<td>20</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Investing in RE will certainly reduce the relative of investment of conventional energy technologies however the need for financial capital and investment infrastructure might be higher.</td>
<td>The text will express this in a more precise manner.</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>10.5.4</td>
<td>78</td>
<td>20</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>This discussion is quite interesting. You could add a real example from Brazil. The increase in the cost of gasoline has been much lower than diesel because gasoline faces competition with ethanol. A plot showing the cost of gasoline and diesel over the last 10 years should be enough to provide a good example. This example can be also very useful for the discussion on Page 79, line 15 to 25.</td>
<td>The discussion in that part is intended to be general. An additional example would be considered to be arbitrarily selected. In addition, the comment does not clearly distinguish cost and price effects.</td>
</tr>
<tr>
<td>Name</td>
<td>Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>To page</td>
<td>From line</td>
<td>To line</td>
<td>Comments</td>
<td>Considerations by writing team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takashi Hongo</td>
<td>Japan Bank for International Cooperation</td>
<td>10</td>
<td>78</td>
<td>80</td>
<td>1</td>
<td>2</td>
<td>Are these amount for every 10 years or single year? It is better to express about the assumption and methodology for forecast.</td>
<td>The given data are decadal ones. The selection of the specific scenarios will be explained.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark Fulton</td>
<td>Deutsche Bank</td>
<td>10</td>
<td>79</td>
<td>80</td>
<td>1</td>
<td>2</td>
<td>The point about avoided costs should be brought out more aggressively and the need for this to be done in a full Cost Benefit Analysis.</td>
<td>The respective knowledge gap will be highlighted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche</td>
<td>Electricit de France (EDF)</td>
<td>10</td>
<td>79</td>
<td>80</td>
<td>1</td>
<td>2</td>
<td>With one example we couldn’t conclude anything according to me. A benchmark analysis will be more relevant</td>
<td>The purpose of this example is to show that upfront investments could result in later savings. It is meant to emphasize the possibility; it is not meant in a sense that this will happen in any conceivable case. The text will be modified in order to make this clear.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marc Darras</td>
<td>GDF SUEZ</td>
<td>10</td>
<td>80</td>
<td>82</td>
<td>4</td>
<td>18</td>
<td>10.5.5: Rather than the selected atmospheric...related policies) a more pertinent phrasing should be The level of allowed GHG emissions. The deployed discount rate is not understandable. If it means only the discount rate, then one has to recall that in a model one makes the choice...</td>
<td>Text will be modified according to the comment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Keassels</td>
<td>International Energy Agency Clean Coal Centre</td>
<td>10</td>
<td>80</td>
<td>82</td>
<td>4</td>
<td>18</td>
<td>Delete this is qualitative</td>
<td>The respective part will be shortened considerably in order to provide additional space for Section 10.3 an 10.4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kirsty Hamilton</td>
<td>Chatham House</td>
<td>10</td>
<td>80</td>
<td>82</td>
<td>2</td>
<td>3</td>
<td>Delete whole paragraphs, it is too theoretical for the SR.</td>
<td>No comment provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos</td>
<td>Petrobras</td>
<td>10</td>
<td>81</td>
<td>82</td>
<td>1</td>
<td>2</td>
<td>The cost of RE can follow the S-shape shown in Figure 10.5.9. Nevertheless, the price will have a different behaviour. Even if RE cost decreases below conventional energy cost for electricity production private utilities have no motivation to bring its price further below the traditional electricity price.</td>
<td>The respective part will be deleted in order to provide additional space for Section 10.3 an 10.4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jose Roberto Moreira</td>
<td>Brazilian Reference Center on Biomass- University of Sao Paulo</td>
<td>10</td>
<td>81</td>
<td>82</td>
<td>18</td>
<td>18</td>
<td>10.5.5: Rather than the selected atmospheric...related policies) a more pertinent phrasing should be The level of allowed GHG emissions. The deployed discount rate is not understandable. If it means only the discount rate, then one has to recall that in a model one makes the choice of discount rate for testing its effect. While in reality, the discount rate is given by the long term cost of inflation, the mean cost of money and the risk level associated with the project. This remark applies wherever the discount rate is mentioned.</td>
<td>The comment is correct, but not in contradiction to Figure 10.5.9. The entire paragraph will be deleted. The comment therefore is obsolete.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maria Argiri</td>
<td>International Energy Agency</td>
<td>10</td>
<td>82</td>
<td>83</td>
<td>3</td>
<td>6</td>
<td>You can significantly reduce this section as it repeats things said in Ch 9</td>
<td>Structure of IPCC requires the section. However we will clearly define the objectives of this section to distinguish them from those in Chapter 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mario contaldi</td>
<td>ISPRA, Institute for Environmental Protection and Research</td>
<td>10</td>
<td>82</td>
<td>83</td>
<td>18</td>
<td>18</td>
