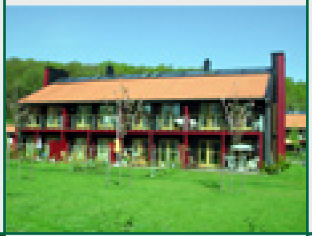
ENERGY CHARTER



Energy Efficiency and Emissions Trading

A PEEREA perspective after the entry into force of the Kyoto Protocol and of the EU ETS

January 2006

Energy Charter Secretariat

ENERGY EFFICIENCY AND EMISSIONS TRADING

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Introduction

The year 2005 was of particular importance for the climate change discussions. The Kyoto Protocol entered into force in February, following the Russian ratification. At the same time, the largest emission-trading scheme for CO_2, the EU ETS came into operation. By the end of the year the first Meeting of the Parties to the UNFCCC took place in Montreal.

The PEEREA Group discussed on several occasions the contribution of the Kyoto flexible mechanisms to boosting energy efficiency improvements. The role of energy efficiency projects in achieving climate change objectives was equally underlined. In 2004 a report was elaborated and subsequently printed on *Carbon Trading and Energy Efficiency*, with the understanding that the PEEREA Group will revisit the subject in order to reflect on new developments in this area.

The attached paper, prepared by the Secretariat with the consultancy support of EcoSecurities, served the discussion and debate in the PEEREA Group on the latest developments and opportunities for energy efficiency in the climate change process. The paper provides only a brief introduction of the main concepts, as they were presented and discussed in the 2004 report. The focus is now on the operation of the EU ETS and on the implications for both EU and non EU PEEREA countries of the Linking Directive on the use of JI/CDM mechanisms in relation to improving energy efficiency.

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CHAPTER 1: BACKGROUND ON INTERNATIONAL EMISSION TRADING

This chapter provides an overview of fundamentals of the Kyoto protocol and the related carbon market. The chapter begins with a brief description of the Kyoto protocol and its flexible mechanisms, followed by a section describing the EU ETS, including its current market situation. The final section of this chapter links the relevance of the EU ETS carbon market to PEEREA and its member countries.

1.1. The Kyoto protocol

'Global warming' is a term used to describe the increase over time of the average temperature of the Earth's atmosphere and oceans. Although the term can be applied for any historical range of time, in most instances, 'global warming' refers to the effect on the climate of certain human activities in recent times (i.e. since the industrial age). These activities release "greenhouse gases" into the atmosphere, which absorb infrared radiation emitted by the Earth's surface and act as a blanket keeping the surface warmer than it would otherwise be. The most important of these gases is carbon dioxide and its main sources of emission are the burning of fossil fuels (coal, oil and gas) and large-scale deforestation.

The theory of human-induced climate change is supported by the well-documented increase in greenhouse gas concentrations in the atmosphere that has accelerated during the past decades. For instance, the concentration of carbon dioxide has increased from 280 parts per million (ppm) in pre-industrial times to 370 ppm in 2003. This increase in greenhouse gases causes an augmentation of the Earth's surface temperature, but also alters various parameters of our climate. The likely characteristics of the resulting changes in climate include more frequent heat waves, increase in rainfall, and increase in frequency and intensity of extreme climate events. Despite many uncertainties regarding the magnitude of these changes and their possible impacts, global warming is seen as one of the greatest environmental and economic challenges facing humanity (Diringer 2004). One thing is certain; if no action is taken in the short term to reduce emissions, the effects (how severe the may be) cannot be avoided. Due to the urgency, the greatest challenge is to move rapidly to much increased energy efficiency and to non-fossil-fuel energy sources. Both the adaptation to the inevitable impacts and mitigation to reduce their magnitude are essential.

1.1.1. Kyoto Protocol Development

The United Nations Framework Convention on Climate Change (UNFCCC), signed in 1992, represents an international agreement to stabilise greenhouse gas concentrations in the atmosphere at 1990 levels. Parties to the Convention are divided into those countries taking on responsibility for achieving the convention's goal by reducing their emissions, the Annex I countries (all developed countries and countries with economies in transition), and those that do not have quantitative targets, the non-Annex I countries (developing countries).

To implement the goals of the UNFCCC, the Kyoto Protocol was adopted at the Conference of Parties (CoP) number 3 in 1997. The Kyoto Protocol became effective on the 16th February 2005. It binds the countries that have ratified it and that are listed in its Annex B (all Annex I countries with the exception of Belarus and Turkey). It covers six greenhouse gases (CO_2, CH4, N2O, SF6, PFCs, and HFCs) for which Annex I Parties have binding emission reduction targets during the period 2008 to 2012. Each Annex I party has its own reduction target ranging from an 8% reduction to a 10% increase limit from the 1990 base year. The average reduction commitment is 5.2% for all Annex I Parties. See Table 1 for Ratification Status for PEEREA Countries.

Table 1. Kyoto Protocol Ratification Status for PEEREA Member Countries.

Country	Kyoto Protocol Status	Country	Kyoto Protocol Status
Albania	Ratified	Kyrgyzstan	Ratified
Armenia	Ratified	Latvia	Ratified
Austria	Ratified	Liechtenstein	Ratified
Australia* ^	Signed	Lithuania	Ratified
Azerbaijan	Ratified	Luxembourg	Ratified
Belarus*	Ratified	Malta	Ratified
Belgium	Ratified	Moldova	Ratified
Bosnia and Herzegovina	No	Mongolia	Ratified
Bulgaria	Ratified	Netherlands	Ratified
Croatia	Signed	Norway*	Ratified
Czech Republic	Ratified	Poland	Ratified
Cyprus	Ratified	Portugal	Ratified
Denmark	Ratified	Romania	Ratified
Estonia	Ratified	Russian Federation*	Ratified
European Communities	Ratified	Slovakia	Ratified
Finland	Ratified	Slovenia	Ratified
France	Ratified	Spain	Ratified
Georgia	Ratified	Sweden	Ratified
Germany	Ratified	Switzerland	Ratified
Greece	Ratified	Tajikistan	No
Hungary	Ratified	The former Yugoslav Republic of Macedonia	Ratified
Iceland*	Ratified	Turkey	No
Ireland	Ratified	Turkmenistan	Ratified
Italy	Ratified	Ukraine	Ratified
Japan	Ratified	United Kingdom	Ratified
Kazakhstan	Ratified	Uzbekistan	Ratified

*** - Denotes state in which ratification of the Energy Charter Treaty is still pending.**
^ - Denotes Australia has not ratified and have no intention to do so.

Based on the principle that the effect on the global environment is the same regardless of where the GHG emissions reductions are achieved, countries may meet their targets through a combination of domestic activities and the use of the Kyoto Mechanisms. These mechanisms are designed to allow countries to meet their targets in a cost-effective manner and assist developing countries achieve sustainable development. There are three Kyoto Mechanisms:

- Joint Implementation (JI)
- Clean Development Mechanism (CDM)
- International Emissions Trading (IET)

Both JI and CDM are project-based mechanisms and involve developing and implementing projects that reduce GHG emissions overseas, thereby generating carbon credits that can be sold on the carbon market. JI is the mechanism that allows trades of credits between Annex I countries, whereas the CDM allows trades between an Annex I country and a non-Annex I country. The main advantages for countries hosting projects are the attraction of foreign investment, the transfer of technology, and the contribution projects make to the country's sustainable development. IET allows the direct trading of emission allowances between Annex I countries.

1.1.3. Joint Implementation (JI)

JI projects are to be undertaken in developed countries or countries with economies in transition (Annex I Parties), involving at least two countries that have agreed to an emission target, i.e. their emissions are "capped". Russia and Ukraine have a large potential for abatement at costs lower than in the EU and are therefore likely to benefit substantially from JI projects.

Examples of JI projects are the replacement of a coal-fired power plant with a more efficient combined heat and power plant in Russia, a project for methane capture from a landfill site located in Poland or building a new renewable energy plant to produce electricity in Bulgaria. However, under Article 3(1) of the Kyoto Protocol, Annex I Parties are to refrain from using CERs and ERUs generated through nuclear energy to meet their emissions targets. This commitment has been fixed until 2012, but Article 3(1) provides an indication for the continuation for subsequent periods.

Joint Implementation projects must have the approval of all Parties involved, and must lead to emission reductions that are additional to any that would have occurred without the project. Because JI projects have to achieve additional emission reductions, they are expected to promote transfers of advanced technologies, and thus contribute to their sustainable development goals. The emission reductions are calculated and verified against a counter-factual "baseline" scenario to be developed and justified by the project participants before the project is implemented. The baseline reflects a scenario showing what would have happened in terms of emissions in the absence of the JI project.

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 certain eligibility requirements laid down in the Marrakech Accords. The second procedure ("track two") applies where the host Party does not meet all these eligibility requirements. In such cases, the amount of ERUs generated by a project must be verified under a procedure supervised by the 10-member Article 6 Supervisory Board, which was set up after the Kyoto Protocol's entry into force.

In every case, project participants must prepare a Project Design Document (PDD), which describes the project, analyses the baseline scenario, provides arguments for the additionality of the project and gives an estimate on the emission reductions generated. The PDD includes the Baseline Study and the Monitoring Plan, central documents in the entire project cycle. Once the PDD is ready, it is sent for evaluation by an independent organisation accredited by the Supervisory Committee. The evaluation, which includes an opportunity for public comment, exists to make sure that the assumptions in the documents are accurate and that the expected emission reduction is likely to happen. The baseline and monitoring plan must be devised according to standard criteria, and the PDD should also include an assessment of the project's environmental impacts. Based on its evaluation and reports by project participants, the independent entity will determine the ERUs that may be issued by the host Party. Once the project is implemented and operating, the performance of the project and the real emission reductions generated are monitored.

The implementation of a JI project results in a transfer of ERUs from one country to the other, but the total emissions permitted in the countries remains the same (a “zero sum operation”). The host country benefits from minimising the part of its assigned amount to transfer, while the investor country benefits from maximising the assigned amount units it acquires. It is expected that both countries will strike a fair balance, so the Marrakech Accords require a less strict control procedure than for the CDM. In the case of JI projects, only the reduction achieved between 2008-2012 can be sold, and not what is achieved in the previous years, or years after. JI projects can also be implemented between two Member States of the European Community. In such a case the environmental effect as regards greenhouse gas emissions is also a zero-sum game within the European Community. The interaction between the EU emission trading scheme and such potential projects is of increasing importance (EcoSecurities 2001).

1.1.4. Clean Development Mechanism (CDM)

The CDM established under the Kyoto Protocol involves Annex I parties implementing emissions reducing projects in non-Annex I countries, i.e. countries that do not have quantitative emission reduction targets (essentially developing countries). These activities are aimed at both enabling Annex I parties to use certified emission reductions (CERs) to contribute towards compliance with their emission targets whilst allowing non-Annex I countries to gain clean technologies and work towards sustainable development. Public funding can finance CDM projects but must not result in the diversion of official development assistance (ODA). Projects must lead to real, measurable, and long-term benefits related to the mitigation of climate change. Moreover, these reductions must be additional to any that would have occurred without the CDM project.

As an example of a CDM project, a company in The Netherlands may invest in a rural electrification project using solar panels in South Africa. It could also be the refurbishment of a coal fired plant switching to clean coal technology in China. Projects may be done on the supply side or the demand side. As for JI projects, the Marrakech Accords requires Annex I Parties to refrain from using CERs generated through nuclear energy. Afforestation and reforestation activities are eligible under the CDM for the first Kyoto commitment period (2008-2012).

The steps that should be undertaken by a project developer are summarised in Figure 1.1.

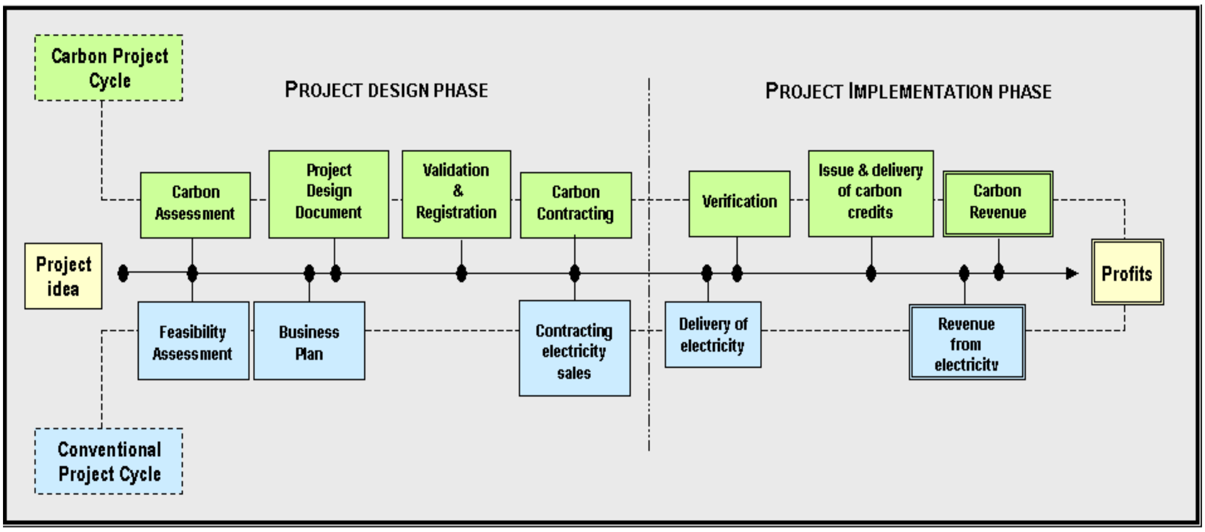

Figure 1.1: The CDM project cycle

1.2. Overview of the International Carbon Market

As a result of the introduction of the Kyoto mechanisms, an international market has developed in which the emission allowances and credits are traded between parties in order to comply with their Kyoto target. The demand for emission reductions is from those legal entities that, under the Kyoto Protocol, are subjected to a cap on their GHG emissions. In practice this means Annex I governments such as EU Member States, Canada, Japan, Norway and Switzerland (in Figure 1.2 these Parties are identified as different A-1a, b and c). These Parties can trade Assigned Amount Units (AAUs) under the mechanism International Emission Trading or purchase CERs/ERUs from CDM/JI projects.. Many EU governments (such as the Netherlands, Denmark, Austria, Spain) and the Japanese government are active on the market via direct purchase programmes or via development banks (the best known example is the World Bank Prototype Carbon Fund).

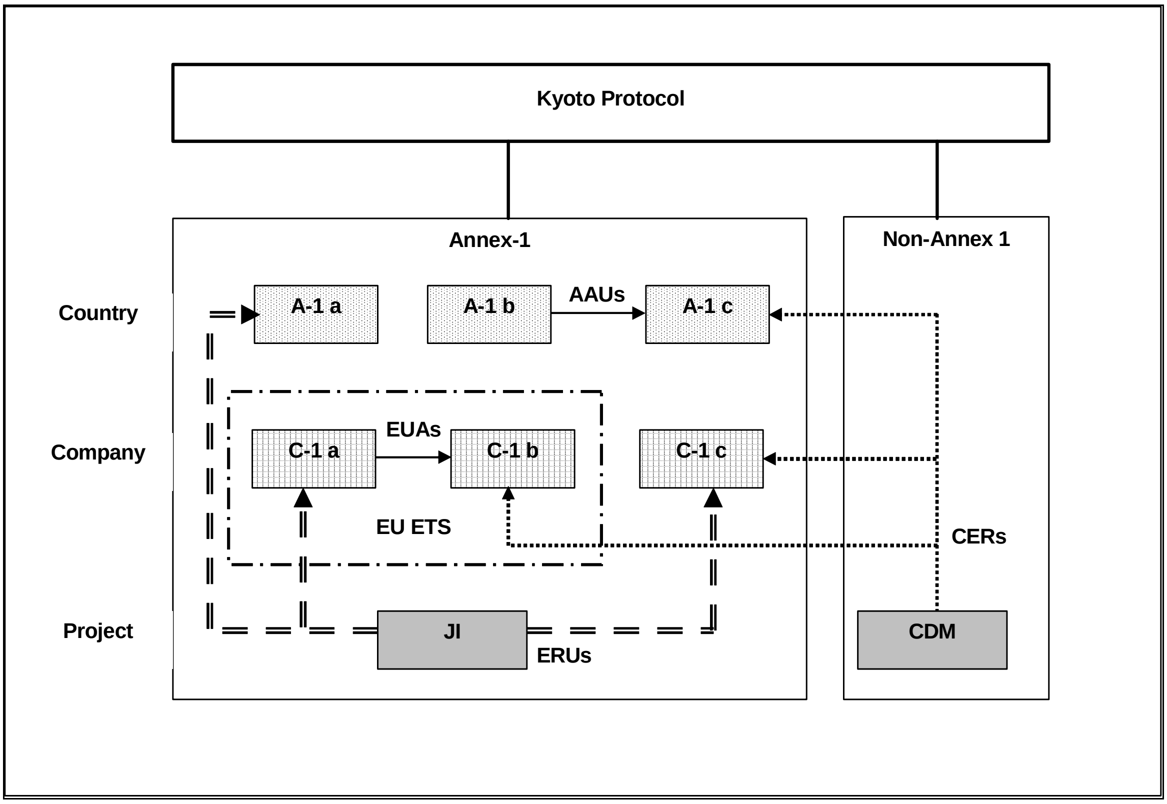

Figure 1.2: Overview of different emission permits (AAUs, CERs, ERUs and EUAs) in the Kyoto compliant carbon markets.

