Comments on the Incorporation of
Carbon Capture and Sequestration
into the Clean Development Mechanism

February 21, 2011

Please accept this letter in accordance with the invitation to submit comments included in decision CMP.6. This decision was adopted to incorporate Carbon dioxide capture and storage in geological formations as an eligible activity under the clean development mechanism. We respectfully request consideration of the points we make herein by the Subsidiary Body for Scientific and Technological Advice (SBSTA) prior to the development of the synthesis report due in the summer of 2011.

Introduction

Carbon capture and sequestration (CCS) is one tool of many that needs to be deployed in the effort to prevent global climate change. As more nations and scientists participate to develop demonstration and commercialization projects, the cost of deploying the technology is expected to decrease, while the well established scientific wherewithal on the technology is being refined. More investment is needed in both CCS and other options to reduce emissions if the world is going to stave off the worst impacts of rising levels carbon dioxide in the atmosphere, particularly in developing countries where the growth of emissions from coal use is greatest. Investment in CCS technology and deployment of CCS projects must not occur without stringent safeguards, however. Rather, investment in CCS should aid in the preparation of an appropriate and risk-minimized infrastructure for CO_2 transport and storage in the near future.

Estimates of the potential to produce Certified Emissions Reduction (CER) credits within the CDM process vary. As further study is conducted on the available CO_2 storage capacity, the estimates of sequestration potential (and corresponding CDM credit potential) have tended to increase at the global scale while local (individual basin) estimates have tended to become more precise. The International Energy Agency reports of 2007 and 2008 state that:

- Approximately 584 Million CERs can be generated annually today in reservoirs that are currently characterized, not taking into account availability of CO_2 supply at the project sites (IEA 2007)
- Globally, there is between 8,000 and 15,000 $GTCO_2$ of potential CO_2 storage capacity worldwide. (IEA 2008)

While a prior communication to the Secretariat dated December 10, 2009, from some of the undersigned organisations stated that it would be ill-advised and potentially problematic to recognize CCS as a valid methodology in the CDM process, because of CDM related aspects, the COP has now formally accepted it as an eligible activity. We want to provide the information necessary to assist the SBSTA and parties to ensure the CCS incorporation process is achieved with maximum environmental integrity and minimal unintended consequences.
Nothing in this comment should be interpreted as a reversal of the position of those organizations that alternative, dedicated methods to finance CCS deployment in developing countries under the UNFCCC umbrella are preferable to the use of the CDM for that purpose.[1]

Credit generation capacity and impact on the CDM program as a whole:

Without advance knowledge of the fate of international climate change agreements and the resultant impact on the entire CDM program after 2012, it is impossible to know how many credits can and would be eventually credited through CCS projects. However, under nearly every scenario for CCS incorporation into the CDM, the amount of credits that can be generated under the program is large. This promising potential should be used to generate real reductions and not a zero sum game as currently structured under the CDM.

In addition, CCS projects, unlike some other projects, have the risk to release small amounts sequestered CO_2 back into the atmosphere, thereby potentially decreasing the overall emissions integrity of the program as a whole if something goes wrong. Therefore, as the SBSTA charts the path for allowing CCS into the CDM program, careful attention must be paid so only properly selected sites that are operated under a narrow range of stringent criteria can be credited. Accordingly, we respectfully request the SBSTA limit the CCS potential within the CDM program to those sites that achieve the utmost scientific certainty in every project qualification and measurement category.

Comments on how the SBSTA should, within the modalities and procedures related to CCS in the CDM and the synthesis report, address the issues identified in Paragraph 3 of Decision -/CMP 6.

Successful CCS projects have been operating for several years across the globe. While some of these are related to power generation, CCS can be applied to any emissions stream as long as suitable capture equipment and operations infrastructure is present, and a suitable geologic storage site is available.

In response to the list of issues identified in paragraph 3 of Decision -/CMP.6 for consideration by the SBSTA, we do not identify any additional, unidentified, issues that are in need of immediate attention. However, we do provide the following comments on the

[1] Clean Air Task Force and the Zero Emission Resource Organisation was not a signatory to the December 10th, 2009, communication to the Secretariat.

necessary modalities and procedures that should be used to maintain the integrity of the CDM and ensure the integrity of the CCS projects certified there under.

- **Site selection for long-term permanence**

Site selection is perhaps the most important aspect of CCS sequestration projects, ahead of efforts to measure, monitor and verify sequestration. The Intergovernmental Panel on Climate Change highlighted this in its Special Report on Carbon Dioxide Capture & Storage in 2005 by stating that "Observations from engineered and natural analogues as well as models suggest that the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1,000 years". Operational requirements reinforce and maximize the ability of an otherwise suitable geologic sequestration site to contain injected CO_2 without leakage, but cannot replace a proper initial site selection.

In accordance with the need for proper site selection, SBSTA should adopt modalities and procedures to ensure proper site selection and long term permanence. These should require that all project applicants submit a site selection plan which includes:

- A detailed risk assessment which studies and reports the potential for leakage from the proposed containment zone to the surrounding geologic features and to the surface. Such an assessment must include an identification of known and potential leakage pathways throughout the spatial and temporal extent of the expected plume.

- A detailed discussion of the criteria used for site selection and the relevant characteristics of the proposed geologic storage site.