<td>The entire para 10.6 reiterates concepts already enalized in ch 9. To avoid repetitions in the SRREN report this para should be dropped or integrated in chapter 9.</td>
<td>Structure of IPCC requires the section. However we will clearly define the objectives of this section to distinguish them from those in Chapter 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEPHANE POUFFARY</td>
<td>ADEME - French Environment and Energy Management Agency</td>
<td>10</td>
<td>83</td>
<td>83</td>
<td>17</td>
<td>17</td>
<td>Maybe somewhere a special item has to be made on nuclear regarding some criteria such as health concerns. Some models can create opposition between nuclear and renewable at the end. It has been one concern during the NEEDS project implementation. Even if a low carbon energy society needs to take into account all sources of energy in its energy mix, RES and nuclear do not respond to the same objectives (externalities).</td>
<td>Outside the scope of the report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Figure</td>
<td>Table info</td>
<td>Comments</td>
<td>Considerations by writing team</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>83</td>
<td>17</td>
<td>83</td>
<td>18</td>
<td></td>
<td></td>
<td>As stated, the reader get information that for biomass the pollutant emissions will never be reduced compared with fossil fuel. This is not the message author are willing to provide. Please, change the sentences.</td>
<td>Will rephrase</td>
<td></td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>83</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.6.1</td>
<td></td>
<td>Strong picture, very good message! Even though the picture is a qualitative representation I believe the external benefits of conventional energy should be lower.</td>
<td>But other commentaries recommend deletion</td>
<td></td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>84</td>
<td>3</td>
<td>84</td>
<td>10</td>
<td></td>
<td></td>
<td>Might review NAS study <strong>Research at DOE : Was it worth it</strong>? In which they do monetize some benefits.</td>
<td>Sentence will be modified. Will add reference to page 83 line 26</td>
<td></td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>84</td>
<td>11</td>
<td>85</td>
<td>15</td>
<td></td>
<td></td>
<td>Delete does not add anything substantial</td>
<td>Paragraphs boost expected contents of the section</td>
<td></td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>84</td>
<td>15</td>
<td>84</td>
<td>16</td>
<td></td>
<td></td>
<td>Insert the phrase, as follow: <strong>For example, biomass, if extended widely, can be controversial as an energy source because of competition on land use. On the other hand, anthropized areas not favorable for food production can be used to some energy crops with social and environmental benefits.</strong></td>
<td>Will do</td>
<td></td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>84</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complement the discussion and the paragraph with the phrase: <strong>However, it's necessary to analyze case by case, avoiding the misjudgement of general biomass production based on hypothetical case</strong>. Fargione's article was very criticized because described a particular an unusual case to evaluate impacts of biofuels production. *</td>
<td>Will do</td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>84</td>
<td>32</td>
<td>84</td>
<td>32</td>
<td></td>
<td></td>
<td>Replace &quot;<strong>run-off into rivers</strong>&quot; by &quot;<strong>run-of-river</strong>*&quot;</td>
<td>Will change clause</td>
<td></td>
</tr>
<tr>
<td>vind Christophersen (Climate and Pollution Agency)</td>
<td>10</td>
<td>85</td>
<td>20</td>
<td>88</td>
<td>4</td>
<td></td>
<td></td>
<td>sec: 10.6.2 does not describe the co-benefits in relation to other environmental problems such as air quality. It only discuss the impact on air quality in sec. 10.6.2.2 But not the benefits connected to reduced emissions from fossil energy (NOx, SOx, particles etc.) if substituted by RE. This should be covered some where in sec. 10.6.2 since it is a very important factor and may be a key for implementation of RE in some regions.</td>
<td>Benefits discussed in other paragraphs of the section e.g. 10.6.1, 10.6.4 and 10.6.5</td>
<td></td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>85</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.6.1</td>
<td></td>
<td>From figure title it does not become clear that this is an example of social costs of renewable energy, it seems to be misplaced from the chapter on sustainable development</td>
<td>Figure will be deleted</td>
<td></td>
</tr>
<tr>
<td>Philippe Marbaix (Université catholique de Louvain)</td>
<td>10</td>
<td>86</td>
<td>29</td>
<td>86</td>
<td>37</td>
<td></td>
<td></td>
<td>This paragraph does not appear to be very clear in particular, methods used in the Stern Review regarding damage cost accounting are a choice, does it only deserves critics ?</td>
<td>Paragraph will be rephrased</td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>86</td>
<td>38</td>
<td>86</td>
<td>43</td>
<td></td>
<td></td>
<td>Convert EUR to USD2005, and to USD2005</td>
<td>Will do</td>
<td></td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>86</td>
<td>38</td>
<td>87</td>
<td>21</td>
<td></td>
<td></td>
<td>The example and reference to the Stern report is enough information.</td>
<td>Paragraph has added information beyond Stern report</td>
<td></td>
</tr>
<tr>
<td>Vicente Schmall (Petrobras S.A.)</td>
<td>10</td>
<td>87</td>
<td>9</td>
<td>87</td>
<td>21</td>
<td></td>
<td></td>
<td>Paragraph repeats the discussion based on the controversial Fargione's article. It's not necessary to repeat that.</td>
<td>Reference will be removed</td>
<td></td>
</tr>
</tbody>
</table>