Furthermore, substantial demand will come from European, Canadian, and Japanese businesses, which have been engaged in the CDM for some time (reflected as C-1a, b and c in Figure 1.2). In the EU the European Emission Trading Scheme will cap CO_2 emissions of the large scale European industry at 2.2 Giga tonne per year. The scheme has only recently started and there are still many market uncertainties, for example the allocation of allowances for 2008 – 2012 is still unknown. Although equilibrium prices are not yet known, general consensus is that CDM/JI projects will provide cost effective emission reductions compared to domestic emission reductions especially during the period 2008 - 2012. If demand for CERs/ERUs ranges between 5% and 15% of total current emissions, this means a demand for CERs/ERUs of between 550 and 1,650 mega tonne of CO_2 until 2012. This makes the EU ETS the biggest market for CERs/ERUs.

Although the policy of Japan is not yet clear and the Canadian government's recent proposal for a trading scheme differs from the 'cap and trade' approach in Europe, companies have been active to access CDM/JI projects.

1.2.1. Key price drivers

The price of carbon will depend on many factors and there have been many modelling studies aimed at predicting the future price of CERs using global GHG emission supply and demand models. Given the aggregate nature of such studies, they do not provide detailed forecasts but rather focus on “market fundamentals”.

In one of the more recent studies[1], executed by the World Bank and GTZ (a German development agency), a most likely base case was defined. Figure 1.3 shows the supply of

[1] “CDM in China”, World Bank, Chinese Ministry of Science and Technology (MOST), German Technical Cooperation unit (GTZ), Swiss State Secretariat for Economic Affairs (SECO). September 2004

emission reductions under the Kyoto Protocol. It clearly demonstrates the CDM is only going to play a minor part of total world supply and that the states in the European Former Soviet Union (EFSU; most notably Russia and the Ukraine) are the leading suppliers in the carbon market.

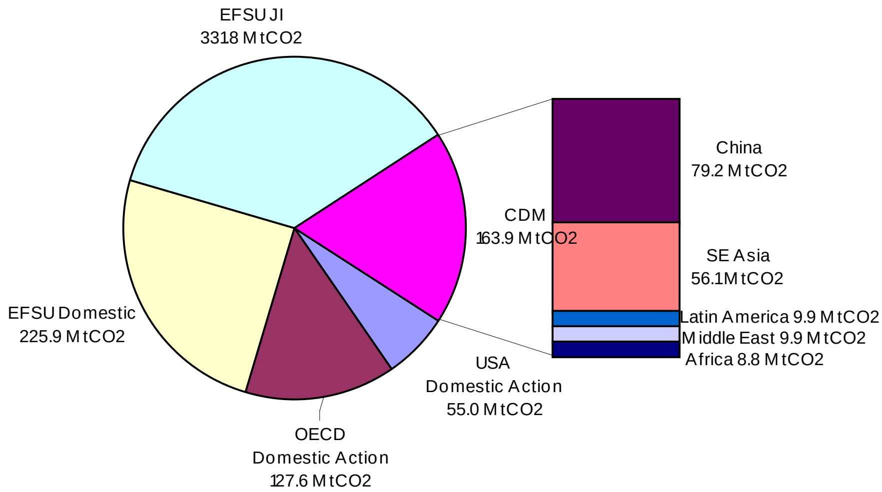

Figure 1.3: Potential Carbon Market Volumes ($MtCO_2$) in 2010 at €6 per tonne CO_2

The equilibrium market price is € 6/tCO_2. Even though this estimate seems on the low side, other academic modelling studies confirm the same message. In fact Table 1.2 shows that the € 6/tCO_2 estimate is one of the highest estimates among a number of different studies. Only the Point Carbon study shows a higher estimate.

Source of Carbon market price studies	€/tCO_2
IPAC (World Bank study)	6.0
EPPA model (Massachusetts Institute of Technology)	3.5
GTEM (Australian Bureau of Agricultural and Resource Economics)	2.5
USA Energy Information Agency (medium scenario)	3.2
Point Carbon	9.9
Average	**5.0**

Table 1.2: Projected Carbon Market Prices for 2010[2]

The World Bank GTZ study highlights the following factors as being the key factors influencing the CO_2 market price:

- Business-as-usual assumptions and marginal abatement costing curves - Issues like economic growth in Europe, high oil prices, the continued switch to natural gas in Europe, impact the emissions in those countries. Marginal abatement cost curves reflect the costs to reduce emissions internally and thereby affect demand for emission reductions elsewhere.
- Market behaviour of Russia and the Ukraine - One of the most important factors is the policy of Russia and Ukraine with regard to their excess Assigned Amounts Units

[2] As mentioned in "CDM in China" by the World Bank and others, except for Point Carbon quote which comes from Point Carbon.

(AAUs)[3]. Under the Kyoto Protocol, Russia, Ukraine and a few other Eastern European countries have an emission target equal to their 1990 emissions. After 1990 the economy of these countries collapsed resulting in an equal reduction of their GHG emissions. Even though their economies have recovered since, their GHG emissions in 2010 are likely to be well below 1990 levels, leaving them with a large amount of excess allowances which they can sell on the world market. These excess allowances are generally referred to as "hot air". If Russia and the Ukraine were to dump all their "hot air" on the international markets, models show that the market price of GHG emission reductions would go down to zero. It is generally assumed that Russia and Ukraine would not do that and will exercise their monopolistic power to keep the price sufficiently high. However, even if Russia and Ukraine planned to do so, this problem is well known by market buyer governments who would be reluctant to purchase such "hot air".

- <u>CDM implementation rate</u> - CDM's complex operation process or project cycle, from validation and registration, to monitoring, verification, certification, and insurance would slow CDM implementation speed and lessen CDM credits. However, a prompt start of CDM projects, resulting in banking of CERs prior to 2008, would enlarge CDM potential.

1.3. The EU Emissions Trading Scheme (EU ETS)

In 1996, the EU Council adopted as its long-term climate objective, a global-mean temperature change that would not exceed 2 degrees Celsius compared with pre-industrial level. To achieve this goal, in July 2003, the European Council formally adopted the Emissions Trading Directive. The Directive laid out the framework for the European Emissions Trading Scheme (EU ETS). In order to minimise the economic costs of its Kyoto commitments on combating climate change, EU countries agreed to set up an internal market enabling companies to trade carbon dioxide emissions. On the first of January 2005, the European Union launched its Emission Trading Scheme, allowing some 12,700 industrial installations spread across all 25 EU member states to buy and sell permits to emit carbon dioxide, covering about 45% of EU CO_2 emissions. By 2007, the European emissions market is expected to be worth € 10 billion per year (Hopkin, 2004).

The first phase of the EU ETS runs from 2005-2007 and the second phase will run from 2008-2012 to coincide with the first Kyoto Commitment Period. Compliance is required on an annual basis within these periods, but the allocation of allowances will be decided separately for the two periods. Further five-year periods are expected subsequently.

So far, the EU ETS only covers the power sector and high-energy use sectors of industry: energy activities (combustion installations with a rated thermal input exceeding 20MW, mineral oil refineries, coke ovens), production, and processing of ferrous metals, mineral industry (cement clinker, glass and ceramic bricks) and pulp, paper, and board activities. Moreover, only CO_2 is included in the first phase with the potential to expand this to the other 5 greenhouse gases (GHG) from 2008.

The 'cap-and-trade' approach, initiated in the EU ETS, sets an overall cap or maximum amount of emissions per compliance period. Companies are given allowances, which represent their target or 'cap' for a compliance period. The number of allowances allocated to

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[3] Under the Kyoto Protocol Russia, Ukraine and a few other Eastern European countries have an emission target equal to their 1990 emissions. After 1990 the economy of these countries collapsed resulting in an equal reduction of their GHG emissions. Even though their economies have recovered since, their GHG emissions in 2010 are likely to be well below 1990 levels, leaving them with a large amount of excess allowances which they can sell on the world market. These excess allowances are generally referred to as "hot air".

each installation for any given period, is set down in a document called the National Allocation Plan. Member States must ensure that by 30 April each year at the latest, the operator of each installation surrenders a number of allowances equal to the total emissions from that installation during the preceding calendar year. Installations will therefore have to surrender allowances for the first time by 30 April 2006 equal to their emissions during 2005.

When an installation's emissions are below its cap, the installation then has allowances to sell; if not, the installation must purchase allowances from companies that have exceeded their emissions reductions targets. Each allowance permits the holder to emit one tonne of CO_2. Fines of 40 euros per excess tonne of CO_2 emitted will be imposed on companies exceeding their target, rising to 100 euros for the second phase of the scheme. For comparison, the prices for carbon allowances are in the 20 euros per tonne range. By offering a much cheaper alternative to fines, the Commission hopes that the EU ETS will stimulate innovation and create incentives for companies to reduce carbon emissions. Specifically, investments in cleaner technologies can then be turned into profits while helping the EU meet its Kyoto commitments on climate change. This unique system has earned the EU the reputation of global leader in fighting climate change; the ETS is the world's first multi-country emissions trading system and the largest scheme ever implemented (IETA 2004).

As previously mentioned, apart from the EU, other industrialised countries such as Japan and Canada are considered main potential buyers of carbon credits. Also, in countries that have rejected the Kyoto Protocol, such as Australia and the United States, initiatives are being developed to reduce GHGs, which include emissions trading initiatives. These are on a voluntary basis (e.g. the Oregon Climate Trust, the Chicago Climate Exchange) or are state-level based emissions trading system (such initiatives are operating for example in New South Wales and Queensland in Australia, and are being developed in several states in the US including California, Massachusetts and New York).

1.4 Current Status of Implementation of EU ETS in EU Member States

1.4.1. Creating an EU market

For the market mechanism of emissions trading to work, there must be an underlying scarcity as in any market (Michaelowa, 2004). The directive itself does not establish this scarcity. It is only established when Member States decide the amount of allowances issued in total, and how they are distributed between the relevant installations. If every Member State were to allocate enough allowances to cover all the expected needs of their installations, the result would be an abundance of allowances, so their value would be very low, or even worthless.

Thus, decisions on the total amount by European governments define the environmental effectiveness of the EU ETS, the price of allowances, and the impact on companies. One of the greatest challenges in the implementation of the EU-ETS was associated with the allocation of allowances. The future success of the EU ETS will centre on the National Allocation Plans (NAPs) that were developed by national governments and, in turn, approved by the European Commission.

1.4.2. National Allocation Plans

Each participating country in the EU ETS was required to produce a National Allocation Plan (NAP). The NAP describes the amount of allowances to be allocated for the EU ETS for any given phase of the scheme, and how those allowances will be allocated to all installations participating in the EU ETS in that country. Emissions limits (i.e. allocation) in the ETS are established by National Allocation Plans, proposals submitted by each EU member state and individually approved by the European Commission. Once the proposals get approval, governments allocate their allowances to industrial installations, such as power companies, mineral miners, and cement and paper manufacturers, giving each an allotment of ‘emissions credits’ that they can trade internationally. The governments involved keep track of the emissions, based mainly on the known inputs to these installations, and update their figures with information on registered trades.

Under the EU ETS Registries Regulation, each Member State establishes one national registry that is linked to the others and to the Community Independent Transaction Log (CITL). Each national registry is connected to the backbone, which in turn ensures a secure, compatible, and smooth integration of all systems under one European umbrella. The sum of all registries together with the CITL operate as the Registries System. All allowances are issued to registry accounts established for each affected facility.

Table 1.3 displays the Kyoto Protocol targets for countries covered under the EU ETS as well as information concerning the country specific EU allowances and number of installations under the scheme. Countries can use several instruments to realise these targets. One of them is the EU ETS whereby liability is transferred to the industry to realise a portion of the reduction. Another instrument that is used by countries is buying CER in large quantities via formal carbon credit purchasing organisations. For example, the Austrian government has recently (third quarter of 2004) announced an agreement to acquire CERs. The Austrian CDM Small-Scale Project Facility will purchase CERs from small-scale projects in developing countries under the Clean Development Mechanism of the Kyoto Protocol. The projects may be based on production of renewable energy, energy efficiency, fuel switching, methane capture, or reduction of industrial emissions.

Table 1.3. Summary information per EU Member States for the 2005-2007 trading period (indicative table based on national allocation plans approved by the European Commission) From Europa newsletter

Member State	CO_2 allowances in million tonnes	Share in EU allowances	Installations covered	Registry functional	Kyoto target %
Austria	99.0	1.5 %	205	Yes	-13*
Belgium	188.8	2.9 %	363	No	-7.5*
Czech Republic	292.8	4.4 %	435	No	-8
Cyprus	16.98	0.3 %	13	No	-
Denmark	100.5	1.5 %	378	Yes	-21*
Estonia	56.85	0.9 %	43	No	-8
Finland	136.5	2.1 %	535	Yes	0*
France	469.5	7.1 %	1,172	Yes	0*
Germany	1,497.0	22.8 %	1,849	Yes	-21*
Greece	223.2	3.4 %	141	No	+25
Hungary	93.8	1.4 %	261	No	-6
Ireland	67.0	1.0 %	143	No	+13*
Italy	697.5	10.6 %	1,240	No	-6.5
Latvia	13.7	0.2 %	95	No	-8
Lithuania	36.8	0.6 %	93	No	-8
Luxembourg	10.07	0.2 %	19	No	-28*
Malta	8.83	0.1 %	2	No	-
Netherlands	285.9	4.3 %	333	Yes	-6*
Poland	717.3	10.9 %	1,166	No	-6
Portugal	114.5	1.7 %	239	No	+27*
Slovak Republic	91.5	1.4 %	209	No	-8
Slovenia	26.3	0.4 %	98	No	-8
Spain	523.3	8.0 %	819	Yes	+15
Sweden	68.7	1.1 %	499	Yes	+4*
United Kingdom	736.0	11.2 %	1,078	Yes	-12.5*
Total	**6,572.4**	**100.0 %**	**11,428**		

Note: Figures do not take into account any opt-ins and opt-outs of installations in accordance with Article 24 and 27 of Directive 2003/87/EC.

1.4.3. EU ETS industry coverage

The EU ETS is the main instrument via which the EU Kyoto commitment will be transported to the EU business community (Baker & McKenzie 2003). For the first crediting period, the EU ETS only targets CO_2, the major GHG covered under the Kyoto Protocol. As depicted in Figure 1.4, the ETS covers around half of the CO_2 emitting sectors, with power and heat being the primary industries being targeted (also See Annex I). At this time there are no plans to incorporate the remaining industries into the scheme. Although this could change for the second commitment period, it is unlikely that the remaining sectors (transportation and domestic households) will be included due to the complexity of implementing a cap-and-trade system in very decentralised and fragmented sectors.

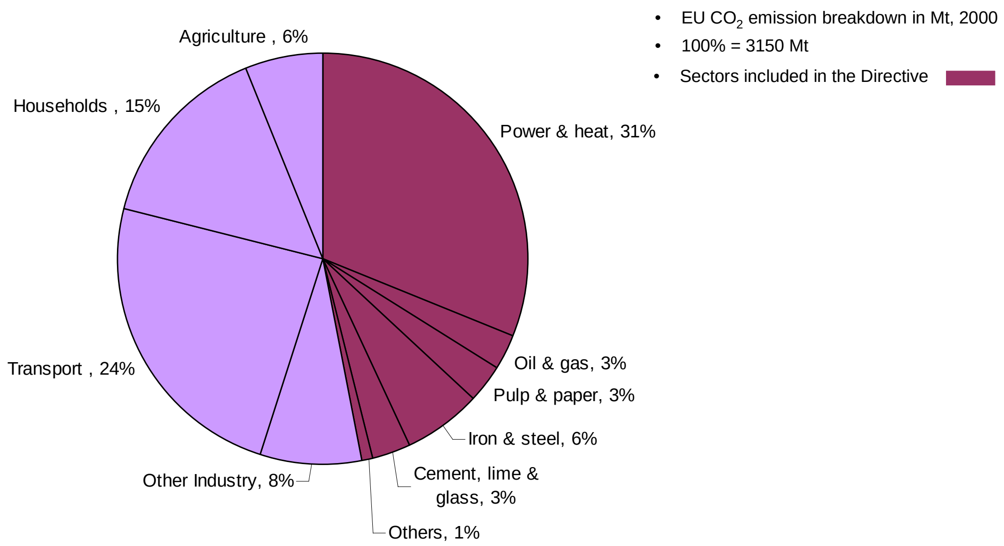

Figure 1.4.: EU ETS Sector Coverage

There are a number of characteristics that all of the six industries participating in the ETS have in common. Firstly, they are major energy consumers and secondly, their primary products are (semi) raw materials to be bought and sold on the European and global markets. In addition, only the relatively large players in each of the sectors are covered. Smaller players are excluded, although they could be covered as of 2008 (to be discussed in the 2006 revision by the EC).

Figure 1.5 provides an overview of the spread in the annual emissions per company. T he right hand figure shows that only 8% of the participating companies have more than 1 Mt CO_2 emissions annually, and only 2% more than 10 Mt CO_2 per year. The left hand figure shows that these 2% represent more than 48% of the total emissions and the 8% companies with more than 1 Mt CO_2 p.a. represent 87% of total emissions. It's hence, safe to say that the GHG trading market is going to be dominated by a relatively small group of players.

As is the case with all costs in any industry, the power sector will incorporate the cost of CO_2 in their market price. This could result in a dual impact for the other industries covered. They will see indirect impacts via the increase in electricity prices and a direct impact via the capping of their CO_2 emissions.

