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THE IPCC FIFTH ASSESSMENT REPORT (AR5)

Report of the AR5 Synthesis Report Scoping Meeting Liege, Belgium, 25-27 August 2010

(Submitted by the IPCC Secretariat on behalf of the Chair)

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REPORT OF THE SCOPING MEETING FOR A SYNTHESIS REPORT FOR THE IPCC FIFTH ASSESSMENT REPORT

Liege, Belgium, 25-27 August 2010

(Submitted by the IPCC Secretariat on behalf of the Chair)

Background

At its 28th Session, Budapest, 9-11 April 2008, the Panel agreed to prepare a Synthesis Report (SYR) for the Fifth Assessment Report (AR5), and at its 30th Session, Antalya, 21-23 April 2009, agreed that the scoping of the AR5 SYR should start with the Scoping Meeting for the AR5 Working Group outlines. In line with that decision, a broad outline for the AR5 SYR was developed at the AR5 Scoping Meeting held in Venice, 13-17 July 2009. Following this, a dedicated Scoping Meeting for the Synthesis Report was held in Liege, Belgium from 24-27 August 2010, from which a Scoping Document was developed.

The proposed outline for the SYR as presented in IPCC-XXXII/Doc. 4 is further explained in the material presented in this report. This report is essentially intended to serve as guidance to the SYR core writing team, as well as the authors of the AR5 Working Group reports. The Scoping Meeting also dealt with other issues such as the schedule and requirements for the preparation of the SYR.

Preface

The IPCC Secretariat and the Chair of the IPCC would like to extend our sincere thanks to the Wallonia Government, in particular His Excellency Mr. Philippe Henry, Minister of Environment for the Walloon Region, Ministry for the Environment, Land Use and Mobility, and to the city of Liege, for hosting the meeting and for the excellent local arrangements. All the efforts of Mr. Jean-Pascal van Ypersele, IPCC Vice-Chair, in carrying out the meeting, were also highly appreciated. Finally, the participants contributed to a very constructive and fruitful meeting where the exchange of views and knowledge resulted in more clarity on the proposed SYR outline. The list of participants is presented in **Annex 6**.

The meeting participants further developed the outline of the SYR based on the work already completed in Venice and in Bali. The meeting clarified the issues of most relevance to the policy-making community today, and the current status of scientific understanding in the areas most relevant to the scope of a SYR for the AR5. The members of the Break-out Groups (BOGs) and the scoping report drafting team dedicated many hours to produce the Scoping Document. The principal product of this Scoping Meeting (the Scoping Document - IPCC-XXXII/Doc. 4), together with this meeting report, will provide guidance to the scientific community in relation to the AR5 SYR, and is particularly relevant to the future work of the AR5 SYR writing team.

This report is purely a narrative of the meeting for the information of the Plenary and for possible guidance of the core writing team when it is formed for the SYR. This narrative does not necessarily represent the views of the IPCC Chair, other Bureau members or the IPCC Secretariat.

1. Plenary Session 1

1.1 Organization of the meeting

The IPCC Chair Mr. R. K. Pachauri opened the meeting and paid homage to the memory of our departed colleague Mr. Steven Schneider. A one minute silence was observed by all the participants. Following the Chair's opening of the meeting, IPCC Vice-Chair Mr. Jean-Pascal van Ypersele introduced the honorable Mr Philippe Henry, Minister of Environment for the Walloon Region, Ministry for the Environment, Land Use Planning and Mobility and Mr. Willy Demeyer, Mayor of the city of Liege, who kindly addressed the audience. Local members of the Press were invited to attend the opening ceremony.

The Chair then continued the session on 25 August at 10.00 a.m. The agenda for the meeting (AR5/SYR-SCOP/Doc. 1, Rev. 1) is presented in **Annex 1**.

1.2 Presentation of the Chair's Vision Paper on the AR5 SYR

The Chair presented his Vision Paper, (see **Annex 2**) AR5/SYR-SCOP/Doc. 2 (Chairman's Vision Paper on the AR5 Synthesis Report).

The Chair mentioned in his Vision Paper that the outline should contain agreed topic headings including: i. Observed changes and their causes, ii. Future changes (in the short and long term), iii. Response, and iv. Transitions and transformation and a list of bullets that are intended as guidance to the authors. The purpose of the Scoping Meeting was to specify sub-topics under these broad topic headings, and if there were strong and compelling reasons to modify these topics, the meeting could also come up with a view in this regard.

He also highlighted the following points:

- There is a clear consensus that the AR5 SYR be structured according to topics rather than questions. This is also a lesson learned from past IPCC experience. The intention is to keep it short, possibly shorter than for the 4th Assessment Report (AR4). The focus of the SYR (and therefore of the Scoping Meeting) should be on both the scientific content and the policy relevance.
- It is critical that the SYR be consistent with the Working Group (WG) Reports and that scientific content flows from the Working Group and Special Reports.
- The SYR process has been started one year earlier than for the IPCC Fourth Assessment Report (AR4 SYR).
- Issues that need to be effectively considered include: Article 2 of UNFCCC and reasons for concern, characterization of uncertainties, and scenarios.
- Frequently Asked Questions (FAQ) in the SYR are not to be treated as a duplication of the WG Reports' FAQs.
- SYR should be intelligible to governments and to the larger public (as well as of interest to all sectors of society).
- Careful attention should go to Cross Cutting Themes (CCTs) and specific issues requiring consistent treatment in the SYR (scenarios, costing methodologies, etc.)

The Chairman finally articulated the sentiments of all the meeting participants in regard to the memory of our departed colleague Mr Steven Schneider and suggested that he would request the Plenary in Busan to dedicate the SYR to the memory of Mr. Schneider.

He also recognized Mr Yuri Isreal, former Co-Chair of IPCC WG II and IPCC Vice Chair, for having received a governmental order for his merits to the fatherland.

1.3 Presentation of WG outlines for the AR5 and relevance for SYR – by Co-Chairs of the Working Groups

The Chair invited the Co-Chairs of Working Group I, Working Group II and Working Group III to give brief presentations on the working group outlines for the AR5 and their relevance for the SYR.

The main points are summarized below:

- WG I provides the physical science basis for the SYR. The Co-Chair presented the number of products delivered by WG I through Expert Meetings and a Workshop in preparation of AR5. He noted the many challenges towards AR5 including the increasing amount of material available which must be assessed, the significantly broader model diversity, and the larger range of uncertainties than before. The presentation covered the need for full coherency across working groups, and the need for a consistent evaluation of uncertainties. The key principles for WG I to follow are rigour, robustness, transparency and comprehensiveness. Finally, the presentation discussed regional aspects covered in several chapters of the WG I report, the Atlas of Global and Regional Climate Projections, and a few issues that are relevant to the SYR such as water, the carbon cycle, ice sheets, and issues related to Article 2 such as irreversibilities, abrupt changes, as well as the consequences of Article 2.
- WG II has an integrated systems approach, including synthesizing chapters on key issues for impacts and adaptation at the end of Part A, and exploration of the intersections across sectoral impacts and adaptation at regional scales in Part B. Compared with the AR4, it will map “Observed Impacts” more comprehensively, make the “Projected Impacts” more specific, and integrate adaptation, mitigation, and sustainability to the extent the literature allows. The WG II and III assessments of adaptation, mitigation and sustainable development will be a nexus for examining issues with respect to second best options. WG II believes that SYR must be a genuine synthesis, should capitalize on the Cross Cutting Themes (CCT), and be sufficiently flexible to take advantage of opportunities that emerge from new findings in the AR5.
- WG III will contribute especially to topic iii and iv. Its underlying philosophy is to explore all potential and possible self-consistent pathways rather than recommending any specific one. WG III intends to be explicit about unintended environmental side effects of certain strategies, and about mitigation options, costs, distribution of risk and policy requirements. It will also identify technological and institutional requirements of various stabilization levels. WG III will also ensure that first and second best scenarios are assessed in order to get a better representation of the policy space. These should be used for both adaptation and mitigation in order to increase coherency across WG II and WG III.
- All working groups agreed on how critical cross-WG cooperation is for full coherency.

1.4 SYR in past assessments and IPCC Procedures for the preparation of the Synthesis Report – by the IPCC Secretary

The Secretary of the IPCC, Ms Renate Christ, gave a presentation about the SYR in past assessments and the IPCC procedures for the preparation of the SYR. She referred to the following documents that were provided to the meeting participants: AR5/SYR-SCOP/Doc. 3 (SYR in Past Assessments – Brief Overview) and AR5/SYR-SCOP/INF. 1 (IPCC Procedures for the Preparation, Review, Adoption and Approval of the Synthesis Report). She recalled the definition of an IPCC “Synthesis Report”, and the process for preparation and other procedural aspects. She also elaborated on how the synthesis reports were produced. For the First Assessment Report, a 10-page synthesis was drafted by the IPCC Chair, and in the course of the adoption text was reduced considerably to an “Overview” not to be read in isolation but in the context of 4 SPMs and 3 Working Group contributions. The Second Assessment Report addressed scientific technical information relevant to interpreting Article 2 of the UNFCCC. The Third Assessment Report

addressed 9 questions considered and adopted by IPCC-15, Costa Rica, April 1999. IPCC-14, Vienna, Nov. 1998 adopted SYR procedures. Finally, the Fourth Assessment Report had six topics. She presented the AR4 SYR timeline, and presented options for the AR5 timetable.

1.5 Presentation of the broad outline prepared at the Venice Meeting

Mr David Wratt, WG I Vice-Chair, gave a presentation of the broad outline prepared at the Venice Meeting. This was presented in AR5/SYR-SCOP/Doc. 4, Rev.1 (Broad Outline of the AR5 Synthesis Report). This broad outline is contained in **Annex 3** to this report.

He described the outcomes of the *AR5 Scoping Meeting* held in Venice, where it was suggested that the SYR be organized under four broad headings: i. Observed Changes and their Causes; ii. Future Changes (in the Short and Long-Term); iii. Response; and iv. Transitions and Transformations.

1.6 Key issues arising from government comments received – by the IPCC Secretary

The Secretary of the IPCC, Ms Renate Christ, presented the key issues arising from government comments received by the IPCC. She referred to AR5/SYR-SCOP/Doc. 5 (Key Issues Arising from Government Comments), and AR5/SYR-SCOP/INF. 2 (Overall Scope and Proposed Broad Outline of the AR5 Synthesis Report - Compilation of submissions from Governments). The main points from her presentation are summarized below:

- SYR must be transparent and comprehensive
- Conclusions must be fully traceable
- Assessment methods must be clear in advance
- Non-technical language to be used
- Integrated graphics considered useful
- Importance to be given to robust findings and uncertainties
- More detail and guidance to be given to the SYR Core Writing Team (CWT)

The more detailed comments from governments that were reflected in her presentation are summarized below:

Comments on structure of the SYR:

- Leave some flexibility to CWT to decide, based on new knowledge, how to best structure information
- Integrate regional information – more guidance on how and to which extent
- Frequently Asked Questions (FAQ)
- More clarity on topics iii and iv needed

Comments on methodological aspects:

- Be clear on time frames – short/medium/long
- Describe changes in scenario assumptions and implications
- Explain implications for policymaking of uncertainties as well as differences in nature of uncertainties (e.g. human factors)
- Describe amount of evidence or expert agreement as opposed to confidence statements

Comments on Topic i:

- Fundamental understanding of climate system (here or in Annex)
- Observed changes and drivers (all including internal variability)
- Respective contributions and linkages of drivers
- Effects on natural and humans systems
- Critical changes and implications for other systems e.g. Arctic and Sea Level Rise
- Explain attribution studies
- Add costs of changes

Comments on Topic ii:

- Include medium-term changes
- Scenario assumptions and future drivers
- Full range of impacts, also positive ones
- Abrupt and irreversible changes, tipping points
- Reasons for concern including societal issues
- Regional projections and phenomena
- Costs of degraded ecosystems

Comments on Topic iii:

- Treat adaptation and mitigation separately and then address synergies and trade-offs
- More on adaptation, technology and economics
- Interaction of cc policies with other policy goals, environmental issues and MDGs
- Role of civil society, multi-level governance, private sector, investment and finance
- Risk transfer

Comments on Topic iv:

- Dynamical interaction of responses
- Address optimal basket of gases, not just low carbon society
- Investment in R&D not only restricted to technology
- Behaviour, production and consumption
- Impacts of different mitigation pathways

Comments related to Article 2 of the UNFCCC:

- Explicit treatment of Art. 2 and key vulnerabilities
    - Separate topic or throughout SYR?
- Show knowledge evolution and reasons for concern
- Address 2°C and 1.5°C

In the following discussion, it was stated by one participant that the IPCC should improve its capacity to communicate. In this context, the participants discussed the value of Frequently Asked Questions (FAQs) in the SYR. Several participants questioned the difference between topics iii and iv, and highlighted the importance of differentiating these topics if they remain separate. The IPCC Chair suggested that there should be a joint session between BOGs 3 and 4 (for topics iii and iv)[1] to discuss this issue. Finally, one participant highlighted the danger of starting the writing process too early and specified it was important to make sure adequate review time was left at the end. While it was clear that there were advantages to starting the Scoping Process early (for example with regard

[1] As shown in the Agenda, Break-Out Groups (BOGs) were to meet later in the day. Please see section 2.3.

to the development of integrated or synthesized graphics for the SYR), there was also consensus that the content of the SYR depends on the WG reports (and the Special Reports[2]).

