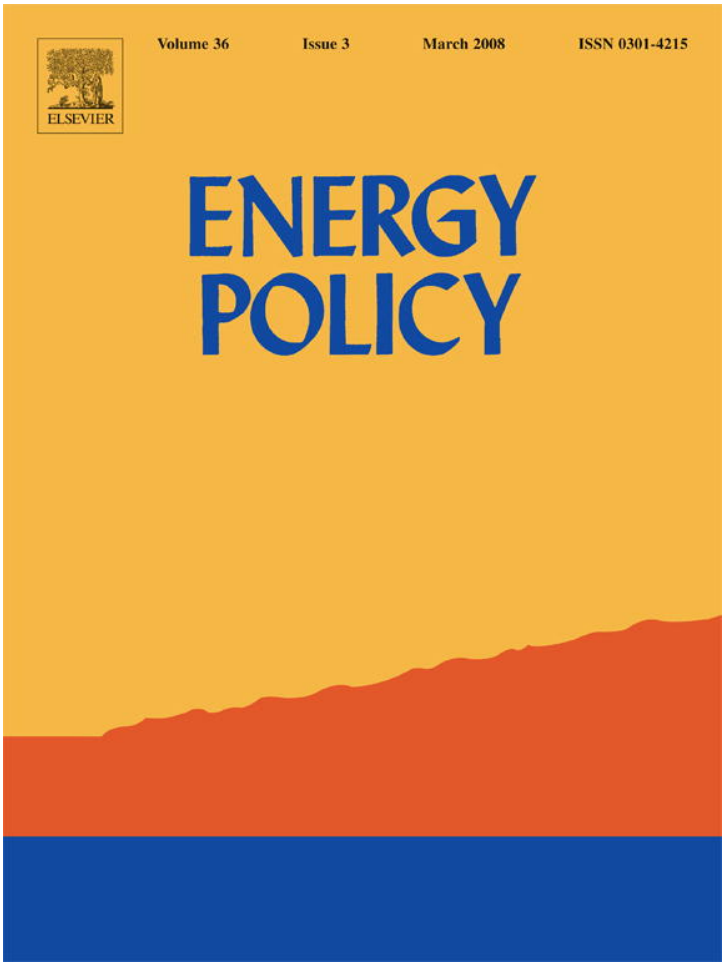

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Viewpoint

Trojan horse or horn of plenty? Reflections on allowing CCS in the CDM

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Abstract

The discussion around allowing CO_2 capture and geological storage (CCS) into the Kyoto Protocol's Clean Development Mechanism (CDM) is important, as the CDM is currently the only structural incentive for reducing greenhouse gas emissions in the developing world. Without the potential incentives given by the CDM, CCS in developing countries will only take place sporadically in niche sectors. The debate around CCS in the CDM has developed into a highly polarised discussion, with a deep divide between proponents and opponents and no view on reconciliation between the various perspectives. Environmental organisations and several developing-country parties in the climate negotiations are increasingly vehemently opposed against CCS in the CDM, and industrialised countries, several large fossil-fuel-dependent developing countries and industry view CCS as a natural option under the CDM, provided some surmountable technical and procedural barriers are taken care of.

This paper argues that the efforts of those trying to bring the discussion to a close by solving technical and procedural issues around CCS in the CDM will not lead to agreement because of underlying convictions of all stakeholders. Six convictions are identified and discussed. Based on the discussion of the convictions of both opponents and proponents, research needs and a potential negotiation package are suggested. The research needs are primarily in the field of the CDM market impacts of CCS, the issue of enhanced oil emission accounting, and sustainable development aspects, and particularly whether developing countries could actually benefit from technological leadership in the field of CCS, or whether they will be worse off. Devoting attention to the identified convictions could provide information for a more acceptable negotiation package on CCS in the CDM.

Keywords: Clean development mechanism; CO_2 capture and storage; Climate policy

1. Introduction

CO_2 capture and geological storage (CCS), as a relatively new option to mitigate climate change, has been both hailed as the technology that brings lower stabilisation levels within reach and condemned as an unsustainable distraction from achieving an energy system fully based on renewables. The fundamentally different ways in which CCS is seen by stakeholders naturally has an impact on the progress made to include CCS in policy efforts. Although inclusion of CCS in the European Union Emissions Trading Scheme has so far not raised many eyebrows, national subsidy schemes, but also inclusion of CCS in the Kyoto Protocol's Clean Development Mechanism (CDM), have met with resistance from some environmental organisations. This paper aims to look beyond the obvious, technical issues around CCS in the CDM, in order to identify knowledge needs that provide an answer to the underlying convictions of both proponents and opponents to bringing CCS in the CDM.

