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ICPIA – Coping with Complexity in the Evolving International Climate Policy Institutional Architecture

The EU Emission Trading Scheme National Allocation Patterns and Trading Flows

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Austrian Institute of Economic Research, Climate Strategies

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Abstract

The EU Emission Trading Scheme (EU ETS) covers emitters from industry and the energy sector and 40 percent of the EU's total greenhouse gas emissions. It is the biggest implementation of a cap-and-trade scheme worldwide and the core instrument of European climate policy since its start in 2005. Based on a database comprising more than 10,000 installations in 26 EU countries, this paper provides a thorough analysis of the performance of the EU ETS in the period 2005-2010. In the first part, we analyse allocation patterns – i.e., the stringency of allocation caps and distribution issues – on EU and country level comparing the results of the EU ETS pilot phase and the first three years of the Kyoto phase. In the second part of the paper, we assess trading flows of European Allowance Units (EUAs) between EU countries comparing the results for the first and second trading period and analyse the use of project-based credits in the second trading period. Our analysis shows a higher overall stringency of the 2008 allocation caps compared to the first trading period reflecting the stronger role of the European Commission. For the following years we find, however, a surplus of allowances reflecting the decline in emissions due to the economic crisis. Traded certificates account for only a small share in EU-wide surrendered allowances, but increased in the second trading phase. Our analysis reveals that some countries have been net importers of EUAs despite national surpluses of allowances. This may either be due to differences in allocation patterns within EU countries, EUA transfers between associate companies or due to excess imports because of wrong (emission) growth expectations.

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Abstract

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Based on a database comprising more than 10,000 installations in 26 EU Member States, this paper provides a thorough analysis of the performance of the EU ETS in the period 2005 to 2010. In the first part, we analyse allocation patterns – i.e. the stringency of allocation caps and distribution issues – on EU and Member State level comparing the results of the EU ETS pilot phase and the first three years of the Kyoto phase. In the second part of the paper, we assess trading flows of European Allowance Units (EUAs) between Member States comparing the results for the first and second trading period and analyse the use of project-based credits in the second trading period.

Our analysis shows a higher overall stringency of the 2008 allocation caps compared to the first trading period reflecting the stronger role of the European Commission. For the following years we find, however, a surplus of allowances reflecting the decline in emissions due to the economic crisis. Traded certificates account for only a small share in EU-wide surrendered allowances, but increased in the second trading phase. Our analysis reveals that some countries have been net importers of EUAs despite national surpluses of allowances. This may either be due to differences in allocation patterns within Member States, EUA transfers between associate companies or due to excess imports because of wrong (emission) growth expectations.

Keywords: emissions trading, EU Emission Trading Scheme, empirical analysis

JEL codes: Q54, Q58



1 Motivation

The EU Emission Trading Scheme (EU ETS) for industry and electricity and heat generation covers about 40% of total EU greenhouse gas emissions (almost 60% of EU CO₂ emissions) and is the biggest implementation of a cap-and-trade mechanism worldwide. It is both a milestone in European climate policy and a strong incentive for starting similar activities in other regions of the world.

In the ETS pilot phase (2005 - 2007), however, substantial over-allocation of emission allowances occurred in most EU Member States and the overall emission cap was not stringent. Because of a more active role of the European Commission in the approval process of the Member States' National Allocation Plans for the second ETS period, the cap was binding in 2008 with verified emissions exceeding allocated allowances on aggregate by 8% (see Kettner et al., 2010). In the course of the economic crisis a strong decline in (EU ETS) emissions which reflected the economic downturn occurred. As a result, in 2009 again a loose cap was observed.

The stringency of the national emission caps is one determinant of trading flows between countries. Countries that are short of allowances will generally import allowances¹; countries with a surplus of allowances will generally be exporters of allowances.

In this paper we present a thorough analysis of allocation patterns and trading flows in the EU ETS and assess the correlation of net exports and imports of allowances with surplus allocation on Member State level. We start by setting out the methodology and data sources for our analysis. Subsequently, we present the indicators for the stringency of the caps and the trading flows highlighting differences between the first and the second trading phase and assess the relationship of allocation patterns and net exports of allowances. The last section concludes.

2 Methodology

Installations covered by the EU ETS need to have an account at their national registries, which record the allocation and verified emissions per installation. Data collected by national registries are transferred to the European registry, the Community Independent Transaction Log (CITL).

Since April 2011, data on verified emissions and allocated allowances for the EU ETS pilot phase (2005 - 2007) and the first three years of the second trading period (2008 - 2010) are available at the CITL on installation level. The CITL also contains data on the allowances surrendered by an installation for compliance. In the "operator holding accounts", the originating countries of the allowances surrendered by each installation are collected.

¹ For single trading years installations that are short in allowances can also 'borrow' allowances, i.e. surrender allowances that were issued for the following trading year. Borrowing has not been allowed, however, between the first and the second trading phase.



Since 2006 WIFO collects data on allocated allowances and verified emissions in the EU ETS from the CITL and assigns it to sectors using information from National Allocation Plans. As of October 2011 the WIFO database covers more than 10,000 installations and the period 2005 - 2010; for approximately 9,000 installations data on allocated allowances and verified emissions are available for all years. For the analysis of trading flows the database was extended by information on the allowances submitted for compliance by the installations.

2.1 Analysis of allocation patterns

The data analysis is performed for the pilot phase and the first three years of the second trading period. The analysis of allocation patterns is based on the indicators developed by Kettner et al. (2008):

- the short or long position of an installation as the difference between allocated and verified emissions of an installation;
- the gross long (short) position of a country as the sum of all long (short) positions of installations in a country; and
- the net long (short) position of a country as the difference of gross long positions and gross short positions of a country if this difference is positive (negative).

With these four indicators – gross long, gross short, net short and net long – the differences between allocated allowances and actual emissions – the allocation discrepancies – are assessed on EU and Member State level.

2.2 Analysis of trading flows

Based on data from the CITL operator holding accounts we perform an analysis of the trading flows within the EU ETS. For each installation we collect data on the allowances surrendered in the period 2005 to 2010 by originating country. These include the number of EUAs surrendered in the first and the second trading period as well as the number of project based credits – Certified Emission Reductions (CERs) from CDM projects and Emission Reduction Units (ERUs) from JI projects – surrendered for compliance in the second trading period.

The allowances surrendered are then aggregated on country level by summing up the installation results. Based on these data, we analyse the share of imported EUAs as well as of CERs and ERUs in surrendered allowances on country level.² Furthermore, we assess the exports of EUAs, CERs and ERUs exports surrendered by another country. With respect to EUA trade we derive the following indicators for each of the EU Member States:

- the net exports of EUAs as the difference between EUA exports and imports if this difference is positive, and
- the net imports of EUAs as the difference between EUA exports and imports if this difference is negative.

² An analysis of intra-country trade and the effective transaction volume is not possible based on the CITL operator holding accounts.



As argued above, the stringency of the national emission caps is one decisive factor of trading flows between countries. Our database allows us to illustrate that countries in a net short position tend to be net importers of allowances; countries in a net long position tend to be net exporters. We demonstrate the correlation of net positions and net exports for the first, completed, trading phase based on the indicators described above.

3 Allocation patterns in the EU ETS

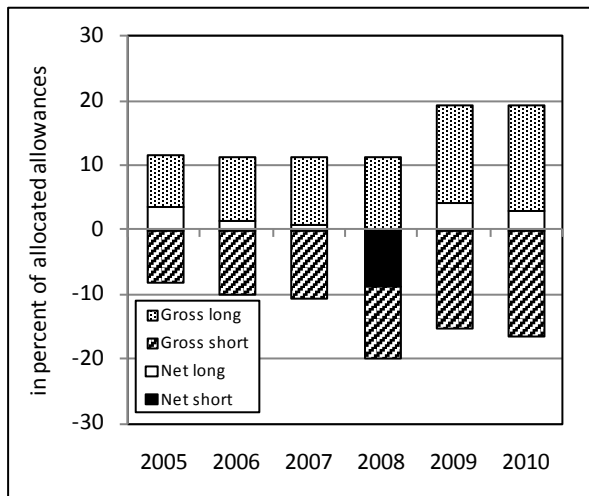
The Commission guidelines for the National Allocation Plans (European Commission, 2003b) aimed at setting a uniform framework for the Member States in their preparation of the first National Allocation Plans. Assuming that all countries had a similar interpretation of the EU guidelines, more or less congruent National Allocation Plans that exhibit similar stringencies of allocation caps were anticipated. It was therefore expected that allocation discrepancies, the difference between allocated EU Allowances (EUAs) and verified emissions, at least for the EU-15 would not substantially differ between countries. This hypothesis was not supported by previous analyses of empirical data on emissions and allocation (Kettner et al., 2008; Ellerman et al., 2010). For 2008 even larger variations in allocation discrepancies were found compared to the pilot phase (Kettner et al., 2010).

The following analysis includes data on allocated allowances and verified emissions for the period 2005 to 2010 for 26 EU Member States. Bulgaria is not included in the analysis as data on verified emissions are not yet available. For Romania which joined the EU ETS in 2007 data for the first trading period are based on 2007 values instead of 2005 - 2007 averages. In order to analyse the development of the stringency of the cap over time we only include those installations in our analysis for which data on allocation and emissions are available for all years.

3.1 Stringency of the EU wide cap

In the pilot phase and the second trading period the overall cap of the EU ETS is the result of the national emission caps set by Member States in their National Allocation Plans (European Commission, 2003a). In the ETS pilot phase (2005 - 2007) substantial over-allocation of emission allowances was observed in most EU Member States and the overall EU emission cap was not stringent in any year. Due to rising emissions in the EU ETS over the period 2005 to 2007 the surplus of allowances or the net long position declined, however, from year to year: While the EU ETS was in a net long position of 3.5% in 2005, for 2006 and 2007 a net long position of 1.3% and 0.8% respectively was observed (Figure 1).

Figure 1. Stringency of the EU-wide cap



Source: CITL; own calculations.

For the second trading phase the European Commission took more influence in the Member States' National Allocation Plans. Most proposed national caps had to be adjusted downwards by the Member States after the European Commission's review process. With cuts of 47% to 56% the Baltic States faced the strongest cuts (see Capoor and Ambrosi, 2008). For 2008, total allocated allowances were reduced by 285 Mt (14%) compared to the first trading phase (from 2,085 Mt to 1,800 Mt). EU ETS emissions, in contrast, only showed a minor decline of 5% between 2007 and the second trading phase (from 2,063 Mt to 1,958 Mt). As a consequence, for 2008 the overall EU cap was binding with verified emissions exceeding allocated allowances on aggregate by 8.8%. Under the assumption of a regular development of economic growth and production activities this would suggest an increased incentive for emission abatement measures resulting from the cap and rising allowance prices. For 2009, however, a totally different picture was observed: The unexpected exogenous shock of the economic crisis to the installations in the trading system translated into a sharp drop in verified emissions. Allocation again exceeded verified emissions showing a net long position of 4.1%. For 2010 emissions moderately increased, but allocated allowances still exceeded verified emissions by 2.9%.

3.2 The Member States evidence

The Member States' shares in total allocated allowances depend on both the size and the industry structure of the countries. With a share of 23% of total EU allocated allowances an outstanding share accrues to Germany which, together with Poland, Italy and the UK, accounts for more than half of the emissions covered by the EU ETS (see Table A-1 in the Appendix).

In Figure 2 the long and short positions by countries in the first and second trading phase are compared. As indicated in the figure, the market on aggregate was in a net long position in the first trading period. In the period 2005 to 2007 on average 2,085 Mt p.a. were allocated,



but only 2,044 Mt of emissions were verified. On average over the three years, the market was long with 41 million of EUAs corresponding to 2.0% of allocated allowances. This net long position is the balance of a 239 Mt (11.5%) gross long position, the relative amount of allowances allocated to installations above their verified emissions, and a 198 Mt (9.5%) gross short position, the relative amount of allowances below their verified emissions. As indicated in Figure 2, only six out of the 26 countries were in a short position up to 18.7% (Ireland) in the first trading period. The remaining 19 countries were long up to 43.4% (Lithuania). The highest absolute net short position was realised in the UK with 36 Mt, the highest absolute net long results in Poland with 29 Mt.

In the first three years of the second trading phase the EU ETS on aggregate was in a net short position of 0.6% or 10 Mt. This was the result of a 310 Mt (17.2%) gross short position and a 299 Mt (16.6%) gross long position. Nine out of the 26 countries were in a net short position; the remaining 17 countries exhibited a net long position. The highest relative net long position showed for Slovakia with 30%, the highest absolute net long position showed for Romania with 20 Mt. The highest percentage net short position accrued to the UK with 17%, the highest absolute net short position accrued to Germany with 57 Mt.³

Figure 2 shows that between the pilot phase and the first years of the Kyoto period substantial changes in allocation discrepancies can be observed for several Member States: In the first trading phase the New Member States generally exhibited higher net long positions than the EU-15 and only one of the New Member States (Slovenia) but five EU-15 countries were in a net short position. In the second trading phase these regional differences largely disappeared as a result of the Commission's intervention in National Allocation Plans. The Baltic States for instance showed the highest net long positions in the first trading period. This changed significantly in the second trading phase. Lithuania's net long position declined from 43.4% in the first trading period to 18.2% in 2008/10; the Latvian net long position fell from 27.5% to 12.2%. The 29.0% net long position of Estonia changed into a net short position of 3.2%. Developments in the Baltic States reflect that these countries faced the most severe cuts in allocation caps (47% - 56%) in the Commission review of National Allocation Plans for the second trading phase (Capoor and Ambrosi, 2008)⁴.