2. Plenary Session 2

Brief overview of 24.08.2010 Meeting on Article 2 of UNFCCC

Mr William Hare gave a presentation on the Consultation Meeting that was held on 24.08.2010 on Article 2 of UNFCCC, attended by 33 people. The report of the meeting is available in IPCC-XXXII/Doc. 8.

2.1 Panel discussion with user representatives

The Chair invited user representatives to discuss past experiences, policy relevant topics that the AR5 SYR should address, and other desired areas of emphasis. The main points are summarized below. The panel speakers were: Ms Antonina Ivanova Boncheva, Ms Lucka Kajfez-Bogataj, Mr Jose M. Moreno, Mr Fredolin Tangang, Mr Dennis Tirpak, and Mr David Warrilow. Issues and topics raised included the following:

Issues and topics relevant to the overall AR5 SYR writing process and the scenarios development process:

- It is important to try and anticipate the world that will receive this report in 4 years time.
- The authors could consider showing emissions progression over the past 20 years and compare them to the projections made in 1990 in order to show which path the world is on.
- Whilst the focus is on a transition to a low carbon world, the IPCC should also indicate explicitly to policy makers what a transition to a warmer world means.
- REDD has become a big issue for the Convention. The IPCC should address the implications of this on a large scale.
- There will be a delay in the global carbon market. The IPCC should explain to policymakers what that means.
- Finance is an important issue in the Convention process: how to spend money effectively (at least public financing). This issue should be assessed in the AR5 and handled in the SYR, if possible.
- The SYR needs to find a way of reconciling global with regional issues, perhaps by focusing on the most critically affected areas.
- Scenarios can be challenging to understand. The SYR needs to be careful when presenting storylines.
- All scenarios need not be treated as equally probable; they should be as realistic as possible rather than looking for the best or the worst one.

Issues and topics specifically relevant to the SYR:

- SYR must address issues that policy makers are concerned about, in order to be of use.
- Relevance and communicability are critical.
- Focus on overcoming the barriers of complexity and difficulty.
- Statements in the SYR must be based on solid evidence and clearly traceable to the underlying reports.
- Transparency is needed in the sources of conclusions and synthesis graphs.

[2] Note two Special Reports are coming out prior to the AR5: “Renewable Energy Sources and Climate Change Mitigation” and “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation”.

- Policymakers are interested in the negative impacts. As there is a request from policy makers, there must be an IPCC reflection on how to cope.
- SYR must be kept simple, straightforward and carry the message with no convolution.
- A critical point is the integration of regional information, as this is what policy makers will be looking for.
- SYR should emphasize topic i. on "observed changes" and on costs, as people can identify with this easily. In that context, a chapter on extreme weather events, as such, with no mention of climate change, could be very useful.
- The SYR, as well as the AR5, should address climate change sceptics and their arguments.
- Need to emphasize near-term horizons for concrete adaptation and mitigation actions as this is of interest to the private sector.
- SYR must show the cost of inaction.
- SYR must discuss financial instruments and options related to technology transfer and international cooperation, and equally address Ministers of Finance.
- SYR should also include successful case studies, perhaps as annexes.
- Policy makers must also know that climate policies can be mainstreamed in larger development policies.

Note: These were a sample of the suggestions provided by some of the user representatives participating in the meeting in Liege; it must be stressed that these are not statements of the IPCC. What is ultimately included in the SYR will depend on what information the chapter teams of the WG contributions to AR5 deem is the most reliable and of highest relevance.

In summarizing the session, the IPCC Chair said that a level of realism is needed. WG AR5 Lead Authors are the main players in producing all the knowledge the IPCC has, so they should be effectively involved in the SYR process. Also IPCC messages must be simple and the SYR must be intelligible and devoid of complexity. It must also address, where possible, the usual questions by members of civil society.

2.2 Scoping – in-depth discussion of four broad areas and policy relevant questions arising from government input

It was highlighted that SYR should be different from the Working Group SPMs in order to have an impact on policy makers, and might move closer to risk analysis, for example. Moreover, it is important to think of who IPCC wants to address as policy makers; indeed it is not only the environment ministers but also the finance ministers and the ministers representing economic sectors (transport, etc). One of the participants talked of the emerging importance of lock-in effects and that if cost is optimized in the short term then this can sometimes prevent the meeting of more stringent targets in the long term. Finally, a delegate suggested that authors could be offered additional guidance by the Panel in the form of a list of policy-relevant questions that the SYR could address. He suggested that he could compile a list of policy-relevant questions from various meeting participants in Liege and provide that as input to the meeting. The idea was also that this list of policy-relevant questions from governments could also serve as further guidance to the SYR core writing team and the AR5 authors. These policy-relevant questions, as well as the full set of questions extracted from government comments received by the Secretariat prior to the Liege meeting (and distributed to Liege participants prior to the meeting in AR5/SYR-SCOP/INF. 2), are available in **Annex 4.**

2.3 Formation of the BOGs and of the scoping document drafting team

Initially, four break-out groups were established to work respectively on topic i, ii, iii and iv and produce an outline for each of them in order to finally generate the Scoping Document detailing the structure for the AR5 SYR. BOG Co-Chairs selected by the Chair were to lead these discussions and were later invited by the Chair to participate in the Scoping Document writing team meeting.

The BOG Co-Chairs for the Liege meeting were: Mr. Chris Reason, Mr. John Schellnhuber (BOG 1 for topic i), Mr. Charles Kolstad, Mr. Leonard Nurse (BOG 2 for topic ii), Mr. Anthony Adegbulugbe, Mr. Andy Reisinger (BOG 3 for topic iii), and Mr. Nebojsa Nakicenovic, Mr. Youba Sokona (BOG 4 for topic iv).

The BOGs were asked to consider the agreed topic headings and produce a list of bullets that would be intended as guidance to the authors. The groups were requested to give careful attention to cross-cutting themes (CCT) and cross-cutting methodologies (CCM) and particular attention to specific issues requiring consistent treatment in the SYR. To that end, mixing between members of different BOGs was encouraged by the IPCC Chair.

A scoping document drafting team under the chairmanship of the IPCC Chair was established for the drafting of the Scoping Document (consisting initially of the BOG Co-Chairs listed above, the Chair of the IPCC and the Secretary of the IPCC). The BOG rapporteurs were also invited to participate in the scoping document drafting team meetings. Later, Mr. Bill Hare (rapporteur for BOG 4) was invited (by the Chair) to help develop the outline for a separate topic addressing issues relevant to the consideration of Article 2 of the UNFCCC (as proposed during the Cross-Working Group consultation on this CWT, held just prior to the SYR Scoping Meeting).

2.4 Meetings of BOGs

As recommended by the IPCC Chair, BOG 3 and BOG 4 met in a joint session to define the scope of topics iii and iv and to prevent any overlap between the two.

The main points of this meeting are summarized below:

- There was a long discussion on potential overlaps between Sections iii and iv. The meeting participants considered the different views expressed at the meeting, so far, on this issue. Finally, the difference between the two topics was clarified between BOG members present at this meeting, and at this stage it was clear among BOGs 3 and 4 that the two topics were to be provided as separate topics. This was later proposed and accepted at the plenary meeting.
- Topic iv should be on response strategies thereby bringing together all the underlying knowledge of topics i, ii and iii and topic iii should evaluate and assess responses.
- Distinguishing topics iii and iv based on time frame alone is problematic.
- It was agreed that it was relevant for teams preparing topics ii and iv to work together.
- It was warned that BOGs 3 and 4 should be careful not to fall into the abstract while trying to delineate their differences.
- On geo-engineering – there is increasing literature on this topic. It could be covered either in topic iii or iv, but its most relevant placement remains open, including whether it warrants being reflected in the outline at all.

After the first sessions of the break-out groups (BOGs), the IPCC Chair met with the BOG Co-Chairs and guidance was given to the groups on how to proceed further in developing concrete proposals. An example of some ideas expressed at this stage were:

BOG 1 – As an overarching principle, bullets could perhaps be organized according to relevance and robustness and according to how observations have developed from the First Assessment Report to the AR5. Furthermore, it was suggested that the SYR could be available this time together with interactive software.

BOG 2 - Essential elements were highlighted including explicit description of the assumptions on which the scenarios are based and what level of certainty can be placed on the future. Participants of this meeting also discussed different ways to approach the material in Section ii, i.e., whether it should be structured according to time scales or in other ways.

BOG 3 – It was suggested that topic iii was about how to evaluate responses, observed responses in mitigation and adaptation, discuss options, cost of specific actions, co-benefits, role of innovation and technology.

BOG 4 – It was suggested that topic iv is about "how" to do things whilst topic iii is about "what".

In relation to topics iii and iv, there was consensus among this group at this time that topics iii and iv should be separate in the proposed outline for the SYR, but there were still some different views among the group regarding how to distinguish the contents of these sections. They discussed distinguishing the topics on a time frame, but did not conclude in favour of this option, as it did not seem appropriate. Some suggested that the focus of topic iv should be on the pathways. Section iv would describe "Representative Concentration Pathways" (RCPs) from very high to very low. The assumption was that topic ii would deal with the high class. Topic iv would focus on response strategies or specific strategic and systemic responses to the challenges that come out of the four pathways.

After this initial cross-BOG meeting the distinction between the topics became clearer, although there was some need for continued discussion. In general, comments arising from this initial "IPCC Chair–BOG Co-Chairs meeting", it was agreed that perhaps a contact group across the four topics could still be useful (this contact group finally did take place in the evening).

In general, at this meeting, caution was recommended regarding time frames. Moreover, it was strongly advised that there be joint talks between BOGs 2 and 4 as they both look at costs. Finally, it was further emphasized that consistency should be used in the costing methodology across the different groups.

3. Plenary Session 3

During the third plenary, reports from the first sessions of the break-out groups were considered and guidance was given to the groups on how to proceed further in developing concrete proposals.

4. Plenary Session 4

4.1 Discussion of schedule and requirements for the SYR preparation

The IPCC Secretary presented the proposed schedule and requirements for the SYR preparation. This schedule was discussed among a small break-out group including the Secretary, the Working Group TSU Heads, and two other participants external to IPCC management. In an attempt to enhance integration and synthesis without interfering with the assessment of the Working Groups an early establishment of the SYR CWT is suggested along with an increased number of meetings of the CWT. The schedule proposed by this group is presented in the final Scoping Document. See **Annex 5**.

4.2 Progress Reports from the BOGs second session

During the fourth plenary, reports from the second sessions of the break-out groups were considered. The BOG Co-Chairs presented the list of bullets produced by the BOGs. They would be used to draft the scoping document detailing the structure for AR5 SYR intended as guidance to the authors.

