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Working Paper No. 299
May 2009

EU Climate Change Policy 2013-2020: Using the Clean Development Mechanism More Effectively

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Subsequently published in P.K. Gorecki, S. Lyons and R.S.J. Tol, 2010, "EU climate change policy 2013–2020: Using the Clean Development Mechanism more effectively in the non-EU-ETS Sector", Energy Policy, Vol. 38, No. 11, pp. 7466-7475.

Abstract: Under European Union proposals for CO2 emission reduction between 2013 and 2020, a Member State can transfer to another Member State the right to use its unused Clean Development Mechanism ("CDMs") credits. The paper addresses three issues in relation to these CDM Warrants ("CDMW"). First, how should the Member State treat the CDMW in making decisions concerning emission reduction? The price of the property right is an important signal for a Member State in deciding the level of domestic abatement compared to trading in CDMWs. In other words, a shadow price for CDMWs should be used in formulating the emission strategy in order to determine whether or not a member State is a buyer or seller of CDMWs. Second, what mechanism should be used to facilitate the exchange of CDMWs? The preferred mechanism depends on the market size, over which there appears to be some ambiguity: market intermediaries such as Over-the-Counter trades and exchanges are preferred if market size is small; auctions if the market size is large. Third, who should realise the value of CDMWs – the State, existing polluters etc? The value of CDM_Ws should accrue to the State.

Key words: climate change; clean development mechanism; property rights.

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*We would like to thank Kelley Ann Kizzier of the Environmental Protection Agency who answered queries concerning current and future EU environmental policy and Anthony Linehan of the National Treasury Management Agency proved details of the Agency's role in carbon trading. The usual disclaimer applied. All three authors are affiliated with the ESRI, while Richard Tol is also affiliated with the Institute for Environmental Studies and the Department of Spatial Economics, Vrije Universiteit, Amsterdam, The Netherlands. The paper was funded by the Energy Policy Research Centre at the ESRI.

EU Climate Change Policy 2013-2020: Using the Clean Development Mechanism More Effectively

1. Introduction

Under the 2008-2012 EU climate change programme, a Member State can meet part of its non-ETS emission targets through purchasing emission offsets or credits from developing (or non-Annex 1) countries through the Clean Development Mechanism ("CDM"). The credit or offset is generated by a certified CDM project that leads to a reduction in emissions in the developing country compared with a business as usual scenario. The reduction results in the issuance of a Certified Emission Reduction ("CER"), one unit of which is equal to one metric tonne of CO_2. Any unused Member State CDM credit (i.e. CERs) allocation simply lapses. It cannot be traded either within or between Member States.

Under the EU proposals for CO_2 emission reduction between 2013 and 2020 the situation with respect to the CDM credits and the non-ETS sector is to change. A new property right is to be created: a Member State can transfer annually to another Member State the right to its unused allocation of CDM credits. In other words, what is traded is the option to purchase a CDM credit, *not* the underlying asset itself. These rights will be referred to as Clean Development Mechanism Warrants or CDM_Ws. They are similar to share warrants[1] or share options.[2] The purpose of the creation of the new property right is to reduce the costs of meeting the EU emissions targets.

CDM_Ws have been assigned, in the first instance, to the Member States. These rights are likely to command a positive price. CDM credits of up to 3% of the verified 2005 non-ETS emissions of a Member State can be used annually over 2013-2020 to meet the Member State's non-ETS emission limit or target.[3] Two important issues surrounding CDM_W are, as yet, unresolved.

[1] A warrant is defined as: "A written certificate that gives the holder the right to purchase shares of a stock for a specified price within a specified period of time date." (Source: http://www.thefreedictionary.com/stock+warrant, accessed 30 March 2009).
[2] A share option is defined as: "A privilege, sold by one party to another, that gives the buyer the right, but not the obligation, to buy (call) or sell (put) a stock at an agreed-upon price within a certain period or on a specific date." (Source: http://www.investopedia.com/terms/s/stockoption.asp Accessed 30 March 2009).
[3] A further 1% can be transferred annually to another entity within the same Member State such as firm that develops CDMs. However, it is difficult to see where the demand for this developing since the Member State is also the one that uses the CDM credits. Therefore the paper does not deal with this aspect of CDMs and EU climate change policy. It also envisaged that for twelve Member States, including Ireland, an additional 1% of can come from CDM projects in the least developed and small island developing states. However, these CDM credits are non-transferable and hence are not considered in this paper. For details see the CEC (2008c) and the EU Parliament's proposal on these issues, discussed in section 5 below.

- First, how should the Member State treat the CDM_W in making decisions concerning emission reduction in the non-ETS sector?

- Second, what mechanism should be used to facilitate the exchange of CDM_Ws?

- Third, who should realise the value of CDM_Ws – the State, existing polluters etc?

The purpose of this paper is to contribute to the debate on resolving these two issues.

Sections 2 through 5 set the background. Attention is focussed on 2008-2012, immediately preceding the introduction of CDM_Ws. These years coincide with the first commitment period under the Kyoto Protocol ("KP") during which EU and other industrialised countries – referred to as Annex 1 countries – must meet their targets to restrict greenhouse gases. Although the EU has set out emission reduction targets for the period 2013-2020, discussions on the successor to the KP are due to commence in Copenhagen in December 2009. Depending on what emerges from Copenhagen, the analysis and conclusions in the paper may need to be modified and revised.

Section 2 discusses briefly the current EU regime for CO_2 emission control, paying particular attention to the non-ETS sector, while Section 3 defines and discusses the role of CDMs. Section 4 discusses the interaction between, on the one hand, the ETS and non-ETS sectors and, on the other hand, CDMs.

Section 5 presents the rationale and key features of the CDM_Ws, while section 6 sets out two general principles that should guide policy in addressing the two questions posed above. Section 7 evaluates three alternative treatments of CDM_Ws and also considers the issue of the appropriate mechanism for exchanging CDM_Ws. The final section of the paper returns to the three questions posed above.

2. EU CO_2 Emission Targets & Regulation: 2008-2012

The EU sets a limit or maximum level of CO_2 emissions,[4] referred to as allowances, for each Member State. One EU Allowance Unit ("EUA") is equivalent to one tonne of CO_2. The level of allowances is set to restrict emissions below what they otherwise would be. For the EU as a whole the target is to reduce emissions by 8% over the

[4] Non-CO2 emissions are converted into CO2 emissions.

period 2008-2012 compared to the 1990 level. In the case of Ireland its allowances are set at 13% above the 1990 level of CO_2 emissions; in 2005 Ireland's actual CO_2 emissions were 25% above the 1990 level (EPA, 2008, p. 6). In other words, the target level of emissions is a binding constraint for most participants. Despite the recession it appears that the target is still binding.[5]

Each Member State has to design a National Action Plan ("NAP"), which demonstrates how it intends to conform to EU Emissions Trading Directive (Directive 2003/87/EC).[6] The current NAP covers 2008-2012. The NAP: divides the overall allowance of a Member State into the EU ETS sector and the non-ETS sector; and, within the EU ETS sector, how the allowances will be distributed. The NAP also considers emission reduction in the non-ETS sector. In Ireland the NAP is designed by the Environmental Protection Agency ("EPA"), within parameters set by government.[7]

The EU ETS sector accounts for about a third of Ireland's CO_2 emissions as projected over the period 2008-2012 (EPA, 2006, p. 9). Under the 2008-2012 NAP, the EU ETS and non-ETS allowances have to be complied with separately; there can be no transfers of allowances between the two sectors, either directly or indirectly. The allowances are set for the five year period as a whole.

