

**Emissions Trading, CDM, JI,  
and More – The Climate  
Strategy of the EU**

Gernot Klepper and Sonja Peterson

NOTA DI LAVORO 55.2005

**APRIL 2005**

CCMP – Climate Change Modelling and Policy

Gernot Klepper and Sonja Peterson, *Kiel Institute for World Economics*

This paper can be downloaded without charge at:

The Fondazione Eni Enrico Mattei Note di Lavoro Series Index:  
<http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm>

Social Science Research Network Electronic Paper Collection:  
<http://ssrn.com/abstract=703881>

# **Emissions Trading, CDM, JI, and More – The Climate Strategy of the EU**

## **Summary**

The objective of this paper is to assess the likely allocation effects of the current climate protection strategy as it is laid out in the National Allocation Plans (NAPs) for the European Emissions Trading Scheme (ETS). The multi-regional, multi-sectoral CGE-model DART is used to simulate the effects of the current policies in the year 2012 when the Kyoto targets need to be met. Different scenarios are simulated in order to highlight the effects of the grandfathering of permits to energy-intensive installations, the use of the project-based mechanisms (CDM and JI), and the restriction imposed by the complementarity criterion.

**Keywords:** Kyoto targets, EU, EU emissions trading scheme, National allocation plans, CDM and JI, Computable general equilibrium model, DART

**JEL Classification:** D58, F18, Q48, Q54

*Address for correspondence:*

Gernot Klepper  
Kiel Institute for World Economics  
Duesternbrooker Weg 120  
24100, Kiel  
Germany  
Phone: +49 431 8814 485  
Fax: +49 0 431 8814 522  
E-mail: gklepper@ifw-kiel.de

## **Contents:**

<b>1. Introduction</b>	<b>3</b>
<b>2. Reaching the European Kyoto Targets</b>	<b>5</b>
<b>2.1 Distance to the European Kyoto Targets</b>	<b>5</b>
<b>2.2 The European Climate Strategies</b>	<b>6</b>
<b>2.3 The Role of the European Emissions Trading Scheme</b>	<b>8</b>
<b>2.4 Some Background on CDM and JI</b>	<b>9</b>
<b>2.5 The Role of Hot-Air</b>	<b>13</b>
<b>3. Simulating the ETS and the Role of CDM and JI</b>	<b>14</b>
<b>3.1 The DART Model</b>	<b>14</b>
<b>3.2 Policy Scenarios for the ETS</b>	<b>16</b>
<b>4. Simulation Results</b>	<b>17</b>
<b>4.1 Implications of the BAU Scenario</b>	<b>17</b>
<b>4.2 The ETS without CDM and JI</b>	<b>18</b>
<b>4.3 The Current Climate Strategy of the EU</b>	<b>23</b>
<b>4.4 Making Optimal Use of CDM and JI</b>	<b>29</b>
<b>4.5 Sensitivity Analysis with Respect to Transaction Costs of CDM and JI</b>	<b>34</b>
<b>5. Summary and Conclusions</b>	<b>35</b>
<b>6. References</b>	<b>38</b>
<b>7. Appendix</b>	<b>39</b>
<b>7.1 Assumptions to Implement the Kyoto and the EU-ETS Targets</b>	<b>39</b>
<b>7.2 Scenarios that were Run with the DART Model</b>	<b>40</b>

## 1. Introduction

One of the major components of the European climate strategy aimed at reaching the European Kyoto targets is the European Emissions Trading Scheme (ETS) for CO<sub>2</sub>. The ETS that started in January 2005, covers facilities in energy activities, the production, and processing of ferrous and non-ferrous metals, the mineral industry and the pulp, paper and board production, which are responsible for around 45% of European CO<sub>2</sub>-emissions. Besides trading emission allowances within the trading scheme, a linking between the ETS and the two flexible project mechanisms “Clean Development Mechanism” (CDM) and “Joint Implementation” (JI) has been established. This allows European facilities covered by the ETS to carry out emission-curbing projects in other Annex I countries (JI) and non-Annex I countries (CDM) and to convert the credits earned into emission allowances under the ETS.

While the ETS guarantees that the emission targets of the ETS sectors are achieved at minimal costs, the efficiency of the overall climate strategy of the EU respectively the different European Member States depends crucially on the policies introduced outside the ETS. There are broadly three areas in which greenhouse gas emissions in the single Member States can be implemented in order to meet the Kyoto-targets:

1. Domestic CO<sub>2</sub>-emission reductions in the ETS sectors
2. Domestic reductions of CO<sub>2</sub>-emissions in the sectors not covered by the ETS and reductions of other greenhouse gases (domestic reductions outside the ETS)
3. Emission reductions abroad – mainly via CDM and JI since it is unclear whether international emissions trading in the first Kyoto commitment period from 2008-2012 will take place.

The third option can be used by firms covered by the ETS as well as by governments, which like to set less stringent domestic targets by avoiding emissions abroad.

The allocation of permits to the ETS is subject of the so-called National Allocation Plans (NAPs), which each member state has to prepare before the beginning of an ETS trading period. For the first trading period from 2005-2007, the final NAPs or at least drafts are now made public for all of the EU25 countries. In addition, the NAPs as well as some government programs contain information on the planned government purchase of CDM and JI credits. Some NAPs also indicate the targets for the ETS sectors until 2012. Given this information it is possible to determine how the different EU member states plan to achieve their Kyoto targets in terms of domestic reductions in and outside the ETS and reductions abroad.

While existing simulation studies are based on hypothetical allowance allocation to the ETS and also ignore the possibility of using CDM and JI credits within the ETS and by European governments, the objective of this paper is to examine the implications of the current NAPs under different assumptions about the use and availability of CDM and JI credits using the DART model (Klepper et al. 2003). DART is a computable general equilibrium model designed for the analysis of international climate policies and calibrated for the enlarged EU. With the help of simulations with DART, it will be possible to simulate the ETS, the CDM and JI market and the domestic action under different assumptions about the functioning of these three markets. Since the Kyoto targets are not binding for the former accession countries, except Slovenia, due to the economic recession in the 1990ies, the focus will be on the EU15.

This paper proceeds as follows. In section 2, we derive the current climate strategy towards the Kyoto targets of the different EU Member States and give some background information on the role of the ETS and the market potential of CDM and JI. Section 3 and 4 present the DART model, our simulation studies and interprets the simulation results. Section 5 concludes.

## **2. Reaching the European Kyoto Targets**

In this section, we derive from the NAPs and other sources how the former EU15-countries plan to achieve the Kyoto targets by making use of the three options described in the introduction. In addition, we summarize past findings on the implications of the ETS, give an overview over the potential market for CDM and JI credits and finally discuss the issue of hot-air. The information gathered in this section can then be used to design the policy simulations and to interpret the results.

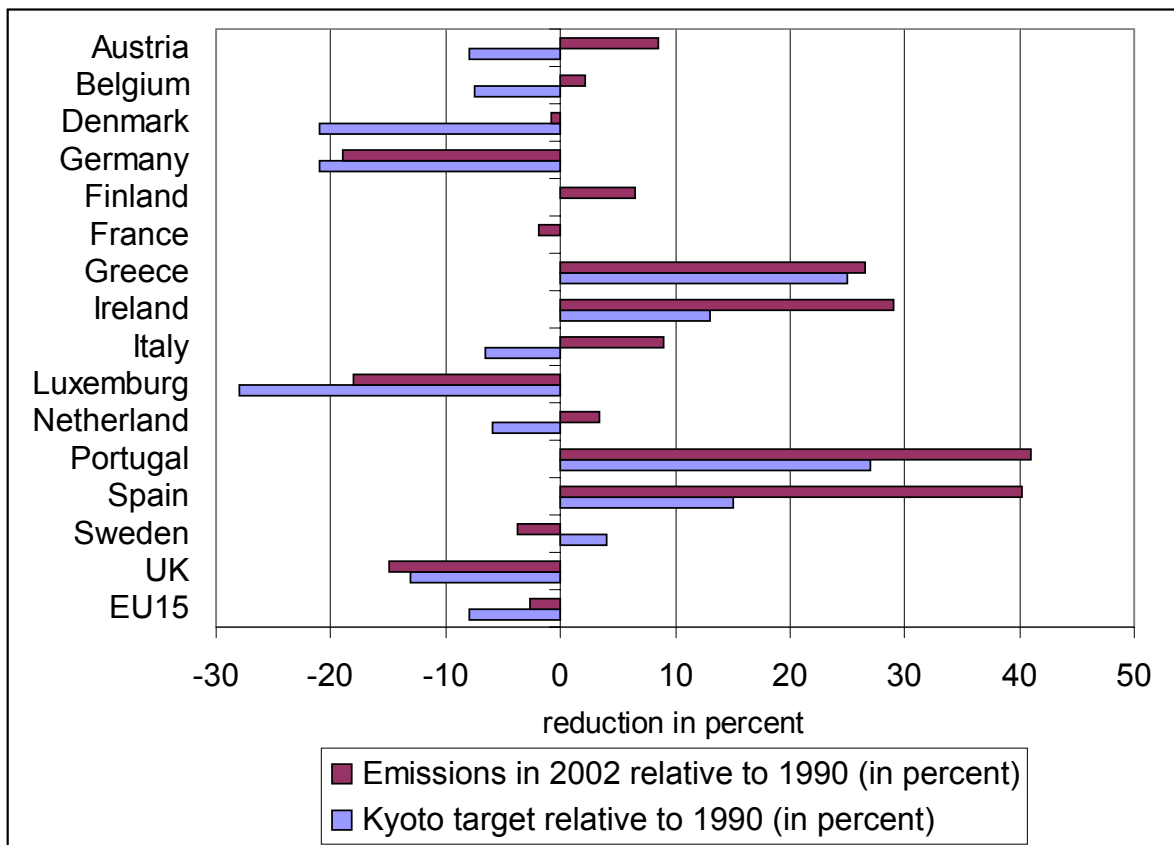
### **2.1. Distance to the European Kyoto Targets**

In the Kyoto Protocol from 1997, the EU agreed to cut their overall GHG-emissions relative to the 1990 level by 8% in the period from 2008-2012. In 1998, this target was differentiated between the different member states in the so-called Burden Sharing Agreement giving cohesion member states, such as Spain, Portugal, Ireland and Greece, a lighter burden, compared to richer member states. The (former) accession countries that joined the EU in May 2004 and those that are scheduled to join in 2007 are not part of the Burden Sharing Agreement but have their own individual Kyoto targets.

Since then, greenhouse gas emissions have risen in most of the EU15-countries, and only few of the countries are on track to fulfill their commitments. Figure 1 shows the Kyoto targets for the EU15-countries as well as the change in GHG-emission from 1990 to 2002. As one can see, the gaps to the Kyoto targets are quite substantial in most countries. Only in Sweden, Great Britain and France, the 2002 GHG-emissions are below the Kyoto target and in Germany only minor reductions are missing.

With the exception of Slovenia, all of the (former) accession countries, where emission fell drastically since 1990 due to the economic break down of their economies, do not face any problems to reach their Kyoto targets. For these countries, the question is thus not how much to reduce in which sectors, but rather, how much of the excess emission rights (hot-air) to use.

Figure 1: Gaps to Kyoto Targets



## 2.2. The European Climate Strategies

The national climate strategies of the EU member states are summarized in the different National Allocation Plans (NAP). The NAPs contain information in different detail and with differing time horizons. Table A1 in the Appendix summarizes the information contained in the NAPs concerning the allocation to the ETS sectors, the emissions of these sectors and the use of CDM and JI<sup>1</sup>. With the help of official data on GHG-emissions, it is possible to derive or estimate for all EU15-countries the emissions of the ETS and non-ETS sectors in 2002, the planned allocation to the ETS in 2007, the planned use of CDM and JI and the remaining reductions that have to be achieved to reach the Kyoto targets. Germany, Denmark, The Netherlands and the UK have also indicated the allocation to the ETS in 2012. Germany, the UK, and the Netherlands plan to reduce the ETS-emissions by 1.5 to 2.5%. Denmark is a special

<sup>1</sup> The numbers on CDM and JI are taken from Lückge and Peterson (2004).

case since emissions in the ETS sectors can grow by about 10% between 2002 and 2007 and then they need to be reduced by 26% between 2008 and 2012.

Figure 2 shows for each of the EU15 states in megatons of CO<sub>2</sub> those reductions relative to 2002 emissions that are necessary to reach the Kyoto target. The dark part of the bars shows the reduction (or increase) of the CO<sub>2</sub>-emissions of the ETS sectors associated with the allowance allocation of the NAPs. Where available, these data are for the period 2008-12. In most cases, though, information is only available for 2005-07. The striped bars show the planned reductions via CDM and JI. These reductions will only be relevant for the first Kyoto commitment period from 2008-12. Given the Kyoto targets, the light bars show the necessary reductions in the sectors and gases not covered by the ETS. This residual can be influenced, of course, if the allocation of allowances in the second commitment period or the CDM and JI credits are adjusted accordingly.

