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Can Permanence be Insured? Consideration of some Technical and Practical Issues of Insuring Carbon Credits from Afforestation and Reforestation

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Can Permanence be Insured?

Consideration of some Technical and Practical Issues of Insuring Carbon Credits from Afforestation and Reforestation

ABSTRACT

Greenhouse gas (GHG) removals by afforestation and reforestation project activities under the Kyoto Protocol's Clean Development Mechanism (CDM) are vulnerable to a variety of risks and uncertainties, resulting in the partial or total reversal of such removals. Hence, GHG removals from these sink activities are considered to be of temporary nature and non-permanent. Specific modalities related to non-permanence will need to be developed in order to include afforestation and reforestation project activities under the CDM and for a decision on modalities to be reached at COP 9 in December 2003. Two main options on how to address non-permanence have been proposed, these being temporary credits and insurance of emission reduction credits. This paper discusses the practicality and potential difficulties of the insurance approach for addressing non-permanence of sequestered carbon stocks and the validity of CERs generated. The insurability of CERs or non-permanence is considered against common insurability criteria. The marketability of the insurance product and several technical questions in relation to developing this new market instrument are asked. In addition, inequities likely to arise if the approach is adopted as a mandatory modality are discussed.

JEL-Classification: Q23, Q25, Q13

Keywords: Clean Development Mechanism, Forestry, Insurance, Permanence

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1 Issue of non-permanence: Some background

The Seventh Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Marrakech decided that the eligibility of land use, land-use change and forestry (LULUCF) project activities under the Clean Development Mechanism (CDM) of Article 12 of the Kyoto Protocol is limited to afforestation and reforestation (A&R)¹. The COP further requested the Subsidiary Body for Scientific and Technological Advice (SBSTA) to develop definitions and modalities for including A&R project activities under Article 12 in the first commitment period. Since this Decision at Marrakech, Parties have had several opportunities to further elaborate and deliberate on the issues that surround LULUCF project activities, namely, non-permanence, baselines and additionality, leakage, uncertainties and socioeconomic and environmental impacts, and have submitted their views on these to the UNFCCC secretariat. Based on submissions by the Parties, a draft consolidated text on definitions and modalities have been prepared by the secretariat under the guidance of the Chair of SBSTA.

Greenhouse gas (GHG) removals by either afforestation or reforestation project activities are vulnerable to a variety of risks and uncertainties, resulting in the partial or total reversal of such removals. Hence, GHG removals from these sink activities are considered to be of temporary nature and non-permanent. In the IPCC Special Report on LULUCF (Watson et al. 2000), a number of risks were identified for LULUCF project activities, such as afforestation and reforestation (although such risks are not necessarily exclusive to forestry activities). These include natural risks (e.g. rainfall, temperature, pests and diseases, reductions in growth rates, fire, climate change, etc.); anthropogenic factors (e.g. encroachment, fires, theft, harvesting, land management); political risks (e.g. non-enforcement, non-compliance, expropriation, uncertain property rights, policy changes); economic risks (e.g. exchange rate and interest rate fluctuations, changes in opportunity costs of land); financial and market risks and institutional risks. Project failure due to such risks not only results in the loss of GHG benefits, there may also be accompanying negative social and environmental impacts. Several

¹ Draft decision –/CMP.1 (Land use, land-use change and forestry) under Decision 11/CP.7

methods for risk mitigation were proposed in the Report: cross-project insurance, regional carbon pools or ‘carbon banks’, financial insurance and portfolio diversification (placing different projects in different locations).

Under the existing modalities and procedures for the CDM contained in the annex to Decision 17/CP.7, there are no provisions to account for emissions from afforestation and reforestation project activities. Hence, specific modalities related to non-permanence will need to be developed in order to include A&R project activities under the CDM. Specific options for modalities relating to non-permanence were proposed in the options paper on modalities for addressing non-permanence² prepared by the UNFCCC secretariat. The options were insurance to cover possible losses of carbon, credit reserves where CERs (certified emission reductions), ERUs (emission reduction units), AAUs (assigned amount units) and/or RMUs (removal units) are held for compensation of any possible loss, buffers, temporary certified emission reductions (tCERs) with an expiry date and temporary net credits which places liability for any reversal of removals with the holder of the credit. At an inter-session workshop³ for Parties to exchange views, all these options and their implications were discussed. In establishing an insurance scheme for CERs, issues raised included nature of compensation in case of a loss, the accreditation of designated insurance companies and the timing of insurance. Issues surrounding the use of tCERs were on their expiry date, re-issuance and possible implications for registries. Buffers and credit reserves were considered as risk management tools rather than stand-alone options for addressing non-permanence.