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

**Expert Review of First Order Draft**

**Do Not Cite, Quote, or Distribute**
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>To page</th>
<th>From line</th>
<th>To line</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>87</td>
<td>10</td>
<td>13</td>
<td>-</td>
<td>Indirect and direct land use change can increase, but the studies are very</td>
<td>Statement will be modified</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>beginning and will evolve in the years.</td>
<td></td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S</td>
<td>10</td>
<td>87</td>
<td>10</td>
<td>87</td>
<td>16</td>
<td>It is unfair only present references, most of then based in dubious</td>
<td>References will be reviewed</td>
</tr>
<tr>
<td>Paulo)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>theoretical hypothesis. Please, add some references showing that the</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>negative impact may not be so severe, depending of the biomass feedstock</td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricit de France (EDF))</td>
<td>10</td>
<td>87</td>
<td>14</td>
<td>87</td>
<td>14</td>
<td>Refer to section 5.6 for adequate and peer-reviewed information regarding</td>
<td>Will refer to the appropriate technology chapter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GHG emissions from hydropower reservoirs (it will allow consistency all</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>across the SR). Proposotion: &quot;can cause methane emissions during the</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>first years after impoundment, which can be significant. However in</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>many cases no GHG emissions are emitted (see section 5.6 of this special</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>report).&quot;***</td>
<td></td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>87</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>Add key msgs and ref of Lancet 2009 by Kirk Smith.</td>
<td>Will review the reference</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>87</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>What is ExternE?</td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricit de France (EDF))</td>
<td>10</td>
<td>87</td>
<td>43</td>
<td>87</td>
<td>44</td>
<td>Convert EUR( ) to USD2005</td>
<td>Will do</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricit de France (EDF))</td>
<td>10</td>
<td>88</td>
<td>13</td>
<td>88</td>
<td>-</td>
<td>Refer to section 5.6 for adequate and peer-reviewed information regarding</td>
<td>Will do for consistency of the report</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water impacts from hydropower. Furthermore it will allow consistency all</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>across the SR. Proposition: &quot;livelihoods. However these impacts can be</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mitigated (see section 5.6 of this special report).&quot;***</td>
<td></td>
</tr>
<tr>
<td>Richard Taylor (International Hydropower Association (IHA))</td>
<td>10</td>
<td>88</td>
<td>15</td>
<td>88</td>
<td>18</td>
<td>Add &quot;The internationalisation of sustainability assessment for hydro has</td>
<td>Will review the protocol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>been advanced over the past 15 years. The International Hydropower</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Association's Hydropower Sustainability Assessment Protocol and its current</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>cross-sectoral review is the leading initiative at the international</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>level.&quot;** Reason: For consistency with chapter 5.&quot;</td>
<td></td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>88</td>
<td>15</td>
<td>88</td>
<td>26</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>89</td>
<td>10</td>
<td>89</td>
<td>15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of Sao Paulo)</td>
<td>10</td>
<td>89</td>
<td>10</td>
<td>89</td>
<td>15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricite de France (EDF))</td>
<td>10</td>
<td>88</td>
<td>20</td>
<td>88</td>
<td>23</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Richard Taylor (International Hydropower Association (IHA))</td>
<td>10</td>
<td>88</td>
<td>20</td>
<td>88</td>
<td>23</td>
<td>10.6.2.4</td>
<td>-</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>88</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.6.2.3</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>89</td>
<td>10</td>
<td>89</td>
<td>15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Comments</td>
<td>Considerations by writing team</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>----------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10</td>
<td>89</td>
<td>16</td>
<td>89</td>
<td>27</td>
<td>Due to the complexity of these issues, here (like in other part of chapter 10.6.2) what it is said in the first sentences (line 16-23) seems partly contradicted in the second sentence (line 24). For an assessment it would be useful some quantitative estimations of the two possible effects.</td>
<td>Text will be rewritten to reflect complexities and case-dependency of issues.</td>
</tr>
<tr>
<td>Naoto Tagashira (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>89</td>
<td>16</td>
<td>-</td>
<td>27</td>
<td>The author may quote the debates on job creation shown in &quot;NREL Response to the Report Study of the Effects on Employment of Public Aid to Renewable Energy Sources from King Juan Carlos University (Spain)&quot;. NREL/TP-6A2-46261, 2009.</td>
<td>We will consider if the reference is found relevant to a controversial topic.</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricite de France (EDF))</td>
<td>10</td>
<td>89</td>
<td>24</td>
<td>89</td>
<td>24</td>
<td>Why to focus the number of new jobs on hydropower? I do not understand (what are the assumed statements?); According to me, as a project developer and operator of power plants, it is the same for other RES (wind, large solar, etc.). Refer to chapter 5, and look at &quot;multiplier effects&quot; of hydropower to be more accurate.</td>
<td>Sentence will be modified.</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>89</td>
<td>32</td>
<td>89</td>
<td>40</td>
<td>Delete covered in wind chapter</td>
<td>Wind power has landscape aspects.</td>
</tr>
<tr>
<td>vind Christophersen (Climate and Pollution Agency)</td>
<td>10</td>
<td>91</td>
<td>8</td>
<td>93</td>
<td>23</td>
<td>Sec 10.6.5 fous only on the external costs not on the benefits e.g. the co-benefits. This should be included.</td>
<td>Benefits will be expanded and relationships between external costs and benefits included.</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>91</td>
<td>-</td>
<td>93</td>
<td>-</td>
<td>10.6.5 provides best visual representation compared to 10.6.1 and 10.6.4. Also strong that nuclear is included but the absence of some key technologies in all figures is regrettable. Merger desirable</td>
<td>Regrettable but text limited by published data.</td>
</tr>
<tr>
<td>Mark Fulton (Deutsche Bank)</td>
<td>10</td>
<td>91</td>
<td>-</td>
<td>93</td>
<td>-</td>
<td>With the development of efficient extraction of shale gas, natural gas has greater security, certainly in the US, perhaps Europe.</td>
<td>Table 10.6.1 from published article but additional comments may be made in the text.</td>
</tr>
<tr>
<td>Takashi Hongo (Japan Bank for International Cooperation)</td>
<td>10</td>
<td>91</td>
<td>-</td>
<td>-</td>
<td>10.6.1</td>
<td>Cost for ecosystem for geothermal is green? Also cost for health by wind is very small but low frequent noise is serious issue if its location close to houses. I am afraid this table is too simplified.</td>
<td>We think there is relevant science in the publication although it is not peer-reviewed. Will send it to TSU for advise.</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricite de France (EDF))</td>
<td>10</td>
<td>92</td>
<td>6</td>
<td>92</td>
<td>13</td>
<td>Convert EUR( ) to USD2005</td>
<td>Will do.</td>
</tr>
<tr>
<td>STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)</td>
<td>10</td>
<td>92</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>Introducing nuclear only here in this chapter is maybe a little bit too late. See previous comment.</td>
<td>Authors mindful of the scope of report limited to renewables.</td>
</tr>
<tr>
<td>Mark Fulton (Deutsche Bank)</td>
<td>10</td>
<td>92</td>
<td>-</td>
<td>-</td>
<td>10.6.4</td>
<td>Gas seems to be underestimated - natural gas seems to be treated too negatively compared to figure 10.6.5, which seems more intuitively correct.</td>
<td>Sentence will be added on the precise positive effects on emission by the use of natural gas either by numbers or comparative percentages.</td>
</tr>
<tr>
<td>STEPHANE POUFFARY (ADEME - French Environment and Energy Management Agency)</td>
<td>10</td>
<td>93</td>
<td>-</td>
<td>-</td>
<td>10.6.5</td>
<td>&quot;See the previous comments regarding risk to deliver &quot;opposition message&quot; between different technologies based on a strictly sensus common agreed externalities method (RES versus nuclear). To reinforce RES benefits, uncertainties have to be quantified somewhere.&quot;</td>
<td>Issues addressed on page 92 line 24-25.</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>104</td>
<td>31</td>
<td>104</td>
<td>52</td>
<td>This is a value driven political statement - renewables will have to compete with other low carbon technologies</td>
<td>Text will be revised.</td>
</tr>
</tbody>
</table>