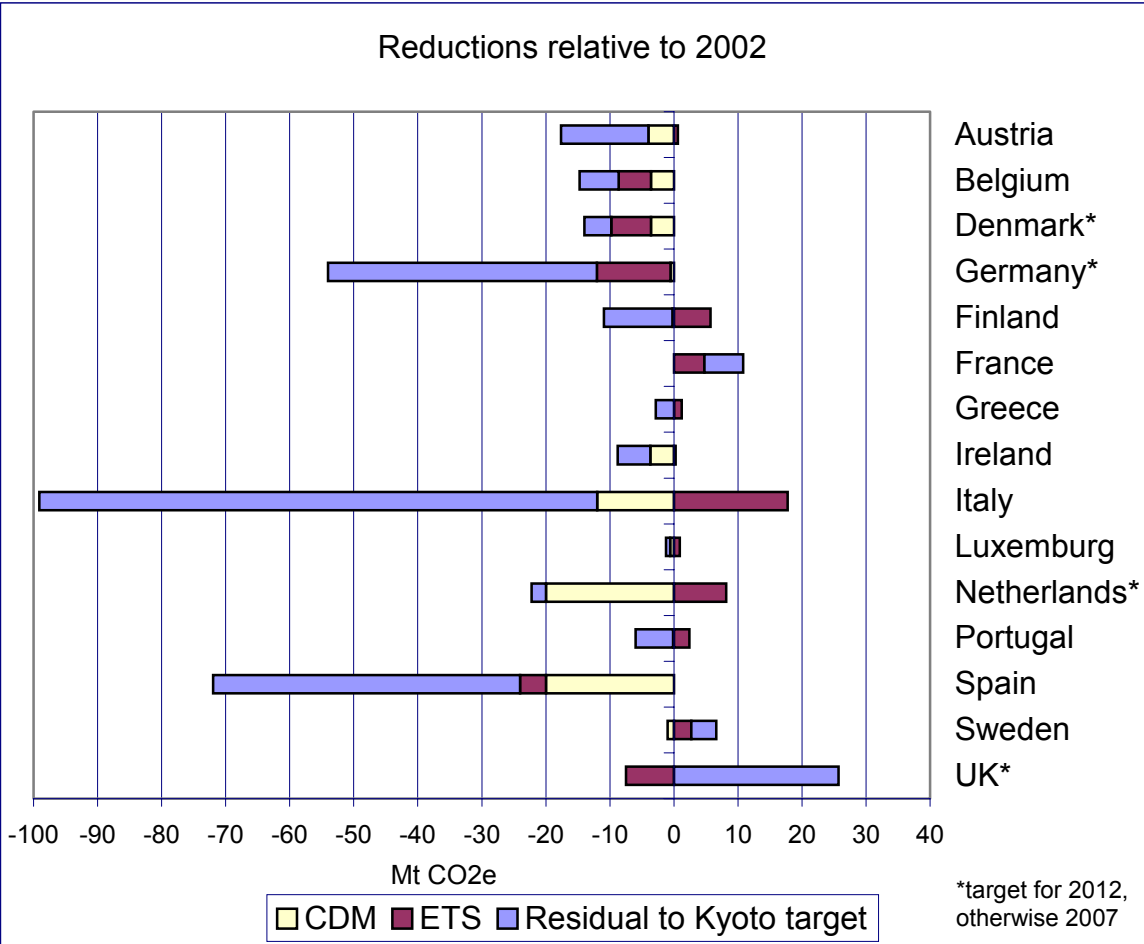
In line with Figure 1, Figure 2 shows that only France, the UK and Sweden already meet their Kyoto target in 2002. Nevertheless, the UK plans to reduce emissions in the ETS, which leaves room for rising emissions in the non-ETS sectors.

Even though most countries have to reduce emissions considerably for meeting their Kyoto targets, Portugal, Finland, Denmark, Austria, the Netherlands and especially Italy allocate allowances to ETS sectors that surpass emissions in 2002. In the remaining countries, emission reductions in the ETS sector also play a minor role given the overall Kyoto target. Only Belgium plans to achieve a major part (about one third) of the reductions necessary for the Kyoto target within the ETS. CDM and JI are also of relatively little importance in most countries. In absolute numbers, the Netherlands and Spain plan to make use of these mechanisms most strongly. Each country plans to acquire credits for around 20 MtCO<sub>2</sub>e per year in 2008 to 2012. CDM and JI are also part of the climate strategy in Belgium, Denmark, Ireland and Italy. Given



these reduction plans, the major burden for domestic reductions falls on the sectors outside the ETS in almost all countries. Only in the UK, Sweden and France, which are on track to fulfill their commitments, emissions outside the ETS, are allowed to rise.

Figure 2: Climate Strategies in the EU15 According to the NAPs



**2.3. The Role of the European Emissions Trading Scheme**

The European Emissions Trading Scheme (ETS) is intended to contribute to meeting the European Kyoto commitments in an economically efficient way. There is now some evidence that the ETS can indeed generate considerable cost savings.

Klepper and Peterson (2004) show that the gains of the ETS compared to unilateral efficient action of all EU countries depend on how much CO<sub>2</sub> is re-

duced within the ETS compared to GHG reductions outside the ETS – that is in sectors and gases not covered by the ETS. Optimally designed, the ETS can reduce the welfare losses associated with the Kyoto Protocol by around 20%. The resulting permit price is in this case around 11€/tCO<sub>2</sub>. Svendsen and Vesterdal (2003) estimate that the ETS could reduce the total abatement costs by 32% compared to a system with no trading between member states.

Estimates about permit prices in the ETS without accounting for the potential use of CDM and JI credits usually vary between 5 and 20€/tCO<sub>2</sub>. The so-called linking directive allows to convert CDM and JI credits into emission allowances under the ETS. Even though the first proposal of the directive envisaged to limit the use of CDM and JI credits to 6% of the total quantity of allowances allocated to the ETS, there are no limitations set in the final version. Governments though are required to consider the issue of complementarity (see section 2.4) in their twice-yearly reports and can set a limit for CDM and JI credits for each single installation.

In January 2005 the trading price for allowances in the ETS was around 8.5€/tCO<sub>2</sub>. On the other hand, there are estimates for the shadow taxes needed to achieve the necessary reductions outside the ETS, ignoring international emission trading or CDM and JI. In Klepper and Peterson (2004) these taxes are on average 22€/tCO<sub>2</sub> but can reach almost 40€/tCO<sub>2</sub> under a more generous allocation of allowances to the ETS sector.

Existing studies have the shortcoming that they only analyze potential allowance allocation since the NAPs were not known when the studies were undertaken. More importantly, the studies ignore the possibility of using CDM and JI credits – by ETS firms and national governments.

#### **2.4. Some Background on CDM and JI**

The project-based mechanisms Clean Development Mechanism (CDM) and Joint Implementation (JI) have been designed to help countries to accomplish their Kyoto targets in an economically efficient and environmentally effective

way. JI allows Annex I Parties of the Kyoto Protocol to implement projects that reduce emissions in the territories of other Annex I parties and use the generated carbon credits to fulfill their Kyoto commitments. CDM gives the possibility for emission reductions in developing (non-Annex I) countries which themselves have no reduction target.

In the EU, it is possible to make use of CDM and JI on both the private and on the governmental level. Governments can use CDM and JI credits to comply with their national Kyoto reduction target. The Linking-Directive allows private entities that are covered by the EU ETS to convert credits from CDM and JI into allowances that can be used in the EU ETS.

In the last years, the global market for carbon credits from project-based mechanisms has been steadily growing. The latest CDM & JI Monitor (2005) reports that 1306 proposed CDM and JI projects have so far been registered in Point Carbon's project Database. Out of these, 271 Projects, potentially yielding 420 MtCO<sub>2</sub>e of emission reductions towards 2012, have reached the level of a Project Design Document (PDD). The latest World Bank report on the carbon market (Lecocq 2004) shows that since 1996 sales have doubled from around 40 MtCO<sub>2</sub>e to around 80 MtCO<sub>2</sub>e in 2003. In 2004, 64 MtCO<sub>2</sub>e have been exchanged through projects from January to May 2004 only, suggesting that the market has doubled again by the end of the year 2004.

A study for the World Bank (Haites and Seres 2004) summarizes information on the demand and supply of CDM and JI credits. Mainly based on modeling studies, the average annual demand from 2008 to 2012 for Kyoto units, excluding Australia and the US, is estimated to lie in the range of 600 to 1150 MtCO<sub>2</sub>e. This includes AAU<sup>2</sup> transfers as well as credits from CDM & JI.

---

<sup>2</sup> AAUs are the „Assigned Amount Units“ under the Kyoto Protocol – the amount of CO<sub>2</sub> each Annex B country is allowed to emit in the first commitment period. The credits for CDM projects are denoted „Certified Emission Reductions“ (CERs) while the credits originating from JI projects are denoted „Emission Reduction Units“ (ERUs).

According to Natsource (2003)<sup>3</sup> the total demand for CDM and JI credits from industry will be 200 +/-100 MtCO<sub>2</sub>e and the demand from the European ETS 110 +/- 65 MtCO<sub>2</sub>e. Governments are estimated to buy 84 to 762 MtCO<sub>2</sub>e p.a. from which the EU25 will demand 54 to 463 MtCO<sub>2</sub>e. Announced plans for government purchases amount to 70 MtCO<sub>2</sub>e p.a. in the EU25 (Lückge and Peterson 2004), 50 MtCO<sub>2</sub>e (including AAUs) in Canada, 95 MtCO<sub>2</sub>e in Japan and 5 to 18 MtCO<sub>2</sub>e in the EFTA countries.

Haites and Seres (2004) also review studies on the supply of CDM and JI credits. Some studies use simulation models, which result in very flat marginal abatement cost curves and thus in a large supply of CDM and JI credits at low prices. Other curves are differentiated between project type and region and derived from the technical potentials. Haites and Seres conclude that the most conservative estimates yield annual reductions in 2010 in the range of 215 to 405 MtCO<sub>2</sub>e at a price of 11 \$/tCO<sub>2</sub>e +/- 50%. Accounting for pre 2008 reductions that can be used for the 2008-12 period, Haites and Seres see the most likely annual supply at 420 MtCO<sub>2</sub>e (range 270 to 505 MtCO<sub>2</sub>e) at a price of 11 \$/tCO<sub>2</sub>e +/- 50%.

Taking the trade volumes from the World Bank (Lecocq 2004) and assuming that the market trend continues and that it needs four years to bring a project on the market (see Haites and Seres 2004), there is a potential of around 220 MtCO<sub>2</sub> per year. Since September 2004 the CDM & JI Monitor from Point Carbon also reports on a bi-weekly basis the proposed CDM and JI projects registered in the Point Carbons database, the number of projects that have reached the level of a project design document (PDD) and the resulting emission reductions. Assuming that all PDD projects are actually validated so far 84 MtCO<sub>2</sub>e p.a. are available for 2008-2012. How many credits for 2008-2012 will be available in the end depends very much on the kind of market trend that is assumed. Under a linear trend, around 300 to 400 MtCO<sub>2</sub> p.a. will be available while under an exponential trend it may well be twice as much. Two

---

<sup>3</sup> This study is reported in Haites and Seres (2004) but not available for the authors of this paper.

simple calculations also show the range of possible supply. Assuming that as in the past four month, every month around 6.5 MtCO<sub>2</sub> are validated and that it takes again four years until a project is running, there is a potential supply of around 290 MtCO<sub>2</sub> p.a. Assuming that all proposed projects will be validated and continue to gain an average of 1.5 MtCO<sub>2</sub> and that continuously 50 projects are proposed and validated every month, there is a potential supply of 700 MtCO<sub>2</sub>. In summary, evidence suggests that the minimum supply of CDM and JI credits is around 200 MtCO<sub>2</sub> p.a. and that it seems unlikely that it will be far above 600 MtCO<sub>2</sub> p.a.

When making assumptions about the supply of CDM and JI credits, it has to be taken into account that institutional issues constitute significant barriers to a more widespread use. Currently institutional capacities are unevenly distributed among potential CDM host countries, and this is likely to remain so. While there is significant capacity in many Asian and South American countries, many African countries still lack behind (Ellis et al. 2004).

Concerning the prices for credits, the World Bank and the OECD see prices in the range of 2.5 to 6 €/tCO<sub>2</sub>e (Lecocq 2004, Ellis et al. 2004). Some EU tenders contracted CDM and JI credits for 2.5 to 8.5 €/tCO<sub>2</sub>e (Lückge and Peterson 2004). The CDM and JI Monitor of Point Carbon reports 5 to 15 €/tCO<sub>2</sub>e.

One problem for deriving prices, e.g. from a simulation model, is the existence of transaction costs for CDM and JI projects. In a survey Michaelowa et al. (2003) report transaction cost ranging from a few €-cent per tCO<sub>2</sub>e up to more than 1000 €/tCO<sub>2</sub>e depending on the project size and type. There is evidence that transaction costs should not be more than 25% of proceeds from permit sales in order to make a project viable. At current prices this would give a cost threshold of about 1 €/tCO<sub>2</sub>e.

Another important issue that influences the demand for CDM and JI credits is the so-called complementarity requirement. As laid out in the Marrakech Accords to the Kyoto Protocol “the use of the mechanisms [International Emis-

sions Trading, CDM, JI] shall be supplemental to domestic action and that domestic action shall thus constitute a significant effort made by each Party included in Annex I to meet its quantified emission limitation and reduction commitments under Article 3, Paragraph 1.” It was in fact the EU that insisted on the inclusion of this requirement and also unsuccessfully pressed for a limit requiring that not more than roughly 50% of the reduction should be imported (see Langrock and Sterk 2004 for the discussion on the complementarity issue). In principle, the complementarity requirement holds for each of the EU25 member states as well as for the former EU15. Table A1 in the appendix includes the calculations of the EU for the maximum amount of credits that are allowed under the above mentioned complementarity criterion.

## **2.5. The Role of Hot-Air**

So far, the possibility of obtaining carbon credits from CDM and JI projects has been introduced. In addition, the Kyoto-Protocol allows the transfer of AAUs between Annex B countries. As far as trade in AAUs between countries with a binding cap is concerned, this option is of minor importance since the project credits are perfect substitutes and can in many cases be obtained at lower prices. This is not the case for countries, which do have a cap that is above their expected business-as-usual emissions in 2012. These excess emission rights are called hot-air. The countries with hot-air are mainly the countries of the Former Soviet Union and to a smaller degree the Eastern European countries. In an extreme scenario where these countries sell all their hot-air, most models, including DART (Klepper and Peterson 2003) predict that the excess supply of allowances is so large that the carbon price falls to zero and the Kyoto targets can be reached at zero cost, however without an emission reduction. Such a scenario is not very likely though. Different studies have estimated that it is optimal for the hot-air countries to restrict their sales of hot-air to around 40% (Haites and Seres 2004, Klepper and Peterson 2003). If some of the hot-air is supplied on the market, the use of CDM and JI credits will be reduced and international carbon prices will fall.

The role of this Kyoto-trading for the ETS is rather limited since the AAUs cannot be used by installations inside the ETS. In addition, the governments of the member states have committed themselves to a strict definition of supplementarity and have opposed the use of hot-air for achieving the Kyoto-targets. Hot-air is therefore not considered in this paper.

