

STRUCTURE OF MEETING

The meeting is structured in 4 parts. Each part contains 3 to 5 sections. Each section in turn contains a number of topics. Part II and III will in part be worked on in parallel. In each part the sections are presented consecutively. With 60+ participants the main idea to structure the meeting is to work in small (~15 persons) groups as much as possible to allow productive discussions actively involving everyone. Throughout the three days there will be plenary and sub-plenary meetings to merge discussions' outcomes.

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|----------------------------------|--|-----------|---------------------|
| Welcome / Introduction | | 1,5 h | Tuesday Morning |
| Part I | Section 1 Section 2 Section 3 | 1,5 - 2 h | |
| Part II | Section 4 Section 5 Section 6 Section 7 | 3 h | Tuesday Afternoon |
| Part III | Section 11 Section 12 Section 10 Section 9 | 3 h | Wednesday Morning |
| Synthesis | Section 8 | 3 h | Wednesday Afternoon |
| Part IV | Section 13 Section 14 Section 15 Section 16 | 3 h | Thursday Morning |
| Synthesis [SSC and Co-Chairs] | | 3 h | Thursday Afternoon |

Coordination. Each part is coordinated by one person (part-chair), for each section two persons responsible are designated, one person coordinates the section (section-chair), the other person is the section's rapporteur (section-rapporteur). Each contributor has been asked whether (s)he has been allocated to a topic (s)he can contribute to and to describe his/her possible input in a few words. This will be reviewed by the section-chairs. They in collaboration with the TSUs coordinate before the meeting which input is given by each designated contributor. The part-chairs ensure that the sections' agendas fit to each other avoiding unnecessary overlaps and gaps. The section-rapporteurs are responsible to report the section's results to the (sub-)plenaries.

Presentations. The part-chairs are asked to give an overview presentation at the beginning the part session, covering the scope of the part, its goals, main challenges, etc. The section-chairs are asked to give an overview input for their section. The other contributors of each section are asked to give brief (5-10min) inputs complementing the initial input. This will allow for discussions.

Discussion. As in most sections the number of participants will be too great to allow discussions with active involvement of everyone (in Part I and IV with 60 participants, in Part II and III likely also with up to 40), the sections should be split. One option would be to have the introductory talk – as the introductory talk for the part – be held before everyone, then splitting the group to present

and discuss sub-topics (e.g. split by adaptation/mitigation, developing/developed country). After those discussions the groups would reconvene and discuss overarching issues.

Goals (preliminary). Each section should organize to meet the following goals:

- What are key issues to be covered in AR5?
- What are new entry points/ideas to trigger adaptation and mitigation?
- Adaptation and mitigation: Quantification of potential and its costs (if possible). Identify main drivers and barriers.
- What are research gaps to be urgently filled?
- What could be the concrete contribution to AR5 WG III Chapter 12 on Human Settlements?

INTRODUCTION

This paper outlines topics that are fundamental to understanding the intersection of human settlements and infrastructure with climate change, including the built environment, transport, energy, water, sanitation and (solid and liquid) waste management. Better understanding is required of what is needed to adapt settlements and infrastructure to climate change, their possible contributions to mitigation, as well as strategies for (sustainable) development. Equally important is an understanding of how societal and environmental factors shape – constrain and enhance – mitigation, adaptation, and development options, and how these factors' relevance could change under different emissions trajectories and development pathways. The aim of the Expert Meeting will be to narrow down this broad field of topics by highlighting key issues and hot topics taking into account the broad range of research communities and the interdisciplinary nature of the field. The meeting should identify existing literature related to human settlements and infrastructure that can be assessed in the relevant chapters of Working Groups II and III of the IPCC 5th Assessment Report (AR5)¹. Furthermore, key research gaps and opportunities for new research are to be identified that could be included in the AR5 analysis. Additionally, the possible merits of a potential IPCC Special Report on Human Settlements and Infrastructure are to be assessed. Finally, the 31st Plenary of the IPCC asked for the Expert Meeting to scope the structure of AR5 WGIII Chapter 12 on Human Settlements.

The scope of the meeting is structured in four **parts** which are subdivided into a number of **sections**. For each section, this paper outlines several **topics** that are likely to be relevant in the context of this Expert Meeting. To introduce these topics, participants may be asked to provide one-page input papers in preparation of the meeting and/or short presentations during the meeting considering the likely vulnerabilities to and impacts of climate change, the possibilities for mitigation, adaptation, and development, and the links between them (co-benefits and trade-offs). These inputs need to consider how these issues vary across low-, middle-, and high-income countries, and between and within regions. Furthermore, each input is required to point to existing case studies for the respective field or identify empirical gaps and research needs. In the process of developing the final agenda the topics will be further narrowed down.