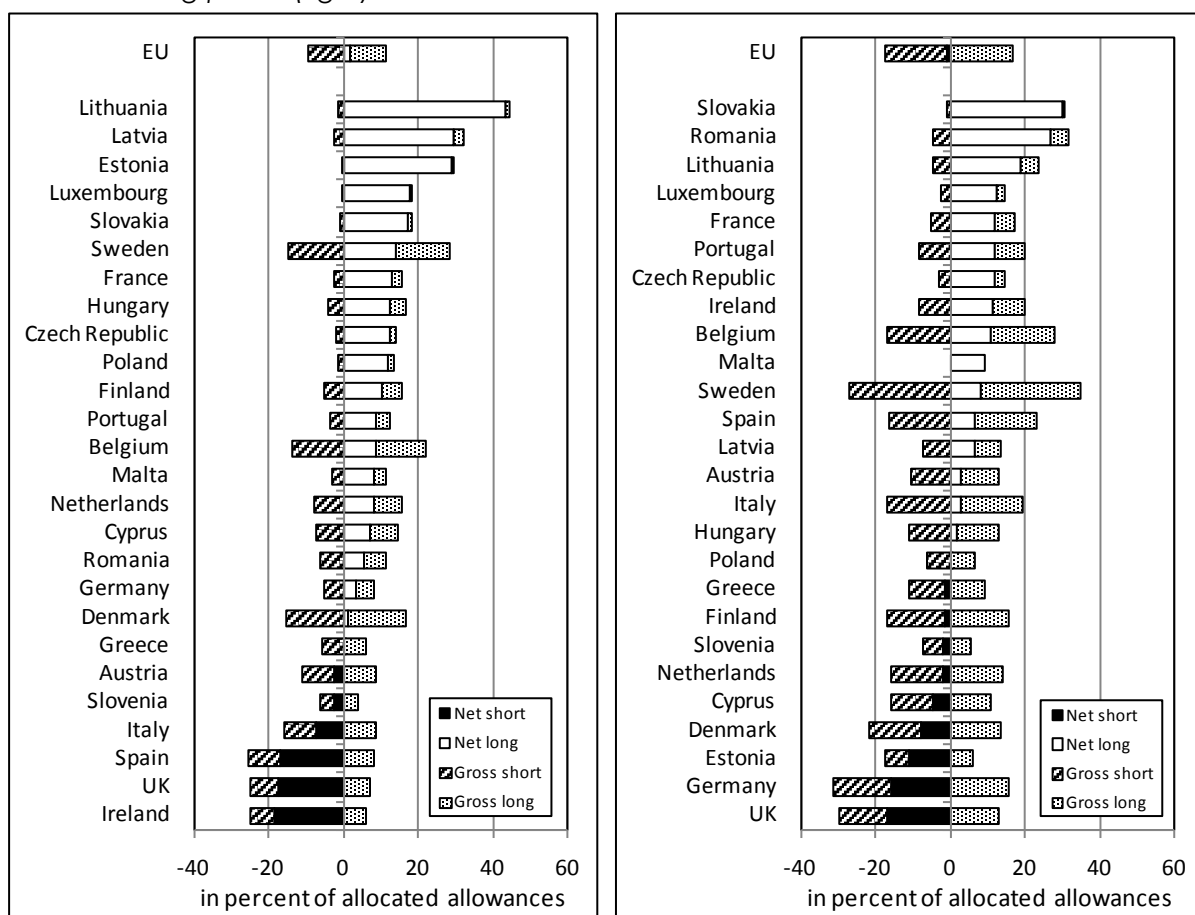
Figure 2 also illustrates to which extent the net long or the net short position is influenced by the gross long and gross short positions of the countries. In the second trading phase differences between gross and net positions exceeded those of the first trading period. This

³ The aggregate figures for the second trading phase counterbalance differences between 2008 and the following two years (see Table A - 2 in the Appendix). In 2008 15 countries were in a net short position due to the more stringent caps demanded by the Commission. Due to the fall of emissions in the course of the economic crisis in 2009 only five out of the 26 countries were in a net short position. In 2010 a moderate increase of emissions was observed but still in 19 countries the caps were not binding.

⁴ For the second trading period Member States' National Allocation Plans were cut by 10.4% in the Commission review. Only the caps of four countries (Denmark, France, Slovenia and UK) were not revised. Caps proposed by the new Member States were most strongly corrected downward (see e.g. Capoor and Ambrosi, 2008). Nevertheless, in first instance the cuts in the national caps of Poland and Estonia demanded by the Commission were annulled by a judgment of the Court of 23 September 2009 (Case T-183/07 EC Commission v Poland (2009), Case T-263/07 EC Commission v Estonia (2009)).

points at larger national allocation discrepancies on installation level. Evidence from the years 2005 and 2006 showed that National Allocation Plans created substantial inequalities as to the allocation positions both on a country and installation level (Kettner et al., 2008). The analysis presented in this paper suggests that this proves even more true for the first three years of the second trading period as inequalities within countries were increasing.

Figure 2. Long and short positions by countries in the first trading phase (left) and in the second trading phase (right).



Source: CITL, own calculations.

The net positions of the countries do not only reflect differences in the stringency of the national caps but also differences in abatement activities. Based on an analysis of economic activity, carbon intensity and energy intensity, Ellerman et al. (2010) estimate abatement in the pilot phase to amount to 210 Mt. Abatement is found to be significantly higher in the old Member States which account for 80% of emission abatement. Anderson and di Maria (2011) analyse abatement and over-allocation in the ETS pilot phase in a dynamic panel data model. Using data on historical CO₂ emissions, economic activity, electricity prices and climate factors they find a net abatement of 173.5 Mt (8% of allocated allowances) for the first trading period.



Sectoral analysis of allocation patterns (Kettner et al., 2011) shows that the sector electricity and heat generation, which accounts for more than 50% of total EU ETS emissions, was the only sector exhibiting a shortage of allowances in all trading years. This holds even more true for the second trading phase where the sector saw the most severe cuts in allocated allowances.⁵ Differences in the stringency of the sectoral caps were motivated by competitiveness concerns on the one hand and the sector's emission reduction potential on the other hand (e.g. Kolhus and Torvanger, 2005; Ellerman et al., 2007). This discussion is also reflected in Directive 2009/29/EC (European Commission, 2009) on the new design of the EU ETS for the post-Kyoto period where the sector power and heat will face full auctioning starting in 2013⁶.

4 Trading flows in the EU ETS

In addition to allocation patterns in the EU ETS we assess trading flows of allowances between Member States. An analysis of EUA imports and exports in the first trading years has also been performed by Trotignon and Delbosc (2008) and Trotignon and Ellerman (2009). We extend this analysis on the one hand to the first two years of the second trading phase highlighting differences between the two trading phases. On the other hand, we assess the use of credits from flexible mechanisms that installations surrendered since the beginning of the second trading period on country level.⁷

4.1 Database and definitions

For the assessment of trading flows, a different database than for the analysis of long and short positions is used that covers the period from 2005 to 2010. In contrast to the previous analysis based on a sample of installations for which data on verified emissions and allocated allowances was available for all years, now all installations are included in the database. This rests on the fact that only information on the originating registry (country) of the surrendered EUAs, but not on the installation to which the allowances were initially allocated is available. Therefore it is not possible to isolate the sample installations as used for the previous analysis of the stringency of the cap.

For the analysis of allowances we use the following terms: Imported allowances are defined as allowances used for compliance by an EU Member State originating from another registry. Exported allowances in turn are defined as allowances exported by one country and

⁵ Allocation of the sectors iron and steel, cement and lime and ceramics in contrast has even be raised by Member States between the first and the second trading phase (see Kettner et al., 2011).

⁶ From 2013 on, preferential allocation rules will apply for sectors potentially affected by carbon leakage; i.e. allowances to these sectors will be distributed based on sector-specific benchmarks. For the other sectors the distribution of allowances will be based increasingly on auctioning (see Kettner et al., 2010); The power sector will be subject to full auctioning starting in 2013 with exceptions for highly efficient co-generation and district heating as well as transitional rules for some New Member States. For other sectors not exposed to carbon leakage the share of auctioned allowances will be 20% in 2013 and increase to 80% in 2020.

⁷ For an analysis of sectoral CER imports in the period 2008/2009 see Trotignon (2011).



surrendered in another country. The analysis of trading flows hence may only include allowances that have been surrendered for compliance. Cross border exchange of allowances that were not surrendered but banked by the installations cannot be identified due to data availability as only information on the originating country but not on the supplying installation is available. When installation information on allowances transactions is for the pilot phase and a more detailed analysis will be carried out.

4.2 EUA trading

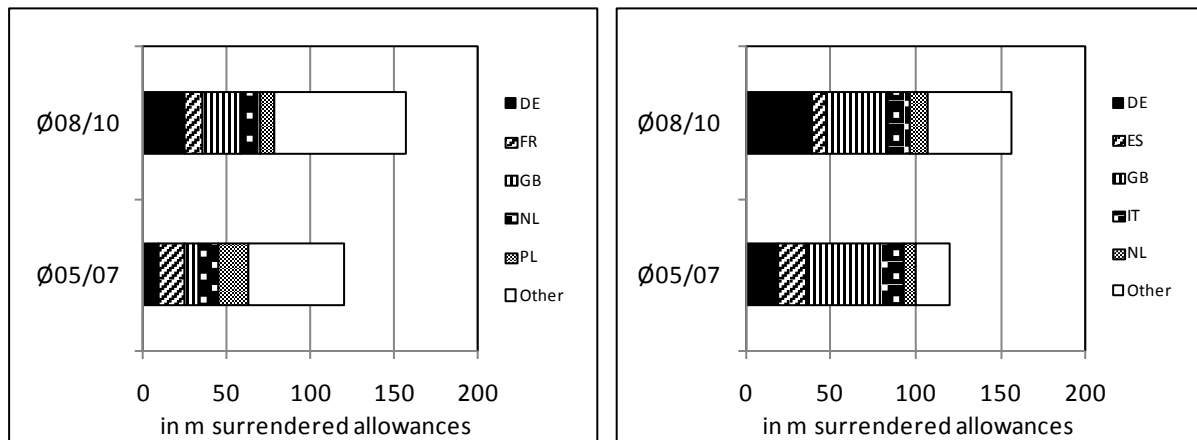
Based on the data and the qualifications described above we find the following preliminary evidence on cross border EU allowance trading in the period 2005 to 2010. On average over the first trading period (2005 - 2007) 120 million of EUAs originating from another registry were used for compliance every year. The use of foreign EUAs continuously increased over the first trading period suggesting an increase in trading activity as agents accustomed to the new market. In the Appendix (Tables A - 5 to A - 12) the structure of surrendered EUAs is shown in detail for each trading year as well as average results for both trading phases. The tables are conceived in matrix form. In the rows, the countries that have surrendered the EUAs are listed; the columns contain information on the originating country of the surrendered EUAs. The sum of the rows hence indicates total allowances issued by a country that were surrendered EU-wide; the sum of the columns indicates total allowances (including imports) surrendered in a country. By subtracting EUAs surrendered within the originating country (located on the diagonal of the matrix) from the column and row totals net exports and net imports are obtained.

In 2005 net flows of allowances amounted to 34.6 million. In 2006 the net trading flows increased to 85.1 million and tripled to 240.3 million in 2007 (see also Tables A - 5 to A - 7 in the Appendix). In the second trading phase, the annual net flows of allowances have significantly increased compared to the first trading period: Net flows of EUAs peaked in 2009 at 183.5 million and were approximately 143 million in 2008 and 2010 (see also Tables A - 8 to A - 10 in the Appendix).

Figure 3 illustrates the largest net exporting and importing countries of EUAs in the first and the second trading phase. In the first trading period the highest country shares in EUA imports accrued to the Netherlands (6.7 million), Italy (14.5 million), Spain (16.2 million), Germany (19.0 million) and the UK (43.9 million). In addition to these countries, in the second trading period also Belgium and Norway show high EUA imports.

The largest exporters of EUAs in the first trading period are Germany (9.2 million), the Netherlands (11.3 million), the Czech Republic (11.3 million), France (15.4 million) and Poland (18.9 million). In the second trading phase a large share in EUA exports accrues also to Spain and the UK. Germany's share in EUA exports has increased as well. In contrast, EUA exports from France and Poland have significantly declined (see also Table A - 11 and Table A - 12 in the Appendix).

Figure 3. EUA exports (left) imports (right) in million

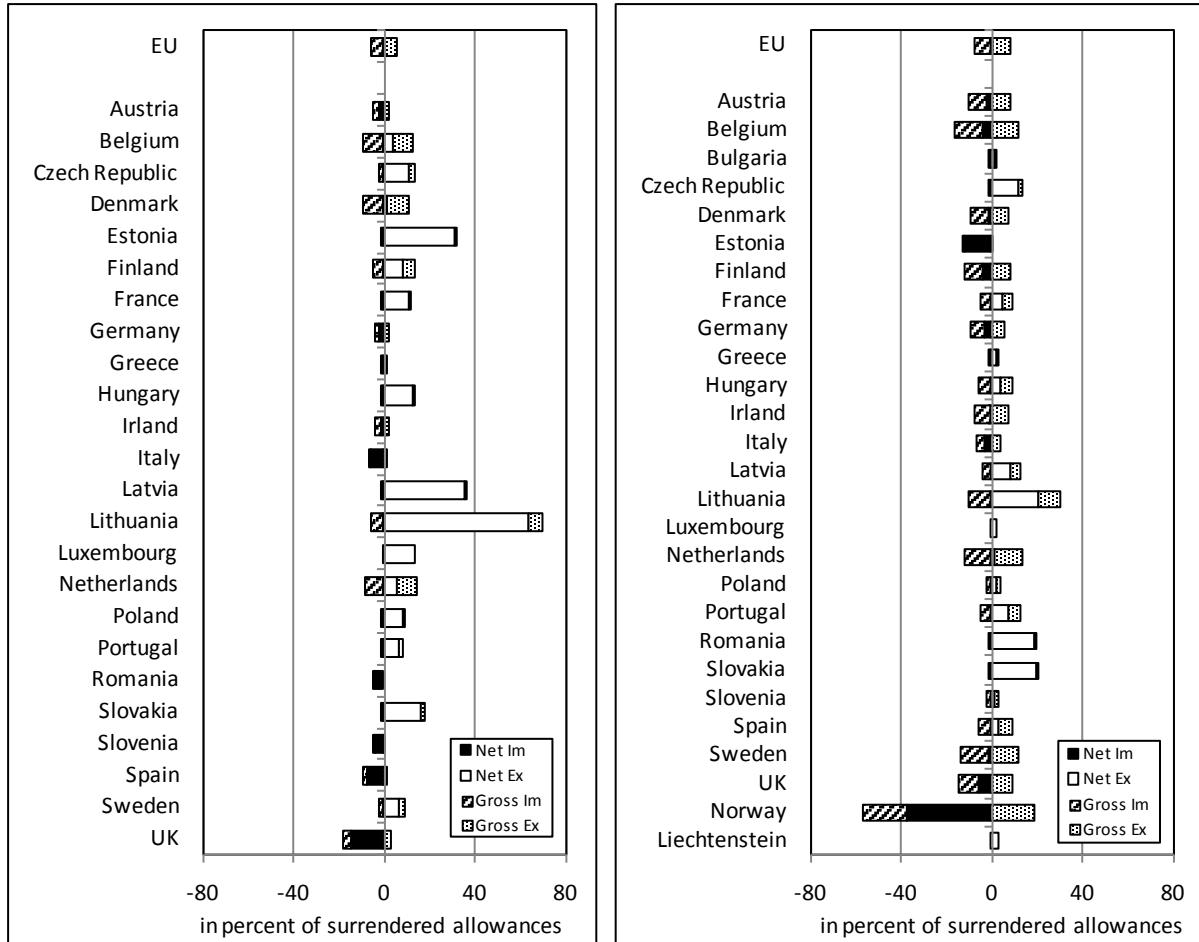


Source: CITL, own calculations.

