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The role of CDM and JI for fulfilling the European Kyoto commitments

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Kiel Working Paper No. 1232

**The role of CDM and JI for fulfilling the European
Kyoto commitments**

by

Helen Lückge and Sonja Peterson

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The role of CDM and JI for fulfilling the European Kyoto commitments

Abstract

To meet their Kyoto targets under the Burden Sharing Agreement, most European countries plan to make use of the flexible project mechanisms “Clean Development Mechanism” (CDM) and “Joint Implementation” (JI). In addition, CDM and JI credits can be used by installations to fulfil their obligations in the upcoming European emissions trading scheme. This paper compiles information from a variety of sources to give an overview over the different options to acquire CDM and JI credits and the extent to which European governments and companies plan to make use of these options.

Keywords: European Union, CDM and JI, Emissions trading

JEL classification: Q48, Q54, Q58

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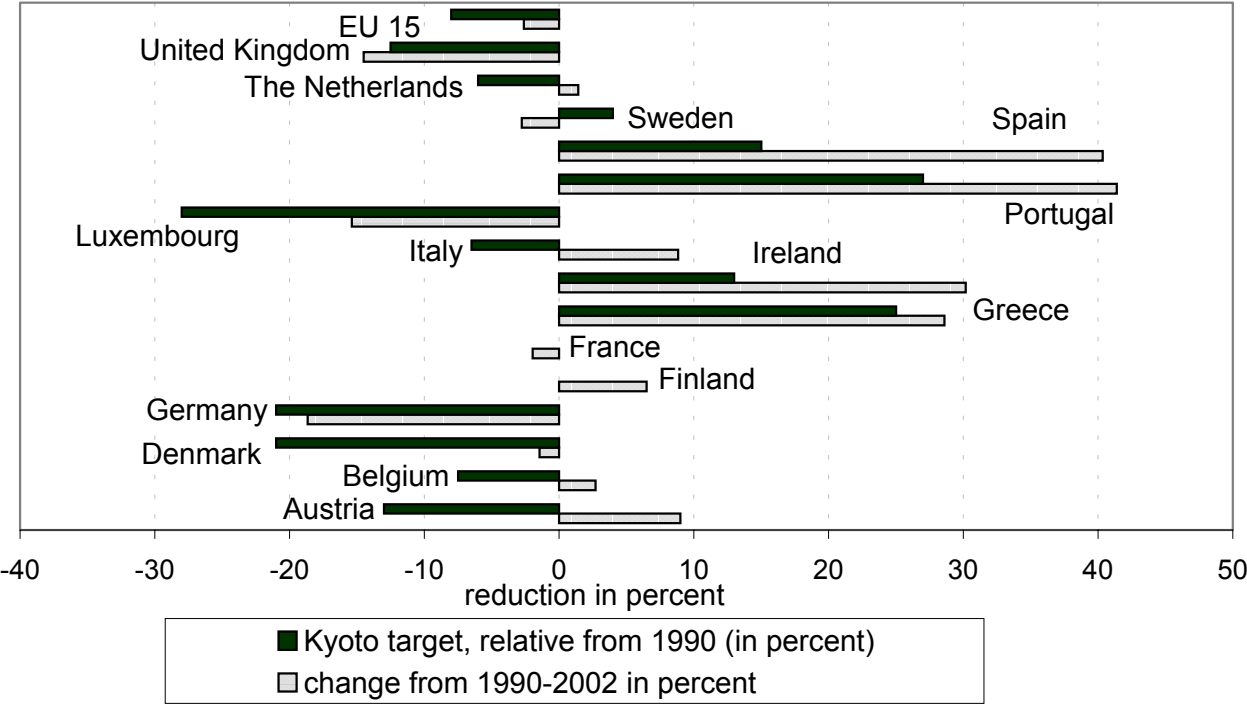
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1. Introduction

In the Kyoto Protocol from 1997, the EU15 agreed to cut down their overall GHG emissions relative to the 1990 level by eight percent in the period from 2008 to 2012. One year later, the EU differentiated this target between their different member states in the so-called EU Burden-Sharing Agreement giving the cohesion member states Spain, Portugal, Ireland and Greece a lighter burden, compared to richer member states. The (former) accession countries that joined the EU in May 2004 resp. are scheduled to join in 2007 are not included in the Agreement but have their own individual Kyoto targets.

Six years later, the picture is rather disappointing at least in the EU15. Only few of the countries are on track to fulfill their commitment. In most cases, greenhouse gas emissions have increased since 1990. Only two countries, the UK and Germany were able to reduce their emissions substantially from 1990 to 2002 which was partly due to situative circumstances. The German reductions fell into their leap through the impacts of reunification while reductions in the UK were due to the liberalization of the energy market. On the other hand, emissions in the Southern EU countries as well as Austria, Belgium, Finland and Ireland increased since 1990. Especially, in the cohesion countries, which under the EU Burden Sharing Agreement are allowed to increase their emissions, emissions have risen substantially by up to 30% to 40%. In France, Denmark, Luxembourg, the Netherlands and Sweden, emissions stayed nearly on the same level than in 1990, no reductions could be achieved. With the exception of Slovenia, all of the (former) accession countries where emissions fell drastically since 1990 due to the break down of their economies, do not face any problems to reach their Kyoto targets. Figure 1 shows the gaps between actual emissions and the Kyoto targets for the EU 15. Figure I in the Appendix shows the situation for the accession countries.

Figure 1: Gaps to Kyoto targets



Now that Russia has ratified the Kyoto Protocol so that it will finally come into force in February 2005, the pressure to reach the targets has become even stronger. As the time to the first Kyoto commitment period (2008-2012) is getting shorter, many countries realize that they have to start acting in order to still achieve their targets. As most countries are aware they will not be able to reduce their emissions sufficiently with domestic action alone, they want to make use of the flexible mechanisms of the Kyoto Protocol focusing on the project-based mechanisms Clean Development Mechanism (CDM) and Joint Implementation (JI).

The project-based mechanisms have been designed to help countries to accomplish their Kyoto targets in an economically efficient and environmentally effective way. Joint Implementation allows Annex I Parties of the Kyoto Protocol to implement projects that reduce emissions, or increase removals by sinks, in the territories of other Annex I parties. Emissions reduction units (ERUs) generated by such projects can then be used by investing Annex I Parties to fulfill their Kyoto commitments. The Clean Development Mechanism also gives the possibility for emissions reductions in developing countries

(non-Annex I) which themselves have no reduction targets under the Kyoto Protocol. Through the investment in environmental projects in the frame of CDM, Annex I countries are supposed to transfer new and efficient technology to developing countries and help them in achieving sustainable development. The rationale behind the project-based mechanisms is that it is of secondary importance for the global environment where emission reductions occur - provided that real emission reductions are indeed achieved.

Many of the European governments have already advanced plans to make use of CDM and JI. In some cases, considerable parts of the necessary emission reductions are hoped to be achieved abroad via these mechanisms. CDM and JI are also important for the European emissions trading scheme (ETS) for CO₂ that is a major component of the European climate strategy. The ETS will start in 2005 and covers facilities in energy activities, the production, and processing of ferrous and non-ferrous metals, the mineral industry and the pulp, paper and board production. At the moment it is discussed controversially how much reductions should be achieved within the ETS sectors and how much should be reduced outside – in sectors not covered by the ETS or via CDM and JI - and what the economic costs of different strategies are. In addition, CDM and JI also play an important role within the ETS as a linking between the ETS and the two project based mechanism has been established that allows to recognize JI and CDM credits as equivalent to EU emission allowances.

Even though there is some information available on the expected use of CDM and JI in the European Union, this information has not yet been compiled and structured systematically. One important source for which this is especially true are the National Allocation Plans (NAPs) in which each country not only has to determine the allocation of allowances in the ETS but also has to provide information on how it intends to reach its overall Kyoto target. This includes information on the planned use of CDM and JI. The aim of this paper is to compile all available information from NAPs as well as additional sources to give an overview over the expected use of CDM and JI in the EU15.

The paper proceeds as follows. Section 2 describes briefly how CDM and JI work, explains the different ways in which JI and CDM can be used and gives an overview over the global CDM and JI market. Section 3 is concerned with CDM and JI projects carried out on governmental level. It compiles information on the amount of CDM and JI credits the different EU member states plan to buy, the associated costs of emission reductions and the host countries of the projects. Section 4 deals with the linking of the ETS and CDM and JI via the so-called linking directive and provides information on the private investment in JI and CDM projects. Section 5 summarizes the main findings and draws some conclusions.

2. The flexible Kyoto mechanisms CDM and JI

2.1. General Information

Following Article 6 of the Kyoto Protocol, Joint Implementation (JI) allows Annex I Parties to implement projects that reduce emissions, or increase removals by sinks, in the territories of other Annex I parties. Emissions reduction units (ERUs) generated by such projects can then be used by investing Annex I Parties to meet their emission targets. As JI projects take place between Annex I parties, the total emissions permitted in the countries remain the same so that JI basically is a “zero sum operation”. Especially Eastern European countries, like Russia or the Ukraine, have a large potential for emission reductions at costs lower than in the EU15 and are therefore likely to benefit substantially from JI projects.

Article 12 of the Kyoto Protocol also gives the possibility for emission reductions in non-Annex I countries which have no reduction target. “The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.” Annex I countries can then use the

certified emission reductions (CERs), which they obtained from the CDM, project to contribute to their reduction compliance.¹

To make sure that a real emission reduction takes place, credits from CDM and JI projects can only be generated if they are additional to what would have occurred in the absence of the project. Therefore, a baseline scenario has to be developed and justified by the project participants before the project is implemented. It has to show what would have happened in terms of emissions in the absence of the project. To ensure that the additionality criterion is indeed met is one of the main concerns of environmental NGOs. As a result, NGOs have developed very strict standards, such as the Gold Standard (see e.g. the WWF brochure) that CDM projects should fulfill in order to ensure their additionality.

Furthermore, the project-based activities are required to support “sustainable development”. Therefore, nuclear energy projects should not be taken into consideration. In addition, Parties cannot count any emission reductions resulting from projects paid for through regular government development assistance funds (IEA 2001).

Under the Bonn agreement, projects relating to sinks (land-use, land-use change and forestry projects) are limited to afforestation and reforestation projects in the first Kyoto commitment period. For the first period, a Party can obtain a maximum of one percent of its base year emissions from such sink projects.

As both investor and host country benefit from a JI project, it is expected that both countries will strike a fair balance, so the Marrakech Accords require a less strict control procedure for JI than for CDM. There are two possible procedures for carrying out a JI project. The first procedure (“track one”) allows a host Party to apply its own procedures to projects where that Party meets

¹ ERUs and CERs basically account for the same amount of reduction, but differ in their origin. CERs originate from CDM projects, while ERUs originate from JI projects. Sometimes the term Emission reductions (ERs) is used when talking about the project-based mechanisms in general. Each unit represents a reduction of one ton CO₂e. This is also true

certain eligibility requirements laid down in the Marrakech Accords.² The second procedure (“track two”) applies where the host Party does not meet these eligibility requirements. In such cases, the amount of ERUs generated by a project must be verified under a procedure supervised by the Supervisory Committee, which will be set up after the Kyoto Protocol’s entry into force. Project participants must prepare a project design document for evaluation by an independent organization accredited by the Supervisory Committee. The evaluation has to make sure that the project has an appropriate project-specific, transparent and conservative baseline and a monitoring plan to ensure that emissions and removals can be accurately estimated. Based on this information, the independent entity will determine the ERUs that may be issued by the host Party. Projects starting as of the year 2000 may be eligible as JI but the generated ERUs will only be issued for a crediting period starting after the year 2008. This regulation is true for all Annex I countries (European Commission 2003b, IETA 2001).

