Submission by Japan
on modalities and procedures for the inclusion of CCS in geographical formations as project activities under the CDM

Japan welcomes the decision adopted at the sixth session of the COP/MOP (decision 7/CMP.6) which has clarified that carbon dioxide capture and storage in geological formations (hereinafter referred to as 'CCS') is eligible as project activities under the CDM. Japan supports the adoption of modalities and procedures for the inclusion of CCS as project activities under the CDM (hereinafter referred to as CCS-CDM) at the seventh session of the COP/MOP, on the basis of the recommendation to be made by the SBSTA at its thirty-fifth session. Japan also welcomes the opportunity to submit its views on these modalities and procedures.

1. Importance of promoting CCS-CDM

(1) CCS technology is essential to achieving large-scale CO2 emission reductions in an effective manner, while at the same time ensuring energy security. The IPCC Special Report on Carbon Dioxide Capture and Storage reiterates that CCS has the potential to reduce overall mitigation costs and increase flexibility in achieving greenhouse gas emission reductions.

(2) The Technology Roadmap for carbon capture and storage, which was published by the International Energy Agency in 2009, highlights the need for, in addition to CCS efforts to be led by developed countries, rapid spread of CCS technology to developing countries. CCS-CDM will enable the effective transfer of technological, human, and financial resources from developed countries to developing countries, which will contribute to the safe and stable implementation of CCS projects in developing countries.

(3) A CCS project requires an enormous amount of initial investment, and it is very difficult to recover those costs without revenues from the sale of CERs. The CDM therefore provides financial incentives for the implementation of CCS projects.

(4) A CCS project will generate employment during its construction phase as well as its operation phase. Project participants for CCS-CDM may use the revenues from sales of CERs for local community development. Thus, CCS-CDM is compatible with the purpose of the CDM to assist the sustainable development of developing countries.

2. Modalities and procedures for CCS-CDM

(1) General

(a) For proper implementation of CCS-CDM, it is of paramount importance that long term site management plans and monitoring plans be

established by project participants, and that CCS-CDM be implemented in accordance with these plans. The modalities and procedures for CCS-CDM need to provide guidance to participants to help them establish such plans in a robust and timely manner.

(b) The modalities and procedures need to address issues identified in paragraph 3 of decision 7/CMP.6 in an appropriate and pragmatic manner. In this context, modalities and procedures should be flexible enough to accommodate a variety of site conditions that are necessary for the proper implementation of CCS-CDM. These conditions depend on the circumstances of each storage site and boundary.

(c) It is Japan's view that some elements need to be added to the issues identified in decision 7/CMP.6 in order to adequately address the unique characteristics of CCS-CDM in the modalities and procedures. Examples of such elements will include eligibility requirements of host countries, consideration of possible non-permanence of the CO2 storage, and requirements to be fulfilled by designated operational entities.

(d) In terms of the format of modalities and procedures, those related to afforestation and reforestation project activities under the CDM (decision 5/CMP.1) may serve as a good reference, although the method of addressing non-permanence should differ between CCS and afforestation/reforestation.

(2) Individual issues

(a) Issues identified in paragraph 3 of decision 7/CMP.6 can be classified based on their nature into the following five categories:

(i) Criteria for storage site selection;

(ii) Monitoring (including in relation to the use of models, leakage and seepage);

(iii) Boundaries;

(iv) Risk and safety assessment; and

(v) Liability.

(b) The modalities and procedures for CCS-CDM need to address the issues noted above in an appropriate and pragmatic manner, taking into account the following points:

(i) Criteria for storage site selection

A number of studies on CCS indicate that there is no doubt regarding the importance of proper site selection in connection with the stable long-term storage of CO2. In selecting storage sites, it is critical

to conduct detailed analyses, covering a wide range of aspects related to geological and hydrogeological formations and structures, using proper models, including regional (conceptual) models and detailed (numerical simulation) models.

Criteria for site selection need to be developed for elements including, but not limited to, the following:

a) Existence of sufficient reservoir volumes and cap rocks which prevent stored CO2 from being released into the atmosphere;

b) Absence of any large-scale fault in the reservoir region or its vicinity, where the stored CO2 is expected to permeate and spread or discharge subsurface fluids;

c) The possibility of injecting CO2 at a designed rate and storing the designed volume based on reservoir simulations using detailed models and analysis of relevant data;

d) The cap rock which exists over the reservoir retaining necessary sealing capability and avoiding breakdown under the planned CO2 injection pressure;

e) Seismicity in the vicinity being determined not to be high, based on results of geology and stratigraphy studies in the vicinity of the storage site, as well as the results of historical analysis of seismic activity.

(ii) Monitoring

In order to ensure the environmental integrity and safety of the storage site and its vicinity, it is necessary to conduct rigorous monitoring during the crediting periods and beyond in accordance with an adequately established monitoring plan. The monitoring plan should clearly define what items need to be monitored, as well as how and how often monitoring should be performed at the time of, and after, CO2 injection.

