



Carbon Dioxide Capture and Storage in Geological Formations as Clean Development Mechanism Project Activities

**Submission from Greenpeace International
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At CMP 6 in Cancun in December 2010, draft Decision -/CMP.6 gave carbon dioxide capture and storage in geological formations (CCS) provisional eligibility as a project activity under the clean development mechanism (CDM), with the condition that the issues identified in decision 2/CMP.5, paragraph 29, are addressed and resolved in a satisfactory manner. It further requests the Subsidiary Body for Scientific and Technological Advice (SBSTA) to elaborate modalities and procedures in order to enable the inclusion of CCS as a project activity under CDM by its 35th session (December 2011).

This submission outlines why Greenpeace strongly believes that the issues identified in decision 2/CMP.5, paragraph 29 cannot be addressed and resolved in a satisfactory manner before SBSTA's 35th session (i.e. December 2011), and why CCS is intrinsically incompatible with the stated objectives of the CDM, that even with strong and stringent modalities and procedures, would not make it eligible for inclusion under CDM.

In every aspect (technical, economic, safety, liability) CCS fails to reach a maturity level that could make deployment practically or economically feasible in the next decade:

CCS is not proven to be a safe and sound technology yet

So far CCS projects (here meant as a coal fired power plants equipped with CO₂ capture technology, transport system and storage site) have not been tested on demonstration scale and thus proven to be environmentally "safe and sound", a requirement for inclusion in the CDM. Issues of site selection criteria, seepage/leakage, liability, monitoring and others are difficult to address and have still not been properly addressed in developed countries to date. Transferring projects at this stage into developing countries would mean using developing countries as a testing ground for this technology.

CCS is prohibitively expensive and uneconomic

No coal-fired power plant CCS demonstration project has started so far. One of the reasons is the high cost of such projects. A number of projects in developed countries have already been cancelled¹ because of that.

¹ <http://www.businessweek.com/news/2010-11-04/shell-s-barendrecht-carbon-capture-project-canceled.html>
<http://www.theaustralian.com.au/national-affairs/cost-blowout-hits-clean-coal-vision/story-fn59niix-1225973604223>

Cost estimates for CCS vary considerably depending on factors such as power station configuration, CCS technology, fuel costs, size of project and location. Moreover, monitoring is not a cheap exercise. Remediation will cost even more and may happen long after operation has ended. Estimated costs for monitoring geologic storage over the full life-cycle of a project (assumed to be 30 years operation and 50 years post-operation) can range from \$0.05 to \$0.10 per tonne of stored CO₂. This is small in comparison to the cost of capture, it nevertheless may represent up to \$50 to \$80 per tonne CO₂ over the life cycle of a typical project. However, these costs increase if a longer post-closure timeframe is taken into account.

One thing is certain, CCS is expensive.

CCS is intrinsically incompatible with the stated objectives of the CDM

For any projects to be eligible under the Clean Development Mechanism, it needs to meet both of its stated objectives: to reduce greenhouse gas (GHG) emissions and to contribute to the sustainable development of the host country. CCS is intrinsically incompatible with these objectives:

CCS will not deliver real GHG emissions reduction

Currently all existing CCS demonstration projects are attached to EOR (extended oil recovery) projects. The process involves injecting large quantities of CO₂ into old depleting oil fields to boost oil production. **Thus CCS projects directly leads to additional carbon emissions.** Putting public money in CCS projects at this stage can only be seen as direct subsidy to oil industry, making previously unprofitable oil extraction profitable and lead to the burning of large quantities of additional, previously inaccessible oil.

CCS creates long-term issues for the host country post CDM crediting period

The end of a CO₂ injection phase or the end of a project is not the end of costs, or responsibility. In contrast to time-limited CDM projects, CCS projects are long-term projects where the end-date can not be predicted ahead of the project. Although the CO₂ injection stage is easy to define, the duration of the post-injection, post-closure stage can not be given precisely. The time frame can range from a many decades to hundreds of years depending on the storage site parameters (geological formation, amount of CO₂ stored, CO₂ behaviour underground etc). The host country will most likely become in charge, responsible and liable for the storage sites in the long-term.

However, no guidelines exist so far on this issue. Monitoring areas could be large. A scenario example is given for a single 1000MW coal-fired power plant, producing 8.6 million tons of CO₂ per year that could generate an underground CO₂ plume of 18 km² in the first year of injection alone. Furthermore, the plume would be expected to grow further still after closure of injection ended, extending to 200 to 360 km², depending on the lifetime of the storage project, the amount of CO₂ stored, and the thickness of the storage formation.