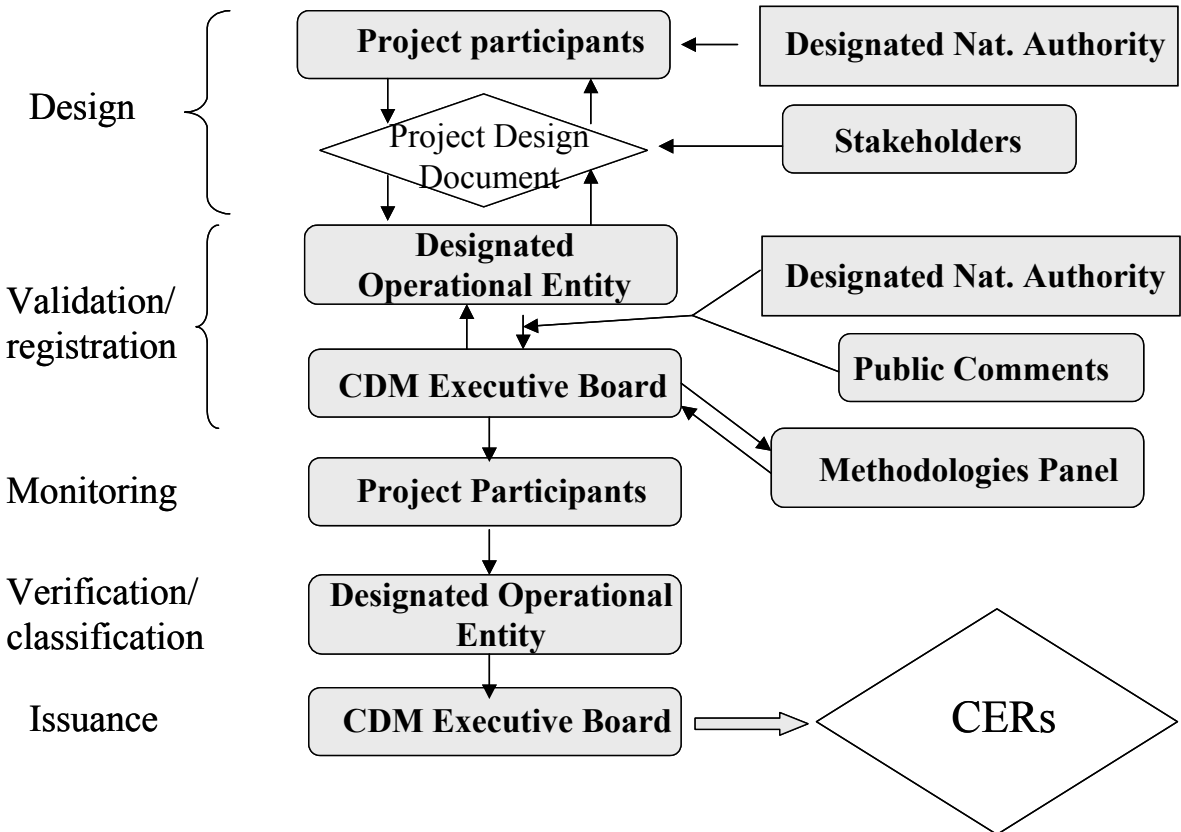
As CDM projects take place in uncapped countries, these projects do not lead to a decrease in the emissions volume of Annex I countries and project cycle requirements are more strictly supervised. CDM implementation is supervised by a UNFCCC body, the Executive Board (CDM Board), responsible for issuing CERs. Projects may aim on the supply or the demand side to affect either the production of emissions or their consumption. Project participants must prepare a project design document, including a description of the baseline and monitoring plan to be used, an analysis of environmental impacts, comments received from local stakeholders and a description of the additional environmental benefits that the project will generate. CDM projects must be approved by the designed national authorities of the countries

for Assigned Amount Units (AAUs), which are the unit of measure for a country’s “assigned amount” under the Kyoto-Protocol.

² A list of eligibility criteria was established already in the Bonn Agreement and refined in Marrakech. A Party is eligible to transfer and/or acquire ERUs and CERs issued in accordance with the relevant provisions, if it is in compliance with the following requirements: it is a Party to the Kyoto Protocol; it has established its assigned amount; it has in place a national system for the estimation of anthropogenic emissions by source; it has in place a national registry; it has submitted annually the most recent required inventory; it submits the supplementary information on the assigned amount (IETA 2001, p. 5).

involved and the host country has to confirm that the project assists in achieving sustainable development. An operational entity will then review the project design document and decide whether or not to validate it. If a project is validated, the operational entity will forward it to the CDM Board for formal registration. Once a project is up and running, participants will monitor its emissions. Project participants will prepare a monitoring report including an estimate of CERs generated by the project and will submit it for verification by an operational entity. Following a detailed review of the project, which may include an on-site inspection, the operational entity will produce a verification report and, if all is well, it will then certify the CERs as legitimate (European Commission 2003b). Figure 2 shows the CDM project cycle in a graphical way.

Figure 2: Outline of the CDM project cycle



Source: Ellis et al. (2004)

To make sure that countries, due to economies of scale, do not only involve in large-scale projects, simplified procedures are to be established for small-scale CDM projects (including renewable energy and energy efficiency projects).

On CoP7 in Marrakech it was discussed to which degree countries should be allowed to fulfill their reduction targets using the flexible mechanisms. Although the EU argued that most of the reductions (at least 50%) have to be achieved domestically, this proposal was disregarded by other countries. Therefore, in the end, the Marrakech accords only state, “that the use of the mechanisms shall be supplemental to domestic action” without a clear definition of what this implies (see Langrock et al. 2004, p. 3 for a discussion on this issue).

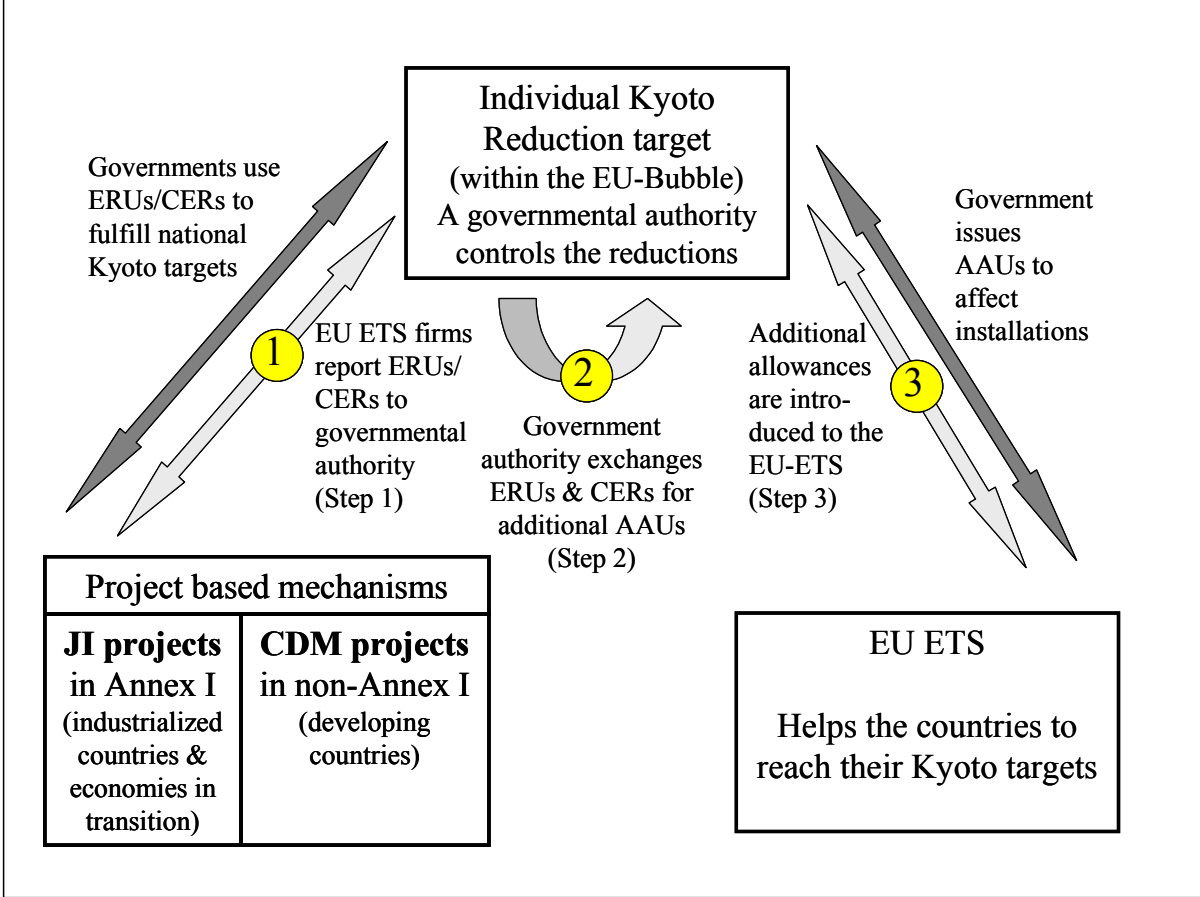
Apart from lowering the compliance costs from meeting the Kyoto targets in investing countries, the CDM is expected to be an excellent vehicle for the transfer of advanced environmentally sound technologies to developing countries and therefore assisting them in achieving their sustainable development objectives.

2.2. Possibilities for the use of CDM and JI in the European Union

The situation in the European Union gives the possibility to make use of JI and CDM on both private and governmental level. Governments can use JI and CDM credits to comply with their national Kyoto reduction target. In section 3 we explore to which extent European governments want to make use of this possibility and gives detailed information on plans and achievements in the different EU member states. Private entities that are covered by the EU ETS can convert CERs and ERUs into allowances that can be used in the EU ETS. This became possible with the so-called “Linking Directive” which wants to ensure that private actors can obtain their responsibilities within the European climate policy in the cheapest possible way. Section 4 gives more information on the Linking Directive and on private involvement in JI and CDM projects. Figure 3 illustrates the two possibilities on governmental and private level. The

dark arrows show the action on governmental while the light arrows show action on private level.

Figure 3: Possibilities to use CDM and JI credits in the EU



There are generally three possibilities to acquire CDM and JI credits:

1. To undertake CDM and JI projects
2. To buy the ERUs/CERs from somebody who directly undertakes CDM and JI projects
3. To invest in a fund that finances CDM and JI projects and acquires the ERUs/CERs.

The first option is especially attractive for international firms with establishments in non-Annex I or transformation countries in which CDM and JI projects can be undertaken. An example of a JI project that falls into this category is the investment of an Austrian cement firm into energy efficiency improvements in its Bulgarian plant where the mother firm obtains ERUs from

the reduced greenhouse gas emissions in Bulgaria (Stockmayer 2004). For small firms undertaking own projects is probably not viable. Those firms should rather buy “normal” allowances on the EU market. Governments can use this first option as well, but mainly chose not to do so. For firms that want to undertake CDM and JI projects there are now a number of professional agencies that specialize on the Kyoto project mechanisms and guide firms through the rather complicated process of verifying projects that was sketched in section 2.1.