Discussion on the report from Break-out Group 1 second session

In the plenary debate it was suggested that it might be more relevant to talk about “poor regions” rather than “developing countries” as there are poor regions within developed countries also. It was reiterated that time frames did not seem appropriate and that cross-cutting sections should be considered. It was further suggested that there be useful collaboration between the Special Report on “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation” and the SYR.

Finally, it was strongly recommended that the IPCC establish how it will tackle the FAQs in the SYR.

Discussion on the report from Break-out Group 2 second session

In the plenary debate one of the participants expressed much appreciation for the inclusion of regional information in the bullets. It was suggested to make connections to RCPs and scenarios (including baseline) in the last section in the outline called “Range of future changes”. It was reiterated that there be no overlap with topic iii and one of the participants pointed out that the concept of “avoided damages” did not appear in the outline.

Discussion on the report from Break-out Group 3 second session

In the plenary debate it was emphasized that there should be no duplication between topics iii and iv. Some participants were concerned that the wording of the outline for BOG 3 would not make it clear that these are different topics. Since the outline should not be differentiated based on time horizons, the first bullet needed rewriting. It was further suggested that it should be made explicit that long-term outcomes and long-term consequences of near-term actions are going to be considered.

Discussion on the report from Break-out Group 4 second session

In the plenary debate it was suggested that Article 2 of UNFCCC should be a separate theme, as it is cross-cutting. One participant put forward the idea to change the topic iv title, as “transformations” seemed too strong. The issue of how adaptation and mitigation will be handled between topics iii and iv was raised; but it was then agreed that this is for the authors to decide on. One participant suggested that perhaps some time should be allowed in the schedule for the private sector to comment on the drafts. It was strongly recommended that the potential socio-economic impacts of changes in topic iv (such as vulnerability) be studied. Finally it was pointed out that “Transitions and Transformation” conveys the idea of future transformative change when it should rather be understood that the world is in the midst of major transitions already.

5. Final Plenary Session

5.1 Scenario development process in the AR5

Mr. Chris Field presented the scenario development process in the AR5. He said that the RCPs would be the starting point, and that the difference with the AR4 is essentially that the IPCC led the SRES development which was finalized before the AR4. Meanwhile, during the AR5, the IPCC is not leading the RCP development. IPCC-XXXII/Doc. 16 covers recent activities and upcoming activities related to scenario development and coordination with the scientific community.

5.2 Introduction to SYR

The Chair presented the work of Mr. Dennis Tirpak and Mr. Andy Reisinger on the introduction to the SYR. Based on their suggestions, the SYR scoping document for government consideration that was produced after Liege now includes four bullet points in the introduction to the full SYR Report:

- Rationale
- Framing of climate and human system
- Major challenges
- Treatment of confidence, risk and uncertainty

5.3 Article 2 of the UNFCCC

Mr. William Hare was asked by the Chair to present a possible outline for a fifth topic in which Article 2 of the UNFCCC would be dealt with separately. This decision was following the proposal of a 5th topic to cover this issue at the Article 2 Cross-Working Group Consultation that met just prior to the Liege meeting. The final outline and narrative for this Topic (as provided here) was prepared by Mr. Hare based on the discussions in Liege which followed this initial presentation. It was then revised in consultation with other meeting participants and it also drew upon the report of the cross working group consultation on Article 2.

In the plenary debate, it was recommended that this topic v should come after topic iv. It was agreed that "Reasons for concern" will be added as it is an overriding topic in this section.

5.4 Results of the meeting and supplementary information on the outlines

For the complete and official results of this meeting, please see the full SYR Scoping Document, presented in **Annex 5**. The meeting closed on the 27th of August, 2010 at 17:00.

The following additional information is presented, intended as further guidance to authors, and should be seen in combination with the final SYR Scoping Document which will be ultimately approved by the Panel. The following narratives have been prepared by Break-out Group (BOG) Co-Chairs[3] and are intended to reflect the views of the BOGs that met in Liege. Authors of the SYR would also need to consider during their drafting process the material that is actually available in the final Working Group reports and any Special Reports, as well as any page limits that may be decided for the SYR as a whole and its different sections.

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[3] The BOG Co-Chairs for the Liege meeting were: Mr. Chris Reason, Mr. John Schellnhuber (BOG 1 for topic 1), Mr. Charles Kolstad, Mr. Leonard Nurse (BOG 2 for topic 2), Mr. Anthony Adegbulugbe, Mr. Andy Reisinger (BOG 3 for topic 3), and Mr. Nebojsa Nakicenovic, Mr. Youba Sokona (BOG 4 for topic 4).

INTRODUCTION

This is the introduction to the full Synthesis Report.

- Rationale
- Framing the climate and human system
- Major challenges
- Treatment of confidence, risk and uncertainty

Supplementary information on the Introduction:

The introduction is intended to set the scene for the entire report. It will present the rationale for the report in the context of the overall products related to the AR5 and the need to summarise, condense and integrate information for policy makers.

As part of this scene-setting, the introduction should provide an overview of the interactions between the climate, human and natural systems (building on, but hopefully developing and improving on Figure 1 in the introduction to the AR4 Synthesis Report). Also, the major challenges the world is facing in addressing climate change would be highlighted without pre-empting their more detailed discussion in the main body of the report.

The introduction should also provide a concise overview in the way that confidence, risk and uncertainty are treated in the AR5. This could extend beyond a pure discussion of the treatment of uncertainty per se but address the relevance of such a treatment as part of risk management.

Finally, the introduction could give an overview of the content of the main topics.

TOPIC 1 – Observed Changes and their Causes

The emphasis in this topic is on scientific evidence, i.e., on documented events and developments that happened in the distant and, most importantly, in the recent past. In particular, the observations and inferences that help to quantify the already discernible human contribution to global change and its impacts are summarized. Moreover, the topic integrates information and insights about how human drivers of climatic changes have developed over time, distinguishing between (i) direct interferences like greenhouse gas emissions; (ii) economic activities generating those perturbations; and (iii) society-wide developments and transformations that provided the underlying historical and systemic frameworks.

- Pre-instrumental environmental changes, their effects and their causes
- Recent observed changes in the climate system
- Observed effects and impacts
- Past and recent drivers of climate change
- Attribution of climate changes, impacts, effects and drivers
- Human activities affecting climate drivers
- Historical transformational dynamics of societies and lessons to be learned
- Observed vulnerability to shifts in extreme-events and other climatic changes

BOG Co-Chairs' Narrative on Topic 1:

This first part of the AR5 SYR provides the scientific basis for the entire report by summarizing and integrating the observed and inferred evidence for climatic changes in the distant and recent past, but also for the effects as well as the immediate and systemic drivers of those changes.

The next IPCC Assessment Report will contain substantial new records of change in the Earth System, and of the resulting tangible impacts on natural and social systems. In particular, progress in attribution of human interference is expected to go well beyond that available in AR4, both concerning specific climate parameter and more general climate effects. Wherever possible, descriptions of observed changes should actually be accompanied by statements regarding attribution.

Evidence from the pre-instrumental period, including paleo-data, should be highlighted, where they are relevant to the present and the future. Consideration should also be given to including counter-examples, where a lack of recent change (such as the rather stationary behaviour of the Antarctic sea ice) is notable.

To avoid misunderstanding or ambiguity, it is suggested that a brief climate tutorial, including definitions of evolving terms (e.g. "attribution") should be provided close to their first usage.

This topic will have input from all three Working Group reports and has the opportunity to maximise synthesis between these reports. Especially, a close cooperation between WG I and WG III is suggested, which has been notably lacking in earlier syntheses. In this context, it is important to consider not only the direct causes of anthropogenic climate change (such as accumulation of greenhouse gases in the atmosphere or modified properties of land surfaces) but also an in-depth analysis of the sectoral economic and geographically-explicit social activities that bring about those biogeophysical perturbations.

The choice of statements to appear under this topic should be guided by an assessment of both policy-relevance and robustness of the underpinning science. Special attention should be paid to regions and sectors, and their vulnerability to change in climatic drivers and processes – this is likely to be achieved most effectively through the use of diagrammatic material. For instance, one could draw a diagram with relevance and robustness as the axes that shows where a range of important items (agricultural production, intensity of tropical storms, tipping elements being obvious examples) lie with respect to these two dimensions. It would be very instructive to document the trajectory of those items over time, not least through the IPCC Reports – what has become more important, what has become more certain?

The observations of vulnerability of particular regions and sectors to recent extreme events, which will appear in Working Group reports, should play a prominent role. Similarly, the observed human responses to climate changes and their effects could be covered here or alternatively under Topic 3. An interesting intellectual challenge to be considered for this Topic is a review of the society-wide developments and transformations that provided the historical frameworks for past climate-change drivers.

Highlighting crucial questions would allow some complex issues to be dealt with in an insightful and concise manner. They could be treated as a topic-specific short list or integrated into a SYR list of frequently asked/rarely answered questions.

TOPIC 2 - Future Changes (in the Short and Long-term)

The purpose of this topic is to provide a "bird's eye" view of future climate change, adaptation and impacts, and mitigation, under various scenarios. The recommended approach to accomplishing this goal is to illustrate possible futures as described in the new scenarios, based on the "Representative Concentration Pathways" (RCPs) and other scenarios used in the Fifth Assessment Report (AR5). Each possible future would be characterized by climate, impacts, adaptation and mitigation, presented in physical, economic and other societally relevant terms.

Drivers of future climate change

- Description of RCPs and further scenarios used in AR5 (including comparison with SRES and previous Assessment Reports)

BOG Co-Chair Note: This is the first occurrence of the RCPs. They should be described here, along with the relationship between RCPs and the other scenarios used in AR5. In particular, the way in which socioeconomic scenarios coupled with mitigation and planned adaptation (adaptation which does not occur spontaneously but requires governmental intervention) map into specific RCPs should be described.

- Anthropogenic (primarily) and physical factors that lead to a change in climate (e.g., emissions, land-use change, population, etc.)

BOG Co-Chair Note: This bullet should describe the multiple stresses or the anthropogenic (primarily) and physical factors that lead to a change in climate.

Basis of projections

- Earth system, impacts, and economic models, and their validity

BOG Co-Chair Note: The point here is not to undertake a validation exercise but rather to give the reader an assessment for the precision (or lack thereof) in the various components generating the projections of future change – an assessment necessary to interpret the projections.

- Uncertainty and confidence

BOG Co-Chair Note: Although many projections may be point projections without explicit probability distributions, the reader should understand the role of uncertainty (e.g., parameter uncertainty), stochasticity (natural randomness) and confidence (level of knowledge that the system has been properly characterized)

- Characterizing risk and reasons for concern

BOG Co-Chair Note: There should be an explicit discussion of risks that may not be apparent in the projections

Range of future changes

- Characterizing climate futures

BOG Co-Chair Note: Pick a set of scenarios, including mitigation and planned adaptation pathways and socioeconomic conditions that map into the four RCPs. The scenarios chosen should span the likely outcomes ranging from a "business-as-usual" condition to one involving aggressive actions to manage climate change.

There are a number of alternative approaches to presenting the range of future changes are available. One would present results in terms of short, medium and long–term time horizons, another would focus on the different worlds that emerge consistent with the RCPs; still another might be regional in focus. The outline does not conclude in favour of one or the other approach.

- Set of changes and impacts on systems, sectors, and regions
    - Mean, variability, extremes
    - Committed climate change, abrupt changes, irreversibility
    - High impact / low probability events
    - Direct and aggregate costs
    - Interaction of adaptation and mitigation measures with impacts, including avoided damages
    - Unintended and cumulative impacts of these measures

BOG Co-Chair Note: This section should include a characterization of the physical changes to the climate system as well as impacts, adaptation and mitigation actions. Physical metrics should include the treatment of variability and climate extremes as well as low probability events and tipping points. Impacts should be described in both physical terms (e.g., species lost) and, for market sectors, in monetary equivalents. Autonomous adaptation (adaptation that occurs spontaneously as a defense against a change in the climate) should be noted and taken into account when reporting impacts. As a companion to the impacts discussion, this section will also describe the aggregate level of mitigation and planned adaptation associated with the chosen scenarios. Economic costs will also be reported for these.