EU ETS – the Traded Sector

In Ireland's NAP the EU ETS sector is divided into: general; cement; and power generation.[8] Allowances are first made to these groups and then, within each group, to individual emission sources, referred to as installations. In general these installations are large readily identified point emissions e.g. a brewery, an aluminium smelter, a power plant, a petroleum refinery or cement works.

The Member State has little discretion in the mechanism selected to allocate the allowances to installations for the period 2008-2012. The relevant EU Directive states that at least 90% of allowances should be distributed free of charge (EPA, 2008,

[5] See EPA (2009) for details.
[6] For details of Ireland's NAP see EPA (2006, 2008).
[7] See EPA (2006, 2008) for details.
[8] Other Member States may also include, iron and steel, certain mineral industries and pulp and paper. It appears that power generation is the most important source of CO2 emissions. In 2005 this sector accounted for 62% of all EU ETS allowances. For details see Matthes & Neuhoff (2007, pp. 23-24).

p.3). The allowances are assigned based on historic levels of emission of an installation (EPA, 2008, pp 14-15). In other words, the more you polluted in the past, the bigger the allowance assigned today. There is also an allowance reserve for new entrants into activities covered by the EU ETS.

The remaining 10% of EU ETS allowances could be auctioned or grandfathered or allocated in some other transparent way by the member state. Ireland chose to distribute 9.5% free to existing and new installations, with 0.5% sold to recover the cost of administering the emission scheme (EPA, 2008, p.5).[9] Ireland retires unused allowances set aside for new entrants and, as such, these allowances contribute towards Ireland meeting its emission targets (EPA, 2008, p. 13). Ireland has thus waived its right to auction EU ETS allowances.[10] Germany (9%), the UK (7%), the Netherlands (3.7%), and Austria (1.3%) have chosen to auction at least part of their EU ETS allocation.[11] Other Member States may follow.

In Ireland allowances are issued annually by the EPA based on the 2003-2004 emissions of an installation (EPA, 2008, p.5). The installation receives the same annual allocation each year between 2008 and 2012. Thus the installation is provided with certainty concerning the allowance that it will be assigned.[12] Of course, if the installation ceases production then it is no longer assigned an allowance.

The installation must, at the end of the year, hold allowances equal to its emissions that year. The emissions can be greater than, equal to or less than the level of allowances that the EPA assigns the installation at the beginning of the year.

The allowances assigned to an installation can be traded or exchanged by the installation's owners – CRH plc, Diageo Ireland, the Electricity Supply Board, Conoco Philips Whitegate Refinery Limited and so on - within a Member State and across Member States.

An active EU ETS market has developed in these allowances. It grew between 2005 and 2007 from 322 million tons of CO_2 to 2,061 million tons of CO_2 in 2007.[13] These

[9] The 0.5% will be sold for the EPA by the NTMA. The first tranche of 185,000 EUAs were sold in December 2008.
[10] A change would require the approval of the Dail and the Commission.
[11] For details see: http://ec.europa.eu/environment/climat/emission/auctioning_en.htm
[12] These are notified to the Commission and published on its website: http://ec.europa.eu/environment/climat/emission/pdf/initial_nap/ie.xls. (Accessed on 30 March 2009).
[13] All data in this and the next paragraph is taken from Capoor & Ambrosi (2006, Table 2, p. 13; 2008, Table 2, p. 7).

volumes refer to spot, future and options trades. Futures contracts account for the major part of the value and volume of transactions.

The EU ETS market is by far the largest market for CO_2 in the world, accounting for 99% of CO_2 traded by value in 2007 Although the current EU ETS trading period began on 1 January 2008, it nevertheless had the experience of the pilot phase of EU ETS trading between 2005-2007, during which an installation's emissions were capped and trading allowed.

Eighty per cent of transaction volumes according to Capoor & Ambrosi (2008, p. 8) were conducted in 2007 were over the counter ("OTC")[14] with the London Energy Brokers Association ("LEBA") accounting for slightly over 50%. The European Climate Exchange ("ECX") accounted for more than 84% of exchange-traded transactions. There are at least five other exchanges,[15] with prices posted on the internet.[16]

The traders in the EU ETS market include installations, market intermediaries (e.g. trading houses, aggregators etc) and asset managers (e.g. investors carbon funds, hedge funds). Capoor & Ambrosi (2008, p. 61) observe that banks entered the carbon market massively in 2007.

The EU ETS trading system is underpinned by the Community Independent Transaction Log ("CITL") that connects Member State registries and maintains an independent record of the issuance, transfer, cancellation, retirement and banking of allowances. [17] It has no role in relation to the financial aspects of a transaction and contains no information on prices. The CITL has been in operation since 2005.

[14] In the OTC market, trading occurs via a network of middlemen, called dealers, who carry inventories of securities to facilitate the buy and sell orders of investors, rather than providing the order matchmaking service seen in specialist exchanges such as the NYSE. Definition from: http://www.answers.com/topic/over-the-counter-finance. Accessed 19 February 2009.

[15] European Climate Exchange (ECX) based in London and Amsterdam started in April 2005
Nordic Power Exchange (Nord Pool) in Norway began in February 2005
BlueNext in France started in June 2005 (Powernext Carbon became BlueNext on January 2008)
European Energy Exchange (EEX) in Germany began in March 2005
Energy Exchange Austria (EEA) in Austria began in June 2005
SendeCO2 in Spain started at the end of 2005.

[16] See, for example,
http://www.eex.com/en/Market%20Data/Trading%20Data/Emission%20Rights/Emission%20Futures%20%7C%20Derivatives/futures-table/2008-09-29#EUA

[17] For an animated presentation showing the interaction of the CITL and the Member State Registries with respect to several transactions see:
http://ec.europa.eu/environment/climat/emission/citl_en.htm

It is mandatory for each Member State to have a national registry. These registries will ensure the accurate accounting of all units under the Kyoto Protocol plus the accurate accounting of allowances under the EU scheme for greenhouse gas emission allowance trading. Not only companies but also natural persons may open an account in any EU registry. For example, environmentalists could purchase and retire permits so as to make targets stricter. Registration of unregulated firms enables intermediaries and traders to participate in the EU ETS market.

Ireland is a small player in the EU ETS market: it accounts for only 1% of all EU allowances under the EU ETS; and, around 100 of the 10,000 installations covered by the EU ETS scheme across the EU. Thus Ireland, or more accurately installations located in the Republic of Ireland, is a price taker in this market.[18] Furthermore this market, like any other, will be subject to the competition rules of the EU, as EU ETS exchanges effect trade between member states.

Each installation has to make a decision concerning how much CO_2 to emit annually, subject to the constraint that at the end of the year it has enough allowances to match its emissions. In this respect it has a number of choices:

- First, the installation may engage in *abatement efforts* so that the installation emits less CO_2. It will be profitable for the installation to do so until the marginal cost of reducing or abating a metric tonne of CO_2 is equal to the price of an ETS allowance for one metric tonne (assuming that the marginal cost of trading is zero).

- Second, the installation may *purchase or sell allowances (i.e. EUAs)* on the EU ETS market. If its abatement efforts plus its assigned allowances are less than its volume of emissions it will have to buy EUAs. On the other hand, if its abatement efforts plus its assigned allowances are greater than the volume of its emissions then it can sell the surplus EUAs.

