

Climate change and cities: the IPCC case for action ¹

Prof. Jean-Pascal van Ypersele²
Vice-Chair of IPCC Working Group II

Key messages :

- Climate change is happening now, mostly as a result of human activities
- Impacts will be felt everywhere, including cities, with most damages in developing countries
- Together with lifestyle and behaviour changes, known technologies and policies can reduce GHG emissions at reasonable costs, but effective policies, including an effective carbon-price signal would be required
- The IPCC has done its job, now the future is in your hands

Ladies and Gentlemen,

It is an honour for me to speak on behalf of the Intergovernmental Panel on Climate Change. Dr Pachauri, the Chair of IPCC has asked me to express his greetings and encouragements, and his apologies for not being able to be present in person, due to a meeting he has to attend with the Prime Minister of India. As a member of the IPCC Bureau, I also participated closely in the process leading to the three-volume assessment report just completed by the IPCC, and I will highlight the key points relevant to the work you will be doing here this week.

Before discussing the substance, I want to quickly remind you what the IPCC is. It is NOT the Independent Police Complaints Commission that exists in London, Mayor Livingstone, but it is the leading body for the assessment of climate change. It was established almost 20 years ago by the World Meteorological Organization and the United Nations Environment Programme to provide the world with a clear, balanced view of the present state of understanding of climate change. The IPCC doesn't do research itself: it reviews and assesses the scientific, technical and socio-economic information published in the scientific literature. It takes about 4 years to complete a new IPCC assessment report. The first was published in 1990, and the most recent one, just completed, and called AR4, is the fourth.

If the IPCC has acquired the weight it has, I believe it is essentially because of three factors: 1) a large number of the best scientists are involved in the writing of its reports, 2) three cycles of reviews take place (by experts and governments) with thousands of comments that are taken into account, and 3), the final approval Plenary for the Summary for Policy Makers involves both the main authors of the Report and official delegations of over 120 countries, which means that the consensus at the end reflects not only the scientists viewpoints, but also the policy makers'. Please note that, because of the elaborated review procedure, and because of the efforts by some delegations to dilute the SPM, the IPCC reports are certainly not exaggerating anything. They try to tell the truth, however inconvenient it might be.

The IPCC (see www.ipcc.ch) is structured in three Working Groups: the first one deals with the geophysics of the problem, the second with impacts, vulnerability and adaptation, and the third WG deals with mitigation (reduction of greenhouse gas [GHG] emissions). I will now use the same structure in my remarks.

¹ Invited keynote speech at the C40 Large Cities Climate Summit, New York, 15 May 2007 (www.nyclimatesummit.com).

² Université catholique de Louvain, Institut d'astronomie et de géophysique G. Lemaître, Chemin du Cyclotron 2, B-1348 Louvain-la-Neuve, Belgium. E-mail : vanyp@climate.be Web : www.climate.be

- **Climate change is happening now, mostly as a result of human activities**

The IPCC WGI concluded in Paris, on February 2nd this year, that “warming of the climate system is unequivocal”. Global mean surface temperature has increased by 0.74°C (1.3°F) over the last 100 years, with temperatures over land rising much quicker than over oceans. The warming is widespread, with a maximum at higher northern latitudes. Most of the observed increase in temperature since 1950 is very likely (probability of occurrence: over 90%) due to the increasing GHG concentration due to human activities, mostly the burning of fossil fuels and deforestation. It is extremely unlikely that the global temperature change of the past 50 years can be explained with natural factors only. Indeed, during this time, the sum of solar and volcanic forcings would likely have produced a cooling, not a warming. Mountain glaciers and snow cover decline, while global average sea level increased recently by about 3 cm (a little over an inch) every 10 years.

Before the end of this century, (without particular emission reduction policies) global temperature is likely to increase by 1.1 to 2.9°C (2 to 5.2°F) if we follow the emission scenario B1, or 2.4 to 6.4°C (4.3 to 11.5°F) if we follow the fossil intensive scenario A1FI. Thus, a total range of 1.1 to 6.4°C (2 to 11.5°F). The corresponding range for sea level increase is 18 to 59 cm (7 to 23 inches), but that is an underestimate because it does not take into account certain glacial processes. In the long term (centuries), the Greenland ice sheet might contribute up to 7 metres (23 feet) to sea level, and this without the contribution from Antarctica. Heavy precipitation events are likely to increase (with the accompanying risks of floods, and I would like to flag that this needs to be better taken into account in rainwater management schemes in cities). Heat waves such as the one which killed between 40 and 70 thousand persons in Europe in 2003 are very likely to become more frequent. Intense tropical cyclone activity is likely to increase.

- **Impacts will be felt everywhere, including cities, with most damages in developing countries**

I will now turn to impacts, vulnerability and adaptation, the subject of the second volume, finalized in Brussels on April 5th. I will focus on what seems most relevant for cities.

As far as observed impacts that have been attributed to climate change, the IPCC highlights the following: health impacts in Europe due to the heat wave of 2003, which was of unprecedented magnitude. Changes in snow, ice, and frozen ground have increased the number and size of glacial lakes, increased ground instability in mountain and other permafrost regions. Hydrological systems have been affected: enhanced run-off and earlier spring peak discharge in many glacier and snow-fed rivers. Warmer and drier conditions in the Sahel have led to a reduced length of growing season, with detrimental effects on crops.

Without mitigation, some of the projected impacts include:

- Increasing annual average runoff and water availability at high latitudes and in some wet tropical areas, and decrease over some dry regions at mid-latitudes and in the dry tropics. Drought affected areas will likely increase in extent. In Africa alone, by 2020, between 75 and 250 million people are projected to be exposed to an increase of water stress due to climate change. Water security problems are also projected to intensify by 2030 in southern and eastern Australia.
- In the course of the century, water supplies stored in glaciers and snow cover are projected to decline, reducing water availability in regions supplied by meltwater from major mountain ranges (such as the Himalayas in Asia or the Andes in Latin America). In North America, the decreased snowpack in western mountains is projected to cause more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources.

