

The IPCC Report & a Future International Climate Regime



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Introduction

The Intergovernmental Panel on Climate Change (IPCC), established in 1988, is an inter-governmental body for reviewing and assessing the most recent scientific, technical and socio-economic knowledge on climate change, its causes and impacts, and response strategies. The IPCC has three working groups: Working Group I addresses the physical and natural science aspects of climate change; Working Group II deals with climate change impacts, vulnerability assessment and adaptation to climate change; and Working Group III handles mitigation of climate change. Three volumes of the Fifth Assessment Report (AR5) of the three Working Groups were released between September 2013 and April 2014. The volume of the Working Group I AR5 reconfirms that it is “extremely likely” that human activity is the dominant cause of observed global warming since the mid-20th century (above 95% probability). If present emission trends are to be continued without additional countermeasures, the global average temperature would be likely to increase in 2100 from 3.7°C to 4.8°C compared to preindustrial levels (Working Group III AR5). In addition to these messages, the AR5 reports contain many other important messages with significant policy implications. This article will first introduce three key messages from the AR5 and point out the importance of managing

the total amount of cumulative greenhouse gas emissions in order to curb global warming. Second, it will review various proposals and policy practices to manage the total amount of emissions and then discuss some prospects for international climate change negotiations over a post-2020 international framework.

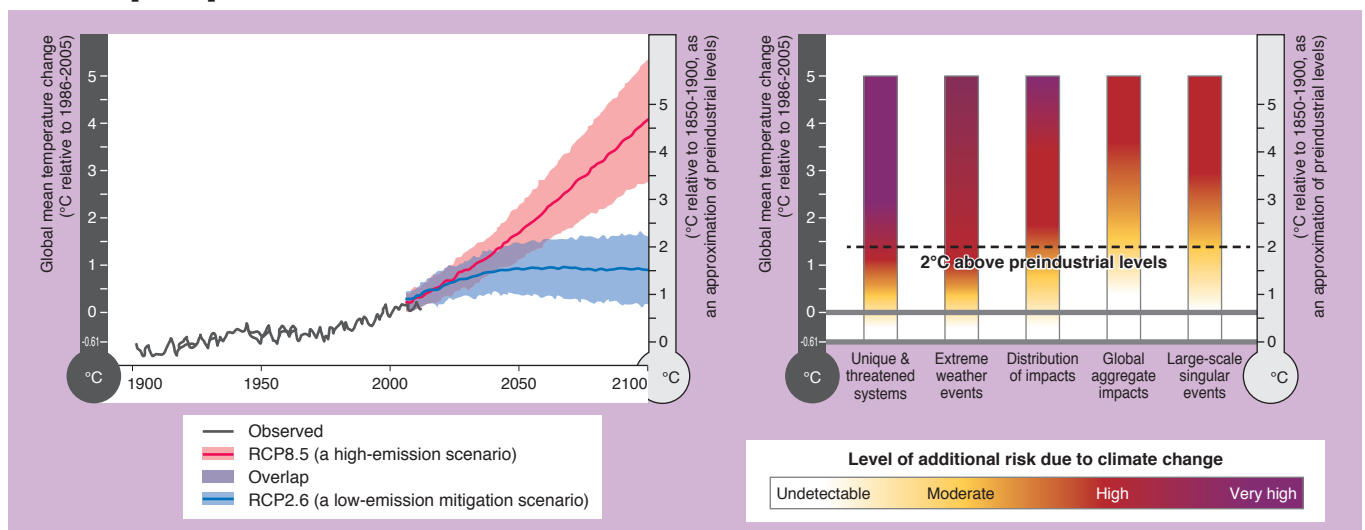
3 Key Messages from IPCC AR5

One of the highlights of the Working Group II report is that some vulnerable systems including ecosystems and cultures are already at risk of climate change and additional risks become considerable at 1°C or 2°C above preindustrial levels (Chart 1). Under the UN Framework Convention on Climate Change (UNFCCC), an umbrella legal framework for international efforts to tackle climate change, countries have agreed to keep an increase in the global mean temperature to 2°C compared to the levels before the Industrial Revolution (the so-called 2°C goal). The 2°C goal was included in the Cancun Agreements, adopted at the 16th Conference of the Parties (COP16) to the UNFCCC in 2010. Therefore, it was a result of political negotiation and is based upon a certain value judgment about what is a dangerous level of global warming. However, the AR5 also provides a scientific rationale for such a value judgment.