- Third, the installation could: (a) *fund and develop a CDM project* which would generate a CDM credit or CER; or (b) *purchase a CDM credit in the secondary market*, if its abatement efforts and assigned allowances fall short of its verified emissions. CERs can be included in the allowances an installation surrenders, given its verified emissions.[19]

[18] The 1% is based on the experimental period 2005-2007. There is no reason to think the share has changed for 2008-2012. For details see Annex to:
http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/05/84&format=HTML&aged=1&language=EN&guiLanguage=en

[19] It should be noted that the Joint Implementation ("JI") can also be used. However, to date it appears to be relatively little used in Ireland. For details see Section 4 below.

Thus if an installation requires additional allowances it can either purchase EUAs or develop/purchase CDM credits.

It appears that installations in Ireland are overall net purchasers on the EU ETS market. In 2005 installations were allocated 19.237 million tonnes CO_2, but actually emitted 22.398 m tCO_2, a difference of 16% of the allowances awarded. However, there was a substantial variation by installation. For example, Scotchtown Cement Works had an allocation of 879,739 tCO_2, but its emissions were 1,028,010 tCO_2.[20]

Non-ETS – the Non-Traded Sector

The non-ETS sector is the rest of the economy not covered by the EU ETS arrangements. Typically here CO_2 emissions are from small scale sources such as transport (e.g. cars, trucks), buildings (e.g. heating), services, agriculture and waste.

In order to meet its emission limits in the non-ETS sector, Ireland has introduced a range of measures set out in the NAP (EPA, 2006). These measures vary from a Greener Homes Grant Scheme to integration of land-use planning and transport development. However, these measures do not include any economic instruments similar to those outlined above for installations in the EU ETS sector.

Individual emission sources are not constrained with respect to their emissions beyond the usual profit and loss calculus with respect to the price of energy. Of course, that would change if Ireland introduced a carbon tax on the non-ETS sector.[21]

One of the mechanisms that the government can use to meet emission targets in the non-ETS sector is to fund and develop CDMs that yield CDM credits or purchase these credits – CERs - in the secondary market. The CERs will count towards meeting the emission limit in the non-ETS sector.

[20] Data source: http://ec.europa.eu/environment/climat/emission/pdf/citl_2005/citl_ireland.pdf
[21] See Tol et al (2008) for a discussion of the carbon tax.

Conclusion

Market mechanisms are used extensively in the EU ETS sector to allocate and price CO_2 allowances - EUAs. Installations trade EUAs OTC and through exchanges, while a small but increasing number of Member States auction off up to 10% of their ETS emission limit. In contrast, in the non-ETS sector very little use is made of market mechanisms or alternative economic instruments such as a carbon tax. That is about to change with the proposals for the non-ETS sector for 2013-2020.

3. The Kyoto Protocol Clean Development Mechanism

The Clean Development Mechanism[22] is a project based method of securing reductions in CO_2 emissions. The CDM is part of the Kyoto Protocol ("KP"). As noted above each CDM project is given one or more CERs. CERs can be sold and traded internationally between Annex 1 (i.e. developers/funders & purchasers) and non-Annex 1 (i.e. suppliers) countries.

An example of a CDM project is a biogas plant for electricity generation that replaces the use of wood fuel for cooking and kerosene for lighting in a non-Annex 1 country.[23] The current arrangements cause high local air pollution and health problems, while the biogas plant would result in low air pollution and positive health benefits. The CDM project also lowers carbon dioxide emissions compared to business as usual resulting in the issuing of CDM credits or CERs.

Under the KP, Annex 1 countries are constrained in their total emissions; non-Annex 1 countries are not constrained. The close to 40 Annex 1 countries are those with high income per capita such as Ireland and other EU Member States (Lee, 2004, Table 15, p. 74), the non-Annex 1 countries generally have low income per capita.

If a non-Annex 1 country reduces its emissions through a CDM project, compared to business as usual,[24] then the CERs can be credited to the meeting of the emissions target of an Annex 1 country. The non-Annex 1 country gains investment and

[22] For a discussion of CDMs see Ellis et al (2007), Haites (2000); Lee (2004); and Michaelowa & Jotzo (2005).
[23] The example is based on Lee (2004, Table 3, p. 26).
[24] For example, the CDM project could be a biogas plant for electricity production that might replace wood fuel for cooking and kerosene for cooking. For details see Lee (2004, p. 26).

sustainable projects increasing their welfare. The Annex 1 country is able to meet its emission targets at lower cost. Thus both sides gain.

CDMs are funded and developed by private firms, international organisations (e.g. the World Bank), public-private partnership funds and governments (e.g. Netherlands). In some instances the CDM projects are funded directly, in others by way of tender.

There are also bilateral agreements between Annex 1 and non-Annex 1 countries to develop CDMs. In other cases, private funds such as ICECAP are set up for the purpose of funding and developing CERs.[25] Not surprisingly, a market has developed for intermediaries with expertise in developing CDM projects. For example, ESB International advertises a Carbon Solution Business, which includes CDMs,[26] while Agcert, part of the AES Corporation, located in Dublin, has created large aggregations of CERs from the agriculture sector.[27]

Administration

The administration of CDMs is through the United Nations Framework Convention on Climate Change Executive Board ("EB"), which consists of 10 members, including one from each of the five official UN regions and two each from Annex 1 and non-Annex 1 countries. The administration is responsible for establishing processes and procedures validating and verifying a CDM project, issuing a CER and monitoring the emissions reduction of a CDM project (Lee, 2004). This has led to substantial transaction costs in getting CDM projects approved (Michaelowa & Jotzo, 2005), which critics argue have not declined as might be expected as familiarity with the system increased (Capoor & Ambrosi, 2008, p. 4).

A CDM project participant needs to be approved by an Annex 1 country, while the project itself needs to be approved by the non-Annex 1 country which then refers the application to the Executive Board. It is the Executive Board that accredits independent organisations that will validate CDM projects.

[25] For details see Lee (2004, p. 77-79).
[26] For details see www.esbi.ie/activities/esbi_cs.html. (Accessed on 10 February 2009)
[27] For details see http://www.agcert.com/aboutus.aspx. (Accessed on 1 April 2009).

In the EU any Member State can approve a CDM project participant. However, in practice it appears that the UK and the Netherlands are responsible for approving most CDM project participants. The popularity of these jurisdictions probably reflects the absence of administrative fees. In contrast, Ireland charges for approval of CDM projects and hence accounts for few projects. [28] Indeed, it appears that as of 31 March 2009 Ireland had issued only one letter of approval for a CDM project and none had been approved by the EB. [29]

Underpinning the CDM Market: Registries

The CDM market is underpinned by the International Transaction Log ("ITL") and a CDM registry as well as national registries of countries that have ratified the KP that play analogous roles to their counterparts in the EU set out above.[30] The ITL validates transactions proposed by registries. It builds up records of holdings and transactions and provides certainty of delivery of carbon to the market.

The CDM registry issues CERs generated by CDM projects, distributes CERs to CDM project participants and forwards CERs to national registers. The ITL was developed later than the CITL reflecting the fact that the CITL operated during the pilot phase of EU ETS, while the ITL only came into effect with the coming into effect of the KP in 2008.

In 2008 the EU's CITL and Member States registries were linked to the ITL.[31] The link means that CERs can be transferred to the registries of Member States. In other words, a company can transfer CERs into their accounts in Member State registries. With the CITL and the ITL linked, each Member State registry will be connected to the ITL only and each transaction involving a Member State will be passed on to the CITL only for recording and additional checks.