---

**Expert Review of First Order Draft**

**Do Not Cite, Quote, or Distribute**

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

**Expert Review of First Order Draft**

Do Not Cite, Quote, or Distribute
**Chapter 10**

**10.5: This chapter includes various items which are not directly related to the title: costs of commercialization and deployment, notably elements which refer to the cost of the production of the system to capture energy from renewable sources. These elements should be addressed in the preceding section under its original title: Cost curves...**

A better understanding will be obtained if the value chain of each technology is presented (more pertinently in 10.4). Attached some example from internal document I developed for Gaz de France, biomass and wind. (See materials darras_marc_picture_2.gif and darras_marc_picture_3.gif)


From there, one understand better:
- The element of cost
- The role of actors
- The technological barriers, as for instance analysed in Renewable energy : RD&D Priorities, IEA 2006.

For instance, in the case of biomass 2 value chains are mixed: the chain for equipment and the chain for biomass supply. The 2 chains have to be analysed before to conclude anything in term of potential, cost, barriers...

Interesting review can be found, mostly on the European market, in special issues of Systèmes Solaires, le journal des energies renouvelables edited by Observ’ER, Paris, France and their annual review for the EU commission Baromètre des energies renouvelables (www.energiesrenouvelables.org)."

---

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

**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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institute</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>&quot;10.6.1: This issue is a very complex one and figure 10.6.1 does not give credit to many aspects of the question. Some elements are addressed in various part of the text. It is essential in such a debate to clarify the perimeter of the analysis and of the various actors. The gross comparison of the conventional energy versus renewable energy does not give full understanding of the issue. One should clarify what is private: in some lines it means identified by the actor, and some others it means a financial/market value. The private benefit of conventional or renewable energy should be equal in the first sense because it is for instance hot water for a given consumer, or power for an industry. The source of energy has no impact on the benefit here. For private costs the market value depends on the value chain, and its organisation, the costs of production and the competition. It should be compared to the revenue of the potential consumer (therefore the question of benefit for access on p.83 line 19 is not proven, and if the footnote is true it is in no case pertinent). But now for traditional biomass the cost is the time spent to collect it (if available), it may be outside a monetary economy. In figure 10.6.1 it is difficult from the text to imagine why external benefits are bigger for renewable Energy than for conventional one. I wonder if one does not make double counting in some cases between external costs and external benefits. What is included in external benefits: security of supply? Access? Externalities can be express in market value (monetary) or not. This rise a lengthy debate on monetarisation. This is slightly touched in section 10.6.2.1, therefore it is important in the analysis to mention the perimeter used and the economics condition: ex for section 10.6.2.2. Some aspects as wastes, dismantling, should not be omitted. In conclusion, to be useful this chapter should be based on a stronger clarification of the concepts, and treat in a similar manner all RE. One may chose or not to make a comparison with conventional energy. One should recall that the approach should be multidimensional rather than single-valued.&quot;</td>
<td>Figure 10.6.1 will be deleted and associated text will be modified accordingly. Comment will be taken into consideration in full</td>
</tr>
<tr>
<td>Name and Institute</td>
<td>Chapter</td>
<td>Comments</td>
<td>Considerations by writing team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kirsty Hamilton (Chatham House)</td>
<td>10</td>
<td>As per comment to Ch1, useful references on cost-related issues include: Extensive work done by Shimon Awerbuch, whose work examined the matter of using finance portfolio theory to better understand the role of renewable energy in reducing risks associated with fossil fuel price volatility. A series of references can be provided (Shimon Awerbuch was invited to be a Contributing Author to AR4); and an academic book was published by Elsevier Science in 2008 to mark his untimely death: &quot;Analytical methods for energy diversity and security: portfolio optimization in the energy sector, a tribute to the work of Dr. Shimon Awerbuch / Morgan Bazilian and Fabien Roques, editors. Dr Awerbuch's website and publications remain active: <a href="http://www.awerbuch.com">www.awerbuch.com</a> (this reference may also be relevant for Chapter 10). Also of relevance may be: Gross, R., Heptonstall, P., Blyth, W., Risks, revenues and investment in electricity generation: Why policy needs to look beyond costs, Energy Economics (2009), doi:10.1016/j.eneco.2009.09.017. [A relevant background paper for the report preceding this Energy Economics article: Hamilton, K., November 2006, Investment: Risk, Return and the Role of Policy, Working Paper for Imperial College, London, commissioned for, and referenced in Annex II of Gross, R. et al UK Energy Research Centre report 'Investing in Electricity Generation: The Role of Costs, Incentives and Risks', May 2007).</td>
<td>Will be taken into consideration in 10.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10</td>
<td>Different sets of scenarios are analysed throughout the chapter. It could be useful a list of all these scenarios (in the Ex. Sum. it is said 137, at page 12 it is said 150) with a clarification on the different subsets used in the different part of the chapter.</td>
<td>This will be made consistent across chapter 10, but the number will change anyway in SOD.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>Comments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jean-Yves Caneill (Electricité de France (EDF-SA))</td>
<td>10</td>