The second option is mostly chosen by governments, which issue tenders for CDM and JI projects by private investors from which they want to buy the CERs and ERUS. The largest tenders are the two Dutch tenders “Emission Reduction Unit purchasing tender” (ERUPT) and “Certified Emission Reduction Unit purchasing tender” (CERUPT) (see Box 1). Some of the so-called government funds (see below) basically work the same way in that they provide money to undertake CDM and JI projects whose CERs/ERUs are then transferred to the governments. Besides using tender and funds, especially for firms it is possible to buy CERs/ERUs from other firms that undertake CDM and JI projects on a smaller scale. In the last years a number of professional broking agencies specializing on carbon trade have been established that help to bring together sellers and buyers of CERs and ERUs.

Box 1: The Dutch procurement tender ERUPT and CERUPT

Through its procurement tender, the Dutch government buys emission reductions achieved by private investment in JI and CDM projects. The tenders are managed by SenterNovem which pays approximately 3-5 € per reduction unit.

Private investors in JI and CDM projects can submit an outline of their project to SenterNovem, which then has to decide if it wants to include the project in question in one of the tenders. This means, that private companies do not invest in JI or CDM projects to fulfill their own reduction commitments but to sell reduction units, which the projects achieve to the Dutch government. On the other hand, it is also possible for project developers in host countries to submit an outline of their project to SenterNovem. This means that CERs or ERUs go directly to SenterNovem and not to another private investor who then sells the reduction units to SenterNovem.

Source: SenterNovem, <http://www.carboncredits.nl>

The third option implies to invest in a carbon fund that collects money to finance CDM and JI projects. The general procedure is that the fund selects the JI and CDM projects from which emission credits are to be acquired following transparent procurement procedures. It also sees the selected projects through the relevant approval and registration process with the international institutions. After successful registration the fund, as trustee, acquires the certified emission credits for the participating government and private companies, calls in the relevant payment amounts from the fund participants and distributes the credits as per their engagement in the fund and issues the acquired CERs and ERUs to the fund members. Most funds pay for emission credits from a project rather than the project itself, although some funds such as the Austrian climate program also allow for some up-front payment. Altogether, funds make it easier for companies or institutions to invest in JI and CDM projects as they act as a mediator between the project hosts and the buyers of emission credits. Funds also take over most of the risks, which come along with the investment in JI or CDM projects, as risks can be managed across a large project portfolio.

The largest and most known fund is the Prototype Carbon Fund established by the World Bank (see Box 2). Furthermore, some governments authorize a private institution with the implementation of a fund which then has to choose possible projects, lead them through the process of verification, and observe their progress (see section 3.2.). Some funds are open for national as well as international investors (such as the KfW Climate Fund) other funds are reserved for national investors (e.g. the Italian Carbon Fund).³ The butters of the Baltic Sea have also established a fund for JI projects in Russia, the Baltic States and Poland. Just recently in November 2004, a private fund, the European Carbon Fund, was launched. It has a subscription target of € 100 Mio. with a minimum of € 50 Mio. and primarily aims to purchase credits from CDM and JI projects (CJM 2004, Point Carbon 3.11.04).

Box 2: Carbon Funds of the World Bank

Recognizing that climate change will have the most impact on its borrowing client countries, the World Bank established the Prototype Carbon Fund (PCF) in 1999 which aims at producing emission reductions from JI and CDM projects. Private companies and governments can contribute to the PCF, which are then invested in JI or CDM projects (the minimum contribution is US\$ 10 Mio. per government and US\$ 5 Mio. per company). Up to now, six governments and 17 companies from industrialized countries – including power and oil companies from Japan and Europe, and leading global banks – have contributed US\$ 180 Mio. to the PCF. 16 projects have already been signed under the PCF and nine other projects are under development. Contributors to the PCF will receive a pro rata share of the obtained Emission Reductions, which are verified and certified in accordance with agreements reached with the respective host countries.

A major emphasis is directed at the development of projects in the area of energy efficiency and renewable energy technology including small-scale hydro energy projects. All in all the project portfolio of the PCF is supposed to be diverse and to cover a wide range of technology and applications. Therefore no more than approximately 20% of the Fund's assets will be invested in projects in the same host country and no more than approximately 25% in projects using the same technology.

The PCF, which is supposed to terminate in 2012, has played a pioneering role in developing the market for GHG emission reductions, while promoting sustainable development, and offering a learning-by-doing opportunity to its stakeholders. It has been taken as a model for the creation of other funds managed by the World Bank like the Community Development Carbon Fund (CDCF) and the Italian Carbon Fund.

The CDCF intends to provide carbon finance through the CDM. It wants to link small-scale projects seeking carbon finance with companies, governments, foundations and NGOs to improve the livelihoods of local communities and to obtain verified CERs. It wants to ensure that carbon finance does not only focus on some major countries but that small countries have a chance as well to be considered by investors. Up to now, four governments and eight private companies have contributed to the CDCF and seven projects have been started. The underlying rules of the CDCF are similar to those of the PCF.

The Bio Carbon Fund intends to demonstrate projects that sequester or conserve carbon in forests and agro ecosystems. The fund aims to deliver cost-effective emission reductions, while promoting biodiversity conservation and poverty alleviation. The fund officially opened for participant contributions in November 2003 and started operations in May 2004 with a capital of US\$ 15 Mio. The target size of the fund is US\$ 100 Mio.

Source: Carbon Finance at the World Bank – Homepage (<http://carbonfinance.org>)

³ The funds that are not open to private firms rather have to be seen as tenders, described in point 2.

Table II in the Appendix gives an overview over the most important European tenders and funds that are targeted or at least open for European investors. Together, all funds add up to around € 725 – 1250 Mio.

2.3. The state of the CDM and JI market

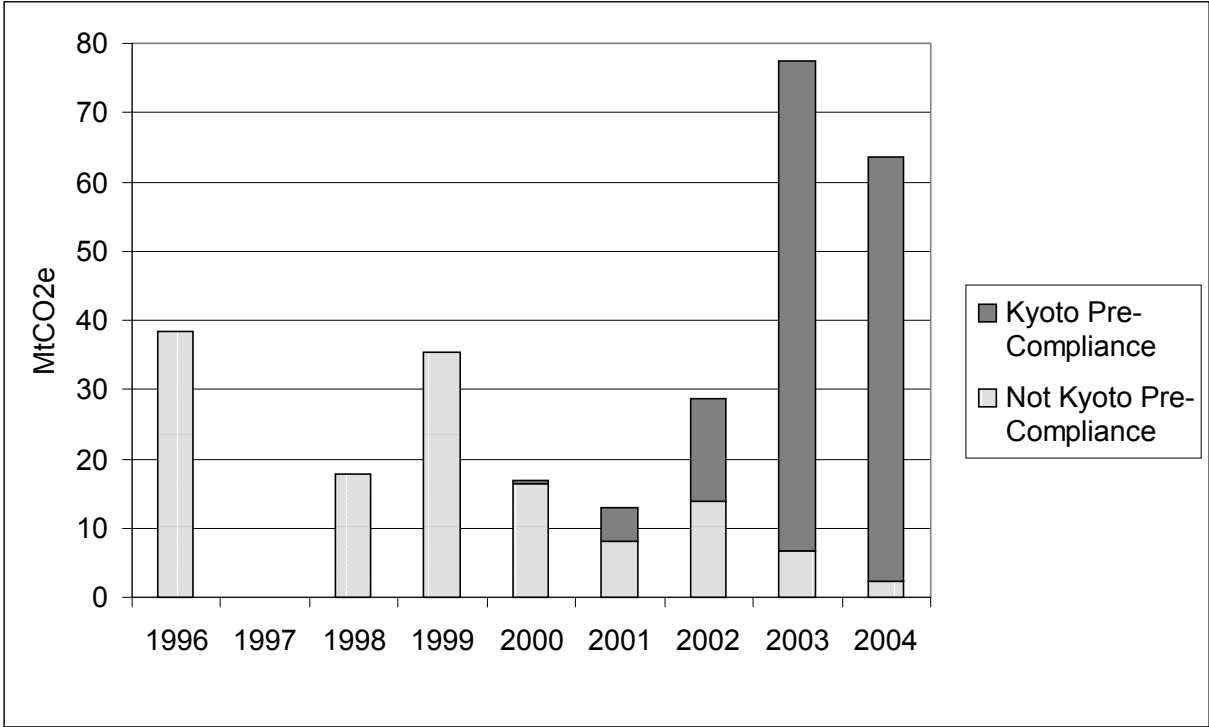
Even though it is only known since the end of September 2004 that the Kyoto-Protocol will come into force, the transactions that can be observed on the international carbon market have steadily been growing and the project-based mechanisms have been getting increasingly important. This sections wants to give a brief summary of the state of the market and the role of European engagement.

The CDM & JI Monitor by PointCarbon of November 23 reports that 1154 CDM and JI projects have so far been registered in PointCarbon's Project Database. Out of these, 253 projects, potentially yielding 313 MtCO₂e of emissions reductions towards 2012, have reached the level of a project design document (see figure 2). The latest World Bank report on the carbon market (Lecocq 2004) summarizes the volumes that have been exchanged through projects since 1996. They are shown in Figure 4. These project-based transactions account for 98% of the total volume of assets exchanged since 1996.

Altogether, sales have doubled from around 40 MtCO₂e in 1996 to around 80 MtCO₂e in 2003. In 2004, a total of 64 MtCO₂e has been exchanged through projects from January to May 2004 only. This suggests that the market might double again by the end of the year 2004.

The World Bank report also provides some information on the buyers of emission reductions (ERs). The Figure 5 shows the largest buyers in the period 2002-2003 compared to 2003-2004.

Figure 4: Annual volumes of project-based emission reductions traded (up to 2012 vintages)