¹ Plenary approved outlines for the AR5 are available at www.ipcc.ch.

PART I: FOUNDATIONS AND CONCEPTS

Section 1. Urban Development

In order to analyse the interactions between human settlements and climate change it is a prerequisite to understand urban development in general. What are key variables, drivers and challenges, who influences decision making and what are relevant time frames of action and reaction to changes? What could be a differentiated typology for urban areas?

Section 2. Urban Energy Systems

Mitigation of climate change with regard to human settlements and infrastructure requires the understanding of energy systems, especially urban ones. This includes not only energy infrastructure in itself but also its distribution and interconnections to surrounding areas. Energy production, transmission and distribution additionally account for large parts of cities' emissions and therefore needs to be in close focus for climate change mitigation options on an urban scale.

Section 3. Data, Methods & Comparability

In order to be able to assess this broad field of topics thoroughly methodical issues need to be agreed upon, i.e. on a global scale data provided and used needs to be complete, consistent and accessible. Methods and standards need to be developed and provided.

PROPOSED TOPICS FOR PART I

Topic 01: Introductory talk covering foundations and concepts including:

- The current contributions of cities and other human settlements to climate change, including a discussion of how this differs when considered from a production perspective (the geographic location of emissions) and a consumption perspective
- Stocks and flows of the built environment
- How to reach comparability of urban GHG emissions and energy consumption? Assessing concepts and initiatives for a systematic approach
- Methodology for differentiated typology of cities taking adaptation to and mitigation of climate change into account as well as considering development options

PART II: SPATIAL ASPECTS

Section 4. Spatial Planning & Land-Use Change

Planning of the structures for human life include a large variety of interconnected tasks, covering not only urban planning but also regional and environmental issues. All of these topics are closely interrelated with climate change adaptation and mitigation measures as well as sustainability and development aspects. There can be direct effects on human life and infrastructure or indirectly because of land-use changes due to human activities. Therefore, this section's focus should be on the interaction of different measures and their consequences on adaptation, mitigation, and development. Opportunities and barriers of climate change response strategies need to be carefully considered. The topic will have to be reviewed at both a national planning level as well as on a smaller, regional scale.

PROPOSED TOPICS

Topic 02. Land-use Change effects of spatial planning and related climate change impacts

Topic 03. The Role of Spatial Planning for Local Climate Change Mitigation, Adaptation, and Development

Section 5. Settlement Forms and Structures

One particularly pressing issue in relation to development, mitigation, and adaptation is **settlement forms and structures** that are compatible with much-reduced greenhouse gas emissions and that enhance the resilience of cities to climate change-related hazards. This also includes the topics of urban growth and urban density. Consideration should be given to the innovations in regard to ‘green-cities’, eco-cities, sustainable cities, local agenda 21, and what relevance these have for mitigation, adaptation, and development.

PROPOSED TOPICS

Topic 04. The relevance for mitigation, adaptation, and poverty alleviation, for development of urban forms at city and city regional levels. Presentations on urban regional planning and/or experiences to date with ‘green-cities’, eco-cities, sustainable cities, and local agenda 21 are welcome

Topic 05. Role of urban green and other urban forms in climate change mitigation and adaptation

Topic 06. Comparison of characteristics of a densely populated city to one with great urban sprawl

Section 6. City-Region Interface & Global Networks

Among other topics with particular relevance for human settlements, **the city-region interface is a complex and important issue highlighting** the multiple linkages cities have with their surrounds, including the resources (especially fresh water) and ecosystem services they often draw from their surrounds. In addition, there are the demands that the population and enterprises of larger and wealthier cities have on more distant eco-systems (i.e. their ecological footprint). There is the need to consider **the infrastructure that links settlements** (including transport, energy, water and sanitation). This topic should also consider **rural-urban linkages** including migration flows and how these will be affected by climate change and their role in adaptation, mitigation and development.

