

S-3 Low-Carbon Society Scenario toward 2050: Scenario Development and its Implication for Policy Measures

2. Multi criteria on evaluating long-term scenario and policy on climate change

Contact person Norichika KANIE, Ph.D.

Associate Professor

Department of Value and Decision Science

Graduate School of Decision Science and Technology

Tokyo Institute of Technology

2-12-1-W9-43 Ookayama, Meguro-ku, Tokyo 152-8552, Japan

Tel/Fax: +81-3-5734-2189

Email: kanie@valdes.titech.ac.jp

Key Words Long and Mid-term Objectives, Targets, Differentiation, Impact on climate change, Participatory Integrated Assessment (PIA)

Summary

This research project addresses issues on medium- to long-term objective-setting on climate change policy. It includes looking into ongoing international debate on mid- to long-term objective setting and criteria for evaluating long-term scenarios. Our research also includes various ideas for differentiation scheme, and draw implications for Japanese target. It turns out that from last year's research that, according to the existing research and by our calculations, Japan's GHG reduction in 2050 needs to be at least 70-80% from 1990 level in order not to exceed 2 °C global mean temperature increase from pre-industrial level, regarding of the international relations would be looked like. Deciding the target for climate protection is, of course, a matter of value judgment, and more comprehensive analysis on how to bring the judgment to decision-making, such as the development of Participatory Integrated Assessment (PIA) is needed. However, taking into account the recent development on the study of the impact of climate change, "2 °C" target should be a feasible point of departure on the ultimate goal of climate change debate.

1. Research Objective

The objective of the project team is to work on issues related to set the GHG stabilization level and the emissions reduction target in 2050 for Japan, as well as to identify the criteria for evaluating long-term scenarios. This includes 1) Japan's reduction targets for 2050 and their rationale (working on the global differentiation scheme), 2) target-setting process (working on ways to set socially acceptable target-setting process), and 3) Impact-Target Relations (providing robustness for the target in terms of impact of climate change, political feasibility and so on).

2. Research Outline

The research team is composed of three components. The first component is a sub-team that evaluates scientific state of the arts knowledge on the impact of climate change. The second team conducts scientific evaluation of inter-relations between the impact of climate change and atmospheric GHG concentration level. This calculation is done by a dynamic optimization model called AIM Impact [policy]. The model provides us with emission paths to reach certain stabilization level, and thus the emission for 2050 is made available. Then our third team works on global differentiation scheme that gives implications for Japan's emissions reduction target for 2050. This means that we have a sub-team that looks into long-term, as well as shorter-term, international institutional framework and politics, because GHG emissions reduction depends very much on the institutional framework to tackle with climate change.

When it comes to target setting, we have realized that this task is very much about political decisions and value judgment. That is to say, ultimately it is people's decision that decide the level at which GHGs should be stabilized. This recognition brings a research on the participatory integrated assessment (PIA). The issue here is the way in which policy-making process such as target-setting interact with science and at the same time with social stakeholders.

3. Results

Various countries and regional institution, such as the EU, UK, Germany, France and Sweden have already set up their respective long to middle term targets for climate change. Also, growing number of companies have started to set targets. On closer investigation into EU target setting process, we found out that there has been two periods of time in 1996, and 2001 and after when middle-long term target has become an issue of European political debate. At both times, the interaction between science and politics played a significant role. Equally in the current debate on the long-middle term targets after 2001, value judgment has drawn significant attention.

According to the approaches that were used for background reports of European countries' long-term target setting and other recent research results, as well as our own original research using AIM Impact [policy] and original differentiation scheme combined with scenario on international politics, a Japanese target for 2050 should be at least around 70-80% reduction of GHG from 1990 level in order not to exceed global mean temperature rise of 2 from pre-industrial level, which should be a starting point of target debate taking into account the latest scientific information on the impact of climate change. This reduction target changes, of course, depending on which stabilization level to aim at. In other words, it depends on what is considered as the dangerous level of climate change. Table 1 shows implication for Japan from the results of existing research on long-term target (Hohne et al 2004¹⁾, den Elzen and Berk 2004²⁾).