The discussion around CCS under the CDM has brought about relatively emotional responses, and is currently characterised by a highly polarised playing field. During COP/MOP2, the Parties to the Kyoto Protocol could not even reach a provisional agreement on the principle

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whether CCS should be in the CDM or not. In their eventually negotiated decision, they asked for more information from observer organisations.

It is not surprising that the issue of CCS under the CDM is controversial. To start with, the CDM itself has had its share of criticism, from allowing a way out of reducing emissions domestically for Annex-I countries to the lack of an unbiased sustainable development check and the large amount of windfall profits as a consequence of HFC-23 destruction projects. But as long as hundreds of renewable energy projects also receive CDM-related funding, criticism has not been too severe. This changed for the case of CCS. To opponents of including CCS in the CDM, the novelty of the CCS technology, at least in the climate change context, raises all sorts of questions, including on potential seepage and permanence, on long-term liability, on what monitoring technologies need to be applied and how to address project boundary issues under the CDM.

It is generally acknowledged that these issues need to be addressed, although the proponents of CCS commonly have more faith in the ability of current science, technology and regulation to satisfactorily resolve them than the opponents. The proponents of CCS in the CDM see it as their inalienable right to receive carbon funding for implementing a greenhouse gas reducing technology, and fail to see why e.g. concerns over sustainable development would have to be a showstopper. The debate surrounding the technical issues of CCS in the CDM ignores the many undercurrents that feed the positions of opponents and proponents. In reality, both opposing and supporting organisations and governments are led by norms, convictions and interests as much as by scientific information.

A polarised debate has characteristics that are wholly different from those of a constructive debate. During a constructive debate, the debaters try to reconcile their position with their opponents; they explore each other's zone of possible agreement and aim to find common ground in order to resolve an issue. During a polarised debate, one or more parties involved do not look for middle ground, because they cannot reconcile the overall topic of discussion with their own norms and convictions. The one discussant accuses the others of dogmatic viewpoints, and none of the discussants is willing to lay conditions for agreement on the table. Imaginably, it is extremely difficult to resolve a polarised debate—which is often not the aim of one or more of the discussing parties. Polarised debates are often vehement and emotional, as the topic touches upon fundamental values.

The nuclear energy debate is the classical example of a polarised debate in the energy sector, but also the debate before the war in Iraq started is a good example. The CCS in the CDM discussion has characteristics of a polarised debate. Careful scrutiny of the positions of the proponents, but particularly of the opponents, would help to shed light on the degree of polarisation, and to find whether there are conditions under which proponents could agree to exclusion of CCS from the CDM, or opponents could agree to inclusion.

2. Approach

The period 2006–2007 has seen a large number of publications and events that enable us to look behind the technical features of CCS and to analyse the positions of the various stakeholders in more depth. Statements, reports and presentations of the following stakeholders will be scrutinised for underlying norms, convictions and interests:

- Fossil-fuel-dependent organisations (such as the World Coal Institute (WCI) or the International Petroleum Industry Environmental Conservation Association (IPIECA));
- Vocal governments in the COP/MOP negotiations and May 2006 SBSTA-workshop on CCS and the CDM;
- Environmental NGOs (e.g., Greenpeace, World Wildlife Fund (WWF), Climate Action Network (CAN));
- CDM-market dependencies (e.g., International Emissions Trading Association (IETA), brokers).

For each of them, their norms, convictions and interests can be laid out. Many of them will generate obvious results, but some may lead to new insights. Among other things, such an exercise might reveal a number of uncertainties in the fields of CCS and CDM that may provide leads to conditional acceptance or rejection of CCS under the CDM. In addition, special attention will be given to potential inconsistencies within the positions of the various organisations, as addressing such inconsistencies might lead to shifting positions.

Based on the analysis, recommendations on filling of gaps in knowledge and possibilities to depolarise the debate on CCS in the CDM can be outlined.

