

Implementing the Kyoto protocol: why JI and CDM show more promise than international emissions trading

Edwin Woerdman*

Department of Economics and Public Finance (ECOF), Faculty of Law, University of Groningen, P.O. Box 716, 9700 AS, Groningen, Netherlands

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Abstract

The Kyoto protocol allows developed countries to achieve cost-effective greenhouse gas emission reductions abroad by means of international emissions trading (IET), joint implementation (JI) and the clean development mechanism (CDM). The article argues that JI and CDM projects will be more effective, efficient and politically acceptable than an IET system. Firstly, *ex post* baselines will ensure real abatement for JI and CDM projects, while the allocation of ‘hot air’ entails the trading of fake emission reductions under IET. Secondly, region-by-project baseline matrices will reduce transaction costs for JI and CDM, while transaction costs may increase for IET both under various trading rules and in an upstream, hybrid or mixed domestic trading system design. Thirdly, JI and CDM have more competitive advantages than IET, for example the possibility of pre-budget banking for CDM. Fourthly, analyses of about one hundred pilot phase projects and twenty permit trading simulation studies indicate that JI and CDM will be cheaper than IET. Fifthly, JI and CDM will be more politically acceptable than IET, since they avoid the macro-level (re)distribution of property or user rights. © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The Kyoto protocol of 1997 to the Framework convention of climate change (FCCC) contains legally binding greenhouse gas (GHG) emission targets for developed countries. These so-called Annex B parties shall individually or jointly reduce their overall GHG emission level by at least 5% below 1990 levels in the commitment period 2008–2012 (Article 3.1). To reach this level Annex B parties have adopted differentiated quantified emission limitation or reduction commitments (QELRCs), such as 8% reduction for the European Community and 7% reduction for the United States. The European Community redistributed the resulting allowable emission levels, called assigned amounts, between its member states. These burden sharing negotiations resulted, for instance, in commitments of 21% reduction for Germany, stabilization for France and 27% allowable emission growth for Portugal.

The Kyoto protocol allows Annex B parties to meet these commitments partly by achieving emission reduc-

tions abroad. This enables developed countries to improve the cost-effectiveness of emission reduction, because reducing GHG emissions at an emission source in another country may be cheaper than doing so domestically. Indeed, several authors find that the marginal costs of GHG emission reduction vary greatly among the FCCC parties (e.g. Kram and Hill, 1996, p. 49). Moreover, since global warming is caused by the total accumulation of GHGs in the atmosphere, it does not matter where these uniformly mixed pollutants are produced or reduced. If parties could make optimal use of these marginal cost differences, the overall costs of combatting climate change would be reduced by almost 80% compared with domestic action only, thereby saving billions of US dollars (e.g. Richels *et al.*, 1996).

For the benefit of cross-border emission reduction, Annex B parties have to purchase emission reduction entitlements from a foreign country by implementing one or more of the so-called Kyoto mechanisms:

- international emissions trading (IET);
- joint implementation (JI), and/or;
- clean development mechanism (CDM).

* Tel.: + 0031-50-363-5770.

E-mail address: e.woerdman@rechten.rug.nl (E. Woerdman)

Within the Annex B region a developed country may purchase assigned amounts (AAs) by means of IET (Article 17), and/or emission reduction units (ERUs) from JI projects (Article 6). An Annex B party may also buy certified emission reductions (CERs) from developing countries by means of CDM projects (Article 12).

Policy makers in developed countries have to decide how much money to invest in which Kyoto mechanism(s). They have to know, among other things, which Kyoto mechanism(s) will be most effective and efficient. Unfortunately this is uncertain, because a market in emission reduction entitlements will only just develop, at least visibly, after 2008. Nevertheless, these strategic investment decisions have to be taken in the short term, especially since CERs which accrue from CDM projects between 2000 and 2008 can be banked in order to use them for the commitment period 2008–2012.