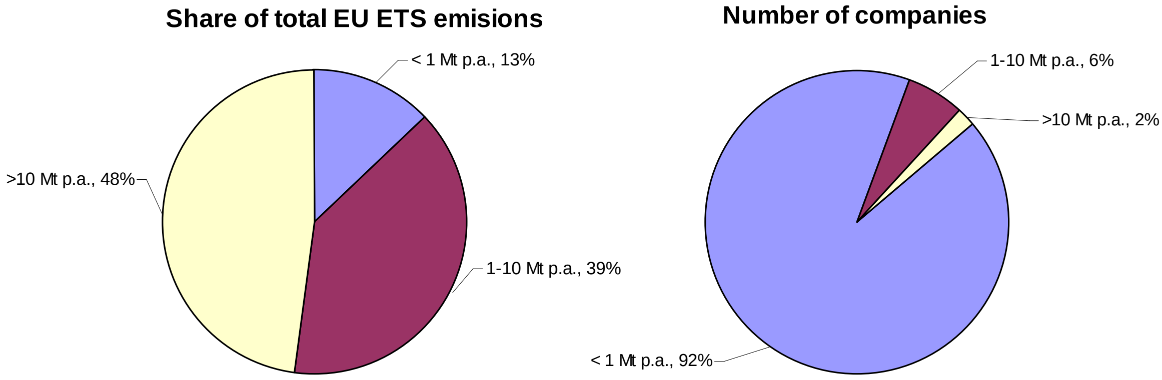

Figure 1.5.: Company emissions size and their share in total (source: Tangen, Point Carbon, 2004)

1.4.4. Banking and borrowing

Companies are not obliged to submit all of the required allowances after each year. They could 'borrow' allowances, and carry over the shortage of allowances to the next year. This is not allowed between the first EU ETS Phase (2005-2007) and the second EU ETS Phase 2008-2012, but only between the years within one period. This has two major implications. One, an EU company that has a shortage in 2005 and 2006 could wait until the end of 2007 to submit all the required allowances. On the one hand this creates some leeway in the first years of the period, it also creates the risk of a price peak at the end of a period because all the debts over the period need to be settled. A second important implication is that there are in practice two different markets for EU allowances: one for Phase I (on which the current prices are reported see Chapter 4) and one for Phase II for which hardly any price information exists.

1.4.5. The Linking Directive (See Chapter 3 for more details)

The "Linking Directive", proposed by the EU parliament in April 2004, allows emission reduction units generated by the project-based Kyoto mechanisms to be used for compliance by companies operating under the EU ETS. The rationale for this linkage is that cost-effective CDM credits (CERs) may reduce the costs of compliance for European industry. The linking is possible because both EU allowances and CDM credits are also defined as one tonne of CO_2 equivalent.

CER have been allowed into the system as of January 2005, and ERUs are allowed as of January 2008. Only an operator – the owner of the installation that has an obligation under the EU ETS – can actually use CERs and ERUs. There are some restrictions on the use of CERs and ERUs, both in terms of amounts and types of projects that generate the emission reductions:

- The EU has allowed Each Member state to cap the use of JI/CERs to comply with the supplementarity rule. This rule state that a significant part of an Annex I country's emission reductions must be made domestically;
- Credits from nuclear projects may not be used;
- Credits from land use, land-use change and forestry activities (the so-called 'sinks') may not be used either;
- Credits from hydroelectric power production projects with a generating capacity above 20MW may be used only if the relevant international criteria and guidelines are respected.

1.5. Historical Carbon Price Developments

1.5.1. Price drivers of EU Allowances

Price drivers for EU Allowances are similar to the Kyoto market fundamentals, but more specific for the EU. They include the Kyoto targets for the EU, population, and economic growth in the EU, emission reduction options within the covered EU industry and important market developments affecting the EU industry (for example the developments in the oil price and other energy commodities). A key price driver for the EU ETS is the National Allocation Plans produced by the EU Member states.

1.5.2. EU ETS price developments

The figures below (Figure 1.6 & Figure 1.7) show the price and volume development of EU ETS trading in the past months. Both pictures show that the market is growing fast and is beyond its initial experimental phase. Over the last half of 2004 and the first months of 2005 the prices stabilised after a maximum of € 13/t CO_2 and a minimum of € 7/t CO_2 around the level of € 8.50/t CO_2. Then the price started rising. Volumes have soared after the summer holidays to levels of nearly 2.5 Mt CO_2 per month.

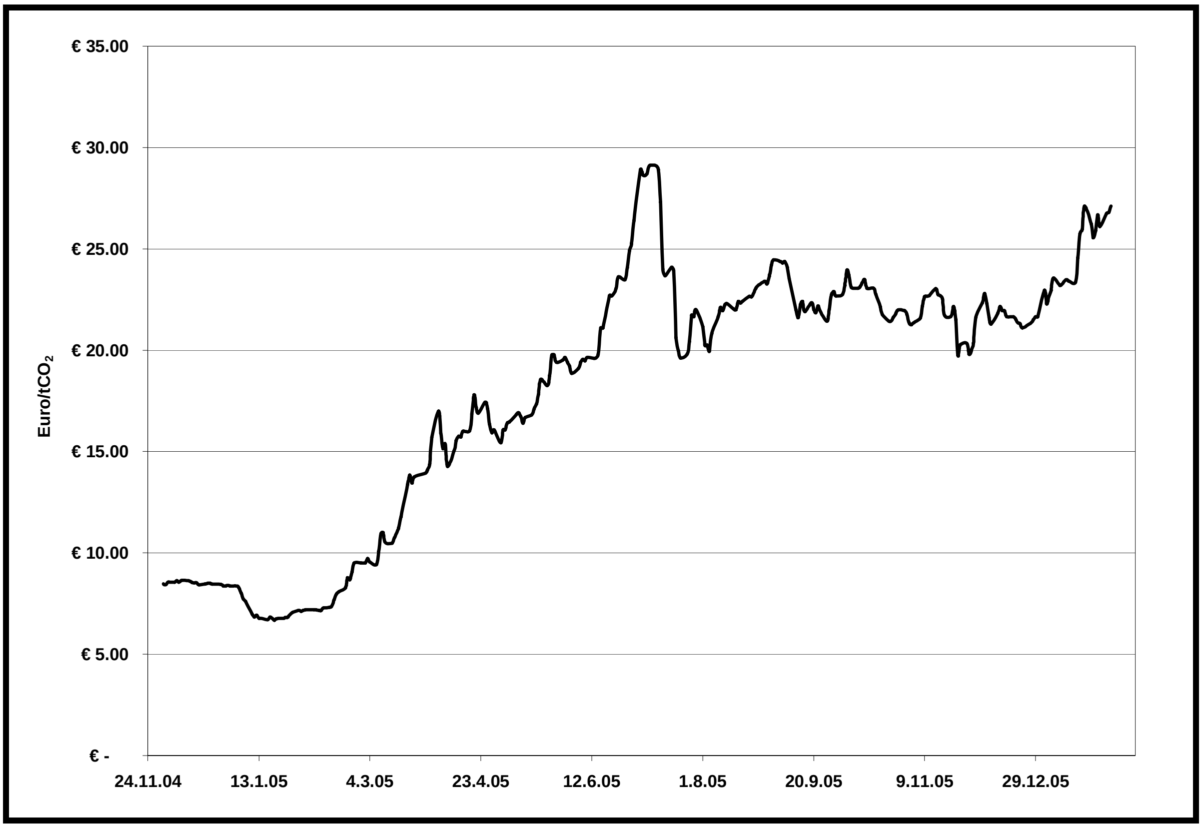

Figure 1.6. : Price development of EU ETS trading in the past months source: (Point Carbon, 2006)

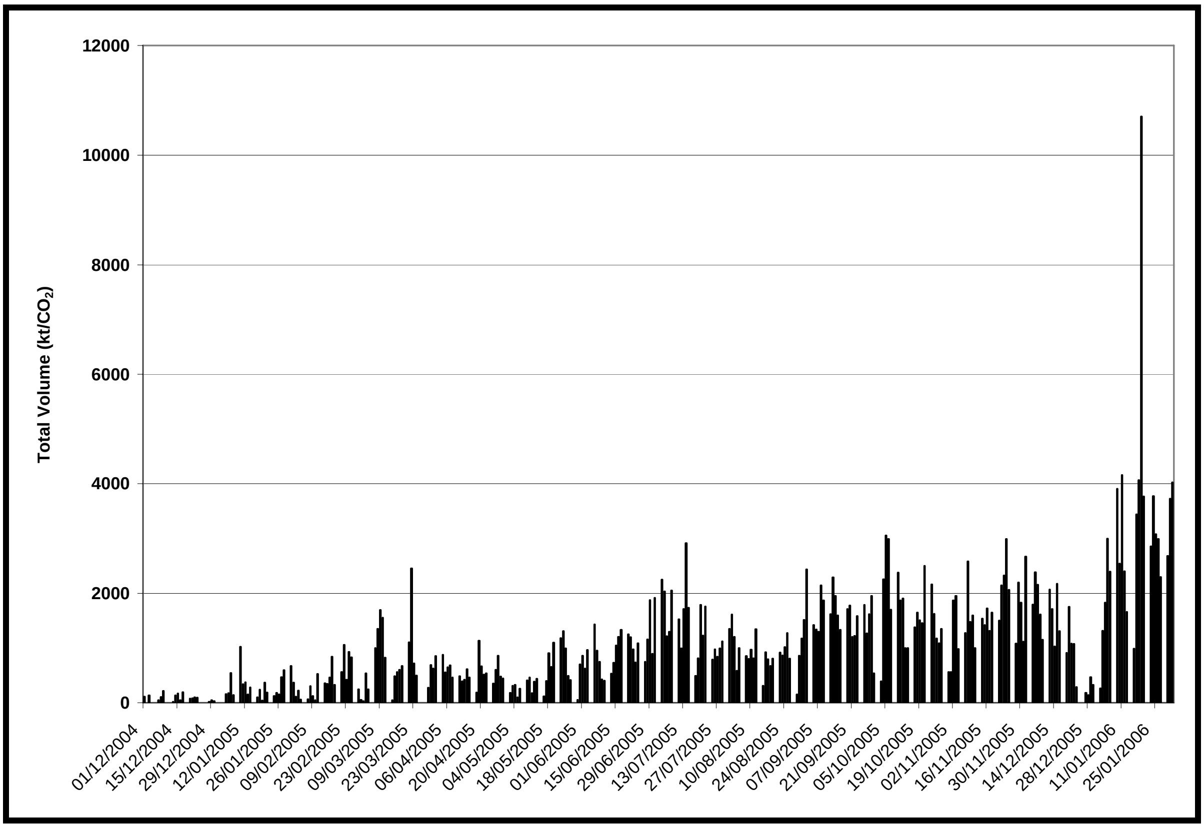

Figure 1.7.: Volume developments for EUA-2005 (source: Point Carbon, 2006)

An interesting feature of the observed market prices is that they are above the forecasted equilibrium price. This is a phenomenon also seen in the trading of the UK ETS (the trading scheme operating in the UK before and in parallel to the EU ETS). Average price estimates over the whole period may be higher in reality than forecasted equilibrium prices. This is due to the fact that companies are reluctant to sell all their excess allowances until they are sure they can comply with their own target. This hoarding behaviour creates artificial scarcity and therefore leads to higher prices during most of the trading period and is often characterised by a sharp down turn towards the end of the trading period.

An additional effect is the emerging nature of the market. Traders indicate that currently only 50 – 60 companies are actively trading, mostly electricity companies. Out of a total range of 15,000 companies this shows that a large part European industry has yet to waken up to carbon trading. This is particularly true for Eastern European companies, which are more likely to have a surplus of allowances.

Another price driver of the EU Allowances is the fact that electricity companies are the ones mostly trading. Electricity companies are more likely to have received a larger part of the emission reduction burden because it’s a sheltered industry. In addition, is more likely that a large correlation exists between different energy commodities in the liberalised North West European power markets, where power traders sell or purchase emission allowances depending on the source of energy they use. This correlation was recently indicated in a news report in the Carbon Finance (6-4-2005).

1.6. Potential of Energy Efficiency in Addressing Climate Change

Energy efficiency is closely linked to climate change policies, since climate change is one of the most significant environmental areas that is impacted by energy use. Emissions trading and other climate change policy instruments provide additional financial incentives to undertake energy efficiency projects. To date, activities of energy efficiency programmes imply that using energy efficiency as a way to reduce GHG emissions within both Annex I and non-Annex I countries has the potential to greatly reduce the costs of GHG mitigation. Numerous studies of the potential for energy efficiency show that energy use can be reduced by 15-20% or more with simple paybacks of less than two years (Prototype Carbon Fund - PCF, 2002). Not only are these reductions cost-effective on the basis of energy savings alone: the resultant reductions in CO_2 and other emissions are an added benefit. Furthermore, these benefits extend beyond GHG emissions reductions by countries with other environmental benefits associated with reduced energy use (local air, water and land use impacts), the installation of current technology in important sectors, and the development of a sustainable infrastructure (OECD 2000). For this reason, energy efficiency is often referred to as a "win-win' option for climate change mitigation (PEEREA 2005).

Furthermore, energy efficiency presents a major and cost-effective opportunity for many countries to reduce not only CO_2 emissions, but also other environmental pollution caused by energy systems, like wastewater, acidification, etc. The initial cost of reducing environmental pollution varies according to the countries and economy sectors in which the reductions are made. In the evaluation of such initial costs, secondary effects such as improved health and productivity should be taken into account. Even though the project owner may only indirectly benefit from such secondary effects, their nature may attract other players such as ministries related to health and safety or even international institutions interested in climate change issues. This may be used to strengthen the support for a project and attract external funding if needed. Measures with a particularly high potential for emission reductions in the industrial and district heating sectors are fuel conversion (coal to gas), CHP (cogeneration) systems, installation of control systems, and actions taken on the demand side

The PEEREA Protocol includes commitments, which are essential in improving energy efficiency and reducing harmful environmental impacts. Thus, reducing CO_2 emissions through energy efficiency measures is important to PEEREA.

Carbon trading mechanisms, as an environmental policy tool, provide a financial incentive that can play an important role in the greater implementation of energy efficiency projects. Table 1.4 below provides a list of PEEREA countries and the relevant CO_2 emissions trading mechanism to each country.

Table 1.4.: PEEREA countries and relevant CO_2 emissions mechanism..

Country	Relevant CO_2 Emissions Mechanism	Country	Relevant CO_2 Emissions Mechanism
Albania	CDM	Kyrgyzstan	CDM
Armenia	CDM	Latvia**	EU ETS / JI
Austria	EU ETS / JI	Liechtenstein	JI
Australia	JI	Lithuania**	EU ETS / JI
Azerbaijan	CDM	Luxembourg	EU ETS / JI
Belarus	JI	Malta	CDM
Belgium	EU ETS / JI	Moldova	CDM
Bosnia and Herzegovina	CDM	Mongolia	CDM
Bulgaria**	JI	Netherlands	EU ETS / JI
Croatia	JI	Norway	JI
Czech Republic**	EU ETS /JI	Poland**	EU ETS / JI
Cyprus	CDM	Portugal	EU ETS / JI
Denmark	EU ETS / JI	Romania**	JI
Estonia**	EU ETS / JI	Russian Federation	JI
European Communities	EU ETS / JI	Slovakia	EU ETS/JI
Finland	EU ETS / JI	Slovenia	EU ETS / JI
France	EU ETS / JI	Spain	EU ETS / JI
Georgia	CDM	Sweden	EU ETS / JI
Germany	EU ETS / JI	Switzerland	JI
Greece	EU ETS / JI	Tajikistan	CDM
Hungary**	EU ETS / JI	The former Yugoslav Republic of Macedonia	CDM
Iceland	JI	Turkey	N/A
Ireland	EU ETS / JI	Turkmenistan	CDM
Italy	EU ETS / JI	Ukraine	JI
Japan	JI	Uzbekistan	CDM
Kazakhstan	CDM	United Kingdom	EU ETS / JI

** JI activities are/will be limited after EU accession and participation in the EU Emission Trading System.

To properly utilize the benefits of emissions trading it is important for PEEREA countries to understand and take advantage of the CO2 emissions mechanism that is most applicable to them. Regarding Table 1.4, it is important to note that although JI projects can be developed in principle in each of the JI listed countries, only countries in Central and Eastern Europe (CEE), and especially Russia and Ukraine, are likely to be major players.

CHAPTER 2: INTERACTION: EU ETS AND ENERGY EFFICIENCY

This chapter focuses on the interaction between the European Union Emission Trading Scheme (EU ETS) and Energy Efficiency. The chapter also includes a discussion on the interactions between emission trading and three other schemes, namely Emission Taxes, Green Certificates, and White Certificates. This chapter is particularly relevant to those PEEREA countries that are directly affected by the EU ETS, as indicated in Table 1.4.

2.1 Interaction Between EU ETS And Energy Efficiency Measures

2.1.1. Factors influencing an organisation's GHG strategy

The optimal GHG strategy for an organisation under the EU ETS can be a strategy that makes use of either internal or external GHG internal instruments, or a combination of the two. External factors are related to the developments in the international carbon markets and climate policy regulations of governments. Whereas, internal factors are those parameters which relate to internal factors outside the realm of the climate policies, which have an impact on an organisation's GHG emissions.

The link between internal and external factors and an organisation's GHG strategy can be best explained via the GHG costing framework. The start of the GHG costing framework is the internal Marginal Abatement Costing curve (MAC). The MAC curve ranks internal emission reduction options and measures on the basis of their marginal costs. The most cost effective division between internal and external GHG instruments is defined by the point where the MAC intersects with the market shadow price.

To determine weather an organization would choose external options over internal emission reductions and JI/CDM over trading of allowances depends on the characteristics of the companies and sectors and the potential drivers behind participation in JI/CDM.