3. Data on relevant positions

Data sources on party and observer organisation positions are, firstly, official submissions to the UNFCCC and other position papers; secondly, presentations at conferences or workshops; and thirdly, statements at contact groups and other negotiation sessions during meetings of the Conference of Parties (COP), and UNFCCC in-session workshops related to CCS (Various parties and observers, 2006). The latter source of information is often not documented, and the write-up of the author is used for reference. A summary of the observer (and two non-observer) responses to the invitation to submit information by 31 May 2007 is given in Table 1.

3.1. Non-governmental organisations

Fossil-fuel-dependent organisations and associations are without exception positive on CCS, and favourably composed towards including CCS in the CDM. They refer

Table 1
Summary of UNFCCC observer submissions for 31 May 2007 (UNFCCC, 2007)

Issues addressed	Observer organisation						Non-observers	
	Greenpeace	IETA	IPIECA	International Risk Governance Council	WCI	WWF	Bellona	NFED
Should CCS be included in the CDM?	No	Yes	Yes	Yes, provided more information becomes available	Yes	No, should be tested first in developed countries	Yes, provided site selection and regulatory framework in place	On the whole, no
Seepage	Emphasis on uncertainties of CO_2 migration and long-term behaviour	Controllable provided appropriate site selection and management	Sufficient information and experience available	Remains an issue; more research needed	Requested information already available	Crediting time in CDM (21 years at most) is too short to address this	Can be addressed in site selection/ environmental impact assessment	Need for national and international regulatory framework
(Long-term) liability	Host country accepting long-term liability unacceptable because of sustainable development objective, possibility of seepage and costs of remediation	Practical and predictable arrangements for project developer and market; may extend beyond the crediting time. Discount factor (contingency fund) or buying back CERs	Sufficient information and experience available	Need to remove risk from host country, may require novel forms of long-term financial bond, or insurance, from the project developer	Requested information already available	Crediting time in CDM (21 years at most) is too short to address this. Strong legislation in host country should be put in place	In the long term, government should take over liability, but it should formulate strict conditions for liability transfer before the project start	Need for national and international regulatory framework
Monitoring	Monitoring should continue until performance is confirmed by an independent expert entity	Not considered an issue	Sufficient information and experience available	Technologies available, but room for improvement	Requested information already available	Strong legislation in host country should be put in place	General guidelines and a regulatory framework can and should be set up	Need for national and international regulatory framework
Procedures		Must incorporate approval mechanisms for site selection, etc.		Suggests procedural safeguards for appropriate CCS	Positive decision by COP/MOP4	Mandatory EIA and other strong legislation required	No ECBM; assessment of environmental impacts necessary	Need for national and international regulatory framework

to existing experience to argue that the scientific and technical questions surrounding CCS can largely be addressed now, and that CCS is ready for full deployment worldwide. The position of these organisations can be explained by their background. Associations often represent a number of coal, oil and gas industries and their interests. These industries would be out of business if climate change policy leads to reduction of energy use and a shift to non-fossil energy sources CCS provides them with a role in solving climate change. Often, these organisations do call for clear regulation on the international level, in order to streamline project approval and to allow for multinationals to operate with similar legislation in different countries.

CDM-market dependents, both the industry associations as well as brokers and project developers, have slightly more varying perspectives on CCS in the CDM. IETA, the heterogeneous association that is the most vocal of such organisations in the field of CCS and CDM, takes an outspoken pro-CCS position although it argues for stringent environmental integrity checks and it provides ideas on regulation related to site selection, long-term liability and certification. It should be considered that IETA is a platform of business associations related to CO_2 emissions trading, and organisations that it represents include project developers, brokers and designated operational entities (DOEs validate and certify CDM projects and CERs). All of them benefit from increasing the scope of the carbon market, which could be an explanation for their interest in CCS. In addition, however, most of them would benefit from maintaining the carbon market's integrity, leading to a call for strict procedures. Arguably, the DOEs even have an additional interest: the more extensive the procedural requirements, the more work they are able to perform. Lastly, there are some specific trading companies that are less positive about CCS, either because they have doubts about the environmental integrity or because they have an exclusive market focus on renewable energy-related CDM projects.

Environmental NGOs are generally more opposed to CCS in the CDM, although their positions also vary much (see Table 1, which lists Greenpeace, WWF, the Bellona Foundation and a Norwegian coalition of environment and development-related NGOs (NFED)). The Bellona Foundation is a firm supporter of CCS and sees it as a necessary and promising technology for mitigating climate change. This may have relation to Bellona's rather exceptional organisation structure: contrary to other NGOs, Bellona is partly financed by industry. Although in other topic areas Bellona is known to be highly critical of the same industries that they depend on for financial support, it is conspicuously positive about CCS.