PROPOSED TOPICS

Topic 07. Issues of resilience and mitigation for national and regional infrastructure, urban regions and rural-urban linkages. This should consider eco-system services for cities that are productive and protective

Topic 08. The implications for rural-urban linkages and for migration patterns of climate change impacts in low and middle-income nations; this should include consideration of migration, adaptation and development

Topic 09. Cities as part of global supply and demand networks. Mapping their network to Global Hinterland. Origins of material streams

Section 7. Disaster Preparedness and Prevention

Additionally, there is a need to consider how mitigation, adaptation, and development affect or are influenced by **disaster preparedness and prevention** (and the contribution to adaptation of current and planned initiatives on disaster risk reduction). A large and growing proportion of disasters stem from extreme-weather events whose frequency or intensity is likely to increase due to climate change. Over the last 20 years, there have been many innovations in mapping and understanding

vulnerability and risk in regard to disasters within particular locations, in investing in risk reduction measures (that reduce the impact of extreme weather events), and in post-disaster responses that build resilience to future extreme weather events. Although this is an issue being given attention in another IPCC expert meeting, it would be important to include an input on this, especially making explicit how this relates to adaptation in cities in low- and middle-income countries (and co-effects with development).

PROPOSED TOPICS

Topic 10. Linkages (i.e. tradeoffs, synergies and conflicts) between disaster management and adaptation. Lessons both from adaptation for disaster management and from innovations in disaster preparedness and disaster risk reduction for climate change adaptation

Section 8. Case Studies Highlighting Cross-Cutting Issues

It is important to review practices currently in use for managing infrastructure of human settlements. Role models need to be identified as well as areas where improvement is needed concerning adaptation, mitigation, and development. Furthermore a strong emphasis should be placed on the different conditions and requirements of cities (e.g. developed vs. developing countries, densely populated cities vs. urban sprawl). However, local geographic characteristics need to be accounted for as factors that strongly limit comparability between cities. This cross-cutting section is to focus on the interplay of the different aspects related to adaptation to and mitigation of climate change as well as development. It shall point out co-benefits and conflicts related to the topic in the respective cities.

PROPOSED TOPICS

Topic 11. Case study of a particular city (e.g. London, New York) on the potentials for mitigation, adaptation, and development and possible co-benefits and conflicts (this could also include a discussion of transport, energy and water/sanitation/waste management in addition to the built environment)

Topic 12. Case study of a particular city (e.g. Durban) on adaptation, poverty alleviation and development (including potential co-benefits and conflicts) – and on where it is possible to include within this encouragement or support for mitigation

PART III: URBAN SECTORS AND INFRASTRUCTURE

Section 9. Built Environment

Attention is needed to built structures particularly at risk, such as informal settlements where around a third of the world's urban population lives. The discussion of the built environment may need two inputs – one focused on high-income countries, and one on low- and middle-income countries. Obviously, the input on high-income countries should have a strong focus on mitigation (and on achieving the scale and rate of emissions-reduction that is consistent with the IPCC suggestions) whereas the input on low- and middle-income countries should have a strong focus on adaptation-mitigation-development linkages.

PROPOSED TOPICS

Topic 13. Planning, managing, retrofitting and governing the built environment in high-income countries for mitigation, adaptation, and development including conflicts between urban compaction (mitigation) and maintaining green structure (adaptation)

Topic 14. Responses to climate change risks in cities in low- and middle-income countries with particular attention to adaptation for those most at risk (including gender considerations), especially those living in informal settlements

Section 10. Transport and Energy System

Discussions of **transport and energy infrastructure** should consider the likely impacts of climate change (including vulnerabilities and risks) with attention given to the possibilities for mitigation, adaptation, development, and the links between them (including possible co-benefits and trade-offs). Furthermore there exist recurrent effects between land-use and infrastructure which need to be accounted for. Attention should also be paid to the development implications for low- and middle-income countries. Thus, a consideration of transport and energy for high-income countries (and many middle-income countries) should have a strong focus on mitigation at a scale consistent with the needed reduction in national and global emissions. Also, effects of changes in communication technology and deployment and their implications on transport and energy needs need to be considered. For low- and most middle-income countries, there should be a strong focus on adaptation and development, at the same time ensuring commitment to keep down emissions growth. For each topic, it may be impossible to find specialists who can cover the range from high-income countries and cities to the least developed countries and cities.

PROPOSED TOPICS

Topic 15. Reducing emissions from transport in cities and urban systems (and how investments in transport can contribute to this)

Topic 16. Urban/human settlement-focused measures that reduce emissions from energy systems including buildings and land use management (and possible co-benefits and conflicts with health). Local application of small scale renewable energy sources needs to be accounted for here

Topic 17. Meeting transport and energy needs in low-income countries that are resilient to climate change impacts (and that minimize greenhouse gas emissions)

Section 11. Water, Sanitation and Waste Management

Discussions of **water, sanitation and waste management** covering the same aspects as the above sectoral section (Section 10).