Some Parties proposed that the modalities to be developed should give project developers a range of options, depending on characteristics of the project activities and country situations. Flexibility in options would contribute to more viable projects. However, other Parties proposed that tCERs should be the only option made available in the modalities as this option presents less risk of loss with replacement of units being guaranteed (whether on reversal or expiry) within the accounting system. A few Parties, in particular those from less developed countries, expressed reservations about the insurance approach due to the non-existence of

² FCCC/SBSTA/2003/5

³ FCCC/SBSTA/2003/8

such markets or structures in their countries. Instead, they proposed that the other options would probably be more applicable in the first commitment period.

The purpose of this paper is to discuss the practicality and potential difficulties of the insurance approach for addressing non-permanence of sequestered carbon stocks in A&R projects and the validity of CERs generated. The insurability of CERs or non-permanence is considered against several common insurability criteria. The marketability of the insurance product and several technical questions in relation to developing this new market instrument are asked. In addition, the inequities likely to arise if the approach is adopted as a mandatory modality are discussed as well. As there are no real cases of A&R projects under the CDM and no real insurance markets for insuring CERs, the arguments presented here remain speculative; presenting potential difficulties that could arise if a tightly-woven framework is not developed in advance.

2 Concepts behind insurance

Insurance is a risk management device in which the uncertainty of losses for a group as a whole is reduced through the pooling of risks. The costs of compensating an individual (the insured) who suffers a loss are spread across a large group of individuals (the law of large numbers). The average loss in an insurance pool will become more certain as more independent and identically distributed exposure units are added in the pool. The insured pays a premium fixed *ex ante* to the insurer for this transfer of risk and for a guarantee that if a loss should occur, the insurer would pay for the loss encountered. The maximum premium paid will be equal to the maximum the insured is willing to pay rather than face a loss of a certain size with a given probability. For risk-averse individuals, the premium they are willing to pay will always be more than the expected value of the loss they might suffer (Janssen 2001, Pearce 2000).

Several conditions must be met before insurers are willing to provide policies against an uncertain loss. Basic criteria for assessing the insurability of risks are (Janssen 2001, see Grote & Köster 1989):

1. Risk pooling – the existence of many independent and identically distributed exposure units.
2. Losses occur with a high degree of randomness;
3. The maximum possible loss is very limited;
4. The average loss amount upon loss occurrence is small;
5. The average time interval between loss occurrences is short, losses occur frequently;
6. The insurance premium willing to be paid for the coverage is high enough;
7. There is a low possibility of moral hazard;
8. Coverage of the risk is consistent with public policy; and
9. The law permits the coverage.

While the first five criteria are based on actuarial principles, there are two rather complex conditions that could arise as a result of asymmetric information, that is, the insurer has one set of information while the insured has another set unknown to the insurer. These are the situations of *moral hazard* and *adverse selection* (described by Janssen 2001 and Pearce, 2000). The problem of moral hazard occurs when the insured does not fulfill his contractual obligations to reduce or control losses and this situation is undiscovered or takes place unobserved by the insurer. If the insurer is unable to predict the behaviour of the insured due to lack of past data on frequency or type of losses, and the insured changes behaviour once insured (such as losing the incentive to reduce or control losses), then the insurance company could either set premiums too high or too low. If the frequency of losses is increased, the insurer loses money if premiums were set too low. On the other hand, if the insurer needs to verify that the insured has met his obligations, the cost of the verification process must be borne either by the insured or the insurer or both. When control costs become too high, the insurance contract may become financially infeasible for both parties and thus, making the risks not insurable.

The problem of moral hazard may be overcome by designing insurance contracts that transfer at least some of the cost of losses back to the insured. The introduction of deductibles or co-insurance clauses into insurance contracts could ensure that the insured maintain an incentive

to prevent or reduce losses. Another means of reducing moral hazard is through experience rating in which the pricing of premiums is based on the insured's past loss records.