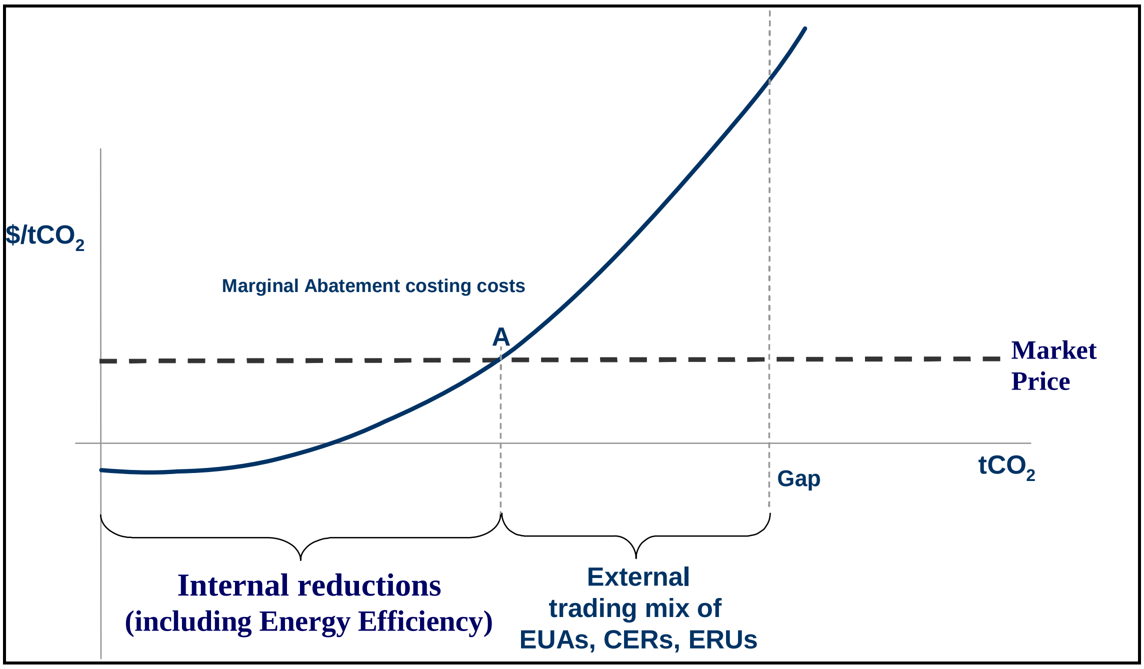

Figure 2.1 Three approximate parameters in the GHG costing framework

This figure demonstrates three direct parameters through which choices between internal and external GHG reduction options are classified: the emission gap, market price, and internal marginal abatement-costing curve.

2.1.1. Interaction with Energy Efficiency

Energy efficiency projects can be undertaken both in the demand and the supply side of energy systems. In terms of GHG emission reduction activities, energy efficiency on the supply side is the introduction of more energy-efficient generation and production technology, which can include fuel-switching elements. Energy efficiency on the demand side involves improvements in end-use technologies and in improved building insulation and energy management (PEEREA 2005). Since most of the GHG emissions in the EU are energy-related (81 % of EU-15 emissions in 2002), the way in which the energy sector evolves will largely determine future GHG emissions.

2.1.2. Direct and Indirect Influences of the EU ETS

Under an emissions trading scheme such as the EU ETS, emission allowances are allocated on the basis of an installation's direct, on-site emissions, whether process or combustion-related. This leaves out emissions associated with the production of an industry's inputs, the most important inputs being electricity and transportation emissions related to the industry's activity, referred to as indirect emissions. As a result of these indirect emissions, consuming industries will see an increase in the cost of one of their inputs. Emissions arising from the consumption of electricity purchased from the grid are an example of indirect emissions.

Furthermore, under the EU ETS, the power generators are allocated allowances on the basis of their direct emissions – the cost of which is fed through to industrial and other consumers, introducing an additional cost (or indirect impact) related to the constraint on emissions**.** Industry's direct emissions can be divided in two distinct categories: process emissions and energy related emissions. Energy-related emissions are greenhouse gas emissions (mostly CO_2) from fossil fuel combustion. Process emissions are not generated by fuel combustion, but as a result of chemical reactions in defined as non-energy related emissions and are emitted during the production process of a product. In regards to impacts on energy efficiency, the EU ETS impacts energy efficiency in two significant ways:

1. **Impact on direct emissions**
2. **Indirect impact via the electricity price**

2.1.3. Impact on Direct Emissions

By putting a value on direct CO_2 emissions, the reduction of such emissions via energy efficiency measures results in direct savings for the company. For example, in the case of a waste heat recovery measure in a paper mill, it leads to direct reduction in the use of coal and hence in the CO_2 emissions from coal. As a consequence the IRR of the project increases substantially. Figure 2.2 shows the impact of a waste heat project where the initial IRR (without emission trading) is 5% and which increases substantially with a EU Allowance price of Eur 10 and Eur 20.

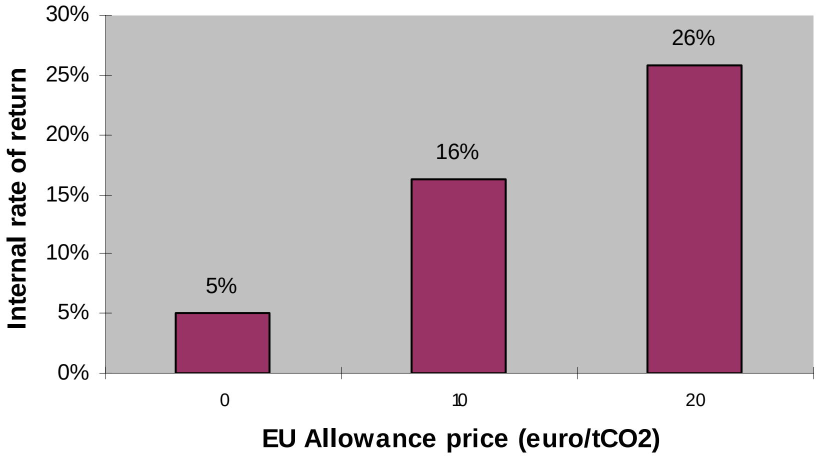

Figure 2.2.: Impact of EU Allowance price on IRR of a waste heat recovery project with different allowance prices

In theory, the value of carbon emission allowances should be reflected in the short-term generating costs of fossil-fired plants, because emissions from generation have to be offset with allowances held or purchased on the CO_2 market (Reinaud, 2003). If the market price does not cover its incremental costs including the value of the allowances, the power producer is better off not to produce and to sell unused allowances. Nevertheless, the decision to pass-on the full opportunity cost of allowances or only part of it depends on several factors – notably on the nature of the power market design and on type of contract the generator has with its customers, including energy-intensive users in a liberalised market.

2.1.4. Indirect Impact Via the Electricity Price

The purpose of emissions trading is to trigger least-cost emission reductions through the introduction of a price attached to emissions. The stronger and the more clear this price signal is to consumers, the more efficient emission reductions measures are. In economic theory, this justifies that opportunity cost of holding allowances be passed on to consumers who will, in turn, have an incentive to lower their demand for electricity. Power generators have an incentive to reduce their emissions to lower their carbon cost and maintain the attractiveness of electricity with these consumers.

Energy efficiency projects generate both direct savings at the owner's facility and indirect savings (including financial savings) for electricity suppliers. Direct savings relates to reduction in fuel consumption for electricity. According to the Prototype Carbon Fund (2002), the CO_2 reduction depends on the carbon content of the fuel, which ranges from 53.1 $kgCO_2/GJ$ for natural gas to 92.2 $kgCO_2/GJ$ for coal. Indirect savings occur in the upstream energy supply systems as a result of reduced extraction, processing, and transmission energy use. These include financial savings related to reduced fuel purchases and load-related savings from deferral or avoidance of investment in new generating capacity, especially to meet peak demand. Similarly, according to the PCF (2002), the CO_2 reduction depends on the carbon content of the fuel used by the generating unit and the type of technology used. The fuel content ranges from 440 $kgCO_2/MWh$ for combined-cycle natural gas units to over 1,000 $kgCO_2/MWh$ for conventional coal-fired plants.

The EU ETS results in an increase in the power prices because of the additional costs for thermal power stations. Power companies will pass these costs on to their end users, which leads to an increase in power prices. Figure 2.3 shows the impact of generation costs for power operators.

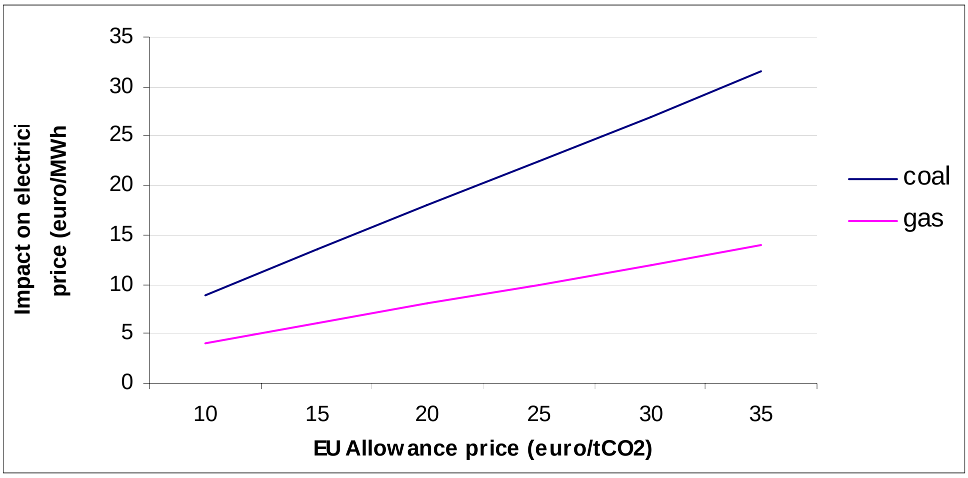

Figure 2.3.: Impact of EU Allowance on generation costs for power operators.

The impact of EU allowances related to the fuel type can be observed on the graph. For power generators the allowances will have an impact in the fuel they use to generate electricity, expressed by the carbon emission factor, consequently the higher emission factor impacts the price of allowances. Finally this will affect the final price of electricity.

Within the merit order of power generation dispatch, the relatively cheaper coal fired plants generally run before the relatively more expensive gas plants are fired up. However, coal emits roughly twice the emissions per MWh as gas. In a perfect market, allowance prices should rise to the point of substitution between coal generation and gas generation. In other words, the higher the price for CO_2 emissions, the sooner gas will substitute coal generation. Conversely, the bigger the spread between coal and gas costs, the more coal will be used. Therefore, changes in fuel prices as well as changes of EUA prices will influence the merit order and substitution threshold of fuels used in generation.

As the power sector is one of the largest emitters of CO_2, the EU ETS was always expected to have a significant impact on electricity prices. The question that most observers are trying to identify is how large this impact will be. Prices in any market are determined by the most expensive resource called upon to meet demand. In the case of most European electricity markets, the reference unit will be a thermal power station consuming coal or gas. As fuel prices vary, so will the cost of production. With carbon, the appropriate response at an operational level is quite straightforward: the value of CO_2 should be included in the cost structure of generation in the same way as fuel costs are. This is true even if adequate free allowances are held to cover the output because those allowances have an opportunity cost equal to the revenue that would have been earned by selling.

A case study to illustrate this is, is a cogeneration project next to a refinery. The project does not change its direct emissions but will generate additional power. Figure 2.4. shows the impact of the IRR of the cogeneration plant with different allowance prices.

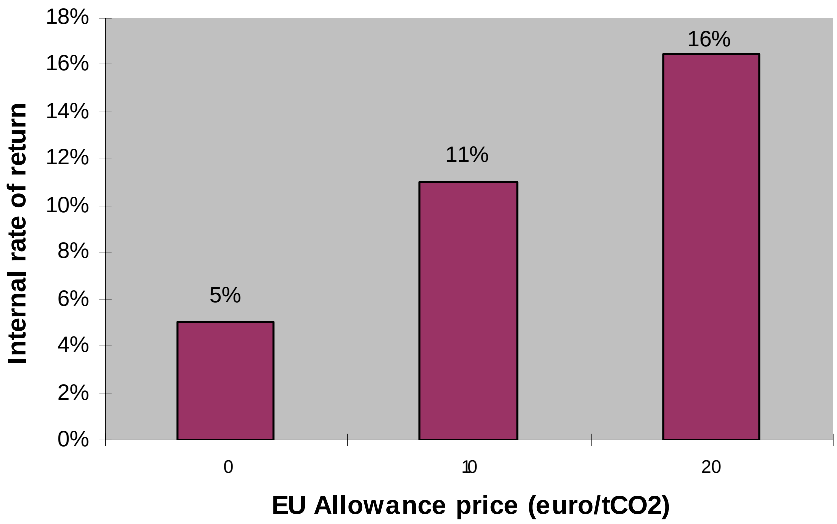

Figure 2.4.: Impact of EU Allowance on the IRR of the cogeneration plant with different allowance prices.

According to a recent study by the International Energy Agency, the immediate impact of the EU ETS will be on the operating costs of power plants. If allowance prices reach €20 per tonne, the study suggests a switch in competitiveness between gas and coal plant. However, if allowance prices remain below this level, they forecast little impact on coal-fired plant. If allowance prices increase much beyond the €20 mark, however, generators may well find it more economical to build new CCGT capacity than continue to run existing coal plant. Increased operating costs will result in increased wholesale electricity prices – some studies have suggested by as much as 40% - although the extent to which the power generators pass on these carbon costs remains to be seen. Increased wholesale power prices will clearly affect not only the competitiveness of EU electricity users, but will also have serious implications for investment levels and competitiveness of the power sectors itself. The potential for relocation of industry and the reduction in competitiveness of the EU as a whole is worrying – but the uncertainty surrounding the post-Kyoto climate change negotiations is the most disruptive concern, for industry, investors, and regulators alike.

2.2. Interaction Between The EU ETS and National Energy Policies

Energy policies, other than GHG emissions trading, can be grouped into the following categories: carbon and energy taxes, negotiated agreements, support mechanisms for renewable electricity, industrial pollution control, and promotion of energy efficiency. There is often a high degree of overlap and synergy between the primary objectives of these energy policies and of the EU ETS, i.e. improving energy efficiency, encouraging the saving of fossil fuel, promoting renewable electricity, etc. versus mitigating CO_2 emissions cost effectively (EU ETS). However, the interactions between these energy policies and the EU ETS are not necessarily complementary and mutually reinforcing, there is the risk that different policy instruments will interfere with one another and undermine the objectives and credibility of each.

According to (Sijm 2003) – from the National Energy Centre, a partner in the INTERACT research project – the interactions between the EU emissions trading scheme (EU ETS) and the national energy policies differ depending on whether these policies affect fossil fuel use by the participating or non-participating sectors of this scheme (Sijm, 2003 & 2005).

If a country participating in the EU ETS has set a certain reduction target for its non-participating sectors, then national policies affecting fossil fuel used by these sectors are both necessary, effective and justified in order to control the emissions of these sectors and, hence, to meet the Kyoto commitments. Two cases can be distinguished:

- In the first case, when there is a fixed level of national mitigation commitments, this implies that both CO_2 emissions and CO_2 reductions of all non-participating sectors are also fixed. In such a case, policies affecting fossil fuel use by non-participating sectors are effective in the sense that a change in such policies actually changes the CO_2 emissions at the level of the non-participating sectors, the country concerned, and even the world as a whole.
- In the second case, a country is fully free and flexible to adjust the emission target of its non-participating sectors by trading emission credits through the Kyoto mechanisms. From an efficiency point of view, such a country should equalise the marginal abatement costs of its climate and energy policies to the international price of an emission credit, but other policy considerations may result in a different outcome regarding the optimal level of domestic reductions by its non-participating sectors.

On the contrary, a major conclusion regarding the CO_2 performance of national energy policies affecting the participating sectors of the EU ETS is that once the EU ETS becomes operational, the effectiveness of all other policies to reduce CO_2 emissions of the participating sectors is reduced. Moreover, in a perfect economy with no market failures, these policies will lead to a lower CO_2 efficiency and less optimal market operations of the EU ETS:

- Lower CO2 efficiency of the EU ETS, either (1) through the encouragement of mitigation options that would have been implemented anyway due to the EU ETS (thereby making this encouragement ineffective, while raising costs), or (2) through the adoption of alternative mitigation options that are more costly to the participating sectors and/or the society as a whole, while not increasing the overall amount of CO2 reductions. In case (2), this will have an additional effect.
- Less optimal market operations of the EU ETS, i.e. less demand for emission allowances and/or more supply of these allowances, leading to a declining price for an emission allowance. This process may continue until the scarcity on the market for emission allowances evaporates fully and the price becomes zero.

Therefore, from the perspective of CO_2 efficiency, the coexistence of the EU ETS and policies affecting fossil fuel use by participating sectors is hard to justify and, hence, these policies could be often considered to be redundant.

However, Sijm points out that there are three reasons why the joint use of the EU ETS and these policies may be justified:

- **Improving the design of the EU ETS** and, hence, leading to an improvement of its operation or political acceptability. A major example is to use existing direct regulations or negotiated agreements as the basis for the allocation of the emission allowances. Some other examples include the use of an energy tax as a penalty for non-compliance with the EU ETS and the use of voluntary opt-in arrangements that participating companies can use for compliance, in order to expand the regulation scope of the EU ETS.

- **Correcting for market failures**. A perfect economy with no (policy) distortions or other market failures assumes, for instance, that the costs of emissions trading (i.e. the carbon allowance price) will be passed on to final energy users and that these users will respond rationally and adequately to these price incentives. In practice, however, there are a variety of barriers and other market failures that reduce energy/ CO_2 efficiency.
- **Meeting other policy objectives besides CO_2 efficiency**. A major example of such policies/objectives is a carbon or energy tax may be used to either (1) raise fiscal resources, (2) serve equity or distributional objectives, (3) capture the economic rents of allocating allowances for free (in case auctioning is not politically acceptable), or (4) mitigate the price uncertainty of a trading scheme such as the EU ETS (by offering the opportunity to pay an emission tax should the allowance price exceed the tax level).