<td>I think that a study that was made in France in the last three years could be valuable quoted in this report either in Chapter 1 or 10. It is called &quot;Scenarios for transition towards a low carbon world in 2050: What's at stake for heavy industries?&quot;. In particular two scenarios of mitigation to lower by 2 the global emissions are presented: one called &quot;mimetic&quot; that reproduces the habits of the past and one &quot;non mimetic&quot; where more renewable energy is introduced at the decentralised level, together with transport and towns infrastructure looked at appropriately. The study was done by a consortium composed by: IDDRI, EPE and industrial companies. The reports can be found at: <a href="http://www.iddri.org/Liddri/Fondation/Programme-de-recherche-Scenarios-sous-contrainte-carbone">http://www.iddri.org/Liddri/Fondation/Programme-de-recherche-Scenarios-sous-contrainte-carbone</a> and a publication is in course of writing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steve Sawyer (Global Wind Energy Council)</td>
<td>10</td>
<td>In general this chapter is very good and although it still needs work, that's largely depending on editing and info from other chapters. The only general criticism is the use of the TPES metric when looking at largely electricity generating resources, it makes comparisons between hydro and nuclear nonsensical, as it does for comparisons between geothermal and wind, for instance. Perhaps electricity could have it's own section; and perhaps you could consider final energy consumption as a much more useful metric.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>Many general points discussed in this chapter have already been discussed in detail in the previous ARs. Taking into account AR4 WGIII report as the starting point, the description of concept should be taken from it (ex Cost and Benefit: 2.4.1 Definitions: the role of actors and instruments: fig 2.3, which is basically Fig 10.5.2 of present SRREN; ...). This will allow streamlining of chapters and underline the incremental added value of SRREN.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name/Institute</td>
<td>Chapter</td>
<td>Comments</td>
<td>Considerations by writing team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10</td>
<td>The general impression is that the chapter does not completely meet the expectations of a IPCC Report. This is due to some perplexities about the accuracy and completeness of some analyses, which on the other hand receive much attention in the chapter: a) while the &quot;general&quot; scenario analysis of subchapter 10.2 seems methodologically correct (and informative in terms of results), some analyses included in 10.3 are based on quite strong simplifications, so that the results can hardly be considered robust; b) apart from some perplexities about the review included in subchapter 10.4, the regional RES supply curves presented in 10.4.4 seem based on a questionable methodology.</td>
<td>Subchapter 10.3 and 10.4 will be re-written and methodology will be included</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Twidell (AMSET Centre)</td>
<td>10</td>
<td>This chapter ends without any summary and conclusions, which are much needed. Reduce the central text by 50% and then make a very clear and crisp conclusion. A conclusion might be that global modelling tells you little for the future of renewables unless a sum is made of many thousands of distinct parts.</td>
<td>Comments will be taken into consideration as we move to the second order draft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>10.3: The purpose of this chapter is not clear. From its analysis it seems to be a bottom up approach versus the top down approach of the scenarios in the previous chapter. Some of the point discussed as the beginning of sub chapter 10.3.2 is general and may be better presented in a specific sub section. The structure power/heat &amp; cooling/transport is one choice which does not necessarily correspondent to the reparation of demand in volume, but more on the availability of analysis.</td>
<td>Section 10.3 will be revised and these points will be taken into consideration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Twidell (AMSET Centre)</td>
<td>10</td>
<td>ALL THIS CHAPTER. The impression is gained by the reader that renewables, CCS and nuclear fission are treated as equal variants for all energy supplies now and into the future. The models seemed to be based on this premis. But, you are comparing chalk with cheese! Why include CCS when, sensibly, you do not include, or mention, fusion power because it has not been demonstrated? CCS is unproven even at demonstration level and is far from reality. How do you capture carbon from transport and building heating emissions? Whereas most renewables are now commercially available and fully demonstrated. For nuclear fission power, it should be made clear that this is only available for centralised electricity in a relitively small number of countries. Multicountry use would never be allowed for reasons of weapons production and security. The models need to be based on reality, not conjecture. At the least present this discussion at the beginning of this chapter. Modelling for mitigation needs to be practically realistic and therefore applicable.</td>
<td>Analyses undertaken in the chapter is limited by approaches available in the scenarios literature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jose Roberto Moreira (Brazilian Reference Center on Biomass- University of S Paulo)</td>
<td>10</td>
<td>Box 10.1, end of second paragraph. The conclusion regarding bottom-up and top-down models for engineering science is new for me. Please, add reference to clarify the statement.</td>
<td>We acknowledge that additional references are needed to support some of the statements on the use of the terms bottom-up and top-down in other scientific communities in box 10.1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>Context is needed in terms of reasons for policies and what are the consequences (intended &amp; unintended)</td>
<td>No actions needed. Comment is too general</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
<td>Table</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mario Contaldi (ISPRA, Institute for Environmental Protection and Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Peter de Haan (Ernst Basler + Partner AG)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Sector</td>
<td>Figure</td>
<td>Table info</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>John Kessels (International Energy Agency Clean Coal Centre)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marc Darras (GDF SUEZ)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taishi Sugiyama (CRIEPI)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dr. Ishwar Hegde (Suzlon Energy Ltd)</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Expert Review of First Order Draft**