In the case of adverse selection, insurance companies may not be able to price premiums appropriately because the insurers do not have sufficient information on individual risks (whether these be high or low). In the absence of such information and insurers being risk-averse, the premiums set will tend to be high. In such a case, individuals with low risks will find premiums too high and may decide not to buy. On the other hand, the high-risk prospective buyers would have incentive to purchase full insurance since the expected insurance payments are higher than the premium. Insurers will then face a higher average loss in the insurance pool and premiums would have to increase correspondingly. Ultimately, only individuals with the highest risks will remain in the insurance market. The market will become very thin to the point that insurance companies may not be able to operate on the law of large numbers.

If premiums are to be adjusted according to different risk groups, the insurer might have to gather information through an independent audit of the insured. This again raises the issue of additional costs that will be added to the premiums set for the policy.

Specialized forestry insurance: At the moment, there are only very few companies worldwide (e.g. Swiss Re, Aon, Marsh) offering specialized insurance for risks related to commercial forestry projects. This specialized insurance provides protection against conventional risks pertaining to losses from operations and natural hazards. In addition, only a handful of industrialized countries have extensive experience with forest insurance, mainly for fire protection and concentrated in the developed Pacific regions of New Zealand, Australia and Japan (Subak 2003). Norway requires mandatory timber insurance for all its plantations.⁴ It is most likely that carbon insurance was piggybacked on conventional insurance, rather than being a completely new insurance type. As national insurance control cannot be relied upon in every case, a proper registration with the CDM Executive Board would be needed. The same is true for the respective re-insurance companies.

⁴ Personal communication Michael Rumberg, June 2, 2003

Afforestation and reforestation project activities under the CDM present additional project risks beside the conventional risks related to operational and natural hazard losses. The subject of insuring against the loss of carbon removals by forestry projects is still in its infancy and remains largely unexplored. Risk of loss as a result of population pressures and human encroachment on land or logging activities tend to be higher in developing countries. Furthermore, institutional support to reduce risks may not exist in many such countries. Thus, premiums would need to be priced higher for A&R projects due to this greater range of risks (Subak 2003). In all cases, the lack of information will affect the ability of insurance companies in the effective underwriting of insurance policies for the protection against carbon losses.

3 The insurability of carbon credits

Insurance against environmental risks has several major advantages over other means of compensation for damages. It has been shown to be more cost-efficient because the risks are spread across large groups and the recovery of costs of damage tends to be faster. This in comparison with legal procedures or the tort liability system for recovering against environmental damages; in both cases can be very expensive and time-consuming.

Nevertheless, the use of insurance for protection against the loss CERs issued due to the loss of carbon stocks and the reversal of removals may present certain technical difficulties or problems in its implementation. This section discusses whether CERs are an insurable product when assessed against insurability criteria. Table 1 presents this discussion.

Marketability of insurance: At present, there is no insurance company offering coverage for carbon. Furthermore, there is little or no knowledge about this type of product. Even if the law allows for insurance coverage, there may not be a demand. Even if there is a demand, there may be no capacity to work with this specialized instrument. For many developing countries, particularly LDCs, the setting up of a legislative framework or support services even for conventional insurance may be beyond their capacities, at least for the first commitment period. The absence of skilled personnel and supporting institutions in developing countries may be a more serious impediment to securing insurance than simply insufficient capital to purchase insurance (Subak 2003). Another hindrance would be the lack of fair and equitable negotiations of insurance contracts that should benefit project participants in developing

countries. A lack of knowledge or poorly negotiated contracts could also result in coverage interpretation problems later when claims arise.

Table 1: Insurability of carbon credits (CERs) and implementation issues

Insurability Criteria	Practicality Issues	CERs insurable?
Risk pooling -the existence of many independent and identically distributed exposure units	The World Bank Bio-Carbon Fund estimates that with the 1% cap on LULUCF CDM projects, only 120 million tons of carbon can be generated from such sequestration projects. However, this cap is unlikely to be reached in the first commitment period and only a small number of projects in a few selected countries are expected to materialize.	Not yet
Losses occur with high degree of randomness	<p>This is the case of LULUCF projects, within risk categories comparable to standard timber insurance.</p> <p>Quantitative risks are insurable, as they have a direct link to the amount of C sequestered under the given project circumstances.</p> <p>These circumstances constitute qualitative risks, which are not insurable, e.g. political risk and price risk. Insurance companies will assess the credit rating of each host country, before deciding whether to insure the project.</p>	Yes, in principle
Maximum possible loss is limited (definable)	Insurance can only cover up to the amount of C fixed, not any collateral losses in C (erosion et al.).	Yes
<p>Average loss amount upon loss occurrence is small</p> <p>Average time interval between loss occurrence is short</p>	Comparable to standard timber insurance, see risk pooling above.	Not yet
Insurance premium willing to be paid is high enough	<p>Depends on who would pay the premium.</p> <p>If the investing party insures the credits, this will create a moral hazard problem, particularly for</p>	Yes, if investor pays