The EUA exports and imports by countries as a share of the countries' surrendered allowances are illustrated in Figure 4. In the first trading period 16 countries were net exporters of EUAs; the remaining eight countries were EUA net importers. The Baltic States showed the highest relative net exports of EUAs of up to 64% for Lithuania. The highest relative net imports (14.2%) resulted for the UK.

In the second trading phase, so far eleven countries have been net importers of EUAs: Austria, Belgium, Denmark, Estonia, Finland, Germany, Ireland, Italy, Sweden, the UK and Norway. The remaining 16 countries were net exporters of EUAs. Norway, which joined the EU ETS in 2008, shows the highest relative net EUA imports. This results from Norway's decision not to allocate EU allowances to offshore oil companies, which in turn have to buy all of their allowances on the market. In the second trading phase relative net exports are generally lower than in the first trading phase. This mirrors the smaller long positions in the second trading period. Net imports and exports so far are in line with the net long and net short position of the countries. For a more detailed analysis, however, trading data on installation level would be necessary. Only with this information the sectoral dimensions of allowance trading and as well as inter-temporal use patterns of allowances – i.e. banking and borrowing – could be assessed.

Figure 4. EUA exports and imports in the first trading phase (left) and in the second trading phase (right)



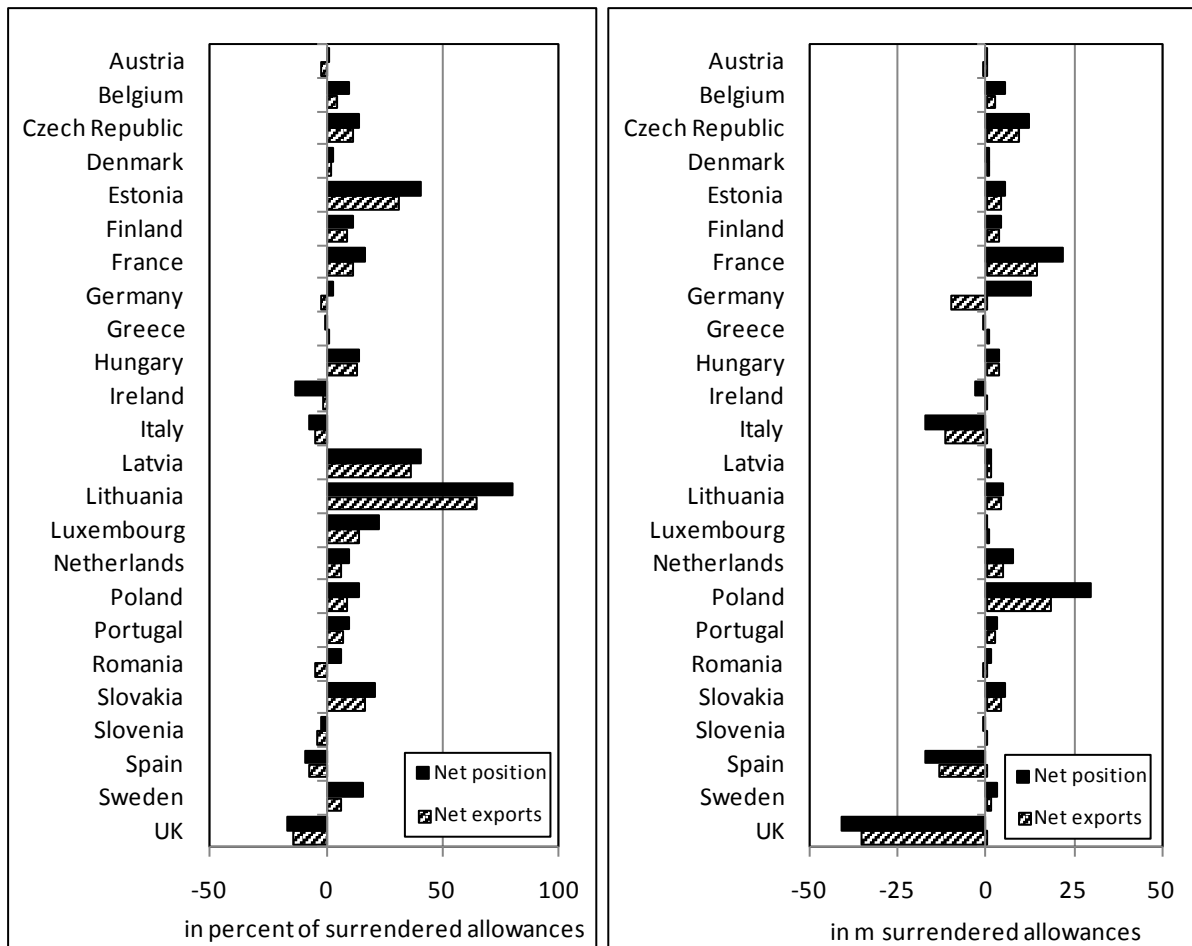
Source: CITL, own calculations.

4.3 Net positions and EUA net exports in the first trading phase

We now present our analysis on the correlation of net exports and net positions by Member States. For this analysis we calculate the countries' net positions based on the total of all installations – i.e. we do not look at a sample of installations as in the previous analysis of allocation patterns – in order to improve the comparability of the allocation / emission data and the trading data; then we compare the Member States' net positions and net exports (Figure 5). The graph illustrates the value and the limits of the database: When comparing net positions and net exports, one can see that in five Member States (Greece, Ireland, Italy, Spain and the UK) net exports exceed the countries' net long positions. These data discrepancies result from the fact that allowances distributed to new entrants in the first trading phase were not listed in the CITL (see Trotignon and Ellerman, 2008; Mc Guinness and

Trotignon, 2007).⁸ For Phase 1, this leads effectively to higher net long positions and less pronounced net short positions than indicated by the CITL database.⁹

Figure 5. Net positions and EUA net exports in the first trading phase in percent of surrendered allowances (left) and in million (right)



Source: CITL, own calculations.

Having these data restrictions in mind one can compare net position and net exports of the EU Member States. As expected, countries in a net short position have generally been net importing countries of EUAs (see Figure 5). Except for the five countries described above, net positions rather pronouncedly exceed net exports in all countries. These surpluses can be attributed to the over-supply of allowances in Phase 1 due to 'generous' allocation in the National Allocation Plans.

⁸ Also allowance withdrawals from installations are not accounted for in the CITL allocation and compliance data. These withdrawals can, however, be expected to only account for a small portion of allowances.

⁹ These distortions due to unconsidered allocations to new entrants are reduced by basing the analysis of long and short positions on installations for which data on allocated allowances and verified emissions for all trading years.



Notably, Austria, Germany and Romania have been net importers of EUAs despite their net long position. The limited correlation between net exports of EUAs and the net long and short positions in these three countries may have three reasons:

- First, the spread of net long and short positions within countries, i.e. not all installations with surplus allowances might have sold them on the market and thus imports of allowances might have been necessary for compliance.
- Second, installations that are part of an international company and were facing a shortage of allowances may have received transfers from an associate company with a surplus of allowances located in another Member State.
- Third, installations may have imported more EUAs than they actually needed. This could reflect an expected higher growth of emissions at the time the allowances were acquired. Other underlying factors could be strategic behaviour or price expectations for EUAs.

4.4 Credits from flexible mechanisms

Directive 2004/101/EC, the so called “Linking Directive” (European Commission, 2004), regulates the use of project-based mechanisms by installations covered by the EU ETS. Linking of the EU ETS with the Kyoto project-based mechanisms, including Joint Implementation (JI)¹⁰ and the Clean Development Mechanism (CDM)¹¹, should increase the cost effectiveness of emission reductions. The use of CDM credits is allowed since 2005; since 2008 it is also possible to surrender JI credits for compliance. The Linking Directive furthermore provides the criteria for the use of Kyoto credits for compliance in the EU ETS that shall ensure the environmental integrity of the scheme. The allowed maximum share of CER and JI credits in the second trading phase generally ranges between 7% and 20% of allocated allowances and is defined in the National Allocation Plans (see e.g. Sterk and Wang-Helmreich, 2008).

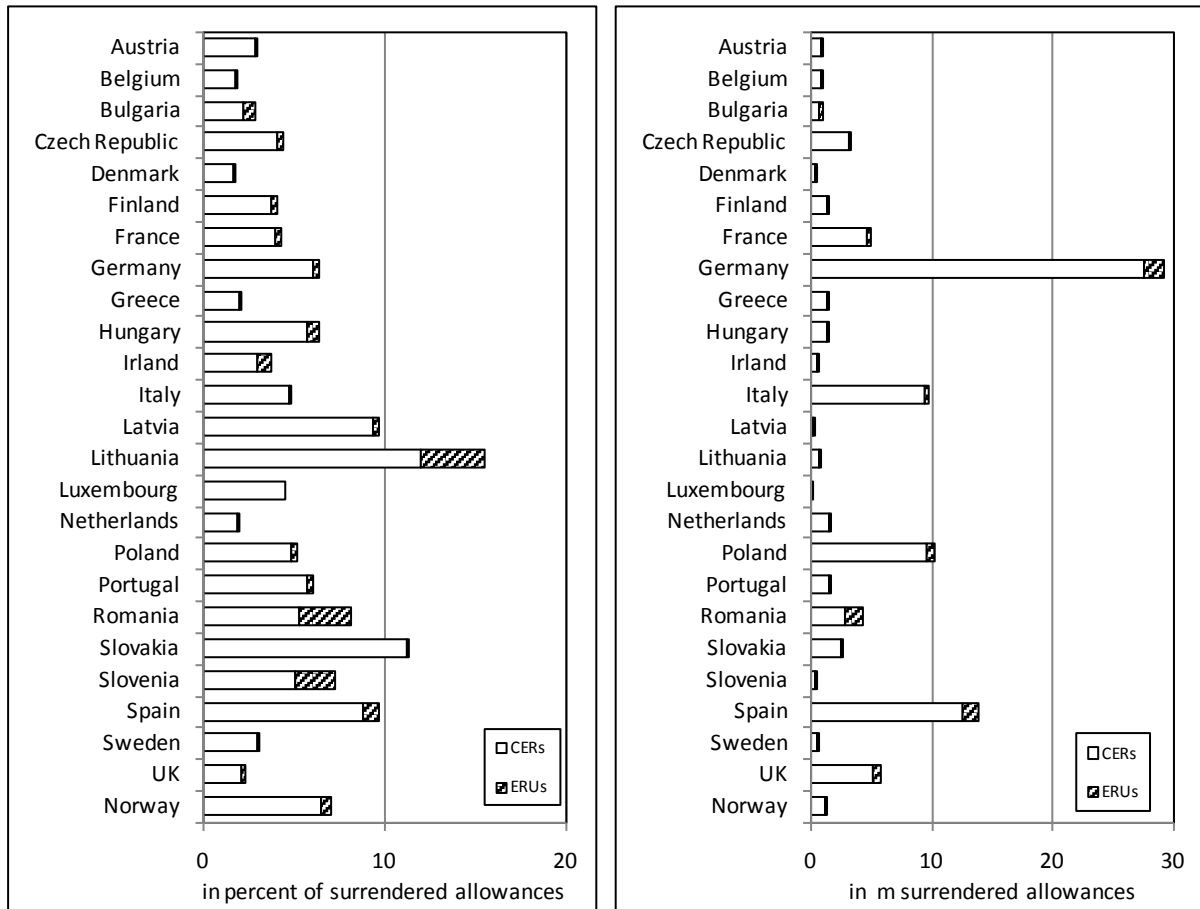
The European private sector is the largest buyer on the CER market¹² (see Capoor and Ambrosi, 2009; Kosoy and Ambrosi, 2010). The share of CERs and ERUs in surrendered allowances is, however, relatively small compared to the share of EUAs and the limits defined in the National Allocation Plans. On average in the period 2008 to 2010 92.6 million of CERs and 7.8 million of ERUs have been submitted by the EU Member States. This corresponds to 4.6% and 0.4% of surrendered allowances respectively. The highest relative share in CER and ERU imports accrues to Lithuania (16%) and Slovakia (11%). In absolute terms, Germany, Spain, Italy and Poland have been the largest importers of credits from JI and CDM projects (see Figure 6 and Table A - 13ff in the Appendix).

¹⁰ The JI mechanism is defined in Article 6 of the Kyoto Protocol. Credits from project based emission reductions in Annex-I countries - so called Emission Reduction Units - may be used for compliance in other Annex-I countries.

¹¹ The CDM mechanism is defined in Article 12 of the Kyoto Protocol. Credits from project-based emission reductions in non-Annex-I countries – so called Certified Emission Reductions (CERs) – may be used for compliance in Annex-I countries.

¹² In the second trading phase, EU ETS installations may surrender approximately 1,400 million of CERs and ERUs (14% of EU allocation) for compliance.

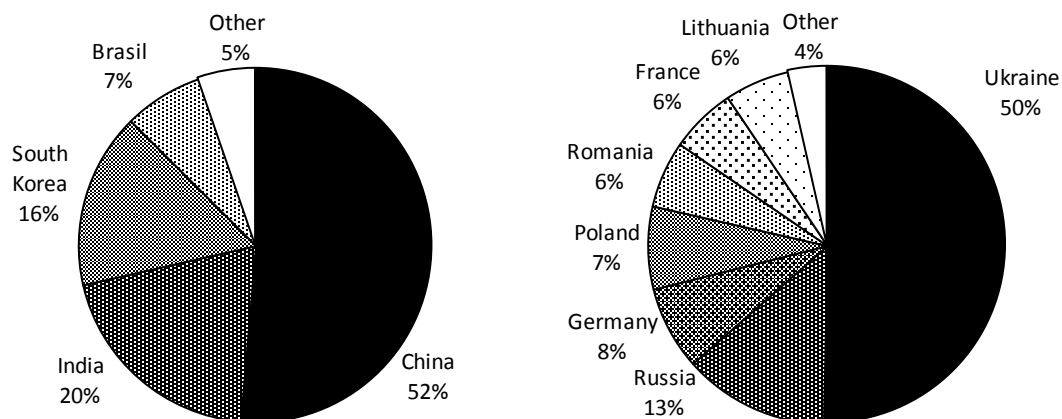
Figure 6. CER and ERU imports in percent of surrendered allowances (left) and in million (right).