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

#### Expert Review of First Order Draft

*Do Not Cite, Quote, or Distribute*

<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>Page</th>
<th>Line</th>
<th>Page</th>
<th>Line</th>
<th>Section</th>
<th>Figure</th>
<th>Table</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10 -</td>
<td>10.6.1</td>
<td>Add &quot;Illustrative&quot; in order not to need extra explanation</td>
<td>Figure deleted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10 -</td>
<td>10.6.1</td>
<td>In the chapter 10.6 it said several times that the assessment of cost and benefits of different technologies requires to consider the character of the energy system in which they are applied. This representation of the concept is not coherent with that, it seems it could be misleading.</td>
<td>Figure deleted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10 -</td>
<td>10.6.1</td>
<td>Delete figure, it is an author guess that conventional energy and renewable energy have these shapes.</td>
<td>Figure deleted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10 -</td>
<td>10.6.2</td>
<td>Delete texts in the figure not related to RE and fill with examples of CC impacts on RE.</td>
<td>Texts in figure will be modified</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10 -</td>
<td>10.6.2</td>
<td>This figure is used several times in different chapters of this SR. It may be interesting to have only one and to refer to this adopted section?</td>
<td>Final editorial review will determine appropriate placement of this figure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippe Marbaix (Université catholique de Louvain)</td>
<td>10 -</td>
<td>10.6.4</td>
<td>This figure contains relatively surprising data for example health effects of PV electricity appear similar to those of coal. Is this supported by literature outside the Krewitt &amp; Schiønmann 2006 report (which does not seem to have been peer reviewed, and is not easy access since it is in German)?</td>
<td>Contents will be compared with peer-reviewed literature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10 -</td>
<td>10.6.5</td>
<td>Delete figure, it is not a comprehensive study.</td>
<td>Study considered comprehensive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christiano Pires de Campos (Petrobras)</td>
<td>10 -</td>
<td>12.4.1</td>
<td>Unreadably graph, resize</td>
<td>Accepted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10 -</td>
<td>10.3.4</td>
<td>alle - too small</td>
<td>Accepted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10 -</td>
<td>10.3.5</td>
<td>This table is essential for the overall report.</td>
<td>Table will be revised</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10 -</td>
<td>10.5.1</td>
<td>The percentage of the technical potential is very interesting. But it could be complemented by a comparison with present figures or a baseline, in order to understand the scale of change from present.</td>
<td>Table will be revised if space allows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10 -</td>
<td>10.5.2</td>
<td>Some lines concern different actors and this could alter results. For example, household scale generation has to be compared with energy delivered to the final consumer, with a much higher cost. Thus potentials should not be only matched with the grid.</td>
<td>Comment is not referring to table 10.5.1., because there are no lines in table 10.5.1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10 -</td>
<td>10.5.3</td>
<td>Use of discount rate of 10% is misleading, because the users are not the same depending on the scale of the projects. Some States use a much lower rate of 4% to 5% for large scale projects and thus the table may alter comparisons with other energy.</td>
<td>A comparison of different costs requires to establish a common reference.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10 -</td>
<td>10.5.4</td>
<td>Excellent synthesis and very useful tool for future work</td>
<td>Comment is highly appreciated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10 -</td>
<td>10.2.1</td>
<td>Explain Cat I to Cat IV before the table (e.g., CO2 concentrations by 2100: Cat I = 300-400ppm, Cat II = 400-440ppm, Cat III = 440-485ppm, Cat IV=485-570ppm, etc.) Note that Cat V is defined after in Figure 10.2.1, which leads to a different definition of references (&gt;600ppm or &gt;660ppm)</td>
<td>Will be adjusted in SOD.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Special Report on Renewable Energy Sources and Climate Change Mitigation, First Order Draft

**Comments**

- **10.3.1.** Attention should be given to the number of significant decimals
  - Accepted

- **10.3.3.** Questions regarding the 2050 generation high scenario. How can the generation in 2050 be lower than in 2030 for geothermal CHP, and for hydropower. For instance the value for hydropower 6027 TWh/a (~22 EJ) is not consistent with table 10.3.5 of this chapter (24 EJ, e.g. ~6650 TWh). This mistake is very important regarding all the following sub-sections of 10.3 as this value for 2050 will be used to estimate CO2 emission reductions for instance. One should mention that IEA, WEO scenarios are limited to year 2030
  - Text will be revised with the table

- **10.3.7.** It's not clear if this table gives an overview of the **“overall”** RES share on primary energy, i.e. calculated as sum of power generation+heating/cooling. If yes, why the data for 2050 are the same of table 10.3.5 (which refers only to power generation)? If on the contrary table 10.3.7 refers only to power generation one of the two table should be eliminated.
  - Table will be revised

- **10.4.1.** Publications of National Roundtable on the Environment and the economy? 2050 scenario
  - Study will be tried to be located and incorporated if space permits

- **10.4.2.** The aggregation of Africa is problematic, see comment on section 10.3.3.1 above
  - We agree this is a problem but this is what the data allow us to do

- **10.4.2.** The report cited for South Africa (Hughes et al 2007) is the original source, but is a technical report that fed into a larger study. Would suggest adding (in addition to the correct reference to the original source), reference to a peer-reviewed book version of the larger study: Winkler, H 2010. Taking action on climate change: Long-term mitigation scenarios for South Africa. Cape Town, UCT Press.
  - Study will be tried to be located and incorporated if space permits

- **10.5.1.** At first glance, looks identical to Table 2.5 in Deploying Renewables IEA, 2008a, not simply ‘based on’
  - Currently, the table is almost identical. It is intended to add numbers from the technology chapters in the SOD.