Several environmental economists claim that emission reduction entitlements from IET will be more environmentally sound and cheaper than those from JI or CDM (e.g. Tietenberg, 1992; Grubb *et al.*, 1998; Zhang and Nentjes, 1999). However, contrary to their findings, we argue that JI and CDM will be more effective, efficient and politically acceptable than IET in implementing the Kyoto protocol. This assessment is mainly based on institutional economics, transaction cost theory, baseline emission methodology and the theory of competitive advantages. Furthermore, trading simulation studies and recent empirical data from pilot phase projects of activities implemented jointly (AIJ) and from the SO₂ allowance trading market in the United States are taken into account.

The following section discusses some basic features of the Kyoto mechanisms. More detailed characteristics of these flexible instruments will be treated indirectly in the sections thereafter. Section 3 not only shows why IET will entail fake emission reductions, but also describes how real abatement from JI and CDM projects can be guaranteed. Section 4 specifies the various market design options for IET in which transaction costs may increase and expounds a method to decrease transaction costs for JI and CDM. Section 5 exposes the competitive advantages of CDM and JI in contrast with the relatively weak competitive position of IET. In Section 6 the analyses of about 100 pilot phase projects and 20 permit trading simulation studies are evaluated, indicating that JI and CDM will be cheaper than IET. Section 7 explains that JI and CDM avoid certain macro-level allocation problems, making them more politically acceptable than IET. Finally, a conclusion is presented according to which JI and CDM projects show more promise than a system of IET in realizing environmentally sound and low-cost international GHG emission reduction.

2. Some basic features of the Kyoto mechanisms

The Kyoto protocol contains three mechanisms to improve the cost-effectiveness of emission reduction, namely international emissions trading (IET), joint implementation (JI) and the clean development mechanism (CDM).

In an IET system, emission reduction is measured top-down from the national commitment, the assigned amount, which then functions as an emission ceiling (Fisher *et al.*, 1996). Article 17 specifies no other emission trade than that between the governments of developed countries. More precisely, an Annex B party which will emit more than its assigned amount is allowed to buy GHG emission reductions from an Annex B party which will emit less than its assigned amount. The emission reduction titles from emissions trading a party acquires (/transfers) from any other party shall be added to (/subtracted from) the assigned amount for the acquiring (/transferring) party (Articles 3.10 and 3.11).

According to neoclassical economic theory, firms should be able to trade directly with each other across national borders, for instance in order to minimize transaction costs (e.g. Tietenberg, 1992). The government then has to divide up its assigned amount into permits (or: allowances), allocating them to individual companies or industrial sectors. Each sovereign state has the authority to establish a domestic permit trading market. If several states would do so, their domestic schemes could eventually be connected (under certain conditions, for instance on monitoring and enforcement) to create an international permit trading market (Zhang and Nentjes, 1999). However, the principles, modalities, rules and guidelines for the trading of assigned amounts are not defined under Article 17. Decisions on the design of an international emissions trading market, in particular on verification, reporting and accountability of emissions trading, will be taken at a future session of the conference of the parties (CoP). At CoP4 in 1998 in Buenos Aires the parties drew up a work programme, the Buenos Aires plan of action, with a view to taking decisions on IET (and other Kyoto mechanisms) at CoP6 in 2000 (Carpenter *et al.*, 1998). It is possible that Parties then limit the elaboration of Protocol Article 17 to intergovernmental emissions trading.

JI and CDM are projects where emission reductions are measured bottom-up from a baseline (Van der Gaast and Woerdman, 1997). A baseline attempts to estimate future emissions at the project location in the absence of the project. A developed country may purchase emission reduction units (ERUs) by carrying out a JI project in another Annex B party (Article 6). JI host countries will be mainly Central and Eastern European countries, since their marginal abatement costs are relatively low compared with other Annex B parties (Hourcade *et al.*, 1996). A developed country may also buy certified emission

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