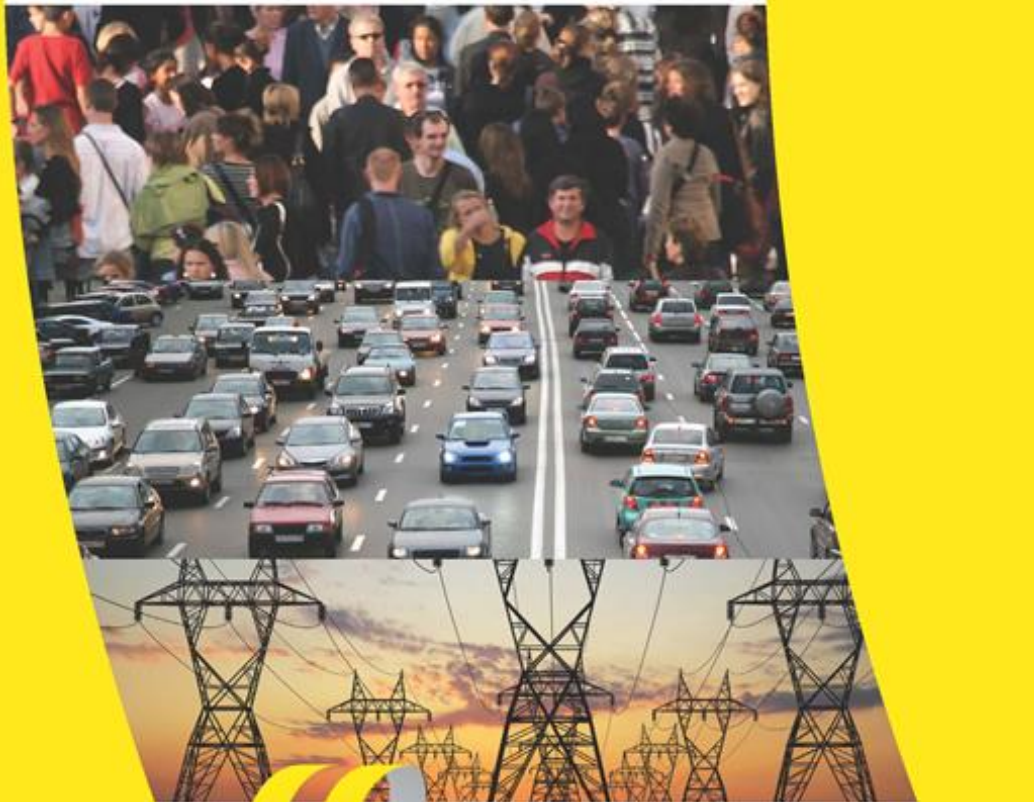
Calculation of additional profits of sectors and firms from the EU ETS



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Calculation of additional profits of sectors and firms from the EU ETS

This report was prepared by:
Sander de Bruyn
Ellen Schep
Sofia Cherif

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Further information on this study can be obtained from the contact person, Sander de Bruyn.

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Executive summary

This study has calculated the additional profits that sectors and companies have made from the EU ETS from 2008 to 2014, distinguishing between three types of profits:

1. Profits from overallocation of free emission allowances. In many sectors/countries, free allowances have been granted in excess of verified emissions, allowing industries to generate additional profits by selling this surplus in the market.
2. Profits from using CDM/JI credits for compliance. Companies were entitled to a certain extent to use cheaper CDM/JI credits for compliance. This has created additional profits since many companies have used these credits for compliance and sold the saved freely obtained allowances on the ETS market.
3. Profits from passing through the opportunity costs of freely obtained allowances. There is a ample empirical evidence that companies have been able to pass through (part of) the carbon costs in product prices. Although the allowances were granted free of charge, the majority of sectors were thus able to pass through the opportunity costs of these allowances in product prices, thus making so-called windfall profits.

Profits in each of these categories from 2008 to 2014 have been calculated for 15 sectors (in general the most polluting ones) in 19 countries. The analysis in this study differs from those in earlier studies on this subject by our having corrected for allocation of waste gases to the iron and steel industry, which have been transferred to the electricity sector on a statistical basis. In our view this yields a more accurate estimate of the extent of overallocation to the iron and steel sector compared with other studies.

Our results show that between 2008 and 2014 European industry received additional profits amounting to over 8 billion euro through overallocation. There are considerable differences in the extent of overallocation per country. Spain had the highest profits, totalling over 1.6 billion euro. In Sweden as much as 33% of emission allowances were issued in excess of verified emissions, creating substantial additional profits for Swedish industry. In relative terms, overallocation was least for Slovenia and Poland, where 88% of allocated allowances had to be used for compliance, leaving 1/8 of allowances for sale on the carbon market. It was above all through between 2008 and -2012 that additional profits were made through overallocation.