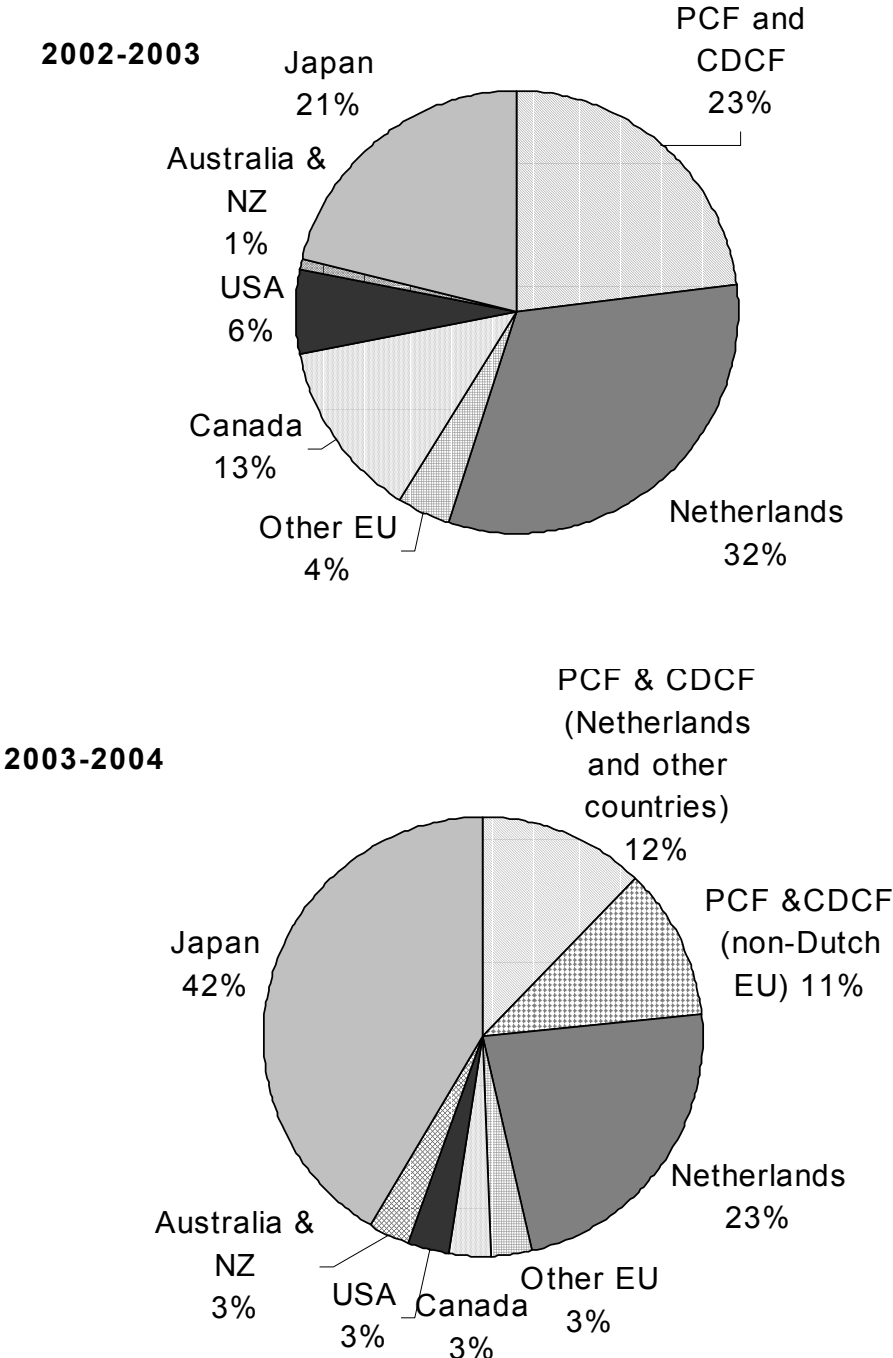


Source: Lecocq 2004, p. 18.

The largest buyers in both periods are Japanese entities, which are mostly private firms⁴, the World Bank with its carbon funds (Prototype Carbon Fund (PCF) and Community Development Carbon Fund (CDCF)) and the Government of the Netherlands. The share of (non-Dutch) European private and public entities might appear very small. However, for the period 2003-2004 data is available that show that 48% of the investments in the World Bank Carbon Business originate from private and public European institutions, excluding the Government of the Netherlands. When their participation is accounted for, non-Dutch European entities represent 15% of the volume purchased in 2003-2004, which is around 20 MtCO₂e. The Netherlands add at least another 33 MtCO₂e. As not all project level data are public a further breakdown is unfortunately not possible.

⁴ The large Japanese purchases demonstrate a growing sense of urgency in Japan, where abatement opportunities are few and at high costs. It might also reflect the persistent regulatory uncertainty, which might lead Japanese firms to invest more in emission reduction projects while they are still uncertain about how the Kyoto burden will ultimately be shared between the public and the private sector.

Figure 5: Market buyers (share of volume of ERs purchased)



Source: State and Trend of the Carbon Market 2004

Concerning the host countries, the majority of ERs in 2003-2004 originate from projects in Asia (51%); Latin America (27%) is second and transition economies (8%) rank third. Only a very small volume and a handful of transactions were associated with projects in the whole of Africa, which is lagging far behind in the CDM market.

Concerning the type of projects, HFC destruction projects account for the largest share of the emission reductions produced in 2003-2004, with 35% of the total volume supplied. Landfill gas capture leading represents 20% of the volume, followed by biomass (12%) and hydro (12%). Taken together, renewables account for 29% of the total volume of project-based ERs transacted.

Because of the different possibilities to allocate risks in the carbon market (buyer or seller can take the registration risk), it is not easy to compare prices across transactions. With registration risk on the buyer, verified emission reductions have been observed to sell at US\$ 3.00 to US\$ 4.25 (weighted average US\$ 3.85). When the registration risk is on the seller, ERs sell at a higher price of US\$ 3.00 to US\$ 6.37 (weighted average US\$ 5.52). The greater the guarantee the seller can provide regarding the robustness of the ERs purchased, the higher the price is likely to be (see Lecocq 2004, p. 18-28).

For further information on the carbon market, see Ellis et al. (2004), Lecocq (2004) and Haites & Seres (2004).

3. CDM & JI in the EU: Plans on governmental level

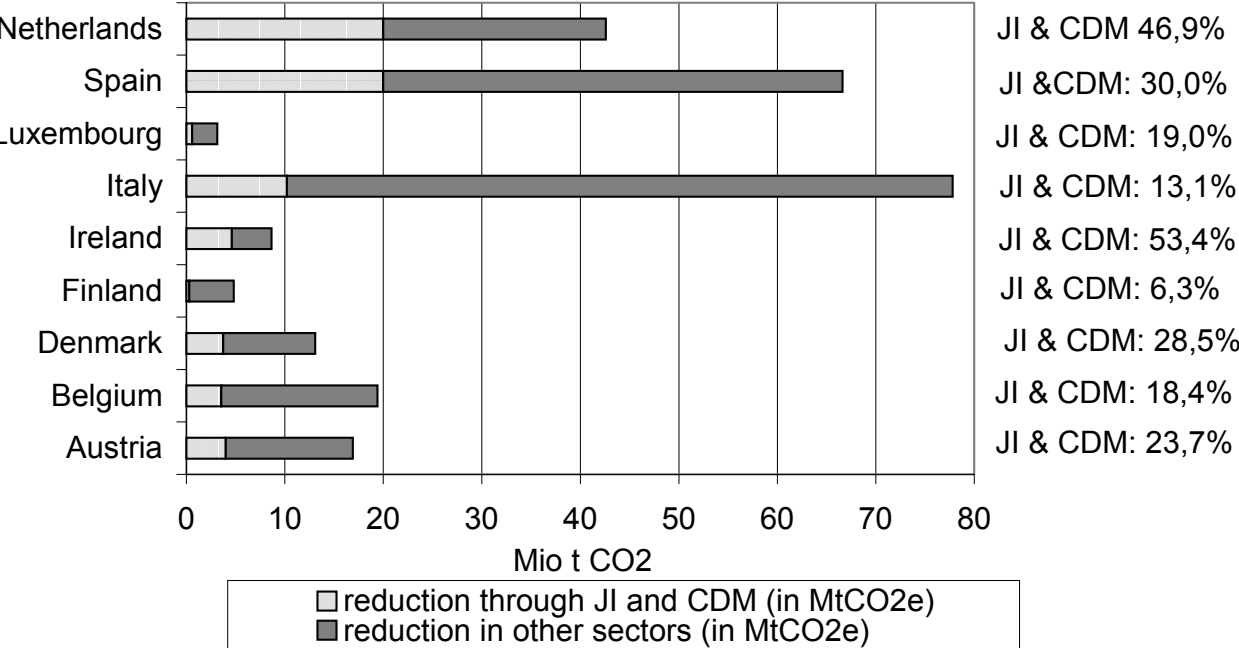
This part of the paper intends to give detailed information on the use of JI and CDM in the EU on governmental level. Most of the information has been taken from the NAPs available at http://europa.eu.int/comm/environment/climat/emission_plans.htm. In addition, the homepages of the relevant ministries, national climate strategies and, if necessary, homepages of already implemented JI and CDM projects or funds were taken as a source to obtain the necessary information.

3.1. The use of JI and CDM

Except for Germany, the United Kingdom and Portugal, all countries mention the use of JI and CDM in their NAPs. Germany and the UK state that they want to concentrate on domestic action to achieve their reduction targets and that the project-based mechanisms could only be additional to domestic action. So the countries as well engage in JI and CDM projects but the mechanisms are no major instrument to fulfill the reduction target. On the other hand, some countries' reduction targets are highly dependent on the use of JI and CDM. The Netherlands want to achieve 50% of their Kyoto target by JI and CDM. The government states that energy production and industry already work on a highly efficient level and that they cannot take over even higher responsibilities. So the government wants to obtain 20 MtCO₂e per year for the 2008-2012 period.

Ireland, Austria and Spain also plan to use the project-based mechanisms on a high level. Ireland wants to achieve more than 60% of additional reductions, which are necessary to fulfill the Kyoto target through the flexible mechanisms. The government takes over two thirds of this responsibility, the other third has to be purchased by sectors covered under the EU ETS. Austria sees the reduction potential of JI and CDM projects at up to 25% of its necessary additional reduction. Like in the Netherlands, the Spanish government wants to obtain 20 MtCO₂e per year to meet its Kyoto target. Finland wants to close the gap between achieved reductions and the Kyoto target using flexible mechanisms but there are no numbers on this gap to be found. Belgium, Denmark, Luxembourg and Italy also plan the use of JI and CDM and Sweden wants to use the project-based mechanisms even if it is already over delivering its Kyoto target. Table III in the Appendix summarizes all information on the use of the project-based mechanisms in the different countries. Figure 6 shows the importance of JI and CDM in the reductions, which are necessary to fulfill the Kyoto commitments from the 2002 benchmark. Altogether, the EU member countries currently plan to acquire around 70 MtCO₂e CERs and ERUs per year in the first commitment period from 2008-2012.

Figure 6: Necessary reductions from 2002 benchmark (in MtCO₂e), share of JI and CDM and reductions in other sectors



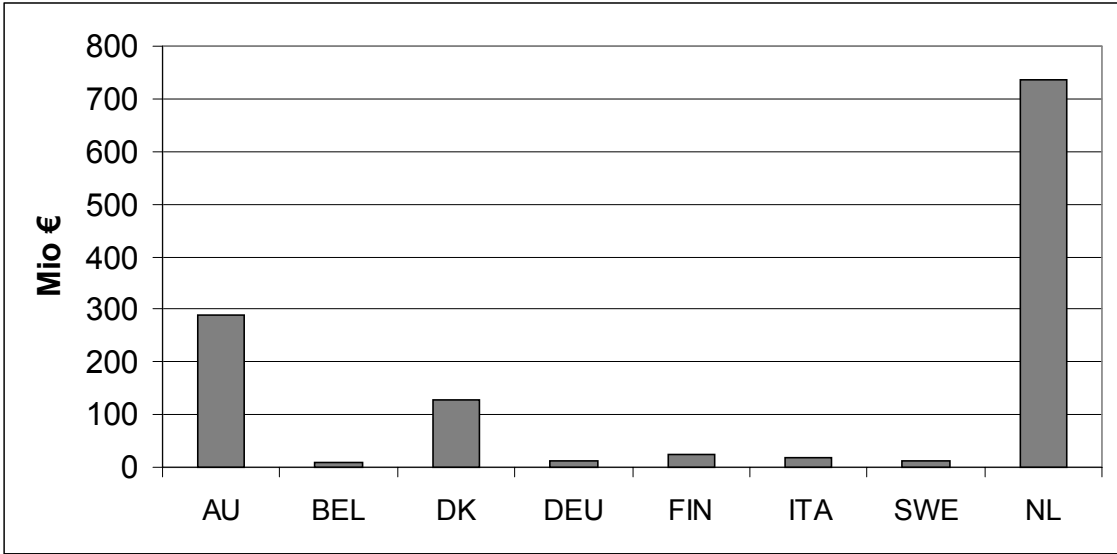
3.2. Organization of JI and CDM

Nearly all countries have implemented a national JI/CDM program or a tender. Finland, Sweden and the Netherlands also invested in the Prototype Carbon Fund of the World Bank. Austria, Italy and the Netherlands invested in the Community Development Carbon Fund. Especially the Dutch tenders ERUPT and CERUPT are already working on a large scale. As the Netherlands is the country that wants to use the project-based mechanisms most strongly, its budget is also the highest within the EU: The Dutch government wants to spend € 736 Mio. on JI and CDM in the 2008-2012 commitment period (see also Box 1 in section 2).