Yet, policies complementary to the EU ETS may at best improve the efficiency of CO_2 abatement (in case of market failures), but not the effectiveness of CO_2 mitigation, since the amount of CO_2 reductions is fixed by the cap on CO_2 emissions. On the contrary, for end-use energy sectors, notably those not covered under the EU ETS, there is a need to continue to develop and promote energy efficiency policies

2.3. Emissions Trading vs. Emissions Taxes: Similarities and Differences

There are a variety of emission control policies available to regulators, and each of them have different properties with respect to incentives for technological change. However, two of the most common methods used are emission taxes and emissions trading. Both are market-based instruments that have become increasingly popular in practice due in part to their dynamic incentives. Economists have long advocated the use of market-based policies to achieve environmental objectives. By attaching an explicit price to emissions, these policy instruments create an ongoing incentive for companies to continually reduce their emission volumes. In contrast, command-and-control type emission standards create incentives to adopt cleaner technologies only up to the point where the standards are no longer binding (at which point the shadow price on emissions falls to zero). In general, market-based approaches allow companies to reduce pollution at lowest cost, unlike command-and-control regulations that specify which technology companies must use (Parry & Bento, 1999).

Emissions trading and taxes differ significantly on various grounds. Taxes increase the prices of certain goods and services, thereby decreasing the quantity demanded; this is called the "price effect". Whereas, emissions trading is considered to be a "quantity-based" environmental policy instrument. Although both policy approaches are "market-based," they operate differently - carbon taxes fix the marginal cost for carbon emissions and allow quantities emitted to adjust, while emissions trading fixes the total amount of carbon emitted and allow price levels to fluctuate according to market forces.

Carbon taxes are simply direct payments to the government, based on the carbon content of the fuel being consumed. Given that the primary objective of the abatement policy is to lower carbon dioxide emissions, carbon taxes make sense economically and environmentally because they tax the externality (carbon) directly. There is no clear answer as to which policy is better, nor are they necessarily mutually exclusive. However, several important advantages and drawbacks of the respective policies are outlined below (Philibert, 2001).

Advantages of Emissions Trading

- A properly functioning emissions trading system allows emissions reductions to take place wherever abatement costs are lowest, regardless of international borders. As costs associated with climate change (e.g. coastal flooding, increasing incidence of violent storms, etc.) have no correlation with the point source of carbon emissions, the rationale for this policy approach is clear.
- Emissions trading has the advantage of fixing a certain environmental outcome - the collective emissions levels are set, and companies/countries pay the market rate for the rights to emit. This also makes emissions trading more favourable to international environmental agreements, such as the Kyoto Protocol, because specific emissions reduction levels can be agreed upon more easily than tax rates or policy instruments, which may vary in appropriateness and applicability between states.
- Via decreasing emissions, companies can actually profit by selling their excess greenhouse gas allowances, thereby making emissions trading is more attractive to private industry. Creating such a market for pollution could potentially drive emissions reductions below targets. In general, transferring resources between private entities is more appealing than transfers to government.
- Emissions trading is better equipped than taxes to deal with all six GHGs included in the Kyoto Protocol in one comprehensive strategy. Each gas has a "greenhouse gas potential" (GWP, based on carbon dioxide). Thus, companies that emit more than one GHG have more flexibility in making reductions.

Advantages of Emissions Taxes

- An emission tax would offer a broader scope for emissions reductions. Trading systems can only be implemented among private companies or countries - not individual consumers (transaction costs would be prohibitively high if commuters needed permits to fill up their car with gas). Emission taxes extend to all carbon-based fuel consumption, including gasoline, home heating oil and aviation fuels. Trading systems may not be able to reach parts of the transportation and service sectors, which could account for 30-50% of emissions.
- An emissions trading system entails significant transaction costs. Conversely, taxes involve modest transaction cost over all stages of their lifetime.
- Emission taxes have dynamic efficiency advantages, which trading lacks because taxes offer a permanent incentive to reduce emissions. Technological and procedural changes, and subsequent technology diffusion, will lead to reductions in permit price (i.e. since emissions goals will be easier to meet, there will be a decrease in permit demand, and hence, a decrease in permit price). Trading systems may not be able self-adjust in response to rapid change, and thus provide the permanent incentive of a tax system to reduce emissions. Therefore, emissions trading must therefore include some method of removing allowances from the system.
- Taxes are not vulnerable to strategic behaviour by companies or non-governmental organizations, which may harm the contractual environment of the market. Non-governmental organizations or even private individuals that object to the concept of purchasing the "right to pollute" may purchase large numbers of permits to drive up costs of CO_2 abatement. Likewise companies may hoard permits, driving up the prices for competitors.
- Emissions trading proposals are highly complicated and technical (e.g. PDD’s), unlike taxes, which are an extremely familiar instrument to policymakers. Ongoing costs are

also low for tax systems because of the lack of monitoring and enforcement requirements.

- Emission taxes earn revenue, which can be "recycled" back into the economy by reducing taxes on income, labour, and/or capital investment. This is often referred to as a "revenue neutral" tax and may be part of a broader program of "environmental tax reform" (ETR). Evidence indicates that there can be profound employment, distributional and political benefits to such an approach. Permit systems do have the potential to earn revenue, however this is only possible if the allowance permits are auctioned.

2.4. Interaction between Emissions Trading and Green/White Certificates:

2.4.1 Green Certificates

The purpose of a Green Certificates (GC) is to help achieve particular renewable energy (RE) targets in a cost efficient way. Green Certificates represent the environmental attributes of power generated from renewable electric plants. Essentially, a Green Certificate represents the "greenness" of a unit of RE production. This divides the unit in two parts: the physical electricity and its associated "greenness", which can be traded in two different markets, the conventional physical electricity markets and a market for the Green Certificates (Mitchell, 2000). At this time, Green Certificate schemes are in place through the EU-15.

A system of Green Certificates can be considered as a regulatory instrument, which helps public authorities to reach a specific goal of renewable energy (RE) production by putting in practice the advantages of the market, and as an accounting system that certifies RE production (Schaeffer et al. 1999). A basic distinction can be made between the mandatory or voluntary character of the demand for these Green Certificates. They can be considered as a regulatory instrument for long term wider use of RE only if the demand is set and mandatory (Oikonomou *et al*. 2004).

The market structure of the Green Certificates can be distinguished in the demand and the supply side. The supply of the certificates is achieved when the producers of RE sell the units to the grid and acquire the GC. The demand for certificates is induced by transferring the national target for RE to either the consumers or to the distribution companies.

2.4.2 White Certificates

The use of White Certificates (WhC) is a new concept to increase energy efficiency using market-based mechanisms. White Certificates are also referred to as Energy Efficiency Titles (EET). The basic principle of this policy measure is that authorities impose energy efficiency obligations on power and/or gas suppliers, which can then decide whether to implement energy efficiency measures themselves or to purchase WhC, depending on their marginal costs (Oikonomou *et al*. 2004). WhC become available and generated when energy savings are realized and certified. The philosophy underlying this system is to combine the guaranteed results of setting obligations with the economic efficiency of market-based mechanisms (Pavan, 2002). The certificate market mechanism is likely to identify the actual costs of energy saving and lead to a high efficiency in the economy (NERA 2005).

WhC are being examined as an option to promote energy efficiency in the residential and commercial (non-energy intensive) sectors within Europe. At this time there is no unified system of WhC in the EU countries (NERA 2005).

The key players in the WC system, which undertake the energy savings, are divided upon the criterion if they receive an obligation or not. The key players are (Oikonomou *et al*. 2004):

- The suppliers/distributors of gas and electricity have an commitment set by the responsible authorities, to save a certain amount of energy within a specified period. To this end, the suppliers have to promote specific energy efficiency projects to the end consumers, directly or indirectly.
- The second group of players is independent companies which function in the framework of the energy services sector, like energy service companies (ESCO's). The investment can be repaid to the ESCO's through a share of the energy savings achieved. The key difference is that ESCO's do not generally receive an obligation, but are allowed to participate in the White Certificates trading scheme, after achieving energy savings.

Both these actors, after the implementation of these projects generate and receive WhC, in return for their realized energy savings. The purpose of the WhC as an instrument is twofold:

- They serve as an accounting tool, which can prove that the requested amount of energy savings has been realized within the time frame agreed. The possessors of WhC will have to declare their savings in energy value after surrendering the WhC to the correspondent authorities
- They can be traded either bilaterally or in a WhC market (Pavan, 2002).

2.4.3 Interaction with Emissions Trading

The most immediate impact of a GC scheme on the EU ETS is mediated through its displacement of CO_2 emissions and consequent potential effect on the allowance price. Additionally, the GC scheme may affect the CO_2 emissions intensity of the marginal electricity producer. As this is a direct determinant of the effect of the EU ETS on the wholesale price, it changes the impact of the trading scheme. The effect may be to either increase or decrease the wholesale price impact of the EU ETS; depending on the precise characteristics of the merit order and fuel mix. These effects mean that the effect of superimposing a GC scheme on the EU ETS is more than just an addition of effects. The exact outcomes cannot be predicted a priori, but depend on the exact circumstances of the relevant electricity markets (NERA 2005).

The interaction between a WC scheme and the EU ETS may not follow the same pattern as that between a GC scheme and the EU ETS (NERA 2005). In particular, while an increase in electricity prices will reduce the price of green certificates, it will not necessarily reduce the price of white certificates. This is because of the differing specification of the targets for each scheme and the differing importance of regulatory decision-making in assessing compliance with these targets.

A key result is that the interaction between WC schemes and the electricity market (and hence the EU ETS) should be mediated by the interpretation of additionality by the regulator. This means that the feedback between electricity and certificate prices will not be as automatic as it is for GC schemes. In contrast to GC schemes, however, WC schemes are likely to extend beyond the electricity market to include energy savings from fuel consumption. In such situations, the WC scheme can provide additional emission reductions, provided the relevant fuel consumption is not also covered by the EU ETS.

The following are general implications of the interactions between the national Green and White Certificate programmes and the EU ETS as summarized in the 2005 NERA Report:

- National GC and WC programmes generally would *not* affect EU-wide CO_2 emissions from EU ETS participating facilities, although the programmes would affect other facets of the EU ETS
- The CO_2 allowance price would be impacted.
- Overall costs of meeting the CO_2 cap would be increased (but this comparison does not take into account the non-CO_2 benefits and any 'technology-forcing' benefits of the two programmes).
- Changes in the location of CO_2 allowance purchases/sales due to the programmes could affect national CO_2 emissions.
- EU-wide CO_2 emissions from participating facilities could theoretically be reduced below the overall cap if the Green and/or White Certificate programmes were sufficiently stringent; in this case, the EU ETS would not be binding and the CO_2 allowance price would be zero. (Of course, the cap could also be reduced if the presence of the Green/White Certificate programmes led policy makers to reduce overall allowances to the participating facilities.)
- CO_2 emissions outside EU ETS participating facilities could be reduced due to White Certificate programmes if non-electric efficiency projects were included (e.g., insulation programs that reduce household/commercial fuel use and thus CO_2 from oil/natural gas sources not covered by EU ETS).
- GC and WC programmes would reduce the effects of the EU ETS on wholesale electricity costs (because they reduce CO_2 compliance costs and the CO_2 allowance price); but this result does not imply that the combined electricity cost/rate increases of the EU ETS and the GC and WC programmes would be smaller than the effects of the EU ETS on its own.
- Providing CO_2 credits for GCs or WCs would not be desirable.
- Providing such credits would represent double counting, which would have the effect of undermining the EU ETS CO_2 cap.

CHAPTER 3: THE EU ETS LINKING DIRECTIVE

The following chapter focuses on the EU ETS Linking Directive, including the interaction between JI/CDM and Energy Efficiency. In particular, it draws attention to matters relevant to PEEREA countries that can directly benefit from JI and CDM (See Table 1.4).

3.1. EU-ETS Linking Directive

The 2004 EU Linking Directive allows carbon credits from Clean Development Mechanism (CDM) and Joint Implementation (JI) projects under the Kyoto Protocol to be imported for use in the EU Emissions Trading Scheme (EU ETS). By linking the Kyoto project-based mechanisms to the Community emissions trading scheme, the proposal provides an additional incentive for projects aimed at reducing greenhouse gases emissions, contributing to the fight against climate change as well as promoting of global sustainable development.

The Linking Directive will stimulate the demand for JI credits, in particular from Russia because of the great potential for projects there, and will lead to more investments by EU companies and the development and transfer of advanced environmentally sound technologies and know how. By stimulating demand for CDM credits it will also assist developing countries hosting CDM projects in achieving their sustainable development goals through the transfer of environmentally sound technologies and know how (Bygrave and Bosi 2004).

CERs were allowed into the system beginning in January 2005, and ERUs will be allowed as of January 2008. Only an operator – the owner of the installation that has an obligation under the EU ETS – can actually use CERs and ERUs. There are some restrictions on the use of CERs and ERUs, both in terms of amounts and in terms of types of projects that generate the emission reductions. The Linking Directive states that Member States may allow operators to use CERs and ERUs up to a percentage of the allocation to each installation. This only applies after 2008, however, thus the EU does not put a limit on the use of CERs before 2008. The maximum percentage is specified by each Member State in its National Allocation Plan.

Although the Kyoto mechanisms already have strict eligibility rules for CDM and will soon have strict eligibility rules for JI, the EU chose to restrict some types of projects in the Linking Directive. Specifically:

- Credits from nuclear projects may not be used;
- Credits from land use, land-use change and forestry activities (the so-called 'sinks') may not be used either[4];
- Credits form hydroelectric power production projects with a generating capacity above 20MW may be used only if the relevant international criteria and guidelines are respected.

3.1.1. Joint Implementation and the Linking Directive

To date, most JI projects have been undertaken in Central and Eastern European countries that have recently acceded to the EU. Participants in the EU ETS are free to use ERUs up to their installation level import cap, but the question is the extent of supply of ERUs. As mentioned, one of the main issues surrounding the use of JI credits in the EU ETS is the

[4] The Linking Directive says that the Commission should consider the risks of using forestry credits in the review of the Directive in 2006, to possibly allow their use as of 2008.

danger of double counting, that is, that the same emission reduction measure generates ERUs and frees up EUAs at the same time. With respect to the double counting problem, three cases relevant to JI projects can be distinguished:

First, JI project activities that take place in installations that fall under the EU ETS. These JI project activities, which directly reduce or limit an installation's emissions, can only sell ERUs if an equal amount of EUAs are cancelled by the operator of that installation. An EU ETS installation that hosts a JI project needs to surrender an EUA for each ERU that is issued. It therefore needs to make sure that the installation receives an adequate allocation of EUAs in line with the baseline specified for the JI project, in order to honour any ERU sales agreements it has already signed. If such a project has not yet been approved as a JI project before the allocation plans have been finalised, the project needs to demonstrate that the EU ETS, which falls under the *Acquis Communautaire* that governs the entry of accession countries to the EU ETS, would not provide a sufficient incentive to reduce the emissions claimed by the applicant JI project. This might be the case if the expected EUA prices in the EU ETS are too low to make the investment economically viable, and if it can be demonstrated that ERU prices are high enough to incentivise the proposed JI emission reduction investment that would otherwise not be implemented. New JI projects therefore need to be carefully designed to make a good case for additionality to the Acquis Communautaire in order to qualify under JI.

Second, emission reduction activities such as grid-connected renewable energy projects or energy efficiency projects that indirectly reduce the emissions of installations covered by the EU ETS may only sell ERUs if an equal amount of EUAs is cancelled from the national member state's registry. To that extent, member states will probably have to set up a reserve pool of EUAs corresponding to the expected number of ERUs to be issued and transferred. This reserve pool means that installations that fall under the EU ETS will get fewer EUAs. The size of the reserve pool will need to be identified in the NAP. However, the calculation of the size of the reserve pool poses a challenge: if the reserve pool is not large enough, JI investors cannot be sure they will be granted ERUs for their projects; if the pool is too large, less EUAs are available for installations covered by the EU ETS. Early registration of JI projects is therefore recommended, and clear application procedures for reserve pool JI credits are crucial.

The third category are emission reduction activities that do not directly fall under the EU ETS and do not indirectly limit or reduce emission of installations within the EU ETS. Examples of such projects include methane capturing from landfills, nitrous oxide reduction projects, non-grid connected renewable energy projects, and energy efficiency projects. Projects from this third category are not affected by the Linking Directive and can be developed 'as usual' as long as they are additional to the *Acquis Communautaire* including temporary derogations specified in the Treaty of Accession to the EU. However, these projects in the EU accession countries will generate a comparatively small amount of ERUs, since new landfill projects will be regulated under upcoming EU laws and most other projects will fall under one of the other categories of JI.

It can be summarised that careful JI project design, adequate contractual provisions and early registration of JI projects - to make sure that they are accounted for in the reserve pool - in combination with the overall good investment climate of EU accession countries mean that JI is still an attractive option for carbon credit buyers.

3.1.2. The Clean Development Mechanism and the Linking Directive

The CDM Executive Board, which reviews projects and issues CERs, is actively approving project methodologies. Once a project has been approved, is operational, and verified, the board will issue an according number of corresponding CERs. Once a CER is issued, it carries the same compliance value as an EUA during the first period under the EU ETS, as there is no CER import cap. However, in contrast to EUAs - which cannot be banked between the first trading period and the second - a CER bought during the first trading period will still have a value in the second. This optionality should add to the value of CERs. For example, companies that have difficulties forecasting their exact emissions in 2007 might prefer to purchase a sufficient quantity of CERs to cover their shortfall of allowances at the margin - and use any CERs they did not use for compliance in 2007 for following years. EUA surpluses, on the contrary, will be worthless after the compliance deadline for 2007 (in April 2008). In addition, CERs could be sold to Kyoto compliance buyers, for example, governments and companies outside the EU ETS.

However, balanced against this is the fact that, in the second period, the use of CERs and ERUs will be constrained by the aforementioned installation level import cap. CERs do not carry the same host country delivery risk as ERUs. The former CERs are issued by the Executive Board, with the approval of the host country, while ERUs have to be taken out of the total Kyoto Assigned Amount Unit (AAU) emissions budget of the Annex 1 country. This AAU budget constraint, as well as the 'Commitment Period Reserve' regulation might increase transfer and default risks. The Commitment Period Reserve requires that Annex 1 countries hold 90% of their AAUs, or 100% of their latest inventory, in reserve to guard against non-compliance.