Source: CITL, own calculations.

The largest exporters of CERs and ERUs to the EU ETS are shown in Figure 7. Four countries dominate CER exports to EU Member States: China, India, South Korea and Brazil. Imports from these countries account for more than 95% of total EU CER imports. ERUs surrendered by EU installations mainly originate from the Ukraine which accounts for more than 50% of ERU imports. A significant share of ERUs (13%) also originates from Russia. One third of surrendered ERUs originates from EU Member States.

Figure 7. Exporters of CERs (left) and ERUs (right); average values for the second trading phase.



Source: CITL, own calculations.

5 Conclusions

In the preparations of the second trading period the European Commission played a stronger role compared to the first trading period. National Allocation Plans had to be adjusted according to the Commission's demands in order to ensure that the overall Kyoto target of the European Union, a greenhouse gas emissions reduction of 8% by 2012 compared to 1990, stays in reach.

Our analysis shows a higher overall stringency of the 2008 allocation caps compared to the first trading period reflecting the stronger role of the European Commission. In 2009, however, the effects of the economic crisis became visible: Emissions plumped and hence the cap was not binding. For 2010 we still find a non-binding cap despite rising emissions. While in the first trading phase regional differences in the stringency of the cap prevailed – i.e. New Member States generally exhibited higher net long positions than the EU-15 – our analysis does not confirm this for the second trading phase. This again can be attributed to the stronger caps ensured by the European Commission.

With respect to cross border trade we show that imported EUAs accounted only for a small share in surrendered allowances in the first trading phase. In the second trading phase the share of imported EUAs in surrendered allowances increased significantly compared to the first trading phase. The share of CERs and ERUs in total surrendered allowances is, however, still relatively small.

One would presume that net exports and imports of EUAs by country highly correlate with the countries' net long and short positions respectively. Our analysis of the first trading phase, however, indicates that some countries became net importers of EUAs despite a surplus of EUAs within the country. There are three possible explanations for this phenomenon: First, the spread of net long and short positions within countries, i.e. not all installations with surplus allowances might have sold them on the market and thus imports of allowances might have been necessary for compliance. Second, installations that are part of an international



company and were facing a shortage of allowances may have received transfers from an associate company with a surplus of allowances located in another Member State. Third, installations may have imported more EUAs than they actually needed because they anticipated higher growth of emissions. A detailed analysis will however not be possible until transaction data on installation level is available for the whole first trading period.



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Appendix

Table A - 1. Allocation and verified emissions by country in million tonnes

	Allocation										Verified emissions									
	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10				
EU	2,013.8	1,986.6	2,063.4	1,784.7	1,785.2	1,790.7	2,070.1	1,786.9	1,943.4	1,961.4	2,046.7	1,943.6	1,713.2	1,745.1	2,030.0	1,800.7				
Austria	31.0	31.3	31.3	27.8	27.7	27.9	31.2	27.8	32.2	31.7	31.7	30.0	24.0	26.8	31.9	26.9				
Belgium	56.7	58.7	58.2	53.6	54.8	54.0	57.9	54.1	53.0	52.9	52.1	54.0	44.9	45.5	52.7	48.1				
Czech Republic	93.7	93.7	93.7	84.8	85.0	85.2	93.7	85.0	80.1	81.1	85.3	79.9	72.1	73.3	82.2	75.1				
Germany	475.4	477.4	479.3	365.1	367.6	376.9	477.4	369.9	456.6	459.9	469.7	447.5	405.6	429.4	462.1	427.5				
Denmark	35.5	26.6	26.5	23.8	23.8	23.8	29.5	23.8	25.4	32.7	29.3	26.5	25.4	25.2	29.2	25.7				
Estonia	16.7	18.2	21.3	11.4	11.4	11.4	18.7	11.4	12.6	12.0	15.3	13.2	10.2	14.4	13.3	12.6				
Spain	156.5	147.2	142.2	144.0	140.4	138.8	148.6	141.1	176.7	168.2	176.2	154.5	126.9	111.9	173.7	131.1				
Finland	44.2	44.2	44.2	34.9	35.1	35.4	44.2	35.2	32.7	44.1	42.0	35.0	32.9	39.1	39.6	35.7				
France	141.3	140.9	140.7	124.7	123.8	123.2	141.0	123.9	124.9	121.8	121.7	118.7	105.5	107.9	122.8	110.7				
Greece	70.8	70.8	70.8	62.8	62.4	63.5	70.8	62.9	71.0	69.0	71.6	69.0	63.3	59.1	70.5	63.8				
Hungary	29.1	29.1	29.1	23.5	23.0	23.8	29.1	23.5	25.3	25.1	26.0	25.9	21.4	21.8	25.5	23.0				
Ireland	16.7	16.7	16.7	17.6	17.6	17.6	16.7	17.6	20.0	20.2	19.3	17.9	14.8	14.1	19.8	15.6				
Italy	209.5	198.4	196.7	193.3	188.5	180.7	201.5	187.5	219.0	218.8	212.8	203.1	168.8	174.2	216.9	182.0				
Lithuania	12.3	9.7	9.4	6.9	7.0	7.5	10.4	7.1	6.2	6.0	5.4	5.8	5.5	6.0	5.9	5.8				
Luxembourg	3.1	3.1	3.1	2.5	2.5	2.5	3.1	2.5	2.6	2.7	2.5	2.1	2.2	2.3	2.6	2.2				
Latvia	3.4	3.3	3.3	2.2	2.4	2.4	3.3	2.3	2.4	2.4	2.3	2.2	1.9	2.3	2.4	2.2				
Malta	2.1	2.2	2.3	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	1.9	1.9	2.0	1.9				
Netherlands	82.4	82.3	82.4	69.0	71.6	71.3	82.4	70.6	76.9	73.7	76.8	73.8	71.0	71.5	75.8	72.1				
Poland	233.0	233.0	233.0	187.5	188.3	191.3	233.0	189.0	200.1	206.8	207.5	193.9	182.7	190.0	204.8	188.9				
Portugal	36.1	36.1	36.1	29.5	29.8	29.9	36.1	29.7	35.8	32.4	30.5	29.2	27.2	22.0	32.9	26.1				
Romania			73.3	71.1	72.8	73.5	73.3	72.5			69.3	63.7	48.8	46.6	69.3	53.0				
Sweden	21.4	21.6	22.0	20.4	20.7	20.9	21.7	20.7	18.6	19.2	18.2	19.1	16.6	21.3	18.7	19.0				
Slovenia	9.0	8.6	8.1	8.2	8.2	8.2	8.6	8.2	8.6	8.7	9.0	8.8	8.0	8.1	8.8	8.3				
Slovakia	30.0	30.0	30.0	30.9	31.1	30.1	30.0	30.7	25.1	25.4	24.4	24.5	20.1	20.0	24.9	21.5				
UK	203.7	203.7	209.6	187.1	187.6	188.7	205.7	187.8	235.8	244.4	245.9	243.1	211.3	210.6	242.0	221.7				

Source: CITL, own calculations.

Table A - 2. Long and short positions by countries in million tonnes

	Gross short position										Gross long position										Net position			
	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10
EU	164.1	198.8	219.2	358.3	270.6	295.6	181.2	288.6	234.5	224.0	235.9	199.5	342.6	341.1	221.3	274.8	70.3	25.2	16.8	-158.9	72.0	45.5	40.1	-13.8
Austria	3.3	3.3	3.6	4.0	1.5	3.0	3.2	2.3	2.1	2.8	3.2	1.8	5.1	4.1	2.5	3.1	-1.2	-0.4	-0.5	-2.2	3.7	1.0	-0.7	0.8
Belgium	8.9	7.2	7.1	10.6	9.5	7.3	7.5	7.8	12.7	12.9	13.3	10.2	19.4	15.8	12.7	13.8	3.7	5.7	6.1	-0.3	9.9	8.5	5.2	6.0
Czech Republic	0.1	0.9	3.8	3.1	1.2	3.2	0.7	2.2	13.7	13.4	12.3	8.0	14.1	15.0	12.3	12.1	13.6	12.6	8.4	4.9	12.9	11.9	11.6	9.9
Denmark	0.1	8.0	5.4	5.0	5.3	5.0	3.3	4.9	10.2	1.8	2.6	2.4	3.7	3.6	3.6	3.0	10.1	-6.2	-2.8	-2.6	-1.6	-1.4	0.4	-1.9
Estonia	0.0	0.1	0.2	2.1	0.1	3.6	0.0	1.7	4.1	6.2	6.2	0.2	1.2	0.7	5.5	0.4	4.1	6.1	6.1	-1.9	1.1	-3.0	5.4	-1.2
Finland	0.4	3.5	2.8	3.9	5.2	8.8	0.8	5.5	11.9	3.5	5.0	3.8	7.4	5.1	5.4	5.0	11.5	0.0	2.2	-0.1	2.2	-3.7	4.6	-0.5
France	4.2	3.0	3.0	7.8	7.3	6.3	2.7	6.0	20.6	22.1	22.1	13.8	25.5	21.7	20.9	19.2	16.4	19.1	19.0	6.0	18.3	15.3	18.2	13.2
Germany	19.9	22.5	27.5	127.7	104.1	114.3	20.3	112.2	38.8	40.0	37.1	45.3	66.1	61.9	35.6	54.6	18.9	17.5	9.6	-82.3	-37.9	-52.5	15.3	-57.6
Greece	3.4	3.2	5.0	8.4	6.9	5.0	3.6	6.0	3.2	5.0	4.3	2.2	5.9	9.5	3.8	5.1	-0.2	1.8	-0.7	-6.2	-0.9	4.5	0.3	-0.9
Hungary	1.1	1.1	1.4	3.5	2.2	2.2	1.1	2.3	4.9	5.1	4.4	1.2	3.8	4.2	4.7	2.7	3.8	4.0	3.0	-2.4	1.6	2.1	3.6	0.4
Ireland	4.1	4.3	4.0	1.9	1.6	1.0	4.1	1.4	0.8	0.8	1.4	1.6	4.4	4.5	1.0	3.4	-3.3	-3.5	-2.5	-0.3	2.8	3.5	-3.1	2.0
Italy	27.3	37.2	33.0	33.9	25.7	33.2	30.9	29.2	17.7	16.7	16.8	24.1	45.4	39.7	15.5	34.6	-9.5	-20.4	-16.1	-9.9	19.7	6.5	-15.4	5.5
Latvia	0.0	0.1	0.1	0.2	0.1	0.3	0.1	0.1	1.0	1.1	1.2	0.2	0.5	0.3	1.1	0.3	1.0	0.9	1.0	0.0	0.4	0.0	1.0	0.2
Lithuania	0.0	0.2	0.2	0.2	0.2	0.7	0.0	0.3	6.0	3.8	4.1	1.3	1.6	2.2	4.5	1.6	6.0	3.6	4.0	1.0	1.4	1.5	4.5	1.3
Luxembourg	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.6	0.5	0.6	0.4	0.4	0.3	0.6	0.3	0.6	0.5	0.6	0.4	0.3	0.2	0.5	0.3
Malta	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.3	0.1	0.2	0.3	0.2	0.2	0.1	0.2	0.3	0.1	0.2	0.3	0.2	0.2
Netherlands	5.9	5.7	7.9	12.2	10.5	11.2	6.1	10.3	11.5	14.3	13.5	7.4	11.1	11.0	12.7	8.9	5.6	8.6	5.6	-4.8	0.6	-0.2	6.6	-1.5
Poland	2.1	3.4	5.8	14.2	8.9	13.3	2.3	10.9	35.0	29.6	31.3	7.8	14.5	14.5	30.5	11.0	32.9	26.2	25.5	-6.4	5.6	1.2	28.2	0.1
Portugal	1.8	1.3	0.6	3.0	3.5	0.8	0.6	1.6	2.1	5.0	6.2	3.3	6.1	8.7	3.8	5.2	0.3	3.7	5.6	0.2	2.6	7.9	3.2	3.6
Romania	0.0	0.0	4.5	6.1	2.0	1.6	4.5	2.7	0.0	0.0	8.4	13.4	26.1	28.5	8.4	22.2	0.0	0.0	4.0	7.4	24.1	26.9	4.0	19.4
Slovakia	0.0	0.6	0.2	0.3	0.2	0.3	0.1	0.3	5.0	5.3	5.8	6.7	11.2	10.4	5.2	9.4	5.0	4.7	5.7	6.4	11.0	10.1	5.1	9.2
Slovenia	0.1	0.4	1.1	0.9	0.4	0.5	0.5	0.5	0.5	0.3	0.3	0.2	0.5	0.6	0.3	0.4	0.4	-0.2	-0.8	-0.6	0.1	0.1	-0.2	-0.1
Spain	32.4	33.2	47.0	31.9	21.2	15.6	36.2	20.6	12.2	12.2	13.0	21.4	34.6	42.5	11.2	30.5	-20.2	-21.1	-34.0	-10.5	13.5	26.9	-25.1	9.9
Sweden	3.1	3.4	3.1	4.8	5.0	6.8	3.1	5.4	5.9	5.9	6.9	6.1	9.1	6.4	6.1	7.1	2.8	2.4	3.7	1.3	4.1	-0.4	3.0	1.7
UK	45.7	56.2	51.8	72.7	48.3	51.5	49.7	54.5	13.7	15.5	15.4	16.6	24.7	29.6	13.3	20.7	-32.1	-40.7	-36.3	-56.0	-23.6	-21.9	-36.4	-33.8

Source: CITL, own calculations.