BOG Co-Chairs' Narrative on Topic 2:

The purpose of this section of the Synthesis Report is to provide a "bird's eye" view of future climate change, mitigation, adaptation and impacts. It is our understanding that similar issues will be examined at a more micro-level in the third section of SYR and that similarly a strategic perspective on possible actions will be treated in the fourth section of SYR.

It is particularly important that regional perspectives and the short-term horizon (a few decades) are drawn out in a way that effectively informs policy and decision makers. These priorities should be reflected in the approach to drafting, though it is not explicit in the outline.

The recommended approach to accomplishing these objectives is to paint several pictures of possible futures, including what might be viewed as business-as-usual (baseline) but also other paths. A possible future includes the socioeconomic context as well as the mitigation and adaptation that lead to a particular time profile of forcing.

A number of alternative approaches to presenting the range of future changes are available. One would lead with short, medium and long –term time horizons, another would focus on the different worlds that emerge consistent with the RCPs and any other scenarios used in the AR5. The outline does not conclude in favour of one or the other approach.

This section of the report would be prefaced with information about the scenario process in the IPCC, including the representative concentration pathways (RCPs) and the socioeconomic/adaptation/ mitigation scenarios that map into each of these RCPs (the specific nature of these remains unclear to us at this time). These scenarios are important and this section may be the first discussion of these in the Synthesis Report. Furthermore, there would be a discussion of the confidence and precision of the projection models used in this section.

There are four representative concentration pathways (RCPs) that will be used in AR5. In turn, there are a number of socioeconomic/adaptation/mitigation scenarios that map into each of these RCPs—each complete scenario implies an RCP. In this section, the synthesis will be based on a number of representative socioeconomic/adaptation/mitigation scenarios, chosen to span four RCPs. In each case, physical climate consequences (e.g., sea level rise, precipitation, weather variability, extreme events, tipping points) and impacts will be synthesized, adjusting for autonomous adaptation and, wherever possible reported at the regional level. Planned adaptation (i.e., that which does not occur spontaneously) will also be reported. Mitigation costs will be synthesized, at the regional level if possible, and reported. Ancillary ("unintended") impacts of mitigation should also be noted. Risks will also be characterized (outcomes that are uncertain but potentially serious). Thus the full "macro" consequences of a set of possible futures will be provided to readers. The possible futures will range from an approximate business-as-usual (baseline) case associated with the highest RCP to an aggressive reduction strategy, associated with the lowest RCP. In describing the projections, it would be useful to introduce the concepts of accumulated damages and avoided impacts.

The types of impacts that will be reported in this tabulation will include impacts to market sectors, denominated in physical units and in monetary units (€ or $) as well as non-market impacts, denominated in physical units. It is important that autonomous adaptation (adaptation that occurs spontaneously as a defensive measure against climate change) be reflected in the impact figures. Adaptation that will not occur without government intervention would also be tabulated. Mitigation is somewhat more straightforward to track. The mitigation costs would include the direct outlays for mitigation as well the indirect economic costs of mitigation efforts. Finally, to the extent possible, non-monetary consequences (distributional consequences, equity issues, risks of low probability events) would be reported for the representative scenarios.

It will also be important to include a discussion of uncertainty, model validity and the RCP scenario process, particularly in how they frame the synthesis of climate change futures. The role of natural variability will be particularly important for describing the patterns and projections of uncertainty. A discussion should also be provided of nonlinear events and irreversible change, as well as high impact/low probability events.

For regional considerations and other specific policy maker interests, and for cross-cutting topics and methodologies, case studies provide a valuable mechanism for communicating conclusions and key messages. The integrative nature of this Chapter may be best complemented through case studies. In addition, it may be useful to identify the consequences of inertia in the climate system on future impacts.

TOPIC 3 - Responses

This topic addresses adaptation and mitigation by presenting information on a wide range of specific response options, including their interactions. It addresses outcomes and consequences of these options over near-, medium-, and long-term time scales. It will also provide a discussion of approaches to evaluate and assess these different options including equity considerations.

Response options

- Observed responses
    - Drivers, outcomes and implications
- Adaptation and mitigation responses (including regional and sectoral perspectives):
    - Options, including technologies, and related policies and measures
    - Capacities and their determinants
    - Costs and benefits, including co-benefits and trade-offs
    - Obstacles, limits and limitations, including inertia
    - Cross-cutting issues and aggregate responses
- Interactions between adaptation, mitigation and development, including equity and ethics.

Enabling factors and addressing barriers, including regional considerations

- International and regional collaboration
- Governance and institutional arrangements
- Investment, finance and financial instruments
- Changes in lifestyles and behavioural patterns
- Innovation, and technology research, development, deployment, diffusion and transfer
- Information, monitoring and evaluation to support decision-making

BOG Co-Chairs' Narrative on Topic 3:

This topic addresses adaptation and mitigation by giving an overview of a wide range of specific response options, including their interactions. It also summarises key enabling factors for further actions and steps to address barriers. Topic 3 focuses on responses that can realistically be applied to existing systems, but may have outcomes and consequences over near-, medium- and long-term time scales. Throughout, this topic will need to take account of response options and capacities in different sectors and regions (perhaps through innovative graphics and integrative tables and matrices).

The bullets suggested by the break-out group in the scoping meeting are wide-ranging to reflect the different perspectives and elements that could all warrant consideration. However, it is recognised that the actual extent and balance of treatment of those issues by the authors will critically need to depend on the material assessed and available in the underlying Working Group reports, as well as length constraints for the Topic. Additional issues for the authors to consider, and further elaboration of bullet points suggested by the scoping meeting, are provided below.

Framing the Topic

In framing this topic, authors should consider providing a brief general discussion of possible approaches to evaluate and assess response options, including equity considerations. This may include discussion of e.g. hedging strategies and other principles that can assist decision-makers in selecting actions that are robust under a range of on-going and potential future changes. Note that Topic 3 does not aim to explicitly follow specific long-term development or climate trajectories, but rather takes a toolbox approach. Topic 4 would then be able to discuss and analyse systemic response strategies and long-term transformative pathways, building on the micro-level and detailed understanding of specific adaptation and mitigation response options developed in Topic 3.

Discussion of specific response options

Discussion of observed responses should focus on 'planned' adaptation and mitigation; historical autonomous responses (emissions trends, and impacts on/autonomous responses of human systems) would be considered in Topic 1. A key point of interest will be the degree to which current adaptation and mitigation choices are robust, depending on a range of future socio-economic developments and goals and on-going (including long-term) changes in the climate system.

Discussion of further response options should aim to take a common approach to mitigation and adaptation, to the extent possible, while recognizing their specificities. Although the outline bullets assume equal treatment of adaptation and mitigation, they will need to be treated separately in some of the response options given the different regional and sectoral perspectives, the different scales, actors and stakeholders as well as technologies and response-specific policies and measures. However, in some parts of the analysis of response options, shared analysis would likely be more useful. Authors will need to decide, depending on the available material, space constraints, and relevance to decision-makers, which issues and aspects might warrant distinct emphasis and/or separate discussion for adaptation and mitigation.

The phrase of 'obstacles, limits and limitations' is intended to flag possible discussion of a wide range of challenges: obstacles refers to barriers to implementation; limitations refers to the fact that almost all policies and measures are implemented imperfectly and may not achieve their objectives, and this may affect their performance; while 'limits' refers to the fact that even perfectly implemented responses may not be able to fully address the scale of the problem. Additional overarching issues that deserve attention are the potential lock-in from past and present adaptation and mitigation responses that may constrain future options, and also the path-dependence of response options on development patterns and trends (inertia). Unintended negative climate or non-climate (including social, environmental and equity-related) consequences of responses may also warrant attention (including any observations of unintended consequences that may have already occurred).
The bullet of 'cross-cutting issues and aggregate responses' is intended to remind authors to consider not only individual response options but also the aggregate effect of combined responses (including e.g. economy-wide, regional and global mitigation potentials across a range of sectors and for different carbon prices; reducing vulnerability to a range of climate impacts through a various measures; and aggregate costs of adaptation and its effectiveness). In addition, cross-cutting issues such as leakage, spill-overs, and how to deal with the basket of greenhouse gases and the role of greenhouse gas metrics, should be considered as far as possible.

It would also be useful for this discussion to consider the implications of non-climate drivers, such as future production and cost of fossil fuels and of renewables or regional development patterns, on appropriate policies and measures to implement adaptation and mitigation responses. Information on the multi-faceted interactions between mitigation, adaptation and development should also include a discussion of mainstreaming climate responses into broader development plans. Discussion of adaptive and mitigative capacities and their determinants could also usefully include information about key capacity building measures and mechanisms. Topic 4 may provide a more comprehensive discussion of the role of capacity building to influence development pathways and achieve transformations.

Discussion of enabling factors and removal of barriers

The scoping meeting considered that a discussion of enabling factors would be a useful organising principle that may allow and benefit from a shared discussion of adaptation and mitigation. Decisions about climate change responses are made at a range of scales (from local to global) and by a range of actors (including individuals, civil society, the private sector, local and national governments, and global institutions). Governance and institutional frameworks at these different scales are therefore key for shaping responses. Financial mechanisms and investments are also required to support responses, although there is also a great need for improved institutional frameworks to support improved decision-making about financial resources and instruments.

Responses need to be supported through enhanced regional and international cooperation. Note that the wider and more fundamental issue of the collective action problem that forms a key barrier to international cooperation would be addressed in Topic 4, while Topic 3 would focus on status and outcomes from concrete existing actions and frameworks for collaboration such as UNFCCC.

Discussion of innovation and technology development, transfer and uptake may wish to include intellectual property rights issues, provided there is relevant information in the underlying reports.

TOPIC 4 - Transformations and Changes in Systems

This topic takes a systems perspective in addressing climate change response strategies and policies to be applied at local, national, regional, and global scales. Transformative changes are occurring in the world, but with various emphases towards sustainable development and/or climate stabilisation. Building on AR5 scenarios described in Topic 2 and mitigation and adaptation measures and options from Topic 3, the focus here is on response strategies and diverse portfolios of policies and options across different stabilisation pathways.

Overview of transformation pathways

- Interpreting scenarios and their pathways including regional and sectoral aspects across different stabilization levels (characteristics and timing)
- Mitigation and adaptation strategies - characteristics, risks and interactions
- Systems, costs, investment strategies, and trade flows
- Avoided damages under adaptation and mitigation
- Benefits and co-benefits, tradeoffs and spillovers (mitigation, adaptation and sustainable development)
- Societal changes

Strategic responses at all levels: common and specific systemic changes across the pathways

- Technology change (RD&D, technology transfer, role of private sector)
- Societal changes
- Policy, governance and institutional (including international) arrangements
- Investment and finance
- Capacity building : mechanisms and strategies
- Equity and ethical dimensions (including diversity of values and priorities)
- Co-benefits, tradeoffs, obstacles and barriers

BOG Co-Chairs' Narrative on Topic 4:

The topic will start out by framing the issues related to transformations and changes in systems and showing why these issues are highly policy relevant. This will include perspectives on the policy and sustainable development contexts, different pathway choices, risks and opportunities arising from the climate change issue, and why transformational changes need to be considered. This latter involves considerations of present development trajectories and the transformational changes embedded in these, as well as climate risks, key vulnerabilities and uncertainties, reasons for concern, and the relationships between mitigation/adaptation benefits and burdens, ethical issues, the timing, rate and scale of action for different stabilization levels, and the risk of lock-in effects for technologies and development pathways.

After introducing the issue, the Topic would provide an overview of transformation pathways and the global, regional and sectoral issues surrounding these for different scenarios, pathways, timing and levels of GHG stabilization. In this context the different characteristics, risks and interactions of mitigation and adaptation strategies would be described along with their system wide implications, costs, differential investment strategies, and related trade flows. Different pathways would be reviewed, examining issues related to avoided damages under different adaptation and mitigation strategies, benefits and co-benefits, tradeoffs and spillovers related to mitigation, adaptation and sustainable development, and of related societal changes.