The prices of CERs are still low, with current bids of between \$3.00 and \$6.50/tCO2e. These lower CER prices largely reflect CER generation, methodology and project risks, and the concerns over the capacity of sellers to pay damages in case of non-delivery of promised CERs. Once the Executive Board issues a CER, project risks largely fall away and a CER should have the same compliance value as an EUA, triggering a necessary price convergence of these two types of emission rights. The flexibility of the use of CERs will likely increase demand for them. At the same time, the supply of CERs is expected to be limited during 2005-07 because of the relatively small number of projects under way. This is likely to lead to an increase in CER prices in the near to medium term. Given the higher versatility of CERs in the first trading period, we may even see them trading at a premium to EUAs.

In the second trading period, the new NAPs, installation-level import caps and the expected availability of CERs and ERUs will dictate prices. One could expect that, during the second trading period, member states will tighten the allocation of EUAs and more Kyoto compliance buyers - governments and companies - will enter the market, providing CERs with a good longer-term price perspective. Because of installation level import caps, however, it expected that CERs and ERUs will trade below EUA price levels unless, of course, they are impacted by strong demand from Japan and Canada.

3.2. Issues Concerning the Linking Directive

Linking CDM and JI to EU emission allowance trading gives rise to various issues. A key issue in the debate leading up to the EU Linking Directive was the concern about the implications of allowing JI and CDM credits into the EU- ETS on the amount of greenhouse gas reductions taken domestically (compared to requiring all reductions to be generated within the EU) and the risks of compromising the practical implementation, within the EU, of the Kyoto Protocol's "supplementarity" principle (see below). The Linking Directive addresses this issue by requiring Member States to decide prior to each trading period on its intended use of ERUs and CERs and the maximum use of JI and CDM credits by each installation covered by the EU-ETS. Estimates indicate that total EU private sector demand for CERs could be in the order of 110 Mt CO_2 as a result of the Linking Directive. It will mean that installations with higher mitigation costs will have the opportunity to emit at levels higher than the target as these emissions can be compensated abroad through project-based mechanisms.

3.2.1. The Concept Of Supplementarity

The "supplementarity" principle has been defined in the Kyoto Protocol and says that a significant part of the emission reductions of Annex I countries should be made domestically and that purchase of CERs will be supplemental to emission reductions taking place in Annex I countries. In practice, 'a significant part' has been translated as around 50%.

The Linking Directive requires the use of project-based credits to be consistent with the Kyoto Protocol, the Marrakech Accords, and subsequent decisions. This means the use of such credits is subject to the principle of supplementarity, which requires emissions reductions achieved through the Kyoto Mechanisms to be "supplemental to domestic action" for the purpose of meeting the Kyoto targets. It has, however, not been further operationalised how supplementarity should be defined.

Note that within the Kyoto Protocol the use of credits from the Kyoto Mechanisms for compliance is limited to governments. Furthermore, the Kyoto Mechanisms do not only include JI and CDM but also international emissions trading (IET, between governments). With the possibility of using project-based credits for compliance under the EU ETS, assessing the supplementarity of international action to domestic action becomes even more complicated. The Linking Directive leaves the definition of supplementarity in the context of the EU ETS up to Member States. It does provide a sort of (flexible) cap on the total amount of project-based credits that will be allowed in the system, according to the following provision (*article 11 bis*):

> "*At such time as the number of CERs and ERUs from project activities converted for use in the Community scheme reaches 6% of the total quantity of allowances allocated by the Member States for the period, the Commission shall undertake a immediate review. In the light of this review, the Commission may consider whether a maximum of for example 8% of the total quantity of allowances allocated by the Member States for the period should be introduced in accordance with the procedure in Article 23(2).*"

The contribution of project-based credits by governments to meeting the national commitment for 2012 varies between countries. However, national circumstances, such as expected growth, emission reduction potential, and marginal abatement cost, also differ strongly.

3.2.2. Fungibility

A central concept of the linking directive is the conversion of ERUs from JI projects and CERs from CDM projects into allowances in the ETS. This will be done by the Member States without any restrictions, thus creating full fungibility.

Linking JI and the CDM to the Community scheme implies the creation of a bridge between two different frameworks. JI and the CDM are project-specific, based on a baseline and credit approach with an ex-post verification of emissions reductions achieved, while the Community scheme is a "cap and trade" programme for the reduction of greenhouse gas emissions based on ex-ante allocation of emission allowances to covered installations. This proposal reflects the fact that these two frameworks differ in many aspects (different institutions involved for the issue of emission allowances and credits, different timing for the implementation, different units of account). It introduces some safeguards as to what to link and how much to link in order to operationalise the Marrakech Accords and preserve the environmental integrity of the Community scheme.

The starting point is that JI and CDM credits are recognised as being equivalent to EU emission allowances from an environmental and economic point of view. Consequently, the proposal does not modify the project cycles through which JI and CDM credits are issued. It means that the proposal is based on trust vis-à-vis the Kyoto system and the competent institutions, in particular the CDM Executive Board and the Article 6 Supervisory Committee.

3.2.2. Double-Counting

To maintain the integrity – and the value - of emission allowances from emissions trading schemes and emission credits from project-based mechanisms it is important that one allowance or one credit correspond to one specific unit of emission or emission reductions (e.g. a tonne of CO_2 equivalent). For these reasons, ensuring that there is no double-counting of emission reductions is a basic principle of flexibility mechanisms. Avoiding double-counting is also critical for overall compliance towards a national GHG commitment.

To avoid double-counting, determining appropriate boundaries for project-based activities is important. This requires clearly identifying emission reductions that can be attributable to these activities and set the limits regarding reductions that could be claimed by participants in project-based schemes. The issue of boundaries is critical to clarify the emissions (direct and/or indirect) for which a particular project-based activity is responsible. Issues of ownership, control, significance will need to be considered, as well as the relative ease of calculation/estimation and accounting.

The Linking Directive allows JI projects to be undertaken in sectors covered by the EU-ETS while avoiding double-counting through the following provisions:

- ERUs from any project affecting directly emissions of an installation covered under the EU-ETS need to be compensated by the cancellation of an equal number of allowances by the operator of that installation.
- ERUs from any project affecting indirectly the emission level of installations covered under the EU-ETS need to be compensated by the cancellation of an equal amount of allowances from the national registry of the Member State from which the ERUs originate. EU member States can thus host JI projects and generate ERUs that can be used for compliance by entities covered by the EU-ETS. However, emission reductions from domestic projects/offsets are not yet recognised under the EU-ETS. This issue merits further consideration in order to ensure a consistent treatment of similar projects regardless of investors' origins and mechanism used.

This provision ensures that an EU allowance and an ERU each correspond to one Assigned Amount Unit (the basis for national allowed emissions under the Kyoto Protocol) and thus preserves the integrity of each unit.

3.3 Interaction Between The Linking Directive and JI/CDM in the EU Member States

In order to meet their target under the EU ETS, a company that has a shortage of EU allowances can choose from a number of options:

- Implementing in-house emission reductions
- Buying EU allowances on the market
- Developing JI/CDM projects
- Buying JI/CDM credits on the markets

The choice for a particular (portfolio of) compliance options will be determined by the comparative cost of the different options (of which one is carbon price), the associated risks and company characteristics. Examples are company's attitude to delivery risk, certain comparative advantages, and whether a traditional interest in international cooperation or international presence exists. The same characteristics can lead companies with an excess of allowances to be interested in developing JI/CDM projects, merely to sell the credits for a profit.

3.3.1. Internal emissions reductions or external off-sets

There are two main options for companies to meet their compliance targets in the EU ETS, internally and externally. Internal options focus on improving energy efficiency or reducing emissions in-house, and external options focus on 'off-setting' on-site emissions elsewhere, either through the development of JI/CDM projects or through the market, trading of EU allowances (EUA) or JI/CDM credits (ERUs and CERs).

3.3.2. Drivers for JI/CDM

This section discusses what type of organizations are most likely to participate in JI or CDM projects, either as investors/project developers or through trading on the market. Compliance targets (in the EU ETS or otherwise) are an important element in this, but not the only one.

The following elements can be drivers for a company to choose to participate in JI/CDM:

- Compliance targets (shortage of allowances)
- International presence
- CSR (Corporate Social Responsibility)
- Prices of JI/CDM credits in relation to EU allowances
- Risk spreading
- Banking of credits

1. Compliance targets

Companies that participate in the EU ETS need to achieve annual CO_2 emissions targets, as described above. Companies that are short in allowances may want to invest in JI or CDM projects and use the resulting credits to cover their target, or buy credits on the market. There are several advantages in entering the JI or CDM market as will be explained later on in this section.

2. International presence

International presence can be an important driver for the business sector to invest in JI and CDM projects. Besides carbon credits, they will accrue other benefits from these investments in their international operations, such as improved productivity, increased market share, more modern technology, etc. Companies who operate internationally have key advantages such as country-specific knowledge, reducing risks, are accustomed to overseas investments, and are able to invest in their own organisation abroad.

3. Corporate Social Responsibility (CSR)

CSR is an issue for many organisations. More and more shareholders demand a proper energy and carbon paragraph in CSR policy statements. Investing in Kyoto flexible mechanisms can be an element of this policy and a way to enhance a company's image.

4. Price difference

The decision to trade EUAs, CERs, or ERUs is largely dependent on the market price. For now we assume that the market price of these credits will be the same in the second period. At present market prices for CERs are favourable compared to EU allowances, providing a driver towards JI/CDM.

5. Banking of credits

An important driver for CDM credits as opposed to EU allowances is their (indirect) bankability. EU allowances cannot be banked between the 1st and 2nd phase of the EU ETS. By buying CDM credits a company achieves more flexibility to either use the credits for compliance in the 1st phase, or to keep them outside of the EU ETS until the 2nd phase, effectively banking the CDM credits.

6. Risk management

Trying to comply with climate change legislation presents a number of uncertainties, be it technical, regulatory or market related complications. These uncertainties differ for the different ways to accrue carbon credits. Spreading the risk through using different options (internal, JI/CDM, buying allowances) is a way to deal with these uncertainties.

3.4. Current Status of Implementation of the Linking Directive in EU Member States

This section presents an overview of the current state of the use of project-based carbon credits in EU Member States, both at the government level as well as the EU ETS participant level. This is based on an analysis of National Allocation Plans and other literature, as well as interviews with Member State representatives on both topics.

3.4.1. Member State use

Most EU-15 Member States are planning to use the Kyoto Mechanisms to meet their Kyoto/Burden sharing target. Exceptions are France, German, Greece, and the UK. New Member States are largely expecting to be sellers of JI credits, except for Slovenia. In the other Member States the level of preparations is very different. Austria, Denmark, and the Netherlands have substantial programs, procedures, and budgets in place, making it more likely that the targeted use of Kyoto Mechanisms will be achieved. For most of the other Member States this is much less certain.

Table 3.1 presents an overview of the intentions by Member States to use the Kyoto Mechanisms (KMs) - at a Member State level - for meeting the Kyoto/Burden sharing targets. The table shows that most of the EU-15 Member States plan to use CDM and JI to meet

2008-2013 targets. Only France, Germany, Greece, and the UK have indicated that they intend to meet their Kyoto target domestically. Finland and Sweden both have not made a final decision yet, but have established pilot programmes for JI/CDM. All new Member States except Slovenia are expecting to be sellers rather than buyers of project-based credits.

In the instances where the issue of supplementarity was explicitly addressed, the amount of credits use planned is based on the 50%/50% supplementarity concept, i.e. 50% of the gap between baseline and Kyoto target is achieved domestically, 50% through Kyoto Mechanisms (KMs) (Austria and the Netherlands).

Country	Using Kyoto Mechanisms	Which	How much Mt/yr	Remarks
Austria	Yes	Priority on JI/CDM	7	Maximum 50% of the efforts required for compliance
Belgium	Yes	JI, CDM	8.2	
Czech Republic	JI seller			
Denmark	Yes	IET, JI, CDM	3.7	Total amount for use of KM indicated in submission to EEA 20-25 Mt/yr
Estonia	JI seller			
Finland	Not yet decided	Not yet decided	Not yet decided	Pilot purchase programme in place
France	No			
Germany	No			
Greece	Currently no intention			
Hungary	Seller JI			
Ireland	Yes	IET, JI, CDM[5]	3.7	Additional 2.1 Mt/yr foreseen by ETS participants
Italy	Yes	IET, JI, CDM	12-69.2	
Latvia	Seller JI			
Lithuania	Seller JI			
Luxemburg	Yes	IET, JI, CDM	3	
Netherlands	Yes	JI, CDM IET not yet decided	20	50% of the gap
Poland	JI seller			
Portugal	Yes	IET, JI, CDM	0.68-1.3	
Slovenia	Yes	IET, JI, CDM	Not yet decided	
Spain	Yes	Priority on IET, CDM	20	7% of 1990 emissions
Sweden	Not yet decided	IET, JI, CDM	Not yet decided	Pilot purchase programme in place
UK	No			
Total			75.6 – 115.4	
Canada	Yes	IET, JI, CDM	20	
Japan	Yes	JI, CDM	19.765[6]-20[7]	1.6% of 1990 emissions
EFTA			5 - 18	
Grand Total			120 – 173	

Table 3.1.: Overview of EU Member State (Plus Canada and Japan, who will both be major players in the market) intentions on the use of Kyoto mechanisms at the Member State level to reach Kyoto/Burden sharing targets (EEA, 2004; Ecofys NAP analysis, interviews, Kiel Institute, 2005)

[5] In the questionnaire submitted to the EEA (EEA, 2004) Ireland states the 3.7 Mt/yr to be achieved through IET. The NAP talks of the use of 'flexible mechanisms', while the interviews suggest JI/CDM will be used as well.
[6] Ministry of the Environment Government of Japan; NEDO (October 2004)
[7] Point Carbon, 03-03-2005, 20 million Yen in 2005, 200 million Yen in 2006.

It should be noted that the above policy intentions are in very different stages of implementation and are backed by very different levels of commitment. In the assessment of national allocation plans the European Commission used the following criteria to assess the level of advancement:

- Does the plan indicate how many Kyoto units the Member State intends to purchase for the period 2008-2012?
- Does the plan indicate which Kyoto units (JI, CDM, and International Emission Trading) will be used to what extent?
- Does the plan present information on the state of advancement of relevant legislation?
- Has the Member State established and notified to the UN a designated national authority?
- Does the plan show that implementing provisions (operational programs, institutional decisions) are in place at the national level?
- Have any credit purchase contracts been signed or any credit purchase tenders been initiated?
- Has the Member State set up or made any financial contributions to carbon purchase funds?
- Does the plan specify how much money has been committed at this stage?

On the basis of the above-mentioned criteria only the JI/CDM policy intentions announced in the NAPs of Austria, Denmark and the Netherlands were considered to be sufficiently substantiated by the European Commission. Belgium, Ireland and Luxemburg indicated how many Kyoto units they intend to purchase but did not comply with other criteria. However, with additional information submitted by these governments on establishing designated national authorities and allocation of financial resources in the budgets for 2005, the European Commission accepted their NAPs. Note though, that especially for Ireland the policy merely represents an expression of intent, as was recently confirmed in interviews. The stage of preparation for the use of Kyoto Mechanisms in other Member States is even less advanced, as shown in Table 3.2 and Table 3.3.

Country	**Status**	**Agreements, MoUs, contracts with countries in place**		**Budget (Million)**
		JI	**CDM**	
Austria	Legal framework and programs under preparation	Czech Republic, Slovakia, Romania, Bulgaria	-	Up to €288
Belgium	F: preparation of legal framework and pilot projects started in 2003 W: CDM projects currently launched	-	-	€120
Denmark	1 JI project contracted, several projects in preparation	Slovakia, Ukraine, Romania, Estonia Lithuania, Hungary Bulgaria, Moldova, Czech Rep, Russia Lithuania, Poland	Malaysia, Thailand, South Africa	€126
Finland	Pilot program, 3 JI projects under consideration	Estonia, Latvia, Lithuania, Poland, Ukraine		€8.5
Ireland	-	-	-	-
Italy	WB-operated Italian Carbon Fund	Morocco	Libya	€15[8]
Luxemburg	-			

[8] Target budget for the Italian Carbon Fund is €80 million, however, only €15 million have so far been secured.

Netherlands	National tender programs ERUPT, CERUPT, WB-operated PCF and CDCF, funds with multilateral, regional and commercial banks, bilateral contracts	Romania, Bulgaria, Estonia, Hungary, Slovakia, Croatia	Bolivia, Colombia, Costa Rica, El Salvador, Honduras, Panama, Nicaragua, Uruguay, Guatemala, Indonesia	€ 736
Portugal	-	-	-	-
Spain	Pilot phase expected to start in 2003	Uruguay, Panama, Argentina, Mexico, Colombia. Under preparation for Peru, Morocco, Costa Rica	Under preparation for Bulgaria	-
Sweden	National tender program SICLIP: 5 CDM projects under development, 15 JI proposals PCF, BASREC	Romania, Baltic Sea region	-	€22.9
Canada	Project Green (13 April 2005): establishing budgets, measures and funds.		Costa Rica, Colombia, Chile, Nicaragua, Tunisia, South Korea	-[9]
Japan	"Upfront Payment Program for CDM/JI projects" starts end of march 2005. Credits generated: max. 154kt (2004), approx. 7,500kt (2005)		Close co-operation with ASEAN, China	€74[10] (Year 2005)

Table 3.2.: Status of JI/CDM purchase provisions at Member State level (EEA, 2004, Ecofys Gap analysis, interviews). Only Member States that have indicated a (potential) intention to buy JI/CDM credits are shown.