Most other NGOs are more critical, although their positions seem to have changed over the course of time. Greenpeace, for instance, in a press release after the publication of the IPCC Special Report on CCS, indicated mildly that CCS is not yet technologically mature. In more recent publications, however, it argues against CCS on an increasing number of points. Of the NGOs that oppose CCS in the CDM, resistance seems to have intensified during the course of 2006 and 2007.

Most opposing NGOs became involved in the debate around CCS and CDM only recently. When the UNFCCC called for submissions on the topic from Parties and observers for the first time, for February 2006, not one environmental NGO submitted a statement. In September 2006, however, a group of four environmental NGOs (CAN Europe, Friends of the Earth, Greenpeace and WWF) sent a letter to the Heads of Delegation urging them to oppose inclusion of CCS in the CDM (Duwe et al., 2006). Their letter highlighted the early stage of CCS technology and limited experience with monitoring and verification of CCS projects, the fact that no OECD country has a regulatory framework so far leading to "exporting risks and uncertainties to the developing world", and diversion of investments in energy efficiency and renewable energy. The letter ended with a call that CCS in the CDM should be stalled until appropriate safeguards, including a strong regulatory framework, are in place. It seems that the subscribers rule out the possibility that CCS belongs under the CDM in the first Kyoto commitment period, but are willing to discuss it for after 2012.

More recent statements of Greenpeace, in a presentation in May 2007 (Goerne, 2007; Watanabe et al., 2007), indicated firmer opposition to CCS in general and CCS in the CDM specifically, regardless of the timing of allowing CCS in the CDM. The statement made reference to the increased use of fossil fuels as a result of the energy penalty, the diversion of effort from more desirable mitigation options, unacceptable long-term risks, the increase of fossil fuel use as a consequence of enhanced hydrocarbon recovery, and the absence of any contribution to sustainable development. Another important part of the argument is that climate change, according to Greenpeace, can be prevented without using CCS or nuclear energy. Greenpeace proposes to find a different policy instrument for CCS deployment, not the CDM.

3.2. Governments

The Party that opposes CCS under the CDM most vocally and firmly is Brazil. At the time of the discussions in 2006 and part of 2007, the negotiator for Brazil was also chairing the CDM Executive Board. Also for Brazil, resistance seems to have grown. In the first UNFCCC submission round in February 2006, it submitted a document that highlighted a number of uncertainties, but did not announce its more outspoken position now (UNFCCC, 2006). Brazil has procedural objections against bringing CCS under the CDM, notably that it cannot be regarded a sink and therefore it is difficult to deal with potential impermanence of CO_2 storage in the CDM modalities. Also, the diverging timescales of CCS

(hundreds to thousands of years) and CDM (21 years at most) are mentioned as a procedural issue. In addition, Brazil highlights technical uncertainties and risks and puts much emphasis on the concept of "developing countries as guinea pigs" argument, a point that many least-developed countries support. The diversion of investment in renewable energy is mentioned, as well as the undesirable effect of producing even more fossil fuels through hydrocarbon recovery (Miguez, 2007; Watanabe et al., 2007).

Proponents of CCS under the CDM are most Annex-I countries, as well as several non-Annex I countries, such as Saudi Arabia, Qatar and China. Where Japan and oil-producing countries are almost unconditionally for inclusion of CCS in the CDM, the European Union is in principle for, but more careful in terms of solving the technical and legal issues around CCS before, allowing it in the CDM. Arguments used include the notion that CCS is new but that projects can be managed safely, and that CCS can play a role in reducing emissions in developing countries with fast-growing coal-fired power capacity.

4. Convictions and norms

From the positions reviewed and discussed in Section 3, I derive a number of underlying convictions of both proponents and opponents of including CCS in the CDM. I attempt to provide a careful discussion of the convictions and the perspectives that allow the stakeholders to employ those convictions. Although many of the convictions are related, every one has a distinct argumentation.

Conviction #1: CCS is ready for market-based deployment

In policy studies, policy instruments to enhance the diffusion of new technologies are often attributed to the technological development stage of the technology. Indeed, it would be inappropriate and ineffective to, for instance, use an emissions trading instrument for advancing a technology that is still in the research phase. The issue is that there is disagreement on how much of a mature technology CCS really is. Those arguing that CCS belongs in the CDM qualify CCS as a mature technology as its various components have seen application in other settings, most notably in the oil and gas industry, and other issues do not pose major technical challenges.