The topic would conclude with a review of strategic, macro-scale response as the system wide level and show the system wide changes for different pathways. It will draw attention to changes common to all pathways as well as those specific too individual pathways. Different pathways involve different co-benefits, tradeoffs, obstacles, barriers to policy and differential risks, which will

need to be considered. System wide change and responses to be considered in relation to different pathways and stabilization levels include technological change, and issues surrounding this such as RD&D, technology transfer, and the role of the private sector, as well as the differential strategies needs for investment and finance. Transformational issues and system wide changes related to arrangements for international, regional, national and local policy, governance and institutional forms will be reviewed. There are different societal, developmental behavioural, equity and ethical dimensions and implications arising from different transformational pathways which will also be outlined in this part of the Topic.

TOPIC 5 - Science supporting Article 2 of the UNFCCC [4]

This topic deals with issues relating to Article 2 of the UNFCCC, drawing together the policy relevant science from each of the Working Group reports that support consideration of this issue. Relationships found between risks and key vulnerabilities for different levels of warming and CO_2 concentration, different levels, timing and pathways for stabilization of greenhouse gas concentrations, and different cumulative emissions and budgets will be described. Information relating to specific sectors cited in Article 2 (ecosystems, food production and sustainable economic development) and their relationship to different stabilization levels and the timing for achieving these will be outlined. Regional information relating to Article 2 will be described.

Risks and Key Vulnerabilities

- Risks and Key Vulnerabilities identified in AR5
- Relationship to levels of warming and CO2 concentration
- Relationship to level, timing and pathways for stabilization of greenhouse gas concentrations
- Relationship to cumulative emissions and budgets

Level and timing of stabilization of greenhouse gas concentrations

- Timeframes and pathways for stabilization

Ecosystems, Food Production and Sustainable Economic Development

- Allowing ecosystems to adapt naturally
- Ensuring food production is not threatened
- Enabling economic development to proceed in a sustainable manner

Regional information relating to Article 2

[4] The 31st Session of the Panel identified issues related to Article 2 of the UNFCCC as a Cross Cutting Theme.

Narrative on Topic 5[5]

Risks and Key Vulnerabilities

Topic 5 will include an examination of the risks and key vulnerabilities identified in the IPCC AR5, including their relationship to different levels of warming (such as 1.5°, 2°, 3°,…), CO_2 concentration and greenhouse gas stabilization. This section would explain how knowledge drawn from Working Groups' assessments is relevant to Article 2.

Material here would be presented in the context of a consideration of reasons for concern, as this was noted at the scoping meeting as being of key relevance to policymakers. Relationships identified between risks and key vulnerabilities and the level, timing and pathways for stabilizing at different greenhouse gas concentration levels would be described. The likelihood of these risks occurring with different cumulative emissions of greenhouse gases over varying time frames, will be synthesized. Furthermore, there would be consideration of abrupt and irreversible changes in the climate system, ecosystems and human systems for a range of different scenarios. Commitment to changes in the climate system under different scenarios could be briefly presented.

Level and timing of stabilization of greenhouse gas concentrations

Issues surrounding the level and timing of stabilisation of greenhouse gas concentrations, including different timeframes and pathways for achieving these levels will be outlined. The costs, benefits and risks of mitigation options and strategies for sustainable development will be put in the context of the different scales and kinds of adaptation, associated with different stabilization levels. This section would outline the relationships found in the AR5 between adaptation and mitigation at different stabilization levels.

Ecosystems, Food Production and Sustainable Economic Development

The topic will also review the findings of the AR5 that relate to the criteria specified in Article 2 that relate to the time frame and level of GHG stabilization.

- Allowing ecosystems to adapt naturally

Article 2 states that stabilization of GHG concentration be achieved in a "timeframe sufficient to allow ecosystems to adapt naturally to climate change". This topic may evaluate this issue by looking at key properties affected by different stabilization levels and time frames, including eco-system services such as biodiversity, food and livelihoods, and cultural values; protection of iconic species, relative effects/changes on broad ecosystem types, including the spatial extent and geographic location of ecosystems.

- Ensuring food production is not threatened

The topic will look at both global and regional impacts on food production for different GHG levels within different development contexts. Global increases in food production could, for example, be accompanied by deficits at regional levels whose consequences for food security would depend upon the regional context and the socio-economic scenarios assumed both globally and regionally.

[5] This outline and narrative was written in consultation with other meeting participants (including BOG Co-Chairs and Rapporteurs), and is drawing upon the report of the cross working group consultation on Article 2 of the UNFCCC. It was prepared by Bill Hare, Potsdam Institute for Climate Impact Research, on request by the Chair. Bill presented the first draft of this outline in Liege, once it was decided in Liege at the full meeting plenary to suggest in the proposed outline the addition of a 5th Topic in the SYR to cover this cross-cutting issue in one place. This decision was following the proposal by Co-Chair Thomas Stocker to add a 5th topic to the SYR for issues relevant to Article 2, as explained in the report of the Article 2 Cross-Working Group Consultation that was held prior to the SYR Scoping Meeting.

- Enabling economic development to proceed in a sustainable manner

Issues related to economic development in Article 2 potentially involve two kinds of effects. On the one hand, effective mitigation of climate change may be a prerequisite for some aspects of sustainable economic development while delayed mitigation could lead not only to increased costs, but also hamper sustainable development. On the other hand, some kinds of climate mitigation strategies and options, and/or different scales of adaptation needs might draw resources away from sustainable economic development. This section will discuss how development pathways, adaptation, and mitigation interact in diverse, nuanced ways.

Regional information relating to Article 2

At the SYR Scoping Meeting, the need for regional information and integration across the working groups in considering Article 2 was emphasized. Issues seen as relevant include regional climate impact patterns, including extreme events, land and water availability, and biomass patterns and use. Information relevant to regions that relate to Article 2 will be synthesized in this section. Links to the Working Group reports could be made available in the electronic version of the report for further regional details relevant to Article 2 of the UNFCCC.

ANNEX 1

AR5 Synthesis Report Scoping Meeting
Liege, Belgium, 25-27 August 2010

OPENING CEREMONY

Wednesday 25 August 2010, 10:00 hours
Liege, Palais des Congrès

Speakers at the opening ceremony:

- Welcoming remarks by Dr Rajendra Pachauri
- Introduction of speakers by Mr Jean-Pascal van Ypersele, Vice Chair of the IPCC
- Speech by Mr Philippe Henry, Minister of Environment for the Walloon Region, Ministry for the Environment, Land Use Planning and Mobility
- Speech by Mr Willy Demeyer, Mayor of the city of Liege
- Concluding remarks and Opening of the Session by Dr Pachauri.

On the podium, in seating order (from left to right)

1) Mr Jean-Pascal van Ypersele, Vice Chair of the IPCC
2) Mr Philippe Henry, Minister of Environment for the Walloon Region
3) Dr Rajendra Pachauri, Chairman of the IPCC
4) Mr Willy Demeyer, Mayor of the city of Liege
5) Ms Renate Christ, Secretary of the IPCC

The media are invited to attend the opening ceremony. At the end of the opening ceremony, the formal meeting which is a closed session, will begin. The media will therefore respectfully be requested to leave the meeting room at this point.

ipcc

INTERGOVERNMENTAL PANEL ON climate change

AR5 Synthesis Report Scoping Meeting
Liege, Belgium, 25-27 August 2010

AR5/SYR-SCOP/Doc. 1, Rev. 1
(6.VIII.2010)
ENGLISH ONLY

DRAFT AGENDA AND INDICATIVE SCHEDULE

(Submitted by the IPCC Secretariat)

IPCC Secretariat

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WMO UNEP

SCOPING MEETING FOR THE SYNTHESIS REPORT (SYR)
FOR THE IPCC FIFTH ASSESSMENT REPORT (AR5)
Liege, Belgium 25-27 August 2010

DRAFT AGENDA and tentative schedule

Registration of participants at the Palais des Congrès
on 24 August 2010 from 16:00 to 18:00 and on 25 August 2010 from 8:30

DAY 1 – 25 August 2010
MORNING 10.00-13.00

PLENARY

1. Organization of the meeting
- 1.1. Opening
- 1.2. Approval of the Agenda (Doc.1, Rev.1)
- 1.3. Programme of work

2. Presentation of vision paper by the IPCC-Chair (Doc.2)

3. Presentation of Working Group outlines for the AR5 and relevance for the Synthesis Report– Co-Chairs of Working Groups

4. SYR in past assessments and IPCC Procedures for the preparation of the Synthesis Report (Doc.3 and INF.1) – IPCC Secretary

5. Presentation of broad outline prepared at the Venice meeting (Doc.4) – David Wratt

6. Key issues arising from the government comments received (Doc.5 and INF.2) – IPCC Secretary

- Discussion

LUNCH – ***Meeting of Breakout Group (BOG) Co-chairs identified before meeting or during morning session***

AFTERNOON 14.00-18.00

7. Panel debate with user representatives about past experience, policy relevant topics the AR5 SYR should address and desired areas of emphasis

8. SYR Scoping – in-depth discussion of four broad areas and policy-relevant questions arising from government input.

9. Formation of BOGs and briefing on tasks and expected outcomes

The initial breakout groups would be structured around the broad outline developed in the Venice meeting and approved by the Plenary in Bali, but based on the vision paper due to be prepared before the meeting, the number of breakout groups and the specific subjects they discuss could be modified appropriately. It is also envisaged that when the BOGs meet initially and discuss the subjects assigned to them they may come up with suggestions on further topics that may emerge as logical outcomes of the discussions that take place.

10. Identification of drafting team

- Meeting of BOGs

EVENING – Reception

DAY 2 – 26 AUGUST 2010
MORNING 09.00-13.00

MEETINGS OF BOGs

LUNCH – ***IPCC Chair will meet with BOG Co-chairs***

AFTERNOON 14.00-18.00

PLENARY

- Implications for dealing with cross cutting themes, with presentations on:
  - Scenario development process;
  - Risk and uncertainty assessment;
  - Article 2 of the UNFCCC
- Progress reports from BOGs
- Consider possible restructuring of mandate and/or re-composition of BOGs as appropriate
- Discuss schedule and requirements for the SYR preparation

Meeting of BOGs to continue

- EVENING – drafting team to prepare first draft scoping paper

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DAY 3 – 27 AUGUST 2010
MORNING 09.00-13.00

PLENARY

- Presentation of draft scoping paper
- Meeting of BOGs to consider draft scoping paper and provide further inputs

LUNCH – meeting of drafting team

AFTERNOON 15.00-17.00

PLENARY

11. Final discussion on draft scoping paper and implementation plan (finalized by drafting team)

12. Closing of the meeting

AFTERNOON/EVENING - *drafting team finalizes scoping paper and implementation plan*

ANNEX 2

AR5 Synthesis Report Scoping Meeting
Liege, Belgium, 25-27 August 2010

AR5/SYR-SCOP/Doc. 2
(12.VIII.2010)
ENGLISH ONLY

CHAIMAN'S VISION PAPER ON THE AR5 SYNTHESIS REPORT

(Submitted by the IPCC Chairman)

Chairman's Vision paper on the AR5 Synthesis Report

1 Preamble

1.1 This vision paper has been drafted as guidance for the participants of the SYR Scoping Meeting, and has to be considered in conjunction with other documents provided for the meeting. The contents and areas of emphasis in this paper draw on the extremely valuable and extensive comments received from governments. The material in this paper is also based on previous experience and practices followed for production of the Synthesis Report right from the First Assessment Report to the Fourth.