Country	Intended use Mt/yr	Budget (Million)	Maximum delivery (Mt/yr) of budget at 5-10 €/t	Potential shortage Mt/yr
Austria	7	Up to €288	5.8 - 11.5	0 -1.2
Belgium	8.2	€120	2.4 - 4.8	3.4 – 5.8
Denmark	3.7	€126	2.5 – 5.0	0 – 1.2
Finland	Not yet decided	€8.5	0.2 - 0.4	-
Ireland	3.7	-	0	3.7
Italy	12 - 69.2	€15	0.3 - 0.6	11.4 – 68.9
Luxemburg	3	-	0	3
Netherlands	20	€ 736	14.7 - 29.4	0 – 5.3
Portugal	0.7 - 1.3	-	0	0.7 - 1.3
Slovenia	Not yet decided	-	0	-
Spain	20	-	0	20
Sweden	Not yet decided	€22.9	0.5 – 1.0	-
Canada	20	-	0	20
Japan	19.8	€74 (2005)	7.4 – 14.8 [11]	5.0 - 12.4
Total	120-173		33.8 – 67.5	

Table 3.3.: Intended use of Kyoto Mechanisms compared to a maximum delivery that can be expected for the stated budgets at carbon prices of 5-10 €/t

Table 3.4 compares the intended use of the Kyoto mechanisms to the gap between a "With existing policies and measures" scenario reported by Member States under the Monitoring Mechanism (EEA, 2004) as an indication of (implicit) supplementarity considerations. For

[9] The Climate Fund's amount $1billion, but primary mandate is to promote domestic GHG emission reductions.
[10] 10 Billion YEN; 1 Japanese YEN = 0.007358 EUR (10th May 2005)
[11] Assuming an annual budget during 5 years identical as the 2005 budget

most countries that have expressed an intention to use Kyoto Mechanisms, the amount of credits planned to be used amounts to about 40-50% of the gap. Notable exceptions are Luxemburg and potentially Italy. Note that for a number of cases, the gap may actually be larger as reported under the Monitoring Mechanisms, due to older data and projections, lower delivery of policies and measures, etc. As a result the percentages would become lower than stated here.

The table also compares the intended use of Kyoto Mechanisms to the size of the EU ETS cap (2005-2007). This shows that the intended use of credits at the Member State level is between 10-20% of the size of the EU ETS cap for most Member States. Exceptions are Luxemburg and to a lesser extent Italy on the high side (88% and up to 29% respectively) and Portugal on the low side (2-4%).

Country	Intended use (Mt/yr)	Gap to Kyoto target With existing P&Ms (Mt/yr) (EEA, 2004)	Intended use as % of gap	EU ETS cap (Mt/yr)	Intended use as % of cap
Austria	7	16.9	41%	33.0	21%
Belgium	8.2	19.7	42%	62.7	13%
Denmark	3.7	25.3	15%	33.5	11%
Finland	Not yet decided	12.7	-	45.5	-
Ireland	Gov: 3.7 Part: 2.1	8.8	42% 24%	22.1	17% 10%
Italy	12 - 69.2	53	23 – 100%	240.5[12]	5 – 29%
Luxemburg	3	0.7	100%	3.4	88%
Netherlands	20	19.7	100%[13] 50%[14]	95.3	21%
Portugal	0.7 - 1.3	17.0	4 – 8%	38.2	2 - 4%
Slovenia	Not yet decided	2.5	-	8.8	-
Spain	20	69.0	29%	160.3	12%
Sweden	Not yet decided	-3.0	-	22.9	-
Canada	Not yet decided[15]	270	-	-	-
Japan	19.8	82.4[16]	24%	-	-

Table 3.4.: Intended use of Kyoto mechanisms compared to the gap between a “With existing policies and measures” scenario reported by Member States under the Monitoring Mechanism (EEA, 2004) and the size of the EU ETS cap (2005-2007, Ecofys NAP evaluation)

Table 3.4 also compares the intended use of KMs to the size of the EU ETS cap (2005-2007, Ecofys NAP evaluation). This shows that the intended use of credits at the Member State level is between 10-20% of the size of the EU ETS cap for most Member States. Exceptions are Luxemburg and to a lesser extent Italy on the high side (88% and up to 29% respectively) and Portugal on the low side (2-4%).

For most countries that have expressed an intention to use Kyoto mechanisms, the amount of credits used is about 40-50% of the gap with the “With existing policies” scenarios as

[12] based on draft NAP

[13] if calculated as for other countries listed here

[14] if calculated in Dutch policy: gap before implementation of measures amounted to 40 Mt (estimated in 1998 for 2010), half of this gap (20 Mt/yr) to be closed through JI/CDM credits, half through domestic measures. Measures delivering 20 Mt/yr have been identified and implemented, leaving the remaining gap of 19.7 Mt/yr shown in the table above.

[15] There is a CAD$ 1-billion Climate Fund per year over next 5 years, but no distinction between domestically and international purchase.

[16] Source: Ministry of the Environment Government of Japan; NEDO; Pacific Consultants Co., Ltd. (October 2004)

submitted under the Monitoring Mechanism. Notable exceptions are Luxemburg and potentially Italy. Comparing the intended use of credits at the Member State level to the size of the EU ETS cap (2005-2007), the former is between 10-20% for most Member States. Exceptions are Luxemburg and to a lesser extent Italy on the high side (88% and up to 29% respectively) and Portugal on the low side (2-4%).

Figure 3.5 compares the intended project-based credits to be purchased for the government each country with the maximum delivery of project-based credits according the established national budget for this purpose and assuming a price of these credits of 5-10 €/t

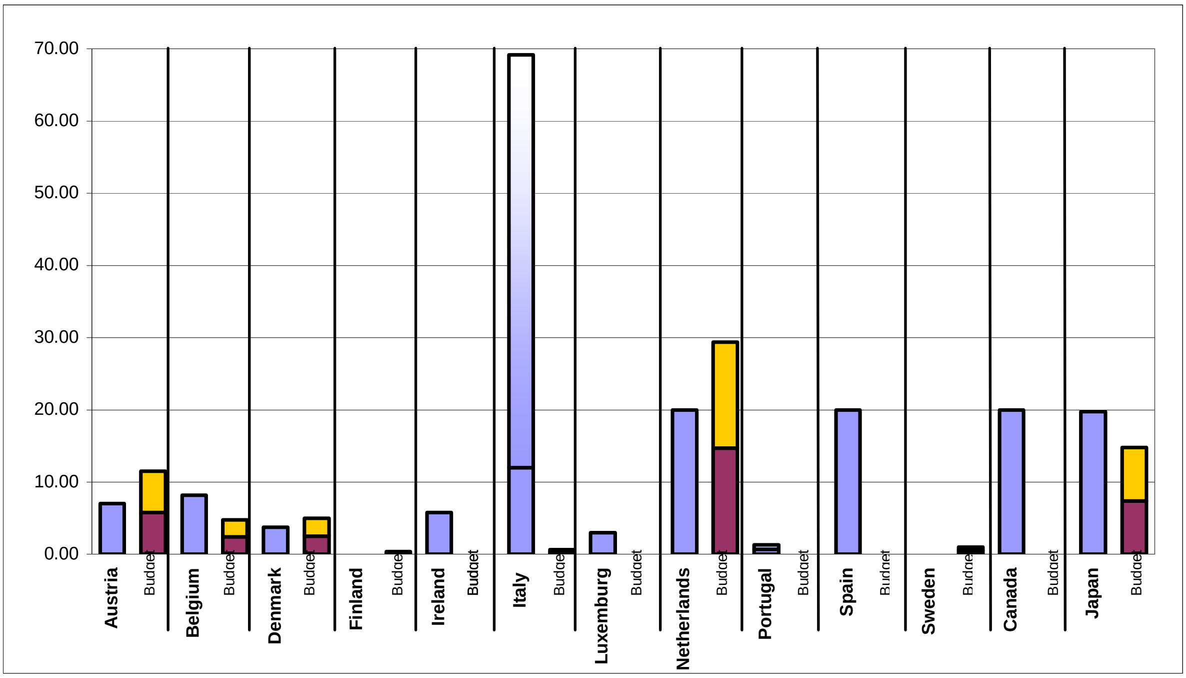

Figure 3.5.: Intended JI/CDM-credits purchase in Mt CO_2/yr (left-hand bars for each country) and the amount of the possible purchase of credits according to the foreseen budget for each country, assuming a price of 5-10€/tCO_2 (right-hand bars).

Decision-making on the use of restrictions on the use of JI/CDM credits by EU ETS participants is in the early stages in most Member States. Quantitative restrictions have so far only be announced by the Netherlands, and are expected to be imposed in Austria and France (both Phase II only). Most other Member States have not yet decided, or are expecting no restrictions. No further qualitative restrictions, other than those adopted by the Kyoto Protocol itself, are currently expected.

3.5. The Impact of The Linking Directive on Promoting Energy Efficiency JI/CDM Projects in PEEREA Countries

Credits from energy efficiency projects on both supply and demand side energy efficiency undertaken under the CDM are accepted in the EU ETS (since 2005). Similarly, credits from JI energy efficiency projects in countries outside the EU (including accession States) are also accepted in the EU ETS (from 2008). Countries that acceded the EU in May 2004 include Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, and Slovenia. This means that projects that directly fall under ETS (e.g. fuel switch at large power plant) or projects that feed into the grid (e.g. a wind park) can only participate in JI if their project has been approved by the host country before 31st December 2004. Thus, energy efficiency projects in the district-heating sector could qualify as JI projects in accession countries, as long as the supply side improvement (e.g., replacement of a boiler) does not go over the 20 MW threshhold. The remaining JI projects (i.e., those covered by the EU ETS) are not allowed to avoid double counting. Within the EU, given the implementation of the energy efficiency directive, JI projects should go beyond the target on energy efficiency set in the energy efficiency directive in order to qualify as climate change mitigation activities and be able to sell the credits in the EU ETS.

Furthermore, three key points make developing countries strong candidates for energy efficiency projects, and hence, potential CDM host countries for energy efficiency projects (From OECD 2000):

- High growth in energy demand is forecast for developing countries, with electricity use expected to increase significantly by 2015.
- The most cost-effective energy efficiency projects tend to be those implemented as part of new construction or major facility modifications, and these types of projects are projected to be significant in developing countries.
- Most developing countries did not participate in the wave of energy efficiency investment that occurred (mostly in OECD countries) after the OPEC oil embargo and the resulting high-energy prices of the 1970s and 1980s. Consequently, there are still numerous opportunities to increase energy efficiency in developing countries, as well as in countries with economies in transition.

As a result of these factors, a significant fraction of the GHG emissions reductions achieved via the Kyoto Protocol's project-based mechanisms could potentially result from successful energy efficiency projects implemented in PEEREA Countries.

As mentioned previously, energy efficiency projects are nearly always economically viable and environmentally friendly. However, in general, financing an energy efficiency project is not always simply done. There are a variety of barriers determined by legislation, by administration, by the lack of awareness and by the specificity of energy efficiency investments. Traditional benefit-cost assessments of energy efficiency investments typically show many projects to be very cost-effective. It is not uncommon to see study-based benefit-cost ratios exceed 10 to 1. Still, large-scale investment in these projects has not generally been undertaken, especially in developing countries. Various barriers to implementation are typically cited (PEEREA) as the reason why such potentially cost-effective investments are not embarked upon. A list of barriers include the following:

- An information cost — a lack of awareness and general misinformation about the benefits of energy efficiency projects;
- An attention cost — managers and households have limited time and attention to devote to the manifold aspects of their business and lives. Energy efficiency projects may have a high rate of return, but still be too small and too complicated to justify the expenditure of attention;
- A technical cost — lack of technical specifications required to select the most appropriate technology;
- A market distortion cost — pricing policies that under-price the true value of the resources being consumed makes conservation less economic for participants;
- Capital allocation costs — the capital pool in the country may not be adequate for incremental/discretionary investments in energy-efficient technologies, which drives up the cost of capital and allocates it to the highest risk-adjusted return projects;

- Public policy costs — taxes and tariffs that discourage the import of foreign-manufactured energy-efficient equipment;
- Cost of cultural barriers — local customs and inertial behaviour can work to maintain the status quo in the design, selection, and operation of energy-using equipment.

In countries with economies in transition the situation can be similarly difficult as it is in developing countries. This is due to the lack of financing and to the immature stage of the market mechanisms. Integration of energy efficiency projects within the broader picture of restructuring the economy, which is an obvious priority, has proved to be not an easy task. On the other hand, especially in these countries, improving energy efficiency has the highest economic and technical potential. The existence of appropriate actors to tackle energy efficiency investments is as important as the economic viability of the proposed projects. Therefore, creating a favourable framework for energy efficiency investments requires awareness and confidence to be created among various market players: end users, financial institutions, service companies, and public institutions.

The factors listed above might explain different tendencies to not invest in what may be considered, in some circumstances, as "economic" energy efficiency projects". Traditional financial analyses may not appropriately address the costs of these barriers. However, most importantly, some of these costs can be overcome by JI/CDM investments (e.g., the availability of capital and technical specifications).

Although not necessarily easy, there are energy efficiency projects under consideration, but nearly all deal with large-scale industries that are high-energy consumers in the first place and the energy efficiency measures are also relatively large-scale. Examples include, two JI projects in the Czech Republic: Energy Efficiency in Buildings and Thomayer Energy Efficiency Project, both under the PDD title "Czech Republic Energy Efficiency an renewable umbrella project".

Figure 3.6 illustrates the amount of JI and CDM projects hosted in PEEREA and Non-PEEREA countries. The data reveals that 20% of all JI/CDM projects occur in PEEREA countries, thus representing a substantial portion of Kyoto Project Host countries. Furthermore, figure 3.7 displays the JI and CDM projects occurring in PEEREA and Non-PEEREA countries by project category. This figure reveals that "Energy projects" represent a significant amount of the JI/CDM projects occurring in PEEREA countries. Note, some "Industry" projects can also be energy efficiency related, and thus represent further projects that may have important to PEEREA.

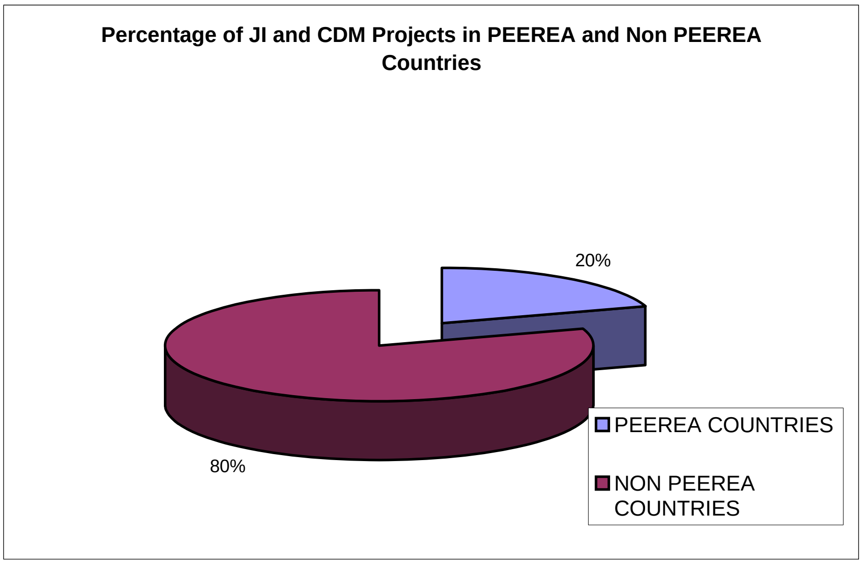

Figure 3.6.: The Percentage of JI and CDM Projects in PEEREA and Non PEEREA Countries.

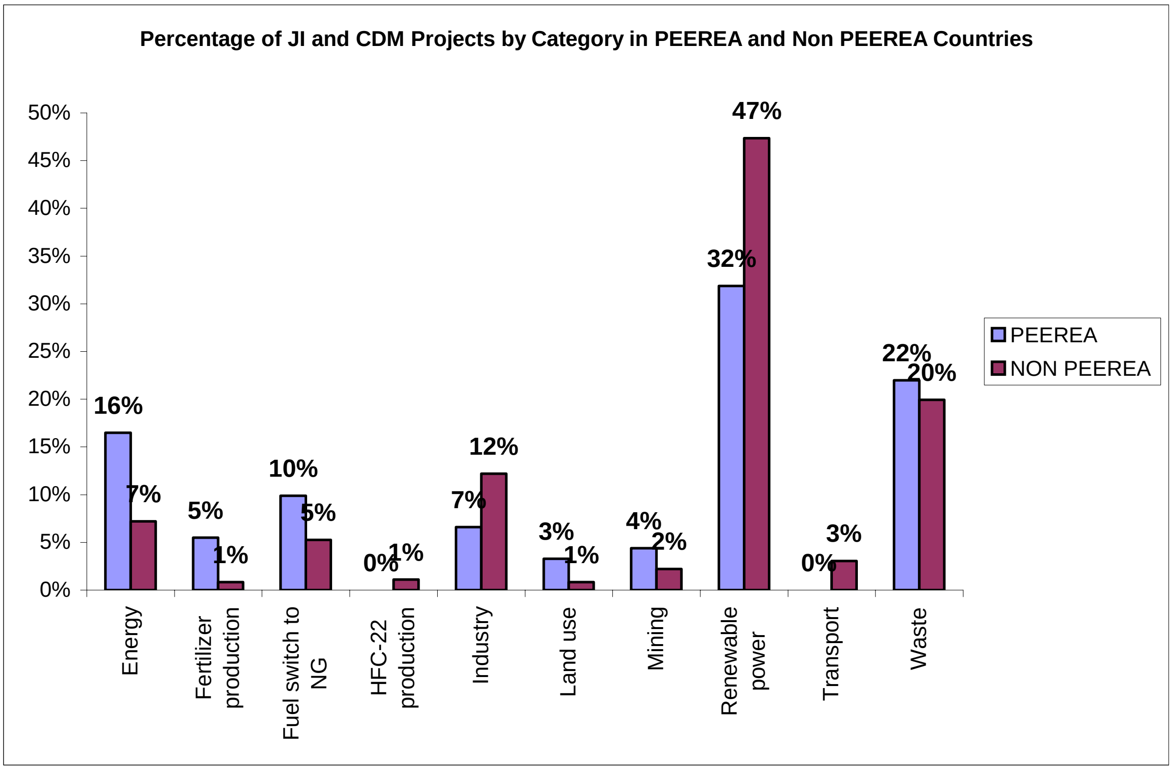

Figure 3.7. : Percentage of JI and CDM Projects by Category in PEEREA and Non PEEREA Countries

CHAPTER 4 : PRELIMINARY CONCLUSIONS

In 1996, the EU Council adopted as its long-term climate objective, a global-mean temperature change that would not exceed 2 degrees Celsius compared with pre-industrial level. To achieve this goal, in July 2003, the European Council formally adopted the Emissions Trading Directive. The Directive laid out the framework for the European Emissions Trading Scheme (EU ETS). In order to minimise the economic costs of its Kyoto commitments on combating climate change, EU countries agreed to set up an internal market enabling companies to trade carbon dioxide emissions. The first phase of the EU ETS runs from 2005-2007 and the second phase will run from 2008-2012 to coincide with the first Kyoto Commitment Period. The Commission hopes that the EU ETS will stimulate innovation and create incentives for companies to reduce carbon emissions. Specifically, investments in cleaner technologies, such as energy efficiency, can then be turned into profits while helping the EU meet its Kyoto commitments on climate change.