Table A - 3. Allocation and verified emissions by sector in million tonnes

	Allocation										Verified emissions									
	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10	2005	2006	2007	2008	2009	2010	Ø05/07	Ø08/10				
EU	2,013.8	1,986.6	2,063.4	1,784.7	1,785.2	1,790.7	2,070.1	1,786.9	1,943.4	1,961.4	2,046.7	1,943.6	1,713.2	1,745.1	2,030.0	1,800.7				
Cement and Lime	183.8	182.9	191.6	193.9	195.4	197.8	191.4	195.7	171.9	176.1	189.8	176.0	142.2	143.1	184.2	153.7				
Ceramics	15.6	15.7	15.8	16.4	16.7	16.8	15.9	16.6	13.2	13.3	13.7	12.1	8.3	8.3	13.6	9.6				
Glass	21.0	20.9	21.2	20.3	20.5	20.5	20.4	18.9	19.0	19.3	18.7	16.1	16.7	16.7	19.2	17.1				
Iron and Steel	185.0	184.7	196.8	199.7	200.1	199.5	196.7	199.8	150.2	155.7	166.6	157.3	110.8	135.0	164.4	134.3				
Power and Heat	1,210.6	1,186.5	1,223.1	949.6	942.2	942.2	1,233.1	944.7	1,243.0	1,253.8	1,299.6	1,214.6	1,100.2	1,098.3	1,292.8	1,137.7				
Pulp and Paper	40.3	40.4	41.0	40.1	41.1	41.4	40.9	40.9	32.4	32.4	31.8	32.2	29.0	30.6	32.4	30.6				
Refineries	147.1	145.8	151.7	143.9	144.6	147.0	152.4	145.1	137.3	136.0	141.8	141.5	133.7	130.6	141.6	135.3				
Other	189.3	188.7	201.2	204.5	208.0	208.8	197.4	207.1	159.7	158.9	168.3	176.4	158.8	167.9	165.5	167.7				
Non-specified	21.2	20.9	21.1	16.4	16.6	16.7	21.0	16.6	16.8	16.1	15.8	14.8	14.1	14.8	16.2	14.5				

Source: CITL, own calculations.

Table A - 4. Long and short positions by sector in million tonnes

	Gross short position					Gross long position					Net position													
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009									
EU	164.1	198.8	219.2	358.3	270.6	295.6	181.2	288.6	234.5	224.0	235.9	199.5	342.6	341.1	221.3	274.8	70.3	25.2	16.8	-156.9	72.0	45.5	40.1	-13.8
Cement and Lime	5.1	6.1	9.8	4.2	1.5	1.2	5.6	1.4	17.0	12.8	11.5	22.1	54.8	55.9	12.8	43.4	12.0	6.7	1.7	17.9	53.3	54.7	7.2	42.0
Iron and Steel	3.1	5.3	5.9	10.7	5.1	10.9	4.2	8.1	37.9	34.4	36.1	53.1	94.4	75.4	36.4	73.5	34.8	29.1	30.2	42.4	89.3	64.5	32.3	65.4
Power and Heat	147.1	176.5	188.5	321.9	248.3	264.6	161.3	263.0	114.7	109.2	112.0	56.9	90.3	108.5	101.6	70.0	-32.4	-67.3	-76.5	-265.0	-158.0	-156.1	-59.7	-193.0
Pulp and Paper	0.9	1.2	1.2	0.9	0.5	1.1	0.9	0.6	8.7	9.2	10.3	8.8	12.6	12.0	9.4	10.8	7.9	8.0	9.1	7.8	12.1	10.8	8.5	10.3
Refineries	2.6	2.9	5.0	6.6	5.0	4.3	3.0	4.5	12.4	12.7	14.9	8.9	15.8	20.7	13.8	14.4	9.8	9.8	9.9	2.4	10.8	16.3	10.8	9.8
Ceramics	0.6	0.8	1.2	0.3	0.1	0.1	0.7	0.1	3.0	3.1	3.4	4.6	8.4	8.6	3.1	7.1	2.4	2.4	2.1	4.3	8.4	8.5	2.4	7.0
Glass	0.5	0.6	0.8	0.6	0.3	0.4	0.6	0.3	2.5	2.5	2.8	2.3	4.7	4.2	2.6	3.6	2.0	1.9	2.0	1.7	4.3	3.9	2.0	3.3
Other	4.1	5.3	6.5	12.7	9.5	12.3	4.8	10.2	33.6	35.0	39.4	40.7	58.7	53.2	36.7	49.6	29.5	29.7	33.0	28.0	49.2	40.9	31.9	39.4
Non-specified	0.2	0.2	0.3	0.4	0.3	0.7	0.1	0.3	4.6	5.0	5.6	2.1	2.9	2.6	4.9	2.4	4.4	4.7	5.3	1.6	2.6	1.9	4.8	2.0

Source: CITL, own calculations.

Table A - 5. Trading flows: Surrendered EUAs by originating country 2005 in millions

2005	Originating Countries																Σ	Im												
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT			LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	
AT	32.53	0.03			0.03	0.32	0.03		0.00		0.16	0.06				0.00	0.01		0.01		0.15					0.01	0.01	0.03	33.36	0.84
BE		54.75			0.04	0.38	0.10			0.08	0.03																	55.39	0.64	
BG																														
CY																														
CZ					6.34							0.00																6.35	0.01	
DE	0.02	0.08			0.65	467.56	0.01	0.01	0.01	0.09	0.36	0.46			0.01	0.02					0.24	0.01	0.03			0.05	469.86	2.29		
DK	0.02	0.16			0.39	0.60	31.90	0.17	0.15	0.25	0.11	0.22	0.06		0.01	0.11				0.00	0.71	0.07	0.14			0.16	35.37	3.46		
EE							12.59																			0.02		12.61	0.02	
ES	0.04	0.04			0.80	1.19	1.61	0.03	155.19	2.29	1.29	0.73	0.02	0.02	0.02	0.19			0.03		0.55		0.14			0.33	165.18	9.99		
FI						0.00		0.02		33.02	0.00	0.00														0.00	33.04	0.02		
FR		0.01			0.02	0.01	0.01			0.02	19.51	0.03			0.02	0.02					0.02					0.01	19.71	0.20		
GB	0.01	0.85			2.73	1.75	0.69	0.90	0.01	0.42	3.02	230.57		0.04	0.17	0.17				0.17	0.86		0.01		0.04	242.45	11.88			
GR												71.32															71.32			
HU													25.37														25.37			
IE		0.01			0.00	0.01	0.04	0.05		0.17	0.10	0.06		21.94							0.01						22.40	0.46		
IT	0.00				0.01	0.13			0.01		0.21				89.97	0.00											90.34	0.37		
LT									0.00						6.60	0.02											6.63	0.03		
LU															2.60												2.60			
LV															0.03	2.79											2.85	0.06		
MT																														
NL	0.00	0.20			0.72	0.35	0.05		0.01		0.21	1.22								0.00	77.49		0.00			0.04	80.35	2.86		
PL																							204.76				204.76			
PT		0.15			0.22	0.05	0.00		0.06	0.01	0.02	0.46								0.01	0.04		35.48				36.51	1.03		
RO																														
SE	0.01	0.02				0.02	0.03	0.02		0.21	0.01	0.02														19.05	19.38	0.33		
SI																										8.73	8.73			
SK		0.01			0.03	0.02				0.00	0.05	0.00			0.00											0.01	0.60	0.13		
Σ	32.62	56.30			12.00	472.40	34.46	13.79	155.46	36.47	25.14	233.87	71.32	25.44	21.99	89.99	7.14	2.60	3.03		80.07	204.84	35.80		19.72	8.74	1.97	34.63		
Ex	0.09	1.55			5.67	4.84	2.56	1.20	0.26	3.46	5.63	3.30	0.07	0.06	0.02	0.54	0.24				2.58	0.08	0.32		0.67	0.01	1.50	34.63		

Source: CITL, own calculations.

Table A - 6. Trading flows: Surrendered EUAs by originating country 2006 in millions

2006	Originating Countries																Σ	Im													
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT			LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK		
AT	29.84	0.17			0.16	0.41	0.08		0.03	0.16	0.22	0.12		0.00	0.04	0.10	0.10	0.10	0.10		0.55	0.15	0.00		0.02			0.26	32.39	2.55	
BE		53.46			0.27	0.19	0.06	0.16	0.16	0.01	0.23	0.00	0.02		0.12	0.04					0.00	0.05						0.00	54.75	1.30	
BG																															
CY																															
CZ	0.00				159.74			0.00		0.00	0.01	0.01			0.00						0.00					0.00	0.02	159.79	0.05		
DE	0.03	0.87		0.01	1.05	472.47	0.34	0.52	0.19	0.27	0.72	1.39	0.04	0.46	0.68	0.22	0.99	0.09	0.09		1.23	1.29	0.11			0.17	0.37	483.51	11.05		
DK					0.04	0.03	33.84	0.02		0.01	0.02	0.14									0.12	0.01				0.05	0.01	34.28	0.44		
EE							2.43																					2.43			
ES	0.01	0.33			0.51	1.02	0.15	0.39	187.84	0.42	0.88	1.86	0.11	0.52	0.05	0.07	0.10	0.07			0.90	1.56	1.29			0.14	0.20	198.42	10.58		
FI	0.03	0.02			0.35	0.07		0.10	0.02	42.61	0.26	0.25	0.04		0.07	0.08		0.03			0.10	0.60				0.08		44.72	2.11		
FR					0.06	0.05			0.00	238.32	0.02	0.10	0.00		0.01						0.01	0.11					0.01	238.69	0.37		
GB	0.11	2.17			3.74	2.47	0.88	3.80	1.34	1.46	4.00	216.23	0.84	1.06	0.04	0.35	1.29	0.26	0.28		4.18	2.52	0.78			0.52	3.15	251.47	35.24		
GR										0.02	0.02	69.84	0.00															69.94	0.09		
HU					0.00			0.01		0.01	0.00		26.02															26.05	0.03		
IE	0.00	0.01			0.04	0.01		0.22				0.12		21.13	0.07	0.00					0.07	0.03	0.00				21.72	0.59			
IT	0.04	0.65		0.01	2.54	2.53	0.18	0.26	0.47	0.77	2.81	2.09	0.18	0.74	0.03	330.42	0.23	0.08			0.62	2.31	0.32			0.31	0.43	348.03	17.61		
LT		0.03			0.00	0.17	0.05			0.39	0.01	0.00	0.01		5.61							0.11					6.40	0.78			
LU															2.71												2.71				
LV																		2.94										2.94			
MT																															
NL	0.02	0.05			0.02	0.05		0.01	0.03	0.17	0.44		0.01	0.01	0.01	0.15					75.60	0.13				0.01	0.00	76.73	1.13		
PL					0.10					0.00	0.01		0.01		0.02						0.00	208.12						208.26	0.14		
PT							0.00		0.00	0.02					0.02						0.00	0.01	33.02			0.00	0.01	33.08	0.06		
RO																															
SE	0.00				0.00	0.02	0.02	0.10		0.01	0.04	0.04	0.01									0.01				18.63	0.00	18.88	0.25		
SI	0.02				0.01	0.03	0.01	0.02		0.01	0.01	0.01									0.01	0.10				8.51	8.71	0.20			
SK		0.01			0.01			0.10		0.08	0.00				0.01	0.15		0.11			0.00	0.03					49.91	50.40	0.50		
Σ	30.11	57.75		0.02	168.64	479.51	35.60	8.14	190.08	45.72	248.18	222.76	71.16	28.85	21.95	331.41	8.75	3.05	3.64		83.38	217.18	35.55			19.95	8.51	54.39		85.07	
Ex	0.27	4.30		0.02	8.90	7.04	1.76	5.71	2.25	3.11	9.87	6.53	1.32	2.83	0.82	0.99	3.14	0.33	0.70		7.79	9.06	2.53			1.32	0.00	4.48		85.07	

Source: CITL, own calculations.

Table A - 7. Trading flows: Surrendered EUAs by originating country 2007 in millions

2007	Originating Countries																Σ	Im													
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT			LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK		
AT	30.42	0.00			0.11	0.31		0.00	0.01	0.04	0.14	0.08	0.03	0.03	0.01	0.03	0.04		0.04		0.13	0.37	0.01		0.01	0.01	0.03	0.07	31.77	1.35	
BE	0.21	40.27			0.14	0.23	0.01	0.01	0.59	0.12	0.65	0.04	0.01	1.47	0.04	0.83	0.62	0.38	0.01		0.23	6.84	0.08		0.03			52.87	12.60		
BG																															
CY																															
CZ	0.00	0.08		0.01	82.26	0.16	0.07	0.11	0.14	0.04	0.09	0.95	0.48	0.48	0.12	0.10	0.00	0.01	0.01	0.26	2.02	0.23		0.07			0.59	87.79	5.53		
DE	0.44	3.07			5.37	450.05	0.52	0.83	0.82	2.47	5.68	6.56	0.05	2.07	0.18	1.04	1.38	0.18	0.18	5.89	4.03	0.82		1.00			1.04	493.79	43.73		
DK	0.01	0.03			0.08	0.25	16.00	0.60	0.81	0.19	0.43	0.43	0.24	0.24	1.20					0.06	0.05	0.12		0.14			0.22	20.45	4.45		
EE		0.02				0.03	0.00	24.92														0.04					25.02	0.09			
ES	0.23	1.31		0.01	2.23	1.25	0.72	0.64	158.36	1.07	3.75	2.09	0.03	0.59	0.06	0.99	0.45	0.03	0.54	2.29	6.65	1.88		0.43			0.75	186.33	27.98		
FI	0.17	0.09			0.57	0.15	0.06	0.15	0.01	38.73	0.62	0.53	0.21	0.02	0.13			0.04	0.04	0.04	0.50	0.14		0.25			0.10	42.50	3.77		
FR	0.01	0.06		0.04	0.17	0.09	0.04		0.43	0.27	123.46	0.22	0.02	0.02	0.06	0.09			0.06	0.11	1.62	0.07		0.02			0.06	126.86	3.41		
GB	0.28	7.07		0.14	7.36	7.07	3.13	0.59	1.25	3.23	13.57	172.30	0.33	1.75	0.08	3.09	3.95	0.30	0.30	13.49	15.24	0.99		0.63			0.96	256.80	84.50		
GR	0.02	0.01				0.00				0.03	0.01	71.77	0.01	0.01	0.01				0.01	0.01	0.82	0.00					0.02	72.71	0.93		
HU		0.01			0.15	0.03		0.03	0.02		0.13	0.01	27.09							0.02	0.23						0.00	27.73	0.65		
IE	0.07			0.02	0.02	0.04	0.02	0.29	0.02	0.12	0.02	0.24			21.16	0.12	0.03	0.04	0.04	0.01	0.02	0.17		0.00			0.02	22.45	1.28		
IT	0.41	0.53		0.21	1.14	2.75	0.48	1.79	1.05	0.30	3.52	2.04	0.07	0.34	0.06	211.59	0.90	0.77	0.77	0.54	4.81	0.88		0.26			2.50	237.02	25.44		
LT						0.00		0.00	0.00	0.00				0.02	0.03	5.77	0.00	0.00	0.30	13.49	15.24	0.99		0.63			0.00	6.10	0.34		
LU																2.57				0.01	0.82	0.00					0.02	72.71	0.93		
LV													0.00	0.00	0.03		2.82			0.01	0.82	0.00					0.00	2.85	0.03		
MT																															
NL	0.10	2.73		0.05	1.06	2.44	0.22	0.56	0.34	0.79	1.91	1.06	0.08	0.38	0.01	0.15	0.60	0.23	0.23	63.72	2.31	0.07		0.17			0.00	0.85	79.86	16.14	
PL	0.04	0.18		0.01	0.07	0.20	0.10	0.00	0.09	0.00	0.26	0.61	0.02	0.07	0.00	0.03	0.02	0.04	0.04	0.02	207.96	0.02		0.01			0.25	210.02	2.06		
PT	0.01					0.01	0.00	0.00	0.21		0.02	0.00	0.00	0.00	0.05					0.00	0.00	31.05		0.00				31.36	0.31		
RO		0.01			0.74	0.04		0.04	0.01	0.03	0.05	0.01	0.18	0.25	0.13	0.07				0.23	1.39			66.28	0.18	0.03	0.03	69.70	3.42		
SE	0.00	0.01			0.08	0.16	0.03	0.03	0.00	0.14	0.04	0.12	0.00	0.00	0.08	0.01	0.01	0.01	0.01	0.01	0.11	0.01		19.37			0.01	20.20	0.83		
SI	0.02				0.01	0.37	0.01	0.05	0.06	0.00	0.02	0.18	0.00	0.01	0.02	0.02	0.04	0.04	0.04	0.09	0.09	0.02		0.04			8.14	9.18	1.04		
SK	0.00	0.01			0.02			0.00	0.00	0.08	0.05	0.05	0.01	0.01	0.07	0.05				0.01	0.14						23.92	24.37	0.45		
Σ	32.44	55.50		0.49	101.58	465.66	21.42	30.64	163.42	48.16	154.25	187.53	72.78	34.86	21.71	218.21	15.53	3.29	5.07	87.14	255.51	36.57	66.28	22.62	8.24	31.43			240.34		
Ex	2.02	15.23		0.49	19.32	15.60	5.42	5.72	5.06	9.42	30.79	15.23	1.00	7.77	0.55	6.62	9.76	2.25	2.25	23.43	47.54	5.52	3.26	0.10	7.50	240.34					