There is much that can be said for that, but CCS also falls short on certain essential areas. For example, CO_2 capture on a full-scale power plant has not yet been demonstrated, and many questions remain on the reliability of the site characterisation and monitoring techniques that are needed to guarantee the safety of storage reservoirs and the permanence of CO_2 storage. The discussion then shifts to a chicken-and-egg debate. The opponents of including CCS in the CDM argue that we should not risk getting it all wrong, so wait until we are absolutely sure about the effectiveness of CCS before structural policy instruments are employed. The proponents while the proponents argue that a learning-by-doing procedure with strict rules in the beginning that can slowly evolve into a more standardised legislative framework later on, but gives structural incentives from the beginning, is both safe and fast in making CCS mature.

Conviction #2: Technology should be developed and tested in industrialised countries first, and only after that be implemented in developing countries

There is an implicit conviction, often reflected in developing country and NGO statements, that for mitigation of climate change, the burden of costs should be with those to blame most for climate change, which coincides with those economically most able to bear the costs. This means that it is left to industrialised countries to develop and first implement new technologies. Only after the technology has matured in industrialised countries, and costs have fallen, it can be implemented in developing countries as well.

Although the pattern for many technologies indeed resembles this, notably because the research and development budgets and therefore the innovative capacity in industrialised countries are much greater, the world is changing towards a model that is increasingly organised differently. Particularly in emerging economies, innovative industries are on the rise, and developing country-based companies are not necessarily followers of industrialised-country ideas anymore. Developing countries are discovering that being a first mover has advantages in terms of market share in the longer term, and are acting accordingly.

Opponents of bringing CCS in the CDM argue that developing countries are used as guinea pigs for a dangerous medicine—a testing ground for a new, risky technology. It seems that the conservative world view of industrialised countries picking up the bill for new technology is dominant if this is stated. Conversely, however, the argument could be made that CCS in the CDM allows developing countries to become a significant market player in CCS-related technologies, when they are eventually implemented in industrialised countries as well. Whether CCS in the CDM is the Trojan horse, as foreseen by the opponents, or actually the horn of plenty according to some of the proponents cannot be predicted at this point.

To be fair, one argument that stands firm in this context, but is quite different of the implicit conviction that the prerogative of technology development lies with industrialised countries, is that poor governance and underdeveloped institutions in CDM host countries will not be able to sufficiently address the complex technical and legislative issues around CCS. This point, however, can be addressed by procedural requirements for CCS–CDM projects with regard to capacity of the host country, potentially supplemented by capacity-building efforts for developing legislation to govern CCS.

The debate, as it usually develops around the "guinea pig" issue, rarely involves proponents countering with the

"CCS as opportunity" argument. Instead, they argue against CCS being risky and being a liability for developing countries. By taking this stance, they do not fully respond to the underlying conviction in the argument made. The discussion might be helped if more light is shed on what actually are the risks of deploying CCS in developing countries, and what can be done to maximise the first-mover advantages for those CDM host countries interested in CCS.

Conviction #3: CCS will overwhelm the CDM market and crowd out other projects

The consequence of treating CDM as a technology-neutral market mechanism has been most clearly felt in the case of HFC-23 destruction activities. These projects generate enormous amounts of CERs against very low costs. The availability of these projects has a depressing effect on the CER price, thus ruling out more expensive options such as renewable energy, as well as countries without HCFC-22 industries, notably in Africa. In addition, the companies involved make substantial windfall profits. Although many parties, especially CER-buying Annex I countries, are undoubtedly secretly thrilled with the HFC-23 projects keeping Kyoto compliance costs low, the effects of HFC-23 are seen as inconsistent with the sustainable development condition by the NGO community, and in general not fully compatible with the initial spirit of the CDM, which was meant to favour sustainable technologies, not increase profits of already well-to-do industries.

The question is whether CCS might have a similar market impact. The same organisations opposing CCS in the CDM for this fear often also make the argument that CCS is costly, which would make it difficult to finance CSS through CDM at current CER prices. However, there may be CCS possibilities that are very substantial and very cheap. Some of the largest single-point sources are, for instance, the CO_2 stacks of gas separation installations in gas recovery operations. Such sources could amount to an annual 10 $MtCO_2$ or more, and CCS would be a very cost-effective way of reducing those emissions. The trouble of the matter is that these numbers constitute commercially sensitive information in the hands of oil and gas companies, are not public, and therefore it is difficult to assess whether CCS will overflow the CDM market, or whether this is an unlikely outcome (Coninck, 2007; Philibert et al., 2007). An additional consequence of much CCS in the market is that this will lead to lower CER prices and more reliance of industrialised countries on non-domestic emission reductions. Many environmental NGOs prefer industrialised countries taking action predominantly at home.