⁵ *Forest restoration* refers to the rehabilitation of degraded lands through afforestation or reforestation.

Insurability Criteria	Practicality Issues	CERs insurable?
	restoration projects. ⁵ Government-guaranteed foreign trade insurance could be willing to cover this risk, more so than private insurance.	
<p>Probability of moral hazard is low</p> <p>Moral hazard on loss prevention (ex-ante moral hazard), which can be overcome by full insurance above a deductible. The entire marginal loss accrues to the insured at low loss levels.</p>	<p>Without a history of damages, it will be difficult in the beginning to fix the deductible.</p> <p>Perverse incentives are likely to develop, most likely in the case of restoration projects. Project proponents may insure their project, and after the first few years of premium payment, will be less careful in ensuring permanence of carbon stocks. In some cases, maybe even allowing the reversal of stocks, with the knowledge that the loss of insured credits will be replaced by the insurer.</p> <p>Replacement shall be made in any kind of emission permit. There is an incentive to try and upgrade A&R CERs to other types of credit that entail no liability.</p> <p>The losses will need to be reported by the DOE. Replacement may lap over to the next commitment period. Would the fine of +30% for non-compliance apply?</p>	No
Coverage of risk is consistent with public policy	Many developing countries, particularly LDCs, may not have the public policy infrastructure to support such specialized insurance policies. Existing public policy structures also may not encourage the reduction of risks and losses. Hence, insurance companies, being risk-averse are not likely to want to underwrite policies for projects in such situations.	Only in low-risk countries
Law permits coverage	This precondition must be met, meaning not only the laws need to be in place, but their enforcement can be assured.	Yes

4 The Canadian proposal: Some technical questions unanswered

Canada proposed the ‘insurance of issued CERs’ as one possible approach to address the risk of non-permanence. If project participants selected insurance to address the risk of non-permanence in their CDM afforestation or reforestation (A&R) project activities, then they must ensure that there is insurance coverage for CERs issued from the A&R project activities throughout the entire crediting period and then, for a period no less than 10 years afterwards. Permanent CERs are issued from the project and project participants or Parties involved are

no longer liable to the risk of non-permanence at the end of 10 years after the selected crediting period. These insured CERs would be considered to have achieved “permanent” emission reductions and would not need to be replaced at the end of the insurance period.

Some of the new modalities proposed if the insurance approach is selected⁶:

- Project participants shall provide to the Executive Board a monitoring report at least every 5 years during the crediting period and to continue providing reports every 5 years for an additional period of no less than 10 years after the end of the crediting period.
- Crediting period approaches are:
 - a maximum of 20 years, which may be renewed at most two times; **or**
 - a maximum of 30 years with no option of renewal.
- In verification and certification by the designated operational entity (OE), the new modalities include:
 - In the case of carbon reversal, certification is a written report by the OE that the A&R activity resulted in a net decrease in anthropogenic removals between two subsequent monitoring period reports as verified.
 - The OE will also have to verify the documentation provided by the project participants to prove that insurance has been acquired for any CERs that would be issued and that the insurance will become effective upon issuance of the CERs, and that the insurance term covers the crediting period and an additional period of no less than 10 years after the end of the crediting period.
 - The OE shall also certify in writing that the project participants have obtained insurance for the verified amount of reductions, and that the insurance will become effective when the CERs are issued.

⁶ FCCC/SBSTA/2003/MISC.5, pp52-59

- In the event a carbon reversal resulting in non-permanence is reported by the OE or the project participants, the Executive Board shall flag CERs previously issued for the project equal to the verified amount of carbon reversals.
- Replacement of the flagged CERs shall occur no later than 120 days after the flagging of the CERs has become final. Destruction of the flagged CERs must occur no later than 15 days after replacement occurred.
- Replacement shall be sourced from the holding account of the insured provider,⁷ which means that only Annex I insurers could be eligible, as only their governments could allow them to hold sub-accounts.