Source: CITL, own calculations.

Table A - 8. Trading flows: Surrendered EUAs by originating country 2008 in millions

2008	Originating Countries																Σ	Im															
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT			LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	U	NO		
AT	26.46	0.09			0.30	1.37			0.06	0.03	0.60	1.22		0.01	0.00						0.20		0.03	0.62							31.01	4.55	
BE	0.01	44.66			0.16	0.48	0.01	0.01	0.25	0.03	0.52	1.04	0.08	0.00	0.25	0.05	0.01	0.03			0.47	5.12	0.02	0.25	0.02	0.00	0.53			54.00	9.33		
BG																																	
CY																																	
CZ	0.00	0.21			77.78	0.01		0.01	0.01			0.04			0.14						0.04			0.03			0.29			78.55	0.77		
DE	0.99	3.55			10.72	409.74	0.85	0.00	2.98	0.79	5.21	6.57		0.03	0.09	0.52			0.03	7.48		0.32	0.05	0.61	0.06	0.80			451.36	41.62			
DK					0.16	0.01	26.98			0.01		0.01			0.00						0.10		1.82	0.02		0.01			29.02	2.03			
EE						0.01		13.47	0.00	0.00											0.30	0.04	0.10	0.18	0.08	0.01	0.26			142.55	5.58		
ES	0.08	0.10			0.79	1.21	0.32	0.00	136.97	0.03	0.79	1.03	0.00	0.02	0.13	0.11					0.05	0.12	0.09	0.11	0.11	0.04	0.17		0.19	39.92	4.07		
FI	0.03	0.33			0.13	0.73	0.01	0.01	0.07	35.86	0.05	1.17	0.06	0.00	0.01	0.09	0.47	0.02			0.13	0.11	0.03	0.04	0.05	0.09			118.35	4.18			
FR	0.01	0.12			0.09	2.00			0.16	0.02	114.16	1.22	0.01	0.00	0.08	0.02					6.96	0.01	0.96	0.01	0.23	0.20			259.90	27.75			
GB	0.07	1.14			1.81	10.38	0.27		1.61	0.40	2.48	232.15	0.17	0.00	0.13	0.86	0.04						0.02						69.66	0.04			
GR									0.01	0.00	0.02		69.62								0.00	0.02	0.00	0.01	0.01	0.00	0.05		32.09	0.91			
HU	0.00	0.00			0.02	0.12	0.00	0.00	0.33	0.00	0.03	0.29	0.00	31.18	0.00	0.01	0.01	0.00			0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00		
IE	0.00	0.22			0.22	0.04			0.11		0.23			18.62	0.01								0.00	0.21					19.67	1.05			
IT	0.82	0.34			1.26	4.93	0.07		2.57	0.04	0.97	5.39	0.00	0.12	0.31	195.14	0.04				0.16	0.03	0.23	0.31	0.23	0.20		0.01	213.18	18.04			
LT					0.04	0.12			0.06	0.04	0.04	0.00	0.00		0.01	5.25					0.02		0.02	0.07	0.03	0.06			5.76	0.51			
LU																													2.01	2.01	0.09		
LV										0.06	0.02								2.55										2.64	0.09			
MT																																	
NL		0.01			0.28	0.48	0.37		0.14	0.01	0.45	1.60	0.01		0.00	0.05	0.01	0.00			77.91		0.00	0.08	0.03	0.08			81.52	3.62			
PL	0.20				0.07	0.12	0.00		0.22	0.00	0.11	0.16	0.00	0.00	0.15	0.03					0.01	198.15	0.00	0.13	0.01	0.00	0.05	199.42	1.27				
PT	0.02	0.00			0.13	0.12	0.04		0.16	0.04	0.10	0.11	0.01		0.15						0.16		26.79	0.05	0.00	0.00	0.05	27.92	1.14				
RO	0.00	0.40			0.07	0.10	0.00		0.12	0.01	0.04	0.11	0.01		0.06	0.00					0.01	0.02	0.01	61.67	0.00	0.03	62.66	0.99					
SE	0.03	0.00			0.07	1.11	0.12		0.12	0.10	0.14	0.07		0.00	0.00	0.04					0.67		0.00	0.01	17.01	0.00	0.02	19.51	2.50				
SI									0.00	0.00																8.05		8.05	0.00				
SK	0.00	0.34							0.02												0.02	0.00				22.83		23.22	0.39				
LI																											0.02	0.02	0.02	0.02	0.02		
NO	1.38	0.44			0.84	3.61	0.02		0.16	0.41	0.98	2.92	0.00	0.00	0.03	0.05					0.46	0.03	0.00	0.23	1.12	0.02	0.06	6.36	19.14	12.78			
Σ	30.11	51.96			94.73	436.86	29.12	13.49	146.15	37.84	126.69	255.37	69.99	31.31	19.14	197.20	6.67	2.03	2.64		95.14	203.65	30.45	64.10	19.56	8.18	25.77	0.02	6.56	143.33			
Ex	3.65	7.30			16.94	27.12	2.13	0.02	9.18	1.99	12.52	23.21	0.37	0.13	0.52	2.06	1.41	0.02	0.09		17.23	5.50	3.66	2.43	2.55	0.13	2.94	0.20	143.33				

Source: CITL, own calculations.

Table A - 9. Trading flows: Surrendered EUAs by originating country 2009 in millions

2009	Originating Countries																											Σ	Im			
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK			U	NO	
AT	26.10	0.03			0.04	0.05	0.00		0.13	0.04	0.07	0.03	0.01	0.01	0.01	0.15	0.04		0.00		0.03	0.01	0.01	0.08	0.04	0.01	0.02		0.00	0.00	26.91	0.81
BE	0.00	36.65			0.08	1.89	0.02		0.76	0.02	0.39	4.73	0.01	0.01	0.01	0.12	0.02				0.02	0.55	0.07	0.17	0.01	0.00	0.03		0.00	45.54	8.88	
BG			69.92																			0.00								69.93	0.00	
CY																																
CZ					69.88	0.34			0.00	0.01	0.01	0.00	0.13						0.02		0.02	0.02	0.23				0.03			70.66	0.79	
DE	1.48	4.18			6.11	331.76	0.55	0.03	7.13	1.19	4.94	14.85	1.24	0.95	0.28	3.77	1.12	0.03	0.16		6.09	3.39	1.08	4.95	1.16	0.17	2.35		4.32	405.28	71.53	
DK	0.04	0.02			0.15	0.00	21.62	0.00	0.09	0.02	0.07	0.27	0.02	0.03	0.01	0.16	0.01		0.01		0.01	0.09	1.33	0.16	0.08	0.00	0.10		0.11	24.40	2.78	
EE								9.14	0.02		0.57	0.09	0.01														0.24			10.07	0.93	
ES	0.03	0.14			0.09	1.80	0.27	0.00	130.42	0.28	0.61	0.87	0.06	0.18	0.06	0.24	0.20	0.00	0.02		0.10	1.22	0.39	0.41	0.11	0.03	0.25		0.05	137.82	7.40	
FI	0.03	0.17			0.01	0.88	0.07		0.22	27.91	0.27	0.99	0.00	0.00	0.00	0.01	0.04		0.01		0.00	0.20	0.01		0.08		0.02		0.11	31.02	3.12	
FR	0.01	0.27			0.02	0.07	0.00		0.91	0.00	104.39	0.27	0.00	0.28	0.12	0.00	0.01				0.01	0.05	0.23	0.01	0.00	0.00	0.22		0.00	106.87	2.49	
GB	0.39	0.78			2.11	11.73	0.32	0.08	3.77	1.20	2.44	185.04	0.55	1.72	0.50	3.29	0.60	0.00	0.22		1.44	3.45	0.65	4.12	0.29	0.15	1.46		1.57	227.85	42.82	
GR						0.00			0.03			63.46					0.00							0.00						63.51	0.04	
HU	0.01	0.01			0.05	0.11	0.02	0.00	0.23	0.02	0.21	0.18	0.01	12.91	0.01	0.06	0.01	0.00	0.01		0.05	0.13	0.04	0.44	0.03	0.00	0.05		0.06	14.66	1.74	
IE		0.27				0.06			0.01	0.02	0.01	0.02	0.01	0.01	16.32	0.09					0.14	0.01	0.01	0.02		0.03			16.99	0.67		
IT	0.08	0.24			0.14	1.60	0.01	0.00	1.34	0.10	0.45	3.23	0.22	0.08	0.03	169.21	0.12				1.05	0.38	0.06	0.98	0.07	0.00	0.11		0.48	180.00	10.79	
LT	0.00	0.09			0.03	0.00			0.05	0.00	0.00	0.00	0.02	0.02	0.02	3.75					0.11	0.01	0.00	0.15		0.00	0.00			4.25	0.49	
LU																2.16														2.16		
LV						0.00		0.00		0.04						0.01			1.95											2.00	0.05	
MT																																
NL	0.03	0.58			0.36	3.12	0.03	0.00	0.55	0.12	0.15	0.58	0.01	0.05	0.00	1.04	0.07		0.00		71.29	0.39	0.02	1.60	0.10	0.01	0.09		0.12	80.31	9.02	
PL	0.01	0.06			0.08	0.58	0.00	0.00	0.18	0.02	0.11	0.41	0.08	0.02	0.02	0.10	0.20		0.00		0.09	178.30	0.03	0.09	0.05	0.00	0.03		0.01	180.47	2.17	
PT	0.11	0.06			0.03	1.14	0.06		0.19	0.03	0.48	0.26		0.01	0.02	0.08	0.00				0.08	0.02	25.48	0.04		0.01			28.11	2.63		
RO		0.15										0.00				0.01						0.00	45.09			0.12			45.38	0.28		
SE	0.02	0.13			0.05	0.23	0.12	0.03	0.21	0.98	0.10	0.38	0.01	0.05	0.01	0.11	0.03	0.00	0.01		0.08	0.21	0.04	0.12	13.97	0.01	0.06		0.11	17.08	3.11	
SI												0.00			0.00						0.00		0.00			7.55			7.55	0.00		
SK		0.00			0.02	0.00	0.00		0.01	0.00	0.00	0.00	0.00	0.00	0.00				0.00		0.00	0.00	0.00	0.00		20.33		0.00	20.37	0.03		
LI																											0.01		0.01	0.01		
NO	0.42	1.03			0.84	1.61	0.21	0.02	1.36	1.41	0.08	0.84	0.50	1.00	0.12	0.07	0.11		0.10		0.03	0.03	0.01	0.11	0.52	0.01	0.54		7.73	18.68	10.95	
Σ	28.75	44.84	69.92		80.11	357.00	23.30	9.32	147.60	33.37	115.35	213.03	66.33	17.31	17.40	178.65	6.35	2.21	2.52		80.60	188.45	29.22	59.00	16.52	7.95	26.10	0.01	14.67	183.52		
Ex	2.64	8.18			10.23	25.24	1.68	0.18	17.18	5.47	10.97	28.00	2.86	4.40	1.07	9.44	2.60	0.05	0.57		9.31	10.16	3.74	13.90	2.54	0.40	5.77		6.94	183.52		

Source: CITL, own calculations.