The EU ETS follows a 'cap-and-trade' approach, by setting an overall cap or maximum amount of emissions per compliance period and allowing companies to balancing their targets by trading allowances. By putting a price on emissions the EU ETS impacts the viability of companies under the scheme in two key ways:

- **Direct**: Reduction of CO_2 emissions via energy efficiency measures results in direct savings for the company.
- **Indirectly**: The EU ETS increases power prices because of the additional costs incurred by power stations due to the cost of the CO_2 emission factor. Consequently, power companies will pass these costs on to their end users, which leads to an increase in power prices.

Being a market based-mechanism itself, or policy tool, the EU ETS sometimes overlaps with other market-based mechanisms in the EU Member States. An example of such an overlap is carbon/energy taxes on fuels or power. However, other existing policy measures are complementary to the EU ETS, thereby improving the CO_2 reductions, as well as meeting energy efficiency demands

Given the relatively recent entry into force of the Kyoto Protocol, the start of the European Emissions Trading Scheme (EU ETS) and its Linking Directive, emissions reductions need to mostly happen through energy efficiency measures, at least in the short term.

The EU ETS is the overriding policy instrument to reduce carbon emissions in the EU, in the foreseeable future. Therefore it makes sense for EU Member states to bring their other energy efficiency measures in line with the EU ETS and avoid overlap or contradictions. New policy measures would be most affective if there are complementary to the EU ETS. Specifically, the implications of the interactions between the national Green and White Certificate programmes and the EU ETS must be considered and closely monitored

Countries have different options for allocating EU allowances to industry as part of their National Allocation Plans, these options being the grandfathering approach and the benchmarking approach. In principle, the benchmarking approach awards early adoption of energy efficiency measures by industry, while the grandfathering approach does not. The grandfathering rewards high pollution. Consequently, PEEREA countries covered by EU ETS, wishing to promote energy efficiency measures in industry are advised to take a benchmarking approach in the development of the NAP.

Given that the EU ETS is the largest buyer of JI/CDM carbon credits, non EU ETS PEEREA countries can benefit from additionally financial resources by selling CDM and JI credits to industries under the EU ETS. These countries can enhance the financial benefits from JI and CDM for their energy efficiency policies/targets by actively promoting JI and CDM to their industrial sectors as a way of financing energy efficiency measures.

Glossary

Additionality
The requirements that project emission reductions have to be additional to what otherwise would have occurred in absence of the project.

Annex I countries
These are the industrialized countries and economies in transition listed in Annex I of the UNFCCC. Their responsibilities under the Convention are various, and include a non-binding commitment to reducing their GHG emissions relative to 1990 levels by the year 2000.

Annex B countries
These are the emissions-capped industrialized countries and economies in transition listed in Annex B of the Kyoto Protocol. Legally-binding emission reduction obligations for Annex B countries range from an 8% decrease (e.g., EU) to 10% increase (Iceland) of 1990 levels by the first commitment period of the Protocol, 2008-2012.

Annex I or Annex B?
In practice, the term Annex I used in the Convention and Annex B used in the Protocol are used almost interchangeably for countries that have to reduce their emissions. However, strictly speaking, it is the Annex I countries that can invest in JI/CDM projects as well as host JI projects, and non-Annex I countries, which can host CDM projects. This even though it is the Annex B countries, which have the emission reduction obligations under the Protocol. Note that Byelorussia and Turkey are listed in Annex I but non Annex B; and that Croatia, Liechtenstein, Monaco and Slovenia are listed in Annex B but not Annex I.

Assigned Amount
The total allowed emissions for an Annex I party over the commitment period (2008-12).

Assigned Amount Unit (AAU)
Unit issued pursuant to Article 17 and requirements thereunder, as well as the relevant provisions in the IET modalities and procedures, and is equal to one metric tonne of carbon dioxide equivalent (tCO_2e).

Baseline
The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A (of the Kyoto

	Protocol) within the project boundary.
Baseline methodology	A methodology is an application of a baseline approach to an individual project activity, reflecting aspects such as sector and region. No methodology is excluded a priori so that project participants have the opportunity to propose a methodology.
Carbon Credit	Generic term for the claimed carbon benefits arising from project-level activities. One credit is equal to one ton of CO2 equivalent.
Central and Eastern Europe (CEE)	CEE is a country code for Central and Eastern Europe. This generally means: Poland, Czech Republic, Slovak Republic, Hungary, Romania, Slovenia, Croatia, Bosnia-Herzegovina, Yugoslavia, Macedonia, Albania and Bulgaria.
Clean development mechanism (CDM)	Article 12 of the Kyoto Protocol defines the clean development mechanism. “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”.
CDM modalities and procedures	At its seventh session, the Conference of the Parties (COP) adopted modalities and procedures for a clean development mechanism (CDM modalities and procedures, see annex to decision 17/CP.7, document FCCC/CP/2001/13/Add.2).
Commitment Period	Period for which the Parties included in Annex B of the Kyoto Protocol have agreed that their aggregate GHG emissions will not exceed their assigned amounts, equal to the period 2008-2012.
Crediting period	The crediting period for a CDM project activity is the period for which reductions from the baseline are verified and certified by a designated operational entity for the purpose of issuance of certified emission reductions (CERs). Project participants shall choose the starting date of a crediting period to be after the date the first emission reductions are generated by the CDM project activity. A crediting period shall not extend beyond the operational lifetime of the project activity.

Certification	Certification is the written assurance by the designated operational entity that, during a specified time period, a project activity achieved the reductions in anthropogenic emissions by sources of greenhouse gases (GHG) as verified.
Certified emission reductions (CERs)	A certified emission reduction or CER is a unit issued pursuant to Article 12 and requirements thereunder, as well as the relevant provisions in the CDM modalities and procedures, and is equal to one metric tonne of carbon dioxide equivalent, calculated using global warming potentials defined by decision 2/CP.3 or as subsequently revised in accordance with Article 5 of the Kyoto Protocol.
CO_2e	Metric tonnes of *GHG* emissions measured in terms of their CO_2-equivalent. This approach to measuring emissions is used in order to take into account the fact that individual *GHG* have different global warming potentials. A tonne of an individual GHG is therefore adjusted so that it is expressed in terms of how many tonnes of CO_2 would be needed to produce a corresponding global warming impact over a period of 100 years.
COP/ MOP	Conference of the Parties to the Framework Convention on Climate Change, or Meeting of the Parties once the Kyoto Protocol has been ratified.
Designated National Authority (DNA)	Ultimately all countries should have a so-called Designated National Authority (DNA). The DNA is empowered to issue relevant endorsements and host Party approvals and manage the local regulatory aspects of the CDM. The endorsement from the host party DNA is required in order to register a project with UNFCCC.
Designated operational entity (DOE)	An entity designated by the COP/MOP, based on the recommendation by the Executive Board, as qualified to validate proposed CDM project activities as well as verify and certify reductions in anthropogenic emissions by sources of greenhouse gases (GHG). A designated operational entity shall not perform validation or verification and certification on the same CDM project activity. This restriction does not apply to small scale projects.
Economies in Transition (EIT)	Term used to describe countries of the Former Soviet Bloc – the Soviet Union itself and the formerly communist states of *Central and Eastern Europe* - that are now in transition to a market

economy. These countries are expected to be the location of choice for many JI projects under the Kyoto Protocol on cost grounds.

Emission Reduction Purchasing Agreement (ERPA)	Agreement between buyer and seller of emission reductions in which the conditions of the sale of carbon credits are defined.
Emission Trading Scheme (ETS)	The European Union agreed to establish a cap-and-trade system to limit CO_2 emissions from large industrial sources as a way to help countries meet their emission reduction commitments under the Kyoto Protocol. The system covers the power sector (all fossil fuel generators over 20 MW), oil refining, cement production, iron and steel manufacture, glass and ceramics, and paper and pulp production. The System is set to start January 1^{st}, 2005 for a first phase (2005-2007). Phases of five years will follow from 2008.
Entry into Force	Typically, the provisions of the treaty determine the date on which the treaty enters into force. Where the treaty does not specify a date, there is a presumption that the treaty is intended to come into force as soon as all the negotiating states have consented to be bound by the treaty [Art.24, Vienna Convention on the Law of Treaties 1969]. The Kyoto Protocol is subject to ratification, acceptance, approval or accession by Parties to the Convention. It shall enter into force on the ninetieth day after the date on which not less than 55 Parties to the Convention, incorporating Annex I Parties which accounted in total for at least 55 % of the total carbon dioxide emissions for 1990 from that group, have deposited their instruments of ratification, acceptance, approval or accession.
Energy Services Company (ESCO)	ESCO is an energy service company that offers to reduce a client's energy cost, often by taking a share of such reduced costs as repayment for installing and financing such upgrades.
European Union (EU)	European Union is the new name for the European Economic Community since the Maastricht Treaty came into force in November 1993. The EU currently has 25 Member States (i.e., Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom and the recent accession countries: Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia.

European Union Allowance (EUA) Installations covered by the *EU ETS* are allocated a fixed quantity of allowances in each Member State *NAP*. A EUA is equal to one metric tonne of carbon dioxide equivalent (*tCO_2e*).

Factoring Arrangement through which *ESCOs* sell the payment streams that will be generated by GHG emission reductions or carbon offset projects to bankers or financiers at a price.

Former Soviet Union (FSU) Former Soviet Union countries are independent states that were created after the desegregation of the URSS. These countries are Armenia, Azerbaijan, Estonia, Latvia, Lithuania, Kazakhstan, Kyrgyzstan, Moldova, Russia, Slovenia, Slovak Republic, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

GHG Greenhouse gas; gases, principally carbon dioxide (CO_2), which contribute to climate change. The other gases are Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorcarbons (HFCs), Perfluorcarbons (PFCs) and Sulphurhexafluoride (SF_6).

Host Party The country on whose territory the project activity will be physically located and implemented. For CDM activities the host Party is a country that is not included in Annex I to UNFCCC. A project activity located in several countries has several host Parties.

Independent Entity (IE) A legal entity that has been accredited by the JI Supervisory Board to perform all necessary functions relevant to the determine JI project eligibility and the verification of emission reductions from such projects.

Internal rate of return (IRR) *Discount rate* at which investment has zero *net present value.*

International Emission Trading (IET) IET is a cap-and-trade system defined under article 17 of the Kyoto Protocol. Any portion of an Annex B country's assigned amount (measured in *AAUs*) can be traded to another Annex B country: the amount traded is deducted from the seller's assigned amount and added to the buyer's.

Issuance of certified emission reductions (CERs) Issuance of CERs refers to the instruction by the Executive Board to the CDM registry administrator to issue a specified quantity of CERs for a project activity into the pending account of the Executive Board in the CDM registry, in

	accordance with paragraph 66 and Appendix D of the CDM modalities and procedures.
Joint Implementation (JI)	A process in the Climate Change Convention by which nations can work together to reduce the emission of greenhouse gases cost-effectively. Lays the groundwork for a possible tradable carbon permits system. This mechanism is defined in Article 6 of the Kyoto Protocol.
Kyoto Protocol (KP)	Protocol under the UN *FCCC*. International legal instrument on climate change containing emission reduction commitments for *Annex B countries*.
Leakage	Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases (GHG) which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity.
Monitoring	Monitoring refers to the collection and archiving of all relevant data necessary for determining the baseline, measuring anthropogenic emissions by sources of greenhouse gases (GHG) within the project boundary of a CDM project activity and leakage, as applicable.
Monitoring plan	Plan that forms part of the PDD and describes which and how the activities for monitoring emissions will be carried out once the project becomes operational.
National Allocation Plan (NAP)	The National Allocation Plan sets out the amount of *allowances* each Member State intends to allocate and how it proposes to allocate them to each installation covered by the EU *ETS*. Under the *ETS* Directive, the final decision on individual allocations must be taken no later than September 30th 2004.
Non-Annex I (or non-Annex B) countries	Countries with no emission reduction commitments under the Kyoto Protocol.

Organization for Economic Co-operation and Development (OECD)

The Organisation for Economic Co-operation and Development is an association of the industrialized nation governments. The OECD consists of Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Republic of Korea, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, the UK, and the US.

Operational Entity (OE)

See "Designated Operational Entity".

Operational lifetime of a CDM project activity

It is defined as the period during which the CDM project activity is in operation. No crediting period shall end after the end of the operational lifetime (calculated as from starting date).

Project Design Document (PDD)

Project Design Document, which refers to all documents to be submitted to an Operational Entity for validation or to an Independent Entity for determination.

Present value

The current discounted value of a stream of benefits and/or costs over time.

Project activity

A project activity is a measure, operation or an action that aims at reducing greenhouse gases (GHG) emissions. The Kyoto Protocol and the CDM modalities and procedures use the term "project activity" as opposed to "project". A project activity could, therefore, be identical with or a component or aspect of a project undertaken or planned.

Project boundary

The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the CDM project activity.

Project Cash Flow

A measure of company's liquidity. In credit analysis, cash flow is analyzed to assess the probability that debt retirement commitments can be met without refinancing, that regular dividends will be maintained in the face of less favorable economics, or that plant and equipment can be modernized, replaced, or expanded without an increase in the equity or debt capital.

Project finance

A form of financing in which lenders look solely or primarily to the cash flows of a project to repay

	debt service and to all of the underlying project assets as collateral for the loan. Also known as limited or nonrecourse financing.
Project participants	In accordance with the use of the term project participant in the CDM modalities and procedures, a project participant is either a Party involved or, in accordance with paragraph 33 of the CDM modalities and procedures, a private and/or public entity authorized by a Party to participate, under the Party's responsibility, in CDM project activities.
Secretariat	The Secretariat of the UNFCCC (sometimes also referred to as the Secretariat of the Parties), located in Bonn, Germany. Its primary role is to provide administrative support to the UNFCCC process and the JI Supervisory Committee and the CDM Executive Board.
Sustainable Development (SD)	According to the World Commission on Environment and Development - the Brundtland Commission, SD is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development implies economic growth together with the protection of environmental quality, each reinforcing the other.
Transaction costs	Costs incurred in attempting to complete transactions. (For example, in buying a home, these might include payments to the broker for arranging the sale, to the bank for one-time special fees, and to the government for the required forms. The value of the time expended in negotiating would also be a transactions cost).
Registration	Registration is the formal acceptance by the Executive Board of a validated project activity as a CDM project activity. Registration is the prerequisite for the verification, certification and issuance of CERs related to that project activity.
Validation	Validation is the process of independent evaluation of a project activity by a Designated Operational Entity against the requirements of the CDM on the basis of the project design document (*CDM-PDD*).
Verification	Verification is the periodic independent review and ex post determination by a *Designated Operational Entity* of monitored reductions in anthropogenic emissions by sources of GHG that

have occurred as a result of a registered CDM project activity during the verification period. There is no prescribed length of the verification period. It shall, however, not be longer than the crediting period.

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ANNEX 1: The Definition of Covered Activities Under the EU ETS Directive

ANNEX I

CATEGORIES OF ACTIVITIES REFERRED TO IN ARTICLES 2(1), 3, 4, 14(1), 28 AND 30

1. Installations or parts of installations used for research, development and testing of new products and processes are not covered by this Directive.

2. The threshold values given below generally refer to production capacities or outputs. Where one operator carries out several activities falling under the same subheading in the same installation or on the same site, the capacities of such activities are added together.

Activities Greenhouse gases	Greenhouse gases
Energy activities	
Combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations)	Carbon dioxide
Mineral oil refineries	Carbon dioxide
Coke ovens	Carbon dioxide
Production and processing of ferrous metals	
Metal ore (including sulphide ore) roasting or sintering installations	Carbon dioxide
Installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2,5 tonnes per hour	Carbon dioxide
Mineral industry	
Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or lime in rotary kilns with a production capacity exceeding 50 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day	Carbon dioxide
Installations for the manufacture of glass including glass fibre with a melting capacity exceeding 20 tonnes per day	Carbon dioxide
Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tonnes per day, and/or with a kiln capacity exceeding 4 m^3 and with a setting density per kiln exceeding 300 kg/m^3	Carbon dioxide
Other activities	
Industrial plants for the production of	Carbon dioxide
(a) pulp from timber or other fibrous materials	Carbon dioxide
(b) paper and board with a production capacity exceeding 20 tonnes per day	Carbon dioxide

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