CDM Market

The CDM market can be divided into primary and secondary. The primary market refers to the funding and development of CDM projects, together with the associated

[28] The EPA website contains a form entitled, "CDM – Approval Application Form". For details see: http://www.epa.ie/downloads/forms/etu/irl%20cdm%20032-11.xls
[29] It should be noted that the letter of approval only approves the participant as an investor in the CDM project and does not carry any approval concerning the project itself. Based on information provided by the EPA.
[30] This discussion follows Howard (2005).
[31] This discussion is based on CEC (2008b).

CERs. The secondary market refers to the trading of CERs, whereby the original owner of the CDM project trade the emission reductions to another party. Overtime the relative importance of the secondary market has increased: in 2005 it accounted for only 8% of the CDM market by value; in 2007 the secondary market accounted for 42% by value of the CDM market.[32]

In terms of buyers of primary CDMs, the EU as a whole accounted for 87% in 2007 of volumes purchased, compared to 81% in 2006.[33] Within the EU the leading buyer is the UK, accounting for 59% of all CDMs in 2007, up from 54% in 2006. Other EU countries that were important purchasers included Europe-Baltic Sea (12%), and Italy and Spain at 4% each. Outside the EU the leading buyer was Japan at 11% in 2007 up from 6% in 2006.

China is by far the leading supplier of CDM projects. In 2007 it accounted for 73% of volumes supplied, up from 54% in 2006. Brazil and India each accounted for 6% in 2007, a drop in market share compared to 2006. It seems as though China will maintain its leading position, given the large number of projects it has in the pipeline (Capoor & Ambrosi, 2008, pp. 28-29).

The supply of CDM projects has expanded rapidly in recent years. In 2004 there was less than 100 m tCO_2e; by 2007 this had increased to approximately 550 m tCO_2e.[34]

The prices of CERs are published on a daily basis.[35] However, according to Lee (2004, p.65) CER prices vary according to "risks, technology type and social development components." In view of the fact that the overwhelming proportion of funders and developers of CDM projects are from the EU it is not surprising that the EU ETS price influences the CER price. However, it appears that in more recent times the two markets may have become decoupled (Capoor & Ambrosi, 2008). CERs usually trade at a discount to EUAs.

[32] For details see Capoor & Ambrosi (2007, Table 1, p. 3; 2008, Table 1, p.1).
[33] For details see Capoor & Ambrosi (2008, Figure 4, p. 25). The data refer to primary CDMs as shares of volumes purchased, vintages up to 2012. The data also includes JIs, but since these are quite unimportant the distribution will largely reflect CDMs. It should be noted that the CDMs of funds are allocated to the countries in proportion to the countries that hold shares in the fund.
[34] Capoor & Ambrosi (2008, Figure 1, p. 20). The volumes refer to project based emission reductions transactions for vintages up to 2012.
[35] http://www.eex.com/en/Market%20Data/Trading%20Data/Emission%20Rights/Emission%20Futures%20%7C%20Derivatives/futures-table/2008-09-29#EUA

4. Interaction of EU Emissions Policy and CDMs: 2008-2012

In this section we consider the role of CERs in the EU ETS and the non-ETS sectors. It should be noted that the CDMs are what is referred to under the KP as a 'flexible mechanism'. Flexible mechanisms under KP also refer to Joint Implementation projects ("JI") which are similar to CDMs but intra-Annex 1 countries, where the credits earned are referred to as Emission Reduction Units ("ERU"). In any event JIs are considerably less developed than CDMs. According to the NTMA (2008, p.12) the 1,000th CDM project was approved in April 2008, but there are only two JI projects registered and no ERUs issued.

CDMs & the EU ETS Sector

In Ireland, initially, an upper limit of 50% of each installation's emission's target could be met though flexible mechanisms under KP (EPA, 2006. p. 27). Subsequently the limit for the period 2008-2012 was set at 11% of the allocation to each installation in the power generation and in the cement sectors, and 5% in the general sector (EPA, 2008, p.5). This reduction was one of the conditions imposed on Ireland before the EU would accept its NAP (EPA, 2008, p.3).

The right to fund and develop CDMs and purchase CERs in the secondary market up to these limits have been assigned to the owners of the various installations free of charge. This is consistent with the overall policy stance of Ireland of distributing allowances free of charge to existing sources of pollution. Change would require both legislation and approval by the Commission.

Once a CDM project is approved and the CERs certified, the funder can use the CERs as part of the allowances it surrenders to match its emissions. Alternatively the CERs can be purchased in the secondary market. It appears that the owners of the installations in Ireland are active on the secondary market for CERs. These firms may also be funding and developing CDM projects, but routing the applications through the UK and/or the Netherlands rather than Ireland.

CDMs and the Non-ETS Sector

In the non-traded sector, the State is responsible for the reduction of CO_2 emissions through a whole series of actions noted above, including CERs.

The State has decided to purchase a maximum of 18.035 million allowances (i.e. emission credits) on the international market[36] to ensure that Ireland has sufficient allowances to comply with the KP commitments in the non-traded sector. The indicative totals suggest that Ireland will 8% of its non-ETS allowances over the period 2008 to 2012 through purchase of CDM credits.[37] These are self-imposed limits. However, the adoption of additional policies to reduce emissions in the non-ETS sector has meant that the maximum may not be required (EPA, 2008, p. 9). Of course, the shortfall is likely to be reinforced by the subsequent recession.

The government created a Carbon Fund under the *Carbon Fund Act 2007* which is administered by the National Treasury Management Agency (NTMA). According to the 2007 *Annual Report of the Carbon Fund*, investments have been made in three funds: European Bank for Reconstruction and Development ("EBRD") Multilateral Carbon Credit Fund; the World Bank Carbon Fund for Europe; and the World Bank BioCarbon Fund (NTMA, 2008, p. 14).

In terms of expenditure the National Development Plan 2007-2013 approved €270 million for purchase of carbon credits. There was a prior commitment of €20 million by the Minister for the Environment, Heritage and Local Government in these funds (NTMA, 2008, p. 29).

5. CDM_Ws: Rationale and Key Issues

The Problem

The EU is anxious that the CDM should continue as a method for emission reduction. Since CDM projects require a lead time for planning and yield benefits – measured in CERs – over a period of years, it is important for CDM suppliers to have certainty over future demand. At the present time the KP, which governs the creation of these

[36] This refers to both CDMs and JIs.
[37] In terms of overall allowances this is equivalent to 6%. For details see EPA (2006, p. 5,927).

rights, is to expire in 2012. A meeting scheduled at the end of 2009 in Copenhagen will discuss a successor to the KP. The difficulty of reaching an agreement as well as its uncertainty about its contents is likely to adversely effect the development of CDMs that yield CERs post-2012. By taking timely action well ahead of December 2009, the EU hopes to provide a lead for the Copenhagen conference and increase certainty concerning future demand for CDM credits post 2012.

The Solution

At the present time – 2008-2012 – in the non-ETS sector a Member State can meet a certain portion of their emission target through CDMs. The CERs from that accrue from these CDMs can only be used to satisfy meeting the limit set for emission levels in the non-ETS sector in a particular Member State. That is about to change.

Under the EU proposals for 2013-2020, a Member State can transfer up to 3% of any unused CDMs to another Member State (i.e. CDM_Ws as defined in the Introduction).[38] The European Parliament's wording in this respect might be usefully quoted:[39]

> (*16*) The continued ability for Member States to use CDM credits is important to help ensure a market for those credits after 2012. To help ensure such market as well as to ensure further greenhouse gas emission reductions within the Community and thus enhance the implementation of the objectives of the Community relating to renewable energy, ***energy efficiency,*** energy security, innovation and competitiveness, it is proposed to allow the annual use by Member States of credits from greenhouse gas emission reduction projects in third countries ***up to a quantity representing 3% of the greenhouse gas emissions of each Member State not covered under Directive 2003/87/EC in the year 2005 or in other Member States*** , until a future international agreement on climate change has been reached. Member States should be allowed to transfer the unused part of that quantity to other Member States (emphasis in original).