### **3. Simulating the ETS and the Role of CDM and JI**

To assess the effects of the current NAPs and the potential role of CDM and JI credit for the European Union, we use the DART-model (Klepper et al. 2003). Below, we first shortly characterize the model and then derive the policy scenarios for the simulation study.

#### **3.1. The DART Model**

The DART (Dynamic Applied Regional Trade) Model is a multi-region, multi-sector recursive dynamic CGE-model of the world economy. For the simulation of the European ETS, it is calibrated to an aggregation of 26 regions. Table 1 lists the 17 countries or group of countries of the EU including the accession countries of Eastern Europe and nine other world regions that represent the rest of the world.

In each region or country, the economy is disaggregated into 12 sectors (Table 2). Four of these sectors participate in the ETS. Although there is no perfect match between the installations subject to the ETS and the sectoral structure of DART, the deviations are relatively small.

The economy in each region is modeled as a competitive economy with flexible prices and market clearing. There exist three types of agents: a representative consumer, a representative producer in each sector, and regional governments. All regions are connected through bilateral trade flows. The DART-model has a recursive-dynamic structure solving for a sequence of static one-period equilibria. The major exogenous drivers are the rate of productivity growth, the savings rate, the rate of change of the population, and the change in human capital.

Table 1: Regions in DART

<b>European Union</b>			
AUT	Austria	IRE	Ireland
BEN	Belgium, Luxembourg	ITA	Italy
DEU	Germany	NED	Netherlands
DNK	Denmark	PRT	Portugal
ESP	Spain	SWE	Sweden
FIN	Finland	UK	United Kingdom
FRA	France	HUN	Hungary
GRC	Greece	POL	Poland
XCE*	Bulgaria, Czech Republic, Rumania, Slovakia, Slovenia		
<b>Other Annex B Countries</b>		<b>Non-Annex B Countries</b>	
USA	United States of America	MEA	Middle East, North Africa
AUS	Australia	LAM	Latin America
FSU*	Former Soviet Union	CPA	China, Hong-Kong
OAB	Rest Annex B (Canada, Iceland, Japan, New Zealand, Norway, Switzerland)	IND	India
<p>XCE includes Bulgaria and Romania for which the accession in 2007 is planned. It excludes the Baltic Countries, which are aggregated in region FSU, as well as Malta and Cyprus, which are aggregated in region ROW. This is due to the regional disaggregation of the GTAP5 data set. This inconsistency has only a small effect since it distorts CO<sub>2</sub>-emissions of ACC by less than 5%.</p>			

Table 2: Sector Structure of the Economies

<b>ETS-sectors</b>		<b>Other sectors</b>	
OIL	Refined Oil Products	COL	Coal Extraction
EGW	Electricity	GAS	Natural Gas Production & Distribution
IMS	Iron, Metal, Steel	CRU	Crude Oil
PPP	Pulp & Paper Products	CEP	Chemical Products
		AGR	Agricultural Products
		TRN	Transport Industries
		MOB	Transportation Services
		OTH	Other Manufactures & Services



The model is calibrated to the GTAP5 database that represents production and trade data for 1997. The elasticities of substitution for the energy goods coal, gas, and crude oil are calibrated in such a way as to reproduce the emission projections of the EIA (EIA 2002). For a more detailed description of the DART model, see Springer (2002) or Klepper et al. (2003).

### **3.2. Policy Scenarios for the ETS**

For assessing the likely impact of the recently introduced emissions trading scheme and project-based mechanisms, a “business-as-usual” (BAU) reference scenario is determined. This BAU scenario includes the climate policy measures introduced until the year 2002. Hence, it includes the impact of policies such as the German eco-tax or the national emissions trading schemes. From 2003 on, BAU keeps these policies in place but does not include any new climate policies. The implications of the BAU scenario for the NAP targets are discussed in section 4.1.

The BAU scenario is then compared to several policy scenarios with which an assessment of the mix of current policies can be made. The first scenario consists of simulating the impact of the NAPs and the European ETS without the use of CDM and JI projects. The targets in the non-ETS sectors are reached by a uniform, but regionally differentiated CO<sub>2</sub>-tax. This scenario is called NoCDM. It helps to illustrate how the burden of the Kyoto targets is distributed between the ETS and the non-ETS in the different national NAPs. It also serves as a reference for the impact of the project based mechanisms. The results of scenario NoCDM are discussed in section 4.2.

The second scenario is designed to capture the national climate policies with respect to CO<sub>2</sub> on the basis of both the ETS and the project-based mechanisms. It is denoted LimCDM and incorporates all the national policy plans made public so far. Thus, there is no restriction for the use of CDM and JI in the ETS, while the national governments only import limited amounts of CDM and JI credits. We furthermore assume that all CDM and JI credits are associ-

ated with transaction cost of 3 €/tCO<sub>2</sub>, which is above the estimated long run transaction costs of around 1€/tCO<sub>2</sub> but far below the transaction cost in some of the smaller projects. Further assumptions, e.g. concerning the CDM and JI demand from the remaining Annex B countries, are described in the Appendix. Scenario LimCDM illustrates the contribution of the project-based mechanism to the Kyoto targets given the ETS within the EU. The results are discussed in section 4.3.

The third scenario derives the optimal solution by letting the ETS work without restrictions and by allowing all sectors the use of CDM and JI to the degree they wish. This scenario OPT differs from LimCDM in that the national restrictions on the use of project based emission credits are withdrawn. It is discussed in section 4.4. Finally, the last scenario is SUP where the optimal emission reductions and CDM/JI purchases for the non-ETS and ETS sectors are restricted by the complementarity requirements in each region.

All scenarios are explained in detail in the Appendix.

## **4. Simulation Results**

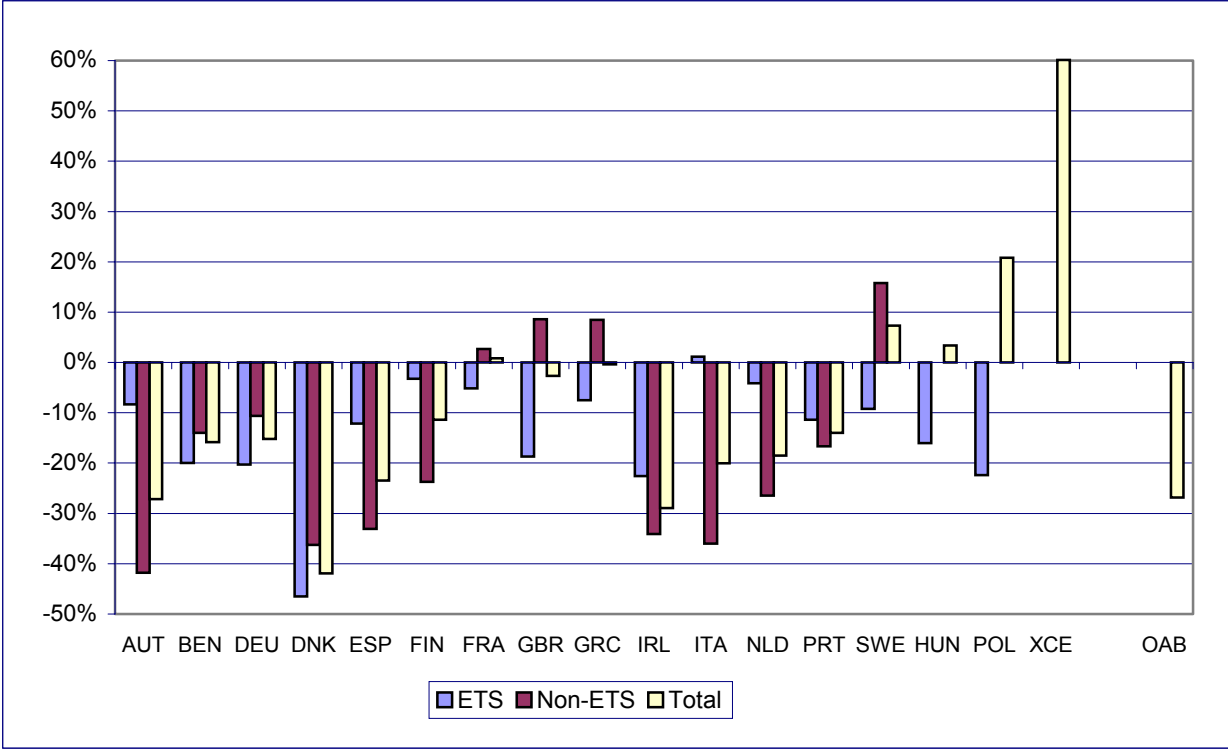
The simulation results of the different scenarios are derived from running the DART-model over the entire period from 1997 to 2012 when the Kyoto targets will be binding. Therefore, only the final results for 2012 are reported in the subsequent figures and tables. All prices are denoted in EUROS of the year 2000.

### **4.1. Implications of the BAU Scenario**

Whereas in Figure 2 above the necessary reductions of CO<sub>2</sub>-emissions relative to the emissions in 2002 are indicated, the reduction requirements should actually be determined by computing the difference between the BAU-emissions in 2012 and the emission caps of that year as given by the Burden Sharing Agreement of the EU. Figure 3 illustrates the results. For each country/region the necessary reduction relative to BAU are decomposed into those

within the ETS and those outside the ETS. In addition, the overall reduction requirements are presented.

Figure 3: CO<sub>2</sub>-Reduction Necessary to Meet the Kyoto Targets Relative to BAU in 2012



Since the emissions of the ETS sectors grow faster than the emissions of the non-ETS sectors in the BAU scenario, the targets from the NAPs imply that considerable reduction efforts in the ETS sectors are needed in order to meet the targets in 2012. Nevertheless, the reduction requirements in the non-ETS sectors are in most cases larger than in the ETS. It is therefore likely that the NAPs do not minimize the costs of meeting the Kyoto targets. This is analyzed in the following sections.

**4.2. The ETS without CDM and JI**

The first scenario looks at the outcome of the climate policy measures laid out in the National Allocation Plans (NAP) but leaves the project-based mechanism outside the system. This NoCDM scenario has emissions trading

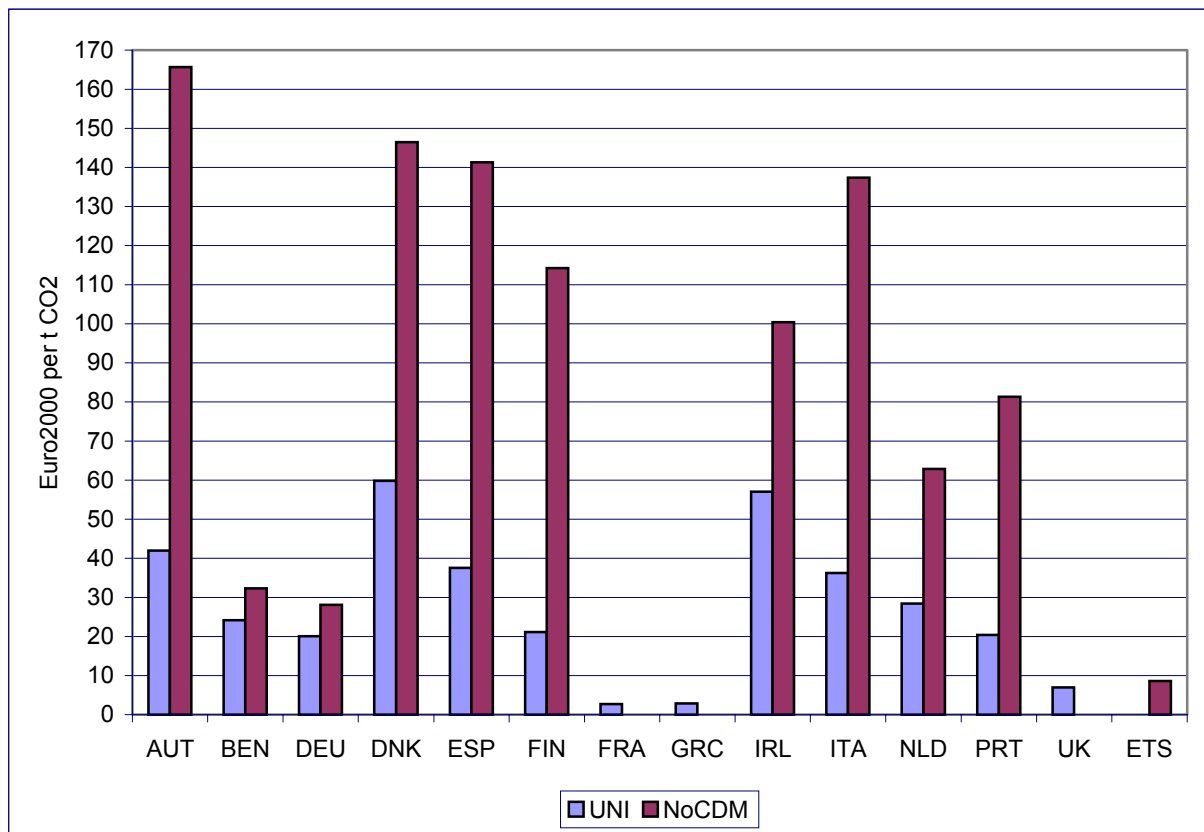
within the ETS according to the caps as they are defined in the NAPs. It is assumed that each government imposes an emission tax on all emissions outside the ETS at a level that makes sure that the Kyoto target is met.

Whereas the ETS equalizes marginal abatement costs across countries in the energy intensive sectors, the distortions between the ETS-sectors and the rest of the economy within each country remain untouched. The degree of that distortion, of course, depends on the amount of allowances allocated to the ETS relative to the Kyoto target. This is illustrated in Figure 4 where the permit price in the ETS is compared to the tax that needs to be imposed outside the ETS for meeting the Kyoto target. In order to illustrate the distortions imposed by the generous allocation of allowances to the ETS, Figure 4 also shows the tax that would emerge without the ETS. In this case, the international efficiency gains from the ETS cannot be realized but the intersectoral marginal abatement costs in each economy are equalized. The light gray bars denoted UNI indicate the marginal abatement costs if each country were to meet its Kyoto target unilaterally.