Another key message from the IPCC AR5 is that the world needs

CHART 1

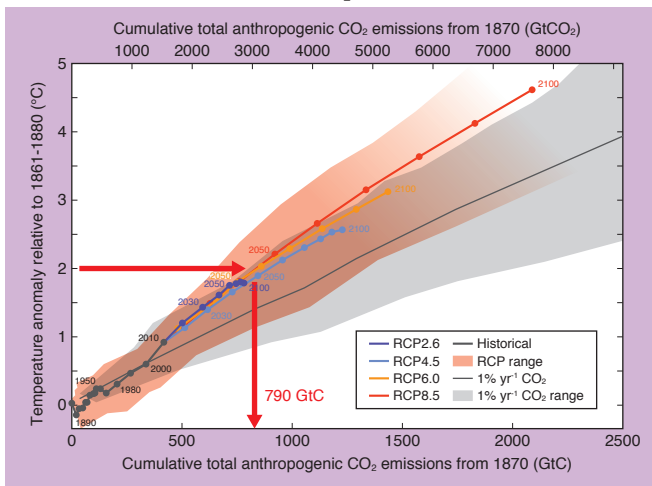
Global perspective on climate-related risks



Source: Assessment Box SPM. 1 Future 1, Working Group II contribution to the IPCC AR5. Modified by the author.

CHART 2

Linear relationship between cumulative CO₂ emissions & temperature rise



Source: Figure SMP.10, Working Group I contribution to the IPCC AR5. Modified by the author.

to move to a virtually zero-emission society to stop global warming. The scientific context for this message is the linear relationship between temperature rise and cumulative CO₂ emissions (Chart 2). This relationship implies that as long as anthropogenic CO₂ emissions continue, global warming will continue. “[C]umulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond” (IPCC Working Group I AR5, Summary for Policymakers). In addition, this linear relationship between temperature rise and cumulative CO₂ emissions also means that the total emissions of greenhouse gases permissible must be determined if the increase in global average temperature is to be curbed to a certain level. AR5 does indicate the need to limit total cumulative CO₂ emissions to 790 billion tons of carbon since the Industrial Revolution onward in order to maintain a high probability (above 66%) of attaining the 2°C goal.

The AR5 further points out that approximately 515 billion tons of carbon have already been emitted as of 2011. This means that remaining permissible total emissions are therefore 275 billion tons of carbon (Chart 2). Since current annual global CO₂ emissions are 9-10 billion tons, this remainder will be used up within less than 30 years in the highly carbon-intensive scenario of the IPCC report (where present emission trends are continued without additional countermeasures). In other words, while it took about 150 years to “consume” just over half of the total emissions allowed to achieve the 2°C goal, the remainder would be used up within the next 30 years.

The third key message from the AR5, which can be found in the Working Group III report, is that it is still technically possible to achieve the 2°C goal, but the window of opportunity is closing rapidly. Emissions pathway scenarios consistent with a likely (66%) chance to keep temperature change below 2°C relative to preindustrial levels include substantial cuts in GHG emissions by mid-century (40% to 70% lower globally than in 2010) through large-scale changes in energy systems and land use, and near zero emissions or below by the end of the century. Since the world still tends to invest in high-carbon infrastructure and facilities thereby leading to carbon lock-in, however, any delay in taking mitigation actions beyond those in place today through 2030 is expected to substantially increase the difficulty of attaining the long-term transition toward a low-carbon society and narrow the range of options consistent with the 2°C goal (IPCC Working Group III AR5, Summary for Policymakers).

These three messages suggest the importance of managing the total cumulative emissions consistent with maintaining the rise in temperature below 2°C relative to preindustrial levels (or at any level that curbs global warming). In the previous Fourth Assessment Report (AR4) released in 2007, debates on emissions pathways toward limiting the increase in the global average temperature to certain levels focused on the issue from the perspectives of when the peak in global emissions would be reached, and how large a reduction was required by 2020 and 2050 respectively. However, the AR5’s presentation of cumulative total emissions in relation to the 2°C goal (statement of permissible total emissions) is very interesting as a response from the realm of science to matters determined politically (the 2°C goal) in the sphere of international negotiations. On the other hand, the scientific findings on cumulative emissions permissible to achieve the 2°C goal raise policy issues such as how to manage total emissions and how to limit global emissions to permissible amounts.