- Geochemical, geomechanical and geophysical analyses, with relevant information on possible seismic activity, performed at the site within five years before the application date to support the findings and conclusions asserted in the site selection plan.

- A geopolitical analysis that discusses the potential for civic or political unrest to disrupt the project activities to the point of resulting in reversal of sequestered emissions.

- A long-term site stewardship plan that ensures the availability of resources to the project site for long-term monitoring and maintaining storage integrity.

- **Stringent monitoring and verification is necessary**

As commonly noted, every CCS project must include stringent monitoring and verification (MV) to ensure that project operators and regulatory bodies understand how the injected CO_2 is behaving in the subsurface, how much CO_2 has been sequestered, and help assess the potential for leakage with prompt intervention if needed. Generally, MV plans are not generic documents that are applicable across a wide range of project types and locations. Rather, they need to be site specific and take into account the unique characteristics of the injection site and identify the necessary tools to track and detect CO_2 in a systematic way.

In accordance with the need to ensure that CCS projects permitted under the CDM represent real emissions reductions with utmost integrity, the SBSTA must require that all project applicants be required to submit a site specific MV plan prior to project initiation. Essential elements of the MV plan must include:

- A determination of baseline conditions both at the injection site and past the lateral and vertical boundaries of the expected plume migration.

- A spatial and temporal computational assessment of the plume boundary based on the use of accepted reservoir simulation models.

- Requirements that the project applicant measure, or conduct, at a minimum,:
  - Injected volume of CO_2, injection rate and injection pressure
  - Composition of injected CO_2 and constituent gases
  - Reservoir pressure and temperature
  - Well integrity tests and recordings for all injection wells, producing wells, abandoned wells that could act as a leakage pathway and observation wells within the injection area
  - Injection plume migration and spatial analysis
  - Other subsurface and surface readings as necessary to determine whether and to what extent CO_2 is leaking from the targeted containment zone.

- Identification of a set of factors or parameters that if observed would indicate the presence of a leak or anomaly warranting further attention and action.

- A reporting and response plan that lays out steps a project operator must take in the event that a leak is detected, including additional monitoring steps and adaptive management strategies.

- Procedures for data retention, lost or missing data, and monitoring system maintenance and calibration

In addition to requiring the CCS project applicant prepare and submit the MV plan prior to project startup, the project must also be required to be operated, though its entire lifetime, in accordance with the MV plan to ensure any and all leakage of CO_2 is identified. Accordingly, the MV plan must identify a set of operational parameters (similar to a checklist) that projects can be judged against by project verifiers. Project verifiers must be able to access the site specific MV plans for each CCS project and be able to understand them with sufficient clarity so as to identify whether all aspects of the MV plan are met.

- **Suitability of the use of modeling in MV plans**

As identified above, MV plans must include a determination of the spatial and temporal boundaries of the injected CO_2 for the purpose of understanding whether and to what extent any CO_2 is leaking to the subsurface. Such models must be validated by site specific data and updated as relevant data is acquired, or yearly, but not less frequency than every 10 years.

It is industry best practice to utilize reservoir modeling in order to track and verify plume migration and other reservoir parameters. However, since such modeling is informed by actual data obtained at the site, and is subject to potential inaccuracies associated with modeling error, use of modeling in MVR plans must not be seen, at this point, as a replacement to traditional monitoring procedures. Instead, modeling and monitoring efforst should be used to inform and continually update each other in a feedback loop.

- **Measuring and accounting for release of carbon dioxide from the boundaries and / or surface**

Accounting for leakage, if it should occur, is a necessary aspect of any CCS project. Such measurements are important not only for accurate carbon accounting to make the atmosphere whole, but also because it gives project developers and operators critical information necessary to manage the project in a way that minimizes, if not stops, additional losses of injected CO_2 to the atmosphere. Simply because a project leaks after initiation of injection however should not serve as the basis for preventing it from accruing credits within the CDM program. If all other elements are satisfied, (i.e. proper site selection, MVR, adaptive management, etc) the project should utilize a suitable monitoring program to assess the amount leaked and deduct it, in an ex ante basis, from the amount that was injected at the project site and credited to the project owner. Injected CO_2 that is not leaked should still be available for crediting as a CER within the CDM program.

Since leakage of injected CO_2 may occur years after the injection occurred, the Secretariat and SBSTA should consider mechanisms for recapturing any credits from any CO_2 that has been emitted to the atmosphere. One such mechanism could involve creating a reserve of credits for each project equal to some % of the CO_2 injected into the subsurface at the project site. The reserve credits should not be suitable for sale by the project developer but rather, shall act as an insurance account against which the project developer could use to satisfy requirements to surrender credits in the event of a leakage occurring at a later date. Another option could include placing an obligation on project developers to buy back and retire credits in the amount of any leakage, should such leakage occur.

- **Post-closure stewardship for project operations and potential impacts arising from the project**

Another important issue to take note of in the context of CCS projects is post-closure stewardship. Typically, closure is assumed to have taken place after injection has stopped and after monitoring and modeling results have indicated that the CO_2 will continue to remain stored. However, this does not mean that monitoring should stop after closure, or that there are no further duties for operators or other entities. For a project to be considered sound, sufficient funds must be available to a designated entity to conduct monitoring, maintain well and site integrity, and to take mitigation or remediation action if needed. In the context of the CDM, both funds and a designated entity must be established before credits are realized.

Respectfully submitted,

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