It turns out that in the unilateral scenario the implicit taxes vary between 5 €/t CO<sub>2</sub> in France and Greece and around 60 €/tCO<sub>2</sub> in Denmark and Ireland. The emission weighted average tax in the EU15 is around 20 €/tCO<sub>2</sub>. This indicates both strongly varying reduction requirements in the EU15 member countries and a significant potential for welfare gains through emissions trading.

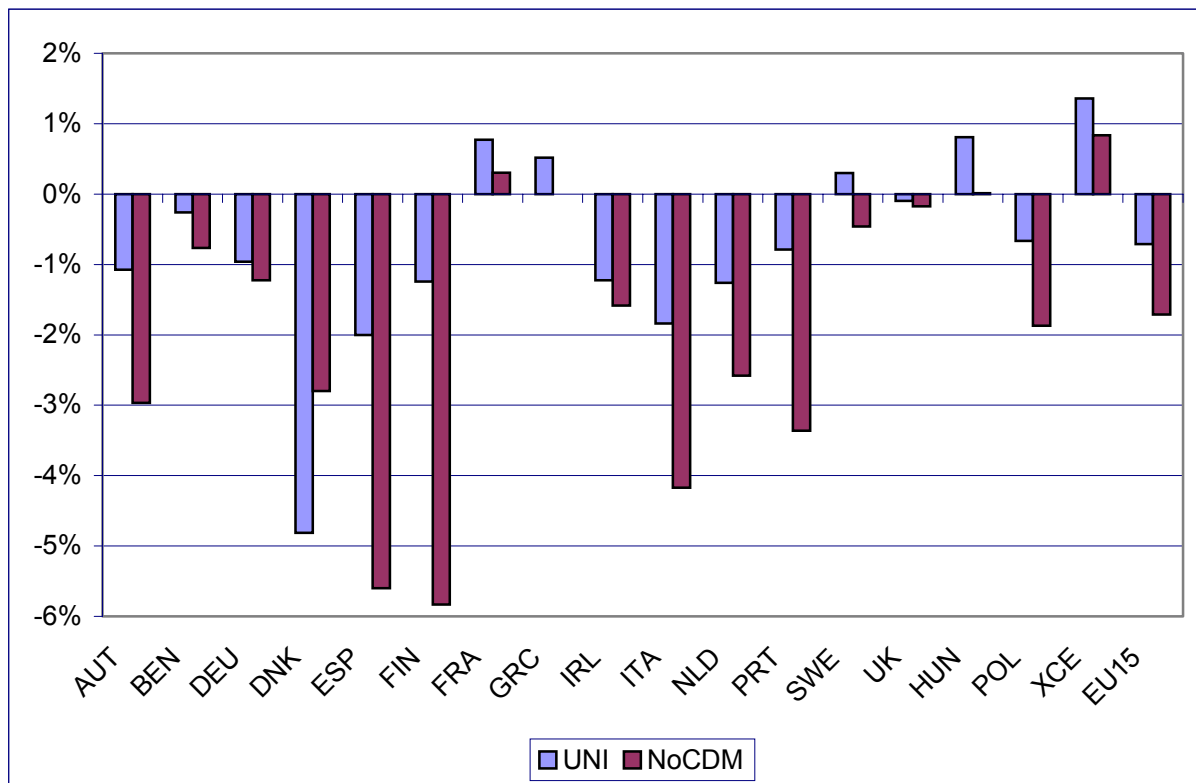
In the NoCDM scenario the ETS with the official NAP targets is simulated and results in an equilibrium allowance price of 8.6 €/tCO<sub>2</sub>. This low permit price is partly due to the efficiency gains from trading but also due to the generous allocation of allowances to the ETS. It is therefore not surprising that the implicit taxes outside the ETS rise far above the unilateral scenario UNI. In fact, the emission weighted average tax outside the ETS is 57 €/tCO<sub>2</sub>, but reaches extremely high levels in countries like Austria, Denmark, Spain, and Italy.

Figure 4: Taxes and Allowance Price with and without Emission Trading



The welfare effects of the two scenarios illustrate the trade off between efficiency gains through trading and the intersectoral distortions within each country. Whereas the emissions trading scheme provides efficiency gains, these are apparently netted out for many countries by the additional distortions imposed by the inefficient internal caps on the ETS and non-ETS-sectors. A comparison of Figure 4 with Figure 5 supports this. Countries with a large divergence between allowance price and implicit tax in the non-ETS sectors, such as Austria, Spain, and Italy experience a strong negative welfare effect through the ETS. On the opposite side, in France, Greece and the UK, the ETS-sectors are more restricted than the non-ETS sectors, leading to negligible welfare effects.

Figure 5: Welfare Effects Relative to BAU in the NoCDM and the UNI Scenario



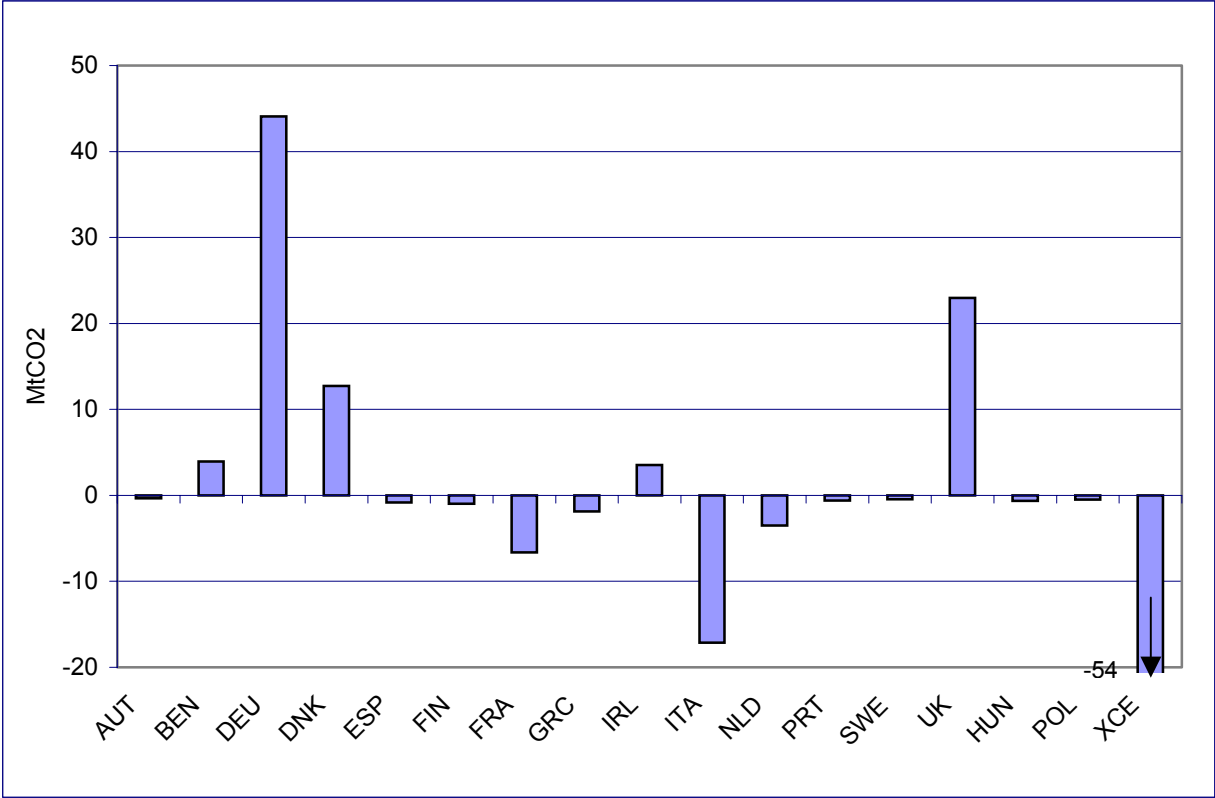
However, there is one country where the efficiency gains from the ETS outweigh the distortions from different marginal abatement costs, that is Denmark. The implicit tax in the unilateral scenario is 60 €/t CO<sub>2</sub> whereas the ETS has less than 10 €/t CO<sub>2</sub>. These gains seem to outweigh the distortions between sectors. The welfare costs in the NoCDM scenario are therefore lower than in the unilateral case (see Figure 5).

Turning to the trade with emission allowances in the ETS, the picture has changed compared to the allocation rules that were proposed by the EU Commission and that have been analyzed in Klepper and Peterson (2004)<sup>4</sup>. While under the least-cost orientated emission targets the ETS turned out to be a rather lopsided affair in the sense that the accession countries would be

<sup>4</sup> Some differences also stem from the fact that in Klepper and Peterson (2004) some EU regions were aggregated. Also, in this paper the targets account for reductions in other greenhouse gases, which was not the case in Klepper and Peterson (2004).

the only exporters of allowances, Figure 6 shows that under the current NAPs seven of the EU15-countries become exporters as well.

Figure 6: Trade in Allowances (Scenario NoCDM)



While the exports of Spain, Finland, Portugal and Sweden are negligible, France, Greece, the Netherlands and especially Italy export 5 to 17 MtCO<sub>2</sub> in 2012. This is partly the case because these countries are close to meeting their Kyoto targets (France, Greece), but partly because of the generous allocation of allowances in the NAPs of Netherlands and Italy that allow emissions in the ETS sectors to rise. It is worth mentioning that the Italian NAP has not been accepted by the EU commission and is under revision. Nevertheless, the main exporters of allowances are still the Eastern European countries.

As Figure 6 shows the trade in allowances in absolute quantities, the size of a country dominates trade flows. For example, Germany’s ETS sectors account for almost one quarter of the total European trading scheme. Hence, Germany is the largest importer with imports of around 45 MtCO<sub>2</sub> in 2012.

This picture changes when one looks at the import shares of allowances relative to total emissions. Countries with high marginal abatement costs like Denmark and Ireland rely strongly on imports. Relative to their emissions the largest importers are Denmark and Ireland where 60% and 23% of the emission of the ETS sectors are covered by imported allowances. The ETS sectors in Germany and the UK import allowances for around 11% of their emissions.

### **4.3. The Current Climate Strategy of the EU**

The previous section has illustrated how the separation of the energy intensive installations in the ETS from the other sectors can lead to significant distortions, especially if the ETS sectors become endowed with a large share of CO<sub>2</sub>-emissions allowed under the Kyoto-protocol. Some of these distortions can be alleviated through CDM and JI activities. The project-based mechanisms allow governments to relieve the pressure that is imposed on the non-ETS sectors by the generous allocation of emission allowances to the energy intensive installations. They also lower the allowance prices within the ETS since cheap CDM and JI credits can be bought from companies in the ETS as well. The amount of project credits that governments will buy is restricted by the supplementarity criterion to which all member states have subscribed. In this section the scenario LimCDM is computed. It allows installations in the ETS to buy any quantity of credits they wish while the governments buy only the amount of credits they have announced. Table A1 in the Appendix summarizes the amounts of CDM and JI credits which the different governments want to acquire.

The results of scenario LimCDM are summarized in Figure 7, which also documents as a reference the results of the scenario NoCDM without project-based mechanisms. In LimCDM the import of project credits reduces the permit prices in the ETS to 5.7 €/tCO<sub>2</sub>. At the same time, the implicit carbon prices in the sectors outside the ETS fall because the government purchases of credits reduce the emission restriction in these sectors.



Figure 7: Implicit Carbon Prices in the non-ETS Sectors

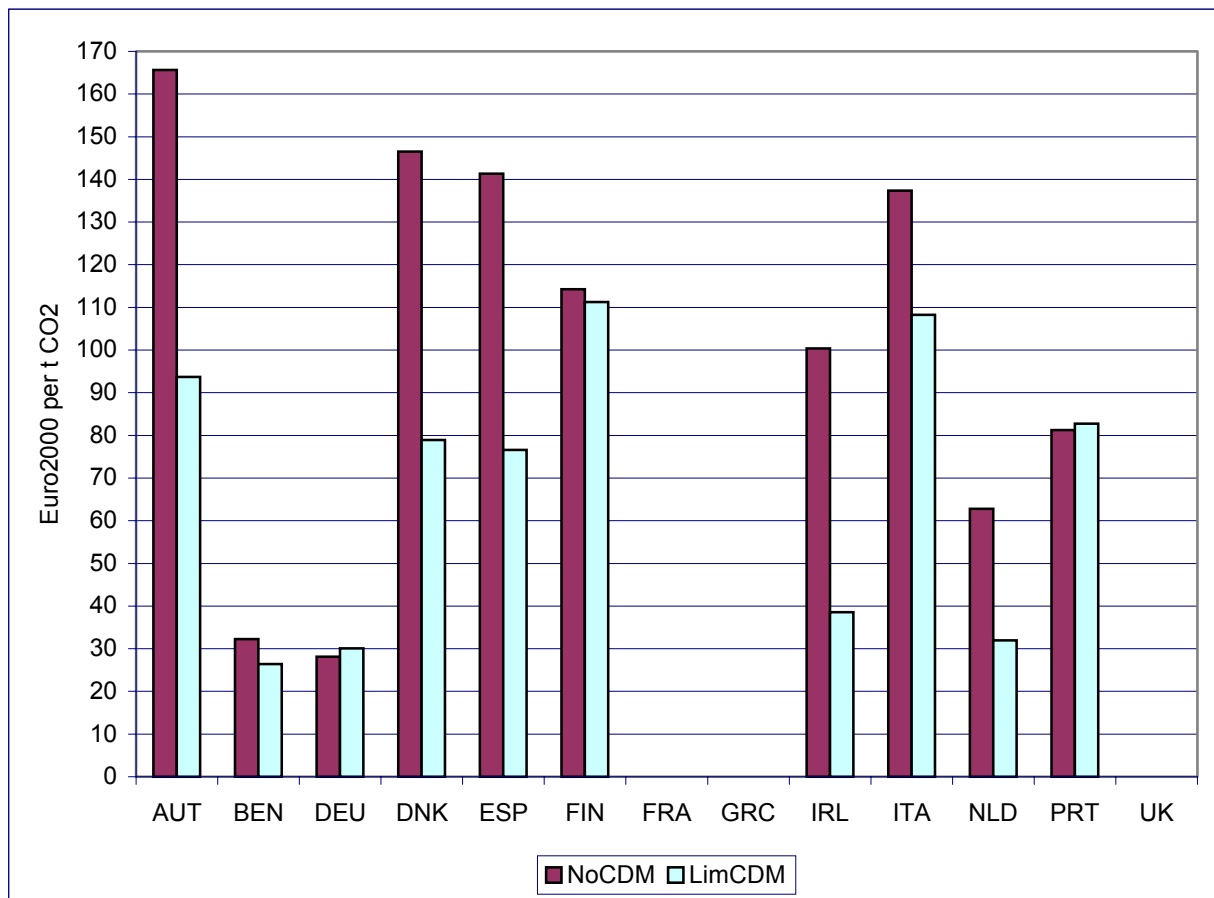


Figure 7 shows that these purchases reduce the inefficiencies imposed by the NAPs that were discussed in the last section and reduce the gap between the allowance price in the ETS and the implicit taxes in the non-ETS sectors. This is especially true for those countries that plan to make considerable use of CDM and JI credits. Austria, Denmark, Spain Ireland and the Netherlands can reduce the marginal abatement cost in the non-ETS sectors by 40 to 60% compared to the NoCDM scenario. In Italy and Belgium, the implicit taxes fall by around 20%. In Germany, Finland and Portugal, where the governments only plan minor (or even zero) purchases of CDM and JI credits, the implicit taxes are not much affected. Altogether, the limited use of the project-based mechanisms still leaves implicit taxes in the non-ETS sectors at levels between 30 and 110 €/tCO<sub>2</sub>, compared to an allowance price that has dropped to 5.7 €/tCO<sub>2</sub>. In addition, substantial differences in marginal abatement costs between countries remain in the non-ETS sectors.