Management of Total Cumulative Emissions

The carbon budget refers to the total emissions of greenhouse gases permissible if the increase in global average temperature is to be curbed to a certain level, or sometimes to the management of these permissible emissions. The term “carbon budget” itself is not used in the IPCC AR5, but the term is used in policy practices and research.

From the perspective of management of total cumulative emissions, the shape of the emissions trajectory that would take place to achieve reduction targets is an important point. For example, under the 2020 year targets of the Cancun Agreements, the issue in

question will be whether emissions targets have been achieved by 2020 or not. However, in relation to temperature increase, cumulative emissions up to the year 2020 are more significant. In other words, even if reduction targets are achieved, cumulative emissions will differ depending on whether reduction trends from 2013 to 2020 follow a linear pattern, or whether they temporarily increase in a parabolic pattern before falling to achieve 2020 reduction targets. Total cumulative emissions will be greater in the latter case. This point must also be taken into consideration when deliberating appropriate emissions reduction targets in a post-2020 international framework. In terms of the management of the total cumulative amount of emissions, the setting of targets based on a certain percentage reduction by a certain year is insufficient. Setting and achievement of targets accompanied by a strong awareness of the total number of tons that can be emitted by certain years is imperative.

In actuality, the idea of managing total emissions had already been proposed prior to the release of the IPCC AR5. For instance, Chinese researchers proposed an approach whereby the global carbon budget is defined as the sum of historical emissions since the Industrial Revolution and future permissible emissions. This figure is divided by the world population of the base year to calculate the per capita carbon budget, and likewise the carbon budget for each country would be allotted based on the per capita figure (“Carbon budget proposal: A framework for an equitable and sustainable international climate regime” by J. Pan and Y. Chen, *Social Sciences in China* 5-34, 2010). Based on this approach, developed countries, including the United States, have already used up their allotted carbon budgets (as well as a portion of the allotments of developing countries). Developed countries are to compensate for the amount in excess by making investments and technology transfers to developing countries. However, major issues remain regarding political receptivity to this proposal which is based on allotment of carbon budgets among nations. Furthermore, this approach also brings up the issue of whether responsibility for emissions back to the days of the Industrial Revolution, when the issue of global warming was not recognised, should be retroactive. For these reasons, whenever this approach has been mentioned by the developing country side during international negotiations, the developed country side, in particular the US, has voiced its distinct opposition.

Meanwhile, Akinobu Yasumoto and Mutsuyoshi Nishimura designate the permissible total emissions toward achievement of the 2°C goal to be the global “carbon budget” and advocate that management of emissions be relegated to the market, not to nations (“A Proposal for a Global Upstream Emission Trading System

(UGETS)”, *Policy Brief 2009*, Harvard Project on Climate Agreements, Belfer Center for Science and International Affairs, Harvard Kennedy School). Firstly, as a limited resource, the carbon budget would be made the property of an inter-governmental organization and sold off as emissions credits on the market. Meanwhile, burning of fossil fuels without emissions credits would be banned. Yasumoto and Nishimura assert that based on this method, the 2°C goal would be achieved, and meanwhile the most highly cost-effective method of achieving targets would take place based on market mechanisms. Furthermore, profit on sales of emissions credits would go to financing developing country assistance. This idea is interesting on the point of effective use via the market of the limited resources that make up the carbon budget. However, it remains uncertain as to whether the understanding of all countries, particularly of Congress in the US, could be garnered on the point of relegating ownership and sales of the large-scale carbon budget to an inter-governmental organization.

In this way, attempts to manage total emissions at a cross-national or international level are likely to be confronted with political difficulties. On the other hand, an approach whereby each nation formulates its own carbon budget is conceivable. For instance, the United Kingdom has adopted a method of management based on total emissions according to domestic laws. It has calculated its total permissible emissions to achieve its long-term target to reduce greenhouse gas emissions by at least 80% by the year 2050, compared to 1990 levels. The total amount that can be emitted every five years is called the “carbon budget” and is stipulated in the 2008 Climate Change Act. At present, the carbon budgets for four periods between 2008 and 2027 have been formulated. It is also reported that the French government is going to follow suit.