Brazil's position on CCS in the CDM could be explained through the arguments it makes that are recited in Section 3.2, but could also be regarded as a consequence of the interests it has in keeping CCS out of the CDM. Brazil's electricity is mainly generated through hydropower, resulting in only a limited potential in the country for CCS. If CCS would be allowed in the CDM, and it picks up speed, Brazil's market share in CERs would likely decrease.

Conviction #4: CCS does not contribute to sustainable development

An issue that has been subject to much debate around the CDM is how it deals with the "sustainable development" condition which was laid down in the Kyoto Protocol. As mentioned, whether proposed CDM activities comply with this condition is determined by the host country. However, host countries have different definitions and their interpretation of what contributes to sustainable development is not consistent with everyone's view on the matter. Except potentially nuclear energy, no technology has yet been excluded from the CDM for being inconsistent with its sustainable development goals. According to some, the HFC-23 projects would be a prime candidate for projects that should be expelled from the CDM for sustainable development-related reasons.

Whether CCS is consistent with sustainable development is a matter of debate. Some argue that no option involving fossil fuels, let alone their enhanced use, can be associated with sustainable development. Indeed, the reserves of fossil fuels are finite, and therefore not sustainable in the long term, and the recovery and use of fossil fuels has numerous social and environmental problems, even with CCS. CCS, they argue, only provides an excuse for using even more fossil fuels. Others argue that CCS reduces the negative climate impacts of fossil fuels that will be used anyway, in some cases reduces air pollution, and helps economic development in developing countries.

On agreement of the Kyoto Protocol, it has been a deliberate decision to grant host countries sovereignty over the sustainable development definition. This has been included to soften the dominant role that the international community, through the CDM Executive Board, plays in the question which projects are approved in specific countries, and thus what the host countries can eventually expect in terms of income from CERs. Those who use the sustainable development argument to keep CCS out of the CDM are implicitly addressing the prerogative of the host country to apply the sustainable development condition as they feel most appropriate. This is a legitimate but quite distinct matter that should be addressed in a different context. According to the present rules in the CDM, the doubt that CCS contributes to sustainable development is not a valid ground for exclusion of CCS from the CDM.

Conviction #5: Enhanced hydrocarbon recovery will lead to more greenhouse gas emissions

There is some CO_2 storage potential, in gas, oil and coal fields, which could lead to the enhanced recovery of hydrocarbons. In oil fields, enhanced oil recovery (EOR) using CO_2 is most developed. It is deployed in the United States on a large scale and may find applications in Europe (North Sea area), but also in developing countries, in the near future. In fact, the first CCS project that was submitted as a CDM activity (but did not obtain approval)

involved EOR. Other options, in gas fields (enhanced gas recovery; EGR) and coal fields (enhanced coalbed methane recovery (ECBM)) are not fully proven. Because it is most acute, attention has primarily been devoted to EOR. Another reason as to why EGR and ECBM have been left alone might be that both produce relatively clean methane, which can be used to replace solid fuels and actually has a lower emission factor than all other fuels except renewables.

CCS projects employing EOR could be early opportunities as the enhanced oil provides significant revenues to the project developer, and could partly or fully compensate for the capture costs. Given the additionality rules in the CDM and current high oil prices, it is unlikely that such no-regret projects would be approved. However, for the case that the capture costs are high enough to make additionality of the CCS–EOR project likely, many have expressed more fundamental arguments against EOR. The oil that is recovered additionally will be combusted, generating about two times as many CO_2 emissions as the CO_2 injected. If these emissions are accounted for, the CO_2 emissions of the CDM project would be even higher than the emissions without the CDM project. This, the opponents say, must lead to the conclusion that EOR should in no case be allowed under the CDM.