[38] As noted in footnote 3 above, CDM credits may be used to meet more than 3% of a Member States non-ETS emission target. However, for reasons set out in that footnote these are not considered in this paper.

[39] European Parliament legislative resolution of 17 December 2008 on the proposal for a decision of the European Parliament and of the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (COM(2008)0017 – C6-0041/2008 – 2008/0014(COD)). This may be accessed at:http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0611+0+DOC+XML+V0//EN&language=EN#BKMD-18

Four observations can be made about the proposal:

- Since the EU is the major buyer of CDM credits, its commitment to continue to purchase CERs to 2020 will be an important signal on which participants can rely to further develop the market. The evidence cited above demonstrates that the supply of CDMs has been rapid, as judged by the growth in CDMs and the volume in the pipeline.

- The CDM is to continue to assist the EU in meeting its energy efficiency goals, but the share of EU non-ETS emissions that can be accounted for by CDM credits appears to be lower than at present. In the case of Ireland, for example, under the 2008-2012 NAP 8% of the non-ETS emission limit can be met through CDM credits, compared to between 3-5% in 2013-2020.

- The creation of a new property right, the CDM_W, that can be traded between Member States. These property rights are owned, initially at least, by the Member State. There are well developed markets for warrants and options for other assets such as shares and commodities and hence there is no reason – providing the right structures are put in place – why a CDM_W market should not develop as well.[40]

- The CDM_W property right will acquire a value. Supply is reduced while demand is likely to increase. The share of CDM credits that can count towards meeting the non-ETS emission limits is halved, while the demand for CERs is increased because the non-ETS emission limits have been reduced. In Ireland's case greenhouse gas limits for 2020 are set at 20% below those of 2005 (CEC, 2008a, Annex, p. 15).

Conclusion

It should be noted that both the continuation of the status quo and the creation of the CDM_W property address the problem as identified above. However, the choice of the CDM_W over the status quo reflects the fact CDM_Ws offer a more cost effective way of reducing emissions. This will be discussed further in section 6 below.

6. Two Principles to Guide CDM_W Policy

In deciding policy towards the CDM_W it is proposed that two principles should be employed. The first concerns the correct pricing of CDM_Ws is used when the Member State decides how to meet its non-ETS emission limits for 2013-2020, the second, given that the CDM_Ws will acquire a value, how the Member State should allocate those rights.

[40] This is discussed further below in section 7 below.

Principle One: Meeting Non-ETS Emission Limits Cost Effectively

The first principle is that the emission limits set for a Member State should be achieved at minimum cost. This principle is clearly consistent with the general tenor of EU emission and climate change policy. This means that, at the margin, the abatement cost per tCO_2 should be the same for all non-ETS emission sources. If this is not the case then it is possible to increase abatement efforts where the marginal abatement costs are low and reduce these efforts where the costs are high and overall costs will decline.

In undertaking this exercise it is important that CDM_Ws are correctly priced. The appropriate price or abatement cost of using a CER is the price of the CDM_W plus the price of the CER in either the primary or secondary market. It is not just the price of the CER.

An example will illustrate the merits of this approach. Suppose the marginal cost of abatement in Member State A in the non-ETS sector is €50.00, while in Member State B it is €30. If both Member States price the CDM_W at zero and consider only the CER price of €20, then both Member States will use their full allocation of CDM_W towards meeting their non-ETS target - scenario 1 in Table 1. In such a case the CER price is less than the cost of abatement and so the Member State will have no incentive to sell the CDM_Ws. No CDM_Ws will be traded between Member States.

However, suppose that the two Member States were to consider the opportunity cost of the CDM_Ws – scenario 2 in Table 1. In other words, CDM_Ws have positive value, which for illustrative purposes is €15. Member State B would sell its CDM_Ws to Member State A. This reflects the fact that for Member State A less resources are used in abatement - €30 – compared with the cost of the CDM_W+CER at €35. The Member State will be better off by €5.00. In contrast, Member State A will purchase a CDM_W for €15 since the price of the CDM_W+CER is less than the marginal cost of abatement at €50. Member State B will be better off by €15. More emission reduction will take place in the Member State where the cost is less (i.e. B), rather than the Member State where the cost is higher (i.e. A).

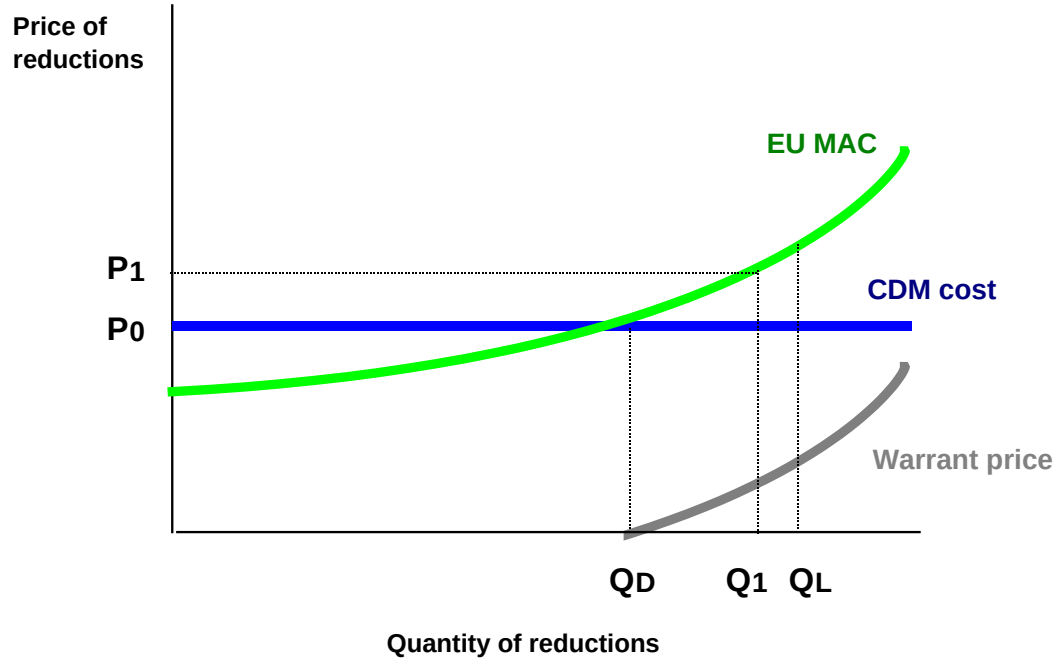
Table 1
Alternative Treatment of CDM_Ws: Two Scenarios

Member State	Marginal Cost of Abatement	CER Price	CDM_W Price	Trades
Scenario 1: CDM_W price treated as though zero				
A	€50	€20	Treated as zero	None
B	€30	€20	Treated as zero	None
Scenario 2¨CDM_W price treated as non-zero – the market price				
A	€50	€20	€15	A will buy CDM_W
B	€30	€20	€15	B will sell CDM_W

Source: See text.

In the above example it is assumed that the limits set for CDMs will be binding, thus giving rise to a positive value for CDM_Ws. However, the limits may not be binding and then the price of a CDM_W would be zero. This is illustrated in Figure 1 below.

Figure 1
Illustration of Price of Reducing CO_2 emissions in European Union Using the Clean Development Mechanism



MAC = marginal abatement cost.
Source: See text.