Austria uses 40% of its funds for climate protection for international measures. The Austrian JI and CDM program is funded with € 12 Mio. in 2004, € 24 Mio. in 2005 and € 36 Mio. per year from 2006 on. Denmark allocated € 125.7 Mio. to the state purchase of JI and CDM credits in the 2003-2007 period. For the other countries, no official budgets are available. Italy and Spain have both

implemented Carbon Funds. Belgium launched a tender for CDM and JI projects for € 10 Mio in September 2004. In Germany, the “KfW-Klimaschutzfonds“ (KfW climate fund) has been implemented to help private actors to engage in JI or CDM projects. Operators can invest in JI or CDM projects through the fund. In the UK, the Climate Change Projects Office has been implemented which helps operators with the development of JI and CDM projects, similarly, the French government wants to implement a national procedure to help private actors to invest in JI and CDM. Figure 7 shows the existing and planned investment in CDM and JI. Altogether these investments amount to around € 1235 Mio. in the first commitment period from 2008 – 2012. Table IV in the Appendix summarizes all information on government programs and the investment in CDM and JI.

Figure 7: Investment in CDM and JI



The status of the different national programs and tenders varies widely. The two Dutch tenders have already contracted several projects or are about to contract them. The Austrian program has published calls and proposals can be handed in until the end of September 2004. By the end of July 2004, expressions of interest for 9 JI and 19 CDM projects have been handed in. The Finish Pilot Program includes seven CDM and five JI projects at different stages of active development. Denmark and Sweden have made agreements

with countries in Eastern Europe. Table V in the Appendix gives more information on the stage of the different programs.

3.3. Projects in the frame of JI and CDM

With respect to JI, most countries and programs concentrate on the use of the following project types:

- Renewable energy (e.g. introduction of wind power, biomass, solar, geothermal energy and small hydro power)
- Fuel switch (e.g. from coal to gas, from oil to gas, waste to energy)
- Energy efficiency (construction or retrofitting of CHP plants, process optimization)
- Recovery and use of methane from landfill deposits
- Waste management / waste processing

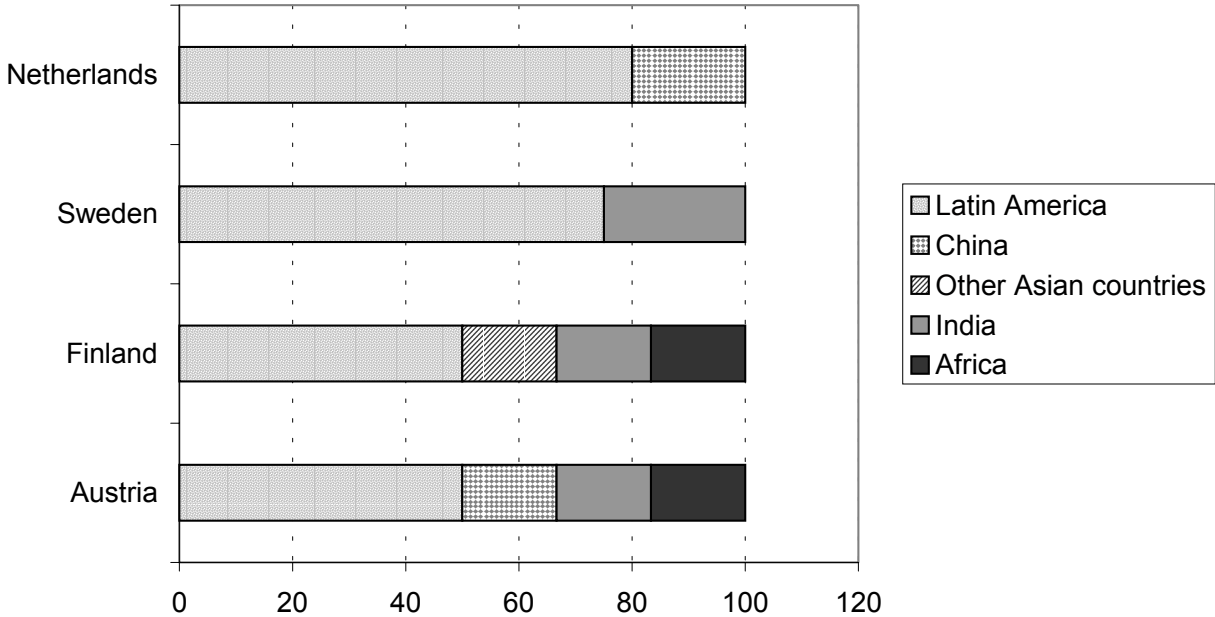
Projects, which make use of nuclear energy, are not included in any of the national programs or tenders. As projects, which make use of hydro plants, are subject to international rules, these projects are also not very common. Only Finland is involved in a small hydro plant. The same is true for sink projects. As it is still unclear how sinks will be evaluated under the European Climate Policy, only the Dutch JI program takes sink projects from afforestation or reforestation into account.

Nearly all JI projects that EU member countries invest in are hosted by countries in Eastern Europe as they offer very cheap reduction potential. Especially the Baltic countries, Estonia, Lithuania and Latvia, but also the other new accession countries Czech Republic, Poland, Slovakia and Hungary are host countries of several JI projects. Of course, also the two big hot-air countries Russia and Ukraine are considered to host JI projects. Only two projects under the Dutch ERUPT tender are situated in other Annex I countries, namely New Zealand and surprisingly Germany. Some countries chose to split up their investments in JI projects over a wide range of countries, for example Denmark has cooperation agreements on JI projects

with seven different countries and is negotiating with five more. In contrast, Finland’s five JI projects are all located in Estonia. Table V in the Appendix gives additional information on JI projects. The Italian Carbon Fund wants to make sure that it invests in projects in countries and regions that are of particular interest to the Italian economy, which are the countries named above as well as the Mediterranean Region.

CDM projects are hosted by countries in Asia, Africa and Latin America. The majority of them are hosted in Latin American countries; several projects are located in Brazil and Costa Rica. Surprisingly, only few projects are hosted by the two big developing countries China and India. Only Austria, Finland and Sweden have invested in a CDM project in India and only two projects are hosted in China. Only two countries are involved in JI projects in Africa: Finland has a JI project in Zambia and Austria is involved in a project in Morocco. Figure 8 shows the share of different host country regions in the different CDM portfolios. Table VII in the Appendix gives further information on CDM projects.

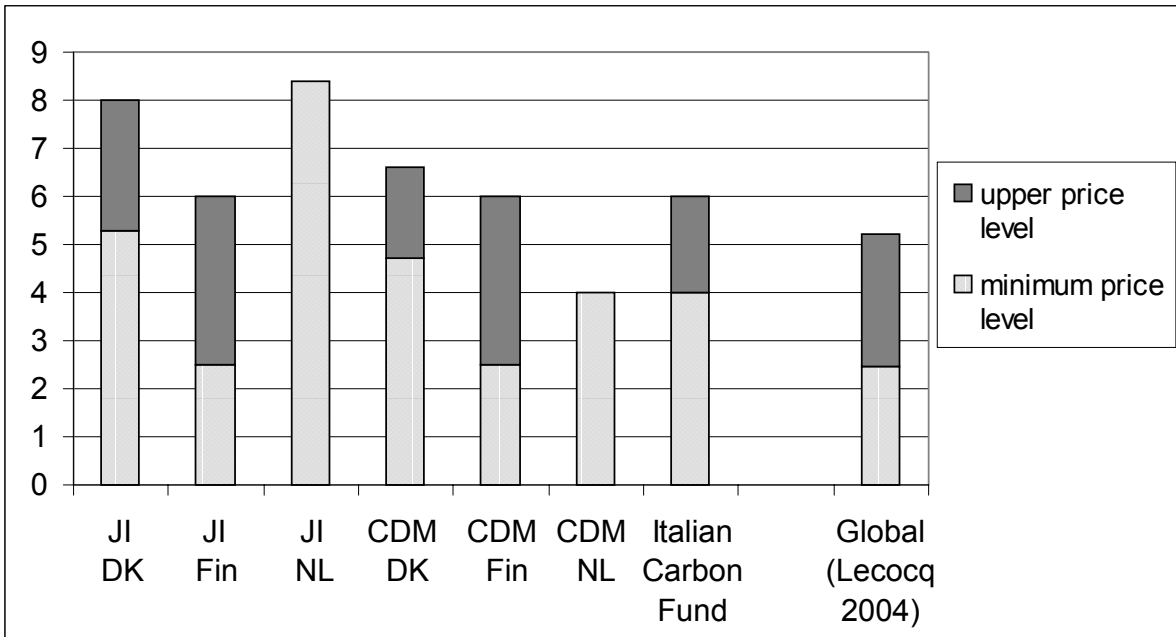
Figure 8: Regional locations of CDM projects per country



3.4. Price estimates for CERs and ERUs issued by EU countries

To show the profitability of the project-based mechanisms, several countries have published price estimates for the purchasing of CERs and ERUs. One has to consider though that these are only estimates and that transaction costs have mostly not been considered. Transaction costs vary widely and depend on the host country of a project and the size of a project. Figure 9 gives an overview of estimated prices for Denmark, Finland, the Netherlands and the Italian Carbon Fund. Global price estimates are added for a comparison (the light and the darker areas show the under and upper limits of estimates).

Figure 9: Price estimates for ERUs and CERs (Euro per tCO₂e)⁵



4. CDM & JI and the European Emissions Trading Scheme

Besides the option for governments to engage in CDM and JI activities, the so-called “Linking Directive” (European Commission 2003a) allows the installations of the upcoming EU ETS to use CDM and JI credits for compliance in the ETS. This section will summarize the content of the

⁵ The global price by Lecocq is given in US \$ and has been converted to Euros (exchange rate of September 04: 1 US\$ = 0,82 Euro).

directive, and the available data on the private engagement in JI and CDM projects and their investment in carbon funds. No information is available on the second option mentioned in section 2, buying emission reductions from someone who is involved in JI or CDM projects.

4.1. The Linking Directive

To make sure that the member countries can fulfill their emission reduction targets in an economically efficient way, a linking between the ETS and the two project mechanisms has been established. The Commission released a draft proposal for a so-called “Linking-Directive” in July 2003 amending the EU ETS to include project-based mechanisms with some restrictions (European Commission 2003a). On April, 20 2004, the European Parliament agreed on a modified text, which has been formally approved by the Council on September, 15. The Directive allows European companies, which are covered by the EU ETS to carry out emission-curbing projects worldwide, and to convert the credits earned into emission allowances under the EU ETS. The actual flow of emission certificates from a CDM/JI project to one of the installations in the ETS will be as follows:

- The CDM/JI project developer receives CERs/ERUs after the project has successfully undergone the standard project cycle for CDM/JI projects as described above.
- The developer sells these CERs/ERUs to an operator of an installation in the ETS.
- The operator surrenders the CERs/ERUs to the Member State where he is located and receives an equivalent in allowances.
- The member state can use the CERs/ERUs for compliance with obligations under the Kyoto Protocol.

CDM credits can be used right from the start of the ETS in January 2005. Credits from JI projects will only be allowed in the second period of the ETS from 2008-2012 and can only be obtained from the Annex I countries that have

ratified the Kyoto Protocol. Credits from Australia and the USA, for example, are not available.