In addition, the 15 sectors selected for more detailed calculations profited from using CERs for compliance, yielding an estimated profit of over 630 million euro. In relative terms, industry in France has benefited most from this source of profits. The largest additional profit category derived from passing through carbon costs. In a minimum variant we estimated that the additional profits in this category totalled over 15 billion euro for the 15 sectors in the 19 countries investigated. In Germany industry earned over 3 billion euro from windfall profits, while in the United Kingdom the figure was over 2 billion euro. In an average variant of cost pass-through rates, these additional profits may have been even higher and could amount to 26 billion euro.

To some extent, the revisions in Phase 3 of the EU ETS have tackled the problem of overallocation to industry through introduction of benchmarks and the cross-sectoral correction factor, although in some industries and countries the problem of overallocation still exists. The additional profits generated through conversion of cheap CERs into EUAs and pass-through of carbon costs have thus far not been addressed, however.

Content

1 Introduction

1.1 Background

The EU ETS is the cornerstone of the climate policies of the European Union. Through the EU ETS about 45% of GHG emissions are being regulated from the entire electricity generation and the majority of the industry sector. When measured in size, the EU ETS is the largest emission trading system in the world. It serves as a blueprint for many emission trading systems being currently designed worldwide.

Last year the 10th anniversary of the carbon reduction policy instrument was celebrated. However, despite the size, impact and durability of the EU ETS, the policy instrument has been criticized from the outset. The critiques especially relate to the potential lack of regulatory incentives that stem from the system, especially when evaluated as being additional to the other climate policy instruments.[1] This is most pressing for sectors, such as industry, that have largely been set free from auxiliary regulatory instruments because they participate in the EU ETS. The main purpose of the upcoming revision for Phase 4 of the ETS (2021-2030) is therefore to try to set the incentives right so the EU ETS can steer companies in their transformation towards a low-carbon economy.

One of the particular annoyances of the present system of the ETS has been the lobbying from industrial organisations for more free allowances. Industry sponsored research, such as Copenhagen Economics (2015) for the fertilizer industry, has suggested that industrial sectors would require free allowances above present emissions in order to stay competitive. Politicians, confronted with a regulatory system that is complex to understand, often lend their ears to such claims that sound reasonable at first sight. However, such studies often lack a proper assessment of the costs and benefits associated with the system.

Against the background of such studies and claims, this study aims to identify and calculate the potential profits that companies have received under the EU ETS so far. This study makes clear that industry, so far, has massively benefitted from the EU ETS due to generous allocation of free allowances, widespread possibilities to use cheap international credits for compliance and the general tendency to base prices on marginal costs which include cost pass-through of a large share of their freely obtained allowances. These benefits may not have received enough exposure. This study builds upon earlier work by Carbon Market Watch (CMW, 2015) by quantifying these benefits in a transparent way.

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[1] Some ex-post investigations have claimed that the EU ETS so far has not really contributed to emission reduction additional to the existing renewable energy support schemes. Others, e.g. (CE Delft, 2015), have argued that although the scheme has contributed to emission reductions in e.g. the UK power market when prices rose above the € 20/tCO_2, the present system has been so overfloaded with free allowances that the regulatory impact has been minimalized.

1.2 Objective

The objective of this project is to deliver a report containing a country-by-country analysis of the additional profits that sectors and companies have made from the EU ETS between 2008-2014. The analysis will focus on fifteen sectors with substantial carbon emissions. The analysis will be undertaken for nineteen countries: all the EU MS that are part of the OECD minus Luxembourg. For each of these countries, a top-20 list will be published of companies receiving most additional profits from the ETS.

The choice for MS that are also part of the OECD is driven by the fact that for these countries a uniform methodology can be created for treatment of waste gases in the ETS. The choice for excluding Luxembourg is given that Carbon Market Watch has already published a report analysing the Luxembourg situation in the ETS.

1.3 Delineation

1.3.1 Definition of additional profits

Additional profits have been defined here as profits stemming from three categories:

- Overallocation of free emission allowances. Free allowances have often been granted in excess to the verified emissions so that industry received more free allowances than they needed being able to sell the surplus on the market or to bank them if they expect that this is more profitable due to future price increases.
- Use of CDM/JI credits for compliance. In this case companies have used cheaper international credits from the Kyoto Protocol's market mechanisms, e.g. the Clean Development Mechanism (CDM) or Joint Implementation (JI), for compliance instead of their free allowances. They have instead sold the remaining free allowances on the market (or banked them for compliance in later years).
- Passing through carbon costs. Although the allowances have been granted for free, the majority of sectors were able to pass through the opportunity costs of these allowances into product prices obtaining so-called windfall profits according to the research literature on this topic.