Assume that the price of a CDM credit or CER is set on the world market, with constant marginal cost (P_0).[41] The Y axis shows the marginal abatement cost curve ("MAC") for meeting the EU's aggregate reduction limit, while the X axis shows the limit, (Q_L), in tonnes of CO_2. If there is no limit on the use of CDM credits, or the 3%

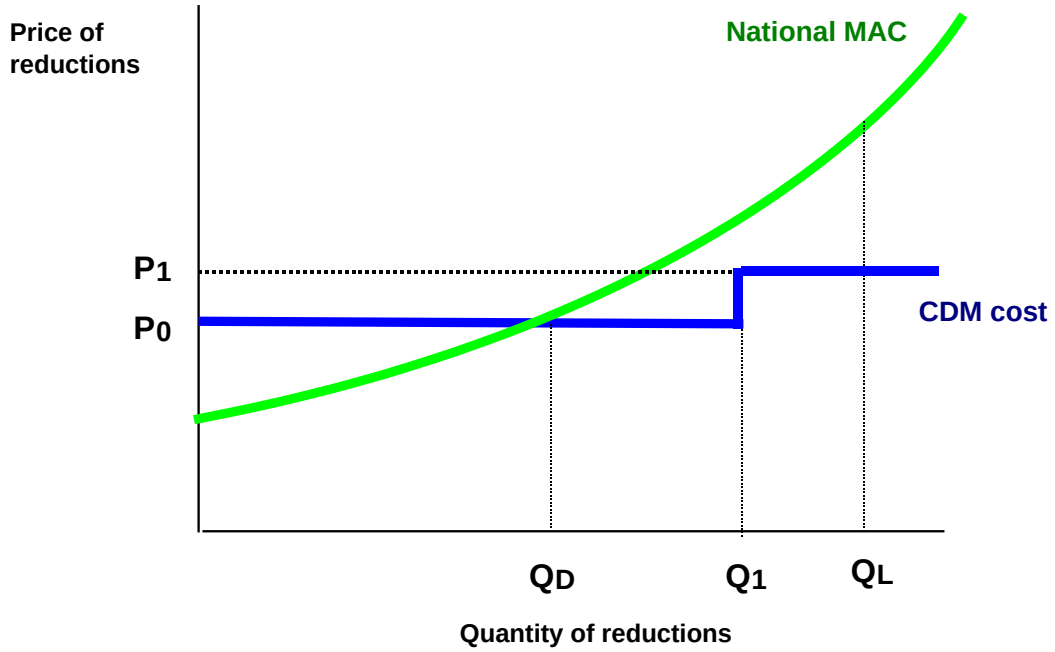
[41] Ignore P_1 and Q_1 for the moment.

limit is non-binding, Member States will buy Q_L-Q_D CDM credits. CDM_Ws will command a zero price, since Member State's will not have exhausted their 3% CDM credit allocation. The prevailing price of CERs in the EU will be close to the world price of CERs (P_0). The marginal cost of compliance will follow the EU marginal abatement curve until (Q_D, P_0) beyond which it will remain constant at the world CDM price. Total cost of compliance for the EU will be the area under this curve.

The more interesting case is where the EU faces a binding target on its aggregate use of CDMs. Assume that only Q_L-Q_1 CDMs may be used – this is equivalent to the 3% allocation. If all EU Member States use their CDM rights in an economically efficient way, buyers would be prepared to pay P_1 for a CDM credit or CER. If the CDM_W market is competitive and there are no transaction costs, CDM_Ws will trade at P_1-P_0. If the market is less than perfectly competitive or there are transaction costs, CDM_W prices will be lower than P_1-P_0. The Member State that is a net purchaser of CDMs will pay P_1- P_0 for a CDM_W to a Member State(s) that is a net seller, and then purchase a CER on the world market at price P_0. Member States with relatively low marginal abatement costs will be able to sell CDM_Ws and thus capture the rent created by the constraint.

Now consider a Member State that has high marginal abatement costs relative to the rest of the EU. (For details see Figure 2 below). This Member State will use domestic abatement up to Q_D, develop or purchase Q_1-Q_D CDM credits using the 3% allocation to Member States and purchase Q_L-Q_1 CDM_Ws from another Member State(s). If total EU use of CDM credits does not face a binding constraint, as with Figure 1, CDM_Ws are priced at zero. However, if the 3% EU constraint is binding, the Member State will pay P_1- P_0 for CDM_Ws (where P_1 is the same as P_1 in Figure 1 above), plus P_0 for the CDM credit. Moreover, the domestically-developed/purchased CDM credits should also be valued in a similar manner, since the CDM_W is the opportunity cost for the Member State using its 3% allocation to meet its domestic target.

Figure 2
Illustration of Price of Reducing CO_2 Emissions in a high MAC Member State Using the Clean Development Mechanism



MAC = marginal abatement cost.
Source: See text.

Principle Two: Maximizing the Value of the Tradable Rights to CDMs for the Member State

The second general principle is that the value of the CDM_Ws should be maximised and accrue to the Member State. These are valuable rights and it is not at all clear that they should be distributed free to, for example, the ESB to develop through its carbon solution arm. The allocation of EUA rights under the EU ETS 2008-2012 on a free of charge basis has been severely criticised in that it leads to inefficiency and distortions (e.g. Matthes & Neuhoff, 2007).

Conclusion

The two general principles are mutually reinforcing. The more that a Member State treats the CDM_Ws as a valuable property right, the more likely it is that they will be valued correctly in the decision as to how many should be used to meet the Member State's non-ETS emission limit and how much should be traded. Furthermore, if the

CDM_Ws are valued in a transparent and open way, then it is much more difficult for a Member State to assign them free of charge to another entity to develop or sell.

7. Policy Options for Trading Warrants in CDMs – CDM_Ws

Attention is now turned to three alternative treatments of the CDM_Ws the degree to which they are consistent with the two general principles.

Separate the Abatement Decision from the Rights Decision

Analytically and conceptually the cleanest and simplest option for the Member State is to separate the decision as to the determination of the volume of CERs to be used in meeting its non-ETS emission limit from the decision as to how to best maximise the value of the CDM_W rights. The two decisions are not, of course, completely divorced since in determining the volume of CDM credits to be used in meeting the non-ETS emission limit, a price for the CDM_W needs to be taken into account. But how would it work?

The Member State would – as with the current NAP – design a plan to meet the emission limit for the non-ETS sector. The NAP would carefully evaluate the abatement costs from the various domestic emission sources such as transport, waste, agriculture and so on. Estimates would then be made of the marginal abatement costs of the various polices to reduce emissions to the level required by the EU limits.

Next consideration of the use of CDM credits would be taken into account. The price of CERs and CDM_Ws would provide a benchmark against which to make the decision as to whether or not to purchase or sell CDM_Ws. Here the Member State – as in the above example – compares its abatement costs with the cost of the CER+CDM_W. If the abatement costs are greater than the CER+CDM_W price then the Member State will buy CDM_Ws as well as CERs and not undertake additional domestic CO_2 abatement; if less than then the Member State will sell its CDM_Ws and undertake extra domestic abatement. At the same time the Member State would instruct an agency, such as the NTMA in the case of Ireland, to maximise the return from its CDM_Ws.

Two Problems

There are least two potential problems with such a solution. First, it presupposes that a CDM_W market will develop. A possible difficult occurs when the final user of the CDM_Ws are Member States, since the CERs purchased by the CDM_Ws are used to meet their non-ETS emission targets. Second, the solution assumes that there will be zero transaction costs.