Table A - 10. Trading flows: Surrendered EUAs by originating country 2010 in millions

2010	Originating Countries																Σ	Im															
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT			LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	U	NO		
AT	25.87	0.10			0.06	0.40	0.01	0.01	0.19	0.08	0.26	0.68	0.04	0.08	0.03	0.14	0.07	0.01	0.01	0.48	0.29	0.05	0.37	0.06	0.01	0.18				0.23	29.72	3.85	
BE	0.02	43.55	0.11		0.20	1.43	0.34		1.32	0.07	0.43	0.21	0.06	0.25	0.04	0.07	0.03	0.01	0.04	0.06	0.14	0.30	0.49	0.11	0.05	0.25				0.00	49.58	6.03	
BG			30.49										0.03																		30.53	0.04	
CY																																	
CZ	0.00	0.02			69.15	0.30	0.00		0.10		0.00	0.21	0.00			0.00				0.05	0.01	0.52			0.04						70.42	1.27	
DE	0.03	0.11	0.05		0.11	411.18	0.00	0.00	0.75	0.07	0.07	1.52	0.07	0.09	0.03	0.90	0.12		0.00	0.16	0.13	0.03	0.19	0.52		0.05			1.52	417.69	6.51		
DK	0.04	0.04	0.00		0.12	0.02	20.10		0.22	0.04	0.13	0.29	0.07	0.06	0.02	0.23	0.03		0.01	0.03	0.20	0.10	0.25	0.28	0.02	0.16		0.07	22.53	2.43			
EE	0.03					0.16		10.50	0.07		0.44	0.01				1.39				0.46	0.52		0.66	0.08		0.03			14.34	3.84			
ES	0.20	0.09	0.02		0.11	0.48	0.04		95.14	0.19	0.56	2.82	0.05	0.13	0.18	0.84	0.06		0.05	2.07	0.59	0.37	1.29	0.07	0.01	0.11		0.59	106.05	10.90			
FI	0.03	0.16	0.01		0.07	0.34	0.03	0.02	0.52	30.13	0.41	1.84	0.20	0.02	0.40	0.24	0.17		0.01	0.06	0.14	0.19	0.25	0.15	0.01	0.80		0.06	36.24	6.11			
FR	0.01	1.04	0.17		0.20	1.23	0.05	0.00	0.72	0.18	100.49	0.28	0.04	0.01	0.00	0.52	0.02		0.04	0.57	0.90	0.01	2.87			0.80		0.04	110.18	9.70			
GB	0.53	0.47	0.35		2.28	7.57	0.89	0.00	2.30	0.23	1.56	192.92	0.72	1.08	1.30	3.93	0.65	0.06	0.11	2.40	3.30	0.87	2.80	0.47	0.11	2.02		1.00	229.92	37.00			
GR						0.03				0.04	0.06	56.14				0.00													56.27	0.13			
HU	0.04	0.01	0.02		0.12	0.02	0.00		0.19	0.01	0.11	0.16	0.03	19.63	0.01	0.06	0.02		0.01	0.04	0.17	0.02	0.20	0.18	0.00	0.05		0.00	21.10	1.47			
IE	0.00	0.26			0.03	0.72			0.26	0.00	0.05	0.79		0.01	13.75	0.02			0.02	0.02	0.09	0.12	0.01			0.07		0.00	16.23	2.48			
IT	0.03	0.37	0.23		0.10	3.30	0.24	0.00	0.97	0.07	1.30	1.70	0.34	0.36	0.09	164.89	0.05		0.01	0.24	0.33	0.12	1.30	0.13	0.08	0.16	0.00	0.18	176.61	11.72			
LT		0.14			0.04	0.00			0.02	0.49				0.01		4.60				0.10			0.03		0.00	0.00			5.43	0.84			
LU																		2.07											2.07				
LV										0.01	0.02					0.07			2.79										3.01	0.22			
MT																																	
NL	0.12	0.27	0.10		0.13	1.88	0.22	0.00	0.65	0.21	2.00	2.84	0.01	0.33	0.01	3.38	0.02		0.01	64.77	1.86	0.54	2.56	0.12	0.01	0.36		0.01	82.40	17.63			
PL	0.02	0.04	0.07		0.07	1.38	0.14		1.92	0.14	1.28	1.54	0.04	0.09	0.01	0.48	0.03		0.05	0.27	175.88	0.18	0.43	0.01	0.03	0.20		0.07	184.38	8.50			
PT	0.00	0.00			0.00	0.02	0.01		0.27	0.01	0.01	0.03			0.02	0.02				0.00		22.19	0.00			0.01			22.60	0.41			
RO			0.02						0.00	0.00			0.01	0.02	0.01						0.00		39.01			0.01			39.08	0.07			
SE	0.03	0.00	0.01		0.04	0.45	0.08		0.22	0.56	0.07	0.45		0.00	0.01	0.33	0.07		0.01	0.04	0.14	0.01	0.05	19.23	0.01	0.02		0.01	21.84	2.61			
SI												0.00								0.00		0.47							7.63	0.48			
SK			0.02							0.00				0.17	0.01					0.00	0.01		0.00						17.32	0.23			
LI																													0.00				
NO	0.10	0.20	0.24		0.17	1.35	0.09	0.05	1.71	0.07	0.40	1.96	0.09	0.03	0.11	0.59	0.15		0.02	0.26	0.50	0.14	0.36	0.06	0.03	0.20		7.08	15.96	8.88			
Σ	27.10	46.88	31.91		72.99	432.28	22.26	10.58	107.54	32.06	110.12	210.34	57.92	22.18	16.18	178.03	6.16	2.14	3.19	72.02	185.26	25.26	54.16	21.58	7.51	22.62	0.00	10.86	143.34				
Ex	1.22	3.33	1.42		3.84	21.10	2.16	0.07	12.39	1.93	9.63	17.42	1.79	2.55	2.42	13.15	1.56	0.07	0.40	7.26	9.38	3.07	15.15	2.35	0.35	5.53	0.00	3.79	143.34				

Source: CITL, own calculations.

Table A - 11. Trading flows: Average surrendered EUAs in the first trading period by originating country in millions

Ø2005/07	Originating Countries																				Σ	Im							
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT	LT	LU	LV	MT			NL	PL	PT	RO	SE	SI	SK
AT	30.93	0.07			0.10	0.34	0.04	0.00	0.01	0.07	0.17	0.09		0.01	0.00	0.02	0.04	0.05	0.05		0.28	0.17	0.00		0.02	0.01	0.10	32.51	1.58
BE	0.07	49.49			0.15	0.27	0.06	0.06	0.25	0.04	0.32	0.03	0.00	0.50	0.01	0.32	0.22	0.13	0.00		0.08	2.30	0.03		0.01		0.02	54.34	4.85
BG																													
CY																													
CZ	0.00	0.03		0.00	82.78	0.05	0.02	0.04	0.05	0.01	0.03	0.32		0.16		0.04	0.03	0.00	0.00		0.09	0.67	0.08		0.02		0.20	84.64	1.86
DE	0.16	1.34		0.00	2.36	463.36	0.29	0.45	0.34	0.94	2.25	2.80	0.03	0.84	0.29	0.42	0.80	0.09	0.09		2.45	1.78	0.32		0.41		0.56	482.39	19.03
DK	0.01	0.06			0.17	0.29	27.25	0.27	0.05	0.36	0.11	0.26		0.10		0.00	0.44	0.00	0.00		0.30	0.04	0.09		0.12		0.12	30.03	2.79
EE		0.01				0.01	0.00	13.31														0.01			0.01			13.35	0.04
ES	0.09	0.56		0.00	1.18	1.16	0.82	0.35	167.13	1.26	1.97	1.56	0.04	0.38	0.04	0.35	0.25	0.03	0.19		1.25	2.74	1.11		0.30		0.55	183.31	16.18
FI	0.07	0.04			0.31	0.07	0.02	0.09	0.01	38.12	0.29	0.26	0.08	0.01		0.02	0.07	0.02	0.02		0.05	0.36	0.05		0.11		0.03	40.09	1.97
FR	0.00	0.02		0.01	0.08	0.05	0.01		0.14	0.10	127.10	0.09	0.04	0.01		0.02	0.04				0.05	0.58	0.02		0.01		0.04	128.42	1.33
GB	0.14	3.36		0.05	4.61	3.76	1.56	1.76	0.87	1.70	6.86	206.37	0.39	0.94	0.05	1.15	1.80	0.09	0.25		6.17	5.92	0.59		0.40		1.44	250.24	43.87
GR	0.01	0.00				0.00				0.02	0.01	70.98	0.00	0.00		0.00	0.00				0.00	0.28	0.01				0.01	71.32	0.34
HU		0.00			0.05	0.01		0.01	0.01		0.05	0.00		26.16							0.01	0.08	0.00			0.00	0.01	26.38	0.22
IE	0.03	0.01		0.01	0.02	0.02	0.02	0.19	0.01	0.10	0.04	0.14			21.41	0.06	0.01	0.00	0.01		0.03	0.02	0.06		0.00		0.01	22.19	0.78
IT	0.15	0.39		0.08	1.23	1.81	0.22	0.68	0.51	0.36	2.18	1.38	0.09	0.36	0.03	210.66	0.38	0.00	0.28		0.39	2.38	0.40		0.19	0.02	0.97	225.13	14.47
LT		0.01			0.00	0.06	0.02	0.00		0.00	0.13	0.00	0.00	0.01		0.01	5.99	0.01	0.01			0.13	0.00			0.00	0.00	6.38	0.38
LU																		2.63										2.63	
LV					0.01									0.00		0.02	0.02	2.85								0.00	0.00	2.88	0.03
MT																													
NL	0.04	0.99		0.02	0.60	0.95	0.09	0.19	0.13	0.26	0.77	0.91	0.03	0.13	0.01	0.05	0.25	0.01	0.08		72.27	0.81	0.03		0.08	0.00	0.31	78.98	6.71
PL	0.01	0.06		0.00	0.06	0.07	0.03	0.00	0.03	0.00	0.09	0.21	0.01	0.03	0.00	0.02	0.01	0.01	0.01		0.01	206.95	0.01		0.00		0.08	207.68	0.73
PT	0.00	0.05			0.07	0.02	0.00	0.00	0.09	0.00	0.02	0.15		0.00		0.02	0.00	0.00	0.00		0.01	0.00	33.18		0.00	0.01	33.65	0.47	
RO		0.00			0.25	0.01		0.01	0.00	0.01	0.02	0.00	0.06	0.08	0.04		0.02				0.08	0.46		22.09	0.06	0.01	0.01	23.23	1.14
SE	0.00	0.01			0.03	0.06	0.02	0.05	0.00	0.12	0.03	0.06	0.00	0.00		0.03	0.00	0.00	0.00		0.00	0.04	0.00		19.02	0.00	19.49	0.47	
SI	0.01				0.01	0.13	0.01	0.02	0.02	0.00	0.01	0.06	0.00	0.00		0.01	0.01	0.01	0.01		0.03	0.06	0.01		0.01	8.46	8.87	0.41	
SK	0.00	0.01			0.02	0.01		0.03		0.00	0.07	0.02		0.00		0.03	0.07	0.04	0.04		0.00	0.06			0.00	0.00	24.77	25.12	0.56
Σ	31.72	56.52		0.17	94.07	472.52	30.49	17.52	169.65	43.45	142.52	214.72	71.75	29.72	21.89	213.20	10.47	2.98	3.91		85.53	225.84	35.98	22.09	20.76	8.50	29.26	120.01	
Ex	0.79	7.03		0.17	11.30	9.16	3.25	4.21	2.52	5.33	15.43	8.35	0.77	3.56	0.47	2.54	4.48	0.35	1.06		11.26	18.89	2.79	1.75	0.04	4.50	120.01		

Source: CITL, own calculations.

Table A - 12. Trading flows: Average surrendered EUAs in the second trading period by originating country in millions

02008/10	Originating Countries																											Σ	Im			
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK			U	NO	
AT	26.15	0.07			0.13	0.61	0.01	0.00	0.13	0.05	0.31	0.64	0.01	0.03	0.02	0.10	0.04	0.00	0.00	0.24	0.10	0.03	0.36	0.03	0.01	0.07				0.08	29.21	3.07
BE	0.01	41.62	0.04		0.15	1.26	0.12	0.00	0.77	0.04	0.45	1.99	0.05	0.09	0.01	0.14	0.03	0.01	0.02	0.19	1.94	0.13	0.30	0.05	0.02	0.27			0.00	49.70	8.08	
BG			33.47										0.01																	33.48	0.01	
CY																																
CZ	0.00	0.08			72.27	0.22	0.00		0.04	0.00	0.00	0.08	0.04		0.05	0.00		0.01	0.01	0.02	0.00	0.00	0.26							73.21	0.94	
DE	0.83	2.61	0.02		5.65	384.22	0.47	0.01	3.62	0.68	3.41	7.65	0.44	0.34	1.11	1.59	0.59	0.01	0.06	4.58	1.17	0.48	1.73	0.76	0.08	1.07			1.95	424.11	39.88	
DK	0.02	0.02	0.00		0.14	0.01	22.90	0.00	0.10	0.02	0.07	0.19	0.03	0.03	0.01	0.13	0.01		0.01	0.01	1.08	1.08	0.14	0.12	0.01	0.09			0.06	25.32	2.42	
EE	0.01	0.00				0.06		11.04	0.03	0.00	0.34	0.03	0.00		0.46					0.19	0.17		0.23	0.03		0.09			12.67	1.63		
ES	0.10	0.11	0.01		0.33	1.16	0.21	0.00	120.85	0.17	0.65	1.57	0.04	0.10	0.08	0.40	0.12	0.00	0.02	0.82	0.62	0.28	0.63	0.09	0.01	0.21			0.21	128.81	7.96	
FI	0.03	0.22	0.00		0.07	0.65	0.04	0.01	0.27	31.30	0.24	1.34	0.09	0.01	0.14	0.11	0.22		0.01	0.04	0.15	0.09	0.12	0.11	0.02	0.33			0.12	35.73	4.43	
FR	0.01	0.47	0.06		0.10	1.10	0.02	0.00	0.60	0.07	106.35	0.59	0.02	0.10	0.00	0.24	0.01	0.00	0.01	0.23	0.35	0.01	1.05	0.02	0.00	0.37			0.01	111.80	5.45	
GB	0.33	0.80	0.12		2.07	9.90	0.49	0.03	2.56	0.61	2.16	203.37	0.48	0.93	0.64	2.69	0.43	0.02	0.11	3.60	2.25	0.83	2.31	0.33	0.09	1.23			0.86	239.22	35.85	
GR						0.01			0.01	0.00	0.02	0.02	63.07				0.00					0.01	0.00							63.14	0.07	
HU	0.02	0.01	0.01		0.06	0.09	0.01	0.00	0.25	0.01	0.11	0.21	0.02	21.24	0.01	0.05	0.01	0.00	0.01	0.03	0.11	0.02	0.22	0.07	0.00	0.05			0.02	22.61	1.37	
IE	0.00	0.25			0.01	0.34	0.01		0.13	0.00	0.02	0.34		0.01	16.23	0.04			0.01	0.05	0.03	0.04	0.08		0.03				0.00	17.63	1.40	
IT	0.31	0.32	0.08		0.50	3.28	0.11	0.00	1.63	0.07	0.91	3.44	0.19	0.19	0.14	176.41	0.07		0.00	0.48	0.25	0.14	0.86	0.14	0.03	0.16			0.00	189.93	13.52	
LT	0.00	0.07			0.04	0.04			0.05		0.18	0.01	0.00	0.01		0.01	4.53			0.08	0.00	0.01	0.08	0.01	0.00	0.02				5.15	0.61	
LU																2.08														2.08		
LV						0.01		0.00		0.03	0.01	0.01					0.03		2.43				0.00	0.03		0.00				2.55	0.12	
MT																																
NL	0.05	0.29	0.03		0.26	1.83	0.21	0.00	0.45	0.11	0.86	1.67	0.01	0.12	0.00	1.47	0.05	0.00	0.01	71.32	0.75	0.19	1.41	0.08	0.00	0.18				81.41	10.09	
PL	0.08	0.03	0.02		0.07	0.69	0.05	0.00	0.77	0.05	0.50	0.70	0.04	0.03	0.01	0.24	0.09		0.02	0.12	184.11	0.07	0.22	0.02	0.01	0.09			0.03	188.09	3.98	
PT	0.04	0.02			0.05	0.43	0.03		0.21	0.03	0.20	0.13	0.00	0.00	0.01	0.08	0.00			0.08	0.01	24.82	0.03	0.00	0.00	0.02				26.21	1.39	
RO	0.00	0.19	0.01		0.02	0.03	0.00		0.04	0.00	0.01	0.04	0.01	0.01	0.00	0.02	0.00			0.00	0.01	0.00	48.59	0.00	0.05				49.04	0.45		
SE	0.03	0.04	0.00		0.05	0.60	0.11	0.01	0.18	0.55	0.10	0.30	0.00	0.02	0.00	0.15	0.05	0.00	0.01	0.26	0.12	0.02	0.06	16.74	0.01	0.03			0.04	19.48	2.74	
SI									0.00		0.00	0.00				0.00				0.00			0.16		7.58					7.74	0.16	
SK	0.00	0.11	0.01		0.01	0.00	0.00		0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.00			0.00	0.01	0.01	0.00			20.09				20.30	0.22		
LI																														0.01	0.01	
NO	0.63	0.55	0.08		0.62	2.19	0.11	0.02	1.08	0.63	0.48	1.91	0.19	0.34	0.08	0.23	0.10		0.04	0.25	0.18	0.05	0.23	0.57	0.02	0.27			7.05	17.93	10.87	
Σ	28.65	47.89	33.95		82.61	408.71	24.89	11.13	133.76	34.43	117.39	226.25	64.75	23.60	17.57	184.63	6.39	2.13	2.78	82.59	192.46	28.31	59.09	19.22	7.88	24.83	0.01	10.70		156.73		
Ex	2.51	6.27	0.47		10.34	24.49	1.99	0.09	12.92	3.13	11.04	22.88	1.67	2.36	1.34	8.21	1.86	0.05	0.35	11.27	8.35	3.49	10.49	2.48	0.30	4.75	0.00	3.64		156.73		