Turning now to the likely welfare effects of the current climate strategies of the EU member states, in Figure 8 the welfare costs of the LimCDM scenario are compared to the situation without the ETS (i.e. scenario UNI) and with ETS but without CDM and JI projects (i.e. scenario NoCDM). Whereas a unilateral achievement of the Kyoto targets would lead to an average welfare loss of 0.7% in the EU15, this loss rises to 1.7% when the ETS is introduced. The addition of CDM and JI projects lowers it again to 0.9%. Hence, some but not all of the distortions of the ETS can be compensated. Those countries that plan to acquire the largest amounts of CDM and JI credits can decrease their negative welfare effects most strongly. This is most obvious in Spain and the Netherlands that both plan to acquire 20 MtCO<sub>2</sub> from CDM and JI projects p.a. As a result, the negative welfare effects are in these countries at least reduced to the level of unilateral efficient action.

Figure 8: Welfare Effects of the ETS with CDM /JI (relative to BAU in 2012)

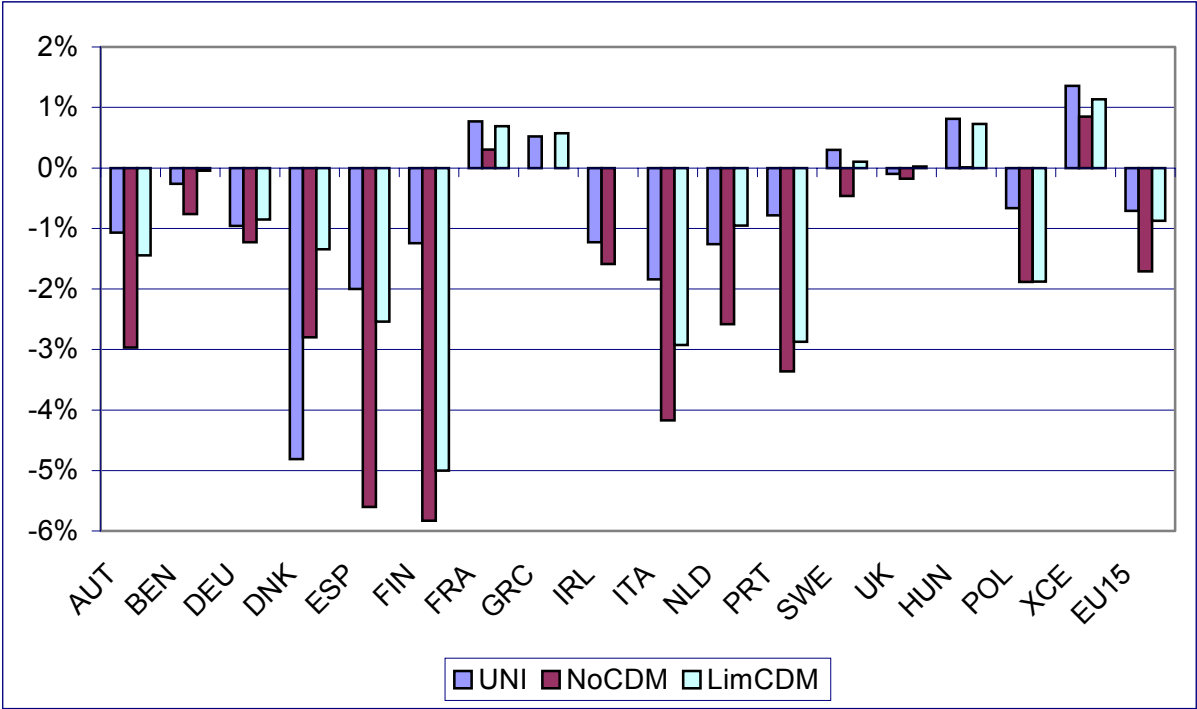
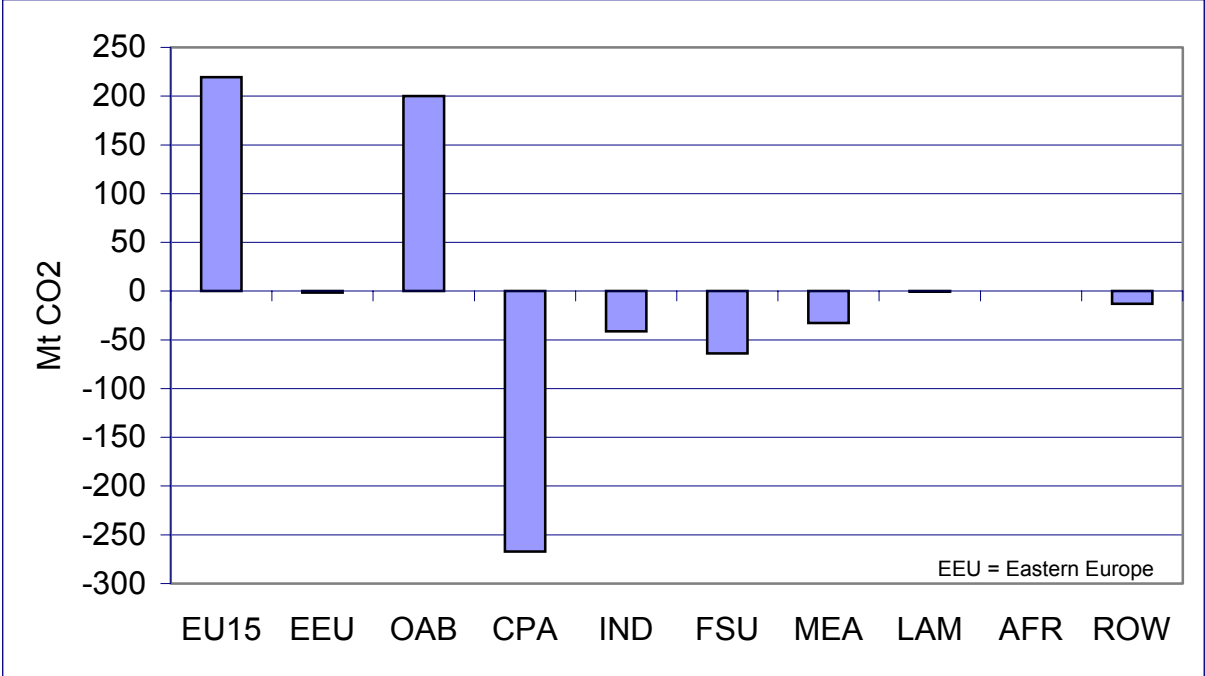


Figure 9 shows the trade flows of CDM and JI credits worldwide. For better readability, the CDM and JI purchases of the EU15 are aggregated. Altogether, the EU15-countries acquire 226 MtCO<sub>2</sub> through CDM and JI. The region OAB (other Annex B countries that ratified the Kyoto Protocol) are restricted to a maximum of purchases of another 200 MtCO<sub>2</sub>. This is a little more than 50% of the reductions relative to the BAU-emission in 2012 that are necessary to reach the Kyoto target and thus an upper estimate of the supplementarity requirement.

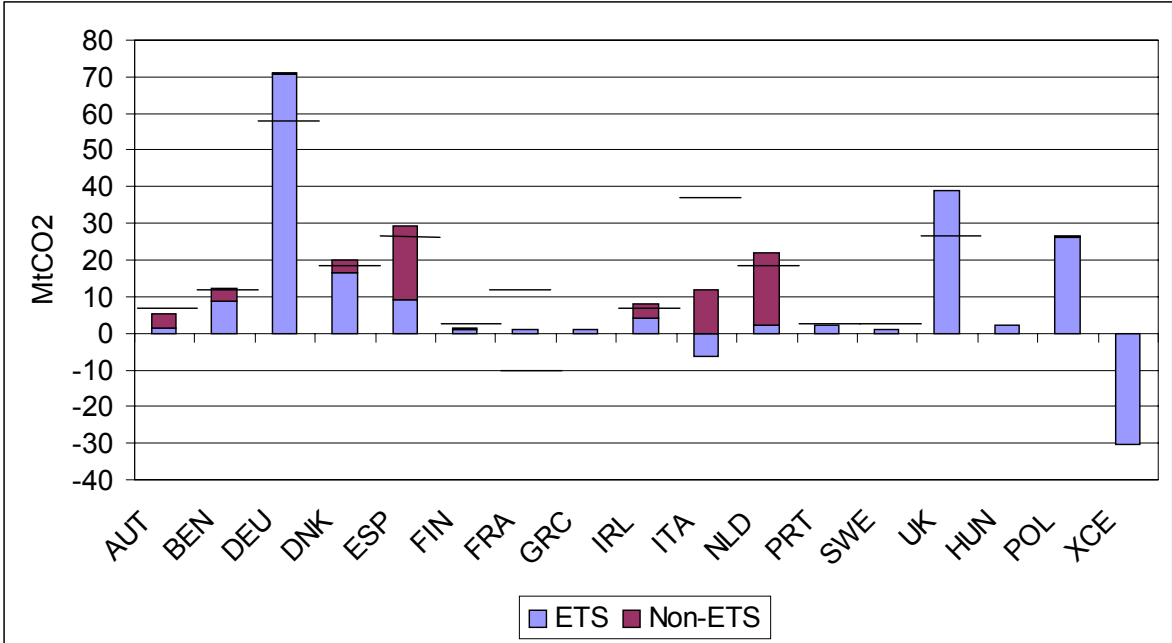
Figure 9: Sales and Purchases of CDM and JI Credits in LimCDM



Concerning the host-countries of CDM projects, about 65% of the CDM allowances are covered by emission reductions in China, followed by the FSU, India and MEA, responsible for around 8 to 15%. Altogether, the size of the CDM and JI market is within the range of estimates presented in section 2.4. However, the distribution of CDM projects across developing countries does not reflect the currently planned projects that are mainly located in Latin America, while only few projects are hosted by China and India (Lückge and Peterson 2004).

Figure 10 shows the allowance flows in the EU in more detail. Negative bars for the ETS sectors indicate that these sectors would sell allowances within the ETS. This is true only for the ETS sectors in the Rest of Eastern Europe (XCE) and Italy. Positive bars for the ETS sectors indicate that these sectors buy allowances, either within the ETS or as credits from CDM and JI projects. The sales inside the ETS are rather small (around 36 MtCO<sub>2</sub>), most of the allowances (around 150 MtCO<sub>2</sub>) originate from CDM and JI projects. The ranking of buyers remains quite the same as in the scenario NoCDM without CDM and JI, only that due to cheap CDM and JI credits some countries who have formerly been allowances sellers now become buyers.

Figure 10: JI, CDM and ETS Credit Flows in the EU in LimCDM



Negative bars for the non-ETS sectors stand for JI projects in Annex B countries. Only 0.3 MtCO<sub>2</sub> JI reductions would be undertaken in Eastern Europe. This is due to the cheap abatement opportunities in the developing countries and sensitive to the level of transaction cost associated with the project-based mechanisms. The positive non-ETS bars finally show the governmental purchases of CDM and JI credits as announced in the NAPs (altogether around 76 MtCO<sub>2</sub>).

As discussed in section 2.4, the Kyoto Protocol requires that the use of CDM and JI shall be supplemental to domestic action. The EU has voted for a strict definition of this supplementarity criterion, and continues to stress its importance. It is thus an interesting question how the CDM and JI purchases shown in Figure 10 compare to the limits set by the supplementarity requirement. For this reason, estimates of these limits (as calculated by the EU, see section 2.4) are added as horizontal lines.

Figure 10 shows that there is little need to further restrict the CDM and JI purchases in the ETS in order to stay within the limits of the supplementarity criterion in most countries. In The Netherlands, Spain, Ireland and Denmark where the government plans to acquire the largest amount of CDM and JI credits the limits are slightly exceeded. The only countries that might have to rigorously restrict their ETS sectors in the use of CDM and JI are Germany and the UK. On the other hand, there is in some countries such as Austria, Finland and Italy the potential for larger government purchases of CDM and JI credits, which would further reduce the welfare costs of meeting the Kyoto targets. Overall, most countries come close to the supplementarity limit with the given plans to purchase CDM and JI credits and without controlling their ETS-sectors.

Altogether there are three main conclusions that can be drawn from the scenario LimCDM. First, the project-based mechanism lead to some cost savings compared to a situation without emission reductions abroad. Second, the current European climate strategy is not efficient since it leads to a large wedge between the marginal abatement cost in the ETS sectors (the allowance price) and the marginal abatement costs (the implicit tax necessary to reach the overall Kyoto targets) in the non-ETS sectors. Third, in most countries the supplementarity criterion does not allow to close this wedge by further governmental purchases of CDM and JI credits at least not without restricting the use of those credits for the ETS sectors.