What Market Mechanism?

It seems reasonable to assume that an OTC and perhaps exchange market would develop for CDM_Ws that parallels the existing CER market described above, while the existing system of national registries could be used to certify transfers of ownership. The same brokers and dealers who are concerned with CERs could easily develop an expertise in trading CDM_Ws. Indeed it would build upon their knowledge and skills. Furthermore, as with EUAs and CERs, no restrictions should be placed on ownership of CDM_Ws since market traders may have different expectations to Member States and thus should be permitted to operate in the market should they so wish. Furthermore these market intermediaries are likely to develop products such as a futures market and various other hedges that may be of value to Member States. Hence even though the Member State will, in the final analysis, be the user of the CDM_Ws[42] market intermediaries can perform valuable roles of assistance to Member States.

In a related paper, Gorecki et al (2009) consider the appropriate market mechanism for a different property right that will be created under the EU climate change policy for 2013-2020. This is the right of a Member State to transfer to another Member State part of their allowed emission allocation in the non-ETS sector, which is referred to as Transfer Emission Units or TEUs. Three different mechanisms were considered: market intermediaries (i.e. OTC or an exchange trades); auctions; and, bilateral arrangements. The answer as to which is the best mechanism, using a variety of criteria, depends critically on the size of the market. If the market is likely to be small then market intermediaries are ranked first, while if the market size is large then auctions are the preferred mechanism. Since the TEU market was considered large an

[42] It is of course possible that environmental groups such as Greenpeace may buy CDMWs and cancel them as a way of making emissions targets stricter.

auction was recommended as the best mechanism. In view of possible competitive problems because a small number of sellers were likely to account for a large percentage of TEUs sold, an auction at the EU level was preferred, rather than a series of auctions at the level of the Member State.

In case of CDM_Ws the market size, at the Member State level, is likely to considerably smaller than TEUs. While a limit for the latter has not been set, Gorecki et al (2009) used a working assumption of 10% of the non-ETS emission limit, which is equivalent to 5.7% of all emissions, substantially above the 3% limit set for CDM_Ws, which is equivalent to 1.7% of all emissions.[43] This suggests that market size in CDM_Ws is likely to be towards the smaller end of the spectrum thus favouring market intermediaries rather than auctions. Existing players, including Member States, are familiar with the OTC and exchange methods of trading a closely related property right, CDM credits or CERs, while the exercise carried out above with respect to TEUs would also suggest that market intermediaries are the preferred mechanism.

Section 5 above argued that the European Parliament's wording with respect to the upper limit of CDM_Ws is 3% of the non-ETS emission limit,[44] which is equivalent to 1.7% of all emissions. However, an alternative interpretation is that the 3% refers to all emissions limit – ETS and non-ETS. If this is accepted as the correct interpretation, then it would appear that the CDM_W market would be characterised as large rather than small, in which case an auction is the most appropriate market mechanism.

Irrespective of the market mechanism the results of Tol (2009) raise the possibility of competitive concerns in the trading of CDM_Ws, particularly on the demand side where Denmark is estimated to account for 58% of all CDM_Ws purchases, followed by Luxembourg (21%) and Sweden (11%).[45] Hence there is a need to carefully monitor trading in CDM_Ws to ensure that there is no breach of EU competition law. This task could be undertaken by the DG Competition, perhaps in partnership with the relevant national competition agencies. Indeed, an EU-wide auction instead of a series of Member State auction would be preferred to minimise competition problems.

[43] All emissions refers to ETS and non-ETS. The importance of ETS and non-ETS refers to 2020 and is taken from Capros et al (2008, Table 4, p. 4).
[44] See also CEC (2008a, p. 12).
[45] On the supply side the market is only moderately concentrated with Poland supplying a third of the market and three other Member States accounting for more than 10% (the Czech Republic, Greece and Romania).

Transaction Costs

While conceptually elegant the above solution could see the NTMA, or its equivalent in another Member State, simultaneously buying and selling CDM_Ws. If transaction costs were zero then this would not matter, but this is unlikely to be the case. If CDM_Ws are sold through a broker or exchange there is likely to be a commission charge related to the value of the transaction. Hence the proposed system needs to be modified.

A Resolution

It should be recalled that the purpose of separating the decision on how to meet the non-ETS emission limit and maximizing the value of the CDM_Ws was in order to ensure that the opportunity cost or value of the these property rights should be taken into account properly by the Member State. This therefore suggests that proxies need to be introduced for the CDM_W price that can then be incorporated into the decisions of the Member State as to how to meet its non-ETS emission limits. However, as the period 2013-2020 progresses and the CDM_W market develops then more accurate prices can be included in the planning by the Member State. Thus the Member State might have to consult on likely future prices for CDM_Ws.

The Status Quo Continued

An obvious alternative model is to continue the status quo which was outlined in section 4 above. Under this option the State, through the NTMA, would purchase CDM credits in the primary and secondary market up to 3% the State's non-ETS emission limit. The State would then minimize the cost of meeting the non-ETS emission limit for the remaining 97%.

The problem with this approach is that it violates both of the principles above. No account is taken of the price of CDM_W. Indeed, it is for all practical purposes set at zero up to 3% of the non-ETS emission limit and infinity after that, since no consideration is given to purchasing CDM_W in the market place from other Member States.

Retaining CDM_Ws as an Insurance Policy

Another option would be for the Member State to use the 3% of the non-ETS emission limit that can be met through CDMs via CDM_W as some form of insurance policy. It could be argued that there is considerable uncertainty about the ability to predict the level of emissions of the Member State to meet the limit set by the EU. Furthermore failure to meet the limit carries certain penalties which the Member State may not want to pay or incur. Hence the Member State could allocate use its CDM_W property right as an insurance policy. If the rights are not needed then they can be sold through an agency such as the NTMA.

The case for using the CDM_Ws as an insurance policy is weak at best. First, all Member States have experience of complying with greenhouse gas emissions limits for the non-ETS sector. In the case of Ireland this has not appear to have proved a problem for 2008-2012, although this will not become clear until the end of the period. Second, during the 2013-2020 phase it is envisaged that Member States will meet the reduction of non-ETS on a linear basis with binding annual targets over the period, but with the opportunity to bank and borrow between years so that there is already a hedge or insurance built into the procedure (CEC, 2008c). Third, there is a market for CDM_Ws which the Member State can use for insurance purposes. At the present time there is already a future market for CERs and EUAs, so that one can be expected to develop for CDM_Ws as well. Fourth, it is not clear that using the CDM_W as an insurance policy is consistent with either of the two principles outlined above, since as with the previous option, no account of the value of the CDM_W in the decision concerning the optimal mix of emissions from domestic and CDM sources.

Conclusion

While no option is perfect it is proposed that the first should be selected with the modifications as proposed. In concrete form this would require the government to instruct the EPA to design a strategy or plan to meet the non-ETS emission limit while taking due regard to the value of the CDM_Ws. The EPA could conduct a consultation process on how to value or price the CDM_Ws that could then be incorporated into the strategy. To the extent that Ireland is a seller of these property rights the NTMA would be instructed to sell them to realise maximum value; to the

extent that Ireland is a purchaser then the NTMA would be instructed to purchase at minimum cost.

8. Conclusion: Answering Three Questions

The CDM mechanism forms an important instrument by which Ireland and other Member States meet their non-ETS emission targets. In both the current (2008-2012) and next (2013-2020) phases of EU climate control a Member State can meet its non-ETS emission target by developing CDMs and using the resulting CDM credits or purchasing CERs up to some maximum proportion. However, there is a significant difference between the two phases: under the current phase any unused allocation of CDM credits lapse if the Member State does not use them; under the next phase the Member State can exchange the right to use any unused CDM credits to another Member State. As shown above the introduction of this right, the CDM_W, should lead to achieving emission reduction targets at lower cost.