- **10.5.1.** In this table, it could be also interesting to have the load factor (capacity factor) for all RES. This is a very useful indicator
  - A comprehensive overview of technical aspects will be part of the Technical Summary.

- **10.5.4.** This figure could be complemented with the range and heating technologies from the previous table. Could you make the units coherent with the previous table? Finally, the original IEA figure did show the range of retail energy prices, which is a very important element for decentralized energy. Heating range prices might be useful too. (See for instance: Renewable energy: RD&D Priorities, IEA 2006.)
  - Heating technologies and electricity generation systems have quite different costs. A direct comparison is not useful. The range given in figure 10.5.1. will be adapted to the ranges discussed in the technology chapters.

- **10.5.4.** This does not seem pertinent here. An analysis of the coherence of research money to solve barriers is the pertinent one.
  - The section has to provide information about R&D costs in order to be consistent with the section heading ("cost of commercialization").

- **10.6.1.** Convert EUR( ) to USD2005
  - Will do
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>To page</th>
<th>From line</th>
<th>To line</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antoine Bonduelle (EE Consultant)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.4.4</td>
<td>-</td>
<td>Supply curves of regional projections are very interesting, but maybe they could be joined in some cases in the same graphs for comparisons of continents (and a gain of space)</td>
<td>will be considered</td>
</tr>
<tr>
<td>John Twidell (AMSET Centre)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.1</td>
<td>-</td>
<td>I am surprised that support mechanisms are not mentioned in this section and were not mentioned in the introduction. If they are discussed elsewhere, then a link should be made here.</td>
<td>will be done in chapter 11</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>&quot;General comment on this section: it is a good first step, but perhaps some more analyses could be performed: e.g. dependence of RES on fossil fuel prices; how do RES contribute to CO2 savings; differentiation between first best and second best scenarios could be intensified (is only done in Fig. 10.2.5); It would also be helpful to learn a bit more on the models that are used in this comparison (e.g. by including a table which model runs which scenarios, and which model follows which modelling approach)&quot;</td>
<td>It will be attempted to improve the analysis of the collected scenario data and move into the directions suggested within the space limitations imposed by the overall chapter.</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>An analysis of the contribution of RES to the overall mitigation effort is missing. From the data collected for this analysis it should be possible to roughly estimate the emission reductions delivered by RES expansion and to compare them to the contribution of competing options such as nuclear, CCS and efficiency. Such a wedge-analysis would be very helpful to estimate RES's overall economic mitigation potential.</td>
<td>There are strong methodological issues connected to the allocation of overall CO2 (and other GHG) emission reductions to individual technologies or technology clusters. There will be an attempt to make such an allocation in section 10.3 for a few representative scenarios that also takes into account the ambiguities in the allocation of emission reductions.</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>General comment: The section provides a good overview of the levels of renewable deployment in the pertinent IAM scenario literature. For the most part, a statistical analysis of the entire scenario set grouped into baseline and various mitigation categories is provided. In this structure, the relation between policy scenario and the respective baseline is are lost. For instance, due to the large differences in baseline development across models, the type of analysis chosen does not provide much information about the structural changes required relative to baseline development.</td>
<td>The statistical analysis of a large set of scenarios is the starting point of chapter 10.2, but we agree that in depth analysis is needed to complement this overview. Within the space limitations we will try to add analysis that links baselines and mitigation cases as suggested here (similar analysis as in Figure 10.2.5).</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>I miss an analysis of the CO2 savings from REN, similar as it is done in the bottom-up analysis in 10.3.4 (Figs 10.3.5 and 10.3.6.).</td>
<td>There are strong methodological issues connected to the allocation of overall CO2 (and other GHG) emission reductions to individual technologies or technology clusters. There will be an attempt to make such an allocation in section 10.3 for a few representative scenarios that also takes into account the ambiguities in the allocation of emission reductions.</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>This analysis is based on a large number of scenarios. It would be helpful to provide an overview of the models involved, and the scenario settings. Given that some models submitted a larger number of scenarios than others (e.g. ReMIND), is there a selection bias? It would be very helpful to include some information on model structure and key assumption in this overview.</td>
<td>An improved overview of the models, scenarios and underlying publications will be provided in the SOD.</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
<td>To page</td>
<td>To line</td>
<td>Section</td>
<td>Figure</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stan Rosinski (Electric Power Research Institute)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Philippe Marbaix (Université catholique de Louvain)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.2.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brigitte Knopf (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.3</td>
<td>-</td>
<td>-</td>
<td>10.3.3</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>10.3.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Expert Review of First Order Draft
Do Not Cite, Quote, or Distribute
<table>
<thead>
<tr>
<th>Name</th>
<th>Institute</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francesco Gracceva</td>