2. Structure and format

2.1 The experience with previous versions of the SYR suggests that:

- The length of the full report should be less than 50 pages for it to be effective, relevant and readable for an audience of policymakers who would essentially benefit from this document. Similarly, the Summary for Policy Makers should not exceed 10 pages. In addition, the SYR should carry the other appendices generally provided which include:

    - User guide and access to more detailed information
    - Glossary
    - Acronyms, chemical symbols; scientific units; country groupings
    - List of authors
    - List of Reviewers and Review Editors
    - Index
    - List of all publications of the IPCC
    - Frequently asked questions (FAQs) and answers

2.2 In the above list of annexures, the possible inclusion of FAQs is a subject that needs to be discussed in the Scoping Meeting and included in the final report of the meeting for consideration by the Plenary.

2.3 The topics to be included in the SYR have been provided as the outcome of the AR5 Scoping meeting (Venice, 13-17 July 2009) and noted by 31st Plenary Session. These are as provided in AR5/SYR-SCOP/Doc.4 of the material submitted to the Scoping Meeting. In essence, these topics include:

- Observed changes and their causes
- Future changes (in the short and long term)
- Response
- Transitions and transformation

2.4 It is entirely open to the Scoping Meeting to specify sub-topics under these broad topic headings. If there are strong and compelling reason to suggest any modification to these topics themselves the meeting could also come up with a view in this regard. However, for all practical purposes the meeting should work within the framework of the four topics agreed on. Several governments did suggest sub-topics or sections under each topic, and the meeting could come up with these on a precise and constructive basis.

3. Issues of emphasis and priorities

3.1 For several logical reasons and on the basis of government comments received there is reason for emphasis and an overriding level of attention to be provided to:

- Article 2 of the UNFCCC – Since the Scoping Meeting is to be preceded by a Cross Working Group meeting on Article 2, output from that meeting would be available at least in draft form for the Scoping Meeting itself.

- Reasons for concern – This is a subject which was covered in the SYR for both the TAR as well as the AR4, but there is continuing interest in dealing with the subject in sufficient depth.

- Characterization of uncertainties – This subject needs to be dealt with as consistently as possible across the three working groups. Documentation on a meeting recently held on the subject will be available to the participants to provide a perspective on how the treatment of uncertainties can take place effectively across working groups.

- Treatment of scenarios, particularly representative concentration pathways (RCPs), their underlying assumptions and characterization.

3.2 The meeting should also come up with any other areas of emphasis or priority that must dominate the thrust of the SYR and the manner in which these would be incorporated in the report.

4. Contents and material to be presented

4.1 The contents of the SYR as required under IPCC procedures should be derived from the material contained in the three Working Group reports as well as the Special Reports under preparation on Renewable Energy Sources and Climate Change Mitigation; and Managing the Risk of Extreme Events & Disasters to Advance Climate Change Adaptation. Since under a decision of the Panel, working on the SYR is being initiated relatively early, it is important to ensure a two way flow between the design of the SYR and the contents of the Working Group reports. To a large extent this has already happened in the approved outlines of the Working Group reports and the preliminary structure of the SYR. However, there is scope for continuing refinement of the contents and elaboration of subjects in the Working Group outlines by which the policy relevance material to be included in the SYR can be reflected in all the documents which would form part of the AR5.

4.2 The Cross Cutting Themes (CCTs) identified for consideration in the AR5 have been described in detail in AR5/SYR-SCOP/INF.3. However, it is entirely possible that the Scoping Meeting may come up with modifications of these CCTs or additions to them as may be considered necessary. However, any departure from the CCTs already identified should be explained carefully through appropriate description of the reasoning and rationale for doing so.

4.3 The dominant view of governments, which can be seen as distinct from similar comments received for the AR4, highlights the importance of this SYR covering societal aspects, economic dimensions, as well as equity aspects in the material to be presented. In this context it would be useful to remind the participants of the meeting of the original UN General Assembly (UNGA) resolution No.43 which forms the charter of the IPCC, which stated that the UNGA “Endorses the action of the World Meteorological Organization and the United Nations Environment Programme in jointly establishing an Intergovernmental Panel on Climate Change to provide internationally coordinated scientific assessments of the magnitude, timing and potential environmental and socio-economic impact of climate change

and realistic response strategies, and expresses appreciation for the work already initiated by the Panel."

4.4 The important part of this resolution is a very clear inclusion of the term "reasonable response strategies". The reasonableness of response strategies that would be included essentially fit under the title of transitions and transformation included in the SYR structure. These would necessarily require proper treatment of the societal and economic aspects of each different response strategies.

5. Audience to be addressed

5.1 The audience of the SYR goes beyond the scientific community and since this is by far the most important policy relevant document in any assessment, it has to be of interest to governments, business and industry, civil society and all stakeholders. Comments received from governments have also pointed to the importance of the role of the private sector. Another issue that was brought out, presumably in the context of transitions and transformation is to consider "low GHG society" rather than "low carbon society". This implies attention to all major GHGs. Here again it would be important to go back to the original UNGA resolution which clearly specified, "calls upon Governments and intergovernmental organizations to collaborate in making every effort to prevent detrimental effects on climate and activities which affect the ecological balance, and also calls upon non-governmental organizations, industry and other productive sectors to play their due role."

6. Process for preparation of the SYR and possible time table

6.1 The Panel in recent plenary sessions has clearly emphasized early treatment and preparation of the SYR. It is also desirable to ensure that the gap between the preparation and release of the WG-I report and the completion of the SYR should not be unduly long. In the case of the AR4, the WG-I report was completed on February 1, 2007, and the SYR in November 17, 2007. Hence the gap between completion of these two documents was barely ten months. For the AR5 the Panel at it's 31st Session decided that the SYR should be finalized 12 months after completion of the WG-I report. Preparation of the SYR would be facilitated considerably by the early establishment of the Technical Support Unit (TSU) for this purpose. The meeting should also consider the two alternative time schedules for taking up and completing the work of the AR5. Based on the recommendations of the Scoping Meeting, the Panel can then take a decision at the 32nd Plenary Session to be held in Busan, Korea in October 2010. The outcome of the Scoping Meeting would be prepared by a drafting team, which is expected to complete this work by the morning of Saturday, August 28, 2010.

ANNEX 3

AR5 Synthesis Report Scoping Meeting
Liege, Belgium, 25-27 August 2010

AR5/SYR-SCOP/Doc. 4, Rev.1
(6.VIII.2010)
ENGLISH ONLY

BROAD OUTLINE OF THE AR5 SYNTHESIS REPORT

Output from Scoping meeting for the Fifth Assessment Report (AR5) of the IPCC, Venice, Italy, 13-17 July 2009

(Submitted by the IPCC Secretariat)

BROAD OUTLINE OF THE SYNTHESIS REPORT (SYR)

1 Introduction

The mandate for consideration of the SYR at the scoping meeting was defined in decision 1 taken at the 30th session of the IPCC held in Antalya on the 21st-23rd of April 2009:

"The scoping of the AR5 Synthesis Report (SYR) and the identification of cross-cutting issues begins with the first scoping meeting, but, in line with past procedure, provision is made for a special meeting dedicated to scoping the SYR structure and content. It is expected that the scoping meeting in Venice (13-17 July 2009) would come up with chapter outlines for the Group contributions to the AR5 and prepare a broad outline for the SYR."

In the preparation for this meeting the Secretariat had invited governments to provide suggestions on the structure and content of the SYR. These suggestions are compiled in AR5-SCOP/INF. 1 (26 June 2009) that was prepared by the IPCC Secretariat. In AR5-SCOP/INF. 1 a common suggestion was that the report should be a synthesis and not just a cut and paste job. However, there were mixed views on whether the report should be framed around questions or topics. While the relevant government submissions were taken into account and were considered in developing this material, it is suggested that the Secretariat of the IPCC manage a comparison of the AR5-SCOP/INF. 1 relevant government submissions with the proposals outlined in this paper, for consideration at the SYR scoping meeting.

2 Structure, timing and implementation

Government Feed-back
It is suggested that governments be invited to provide feed-back on the process, and the general structure, as well as providing further comments on material to be covered under the individual broad headings. The questions provided by governments should also serve as guidance in the preparation of the SYR.

Length
It is suggested that the synthesis report would be a short document similar in length to the AR4 synthesis report. As mandated by the IPCC procedures the complete output would consist of an SPM and a longer report.

Topics rather than questions
It is suggested that the SYR would be framed around a series of topics rather than questions (it may be recalled that the TAR was framed around questions whereas the AR4 was framed around topics).

Frequently ask questions (FAQs)
The Scoping meeting also discussed the usefulness of a set of FAQs within the framework of the SYR. It was agreed that there is value-added in having FAQs, either in the main text or added as an appendix at the end of the text. It is suggested that any FAQs would be developed by the SYR author team in consultation with the Working Group Co-Chairs.

Timing
The possibility of significant new information or data appearing between the WGI SPM approval and the AR5 SYR approval was noted. The proposed period between WGI SPM and AR5 SYR approval of 12 months minimizes the risks this would occur.

It was proposed that the AR5 SYR scoping meeting would be held before the WGI LA1 meeting which is scheduled to be held in August 2010.

Implementation
These are suggested steps to be taken in order to complete the AR5 SYR:

- Selection of the initial core author team (drawn from all three Working Groups) soon after approval of the AR5 SYR outline. At a later stage in the process the core author team may be augmented by other authors from the Working Groups.
- A Technical Support Unit for the AR5 SYR should be established headed by an appropriate expert. It would be desirable for at least one member of this TSU to be appointed before the AR5 SYR scoping meeting.

3 Broad Outline for the Synthesis Report

It is suggested that the Synthesis Report be organized under four broad headings: 1. Observed Changes and their Causes; 2. Future Changes (in the Short and Long-Term); 3. Response; and 4. Transitions and Transformations.

Material that could be covered under each of these headings includes:

i. Observed Changes and their Causes
Observed changes in climate, natural and human systems, and their effects; Drivers of change in these systems (attribution and linkage).

ii. Future Changes (in the Short and Long-term)
Future drivers; Future changes in climate, natural, and human systems (due to other causes as well as climate change), and key risks (this material on changes and key risks would be framed around representative scenarios, including Representative Concentration Pathways); The wider context – including sustainable development; Reasons for concern (e.g. high risk uncertain probability, impacts on society and ecosystems, limits to adaptation…).

iii. Response
Reduction of vulnerabilities; The solution space; Risk Management and framing of response (noting this is a dynamic process, and is informed by the on-going policy process under the UN Framework Convention on Climate Change (UNFCCC) including consideration of Article 2); Effect of existing climate-related policies; Adaptation options, including technologies (food security, fresh-water and terrestrial ecosystems, coastal and marine ecosystems, human health, built environment (all sectors), and urban and rural communities); Mitigation options (policies and measures, technologies; all sectors and systems - land-use, energy, transport (including aviation and shipping), agriculture, industry, built environment); Co-benefits and externalities; Bottom-up and top-down Integration; Greenhouse gas metrics; Multi-metric valuations; Reduction of scientific uncertainty to assist decision-making; Investment in R&D to expand technological options and reduce response cost; “Geoengineering” proposals (e.g. carbon removal from the atmosphere, radiative forcing management); Equity and sustainable development dimensions; Interactions between adaptation, mitigation and development.

iv. Transitions and Transformation
Pace and scale (dynamics); Equity dimensions over different time and space scales; Development pathways including a global transition to a climate-resilient, low carbon society; Behavioural and societal changes; Benefits and costs (including co-benefits); Governance and institutional arrangements; Investment needs; Development issues; Climate and security.

Notes: The development of material for the future change section and the response section will pick up on and be influenced by outcomes of COP15 of the UNFCCC (Copenhagen, December 2009). Issues to be addressed in several sections include: Extremes, Commitment, Reversibility, Inertia, and Lock-in. More detailed consideration needs to be given to how regional aspects are addressed within the AR5 SYR. Note that “Transitions and Transformation” includes both adaptation and mitigation.

4 Issues for Consistent Treatment across Working Groups

In developing the broad outline, the SYR Breakout Group noted several issues for which a consistent treatment by all three Working Groups is highly desirable so that a coherent synthesis can be developed. These issues include: Risk (short and long-term); Uncertainty / confidence; Regions; Sectors; Ethics and value systems (recognizing pluralism in these); Cost framework and metrics; Technologies; Timescales; Sustainable development perspective; Scenarios; and Extremes and Reversibility.