#### 4.4. Making Optimal Use of CDM and JI

In the last section, it was illustrated that even a restricted use of CDM and JI can reduce the costs of meeting the European Kyoto targets considerably. In this section we remove the restriction on the governmental use of the project based mechanisms and also ignore the supplementarity requirements to analyze the cost minimizing use of CDM and JI in the scenario denoted OPT.

In this case, the unrestricted use of CDM and JI throughout Europe leads to an equalization of the carbon prices worldwide. Thus, the wedge between the implicit tax in the non-ETS sectors and the allowance price in the EU ETS is closed. The only exceptions are those countries that do not need to reduce emissions in the non-ETS sectors, which are the UK, France, Greece, Sweden and the Eastern European countries. Here, the implicit carbon tax is zero. The international carbon price would be 6.8 €/tCO<sub>2</sub>.<sup>5</sup> It turns out that the unrestricted use of the project-based mechanisms implies that the European Kyoto targets can be reached basically without any negative welfare effects. In fact, in almost all countries the welfare changes relative to a business-as-usual are close to zero. The welfare effects for the different countries are shown in Figure 13, where the welfare effects of all different scenarios are compared.

Figure 11 shows the international allowance flows under the OPT scenario. Again, the EU15 is for better readability aggregated to one region. Compared to the LimCDM scenario, the European purchases of CDM and JI credits have increased by more than 60% to 400 MtCO<sub>2</sub>. The other Annex B countries have more than doubled their demand. Altogether, the project-based mechanisms now have a volume of around 880 MtCO<sub>2</sub>. China remains the single largest host country of CDM and JI projects as before in the LimCDM scenario.

---

<sup>5</sup> Theoretically, the countries with a zero implicit carbon tax could supply JI credits. This possibility is excluded for The EU15 countries, since there is no empirical evidences for this to take place. In addition, the amounts supplied would be negligible. In Eastern Europe, the model allows for JI (see Figure 11).

Figure 11: Sales and Purchases of CDM and JI Credits in OPT

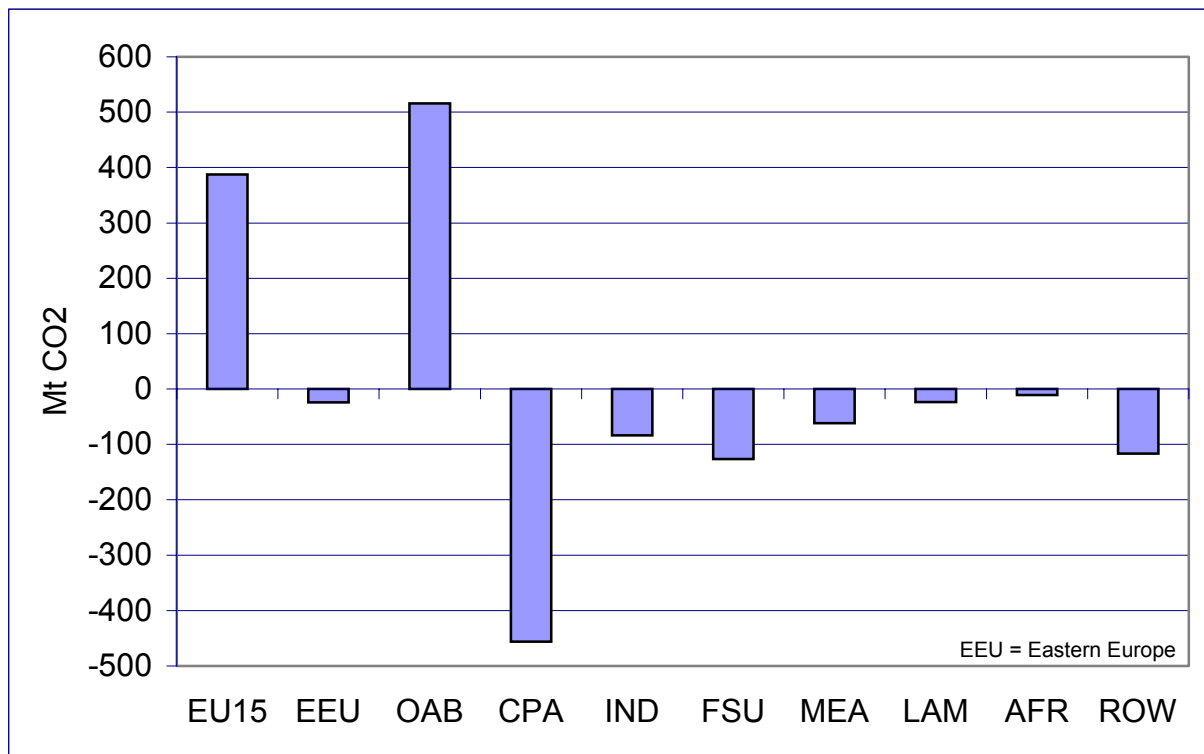


Figure 12 shows the allowance flows in the EU25. Since the higher demand for CDM and JI credits has driven up the price of CDM and JI allowances, the purchases of the ETS sectors have overall decreased by 40% compared to the LimCDM scenario. They now sum up to 94 MtCO<sub>2</sub>. In contrast, the sales of allowances within the ETS have increased by 45% to 52 MtCO<sub>2</sub>. The governmental purchases to be used in the non-ETS sectors are on average 2.5 times larger than in scenario LimCDM and reach 270 MtCO<sub>2</sub>. The largest relative increases can be seen in Germany, followed with some distance by Finland, Italy and Ireland. The Eastern European countries now sell 7.7 MtCO<sub>2</sub> JI credits.

Except for France, Greece and Sweden, no country meets the complementarity requirement in this scenario. It turns out to be optimal to buy 1.4 to 2.5 times as much CDM and JI credits than allowed by the complementarity criterion. This implies that only minor emission reductions (2 to 5% relative to BAU in 2012) are undertaken domestically.





























KTHC	36.2004	<i>Franca ECKERT COEN and Claudio ROSSI</i> (Ixviii): <u>Foreigners, Immigrants, Host Cities: The Policies of Multi-Ethnicity in Rome. Reading Governance in a Local Context</u>
KTHC	37.2004	<i>Kristine CRANE</i> (Ixviii): <u>Governing Migration: Immigrant Groups' Strategies in Three Italian Cities – Rome, Naples and Bari</u>
KTHC	38.2004	<i>Kiflemariam HAMDE</i> (Ixviii): <u>Mind in Africa, Body in Europe: The Struggle for Maintaining and Transforming Cultural Identity - A Note from the Experience of Eritrean Immigrants in Stockholm</u>
ETA	39.2004	<i>Alberto CAVALIERE</i> : <u>Price Competition with Information Disparities in a Vertically Differentiated Duopoly</u>
PRA	40.2004	<i>Andrea BIGANO and Stef PROOST</i> : <u>The Opening of the European Electricity Market and Environmental Policy: Does the Degree of Competition Matter?</u>
CCMP	41.2004	<i>Micheal FINUS</i> (Ixix): <u>International Cooperation to Resolve International Pollution Problems</u>
KTHC	42.2004	<i>Francesco CRESPI</i> : <u>Notes on the Determinants of Innovation: A Multi-Perspective Analysis</u>
CTN	43.2004	<i>Sergio CURRARINI and Marco MARINI</i> : <u>Coalition Formation in Games without Synergies</u>
CTN	44.2004	<i>Marc ESCRHUELA-VILLAR</i> : <u>Cartel Sustainability and Cartel Stability</u>
NRM	45.2004	<i>Sebastian BERVOETS and Nicolas GRAVEL</i> (Ixvi): <u>Appraising Diversity with an Ordinal Notion of Similarity: An Axiomatic Approach</u>
NRM	46.2004	<i>Signe ANTHON and Bo JELLESMARK THORSEN</i> (Ixvi): <u>Optimal Afforestation Contracts with Asymmetric Information on Private Environmental Benefits</u>
NRM	47.2004	<i>John MBURU</i> (Ixvi): <u>Wildlife Conservation and Management in Kenya: Towards a Co-management Approach</u>
NRM	48.2004	<i>Ekin BIROL, Ágnes GYOVAI and Melinda SMALE</i> (Ixvi): <u>Using a Choice Experiment to Value Agricultural Biodiversity on Hungarian Small Farms: Agri-Environmental Policies in a Transition al Economy</u>
CCMP	49.2004	<i>Gernot KLEPPER and Sonja PETERSON</i> : <u>The EU Emissions Trading Scheme. Allowance Prices, Trade Flows, Competitiveness Effects</u>
GG	50.2004	<i>Scott BARRETT and Michael HOEL</i> : <u>Optimal Disease Eradication</u>
CTN	51.2004	<i>Dinko DIMITROV, Peter BORM, Ruud HENDRICKX and Shao CHIN SUNG</i> : <u>Simple Priorities and Core Stability in Hedonic Games</u>
SIEV	52.2004	<i>Francesco RICCI</i> : <u>Channels of Transmission of Environmental Policy to Economic Growth: A Survey of the Theory</u>
SIEV	53.2004	<i>Anna ALBERINI, Maureen CROPPER, Alan KRUPNICK and Nathalie B. SIMON</i> : <u>Willingness to Pay for Mortality Risk Reductions: Does Latency Matter?</u>
NRM	54.2004	<i>Ingo BRÄUER and Rainer MARGGRAF</i> (Ixvi): <u>Valuation of Ecosystem Services Provided by Biodiversity Conservation: An Integrated Hydrological and Economic Model to Value the Enhanced Nitrogen Retention in Renaturated Streams</u>
NRM	55.2004	<i>Timo GOESCHL and Tun LIN</i> (Ixvi): <u>Biodiversity Conservation on Private Lands: Information Problems and Regulatory Choices</u>
NRM	56.2004	<i>Tom DEDEURWAERDERE</i> (Ixvi): <u>Bioprospection: From the Economics of Contracts to Reflexive Governance</u>
CCMP	57.2004	<i>Katrin REHDANZ and David MADDISON</i> : <u>The Amenity Value of Climate to German Households</u>
CCMP	58.2004	<i>Koen SMEKENS and Bob VAN DER ZWAAN</i> : <u>Environmental Externalities of Geological Carbon Sequestration Effects on Energy Scenarios</u>
NRM	59.2004	<i>Valentina BOSETTI, Mariaester CASSINELLI and Alessandro LANZA</i> (Ixvii): <u>Using Data Envelopment Analysis to Evaluate Environmentally Conscious Tourism Management</u>
NRM	60.2004	<i>Timo GOESCHL and Danilo CAMARGO IGLIORI</i> (Ixvi): <u>Property Rights Conservation and Development: An Analysis of Extractive Reserves in the Brazilian Amazon</u>
CCMP	61.2004	<i>Barbara BUCHNER and Carlo CARRARO</i> : <u>Economic and Environmental Effectiveness of a Technology-based Climate Protocol</u>
NRM	62.2004	<i>Elissaios PAPYRAKIS and Reyer GERLAGH</i> : <u>Resource-Abundance and Economic Growth in the U.S.</u>
NRM	63.2004	<i>Györgyi BELA, György PATAKI, Melinda SMALE and Mariann HAJDÚ</i> (Ixvi): <u>Conserving Crop Genetic Resources on Smallholder Farms in Hungary: Institutional Analysis</u>
NRM	64.2004	<i>E.C.M. RUIJGROK and E.E.M. NILLESEN</i> (Ixvi): <u>The Socio-Economic Value of Natural Riverbanks in the Netherlands</u>
NRM	65.2004	<i>E.C.M. RUIJGROK</i> (Ixvi): <u>Reducing Acidification: The Benefits of Increased Nature Quality. Investigating the Possibilities of the Contingent Valuation Method</u>
ETA	66.2004	<i>Giannis VARDAS and Anastasios XEPAPADEAS</i> : <u>Uncertainty Aversion, Robust Control and Asset Holdings</u>
GG	67.2004	<i>Anastasios XEPAPADEAS and Constadina PASSA</i> : <u>Participation in and Compliance with Public Voluntary Environmental Programs: An Evolutionary Approach</u>
GG	68.2004	<i>Michael FINUS</i> : <u>Modesty Pays: Sometimes!</u>
NRM	69.2004	<i>Trond BJØRNDAL and Ana BRASÃO</i> : <u>The Northern Atlantic Bluefin Tuna Fisheries: Management and Policy Implications</u>
CTN	70.2004	<i>Alejandro CAPARRÓS, Abdelhakim HAMMOUDI and Tarik TAZDAÏT</i> : <u>On Coalition Formation with Heterogeneous Agents</u>
IEM	71.2004	<i>Massimo GIOVANNINI, Margherita GRASSO, Alessandro LANZA and Matteo MANERA</i> : <u>Conditional Correlations in the Returns on Oil Companies Stock Prices and Their Determinants</u>
IEM	72.2004	<i>Alessandro LANZA, Matteo MANERA and Michael MCALEER</i> : <u>Modelling Dynamic Conditional Correlations in WTI Oil Forward and Futures Returns</u>
SIEV	73.2004	<i>Margarita GENIUS and Elisabetta STRAZZERA</i> : <u>The Copula Approach to Sample Selection Modelling: An Application to the Recreational Value of Forests</u>