- Freshwater availability in Central, South, East and Southeast Asia; particularly in large river basins, is projected to decrease due to climate change, which could, in combination with other factors adversely affect more than a billion people by the 2050s.
- In Southern Europe, climate change is projected to worsen extreme heat and drought in a region already vulnerable to climate variability, reducing water supplies, hydropower potential, summer tourism, and crop productivity.
- Coasts are projected to be exposed to increasing risks, including coastal erosion, due to climate change and sea-level rise. Many million more people are projected to be flooded every year due to sea-level rise by the 2080s. The numbers affected will be largest in the mega-deltas of Asia and Africa while small islands are especially vulnerable.
- After the 21st century, very large sea-level rises (we are talking about 4-6 metres or more, that is 13 to 20 feet or more) that would result from widespread deglaciation of Greenland and West Antarctic ice sheets imply major changes in coastlines and ecosystems, and inundation of low-lying areas, with greatest effects in river deltas. Relocating populations, economic activity, and infrastructure would be costly and challenging.

In general, the net annual costs of the impacts of climate change are projected to increase over time as global temperatures increase. For example, while developing countries are expected to experience larger percentage losses, global mean losses due to climate change could be 1 to 5% GDP for 4°C (7°F) of warming.

Adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions. Adaptation is essential, particularly in addressing near-term impacts, because even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades. A wide array of adaptation options are available. One way of increasing adaptive capacity is by introducing the consideration of climate change impacts in development planning, for example, by:

- including adaptation measures in land-use planning and infrastructure design (and let me add that this kind of measures, if well designed, can also have positive effects on emission reductions);
- including measures to reduce vulnerability in existing disaster risk reduction strategies.

But adaptation alone is not expected to cope with all the projected effects of climate change, and especially not over the long run as most impacts increase in magnitude.

Ladies and gentlemen, the picture coming from the first two volumes of the IPCC AR4 is bleak, but the IPCC has hopefully a third working group, dealing with mitigation. It has completed its contribution to AR4 in Bangkok on May 4, just 10 days ago, and you may have heard that it offers some reasons for optimism.

- Together with lifestyle and behaviour changes, known technologies and policies can reduce GHG emissions at reasonable costs, but effective policies, including an effective carbon-price signal would be required

The WG3 observes first that global greenhouse gas (GHG) emissions have grown since pre-industrial times, with an increase of 70% between 1970 and 2004. Transport is a sector where emissions have grown even more: +120%. The buildings sector emissions have grown by 75% (including electricity-related emissions). And with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades. The good news is that there is substantial economic potential for the mitigation of global GHG emissions over the coming decades, that could offset the projected growth of global emissions or reduce emissions below current levels. All sectors and regions have the potential to contribute to the reductions.

The largest potential is in the buildings sector. Some of the commercially available options assessed by IPCC are: efficient lighting and daylighting; more efficient electrical appliances and heating and cooling devices; improved cook stoves, improved insulation ; passive and active solar design for heating and cooling; alternative refrigeration fluids, recovery and recycle of fluorinated gases. The IPCC estimates that by 2030, about 30% of the projected GHG emissions in the building sector can be avoided with net economic benefit. And there are also large co-benefits: e.g., improvements in indoor and outdoor air quality, improvement in social welfare. However, many barriers make it difficult to realize this potential. (That is YOUR challenge !)

Transport is important as well, with the following currently available options listed: More fuel efficient vehicles; hybrid vehicles; cleaner diesel vehicles; biofuels; modal shifts from road transport to rail and public transport systems; non-motorised transport (cycling, walking); land-use and transport planning. The effect of mitigation options may be counteracted by growth in the sector. Market forces alone, including rising fuel costs, are therefore not expected to lead to significant emission reductions.

The waste sector can also positively contribute to GHG mitigation at low cost and promote sustainable development.

In order to stabilize the concentration of GHGs in the atmosphere, emissions would need to peak and decline thereafter. The lower the stabilization level, the more quickly this peak and decline would need to occur (the peak for CO₂ emissions is before 2015 if we want to achieve the lowest stabilization range assessed). Mitigation efforts over the next two to three decades will have a large impact on opportunities to achieve lower stabilization levels

The deployment of the portfolio of technologies that could achieve stabilization of GHG concentrations in the atmosphere assumes that appropriate and effective incentives are in place.

The IPCC concludes that an effective carbon-price signal could realize significant mitigation potential in all sectors, by making many mitigation options economically attractive.

- The IPCC has done its job, now the future is in your hands

What is the bottom line?

For the lowest range in concentration stabilization levels assessed, 445 to 535 ppm of CO₂-equivalent (which leads in the long term to a temperature increase between 1.5 and 2.3°C (2.7 to 4 °F), global CO₂ emissions need to peak before 2015, and the reduction of average annual GDP growth rate is less than 0.12 percentage points in 2050.

Knowing that climate change is threatening the livelihood, the water resources, the food security of hundreds of millions of people; knowing that 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global temperature exceed 1.5 to 2.5°C above the 1990 temperature, is that price for mitigation (a reduction of average annual GDP growth rate of less than 0.12 percentage points) too expensive?

It is NOT for the IPCC to answer that question. The IPCC shows what the problems are, what caused them, and options for moving forward. But its reports are now on your table.

The French Cardinal of Richelieu is said to have defined politics as “the art of making possible what is necessary”.

Ladies and Gentlemen, Mayors, Governors, Business executives, it is your turn now.
Thank you for your attention.