Three questions were posed at the beginning of this paper. The questions, together with the answers are as follows.

First, how should the Member State treat the CDM_W in making decisions concerning emission reduction in the non-ETS sector?

To achieve the emission reductions in the non-ETS sector set for 2013 to 2020 requires that the property right is priced appropriately by the Member State to ensure that compliance costs are minimised. The CDM_W rights should not therefore be treated as though they were a free good with a zero price. The price of the property rights is important signal for Member States in deciding the level of domestic abatement compared to trading in CDM_Ws.

Ideally the decision to meet the non-ETS emission target should be separate from the decision as to how the CDM_W should be distributed. However, the transaction costs of buying and selling CDM_Ws rule out this approach.

The next best alternative is to design a strategy to meet the non-ETS emission limit having due regard to the value of the CDM_Ws. In other words, some sort of shadow

price for CDMWs would be used in formulating the strategy in other to determine whether or not Ireland is a buyer or seller of CDM_Ws.

To the extent that Ireland is a seller of CDM_Ws the NTMA would be instructed to sell them to realise maximum value; to the extent that Ireland is a purchaser then the NTMA would be instructed to purchase at minimum cost.

Second, what mechanism should be used to facilitate the exchange of CDM_Ws?

The preferred mechanism depends crucially on the market size. There appears to be some ambiguity concerning whether or not the size of the CDM_W market is 3% of the non-ETS emission limits or 3% of ETS plus non-ETS emission limits. Drawing on earlier work by the authors, it is concluded that:

- If the former case the preferred mechanism is market intermediaries such as OTC and exchanges. CERs are currently traded on these markets and hence there a degree of familiarity with the underlying right that is being traded.
- If the latter case then the preferred mechanism is an auction.

However, irrespective of whether it is the former or the latter, in view of the presence of particularly large buyers, competition authorities will need to monitor the situation closely to ensure that no breach of competition law occurs. Indeed, an EU-wide auction instead of a series of Member State auction would be preferred to minimise competition problems.

Third, who should realise the value of CDM_Ws – the State, existing polluters etc?

The value of CDM_Ws should accrue to the State. There is no reason for these valuable rights to be given away 'free' to some third party. In the case of the EU ETS the distribution of allowances on a free of charge basis has led to inefficiencies and distortions.

18 May 2009

References

BMU (2008) *Release of EU Allowances in Germany. Annual Report 2008*. Berlin: BMU. This may be accessed at: http://www.bmu.de/files/pdfs/allgemein/application/pdf/jahresbericht_kwf_08_en.pdf

Capoor, K. & P. Ambrosi (2007) *State and Trends of the Carbon Market 2007*. Washington: World Bank.

Capoor, K. & P. Ambrosi (2008) *State and Trends of the Carbon Market 2008*. Washington: World Bank.

Capros, P., L. Mantzos, V. Papandreou, & N. Tasios (2008) *Model-based Analysis of the 2008 EU Policy Package on Climate Change and Renewables*. Report to the European Commission, DG ENV. Brussels: the Commission.

CEC (2004) "Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings." OJ C 31/5 February.

CEC (2007) *Limiting Global Climate Change to 2 Degrees Celsius. The Way Ahead for 2020 and Beyond*. COM (2007) 2 Final. Brussels: CEC.

CEC (2008a) *Proposals for a Decision of the European Parliament and of the Council on the Effort of member States to Reduce Their Greenhouse Gas Emission to Meet the Community's Greenhouse Has Emission Reduction Commitments up to 2020*. COM (2008) 17 Final. Brussels: CEC.

CEC (2008b) "Emissions Trading: Commission to connect EU with UN carbon credit registry before December." Press Release IP/08/1246. 6 August.

CEC (2008c) "Questions and Answers on the Decision on effort sharing." Memo/08/797. 17 December 2008.

CEC (2009) *Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings*. C (2009) 864 Final. Brussels: CEC.

Competition Authority (2002) *Notice in Respect of Guidelines for Merger Analysis*. Dublin: the Authority. This may be accessed at: www.tca.ie.

Department for Environment, Food and Rural Affairs (2007) *EU Emissions Trading Scheme. Consultation on Proposed UK auction design for use in the EU Emissions Trading Scheme Phase II*. London: the Department.

Ellis, J, H. Winkler, J. Corfee-Morlot & F. Gagnon-Lebrun (2007) " CDM: Taking stock and looking forward." *Energy Policy*. Vol. 35, pp. 15-28.

EPA (2006) *Ireland's National Allocation Plan*. Dublin: EPA.

EPA (2008) *Ireland's National Allocation Plan for Emission Trading 2008-2012*. Dublin: EPA.

EPA (2009) “Ireland’s GHG Projections 2008-2012”. Press Release. 12 March.

Gorecki, P., S. Lyons & R. Tol (2009) *EU Climate Change Policy 2013-2020: Thoughts on Property Rights and Market Choices*. Working Paper 292. Dublin: ESRI.

Haites, E, & F. Yamin (2000) “The clean development mechanism: proposals for its operation and governance.” *Global Environmental Change*, Vol. 10, pp. 27-45.

Hepburn, C., M. Grubb, K. Neuhoff, F. Matthes, & M. Tse (2006) “Auctioning of EU ETS phase II allowances: How and why*?”* *Climate Policy*. Vol 6., pp. 137-160.

Howard, A. (2005) “International transaction log and CDM registry.” Presentation to UNFCCC Slide Event at COP/MOP 1, Montreal, 1 December. Available at: http://www.ieta.org/ieta/www/pages/getfile.php?docID=1284

International Competition Network (2006) *ICN Merger Guidelines Workbook.* Prepared for the 5th Annual ICN Conference in Cape Town.

Klemperer, P. (2004) *Auctions: Theory and Practice*. Princeton: Princeton University Press. All pages references refer to the online version, which may be accessed at: http://www.gqq10.dial.pipex.com/

Lecocq. F., & P. Ambrosi (2007) “The Clean Air Development Mechanism: History, Status & Prospects”. *Review of Environmental Economics and Policy*, Vol1, No 1, pp. 134-151.

Lee, M-K et al (2004) *CDM Information and Guidebook*. 2nd Edition. Roskilde, Denmark; Unep Riso Centre.

Matthes, F., & K. Neuhoff (2007) *Auctioning in the European Union Emissions Trading Scheme*. Final Report Commissioned by WWF. Berlin/Cambridge Oko-Instit e.V/University of Cambridge.

Michaelowa, A, & F. Jotzo (20005) “Transaction costs, institutional rigidities and the size of the clean development mechanism.” *Energy Policy*. Vol. 33, pp. 511-523.

National Treasury Management Agency (2008) *Carbon Fund Annual Report 2007*. Dublin: NTMA

Steeds, D. “Independent Observer’s Report on the conduct of the EU ETS Carbon Emissions Allowances Auction on 19 November 2008”. London: Evolve Business Consultancy.

Tol R. et al (2008) *A Carbon Tax for Ireland*. Working Paper 246. Dublin: ESRI.

Tol, R. (2009) *Intra- and Extra-Union Flexibility in Meeting the European Union’s Emission Reduction Targets*. Working Paper 290. Dublin: ESRI.

Year	Number	Title / Author(s) ESRI Authors / Co-authors / *talicised*
2009		
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