Based on the above new modalities proposed, several technical difficulties are foreseeable in the implementation of the insurance approach. Unless several technical questions are resolved, the implementation of such an approach as one of the modalities for addressing non-permanence is unlikely to be neither marketable nor successful in ensuring the environmental integrity of A&R projects under the CDM. Several scenarios are given below where there might arise technical difficulties.

4.1 The ton-year approach revisited?

The Canadian approach to insuring CERs for a definite period (i.e., Option 1 for 70 years or Option 2 for 40 years) is somewhat similar to the equivalence factor approach used in ton-year accounting. This approach allows for temporary sequestration where credit is issued for the number of tons of carbon removed from the atmosphere over a given period defined in years. However, the question still remains as to the optimal time period that carbon must remain sequestered to be considered equivalent to “permanent” emission reduction. To address the problem of determining the equivalence time parameter, the concept of Global Warming Potentials (GWPs) has been adopted for use in the Kyoto Protocol and a 100-year reference time horizon is used to calculate the Absolute GWPs for CO₂. Under this approach, the net carbon stocks accrued from a sequestration project must be maintained for a period of

100 years to be consistent with Article 5.3 of the Protocol. If carbon stocks are released prior to the 100-year time horizon, only partial credit should be awarded. Therefore, in sequestration projects that have a crediting lifetime of 40 years, partial credits that could be issued are 31.2 % of the full credits if stocks remained intact for 100 years. For sequestration projects that have a duration of 70 years, the amount of partial credits that could be issued is 59.4% of the full credits (Watson et al. 2000).

If sequestration projects generated ‘permanent’ credits, which were calculated using the GWP time horizon of 100 years, then project participants would be over-insuring their number of credits (100% insurance for all CERs verified and issued) when only less than 60% of credits could be considered as contributing to the effect of ‘permanent’ removal. Insuring CERs throughout the crediting period and then an additional 10 years after the end of the crediting period, without need for replacing the CERs if there should be carbon reversal after this period, do not sufficiently fulfill the environmental integrity of the sequestration project in that a certain amount of CO₂ has been permanently removed from the atmosphere.

4.2 Transfer of risk vs. removal of risk?

Insurance is only an instrument for the transfer of risk (to another party/ the insurer) and not for the complete removal of risk necessary in resolving non-permanence. The insurer, in most cases, would have to determine liability and if the insured’s non-compliance (problem of moral hazard) was the result of the loss. Depending on the terms of the insurance contract, the insurance company may not cover full compensation and the insured may have to pay the deductible before recovering the balance of the losses through an insurance claim. On the other hand, the tCERs approach would offer a better-guaranteed situation for the removal of risk. This is because the loss or expiry of tCERs would have to be completely replaced either through renewal of the tCERs units (if stocks remained in place) or with other permanent credits (AAUs, ERUs, RMUs or other CERs).

⁷ Personal communication Darren Goetze, Canadian Ministry for the Environment, 6th June, 2003

Since the insurance of CERs is a new market, the insurance companies lack information (e.g. political framework or price data), necessary for formulating coverage and determine premiums. Without information about project participants' risk profile in relation to others undertaking similar projects, problems of adverse selection and moral hazard will occur. This can happen in the case of forest restoration projects when after obtaining insurance cover, there is little incentive to guard against losses of stocks (hence, carbon reversal and loss of CERs generated), as opposed to plantation forestry where the final objective after the crediting lifetime is to secure the value of the timber stand.

4.3 Will project lifetimes be shortened due to insurance?

An insurance coverage for the loss of CERs will not provide coverage for harvesting of stocks. The landowners or project participants are bound to an insurance contract and thus, they will not be allowed to harvest before the insurance contract ends (no less than 10 years after the end of the crediting period). If the project or land is transferred to another party, the new owners are also bound to the terms of the insurance contract. The land use cannot be altered before the insurance contract ends or liability for the loss of CERs could revert to the insured. In both cases, opportunity costs of higher-value uses are lost. Furthermore, binding a land use for a period of ten years might infringe with the host country's sovereignty.

