Making the case for CCS in the CDM

The developing world needs a support mechanism to also benefit from CCS's Climate Change mitigation potential. Why can this not be the CDM?

By Henk Sa and Lodewijk Nell, EcoMetrix Africa

Although CCS in geological formations is a well-established mechanism predominately used in the Oil and Gas industry for Enhanced Oil and Gas Recovery (EOGR) its applications as a method for reducing the global output of anthropogenic Green House Gasses (GHG's) which are the main cause of climate change. CCS has not taken of in line with its expected potential as a climate change mitigation technology in the developing world.

Developing countries such as China, India and South Africa will be dependent on fossil fuel based economic growth for the foreseeable future and therefore the application off CCS to grow their industry and thereby their economies along a greener trajectory should be encouraged.

The primary issue with the development of CCS facilities in developing countries (as is the case in the industrialised world) are the cost related to the investment and operation of these installations.

Although there are several subsidy systems under development to address these costs, they are not substantial and uniform enough the elevate CCS to a real emission reduction mechanism. A well established and operational system to financially support GHG emission reduction activities in development countries is the Clean Development Mechanism. In this article a closer look is taken on the possibility of including the CCS into the CDM.

In 1997, the Kyoto Protocol, which was adopted by industrialized and developing countries (Annex I and non-Annex I countries according to the Protocol), set binding GHG emission limits for Annex I countries for the period 2008 - 2012. The Protocol established "Flexibility Mechanisms" to allow industries (and countries) to have more and lower-cost options for reducing emissions. The Clean Development Mechanism (CDM) and Joint Implementation (JI) are two of those mechanisms and they allow for the purchase of Certified Emission Reductions (CERs, under the CDM) and Emission Reduction Units (ERUs, under JI) by affected parties from sustainable development projects (e.g., renewable energy, energy efficiency) in non-Annex I countries as a means of complying with domestic emission limits.

CCS cost and CDM revenue

If CCS would be accepted as a method for reducing the emission of GHG's into the atmosphere a CCS project could generate an additional income stream to cover its investment and operating cost from the sale of Certified Emission Reductions (CERs) used within the CDM system as the unit of measure for one ton of CO2e that did not go into the atmosphere.

Historically the price of a CER has been around 19.43 Euro/CER. With a market high of 33.35 Euro/CER and a market low of 7.93 Euro/CER. For a global GHG agreement replacing the Kyoto after 2012 to effectively realise the overall objective or reducing the global output of anthropogenic GHG's that caps put on industrialised countries will need to be severely tightened which will have an upward effect on the CER price which is estimated to go up to between 30 and 60 Euro/tCO2e

New energy technologies do not come cheap. If no combination is made with EOGR, current CCS cost are estimated at around 60-90 Euro/ton CO2 depending on the circumstances. Nevertheless, it is expected that these cost will come down to 35-50 Euro/ton CO2 in the early commercial phase (2020+).

From the latter can be deducted that the cost of CCS could be covered by the revenue for CDM in the longer term (2020+) and on the short term in combination with EOGR or with subsidies as is currently been done in de developing world. Therefore, at least from an economic perspective, the CDM could be considered a very suitable mechanism to deploy CCS in developing countries. So why is this not the case?

Barriers

Many of the industrialised parties have pushed for the technology to be included within the Clean Development Mechanism (CDM) established by Kyoto, in theory allowing CCS projects to generate project credits. Some parties, however, have voiced strong concerns as to the technology's inclusion, citing the putative risks associated with storage, the high costs of implementation and its unassailable link to fossil fuel consumption.

In recent years discussions appeared to reach an impasse, with the CDM Executive Board, SBSTA and the Conference and Meeting of the Parties (COP/MOP) unable to agree as to the technology's inclusion. At the most recent COP in Copenhagen 2009 the mitigatory role of CCS was recognised, however some issues were deemed unresolved by the COP and further clarification of the many issues raised by the parties was sought.

The table provides an overview of the outstanding issues that need to be addressed before including CCS into the CDM.

When looking at the issues it becomes apparent that none of them express fundamental issues with CCS as a climate change mitigation technology like is the case with for example nuclear energy and large scale hydro. All of the issues relate to either technical or CDM systematic concerns. The technical concerns mostly revolve around the limited experience with the technology and the long timelines involved in applying it. CCS has been widely used in the developed world as a method for EOGR and even though this does not provide experience on the impacts of the technology in 200 to 500 years' time this is the case with most if not all of the technologies applied around the world including those under the CDM.