Monitoring needs to start from the very beginning of injection. Subsequent monitoring continues over the project lifetime, and the stored mass of CO₂ will need to be verified at regular intervals during injection. On completion of injection, monitoring must continue for a period of time. The frequency of monitoring activity is likely to decrease as confidence increases that the CO₂ plume is behaving as predicted. The timeframe of post-closure monitoring is case-by-case dependent and can not be defined ahead of the project.

CCS will not contribute to the sustainable development of the host country

In order to stay as far below 2C as possible and avoid dangerous consequence of runaway climate change, all countries need to begin de-carbonising their economies. Large, rapidly industrialising developing countries have a choice today – invest in clean low-carbon economies using renewable energies and energy efficiency, or go down the unsustainable development pathway using dirty and polluting energy sources such as fossil fuel and nuclear. China has already taken ambitious measures to begin this transition, by shutting down dirtiest coal plants, setting ambitious domestic energy efficiency targets and deploying thoughtful policy measures that encourage the development and deployment of renewable energies.

This challenging transition requires large-scale deployment of renewable energies, phasing out of old fossil fuel facilities and upgrading the energy infrastructure to enable renewable sources to connect to the grid. It will take time and substantial investment. The Clean Development Mechanism can and should be a catalyst to aid this transition in developing countries. At this critical moment, transferring immature, unproven CCS technologies will only slow down this much needed transition, and incentivise the construction of new coal power plants that will further lock developing countries in unsustainable, fossil fuel dependent development pathway, in complete contradiction to the objectives of the Clean Development Mechanism.

Every dollar invested in fossil fuel technologies such as CCS means a dollar less invested in energy efficiency and renewable energy sources that can replace several times more carbon for the same costs, and can deliver much faster than CCS technologies which is still a long way from being ready for deployment.

CCS will prevent an equitable distribution of CDM projects

According to the Marrakesh Accords, CDM shall promote equitable geographic distribution of clean development mechanism project activities at regional and sub-regional levels, and activities should lead to the transfer of environmentally safe and sound technology. The CDM shall also provide cost-effective emission reductions and contribute to sustainable development.

Because of the high costs, CCS will probably not be used in small scale projects. Moreover, capture technology is energy-intensive and increases the energy demand of a coal-fired power plant by up 30%. Coal prices are likely to increase further because of increasing demand as do the

environmental impacts related to coal mining activities. The costs of electricity will almost double, depending on the plant and capture type.

CCS projects will not be distributed equally. Only a limited number of developing countries and countries in transition will benefit from such projects, these are countries with a share of coal-fired power plants and oil and gas exporting countries. The already uneven distribution of projects will increase further.

Projects under the CDM should focus on renewable energy and energy efficiency. This would help increase access to clean, reliable and affordable energy in developing countries on a regional as well as local scale. A CDM project should improve social, economic, and environmental well being. CCS projects do not deliver this.

CDM is the worst possible mechanism for CCS policy development

CDM crediting periods are much shorter than the lifetime of a storage project, which can be well over 50 years, depending on the proposed storage location. What will happen at the end of the crediting period with e.g. a coal power plant that had been equipped with a capture facility, a pipeline system and a storage site, i.e. a CCS project? The high running costs and additional fuel consumption means that there is a real risk that the CCS project will stop, once the CDM funding that is propping up the operation is gone. It could be that the storage site would be closed, and the power plant will again emit CO₂ for decades; it could also be that the storage site will be used for a new CDM project in which CO₂ from another power plant will be captured and stored. Such constellations make decisions on long-term responsibilities for monitoring and remediation measures more difficult. These long-term issues run well beyond the scope and remit of a CDM project, thus it is not an appropriate platform for developing modalities or procedures to address safety and liability concerns.

In fact, using CDM as a catalyst to shape the process of managing, monitoring, evaluating and verifying CCS projects may be the worst possible way to develop the sustainable business practice, good policies and procedures that are required for CCS deployment.

To conclude, CCS technology is unproven, uneconomic and unhelpful to real de-carbonisation of rapidly developing economies. There are too many uncertainties and issues to make deployment feasible in developed or developing countries in years to come. CCS increases carbon dioxide emissions, its time-frame makes it incompatible with CDM. Because of its shorter timeframe, CDM is not a suitable platform to develop sustainable business practice, good policies and procedure for CCS.

It is not possible for these issues and uncertainties to be addressed or resolved in a satisfactory manner before SBSTA 35th session (i.e., Dec 2011), and thus Greenpeace does not believe CCS is eligible for the CDM, and strongly opposes the inclusion of CCS in the CDM.