ANNEX 4

QUESTIONS SUBMITTED BY GOVERNMENTS RE: THE AR5 SYNTHESIS REPORT

Questions submitted by IPCC Panel members in the last round of submissions (government comments) on 6 August 2010[6], and followed by questions submitted by participants attending the Scoping Meeting in Liege on 26 August, 2010[7].

Section 1	**Questions submitted prior to the Scoping Meeting in Liege**
Country	Questions
China	• How accurate are the global average temperature projections in previous IPCC Assessment Reports? What is the reason behind their differences with observational facts? What is the sensitivity of global average temperature to the concentration of carbon dioxide? • Whether there is sufficient evidence that demonstrates the greenhouse gas stabilization at a certain (or several) concentration level (s) is dangerous? What is the scientific foundation on which this research evidence is based? What are the uncertainties of this evidence? What are the technical and economic feasibilities in achieving this level of stabilization? • What are the costs of various emission reduction measures? What are the differences for countries at different stages of development and in different environmental conditions? • What is the distribution pattern of the low carbon technologies? What are the accessibility, transfer approaches, costs and obstacles of the low carbon technologies for developing countries?
Denmark	• What are the implications of the 2 and 1.5 degree targets mentioned in the Copenhagen Accord?
France	• Who will be supporting the costs of mitigation and adaptation actions?
Germany	• Are there any instruments and tools that could incentivise adaptation and mitigation actions? What kinds of incentives could involve major player s in the political economy of climate change? How can we make sure that incentives reach local communities and actors? How should coordination issues be addressed?
India	• What is needed to shift to low carbon development path? • What are the policy, financial and technology barriers and what measure to over come them? • How can the world achieve early peaking of emissions and then deep emission cuts?

[6] *Extracted from AR5/SYR-SCOP/INF. 2 (6.VIII.2010) "OVERALL SCOPE AND PROPOSED BROAD OUTLINE OF THE AR5 SYNTHESIS REPORT, Compilation of submissions from Governments" (Prepared by the IPCC Secretariat)*

[7] See questions in Section 2.

Kenya	• What are the relative roles of natural and human-induced forces in bringing about change, and how might human-induced and natural forces interact in the future? • How has the climate system responded to both natural and human-induced forces, and how might it respond to potential future forcing? • What is the sensitivity of natural and managed ecosystems to climate changes and how will sensitive systems be affected by climate variability and changes in the future? • What are the projected costs and effects of different potential response strategies to manage the risks of climate change? • How can we use and improve the climate change knowledge to protect the global environment and to provide a better living standard for all?
The Netherlands	• What are the contribution of Climate Change and other drivers to observed and projected impacts/changes? • What is the full range of projected impacts, including positive impacts, extreme impacts of low or unknown probability (tipping points/irreversibility) for important impacts such as sea level rise? • What are the projected developments of impacts and damages at different mitigation pathways and which of these can be avoided at different levels of costs? Are the measures that contribute to sustainable development actually taken is in response to climate change? If not, in response to which other factors are they taken?, What are the positive and negative influences of other human-induced and natural developments (such as land use change) on impacts that also result from climate change? • What are the non-market barriers for mitigation and adaptation measures? How can they be overcome? • What are the impacts of financial instruments (subsidies and levies) applied to energy production (both on fossil fuels and renewables) on the carbon market? • What are the impacts of different modalities of feedback of the auction revenues into the economy? • What feedback available do we have of CC on emissions, emission reduction potentials and costs, and on adaptation potentials and costs and unavoidable damages? • How important are the current and potential financial flows that are used for climate actions in developing countries from public and from private entities and from the carbon market? • What are the domestic and international instruments that may reduce GHG emissions from exposed sectors or sectors that to a large extend are regulated through internationally agreed standards? • What linkages are there between CC mitigation and adaptation and the realisation of the MDGs?
New Zealand	• Briefly, what are the fundamentals to understand how our climate system works? • How does climate change impact biodiversity?
Romania	• How are climate and socio-economic uncertainties linked to each other and how can knowledge be used practically in such a dynamic framework?
Slovenia	• What are the regional »costs and benefits« for different projection times? • What are the impacts of political, economic and social circumstances

	on mitigation and adaptation processes?
South Africa	• What are the non-technological and behavioural adaptation options? • What are the synergies and conflicts of a range of options for action on climate change? • What are the costs of transition in the short term and long term?
Spain	• In the first topic: how are attribution studies conducted? • What is the probability of abrupt or irreversible changes for different RCPs? What would the impact on society and ecosystems? • Given the fast-moving evidence base and given the questions that have been raised about the 4th IPCC assessment, to what extent has the state of knowledge improved since the last IPCC report and what are the implications for mitigation and adaptation policies?
United Kingdom	• What are the key impacts and risks associated with different levels of climate change across sectors and regions, and the world as a whole, and associated with different stabilization levels? • Which of these presents major risks to society and the natural world that they might be deemed to be “dangerous”? • What emission and development pathways would be appropriate to achieve specific climate stabilization levels and avoid “dangerous” impacts? • What mixes of mitigation options (societal, economic and technological) might enable achievement of such climate stabilization levels, taking account of costs and uncertainties? Related questions would include: - What are the barriers to achieving such goals and how might they be overcome? - What are the potential conflicts of such changes with other development objectives? - What adaptation strategies are needed globally to cope with different levels of climate change?
United States	• What are the effects of existing climate change policies? • Using RCPs as well as other information in the underlying report, what are the different emission trajectories at various concentration levels and associated temperature increases? • What technological, sectoral, behavioral and societal mitigation and adaptation options can be considered under various scenarios and concentration levels? • What are the costs and benefits (including co-benefits and externalities) of different mitigation options (including market- and non-market approaches, multi-gas approaches, CO_2 approaches, and R&D policies), as well as associated considerations (e.g., timelines for penetration, policy design considerations)? • What are the costs and benefits (including co-benefits and externalities) of action versus inaction? • Are there any linkages between adaptation and mitigation options with respect to broader energy and development policies, including the state of knowledge with respect to socio-economic drivers (e.g., land-use and energy scenarios)? • Which constraints and barriers can be identified with regards to adaptation options, and what are the limits of adaptation?

Section 2 Policy-relevant questions submitted in Liege by participants

These policy-relevant questions were tabled in Liege by expert and SYR scoping meeting invitee Mr. David Warrilow. They were revised in Liege after Mr. Warrilow volunteered (during the plenary) to incorporate additional policy-relevant questions from other meeting participants in Liege on the 26th of August 2010. The Chair supported this initiative.

Introduction

- What is the overall scope of this report?
- What are the underlying assumptions?
- What are the significant new elements since the AR4?
- What are the main policy issues that the report addresses?
- How is uncertainty handled?

Topic 1 Observed Changes and their Causes

- How much has climate change in recent times – globally and regionally?
- What evidence do we have for such changes?
- What impacts have such changes had?
- How significant are recent changes compared to climate change over geological timescales?
- What are the primary causes of climate change since the pre-industrial area and what is their contribution?
- What role has man had?
- What are historic emissions from human activity and how have they been distributed regionally.
- Could there be other explanations?
- Why is warming not smooth like the rise in GHGs?
- How far have recent extreme events been affected by climate change?

Topic 2 Future Changes (in the Short and Long-term)

- How do earlier climate projections (particularly GHG emissions, concentrations and temperature) compare with observed changes and explain discrepancies?
- How will climate change in the future in the absence of additional mitigation measures, taking account both human and natural factors?
- What will the impact of such changes in climate be?
- What are the large scale risks associated with climate change?

Topic 3 Responses

- How far can impacts be offset by adaptation measures?
- What are the main types of adaptation options and what are their typical costs?
- What are the likely global costs of adaptation in the next 10-20 years?
- What is the potential impact on emissions and costs of key emission reduction options?
- What are the unit costs of various emission reduction measures?
- What are the differences in mitigation potential between countries at different stages of development and in different environmental

conditions?

- What is the international distribution pattern and flow of low carbon technologies?
- What actions are needed to shift to low carbon development path?
- What are the relative influences of other human-induced and natural developments (such as land-use change) on CC Impacts?
- How will fossil fuel production likely change over the next century? What effect will that have on climate change?
- Would any of the current proposed geo-engineering strategies effectively and safely combat climate change? What potential consequences would they have?
- How much adaptation do we need between now and around 2020, 2050 and 2100 in order to cope with residual climate change?
- How can we enhance employment and sustainable consumption and production patterns as well as the sustainable development in general while reducing GHG emissions?
- What are the co-benefits of mitigation and adaptation measures?
- What are the key lessons from historic changes in society and the climate system?

Topic 4 Transformations and Changes in Systems

- How can the world achieve early peaking of emissions and then deep emission cuts?
- What mitigation options (societal, economic and technological) would need to be implemented to achieve a fundamental transformation in society to achieve deep cuts in emissions.
- What are the policy, financial and technological barriers to achieving such changes and how might they be overcome?
- What role would financial incentives have in driving transformational change?
- What are the potential benefits and conflicts of such changes with other development objectives?
- What adaptation strategies are needed globally to cope with different levels of climate change?
- What have we learned about the challenge of collective action to deal with a common problem?
- What are the relevant ethical criteria that can be used for assessing policy options?
- How can policy architectures be changed to facilitate transformation?

Topic 5 Science supporting Article 2 of the UNFCCC

- What are the key impacts and risks and costs of different levels of climate change across sectors and regions, and the world as a whole, with different stabilisation levels?
- What level of climate change may be deemed dangerous and on what grounds?
- What would different targets for climate change imply for GHG stabilisation concentrations and the emission pathways to achieve these?
- What mitigation options (societal, economic and technological) would need to be implemented to achieve stabilisation of GHGs at different concentrations/ temp levels, taking account of costs and uncertainties?
- Is achievement of a low stabilisation level feasible?

ANNEX 5

THIRTY-SECOND SESSION OF THE IPCC
Busan, 11-14 October 2010

IPCC-XXXII/Doc. 4
(3.IX.2010)
Agenda Item: 4.1
ENGLISH ONLY

THE IPCC FIFTH ASSESSMENT REPORT (AR5)

Scope, Content and Process for the Preparation of the Synthesis Report (SYR) of the IPCC Fifth Assessment Report (AR5)

(Submitted by the IPCC Secretariat)

Scope, Content and Process for the Preparation of the Synthesis Report (SYR) of the IPCC Fifth Assessment Report (AR5)

Background

At its 28th Session, Budapest, 9-11 April 2008 the Panel agreed to do a Synthesis Report and at its 30th Session, Antalya, 21-23 April 2009 agreed that the scoping of the AR5 SYR should start with the first scoping meeting. In line with that decision a broad outline for the AR5 Synthesis Report was developed at the AR5 Scoping Meeting held in Venice, 13-17 July 2009. A dedicated scoping meeting for the Synthesis Report was held in Liege, Belgium from 24-27 August 2010, from which the following scoping document was developed.

I. SCOPE

As defined in the IPCC procedures, the SYR would "synthesize and integrate material contained within IPCC Assessment Reports and Special Reports". Its scope would include material contained in the three Working Group contributions to the AR5, and it would draw on information contained in other IPCC Reports as required. It would be written in a "non-technical style suitable for policymakers and address a broad range of policy-relevant, but policy-neutral questions". The SYR should be largely self-contained, but guide readers to the underlying material if they wish to look further.

The primary audience for the SYR would be policymakers, in particular from governments, advisors to policymakers, and experts. However, it is recognized that others will also make use of the report.

The proposed SYR would consist of two parts:

1. Summary for Policymakers (SPM): up to 10 pages of text
2. Longer Report: up to 50 pages of text including maps and figures

The SYR publication would also contain annexes such as a glossary, list of authors, reviewers, Review Editors, and an index.