Even though the first proposal envisaged to limit the use of CDM and JI credits to 6% of the total quantity of allowances allocated to the ETS, there are no limitations set in the final version of the Directive. Governments though are required to consider the issue of complementarity – achieving more than half of the emissions reductions domestically – in their twice-yearly monitoring reports and can set a limit for CDM and JI credits for each single installation. At least some countries like Germany actually plan to limit the use of CDM and JI even though it is not yet clear to what degree.

To ensure the credibility of the EU ETS the linking excludes nuclear power. Credits from sink projects are not allowed during the first trading period of the ETS but may be included in the second phase after a review that finds that there is new scientific proof of their environmental potential available. Because of the same reason, large hydro projects must be subject to the international rules on Dams drawn up by the World Commission to prevent negative environmental and social impacts from such projects. Finally, the Directive contains some provisions to prevent double counting of emission reductions. An installation under the ETS is thus not eligible under JI. For more detailed information on the linking directive and its controversial topics, see Langrock et al. (2004) or Bygrave & Bosi (2004).

4.2. Engagement of private companies in CDM & JI projects

Different information sources show, that some private companies already invested in JI or CDM projects (see e.g. PointCarbon or CDM Watch). In 2002, the Union of the electricity industry in Europe, Eurelectric, conducted a survey amongst electricity companies to obtain information on their involvement in JI and CDM projects. The report showed that 18 major European electricity companies were already participating or planned to invest in JI and CDM projects (see Eurelectric 2002). Haites & Seres (2004) who have undertaken a survey on the potential of the CDM market come to the conclusion that the

demand by industry in Europe will be between 45 and 175 MtCO₂e per year. These estimates though are mainly based on modeling studies.

Even though information on private engagement in CDM and JI projects is partly available, it is mostly not possible to determine how the resulting carbon credits will be used. Many companies develop or invest in CDM and JI projects because it is profitable to sell the ERUs/CERs e.g. to funds or tenders. Only since the linking directive has been established firms have an increased incentive to invest in CDM and JI projects to obtain emission allowances for the EU ETS. Indeed, first transactions in this context can be observed. The broker Co2e for example announced on October 12 that a CDM transaction where a European corporate buyer signed an emission reductions purchase agreement to acquire credits from a sugar cane plant in Brazil for use in the EU ETS has been arranged.

However, as long as the CDM Executive Board has not yet started to revise CDM projects, it is unclear if the reductions achieved by the ongoing projects will be accountable as official CERs and therefore be exchangeable into ETS allowances. As long as the official status of the projects is unclear it is thus difficult to estimate the absolute amount of CERs that will enter the ETS. In addition, some projects have primarily been started to help a company gain a "green" image or because of a company's mission statement so that it is questionable if they were established according to the official standards. It is nearly impossible to estimate their importance for the ETS.

Keeping this in mind, we nevertheless tried to compile some relevant data on the engagement of EU companies in CDM and JI. The most useful database turned out to be the database for ongoing CDM projects of CDM Watch⁶, (http://www.cdmwatch.org/search_project.php) which also gives information on investors. The database covers 34 entries of companies based in the EU,

⁶ CDM Watch is a non-profit organisation that monitors the Clean Development Mechanism (CDM), analyses CDM projects and provides a clearinghouse for information on CDM projects and CDM related issues and developments. CDM Watch is funded by the German Federal Ministry for Economic Cooperation and Development.

which have already invested in CDM projects⁷. Table IX in the Appendix gives information on CDM projects, which have been entered into this database. It includes companies from nearly all EU15. Only companies from the cohesion countries, Austria and Luxembourg seem to be less active. Most of the companies are big energy providers, which focus on both fossil fuels and renewable energy resources.

The size of the projects ranges from very small projects, which have a supposed GHG-reduction potential of 100 ktCO₂e to huge hydro or gas capture, and destruction projects with a potential of up to 10 MtCO₂e. Two German companies invested in very large-scale projects. One of them with a reduction potential of nearly 11 MtCO₂e is based in Brazil, the other with a potential of nearly 7 MtCO₂e is hosted by Indonesia. On the other hand, the project with the smallest reduction potential of only 156 ktCO₂e, which is hosted by Bangladesh, is financed by a Dutch company. All in all, the 34 existing CDM projects with private participation from EU countries are supposed to have a reduction potential of at least 53.6 MtCO₂e⁸. Only a minor part of these reductions, though are likely to enter the EU ETS. 13 of the projects are part of CERUPT, so that the carbon credits resulting from the projects will go to the Dutch government. Three projects are part of the PCF. For three other projects, the involvement of Denmark as an Annex I party is reported, so that it is likely that the carbon credits of these projects will be used by the Danish government. For the remaining 16 projects with scheduled emission reductions of altogether 34.2 MtCO₂e, it is not clear who will actually use the resulting CERs and ERUs.

Concerning the host countries, most of the projects are hosted by Latin American countries and by (non-China) Asian and Pacific countries. Only few projects are hosted by the two important developing countries China and India and, as the section on the world carbon market has shown, Africa is lagging behind in hosting CDM projects.

⁷ Information from a different source is available for one more JI project, see Appendix.

⁸ In some projects more than one company/institution is involved. These may include non-European companies/institutions.

Investors seem to favor projects that are related with the use of renewable energy sources. More than two thirds of the projects fall in this project category. Four of the renewables projects are bagasse-projects (burning the residue of sugar cane production), three of them are wind farm projects, two projects produce energy with biomass and one with geothermal. Gas capture or destruction projects are also very common, as well as energy efficiency and large hydro projects. All three large hydro projects were initiated by a Swedish company. It is already known that these projects fall into the non-additional category and that they will not produce CERs.

4.3. Engagement of ETS firms in carbon funds

Already for some time companies have the possibility to invest in the Carbon Business of the World Bank. Up to now, only big companies have used this option. Box 3 gives an overview of private investment in the World Bank’s Carbon Business. Unfortunately, the level of investment is only known for some companies.

Box 3: Private investment in the World Bank Carbon Funds

In addition to national governments, several private entities from EU countries have invested in the World Bank’s Prototype Carbon Fund. These are either big energy companies or banks.

Energy suppliers:	Banks:
British Petroleum (BP) / Amocco	Deutsche Bank (Germany) (5 Mio. US\$)
Electrabel (Belgium)	RaboBank (The Netherlands)
Fortum (Finland)	
Gaz de France	
RWE (Germany)	

Private investors are also involved in the Community Development Carbon Fund:

- BASF (Germany) (US\$ 2,5 Mio.)
- ENDESA (Spain) (US\$ 2,5 Mio.), KfW
- Statoil (Norway) (US\$ 2.5 Mio.)

Source: Prototype Carbon Fund, <http://www.carbonfinance.org>

In addition to the World Bank funds, some countries have opened their JI & CDM funds for private investment or have implemented a fund primarily for private investors to help private companies to obtain emission reductions from the project-based mechanisms. The latter is the case for the German KfW Climate Fund, which is a tool for private companies from all over Europe to invest in JI and CDM projects. The Spanish and Italian Carbon Funds are also open for private investments, but the minimum contribution to the Italian Carbon Fund is US\$ 1 Mio. On the other hand, some funds, like the Austrian or Danish Carbon Funds seem to be implemented to help the governments achieve their Kyoto targets, only.

Information on how much European firms plan to invest into such funds is not available. Some funds have announced targets for private investment, such as the KfW fund that aims at private investment of € 32 Mio. or the NEFCO fund that looks for € 15 Mio. of private investment. This information is also included in Table II in the Appendix.

5. Summary and Conclusions

Emission reductions abroad via CDM and JI projects are likely to play an important role for meeting the European Kyoto commitments. On the one hand, governments can use these flexible Kyoto mechanisms to require less severe emission restrictions by domestic households and domestic industry. On the other hands, firms covered by the upcoming European emissions trading scheme will be able to exchange CDM and JI credits to emission allowances for their use within the scheme.

In this paper, we have described the general functioning of CDM and JI projects and the different possibilities to acquire CDM and JI credits. The main goal was to gather information from various sources on the likely amount of CDM and JI credits that will be used on public and private level. The focus was on the former EU15 countries that have binding emission targets.

Concerning public demand for CDM and JI credits almost all Western European governments have announced in their National Allocation Plans that

they will make use of CDM and JI to fulfill their obligations. The part of still necessary reductions that will presumably be achieved via these mechanisms reaches from around 50 % in the Netherlands and Ireland over around 30% in Spain and Denmark and around 20% in Luxembourg, Belgium and Austria to less than 10% in Finland. Germany and the UK want to concentrate on domestic action, even though Germany also invests in different climate funds. In absolute numbers, the Netherlands and Spain will be by far the largest buyers of CDM and JI credits. Both plan to buy credits for around 20 MtCO₂e per year. Altogether the Western European countries plan to acquire around 70 MtCO₂e per year in the first commitment period from 2008 – 2012 and plan to invest around € 280 Mio. per year to do so. If these plans will indeed be realized, around one third of the emission reductions relative to 2002 emissions that are required to meet the EU15 Kyoto target will be achieved via CDM and JI on governmental level.

Information on the likely private investment from firms under the European emission trading scheme in CDM and JI is much more difficult to compile. As companies can not only invest in CDM and JI to use the resulting credits in the EU ETS but also to sell them to e.g. funds or tenders, an investment of a European firm does not necessarily lead to carbon credits that will enter the EU ETS or even the EU at all. Evaluating a project database with respect to existing investment of European companies in CDM and JI showed that at least 25 firms from at least nine EU member countries have already invested in CDM and JI projects. Most firms belong to the energy sector and the investment will lead to emission reductions of around 45 MtCO₂e. Of these, at least 10 MtCO₂e will go to tenders and government programs. For the remaining 35 MtCO₂e it is likely that some will be converted into ETS allowances. Furthermore, there is some investment in diverse funds. At least seven large European companies have invested at least US\$ 10 Mio. in the World Bank carbon funds.

To acquire more detailed information on the private engagement in CDM and JI would require a survey among ETS firms, which is beyond the scope of this

paper. Altogether, the CDM and JI market is developing rapidly and is still surrounded by many uncertainties concerning eligible projects, verification, transaction costs and prices. All of these factors will influence the success of the government programs and plans as well as the private demand for CDM and JI credits. Still, the information gathered in this paper gives a first overall picture of the importance of the mechanisms for reaching the European climate targets under the Kyoto Protocol and will help to analyze issues such as the costs of reaching the Kyoto targets, the outcome of the EU emissions trading scheme and the demand on the international carbon market.