For forest plantations, there is no incentive to extend the crediting period beyond the first rotation. The stipulation of a 10-year coverage beyond the crediting period would lead to a trade-off between early certification and a belated harvest. In the case of high CER values, the incentive would be to end the crediting period by the time the plantation would normally be harvested and maintain the plantation during the insurance coverage of ten years beyond the crediting period. In the inverse case of low CER values, which is more likely for the first commitment period, it would be logical to end the crediting period early and certify a lower amount of CERs so that insurance coverage ends by the time of harvesting.

The alternative is to insure the plantation for the expected average level that can be maintained over several rotations, but still there is no incentive to extend the crediting period beyond one rotation period.

In case of forest restoration, there is little interest of the project owner to maintain the insurance over long periods. CERs would be certified as soon as the maturity stabilization

level is reached, and the forest remained insured for another ten years. Knowing that this level can be reached in as little as 15 – 20 years under tropical conditions, there is no incentive for any prolongation of the crediting period. To the contrary, if pioneer species are used for an active forest restoration, these may take up more carbon in the beginning. But with natural succession occurring in the under story, the pioneer species might die back, so that the total carbon level may even decrease after the stabilization level.

4.4 When and for how long are premiums paid?

The Canadian proposal is unclear about the proposed start of the insurance contract, as it only states “insurance *will become effective* when the CERs are issued”. The proponents interpret this phrase in the way that the CERs are insured as soon as they are issued.⁸ There will thus be a trade-off between the insurance premium and the opportunity costs of not certifying until the end of the crediting period.

There are considerable uncertainties attached to long-term insurance. Insurance companies will not be willing to fix the premium once and forever. The prices of CERs may vary over the crediting period in an unforeseeable way, as the CER value is not only determined by market conditions, but also by political decisions on an international and national level. Therefore, premiums will vary on every contract renewal. On top of this variation, there will be variations due to the changes in the risk profile of insured projects. In her paper on carbon insurance, Subak (2003) noted that it might be very difficult to gain the long-term commitment of insurers to agree on continuous coverage for forestry projects that have lifetimes of several decades. In practice, insurers generally grant coverage on an annual basis. She proposed that an expiring credit approach could provide a safety valve for an A&R project that is partially insured or insured only for the short term. This comes back to the question of liability and credit fungibility discussed above.

Replacement in case of project losses can be done with credits that do not necessarily stem from CDM A&R projects, like CERs, ERUs, RMUs or even AAUs. This means that after

⁸ Personal communication Darren Goetze, Canadian Ministry for the Environment, 5th June, 2003

replacement this share of the credits needs no longer be insured. It will be in the interest of the insurance companies to replace losses only with A&R credits whose remaining insurance period is comparable to one of the credits lost. If they keep to the Canadian proposal, this will lead to another dimension of moral hazard risk: If replacement upgrades insurable CERs to emission permits that do not entail any liability, there is an incentive for the project owner to provoke losses. This is even more true, as these credits have a higher market value due to the fact that there is no cap on their use.

4.5 Who bears the liability?

If the intention of the Canadian proposal is to preserve fungibility of A&R CERs, then the seller should be held liable over the whole crediting period. The subject of seller liability however is something developing countries will not accept. If liability is does not involve proof of negligence or fault, depending on the environmental law of the respective country, then the insurance company will have to pay for any loss, giving rise to the problem of moral hazard. If, on the other hand, the buyer will remain liable, the product is not fungible any longer, all the more because no certain value can be attached to insurance premium. This is why the insurance industry rejects buyer liability as “too unpractical and too risky from the insurers standpoint” (UNEP III 1999). Thus the debate over buyer or seller liability may lead to deadlock: If seller liability without proof of negligence or fault would be a condition, no insurance companies would like to come in. On the other hand, if buyer liability were imposed, the market would rule out insured CERs, as their market value would be too uncertain.

If the issue of buyer/seller liability cannot be resolved on the international level, liability for the loss of CERs may have to revert to the tort liability system of each individual country, which will become prohibitively expensive for insurance companies.