<td>(ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>As stated more than once in the SRREN, to produce robust insights a comparative analysis of different scenarios should be based on a large and differentiated set of internally coherent and consistent scenarios. The analysis carried out in 10.3.2 seems based on a quite limited set of scenarios, in fact two main sources, IEA and Greenpeace. And it seems questionable the combination of the results of different scenarios, each produced with different methodologies and assumptions: all the potential shares of RES included in tab. 10.3.3, tab. 10.3.4 and fig. 10.3.3 are calculated by combining absolute numbers form different scenarios, this means that coherence and consistency of scenarios is no more granted. Maybe there is too much emphasis on the results of what it is defined no more than a &quot;theoretical excercise&quot; (page 31, line 11)?</td>
<td>New scenarios will be added, if data are available</td>
</tr>
<tr>
<td>Douglas Arent</td>
<td>(NREL)</td>
<td>The discussion of RES deployment potential by end-use sector is very important and welcome. Some work on sectoral mitigation potentials from the perspective of integrated energy-economic modeling was presented by Luderer et al. 2009 and could be of interest for this section.</td>
<td>We will look at the document and see if it fits in the chapter</td>
</tr>
<tr>
<td>Harald Winkler</td>
<td>(Energy Research Centre, University of Cape Town)</td>
<td>The aggregation of Africa as a region is problematic, hiding very significant differences in potential across the region. The situation in South Africa (and to a lesser extent, Nigeria and Egypt) is dramatically different to the 51 other countries on the continent.</td>
<td>Data available provides this level of desaggregation</td>
</tr>
<tr>
<td>Christiano Pires de Campos</td>
<td>(Petrobras)</td>
<td>Should delete &quot;and sector&quot; since there is no mention later in this section.</td>
<td>We will consider revising</td>
</tr>
<tr>
<td>Francesco Gracceva</td>
<td>(ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>It is said that the analysis of chapter 10.2, based on integration model scenarios, and the analysis of chapter 10.3, based on 'bottom up' scenarios, differ significantly by source. But from tables/figures of chapter 10.2 it seems that the technical detail models analysed in 10.3 (IEA and Greenpeace) are included also in the analysis of 10.2. It's not completely clear how the 'bottom up' scenarios used in 10.3 have been selected, they don't seem to be the only 'bottom up' scenarios of the wider set of scenarios considered in 10.2 (some of the models cited in figure 10.2.9 are bottom-up models).</td>
<td>We will make clear how the scenarios for 10.3 were selected. We will no longer distinguish between top down and bottom up models</td>
</tr>
<tr>
<td>Christiano Pires de Campos</td>
<td>(Petrobras)</td>
<td>Poor analysis. Should be rethinks or deleted.</td>
<td>Whole section will be removed and replaced by a new section</td>
</tr>
<tr>
<td>Gunnar Luderer</td>
<td>(Potsdam Institute for Climate Impact Research)</td>
<td>This section presents a brief comparison between the results from bottom-up models and top-down models. Some explanations or hypothesis on the substantial differences should be provided.</td>
<td>We will no longer distinguish between top down and bottom up models</td>
</tr>
<tr>
<td>Douglas Arent</td>
<td>(NREL)</td>
<td>Introduce stlized figure/example to clarify difference of abatement curve and supply curve</td>
<td>Will include technology cost curves</td>
</tr>
<tr>
<td>Gunnar Luderer</td>
<td>(Potsdam Institute for Climate Impact Research)</td>
<td>This discussion on the supply cost concept and its limitations is very helpful.</td>
<td>Thank you!</td>
</tr>
<tr>
<td>Name (Institute)</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Francesco Gracceva (ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development))</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunnar Luderer (Potsdam Institute for Climate Impact Research)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Name Institute</td>
<td>Chapter</td>
<td>From page</td>
<td>From line</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Douglas Arent (NREL)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stan Rosinski (Electric Power Research Institute)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Harald Winkler (Energy Research Centre, University of Cape Town)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Kyte (E.ON AG)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Osamu Kimura (Central Research Institute of Electric Power Industry)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Seth Dunn (GE Energy)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Harald Winkler (Energy Research Centre, University of Cape Town)</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Expert Review of First Order Draft
Do Not Cite, Quote, or Distribute
<table>
<thead>
<tr>
<th>Name (Institute)</th>
<th>Chapter</th>
<th>From page</th>
<th>From line</th>
<th>To page</th>
<th>To line</th>
<th>Section</th>
<th>Figure</th>
<th>Table</th>
<th>Comments</th>
<th>Considerations by writing team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emmanuel Branche (Electricité de France (EDF))</td>
<td>10.6.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Refer to environmental and social section of the different technology chapters, rather than simplifying and writing wrong elements. Most of the time for each negative impact there is a mitigation measure that will reduce this impact, and that may in some cases set positive impacts. But all the mitigation and positive impacts are not written in this section</td>
<td>Text will utilise summary information from technology chapters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harald Winkler (Energy Research Centre, University of Cape Town)</td>
<td>10.6.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>There are also health BENEFITS to electrification. In South Africa, a study found that one of the major benefits of electrification, but one that is not included in traditional cost-benefit analysis, is the avoided health costs of fuels such as wood, coal and paraffin. The paper looks at the South African electrification programme, and presents estimates for these avoided health costs. The resulting benefits are of the same order of magnitude as the local air pollution damages from the power stations that produce electricity. Spalding-Fecher, R &amp; Matibe, D K 2003. Electricity and externalities in South Africa. Energy Policy 31 (8): 721-734. If electrification is carried out with RETs, this would have significant synergies - so perhaps this would also be relevant in section 10.6.4</td>
<td>A generic statement will be inserted to incorporate this idea</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>