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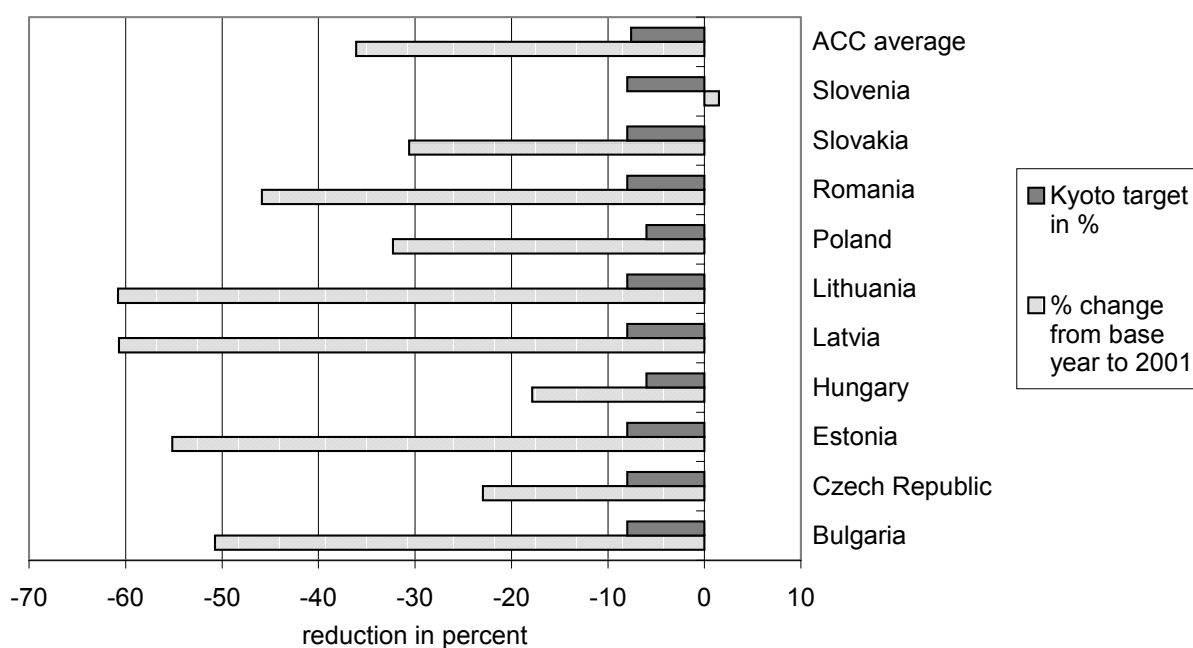
7. Appendix

Table I: GHG emissions in the EU 15 from 1990 to 2002 (in MtCO₂e)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	% change 1990-2002
Austria	78	82	75	75	76	79	83	82	82	80	81	84	85	9,0
Belgium	146	149	148	147	152	155	159	150	155	148	150	149	150	2,7
Denmark	69	79	73	76	80	77	90	81	76	73	68	69	68	-1,4
Finland	77	75	72	72	79	76	82	81	78	77	75	81	82	6,5
France	565	589	579	556	552	560	576	568	583	564	558	562	554	-1,9
Germany	1249	1196	1146	1131	1108	1101	1119	1082	1056	1020	1016	1027	1016	-18,7
Greece	105	105	106	107	109	110	114	120	124	124	130	135	135	28,6
Ireland	53	54	55	55	57	58	59	62	64	66	68	70	69	30,2
Italy	509	511	506	500	493	525	517	523	535	540	544	554	554	8,8
Luxembourg	13	13	13	13	13	10	10	9	8	9	10	10	11	-15,4
Netherlands	211	218	218	221	222	225	234	218	224	213	213	216	214	1,4
Portugal	58	60	64	62	63	67	65	68	72	80	78	78	82	41,4
Spain	285	291	300	289	304	316	310	331	341	370	385	383	400	40,4
Sweden	72	72	72	72	75	74	77	73	73	70	68	68	70	-2,8
UK	743	744	721	701	696	686	708	684	679	648	648	656	635	-14,5
EU 15	4233	4239	4149	4076	4079	4119	4204	4132	4151	4083	4090	4144	4123	-2,6

Source: EEA Technical Report 2/2004

Figure I: GHG emissions in accession countries



Source: European Commission COM (2003) 735 final

Table II: Carbon Funds and Tenders

Program & Source	Initiator	Comments	Eligible Investors	Investors	Volume
Austrian JI and CDM program http://www.ji-cdm-austria.at/en	Austrian government		Austrian government only	Austrian gov : 12 Mio € in 2004, 24 Mio € in 2005, 36 Mio € from 2006 on	288 Mio €
Belgium JI/CDM Tender JKO (2004)	Flemish Government	Started in September 2004	Flemish government only	Flemish government	10 Mio €
BioCarbon Fund http://carbonfinance.org/	World Bank	Implemented to demonstrate projects that sequester or conserve carbon in forests and agro-ecosystems.	Open to all World Bank member countries, and to companies/entities located in these countries.	Interest from governments (e.g. Canada) and companies	Start capital in May 2004: US\$ 15 Mio Target size: US\$ 100 Mio
CDCF http://carbonfinance.org/	World Bank	Implemented to support small-scale projects hosted in disadvantaged countries.	Open to all World Bank member countries, and to companies/entities located in these countries.	Governments of Austria, Canada, Italy, Netherlands 3 EU-15 companies, 4 Japanese companies, 1 Swiss company	Target size: US\$ 100 Mio
CERUPT (Certified Emission Reduction unit purchasing tender) http://carboncredits.nl	Dutch government	Tender for CDM projects; CERs go to the Dutch government	Dutch government only	Dutch government	CERUPT /ERUPT approx. € 200 Mio p.a.
Danish Carbon tender Carbon Market Europe 18. June 2004	Danish government	Purchases JI credits	Danish government only	Danish government	Budget for 2004: 13.5 Mio € Altogether: 126 Mio €

Program & Source	Initiator	Comments	Eligible Investors	Investors	Volume
ERUPT (Emission reduction unit purchasing tender) http://carboncredits.nl	Dutch government	Tender for JI projects;	Dutch government only	Dutch government	CERUPT /ERUPT approx. € 200 Mio p.a.
European Carbon Fund CDM & JI Monitor 9 November 2004	IXI Corporate & Investment Bank & Caisse des Dépôts	Aim is to purchase CO ₂ allowances (also from CDM & JI) to create liquidity for the ETS market	Generally open to all investors		100 Mio €, unclear how much will be used for CERs and ERUs.
INCaF (IFC Netherlands Carbon Facility) http://ifcn1.ifc.org/ifcext/enviro.nsf/	Dutch government, managed by the Intern. Finance Co-operation (IFC)	Arrangements under which IFC will purchase CDM credits for the Dutch government	Dutch government only	Dutch government	Currently about US\$ 80 Mio € in INCaF and NECaF together
Finish CDM & JI program JIQ (2003) http://global.finland.fi/Englis h/projects/cdm	Initiated by Finnish government	Aim is to gather experiences on JI and CDM by implementing pilot projects	Finnish government only	Finish government	Up to 10 Mio € from Finish government
Italian Climate Fund http://www.italiancarbonfund.org	Italian gov., managed by World Bank	Initiated by Italian government	Italian investors only Minimum investment 1 Mio US\$	Italian government (ca. 10 Mio €)	15 Mio US\$ Target: US\$ 80 Mio
KfW-Fund http://www.kfw.de	Kreditanstalt für Wiederaufbau for the German government	Wants to develop a service instrument for German and European firms.	Open to all investors Minimum investment of 500T€, pooling possible	German government (up to 8 Mio €) KfW up to 10 Mio € (minimum 20%)	Target: 50 Mio €
NCDF (Netherlands Clean Development Facility) http://carbonfinance.org/	Dutch government, managed by World Bank	Facility to purchase CDM credits.	Generally open to all investors	Dutch government Firms	US\$ 20 –160 Mio (32 MtCO ₂ e)

Program & Source	Initiator	Comments	Eligible Investors	Investors	Volume
NECaF (Netherlands European Carbon Facility) http://ifcn1.ifc.org/ifcext/en_viro.nsf/	Dutch government, managed by the IFC	Arrangements under which IFC will purchase JI credits for the Dutch government	Dutch government only	Dutch government	Currently about US\$ 80 Mio € in INCaF and NECaF together
NEFCO (Nordic Environment Finance cooperation Testing Ground Facility http://www.cbss.st/basrec/newslist/dbaFile1981.html Schröder-Selbach (2004)	Governments of Baltic Sea butters	Aim is to buy ERUs from Russia, the Baltic States and Poland, Pre-financing is possible	Generally open to all investors	Scandinavian governments: 10 Mio € German government: 5 Mio €	First round: 15 Mio €, Second round aims at private investment of 15 Mio €
PCF Prototype Carbon fund http://carbonfinance.org/	World Bank	See Box 2	Open to all World Bank member countries, and companies/entities located in these countries. Minimum: US\$ 10 Mio for governments and US \$ 5 Mio for firms	Governments of Canada, Finland (10 Mio €), Netherlands, Norway, Sweden (10 Mio €), Japan 7 EU-15 firms 8 Japanese firms 2 Norwegian firms	Target size: US\$ 180 Mio.
SICLIP (Swedish International Climate Investment program) Http://www.stem.se	Swedish government	Aim is to gain experience to provide support to Swedish companies intending to invest in CDM projects	???	Swedish government	Part of the SEK 350 Mio. SICLIP budget will be used for JI and CDM projects.
Spanish Carbon Fund JKO (2004)	Consortium of 3 companies	will invest in CDM projects	???	Co2 Spain; Baker & McKenzie; Co2e.com	???
Sum of Funds*					735- 1260 Mio €

* Assuming an exchange rate of 1 USD = 0.82 € as of September 04.

Table III: Planned use of CDM and JI in the EU15

Austria	3-5 MtCO ₂ e per year. 23.7% of the necessary reductions (from 2002 benchmark) shall be accomplished by JI and CDM.
Belgium	In 2008-2012 the federal government wants to buy 2.46 MtCO ₂ e per year and the Walloon region plans to obtain 1.1 MtCO ₂ e per year. This implies that Belgium wants to achieve 18.4% of necessary reductions through JI and CDM.
Denmark	18. MtCO ₂ e for 2008-2012 which is supposed to contribute 28,5% to GHG-reductions which are necessary to achieve the Kyoto target.
Germany	JI and CDM do not play a major role. The German government will nevertheless put money in different climate funds (see Table III)
Finland	The gap between achieved reductions and the Kyoto target shall be closed by the flexible mechanisms. Projects from Pilot Program: 1.0-1.4 MtCO ₂ e for the first commitment period. This implies that 6.3% of necessary reductions would be achieved through the help of JI and CDM.
France	The French government wants to implement a national procedure to help private actors to invest in JI and CDM. It also wants to sign bilateral agreement with host countries.
Greece	No information available
Ireland	63.04% of additional reductions which are necessary to fulfill the Kyoto target shall be purchased through flexible mechanisms (2/3 government, 1/3 ETS sector) 18.5 MtCO ₂ e for 2008-2012 period
Italy	The government wants to use JI & CDM but the NAP gives no specific information on the amount that shall be reduced through JI and CDM.
Luxembourg	3 MtCO ₂ e shall be obtained by JI, CDM and the EU ETS, which implies that the flexible mechanisms contribute 19.1% to the GHG-reductions, which are necessary to achieve the Kyoto target.
Netherlands	Half of the gap to the Kyoto target shall be obtained by JI and CDM 100 MtCO ₂ e in 2008-2012 period (20 Mt per year);
Portugal	Plans to obtain 0.4- 0.9 MtCO ₂ e by JI and CDM. This is approximately 10-20% of the actual gap to the burden-sharing target.
Spain	100 MtCO ₂ e in 2008-2012 (20 Mt per year). This implies a contribution of 30% to necessary reductions.
Sweden	1 MtCO ₂ e per year during 2008-2012 period
UK	No statements on the use of JI and CDM

Sources: National Allocation Plans http://europa.eu.int/comm/environment/climat/emission_plans.htm, EEA (2004) and sources shown in Table II.