The CDM issues are either related to the rules of the CDM when it comes to monitoring or project boundaries for example which can be addressed rather straight forward within the existing CDM framework or to the fundamental issue of storing GHG as a climate change measure. Although this is an excepted concept within the current CDM framework it would be useful to included CCS in the CDM by adopting for example a CER buffering mechanism such as applied within the REDD system. In such a system a percentage of the CERs generated by the project could be held by the UNFCCC as a buffer to offset potential leakage from a CCS project in the future.

Issue category	Understanding of issue	Comment on the issue
Non-permanence, including long-term permanence	The technology does not avoid emissions but rather stores them hence there is a risk that the stored GHG goes back into the atmosphere	The concept a a carbon sink is accepted under the CDM via, for example, forestry type projects
Measuring, reporting and verification	The CO2 stored via CCS is modelled not measured. This is especially a concern when it comes to leakage over long periods of time	Most CDM projects depend on modelling to determine the volume of CERs generated
Environmental impacts	The lack of experience with CCS would pose challenges for conducting a CCS Environment Impact Assessment (EIA) especially relating to the risk of seepage	Most CDM projects depend on a host nation's assessment of the environmental impact of the project via a EIA process. As CDM projects are by definition not common practice in the host country the risk of a poor EIA is not very different for a CCS project then for any other CDM project
Project activity boundaries	The CCS reservoir could be cross boundary and migrate over time making it difficult to set the project boundary for a CCS project	There are several CDM methodologies in use today that apply cross boundary consideration when defining the project boundary (e.g. ACM0002 for renewable energy to the grid) so this would be nothing new. The migration of GHG beyond the project boundary is also possible in the case of the widely used CDM project type, Landfill gas to Energy and is not considered as a problem in these projects even though the GHG is stored mush closer to the service than would be that case with CCS
International law	International Maritime treaties were drafted without having CCS activities in mind	Many CDM projects that are currently in place operate under legislation that was not designed with CDM or the underlying project in mind. In most cases project specific solutions where designed and in some cases the regulations where adapted
Liability	Who will be liable for leakage and migration of CO2 from a geological formations taking into account the long timeframe of the storage	This concern exists for all projects that apply the principle of a carbon sink (e.g. forestry projects that are hit by a forest fire). It is reasonable to assume that CO2 storage in a empty gas field that held LNG for 2 million year carries a lower risk of leakage than a forest. Hence the question of liabilities is less of an issue for CCS projects than existing CDM projects
The potential for perverse outcomes	The carbon market could be flooded by CCS CERs making the CER price drop and thereby excluding some important CDM project types such as renewable energy	As indicated earlier the cost per tCO2 stored via CCS are not substantially lower so the effect of flooding the market and dropping the price does not exists as CCS won't be feasible under the CDM at a low CER price. An increase in the volume of CERs generated should be addressed by tightening caps not defining a technology an issues because it contributes to mush to mitigating climate change.
Safety	Idem as issue 1. The technology does not avoid emissions but rather stores them hence there is a risk that the stored GHG goes back into the atmosphere so it could be risky and unsafe	The concept a a carbon sink is accepted under the CDM via, for example, forestry type projects
Insurance coverage and compensation for damages caused due to seepage or leakage	Idem as issue 1. The technology does not avoid emissions but rather stores them hence there is a risk that the stored GHG goes back into the atmosphere and who will be picking up the tab when there is leakage	The concept a a carbon sink is accepted under the CDM via, for example, forestry type projects

Table 1 - an overview of the outstanding issues that need to be addressed before including CCS into the CDM

So what's needed in Cancun?

When investigating the topic it becomes apparent that there are no real barriers for including CCS into the CDM and as is so often the case with large topics like Climate Change, CCS and CDM what is required to realise this is leadership by people that do not confuse the objective (the mitigation of climate change) with the method (CCS). In addition to that a watchful eye should be held on those that raise concerns about the method to push their own alternative agenda even though that agenda does not strive towards the same objective.

Henk Sa

As the Managing Director of EcoMetrix Africa (South Africa's most successful CDM company), Henk is responsible for the corporate strategy and daily operation of the company. After working as a strategy consultant in the energy field at PwC, Henk joined EcoSecurities and worked in the field of Climate Change in both Europe and Africa.

Lodewijk Nell is Director Consultancy at EcoMetrix Africa and has more than ten years consulting experience in the energy sector at PwC and TNO. In 2007 he became involved in building CCS partnerships and commercialising CCS technologies in Europe. He continues to do so in South Africa from a techno-economic perspective.

lodewijk.nell@ecometrix.co.za