Toward the Solution to the Problem of Global Warming

- Analysis of Current Findings and Measures: Alternatives for Action -

Summary

1. Background of the Report

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) released in 2007 concluded that there is an extremely high possibility that the emission of greenhouse gases (GHGs) from human activities is the cause of the phenomenon of global warming. Various phenomena presumably attributable to global warming are now emerging, causing great concern in society. Measures to combat the problem of global warming were discussed as the main themes at the G8 Hokkaido Toyako Summit (July, 2008), illustrating their status as important political measures in Japan as well as throughout the world. Under these circumstances, the Science Council of Japan (SCJ) believes that it is important to examine the available scientific findings on the problem of global warming with a view to accurately conveying the findings to society, and also to analyze possible alternatives for action to be taken based on the findings. For this purpose, the SCJ set up the Committee to Examine Global Environmental Problems Originating from Human Activities Including Global Warming in July, 2007, and this committee examined the identified problems through a series of sessions. Based on the discussion of the committee, the Committee to Analyze Findings and Measures Relating to the Problem of Global Warming (Analyzing Committee) was set up in October, 2008. This report compiles the the results of the examination of the Analyzing Committee.

2. Present Situation and Problems

Mitigation of the speed of global warming and the avoidance of and adaptation to the effects of global warming are essential to solve the problem of global warming. The formulation of suitable measures requires the prediction of future climate change as accurately as possible, followed by the evaluation of likely effects based on this prediction and the implementation of appropriate adaptation and by mitigation measures which duly take the cost aspect into consideration. Measures to combat global warming have been continually discussed as the main issues at a series of G8 summits from the Gleneagles Summit (July, 2005) to the Hokkaido Toyako Summit. As far as the present state of scientific research is concerned, although a warmer future will almost certainly occur, there are still many uncertainties regarding the details. This means that any attempt to examine or set up measures to combat global warming must take these uncertainties into consideration. Moreover, even if a global agreement is reached on the stabilization level for the future climate, there are many routes to reach this. Accordingly, the selection of a particular route to solve the problem must involve comprehensive examinations utilising all available knowledge in the natural and social science fields. Based on this understanding of the present situation, the Analyzing Committee has conducted comprehensive and cross-cutting examinations with experts on climate change, evaluation of its effects, adaptation measures, and mitigation measures. This type of effort is quite new worldwide. Given many issues to be dealt with, the examination results of the Analyzing Committee clearly indicate the difficulty of preparing a single scientific map with coherent logic throughout the predicted climate change, adaptation measures, and mitigation measures. In the current situation of diverse ideas and predictions, we believe that it is essential to properly arrange our knowledge and its limitations, to confirm common ground based on

highly probable scientific findings, and to indicate alternatives for realistic action based on this common ground.

3. Contents of the Report

The main results of the examinations are outlined below.

- Climate change caused by human activities is already taking place and it is almost certain that this change is having various effects on the world's ecosystems and human society. However, major uncertainties still exist in regard to the details of such change and its effects and the prediction of long-term climate change, all of which form the basis for policy decisions. In view of the severity of the predicted conditions likely to emerge, the formulation and implementation of damage mitigation measures, including preventive measures, is essential to prevent an increase of the damage caused by an unanticipated situation almost corresponding to the upper limit of the prediction range, while taking the balance between the economy and the environment into consideration.

- Reduction of the uncertainties will require improvement of the climate model and the development of a technological base for advanced computation. At the same time, an integrated observation system should be created to spot and monitor the ongoing warming process in a multi-faceted manner. To facilitate these activities, a comprehensive international research project should be launched with the collaboration of the governments of many countries, international organizations, and academia.

- The planning and implementation of adaptation measures are urgently required to ensure the safety of society in response to the effects of the ongoing climate change in order to create a sustainable society. For this purpose, vulnerable ecosystems, regions, and social systems must be identified. The capacity of vulnerable developing countries to deal with climate change should be enhanced through the transfer of adaptation technologies, the planning of adaptation measures, and the introduction of a program to improve the social awareness of the risks posed by climate change and of adaptation measures on the basis of assisting presumed self-help efforts. Meanwhile, Japan and other developed countries should systematically formulate adaptation measures.

- Measures to combat global warming must meet four requirements; (1) positive contribution to environmental conservation in that the global GHG emission volume will be reduced, (2) cost effectiveness in that measures can be implemented efficiently, (3) equity in sharing the implementation cost of the measure, and (4) institutional feasibility of the actual implementation of measures. Because several decades could be required before the intended effects of measures to combat global warming materialize, the distribution of the cost between generations should also be considered.

- Evaluation of the cost of damage caused by global warming and the cost of adaptation and mitigation measures should be continued in order to establish a target stabilization level for climate change. Among the various IPCC scenarios, scenarios in which the climate stabilises at a temperature rise above 4°C at best since the Industrial Revolution are considered to be inappropriate as the target level in view of the massive damage predicted and increased possibility of irreversible impacts of global warming.

- Achievement of the target of halving the global emission of GHGs which has been discussed at the G8 Summit and on other occasions will require the full-scale cooperation of the international community and successful solutions of many difficulties. Policies which aim at achieving this target are desirable from the viewpoint of reducing the environmental load and other aspects and can constitute a major driving force to create a low environmental load-type sustainable society and economic system. Full awareness of the fact that the stabilization of the climate will require the further long-term reduction of the emission of GHGs is needed.

- The early examination and sharing of a long-term target for climate stabilization with balanced costs between adaptation measures for the effects of global warming and mitigation measures to avoid adverse effects will be required along with examination of the likely dangerous level of global warming as referred to by the UN Framework Convention on Climate Change. The required actions include the establishment of an international framework in which all of the world's major GHG producing countries participate in the post-first commitment period of the Kyoto Protocol, approaches which actually function to reduce GHG while properly considering equity between various countries such as national numerical targets, sector-specific approaches, and the design of economic and other measures which produce incentives such as a carbon tax and the trading of emission rights.

- The creation of an accurate image of the low carbon society will be required to establish such a society. The development and diffusion of innovative technologies to support this society will also be necessary together with reform of the social system and lifestyle. As long-term large-scale measures to combat global warming have various impacts and knock-on effects, they must be positioned among higher world targets, such as the Millennium Development Goals, to be achieved for entire mankind. It is essential to develop a mechanism which does not demand that particular countries, regions, or generations bear an excessive burden and makes the maximum contribution to the improvement of sustainable welfare essential.

- More accurate predictions and the systematization of findings are needed to establish global policies which are designed to overcome the adverse effects of global warming and to change the behavior of people. The dissemination of accurate scientific findings must be promoted. To meet these requirements, education must be enhanced for all generations and academia must play a leadership role in the enhancement of the education.