PROPOSED TOPICS

Topic 18. Contributions of water, sanitation and waste management to adaptation, mitigation, and development

Topic 19. Meeting water, sanitation and waste management infrastructure needs in low-income countries that are resilient to climate change impacts (and that minimize greenhouse gas emissions); this also should give attention to achieving this within countries or regions already facing or soon to face water stress

Section 12. Health

All the above need to consider issues of **health** (particularly the potentially very large health impact of climate change in human settlements lacking the capacity to adapt) and of equity (within and between countries) with attention to groups most at risk. One issue with particular relevance is the role of health and emergency services in responding to climate change, as well as their contributions to adaptation. Although health is noted as a key outcome, health and emergency services have not been considered in previous assessments.

PROPOSED TOPICS

Topic 20. The infrastructure and service implications of reducing climate change-related health risks, especially in low- and middle-income countries, with consideration of co-benefits and trade-offs between adaptation, mitigation, poverty alleviation and development

PART IV: GOVERNANCE, GOVERNMENT & PRIVATE INVOLVEMENT

Section 13. Adaptation & Mitigation as Co-Effects

It is important to pay particular attention to the fact that climate change adaptation and mitigation are not always first priority on the agendas of local urban governments. However, many municipal activities cause co-effects on adaptation, mitigation, and development strategies. Those bear the potential to contribute significantly to climate relevant goals.

PROPOSED TOPICS

Topic 21. Municipal actions and their co-effects on adaptation, mitigation, and development

Section 14. Government and Governance Framework for Adaptation, Mitigation, and Development

One obvious cross-cutting theme is **government and governance for adaptation, mitigation, and development** that includes urban planning and management. This should focus on all levels of government, with particular attention to city and municipal government because these have primary responsibility for the policies and actions needed for adaptation, mitigation, and development. In addition, an crucial role of higher levels of government is to provide the financial and legislative framework to support local plans and actions. There are obvious links with the topics listed above in that governments should provide the policy framework and incentives for supporting needed changes in transport, the built environment, energy and water, sanitation and waste management.

PROPOSED TOPICS

Topic 22. Government and governance for mitigation, adaptation, and development in urban regions of high-income countries

Topic 23. Drivers for urban actions on adaptation, mitigation, and development

Topic 24. Single issue policies vs. interconnected strategies combining adaptation, mitigation, and development measures

Topic 25. Micro-Finance. Financing of households and small businesses especially in developing countries for adaptation, mitigation, and development

Section 15. Role of the Public & Private Sector in Mitigation-Adaptation-Development

Another obvious cross-cutting theme is **the role of the public and private sector in mitigation-adaptation-development**. This includes considering new investments, retrofitting existing production systems, and finance (including the role of insurance) as well as an interest in safeguarding the supply chains. It should be considered what shares of public and/or private-sector investments should shape human settlements – i.e. how choices made now influence emission paths into the future. The two are obviously linked with governance, as governments have to develop the policies, regulations and incentives to trigger responses from the private sector.

PROPOSED TOPICS

Topic 26. Innovative responses by private enterprises to mitigation, adaptation, and development and the government and private sector underpinnings for expanding such responses (including the role of insurance). This may need to consider what kind of national and international measures are needed to reduce the emissions implications of private sector investments in transport, the built environment, energy, etc. (including carbon pricing)

Topic 27. Innovative strategies of organizing public sectors and incentivising behaviours towards the use of adaptation, mitigation, and development mechanisms

Section 16. DCs/EITs: Limited Technical, Financial and Political Capacity of Local Governments

One particular concern in relation to governance for low-income and most middle-income countries is the **very limited technical, financial and political capacity of local governments** to address any climate change or development issues. Perhaps there is a need for an input reviewing the limitations within local governments in low- and middle-income countries for addressing adaptation, mitigation, and development (and where needed how to ensure this is within a mitigation framework).

PROPOSED TOPICS

Topic 28. Local governance for adaptation in low- and middle-income countries, including co-effects between adaptation, mitigation, poverty alleviation and development (and where relevant contributing to mitigation). It is crucial to consider the role of land-use management and of urban planning as well as the potentials of community-based adaptation and its limitations when it receives no support from local governments.