The AR5 SYR would be self contained and published as a stand-alone publication in the six official UN languages. It would be accompanied by a DVD, which contains the SYR (SPM and longer report), the contributions of the three IPCC Working Groups to the AR5 in English, and the summaries of these reports (SPM and Technical Summary) in all official UN languages. Automatic hyperlinks to references from the SYR (and its SPM) to the longer Working Group reports will be available on the DVD/off-line version and the web-based version of the reports. There will also be full traceability in the referencing for the AR5 in the hard copies of all the reports, including the SPM of the SYR.

II. CONTENT

The following structure for the AR5 SYR is proposed.

It contains agreed topic headings and a list of bullets that are intended as guidance to the authors. Cross Cutting Themes and Methodologies (CCT and CCM) need to be given careful attention throughout the report, and particular attention must be paid to specific issues requiring consistent treatment in the SYR.

FOREWORD

The Chairman's foreword will describe the history of the report, its structure, and the relationship to the other AR5 reports, how detailed information on topics and regions can be accessed and how it has been cross-referenced. It will describe who the intended users are. It will also state how the cross cutting themes and methodologies used in the AR5 are addressed in the SYR.

INTRODUCTION

- Rationale
- Framing the climate and human systems
- Major challenges
- Treatment of confidence, risk and uncertainty

TOPIC 1 – Observed Changes and their Causes

The emphasis in this topic is on empirical evidence, i.e., on documented events and developments that happened in the distant and, most importantly, in the recent past. In particular, the observations and inferences that help to quantify the already discernible human contribution to global warming and its impacts are summarized. Moreover, the topic integrates information and insights about how human drivers of climatic changes have developed over time, distinguishing between (i) direct interferences like greenhouse gas emissions; (ii) economic activities generating those perturbations; and (iii) society-wide developments and transformations that provided the underlying historical and systemic frameworks.

- Pre-instrumental environmental changes, their effects and their causes
- Recent observed changes in the climate system
- Observed effects and impacts
- Past and recent drivers of climate change
- Attribution of climate changes, impacts, effects and drivers
- Human activities affecting climate drivers
- Historical transformational dynamics of societies and lessons to be learned
- Observed vulnerability to shifts in extreme-events and other climatic changes

TOPIC 2 - Future Changes (in the Short and Long-term)

The purpose of this topic is to provide a "bird's eye" view of future climate change, adaptation and impacts, and mitigation, under various scenarios. The recommended approach to accomplishing this goal is to illustrate possible futures as described in the new scenarios, based on the "Representative Concentration Pathways" (RCPs) and other scenarios used in the Fifth Assessment Report (AR5). Each possible future would be characterized by climate, impacts, adaptation and mitigation, presented in physical, economic and other societally relevant terms.

Drivers of future climate change

- Description of RCPs and scenarios used in AR5 (including comparison with SRES and previous Assessment Reports)
- Anthropogenic (primarily) and physical factors that lead to a change in climate (e.g., emissions, land-use change, population, etc.)

Basis of projections

- Earth system, impacts, and economic models, and their validity
- Uncertainty and confidence
- Characterizing risk and reasons for concern

Range of future changes

- Characterizing climate futures
- Set of changes and impacts on systems, sectors, and regions
    - Mean, variability, extremes
    - Committed climate change, abrupt changes, irreversibility
    - High impact / low probability events
    - Direct and aggregate costs
    - Interaction of adaptation and mitigation measures with impacts, including avoided damages
    - Unintended and cumulative impacts of these measures

TOPIC 3 - Responses

This topic addresses adaptation and mitigation by presenting information on a wide range of specific response options, including their interactions. It addresses outcomes and consequences of these options over near-, medium-, and long-term time scales. It will also provide a discussion of approaches to evaluate and assess these different options including equity considerations.

Response options

- Observed responses
    - Drivers, outcomes and implications
- Adaptation and mitigation responses (including regional and sectoral perspectives):
    - Options, including technologies, and related policies and measures
    - Capacities and their determinants
    - Costs and benefits, including co-benefits and trade-offs
    - Obstacles, limits and limitations, including inertia
    - Cross-cutting issues and aggregate responses
- Interactions between adaptation, mitigation and development, including equity and ethics.

Enabling factors and addressing barriers, including regional considerations

- International and regional collaboration
- Governance and institutional arrangements
- Investment, finance and financial instruments
- Changes in lifestyles and behavioural patterns
- Innovation, and technology research, development, deployment, diffusion and transfer
- Information, monitoring and evaluation to support decision-making

TOPIC 4 - Transformations and Changes in Systems

This topic takes a systems perspective in addressing climate change response strategies and policies to be applied at local, national, regional, and global scales. Transformative changes are occurring in the world, but with various emphases towards sustainable development and/or climate stabilisation. Building on AR5 scenarios described in Topic 2 and mitigation and adaptation measures and options from Topic 3, the focus here is on response strategies and diverse portfolios of policies and options across different stabilisation pathways.

Overview of transformation pathways

- Interpreting scenarios and their pathways including regional and sectoral aspects across different stabilization levels (characteristics and timing)
- Mitigation and adaptation strategies - characteristics, risks and interactions
- Systems, costs, investment strategies, and trade flows
- Avoided damages under adaptation and mitigation
- Benefits and co-benefits, tradeoffs and spillovers (mitigation, adaptation and sustainable development)
- Societal changes

Strategic responses at all levels: common and specific systemic changes across the pathways

- Technology change (RD&D, technology transfer, role of private sector)
- Societal changes
- Policy, governance and institutional (including international) arrangements
- Investment and finance
- Capacity building : mechanisms and strategies
- Equity and ethical dimensions (including diversity of values and priorities)
- Co-benefits, tradeoffs, obstacles and barriers

TOPIC 5 - Science supporting Article 2 of the UNFCCC [8]

This topic deals with issues relating to Article 2 of the UNFCCC, drawing together the policy relevant science from each of the Working Group reports that support consideration of this issue. Relationships found between risks and key vulnerabilities for different levels of warming and CO_2 concentration, different levels, timing and pathways for stabilization of greenhouse gas concentrations, and different cumulative emissions and budgets will be described. Information relating to specific sectors cited in Article 2 (ecosystems, food production and sustainable economic development) and their relationship to different stabilization levels and the timing for achieving these will be outlined. Regional information relating to Article 2 will be described.

Risks and Key Vulnerabilities

- Risks and Key Vulnerabilities identified in AR5
- Relationship to levels of warming and CO2 concentration
- Relationship to level, timing and pathways for stabilization of greenhouse gas concentrations
- Relationship to cumulative emissions and budgets

Level and timing of stabilization of greenhouse gas concentrations

- Timeframes and pathways for stabilization

Ecosystems, Food Production and Sustainable Economic Development

- Allowing ecosystems to adapt naturally
- Ensuring food production is not threatened
- Enabling economic development to proceed in a sustainable manner

Regional information relating to Article 2

ANNEXES

- User guide and access to more detailed information
- Glossary
- Acronyms, chemical symbols; scientific units; country groupings
- List of Authors
- List of Reviewers and Review Editors
- Index
- List of all publications of the IPCC

[8] The 31st Session of the Panel identified issues related to Article 2 of the UNFCCC as a Cross Cutting Theme.

III. PROCESS

Writing Team

The IPCC Chair would lead the Core Writing Team (CWT). In accordance with the IPCC Procedures the members of the CWT would be nominated by the IPCC Chair in consultation with the Co-Chairs of the Working Groups. The composition of the writing team would be agreed by the Bureau. The CWT should include the Co-Chairs of the three Working Groups, and 6-8 members of the author teams from each Working Group report. The members of the CWT should be chosen to ensure that the CWT has the scientific and technical expertise needed to carry out its task, noting the need to aim for a range of views and geographical representation.

As was the case during the writing of previous Synthesis Reports it is suggested that the Core Writing Team be assisted by an extended writing team (EWT). It should include 1-2 members of the author team from each chapter of the working group contributions to the AR5. The function of the EWT would be comparable to that of contributing authors. Review Editors would assist the writing team, carrying out tasks as described in IPCC procedures.

Time schedule

In an attempt to enhance integration and synthesis without interfering with the assessment of the Working Groups an early establishment of the SYR CWT is suggested along with an increased number of meetings of the CWT.

- The members of the core writing team (CWT) would be chosen in late 2011, after the 1st Lead Authors meetings of the Working Groups have been held and after the Zero-order drafts have been prepared.
- A first CWT meeting (CWT-1) would be held in early 2012 (March, tbc, after the second Lead Authors meetings of all three Working Groups) to agree on working arrangements, assignment of tasks (stock taking, input to expert review for WG reports, etc.) and identify the extended writing team (EWT).
- At CWT-2 in mid 2012 (when all 1st-order drafts of the WG Reports are available) the writing of the Zero-order draft SYR would start. A progress report for the next Session of the Panel (scheduled Sept/Oct 2012 tbd) will be prepared.
- Between January and March 2013 the Zero-order draft of the SYR will be reviewed by the authors of the AR5 Working Group Reports.
- CWT-3 would meet in mid 2013 to consider the comments on the Zero-order draft and start writing the draft SYR based on the 2nd-order drafts of the Working Group Reports, including development of integrated graphics, figures and tables.
- CWT-4 (scheduled for January 2014 after the final drafts of all Working Group contributions are available) will finalize the draft SYR for government/expert review.
- In February/March 2014 the first order draft of the SYR (SPM and longer report) will be sent for an 8 weeks simultaneous expert/government review. Contrary to earlier practice this has to happen before approval/acceptance of the Reports of the Working Groups due to time constraints between WG III and SYR approval.
- CWT-5 (scheduled in April/May 2014) would consider the review comments and prepare the final draft SYR.
- The final draft would be submitted to governments and participating organizations at least r 8 weeks before the Session of the Panel that adopts/approves the AR5 SYR.
- Adoption and approval of the SYR and its SPM is foreseen in September 2014 to allow delivery of an unedited version of the AR5 SYR to the next UNFCCC COP which is scheduled to take place November – December 2014.
- Printing, Translation and Distribution of the AR5 by end of 2014/early 2015.

Management of the SYR

The IPCC Chair will chair the writing team and provide overall guidance to the development of the SYR. The organization of writing team meetings, the review and publication process will be managed and coordinated by the IPCC Secretariat.

The preparation of the AR5 SYR will require considerable technical support, including for management of the writing and review process, editing and layout of the report. Therefore it will be necessary to establish a TSU for the SYR. The SYR TSU would be co-located with the Office of the IPCC Chair and work in close collaboration with the IPCC Secretariat.

Working Group TSUs will however be asked to provide support to the development of the SYR in particular as far as their Working Group contributions are concerned, e.g. facilitating file and data transfer for adjusting graphics, ensuring consistency with final WG contributions and development of index, search facility and glossary.

Based on previous experience the following expertise and staff support would be required:

- 1 full-time professional staff member for four years with experience in climate change science (IPCC Trust Fund (TF))
- 1 junior professional officer for four years (in-kind contribution from the Chair's organisation)
- 1 administrative assistant with expertise in electronic publishing
- IT expertise for indexing, website and DVD development, including intelligent search facility (TF/ IPCC-Sec)
- Graphics work (TF)
- Layout, translation and printing in 6 UN languages (TF/ IPCC-Sec)

Staff of the IPCC Secretariat will arrange writing team meetings and the plenary Session for adopting/accepting the SYR and provide administrative support to the process. Hence, based on the assumption that staff support as indicated above can be mobilized from the IPCC Secretariat, TERI (Office of the IPCC Chair) or WMO/UNEP, the cost to the IPCC TF of Staff, IT inputs, graphics, layout, translation and printing of the SYR in 6 UN languages is estimated at SFR 1,4 Million.

ANNEX 6

LIST OF PARTICIPANTS
AR5 Synthesis Report Scoping Meeting - Liege, Belgium, 25-27 August 2010

Surname	FirstName	Institution	Country
PACHAURI	Rajendra K.	Chairman IPCC, TERI	India
ACOSTA MORENO	Roberto	Ministry of Science, Technology and Environment	Cuba
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