CCMP	74.2004	<i>Rob DELLINK and Ekko van IERLAND</i> : <u>Pollution Abatement in the Netherlands: A Dynamic Applied General Equilibrium Assessment</u>
ETA	75.2004	<i>Rosella LEVAGGI and Michele MORETTO</i> : <u>Investment in Hospital Care Technology under Different Purchasing Rules: A Real Option Approach</u>
CTN	76.2004	<i>Salvador BARBERÀ and Matthew O. JACKSON</i> (lxx): <u>On the Weights of Nations: Assigning Voting Weights in a Heterogeneous Union</u>
CTN	77.2004	<i>Àlex ARENAS, Antonio CABRALES, Albert DÍAZ-GUILERA, Roger GUIMERA and Fernando VEGA-REDONDO</i> (lxx): <u>Optimal Information Transmission in Organizations: Search and Congestion</u>
CTN	78.2004	<i>Francis BLOCH and Armando GOMES</i> (lxx): <u>Contracting with Externalities and Outside Options</u>
CTN	79.2004	<i>Rabah AMIR, Effrosyni DIAMANTOUDI and Licun XUE</i> (lxx): <u>Merger Performance under Uncertain Efficiency Gains</u>
CTN	80.2004	<i>Francis BLOCH and Matthew O. JACKSON</i> (lxx): <u>The Formation of Networks with Transfers among Players</u>
CTN	81.2004	<i>Daniel DIERMEIER, Hülya ERASLAN and Antonio MERLO</i> (lxx): <u>Bicameralism and Government Formation</u>
CTN	82.2004	<i>Rod GARRATT, James E. PARCO, Cheng-ZHONG QIN and Amnon RAPOPORT</i> (lxx): <u>Potential Maximization and Coalition Government Formation</u>
CTN	83.2004	<i>Kfir ELIAZ, Debraj RAY and Ronny RAZIN</i> (lxx): <u>Group Decision-Making in the Shadow of Disagreement</u>
CTN	84.2004	<i>Sanjeev GOYAL, Marco van der LEIJ and José Luis MORAGA-GONZÁLEZ</i> (lxx): <u>Economics: An Emerging Small World?</u>
CTN	85.2004	<i>Edward CARTWRIGHT</i> (lxx): <u>Learning to Play Approximate Nash Equilibria in Games with Many Players</u>
IEM	86.2004	<i>Finn R. FØRSUND and Michael HOEL</i> : <u>Properties of a Non-Competitive Electricity Market Dominated by Hydroelectric Power</u>
KTHC	87.2004	<i>Elissaios PAPHAKIS and Reyer GERLAGH</i> : <u>Natural Resources, Investment and Long-Term Income</u>
CCMP	88.2004	<i>Marzio GALEOTTI and Claudia KEMFERT</i> : <u>Interactions between Climate and Trade Policies: A Survey</u>
IEM	89.2004	<i>A. MARKANDYA, S. PEDROSO and D. STREIMIKIENE</i> : <u>Energy Efficiency in Transition Economies: Is There Convergence Towards the EU Average?</u>
GG	90.2004	<i>Rolf GOLOMBEK and Michael HOEL</i> : <u>Climate Agreements and Technology Policy</u>
PRA	91.2004	<i>Sergei IZMALKOV</i> (lxx): <u>Multi-Unit Open Ascending Price Efficient Auction</u>
KTHC	92.2004	<i>Gianmarco I.P. OTTAVIANO and Giovanni PERI</i> : <u>Cities and Cultures</u>
KTHC	93.2004	<i>Massimo DEL GATTO</i> : <u>Agglomeration, Integration, and Territorial Authority Scale in a System of Trading Cities. Centralisation versus devolution</u>
CCMP	94.2004	<i>Pierre-André JOUVET, Philippe MICHEL and Gilles ROTILLON</i> : <u>Equilibrium with a Market of Permits</u>
CCMP	95.2004	<i>Bob van der ZWAAN and Reyer GERLAGH</i> : <u>Climate Uncertainty and the Necessity to Transform Global Energy Supply</u>
CCMP	96.2004	<i>Francesco BOSELLO, Marco LAZZARIN, Roberto ROSON and Richard S.J. TOL</i> : <u>Economy-Wide Estimates of the Implications of Climate Change: Sea Level Rise</u>
CTN	97.2004	<i>Gustavo BERGANTIÑOS and Juan J. VIDAL-PUGA</i> : <u>Defining Rules in Cost Spanning Tree Problems Through the Canonical Form</u>
CTN	98.2004	<i>Siddhartha BANDYOPADHYAY and Mandar OAK</i> : <u>Party Formation and Coalitional Bargaining in a Model of Proportional Representation</u>
GG	99.2004	<i>Hans-Peter WEIKARD, Michael FINUS and Juan-Carlos ALTAMIRANO-CABRERA</i> : <u>The Impact of Surplus Sharing on the Stability of International Climate Agreements</u>
SIEV	100.2004	<i>Chiara M. TRAVISI and Peter NIJKAMP</i> : <u>Willingness to Pay for Agricultural Environmental Safety: Evidence from a Survey of Milan, Italy, Residents</u>
SIEV	101.2004	<i>Chiara M. TRAVISI, Raymond J. G. M. FLORAX and Peter NIJKAMP</i> : <u>A Meta-Analysis of the Willingness to Pay for Reductions in Pesticide Risk Exposure</u>
NRM	102.2004	<i>Valentina BOSETTI and David TOMBERLIN</i> : <u>Real Options Analysis of Fishing Fleet Dynamics: A Test</u>
CCMP	103.2004	<i>Alessandra GORIA e Gretel GAMBARELLI</i> : <u>Economic Evaluation of Climate Change Impacts and Adaptability in Italy</u>
PRA	104.2004	<i>Massimo FLORIO and Mara GRASSEN</i> : <u>The Missing Shock: The Macroeconomic Impact of British Privatisation</u>
PRA	105.2004	<i>John BENNETT, Saul ESTRIN, James MAW and Giovanni URGA</i> : <u>Privatisation Methods and Economic Growth in Transition Economies</u>
PRA	106.2004	<i>Kira BÖRNER</i> : <u>The Political Economy of Privatization: Why Do Governments Want Reforms?</u>
PRA	107.2004	<i>Pehr-Johan NORBÄCK and Lars PERSSON</i> : <u>Privatization and Restructuring in Concentrated Markets</u>
SIEV	108.2004	<i>Angela GRANZOTTO, Fabio PRANOVI, Simone LIBRALATO, Patrizia TORRICELLI and Danilo MAINARDI</i> : <u>Comparison between Artisanal Fishery and Manila Clam Harvesting in the Venice Lagoon by Using Ecosystem Indicators: An Ecological Economics Perspective</u>
CTN	109.2004	<i>Somdeb LAHIRI</i> : <u>The Cooperative Theory of Two Sided Matching Problems: A Re-examination of Some Results</u>
NRM	110.2004	<i>Giuseppe DI VITA</i> : <u>Natural Resources Dynamics: Another Look</u>
SIEV	111.2004	<i>Anna ALBERINI, Alistair HUNT and Anil MARKANDYA</i> : <u>Willingness to Pay to Reduce Mortality Risks: Evidence from a Three-Country Contingent Valuation Study</u>
KTHC	112.2004	<i>Valeria PAPPONETTI and Dino PINELLI</i> : <u>Scientific Advice to Public Policy-Making</u>
SIEV	113.2004	<i>Paulo A.L.D. NUNES and Laura ONOFRI</i> : <u>The Economics of Warm Glow: A Note on Consumer's Behavior and Public Policy Implications</u>
IEM	114.2004	<i>Patrick CAYRADE</i> : <u>Investments in Gas Pipelines and Liquefied Natural Gas Infrastructure What is the Impact on the Security of Supply?</u>
IEM	115.2004	<i>Valeria COSTANTINI and Francesco GRACCEVA</i> : <u>Oil Security. Short- and Long-Term Policies</u>

ITEM	116.2004	<i>Valeria COSTANTINI and Francesco GRACCEVA: <u>Social Costs of Energy Disruptions</u></i>
ITEM	117.2004	<i>Christian EGENHOFER, Kyriakos GIALOGLOU, Giacomo LUCIANI, Maroeska BOOTS, Martin SCHEEPERS, Valeria COSTANTINI, Francesco GRACCEVA, Anil MARKANDYA and Giorgio VICINI: <u>Market-Based Options for Security of Energy Supply</u></i>
ITEM	118.2004	<i>David FISK: <u>Transport Energy Security. The Unseen Risk?</u></i>
ITEM	119.2004	<i>Giacomo LUCIANI: <u>Security of Supply for Natural Gas Markets. What is it and What is it not?</u></i>
ITEM	120.2004	<i>L.J. de VRIES and R.A. HAKVOORT: <u>The Question of Generation Adequacy in Liberalised Electricity Markets</u></i>
KTHC	121.2004	<i>Alberto PETRUCCI: <u>Asset Accumulation, Fertility Choice and Nondegenerate Dynamics in a Small Open Economy</u></i>
NRM	122.2004	<i>Carlo GIUPPONI, Jaroslav MYSLAK and Anita FASSIO: <u>An Integrated Assessment Framework for Water Resources Management: A DSS Tool and a Pilot Study Application</u></i>
NRM	123.2004	<i>Margaretha BREIL, Anita FASSIO, Carlo GIUPPONI and Paolo ROSATO: <u>Evaluation of Urban Improvement on the Islands of the Venice Lagoon: A Spatially-Distributed Hedonic-Hierarchical Approach</u></i>
ETA	124.2004	<i>Paul MENSINK: <u>Instant Efficient Pollution Abatement Under Non-Linear Taxation and Asymmetric Information: The Differential Tax Revisited</u></i>
NRM	125.2004	<i>Mauro FABIANO, Gabriella CAMARSA, Rosanna DURSI, Roberta IVALDI, Valentina MARIN and Francesca PALMISANI: <u>Integrated Environmental Study for Beach Management: A Methodological Approach</u></i>
PRA	126.2004	<i>Irena GROSFELD and Iraj HASHI: <u>The Emergence of Large Shareholders in Mass Privatized Firms: Evidence from Poland and the Czech Republic</u></i>
CCMP	127.2004	<i>Maria BERRITTELLA, Andrea BIGANO, Roberto ROSON and Richard S.J. TOL: <u>A General Equilibrium Analysis of Climate Change Impacts on Tourism</u></i>
CCMP	128.2004	<i>Reyer GERLAGH: <u>A Climate-Change Policy Induced Shift from Innovations in Energy Production to Energy Savings</u></i>
NRM	129.2004	<i>Elissaios POPYRAKIS and Reyer GERLAGH: <u>Natural Resources, Innovation, and Growth</u></i>
PRA	130.2004	<i>Bernardo BORTOLOTTI and Mara FACCIO: <u>Reluctant Privatization</u></i>
SIEV	131.2004	<i>Riccardo SCARPA and Mara THIENE: <u>Destination Choice Models for Rock Climbing in the Northeast Alps: A Latent-Class Approach Based on Intensity of Participation</u></i>
SIEV	132.2004	<i>Riccardo SCARPA Kenneth G. WILLIS and Melinda ACUTT: <u>Comparing Individual-Specific Benefit Estimates for Public Goods: Finite Versus Continuous Mixing in Logit Models</u></i>
ITEM	133.2004	<i>Santiago J. RUBIO: <u>On Capturing Oil Rents with a National Excise Tax Revisited</u></i>
ETA	134.2004	<i>Ascensión ANDINA DÍAZ: <u>Political Competition when Media Create Candidates' Charisma</u></i>
SIEV	135.2004	<i>Anna ALBERINI: <u>Robustness of VSL Values from Contingent Valuation Surveys</u></i>
CCMP	136.2004	<i>Gernot KLEPPER and Sonja PETERSON: <u>Marginal Abatement Cost Curves in General Equilibrium: The Influence of World Energy Prices</u></i>
ETA	137.2004	<i>Herbert DAWID, Christophe DEISSENBERG and Pavel ŠEVČIK: <u>Cheap Talk, Gullibility, and Welfare in an Environmental Taxation Game</u></i>
CCMP	138.2004	<i>ZhongXiang ZHANG: <u>The World Bank's Prototype Carbon Fund and China</u></i>
CCMP	139.2004	<i>Reyer GERLAGH and Marjan W. HOFKES: <u>Time Profile of Climate Change Stabilization Policy</u></i>
NRM	140.2004	<i>Chiara D'ALPAOS and Michele MORETTO: <u>The Value of Flexibility in the Italian Water Service Sector: A Real Option Analysis</u></i>
PRA	141.2004	<i>Patrick BAJARI, Stephanie HOUGHTON and Steven TADELIS (lxxi): <u>Bidding for Incomplete Contracts</u></i>
PRA	142.2004	<i>Susan ATHEY, Jonathan LEVIN and Enrique SEIRA (lxxi): <u>Comparing Open and Sealed Bid Auctions: Theory and Evidence from Timber Auctions</u></i>
PRA	143.2004	<i>David GOLDREICH (lxxi): <u>Behavioral Biases of Dealers in U.S. Treasury Auctions</u></i>
PRA	144.2004	<i>Roberto BURGNET (lxxi): <u>Optimal Procurement Auction for a Buyer with Downward Sloping Demand: More Simple Economics</u></i>
PRA	145.2004	<i>Ali HORTACSU and Samita SAREEN (lxxi): <u>Order Flow and the Formation of Dealer Bids: An Analysis of Information and Strategic Behavior in the Government of Canada Securities Auctions</u></i>
PRA	146.2004	<i>Victor GINSBURGH, Patrick LEGROS and Nicolas SAHUGUET (lxxi): <u>How to Win Twice at an Auction. On the Incidence of Commissions in Auction Markets</u></i>
PRA	147.2004	<i>Claudio MEZZETTI, Aleksandar PEKEČ and Ilia TSETLIN (lxxi): <u>Sequential vs. Single-Round Uniform-Price Auctions</u></i>
PRA	148.2004	<i>John ASKER and Estelle CANTILLON (lxxi): <u>Equilibrium of Scoring Auctions</u></i>
PRA	149.2004	<i>Philip A. HAILE, Han HONG and Matthew SHUM (lxxi): <u>Nonparametric Tests for Common Values in First-Price Sealed-Bid Auctions</u></i>
PRA	150.2004	<i>François DEGEORGE, François DERRIEN and Kent L. WOMACK (lxxi): <u>Quid Pro Quo in IPOs: Why Bookbuilding is Dominating Auctions</u></i>
CCMP	151.2004	<i>Barbara BUCHNER and Silvia DALL'OLIO: <u>Russia: The Long Road to Ratification. Internal Institution and Pressure Groups in the Kyoto Protocol's Adoption Process</u></i>
CCMP	152.2004	<i>Carlo CARRARO and Marzio GALEOTTI: <u>Does Endogenous Technical Change Make a Difference in Climate Policy Analysis? A Robustness Exercise with the FEEM-RICE Model</u></i>
PRA	153.2004	<i>Alejandro M. MANELLI and Daniel R. VINCENT (lxxi): <u>Multidimensional Mechanism Design: Revenue Maximization and the Multiple-Good Monopoly</u></i>
ETA	154.2004	<i>Nicola ACOCELLA, Giovanni Di BARTOLOMEO and Wilfried PAUWELS: <u>Is there any Scope for Corporatism in Stabilization Policies?</u></i>
CTN	155.2004	<i>Johan EYCKMANS and Michael FINUS: <u>An Almost Ideal Sharing Scheme for Coalition Games with Externalities</u></i>
CCMP	156.2004	<i>Cesare DOSI and Michele MORETTO: <u>Environmental Innovation, War of Attrition and Investment Grants</u></i>