Items to be monitored at the time of CO2 injection include, among others, pressure and temperature at the bottom-hole of the injection well, injection rate/pressure/temperature of CO2 at the head of the injection well, concentration of CO2 and impurities, and microseismicity at the storage site and its vicinity.

There is no argument regarding the need to carefully monitor CO2 seepage from the storage site. It is generally understood that the area around the wells has the highest risk of seepage. It is therefore crucial to assess the adequacy of the injection well, exploration well(s),

other wells drilled for the project in question, and wells drilled for other projects.

In addition to the monitoring activities noted above, simulation of CO2 behavior also needs to be undertaken using numerical simulation models established based on a wide variety of data, including data on geological formations and structures, which must be acquired before CO2 is injected. Comparison between the simulation results and actual monitoring results contributes to better site selection and improvement of the monitoring plan. In this context, it is indispensable to make the best use of models and continuously improve them, taking into account the degree of uncertainty associated with the models, which is to be estimated before using them.

It is also necessary to monitor, as part of leakage emissions, CO2 emitted by each aspect of a CCS project, namely, isolation, capture, treatment, transportation, injection, and storage of CO2. This helps complete the CO2 accounting (additions and removals of CO2) associated with CCS-CDM.

(iii) Geographical boundaries

As with other types of CDM project activities, geographical boundaries of CCS-CDM need to be defined before the start of project activities. As described in decision 7/CMP.6, the boundaries need to include all above-ground and underground installations and storage sites, as well as all potential sources of CO2 that can be released into the atmosphere, involved in the capture, treatment, transportation, injection, and storage of CO2, and any potential migratory pathways of the CO2 plume, including a pathway resulting from dissolution of the CO2 in underground water.

Transboundary CCS-CDM should be accepted in a manner consistent with existing CDM rules and practices. These project activities could include those under which the capture of CO2 and its storage occur in different countries, as well as those under which the storage site spreads into multiple countries. For all these cases, liability issues among countries involved need to be addressed before project initiation, in order to avoid legal problems.

(iv) Risk and safety assessment

Results of a risk and safety assessment, including a socio-environmental impact assessment, need to be contained in a PDD for CCS-CDM. The assessment needs to be accompanied by adequate site selection, use of various techniques to prevent CO2 seepage,

vigorous monitoring, and timely action to be taken in the event of any irregularities being discovered.

According to the IPCC Special Report on Carbon Dioxide Capture and Storage, routes of CO2 seepage may be classified into (a) along the injection well or abandoned well, (b) along a fault or fracture, (c) along the storage formation stratum, and (d) through the cap rock. Actual seepage occurs via a combination of these routes. While (c) and (d) may constitute part of a long-term seepage scenario, (a) and (b) may constitute part of a short-term scenario. In undertaking the environmental impact assessment of CO2 seepage, the routes, scenarios, and seepage driving forces, such as buoyancy or pressure, corresponding to the scenario need to be considered.

Examples of items to be assessed in the environmental impact assessment could include:

a) Air quality (CO2, SOx, NOx, dust);

b) Noise;

c) Vibration;

d) Water quality (shallow groundwater) (pH, HCO3, contamination, water temperature);

e) Chemical properties of seawater (CO2 concentration index, hydrogen ion concentration, concentration of hazardous substances); and

f) Organisms and ecosystem, scenery, waste, soil contamination (to be selected as appropriate, based on the site situations).

Before undertaking CCS-CDM, it is important to confirm the natural fluctuation of assessment targets in order to more accurately assess the impact of the project activity on the environment.

The CCS risk and safety assessment needs to be carried out by independent assessors with sufficient expertise in that field. The expertise could relate to ISO standards on risk management.

Risk and safety assessment is a new challenge, for which little experience has accumulated. It also has the characteristics that (a) the existence or degree of the environmental impact of CO2 seepage is not clearly known; (b) the impact could appear after a very long time has elapsed since CO2 injection; and (c) there are no recognized international guidelines on how the assessment is to be carried out. Taking these characteristics into account, the sharing of information

and experience could be very useful. A technical workshop, which is referred to in decision 7/CMP.6, could provide a good venue for this purpose.

(v) Liability

Liability issues, including those relating to the harmful effects of CO2 seepage on the human body, the environment, and social infrastructure, should be handled in accordance with the legislation and laws of each country involved. However, the manner in which liability issues are handled needs to be defined and agreed upon in advance by all countries involved, and clearly described in a PDD.

The treatment of the issue of non-permanence of CO2 storage should be properly addressed, and needs to be discussed further, although it is not desirable to take the same approach as with afforestation and reforestation project activities under the CDM, which have introduced provisions for the expiry of CERs. Such an approach would make it difficult for project participants to manage the investment costs of CCS-CDM, and will discourage their involvement. CERs from CCS-CDM should be treated in the same way as normal CERs, and should not lose validity even after a certain period of time.