Table IV: Organization of CDM and JI

Austria	Austrian JI and CDM program (www.klimaschutzprojekte.at) 40% of the Austrian funds for climate protection are used for international measures (JI and CDM) The JI and CDM program is funded with: € 12 Mio. in 2004, € 24 Mio. in 2005, € 36 Mio. per year from 2006 on.
Belgium	In September 2004 the Flemish government launched a tender for CDM and JI projects for € 10 Mio.
Denmark	JI tender: DanishCarbon.dk (http://www.danishcarbon.dk) € 125.7 Mio. have been allocated to the state purchase of JI credits in 2003-2007 period Investment in the BASREC fund (www.cbss.st/basrec) (all Scandinavian countries together will invest € 10 Mio.)
Germany	€ 8 Mio. will be invested in the KfW-Klimaschutzfonds (http://www.kfw.de) and € 5 Mio. in the BASREC fund
Finland	Finish CDM/JI Pilot program (http://global.finland.fi/english/projects/cdm/) Up to now, 10 Mio. € has been allocated to the program. Carbon fund of the World Bank: Finland invested 10 Mio. € Investment in the BASREC fund (see Denmark)
France	The French government wants to implement a national procedure to help private actors to invest in JI and CDM. It also wants to sign bilateral agreement with host countries
Italy	An Italian Carbon Fund has been implemented which is managed by the World Bank. The Italian Carbon Fund has an initial endowment from Italy of US\$15 Mio. (http://www.italiancarbonfund.org) In addition, Italy invested US\$ 7 Mio. in the CDCF of the World Bank
Netherlands	ERUPT (Emission reduction unit procurement tender)/ CERUPT (Certified Emission reduction procurement tender) tenders for JI resp. CDM projects (http://www.carboncredits.nl) World Bank PCF In total: € 736 Mio. are spend on JI and CDM in the 2008-2012 period
Luxembourg	A fund is about to be implemented
Spain	A Spanish Carbon Fund, launched by CO ₂ Spain, working together with CO2e.com, is about to start. (http://www.co2e.com) Apart from that, the government is in contact with the World Bank, the Andean Corporation Foundation, the EBRD, the BID.
Sweden	Since 1993: pilot projects Swedish International Climate Investment Program World Bank PCF: 10 Mio. US\$ were invested by Sweden Investment in the BASREC fund (see Denmark)
UK	A Climate Change Projects Office has been implemented which helps in the development of JI and CDM projects. (www.dti.gov.uk/ccpo/)

Sources: National Allocation Plans http://europa.eu.int/comm/environment/climat/emission_plans.htm, EEA (2004) and sources shown in Table II.

Table V: Stage of implementation of JI and CDM projects

Austria	<p>Calls for JI and CDM projects have been published on 04.12.2003 and respectively 10.12.2003. Proposals for projects can be handed in until 30.09.2004.</p> <p>Until 28.07.04, expressions of interest for 9 JI and 19 CDM projects have been handed in. The status of the different projects as well as the host countries and technologies vary widely.</p>
Denmark	<p>Denmark has made overall cooperation agreements on joint climate projects with Slovakia, Romania, Bulgaria, Ukraine, Estonia, Latvia and Moldova, and negotiations are taking place on similar country agreements with Russia, Poland, Lithuania, Hungary and the Czech Republic.</p>
Finland	<p>The project pipeline of the Pilot Program currently includes approximately thirty potential projects.</p> <p>The current project portfolio of the Pilot Program includes seven CDM and five JI projects at different stages of active development.</p>
Netherlands	<p>Under ERUPT and CERUPT, 12 JI projects have been contracted or are about to be contracted: 5 CDM projects and 7 JI projects</p> <p>In 2003 36 MtCO₂e CERs and 8.4 MtCO₂e have already been contracted.</p> <p>Other projects:</p> <p>Rabobank: Focuses on the food and agribusiness.</p> <p>IFC; IBRD; CAF (Andean Development Corporation): Focuses on projects in Latin America and the Caribbean</p>
Sweden	<p>Agreements with Estonia, Lithuania and Russia are underway</p> <p>An agreement with Romania was concluded in 2003</p>

Sources: National Allocation Plans http://europa.eu.int/comm/environment/climat/emission_plans.htm, and sources shown in Table II.

Table VI: Information on JI projects

Austria	<p>Host countries of ongoing projects: Bulgaria, Poland, Rumania, Slovakia, Czech Republic, Ukraine, Hungary</p> <ul style="list-style-type: none"> ▪ Construction or retrofitting of combined heat and power (CHP) plants ▪ Fuel switch projects ▪ Projects using renewable energy sources ▪ Projects leading to the avoidance or energy recovery of landfill gas ▪ Waste management measures resulting in GHG reductions ▪ Reduction in final energy consumption (energy efficiency measures)
Denmark	<p>Cooperation agreements on joint climate projects with: Slovakia, Romania, Bulgaria, Ukraine, Estonia, Latvia and Moldova, Negotiations are taking place with: Russia, Poland, Lithuania, Hungary and the Check Republic.</p> <p>Project types which may be eligible under DanishCarbon include:</p> <ul style="list-style-type: none"> ▪ Renewable energy (wind power, biomass, solar, geothermal energy and small hydro power (below 20 MW)) ▪ Fuel switching ▪ Energy efficiency, e.g. CHP, process optimization ▪ Methane capture ▪ Reductions in industrial processes, e.g. reduction of emissions from adipic acid production and HCFC production.
Finland	<p>Five projects in Estonia:</p> <ul style="list-style-type: none"> ▪ two heating projects ▪ bioenergy project ▪ wind farm project ▪ small hydro plant
Italy	<p>The ICF wants to reach countries/regions that are of particular interest to the Italian economy, including China, Central and Latin America, the Mediterranean Region, the Balkans and Middle Eastern countries</p>
Netherlands	<p>Host countries: Bulgaria, Czech Republic, Estonia, Hungary, New Zealand, Romania, Slovakia</p> <p>Project types:</p> <ul style="list-style-type: none"> ▪ Renewable energy (solar, wind, hydro, etc.) ▪ Fuel switching ▪ Energy efficiency ▪ Waste processing ▪ Afforestation/reforestation
Spain	<p>Project types:</p> <ul style="list-style-type: none"> ▪ Energy efficiency and fuel substitution ▪ Renewable energy projects ▪ Methane capture and other emission reducing technologies.
Sweden	<ul style="list-style-type: none"> ▪ Switching from fossil to biofuels; ▪ Expanded use of biofuels in energy-efficient CHP plants; ▪ Fuel switching and/or energy efficiency improvements in industrial plants and/or electricity generation; ▪ Recovery and use of methane from landfill deposits.

Sources: National Allocation Plans http://europa.eu.int/comm/environment/climat/emission_plans.htm, and sources shown in Table II.

Table VII: Information on CDM projects

Austria	Host countries of ongoing projects: Brazil, Ecuador, China, India, Columbia, Morocco. Eligible projects: see JI
Finland	Host countries: Vietnam, Honduras, El Salvador, Costa Rica, India and Zambia Projects which are eligible und the Finish CDM project: <ul style="list-style-type: none"> ▪ Hydropower projects ▪ Landfill closure and gas recovery ▪ Renewable energy projects
Nether-lands	Host countries: Bolivia, Brazil, China, Costa Rica, Panama, Projects eligible for CDM include: <ul style="list-style-type: none"> ▪ Renewable energy ▪ Energy improvement; ▪ Transportation improvement; ▪ Recovery and utilization of methane from waste landfills and coal mines and/or fossil fuels-switching to less carbon-intensive sources Projects not eligible for financial support of the Dutch CDM program: <ul style="list-style-type: none"> ▪ Afforestation and reforestation projects ▪ Projects related to nuclear energy; ▪ Projects that are not cost-effective for the Netherlands ▪ Projects which may result in severe damage on biodiversity or on social livelihood.
Sweden	SICLIP-CDM Priority: energy efficiency and renewable energy projects Purchase agreements have been signed with four projects of which three are located in Brazil and one in India.

Sources: National Allocation Plans http://europa.eu.int/comm/environment/climat/emission_plans.htm, and sources shown in Table II.

Table VIII: Price and transaction cost estimates

	JI (price per tCO _{2e})	CDM (price per tCO _{2e})
Denmark	5,30€ - 8,00€ (DKr 40-60 per tCO _{2e})	No official statement on the costs. One estimation: € 4.70 - € 6.60
Finland	The price is estimated at € 2.56 excluding transaction costs. As only small projects are implemented, transaction costs are estimated to be high.	
Italian Carbon Fund	Expected to be in the US\$ 4-5 range with eventual outcome price, including costs, of about US\$ 6 per tCO _{2e} .	
Netherlands:	ERUPT: First experiences: average price € 8.4 PCF: 3 - 5 US\$	Upper price limit set by the ministry: 5 US\$ per tCO _{2e} Assumed average price: US\$ 4

Sources: National Allocation Plans http://europa.eu.int/comm/environment/climat/emission_plans.htm, and sources shown in Table II.

Table IX: Engagement of European companies in JI and CDM projects.

(Type 1 projects: Energy efficiency, Type 2: renewables, Type 3: hydro, Type 4: gas capture or destruction, Type 5: fuel switching)

Firm	Project (country and type)	Reductions in ktCO₂e (# other project participants)	Crediting period (years)
Austria			
Mayr-Meinhof Karton AG*	1 project in Bulgaria (Type 1)	450.0	8
Germany			
Ferrostaal AG	Trinidad & Tobago (Type 4)	2,286.9	10
	Brazil (Type 4)	10,954.0	21
Krupp Uhde GmbH	No information available		
Italy			
Ecoenergy	Brazil (Type 2)	669.6 (1 other)	7
	Nicaragua (Type 2)	753.3	7
Giammarco-Vetrocoke	India (Type 1)	228.0	
The Netherlands			
Grontmij Climate and Energy	Bolivia (Type 4)	1,776.6	21
Van der Wiel Storgas	Argentina (Type 4)	6,376.6	9
World Wide Recycling	Bangladesh	155.6 (1 other)	7
United Kingdom			
Agrinergy	India (Type 2)	220.0	10
British Petroleum	Brazil (Type 2)	No information	
CLP Envirogas Ltd.	Costa Rica (Type 4)*	785.8	10
ConocoPhillips	Vietnam (Type 4)	6,770.0 (1 other)	10
Lafarge Cement	Malaysia (Type 5)	>1,000.0	10
Rolls Royce	Thailand (Type 2)	1,755.2 (1 other)	21

Projects contributing to funds and government programs

Belgium			
Turbowinds	2 projects in Costa Rica (Type 2) within PCF, 1 st project for Belgium gov.	327.0 300.0	21
Denmark			
ABB Denmark	China (Type 1) for Danish government	1,017.3 (1 other)	10
Danish Energy Management	Malaysia (Type 2) for Danish government	1,075.2	21
France			
Onyx	Brazil (Type 4) for CERUPT	700.0	10
Germany			
Enercon	India (Type 2) for CERUPT	475.6	10
Heidelberg Cement	Indonesia (Type 1 and Type 5) for PCF	6,949.8	10 21
Italy			
Astaldi	No information available for CERUPT		
Sweden			
Alstom Power Generation	2 projects in Panama (Type 3)	3,942.9 (2 other)	10
	Peru (Type 3) for CERUPT	2,158.9 (2 other)	10
GE Energy AB	2 projects no information available for CERUPT		

The Netherlands			
NEG Micon	Jamaica (Type 2) for CERUPT	522.5	10
Shell	El Salvador (Type 2) for CERUPT	100.0	10
United Kingdom			
Agrinergy	Thailand (Type 2) for Danish government	750.0	10
CLP Envirogas Ltd.	Costa Rica (Type 4) for CERUPT	785.8	10
Renewable Energy systems	No information available for CERUPT		
Rolls Royce	Bolivia (Type 1) for CERUPT	319.4	10

Source: [Http://www.cdmwatch.org/search_project.php](http://www.cdmwatch.org/search_project.php)

*: <http://www.innovationsstiftung-sh.de/pdf/stockmeyer.pdf>