CCMP	157.2004	<i>Valentina BOSETTI, Marzio GALEOTTI and Alessandro LANZA: <u>How Consistent are Alternative Short-Term Climate Policies with Long-Term Goals?</u></i>
ETA	158.2004	<i>Y. Hossein FARZIN and Ken-Ichi AKAO: <u>Non-pecuniary Value of Employment and Individual Labor Supply</u></i>
ETA	159.2004	<i>William BROCK and Anastasios XEPAPADEAS: <u>Spatial Analysis: Development of Descriptive and Normative Methods with Applications to Economic-Ecological Modelling</u></i>
KTHC	160.2004	<i>Alberto PETRUCCI: <u>On the Incidence of a Tax on PureRent with Infinite Horizons</u></i>
IEM	161.2004	<i>Xavier LABANDEIRA, José M. LABEAGA and Miguel RODRÍGUEZ: <u>Microsimulating the Effects of Household Energy Price Changes in Spain</u></i>

#### NOTE DI LAVORO PUBLISHED IN 2005

CCMP	1.2005	<i>Stéphane HALLEGATTE: <u>Accounting for Extreme Events in the Economic Assessment of Climate Change</u></i>
CCMP	2.2005	<i>Qiang WU and Paulo Augusto NUNES: <u>Application of Technological Control Measures on Vehicle Pollution: A Cost-Benefit Analysis in China</u></i>
CCMP	3.2005	<i>Andrea BIGANO, Jacqueline M. HAMILTON, Maren LAU, Richard S.J. TOL and Yuan ZHOU: <u>A Global Database of Domestic and International Tourist Numbers at National and Subnational Level</u></i>
CCMP	4.2005	<i>Andrea BIGANO, Jacqueline M. HAMILTON and Richard S.J. TOL: <u>The Impact of Climate on Holiday Destination Choice</u></i>
ETA	5.2005	<i>Hubert KEMPF: <u>Is Inequality Harmful for the Environment in a Growing Economy?</u></i>
CCMP	6.2005	<i>Valentina BOSETTI, Carlo CARRARO and Marzio GALEOTTI: <u>The Dynamics of Carbon and Energy Intensity in a Model of Endogenous Technical Change</u></i>
IEM	7.2005	<i>David CALEF and Robert GOBLE: <u>The Allure of Technology: How France and California Promoted Electric Vehicles to Reduce Urban Air Pollution</u></i>
ETA	8.2005	<i>Lorenzo PELLEGRINI and Reyer GERLAGH: <u>An Empirical Contribution to the Debate on Corruption Democracy and Environmental Policy</u></i>
CCMP	9.2005	<i>Angelo ANTOCI: <u>Environmental Resources Depletion and Interplay Between Negative and Positive Externalities in a Growth Model</u></i>
CTN	10.2005	<i>Frédéric DEROLAN: <u>Cost-Reducing Alliances and Local Spillovers</u></i>
NRM	11.2005	<i>Francesco SINDICO: <u>The GMO Dispute before the WTO: Legal Implications for the Trade and Environment Debate</u></i>
KTHC	12.2005	<i>Carla MASSIDDA: <u>Estimating the New Keynesian Phillips Curve for Italian Manufacturing Sectors</u></i>
KTHC	13.2005	<i>Michele MORETTO and Gianpaolo ROSSINI: <u>Start-up Entry Strategies: Employer vs. Nonemployer firms</u></i>
PRCG	14.2005	<i>Clara GRAZIANO and Annalisa LUPORINI: <u>Ownership Concentration, Monitoring and Optimal Board Structure</u></i>
CSRM	15.2005	<i>Parashar KULKARNI: <u>Use of Ecolabels in Promoting Exports from Developing Countries to Developed Countries: Lessons from the Indian LeatherFootwear Industry</u></i>
KTHC	16.2005	<i>Adriana DI LIBERTO, Roberto MURA and Francesco PIGLIARU: <u>How to Measure the Unobservable: A Panel Technique for the Analysis of TFP Convergence</u></i>
KTHC	17.2005	<i>Alireza NAGHAVI: <u>Asymmetric Labor Markets, Southern Wages, and the Location of Firms</u></i>
KTHC	18.2005	<i>Alireza NAGHAVI: <u>Strategic Intellectual Property Rights Policy and North-South Technology Transfer</u></i>
KTHC	19.2005	<i>Mombert HOPPE: <u>Technology Transfer Through Trade</u></i>
PRCG	20.2005	<i>Roberto ROSON: <u>Platform Competition with Endogenous Multihoming</u></i>
CCMP	21.2005	<i>Barbara BUCHNER and Carlo CARRARO: <u>Regional and Sub-Global Climate Blocs. A Game Theoretic Perspective on Bottom-up Climate Regimes</u></i>
IEM	22.2005	<i>Fausto CAVALLARO: <u>An Integrated Multi-Criteria System to Assess Sustainable Energy Options: An Application of the Promethee Method</u></i>
CTN	23.2005	<i>Michael FINUS, Pierre v. MOUCHE and Bianca RUNDSHAGEN: <u>Uniqueness of Coalitional Equilibria</u></i>
IEM	24.2005	<i>Wietze LISE: <u>Decomposition of CO2 Emissions over 1980–2003 in Turkey</u></i>
CTN	25.2005	<i>Somdeb LAHIRI: <u>The Core of Directed Network Problems with Quotas</u></i>
SIEV	26.2005	<i>Susanne MENZEL and Riccardo SCARPA: <u>Protection Motivation Theory and Contingent Valuation: Perceived Realism, Threat and WTP Estimates for Biodiversity Protection</u></i>
NRM	27.2005	<i>Massimiliano MAZZANTI and Anna MONTINI: <u>The Determinants of Residential Water Demand Empirical Evidence for a Panel of Italian Municipalities</u></i>
CCMP	28.2005	<i>Laurent GILOTTE and Michel de LARA: <u>Precautionary Effect and Variations of the Value of Information</u></i>
NRM	29.2005	<i>Paul SARFO-MENSAH: <u>Exportation of Timber in Ghana: The Menace of Illegal Logging Operations</u></i>
CCMP	30.2005	<i>Andrea BIGANO, Alessandra GORIA, Jacqueline HAMILTON and Richard S.J. TOL: <u>The Effect of Climate Change and Extreme Weather Events on Tourism</u></i>
NRM	31.2005	<i>Maria Angeles GARCIA-VALIÑAS: <u>Decentralization and Environment: An Application to Water Policies</u></i>
NRM	32.2005	<i>Chiara D'ALPAOS, Cesare DOSI and Michele MORETTO: <u>Concession Length and Investment Timing Flexibility</u></i>
CCMP	33.2005	<i>Joseph HUBER: <u>Key Environmental Innovations</u></i>
CTN	34.2005	<i>Antoni CALVÓ-ARMENGOL and Rahmi İLKILIÇ (Ixxii): <u>Pairwise-Stability and Nash Equilibria in Network Formation</u></i>
CTN	35.2005	<i>Francesco FERI (Ixxii): <u>Network Formation with Endogenous Decay</u></i>
CTN	36.2005	<i>Frank H. PAGE, Jr. and Myrna H. WOODERS (Ixxii): <u>Strategic Basins of Attraction, the Farsighted Core, and Network Formation Games</u></i>

CTN	37.2005	<i>Alessandra CASELLA and Nobuyuki HANAOKI</i> (lxxii): <u>Information Channels in Labor Markets. On the Resilience of Referral Hiring</u>
CTN	38.2005	<i>Matthew O. JACKSON and Alison WATTS</i> (lxxii): <u>Social Games: Matching and the Play of Finitely Repeated Games</u>
CTN	39.2005	<i>Anna BOGOMOLNAIA, Michel LE BRETON, Alexei SAVVATEEV and Shlomo WEBER</i> (lxxii): <u>The Egalitarian Sharing Rule in Provision of Public Projects</u>
CTN	40.2005	<i>Francesco FERI</i> : <u>Stochastic Stability in Network with Decay</u>
CTN	41.2005	<i>Aart de ZEEUW</i> (lxxii): <u>Dynamic Effects on the Stability of International Environmental Agreements</u>
NRM	42.2005	<i>C. Martijn van der HEIDE, Jeroen C.J.M. van den BERGH, Ekko C. van IERLAND and Paulo A.L.D. NUNES</i> : <u>Measuring the Economic Value of Two Habitat Defragmentation Policy Scenarios for the Veluwe, The Netherlands</u>
PRCG	43.2005	<i>Carla VIEIRA and Ana Paula SERRA</i> : <u>Abnormal Returns in Privatization Public Offerings: The Case of Portuguese Firms</u>
SIEV	44.2005	<i>Anna ALBERINI, Valentina ZANATTA and Paolo ROSATO</i> : <u>Combining Actual and Contingent Behavior to Estimate the Value of Sports Fishing in the Lagoon of Venice</u>
CTN	45.2005	<i>Michael FINUS and Bianca RUNDSHAGEN</i> : <u>Participation in International Environmental Agreements: The Role of Timing and Regulation</u>
CCMP	46.2005	<i>Lorenzo PELLEGRINI and Reyer GERLAGH</i> : <u>Are EU Environmental Policies Too Demanding for New Members States?</u>
IEM	47.2005	<i>Matteo MANERA</i> : <u>Modeling Factor Demands with SEM and VAR: An Empirical Comparison</u>
CTN	48.2005	<i>Olivier TERCIEUX and Vincent VANNETELBOSCH</i> (lxx): <u>A Characterization of Stochastically Stable Networks</u>
CTN	49.2005	<i>Ana MAULEON, José SEMPERE-MONERRIS and Vincent J. VANNETELBOSCH</i> (lxxii): <u>R&amp;D Networks Among Unionized Firms</u>
CTN	50.2005	<i>Carlo CARRARO, Johan EYCKMANS and Michael FINUS</i> : <u>Optimal Transfers and Participation Decisions in International Environmental Agreements</u>
KTHC	51.2005	<i>Valeria GATTAI</i> : <u>From the Theory of the Firm to FDI and Internalisation: A Survey</u>
CCMP	52.2005	<i>Alireza NAGHAVI</i> : <u>Multilateral Environmental Agreements and Trade Obligations: A Theoretical Analysis of the Doha Proposal</u>
SIEV	53.2005	<i>Margaretha BREIL, Gretel GAMBARELLI and Paulo A.L.D. NUNES</i> : <u>Economic Valuation of On Site Material Damages of High Water on Economic Activities based in the City of Venice: Results from a Dose-Response-Expert-Based Valuation Approach</u>
ETA	54.2005	<i>Alessandra del BOCA, Marzio GALEOTTI, Charles P. HIMMELBERG and Paola ROTA</i> : <u>Investment and Time to Plan: A Comparison of Structures vs. Equipment in a Panel of Italian Firms</u>
CCMP	55.2005	<i>Gernot KLEPPER and Sonja PETERSON</i> : <u>Emissions Trading, CDM, JI, and More – The Climate Strategy of the EU</u>



(lxv) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications” organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003

(lxvi) This paper has been presented at the 4th BioEcon Workshop on “Economic Analysis of Policies for Biodiversity Conservation” organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL) , Venice, August 28-29, 2003

(lxvii) This paper has been presented at the international conference on “Tourism and Sustainable Economic Development – Macro and Micro Economic Issues” jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003

(lxviii) This paper was presented at the ENGIME Workshop on “Governance and Policies in Multicultural Cities”, Rome, June 5-6, 2003

(lxix) This paper was presented at the Fourth EEP Plenary Workshop and EEP Conference “The Future of Climate Policy”, Cagliari, Italy, 27-28 March 2003

(lxx) This paper was presented at the 9<sup>th</sup> Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004

(lxxi) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications”, organised by Fondazione Eni Enrico Mattei and Consip and sponsored by the EU, Rome, September 23-25, 2004

(lxxii) This paper was presented at the 10<sup>th</sup> Coalition Theory Network Workshop held in Paris, France on 28-29 January 2005 and organised by EUREQua.

**2004 SERIES**

<b>CCMP</b>	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti )
<b>GG</b>	<i>Global Governance</i> (Editor: Carlo Carraro)
<b>SIEV</b>	<i>Sustainability Indicators and Environmental Valuation</i> (Editor: Anna Alberini)
<b>NRM</b>	<i>Natural Resources Management</i> (Editor: Carlo Giupponi)
<b>KTHC</b>	<i>Knowledge, Technology, Human Capital</i> (Editor: Gianmarco Ottaviano)
<b>IEM</b>	<i>International Energy Markets</i> (Editor: Anil Markandya)
<b>CSRM</b>	<i>Corporate Social Responsibility and Sustainable Management</i> (Editor: Sabina Ratti)
<b>PRA</b>	<i>Privatisation, Regulation, Antitrust</i> (Editor: Bernardo Bortolotti)
<b>ETA</b>	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)
<b>CTN</b>	<i>Coalition Theory Network</i>

**2005 SERIES**

<b>CCMP</b>	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti )
<b>SIEV</b>	<i>Sustainability Indicators and Environmental Valuation</i> (Editor: Anna Alberini)
<b>NRM</b>	<i>Natural Resources Management</i> (Editor: Carlo Giupponi)
<b>KTHC</b>	<i>Knowledge, Technology, Human Capital</i> (Editor: Gianmarco Ottaviano)
<b>IEM</b>	<i>International Energy Markets</i> (Editor: Anil Markandya)
<b>CSRM</b>	<i>Corporate Social Responsibility and Sustainable Management</i> (Editor: Sabina Ratti)
<b>PRCG</b>	<i>Privatisation Regulation Corporate Governance</i> (Editor: Bernardo Bortolotti)
<b>ETA</b>	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)
<b>CTN</b>	<i>Coalition Theory Network</i>