Toward a Post-2020 Framework

Recently, international climate change negotiations have intensified over a post-2020 framework, which will be applicable to all countries under the UNFCCC. Requiring each country to stipulate a carbon budget in units of several years based on long-term reduction targets that contribute to the 2°C goal is worthy of consideration in the context of the post-2020 international framework, from the perspective of planning emission reduction targets based on total amount. However, the issue remains that there is no guarantee that the aggregate carbon budgets formulated by each country will be in agreement with the global carbon budget required to achieve the 2°C goal. In addition, current climate negotiations have moved toward a “bottom-up” approach of setting emission reduction commitments. Each country is now allowed to

determine the type and the stringency of its emission reduction contribution, reflecting its own national circumstances. While this approach of nationally-determined contributions seems a realistic way to ensure universal participation of countries with diverse circumstances in the post-2020 framework, there is an increasing risk that the sum of countries' contributions may not be sufficient to achieve the 2°C goal. Finding a way of ensuring both universal participation as well as ambitious levels of mitigation contributions collectively consistent with the 2°C goal is very challenging.

The idea of linking nationally determined contributions with an international process has been drawing attention as a way to enhance the level of nationally determined contributions. This idea has a few variations. One variation emphasizes the importance of transparency, and is represented by the US proposal. The US special envoy for climate change, Todd Stern, said in a presentation at the World Future Energy Summit in Abu Dhabi on Jan. 15, 2013, "Countries will be more ambitious if they have confidence that their peers are also genuinely acting." To this end he suggested requesting countries to submit their proposed contributions, for example, six months in advance so that other countries and the broader public would have time to scrutinize the submission and offer comments. The core of this approach is the process of generating information on nationally determined contributions and ensuring their *ex-ante* clarity gives rise to social pressure to make mitigation contributions more ambitious.

Another variation emphasizes the importance of assessment and review, and is represented by the EU and some small developing countries' views. Highlighting the importance of assessment and review, some also stress the role of the research community in such assessment and review process. For example, Takeshi Kuramochi, Jusen Asuka and I have discussed the importance of emissions modelling analyses for raising the ambition levels of nationally determined contributions from two perspectives: (i) modelling analyses can provide a benchmark emissions reduction range for each country that is consistent with the 2°C goal prior to domestic discussions over nationally determined contributions; and, (ii) modelling analyses can provide insights into untapped emissions reduction opportunities ("A Process for Making Nationally-determined Mitigation Contributions More Ambitious", *Carbon and Climate Law Review*, 4/2013). In addition, it is also possible for such modelling analysis to assist policymakers to deliberate national carbon budgets while maintaining awareness of the global carbon budget.

However, some developing countries, especially those with large emissions, are in general reluctant to go through the international process proposed above. It cannot, therefore, be prejudged if and

what kind of international process for nationally determined contributions will be agreed. For a process of submitting nationally determined contributions to be effective, however, internationally agreed rules are necessary to enable *ex-ante* clarity, transparency and understanding of nationally determined contributions, as well as to ensure that countries' contributions are ambitious. From this viewpoint, whether any decision on an international process or rules for nationally determined contributions can be made or not is a touchstone of an effective post-2020 framework.

With a view to facilitating *ex-ante* clarity, transparency and understanding of the nationally determined contributions, the COP19 Decisions invited countries to communicate their nationally determined contributions well in advance to COP21 in December 2015 where a post-2020 framework will be agreed or by March 2015 by those countries ready to do so. The COP19 Decisions also invited countries to provide information when putting forward their contributions, and the content of such information will be identified at COP20 in December 2014. Since the negotiation period up to COP21 is only one and a half years, it is desirable that countries agree on international rules and process for setting and reviewing nationally determined contributions at COP20.

Conclusion

The AR5 indicates that climate change is unequivocal, its negative impacts have already been observed, warming of the climate system at 2°C above preindustrial levels would be risky, and warming at 4°C above would be dangerous. It also indicates that to keep global warming less than 2°C compared to preindustrial levels requires urgent and substantial actions to manage total cumulative emissions. However, international negotiations have not adequately responded to these scientific messages. Given the short time period leading up to COP21, it is critically important to gear up the pace of negotiations and find common ground on how to enhance the ambitious levels of nationally determined contributions. The failure of COP20 would slow political momentum over climate change issues and delay actions which are absolutely necessary for maintaining temperature change below 2°C relative to preindustrial levels. **JS**

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