Table 1. Japanese reduction targets for 2050 as per 1990 level (CO₂ and 6GHG)

CO ₂				
Stabilization level	Multi-stage	C&C	CDC	Triptych
400	-84.05%	-77.34%	-88.31%	-84.06%
450	-81.45%	-71.67%	-77.68%	-69.10%
550	-62.65%	-45.23%	-52.16%	-46.47%

GHG				
Stabilization level	Multi-stage	C&C	Brazilian Proposal	Triptyc
550	-70.63%	-74.35%	-74.08%	-65.26%
650	-45.33%	-55.30%	-61.87%	-23.27%

Source: Hohne et al 2004, den Elzen and Berk 2004

In case of our calculation, AIM Impact [policy] has shown us that 475ppm stabilization level is required in order to reach the “2 °C” target (Figure 1). Using the Contraction and Convergence scheme in which per capita emissions converge in a certain year, Japan’s GHG reduction in 2050 should be between 68% and 85% from 1990 level should we achieve 475ppm stabilization level and its paths (Table 2-4).

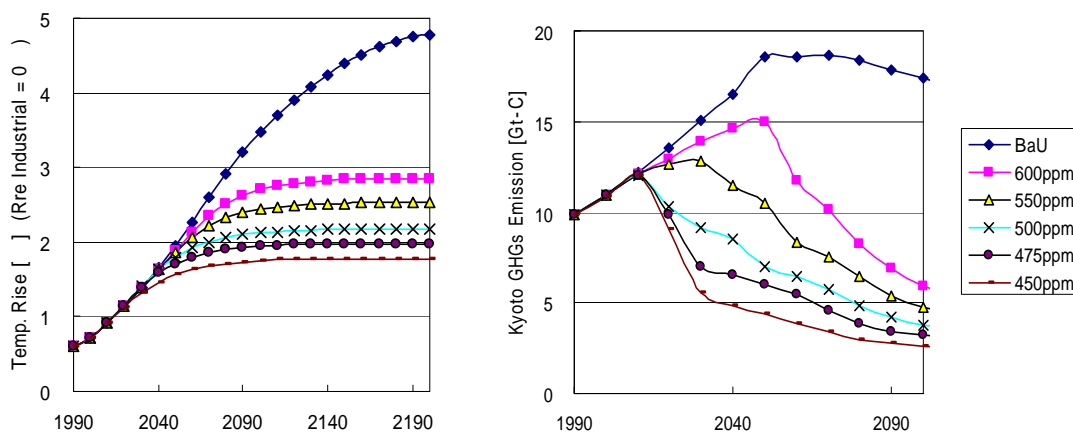


Figure 1 . Global Mean Temperature Increase by 2200, and GHG emissions and GHG concentration level by 2100

Table 2 . Japan’s 2050 target from 1990 level by C&C with Converging year 2050

400ppm	475ppm	500ppm	550ppm	600ppm
84%	79%	75%	63%	48%

Table 3 . Japan's 2050 target from 1990 level by C&C with Converging year 2070

400ppm	475ppm	500ppm	550ppm	600ppm
78%	71%	68%	54%	37%

Table 4 . Japan's 2050 target from 1990 level by C&C with Converging year 2100

400ppm	475ppm	500ppm	550ppm	600ppm
76%	67%	63%	45%	23%

Further elaboration is needed for differentiation scheme by paying more attention to international institutional framework leading to 2050, because GHG emissions reduction depends very much on the institutional framework to tackle with climate change. Combining international politics scenario with global differentiation scheme is a next step forward. Also necessary research is to look into possibilities for participatory integrated assessment (PIA). We have tentatively set a target for 2050, but it is ultimately the matter of value judgment that decide the level of stabilization. The way in which science interacts with policy-making and multi-stakeholders should also be an important part of target-setting study.

Reference

- 1) Hohne, N., Phylipsen, D., Ullrich, S., Blok, K. (2004) *Options for the second commitment period of the Kyoto Protocol*, ECOFYS.
- 2) Den Elzen, M. and Berk, M. (2004) "Bottom up approaches for defining future climate mitigation commitments" *RIVM Report 728001029/2004*.