Others indicate that on the whole scope of things, the additional oil on the market as a result of EOR projects is not significant enough to provoke any change in oil consumption patterns—i.e., they argue that oil will be used anyway. This is probably true for the short term, but in the longer term, opponents will argue, EOR allows more oil to be recovered on the whole, will delay the moment that the use of oil peaks and will thus add to the accumulation of CO_2 in the atmosphere. This is not clear-cut, however; the global potential for EOR is unlikely to be large enough for a serious delay of the peak in oil use, and it cannot be stated with certainty that every drop of oil in the currently known resources and reserves will be used. In this case, it is by no means clear who is right. Studies on a global system level could provide an answer, but have limitations of their own and are unlikely to provide answers that are accepted by all. This subject warrants further research.

Conviction #6. Renewable energy is to be preferred over CCS, but the CDM market will prefer CCS

One of the most prominent arguments against allowing CCS in the CDM is the conviction of many individuals that, rather than applying a remedy like CCS, the CDM should support the better solution to the CO_2 intensity in the energy sector: renewable energy. Underlying this is the conviction that renewable energy is to be preferred over CCS. One of the most significant reasons for this is the energy penalty of CO_2 capture, particularly in the case of coal-fired electricity, and the associated life-cycle greenhouse gas emissions.

Implicit in this conviction is the fear that CCS will take over renewables in the CDM market. This issue has been addressed in Conviction #3 related to the question of whether CCS would severely distort the CER market. Here I discuss the matter in relation to the renewables vs. CCS question. It is not obvious that CCS projects necessarily have lower abatement costs than renewable energy projects, and that CCS would displace projects involving renewables. Firstly, within the CDM, renewables have certain advantages. CCS projects will not be able to use streamlined small-scale procedures and cannot yet make use of approved methodologies. Secondly, especially if stricter rules would be applied to CCS projects, it is not sure whether CCS would significantly crowd out renewables *ceteris paribus*; some argue that the presence of CCS in the portfolio of options tempts countries into taking on stricter targets, thus expanding the CDM market as a whole. However, although potentially feasible, such a statement is difficult to prove.

It goes too far to fully address the question of renewables vs. CCS in detail in this paper, but it should be noted that the conviction that renewables are inherently better than CCS is quite widely shared among both proponents and opponents of CCS in the CDM. Most advocates of CCS acknowledge that it is a "bridging" solution and that eventually renewable energy, in one form or another, will be the source of energy in the (very) long term. Views on how far into the future fossil fuels can and need to be phased out, however, differ, and this is where the disagreement seems to commence. However, mostly, there is no fundamental disagreement on whether renewables are better than CCS—in the long term, they are. The conviction leading to different views relates more to the possibilities of renewables in the short term and the consequential need for CCS, both within and outside the CDM.

5. Recommendations for a possible way forward

A number of outcomes of the CCS and CDM negotiations is imaginable, given the fundamental issues discussed above. Some of the issues need further clarification, such as the CDM market impacts of CCS, the issue of enhanced oil emission accounting and sustainable development aspects. Particularly the conviction that provides the title to this paper, whether developing countries will actually benefit from CCS or whether they will be worse off, could benefit from further research into the conditions under which the one or the other might happen.

Other issues could possibly be traded against one another into one package related to CCS in the CDM. Even an agreement involving issues that do not immediately relate to CCS in the CDM is thinkable. A possible package is outlined here as an example:

- CCS is principally allowed under the CDM, but not until COP/MOP has accepted a set of rules and regulations that are CCS-specific, include provision for long-term liability and is carefully scrutinised by an accredited

body of experts. Those rules and regulations are flexible in the beginning, to allow learning from demonstration projects both inside and outside the CDM.

- Capacity building for DNAs and other host country officials in the field of safety and good housekeeping of CO_2 storage locations must be provided before a CCS project can be approved by the host country or the CDM Executive Board.
- All cases of EOR are excluded from the CDM, but no further technology biases (such as quota on renewable energy CERs or maximum amounts of CCS-related CERs) will be imposed.
- The upstream life-cycle greenhouse gas emissions of CCS projects on coal-fired power plants are taken into account in the emission reduction calculation of the CDM project.
- Sustainable development remains the prerogative of the host country. However, a discussion paper commissioned by the Secretariat on sustainable development and CCS will be distributed amongst all Parties.

It is by no means certain that the above is an acceptable outcome for all. Some suggestions might be unacceptable, and other issues might have to be involved in order to balance the outcome. However, an open discussion of the underlying issues around CCS in the CDM would help the debate enter a more productive stage, and could provide a better basis for an acceptable outcome for all parties.

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