4.6 Additional costs from monitoring and control measures

In light of unknown risks and the lack of experience of a baseline for the underwriting of insurance for a new market on A&R projects under the CDM, insurance companies may need to impose certain monitoring and control measures to gain access to information required for

pricing premiums appropriately. Risk management plans may be a mandatory requirement in order to purchase insurance policies. However, project participants, faced with misperceptions of probability of risks or financial constraints, may not voluntarily implement a risk management plan and to incur additional costs and time to reduce perceived risks of loss that could occur in the future. Thus, insurance companies may then require third party inspections to monitor project participants and the risk reducing activities on-site and to deter non-compliance. The employment of a third party to carry out monitoring will increase the cost of the insurance transaction. Will these third party inspectors require accreditation from the CDM Executive Board as well? And if the project participant is found to be not meeting the standards set in the insurance contract and risk management plan, the insurance company may then impose appropriate penalties or premium increases for the insured party. This again will further increase the costs of the transaction process.

5 Inequity of an insurance approach

On top of the several technical difficulties surrounding the insurance approach, the approach also poses several inequity issues. The adoption of an insurance approach is likely to result in an inequitable distribution of A&R CDM project activities among developing countries.

- It is highly likely that only countries with high CDM potential will benefit from such project activities if insurance is used to overcome non-permanence of carbon stocks. In addition, countries with a high CDM potential would also likely be countries that have adequate, existing infrastructure (financial, legal) and capacity (human, market) to deal with complex insurance underwriting. This would exclude many LDCs without such capacity to undertake such projects.
- Adverse selection: Carbon is a new area of insurance and insurers are unlikely to have experience or an adequate information base to price premiums according to high or low risks for each risk type. High risks buyers are likely those from LDCs and where projects have a higher probability of carbon reversal. And, if premiums are priced too high, the market for such insurance are likely to be thin with the corresponding probable situation of losses likely to be high. It may not be a financially viable market for insurance companies underwriting such policies.

- Insurance premiums are likely to be high in the initial period, increasing the already high transaction costs of A&R project activities. This will rule out many players in the market and only the big players will be able to afford the implementation of such projects.
- If the accreditation of insurance companies (and re-insurance companies) with the UNFCCC secretariat are required, it is likely to be a lengthy process, holding up potential projects that select or require insurance coverage. Furthermore, if replacement is made in-kind, the insurance company needs to hold a sub-account at the CDM registry, which is not possible for companies from non-Annex B parties.

6 Conclusions

Obviously, there are still many technical questions unanswered with the insurance approach. Beyond the institution of modalities for the CDM, the structure of an insurance approach such as the rules and processes defining the service, rights and liabilities of the stakeholders within the contract, information on defining types of risks and behaviour of the insured, supporting services and legislative frameworks, will all need to be worked out before the approach can take off. There are even indications that CERs from afforestation and reforestation might not be insurable at all.

Given the above, will insurance companies invest the time and money to develop a specialized product for insuring against the loss of issued CERs, given that the market share would be very small, even in the most optimistic of cases? The bottom line centers around the profitability of such a specialized product before the first expenditure is thrown in. This situation would even be more complicated if tCERs and insured CERs were to coexist in the modalities. At this point, the market situation remains that the demand for insurance coverage of loss of issued CERs is unspecified and ambiguous. A few A&R projects scattered in various countries around the world will not generate sufficient demand and volume for insurance companies to be willing to develop and insure the new product.

7 References

Canada 2003, Proposal of Canada, Provisions governing iCERs, draft produced for SBSTA
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Grote, W. and Köster, P. 1989. Allgemeine Versicherungslehre, Haan

Janssen, J. 2001. Risk management of investments in Joint Implementation and Clean Development Mechanisms projects. Dissertation (Nr. 2547). Universität St. Gallen, Switzerland.

Pearce, D. 2002. "The insurance industry and the conservation of biological diversity: an analysis of the prospects for market creation." Prepared for the Working Group on Economic Aspects of Biodiversity, Organization for Economic Co-operation and Development. ENV/EPOC/GSP/BIO(2001)4/FINAL.

Subak, S. 2003. Replacing carbon lost from forests: an assessment of insurance, reserves, and expiring credits. *Climate Policy* 130:1-17.

UNEP III (UNEP Insurance Industry Initiative) 1999. The Kyoto Protocol and Beyond: Potential Implication for the Insurance Industry, Geneva

Watson, R. T. et al. 2000. *Land use, land-use change and forestry*. A special report of the Intergovernmental Panel on Climate Change. Cambridge University Press, United Kingdom.