Source: CITL, own calculations.

Table A - 13. Trading flows: Surrendered CERs and ERUs by originating country 2008 in millions

2008	Originating Countries														Σ											
	AR	BO	BR	CL	CN	CO	EC	EG	GT	HN	ID	IL	IN	JO		KR	MX	MY	PE	PG	PH	PK	SV	VN	ZA	NZ
AT			0.35		0.21	0.00						0.23	0.26	0.00												1.07
BE			0.13		0.27							0.87	0.19	0.08												1.55
BG																										0.00
CY			0.01		0.14							0.10	0.06												0.00	0.30
CZ			0.15		0.37							0.41	0.89	0.01											0.00	1.85
DE			2.41	0.02	6.96						10.83	2.59	0.65	0.07							0.00		0.18			23.72
DK					0.29						0.08	0.21														0.58
EE																										0.00
ES	0.01		0.19	0.00	14.16	0.01	0.07			0.00		1.87	1.35	0.04	0.01						0.01					17.72
FI			0.02		0.27				0.00			0.32	0.43	0.20	0.00								0.20			1.45
FR			0.88		1.87							2.05	0.75	0.21												5.76
GB			0.80	0.31	1.11	0.00			0.01	0.00		1.24	0.41	0.60											0.05	4.49
GR			0.01		0.12	0.03					0.02	0.85	0.10	0.01											0.00	0.19
HU			0.14		0.68							0.12	0.15													1.78
IE			0.12		0.33							1.08	1.81	0.04	0.03								0.65	0.00		0.71
IT	0.00		0.29		3.51	0.00					0.09	0.32	0.03													7.40
LT			0.01		0.01						0.02	0.02														0.47
LU					0.07																					0.09
LV					0.02								0.08													0.10
MT																										0.00
NL			0.22		0.39						0.80	0.58										0.00				1.99
PL	0.02		0.41	0.03	1.36						1.42	1.30	0.10											0.02		4.64
PT	0.01				0.32						1.00	0.64									0.01					1.99
RO	0.05				0.39				0.00		0.33	0.10	0.02								0.00					0.89
SE			0.06		0.13						0.39	0.02														0.59
SI	0.01		0.07	0.04	0.41						0.11	0.11	0.05													0.80
SK	0.00		0.13		0.47						1.10	0.39	0.01													2.12
LI																										0.00
NO					0.04						0.12	0.02												0.02		0.21
Σ	0.10		6.42	0.40	33.91	0.04	0.07		0.01	0.00	25.44	12.78	2.04	0.10	0.00						0.03		1.03	0.05	0.05	82.43

Source: CITL, own calculations.

Table A - 14. Trading flows: Surrendered CERs by originating country 2009 in millions

2009	Originating Countries																	Σ								
	AR	BO	BR	CL	CN	CO	EC	EG	GT	HN	ID	IL	IN	JO	KR	MX	MY		PE	PG	PH	PK	SV	VN	ZA	
AT			0.03	0.00	0.18			0.02					0.09		0.06											0.39
BE			0.06		0.44								0.07		0.06	0.01										0.63
BG																										
CY																										
CZ			0.36	0.00	0.44							0.43			1.75	0.01					0.04				0.00	3.03
DE	0.02	0.04	2.24	0.13	13.79			0.01			0.00	0.00	6.60		2.52	0.31	0.13			0.06			0.09	0.05	26.00	
DK			0.01	0.00	0.08							0.01			0.03									0.00	0.13	
EE																										
ES	0.00		0.46	0.08	5.87	0.00	0.00		0.00	0.01	0.00	0.98			0.64	0.09				0.00				0.01	8.17	
FI			0.37	0.01	0.39			0.01	0.00			0.11			0.30				0.00				0.00		1.20	
FR			0.45		1.69					0.00	0.07	0.82			0.84	0.03					0.01			0.01	0.01	3.91
GB	0.13	0.18	0.39	0.07	2.10					0.00	0.02	1.55			0.44	0.02		0.00			0.01			0.06	4.95	
GR	0.00		0.01		0.05							0.04			0.03										0.13	
HU	0.01		0.16		0.69							0.25			0.09	0.05								0.02	1.28	
IE			0.01		0.16							0.04			0.01										0.22	
IT	0.06		0.30	0.00	4.98			0.00			0.01	1.57			1.21	0.06	0.00				0.08			0.00	8.29	
LT	0.02		0.06		0.73							0.14			0.13	0.00									1.08	
LU					0.02																				0.02	
LV			0.01		0.27							0.16			0.01	0.01					0.02				0.48	
MT																										
NL	0.05		0.04		0.39				0.00			0.18			0.10						0.01				0.76	
PL	0.07		0.78		4.72	0.00		0.01				2.31			2.24	0.05				0.00	0.06			0.04	10.27	
PT			0.07		1.15							0.18			0.05									0.08	1.53	
RO	0.22		0.19		2.01							0.64			0.32	0.00			0.02					0.01	3.40	
SE			0.06	0.01	0.11	0.00			0.00			0.20			0.04									0.00	0.43	
SI			0.04		0.24							0.08			0.01	0.01									0.37	
SK			0.22	0.01	0.64						0.01	0.21			0.13	0.00								0.01	1.23	
U																										
NO	0.00				0.18							0.14			0.01										0.00	0.33
Σ	0.58	0.22	6.35	0.31	41.34	0.01	0.00	0.03	0.02	0.00	0.02	0.10	16.79	11.00	0.65	0.13	0.00	0.02	0.00	0.02	0.00	0.28	0.09	0.31	78.24	

Source: CITL, own calculations.

Table A - 15. Trading flows: Surrendered ERUs by originating country 2009 in millions

2009	Originating Countries														Σ
	BG	CZ	DE	FR	HU	LT	PL	RO	NZ	RU	UA				
AT														0.00	0.00
BE														0.00	0.00
BG															
CY															
CZ					0.10										0.10
DE			0.21			0.00								0.47	0.67
DK															
EE															
ES											0.04				0.04
FI						0.00					0.13				0.13
FR				0.15							0.15				0.30
GB								0.02			0.20				0.22
GR											0.02				0.02
HU			0.01								0.01				0.02
IE															
IT											0.29				0.29
LT			0.02			0.01					0.43				0.46
LU															
LV											0.01				0.01
MT															
NL															
PL			0.00				0.00				0.26				0.26
PT															
RO			0.10								0.22				0.33
SE															
SI						0.04					0.13				0.17
SK															
U															
NO			0.21												0.21
Σ			0.54	0.15	0.10	0.05	0.00	0.00	0.02		2.36				3.23

Source: CITL, own calculations.

Table A - 16. Trading flows: Surrendered CERs by originating country 2010 in millions

2010	Originating Countries																Σ								
	AR	BO	BR	CL	CN	CO	EC	EG	GT	HN	ID	IL	IN	JO	KR	MX		MY	PE	PG	PH	PK	SV	VN	ZA
AT			0.12		0.79							0.22	0.07												1.19
BE			0.05		0.29							0.20	0.02	0.01											0.57
BG			0.02		1.76						0.05	0.10	0.25								0.11				2.30
CY			0.07		0.24							0.03	0.32												0.65
CZ	0.00		0.83		1.88							0.00	0.15	1.75	0.00						0.03		0.00	0.01	4.67
DE	0.13		1.57	0.10	16.98	0.01	0.00	2.92	0.02		0.00	0.06	2.98	0.24	7.75	0.22					0.07			0.32	33.37
DK			0.05		0.56					0.00		0.04													0.65
EE																									
ES	0.55		1.05	0.00	6.69		0.01			0.00		0.00	1.44	1.98	0.11	0.19	0.00				0.14			0.01	12.17
FI	0.01		0.07	0.11	1.05				0.01			0.14	0.24	0.01											1.64
FR	0.01		0.37		2.51							0.77	0.66	0.06							0.02			0.03	4.41
GB	0.01		0.65	0.15	4.20		0.05				0.00	0.48	0.56	0.10							0.00			0.01	6.20
GR			0.05		2.93							0.14	0.51	0.02										0.00	3.65
HU	0.00		0.05		0.91							0.07	0.01	0.11									0.00		1.14
IE	0.01				0.52							0.17	0.03												0.73
IT	0.18		0.96	0.09	8.16		0.03			0.00	0.05	1.46	1.48	0.07			0.00				0.15		0.01	0.25	12.88
LT			0.00		0.47							0.17		0.00											0.65
LU			0.02		0.16				0.00			0.01													0.19
LV					0.19							0.00		0.02											0.21
MT																									
NL			0.08	0.04	1.16		0.01					0.03	0.20	0.35	0.02						0.03			0.00	1.92
PL	0.11		0.77	0.05	7.97		0.02				0.00	1.75	2.80	0.28							0.03		0.14	0.00	13.91
PT			0.01	0.00	0.64	0.00						0.25	0.37								0.00				1.28
RO	0.01		0.11	0.02	3.09							0.76	0.00	0.30	0.01						0.01	0.00	0.02		4.33
SE			0.04		0.42							0.31	0.02	0.00											0.79
SI			0.01		0.06						0.00	0.01	0.02	0.02											0.12
SK	0.00		0.05		2.48						0.08	0.93	0.76	0.03							0.03			0.00	4.36
U																									
NO	0.03		0.36		1.39	0.10					0.00	0.79	0.51	0.04				0.00		0.00				0.00	3.23
Σ	1.05		7.35	0.56	67.49	0.11	0.00	3.04	0.03	0.00	0.05	0.22	13.55	0.24	20.80	1.10	0.19	0.00	0.00	0.62	0.00	0.00	0.17	0.63	117.22

Source: CITL, own calculations.

Table A - 19. Trading flows: Average surrendered ERUs in the second trading period by originating country in millions

Ø2008/10	Originating Countries														Σ	
	BG	CZ	DE	FR	HU	LT	PL	RO	NZ	RU	UA					
AT						0.00									0.00	0.00
BE						0.00									0.03	0.03
BG	0.12	0.01					0.00								0.10	0.23
CY																
CZ		0.00			0.03	0.03	0.12								0.07	0.25
DE			0.22	0.13	0.00	0.11	0.11	0.18	0.00	0.10	0.76				1.62	1.62
DK						0.00										0.00
EE																
ES	0.00	0.00	0.15	0.07	0.02	0.06	0.21	0.00	0.00		0.70				1.21	1.21
FI						0.02	0.01		0.00		0.06				0.09	0.09
FR			0.00	0.06			0.00				0.26				0.33	0.33
GB				0.06	0.01	0.05	0.03	0.05	0.06		0.36				0.63	0.63
GR								0.00			0.01				0.01	0.01
HU			0.00	0.00		0.06	0.04	0.00			0.07				0.17	0.17
IE				0.01	0.00	0.03					0.09				0.13	0.13
IT						0.00		0.03			0.22				0.25	0.25
LT			0.01			0.03		0.01			0.17				0.22	0.22
LU																
LV											0.01				0.01	0.01
MT																
NL						0.00	0.01				0.02				0.03	0.03
PL	0.00		0.01	0.07	0.00	0.04	0.03	0.04			0.49				0.69	0.69
PT			0.05	0.05							0.00				0.11	0.11
RO			0.03	0.01		0.00	0.01	0.10			0.93	0.41			1.49	1.49
SE						0.00									0.00	0.00
SI				0.01		0.02	0.02	0.04			0.10				0.18	0.18
SK						0.00					0.00				0.00	0.00
LI																
NO			0.11	0.00		0.00		0.00							0.11	0.11
Σ	0.12	0.02	0.59	0.47	0.06	0.46	0.58	0.47	0.07	1.03	3.92				7.80	7.80

Source: CITL, own calculations.