Eventual other profits or costs associated with the EU ETS (e.g. higher electricity prices or compensations received for indirect cost price increases or profits and losses from hedging behaviour on the carbon markets) have not been taken into account in this study.

1.3.2 Definition of countries

The analysis has been undertaken for nineteen countries (all of the EU MS that are also part of the OECD, minus Luxembourg). The countries are:

- Austria;
- Belgium;
- Denmark;
- Finland;
- France;
- Germany;
- Greece;
- Ireland;
- Italy;
- The Netherlands;

- Portugal;
- Spain;
- Sweden;
- United Kingdom;
- Poland;
- Hungary;
- Czech Republic;
- Slovak Republic;
- Slovenia.

1.3.3 Delineation of sectors

The analysis has been undertaken for several sectors that have the highest carbon emissions in the ETS, excluding electricity, heat and aviation. Some additional sectors have been included since some companies that are active one carbon intensive sector tend to have installations in other sectors as well. The following sectors have been included in this study.

- Refineries 19.20;
- Extraction of crude petroleum and gas 06.10;
- Iron and Steel 24.10;
- Manufacture of coke oven products 19.10;
- Cement 23.51;
- Lime 23.52;
- Petrochemicals 20.14;
- Inorganic chemicals 20.13;
- Industrial gases 20.11;
- Manufacture of plastics in primary form 20.16;
- Fertilizers 20.15;
- Flat glass 23.11;
- Hollow glass 23.13;
- Other glass 23.14;
- Manufacturing of bricks 23.32.

1.3.4 Delineation of companies

We use in this research, next to sectors and installations, individual companies by linking the installations to their legal owners. This provides additional information on the total net profits for individual companies. We take here as an entity, as much as possible, the company that publishes an annual financial report as one company. Moreover, only the installations that fall under the abovementioned fifteen sectors are taken into account in the calculus.
If, e.g., a company active in the manufacturing of bricks (NACE 23.32), also has installations that produce tiles (NACE 23.31), these installations are not being attributed to this individual company.

1.4 Differences with Sandbag

The present study slightly differs with respect to analysis and data used from that of other organisations. We have used for this report data from an in-house developed database of individual installations that are further differentiated towards economic sectors, products and legal ownership taking into account publicly available data and combining various databases. This in-house developed database contains over 16,000 installations and is coupled with additional statistical information, such as Eurostat.

Sandbag has published a range of studies containing analysis of the additional profits companies have received from overallocation of free allowances.

Our analysis is in design very similar to Sandbag and results should be more or less similar. Nevertheless there are a few differences between our analysis and that of Sandbag (see e.g. Sandbag, 2013).

1. For linking the installations to companies we have used the databases maintained by University of Florence combined with the EUTL registry and our own analysis, while Sandbag has set up their own database. There may thus be (small) differences by allocating installations to companies.

2. For linking installations to economic sectors we use information from the EC augmented with information obtained through the national emission authorities in a couple of countries and web-based research conducted at CE Delft. There may thus be (small) differences by allocating installations to sectors.

3. With respect to waste gases, Sandbag has appointed these from information from the iron and steel plants which includes an assessment of potential shortages of allowances at appointed power installations. In our research we have based this on statistical information on waste gases from IEA statistical sources at the sectoral level[2].

4. Sandbag is capable of allocating the iron and steel waste gases transfers to individual installations while in our analysis we cannot do this. Instead we have attributed the overall calculated transfers per ratio of the verified emissions if more than one iron and steel company is active in a given country.

5. We have calculated additional profits from passing through the carbon costs as an alternative source of potential profits, while Sandbag has not quantified these so far.

In general our calculations are more precise at the sectoral level than at the company level. At the sectoral level our estimations are the best guess of additional profits given the present state of knowledge and statistical information on both emissions, sectoral coverage and costs passed-through. At the company level our level must be regarded as an estimate. This is because the analysis on waste gases and costs passed-through have essentially been quantified at the sectoral level and subsequently been evenly distributed among the companies active in these sectors. No attempt has been made to take into account potential differences in price settings or waste gases between firms in a specific sector.

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2 Sandbag (2013) states: *"After initially identifying a shortlist of the most oversupplied companies using the EU Transaction Log and Sandbag's company database (which assigns companies to ETS installations), we double check our information on installation ownership with these companies and ask them to identify any waste gas transfers we have not accounted for that would mitigate their surpluses [....]. In most cases, commercial sensitivity has prevented companies from giving us precise information about the scale of allowances transferred. Instead they have typically identified the installations that receive their waste gases and advised us to use any EUA shortfalls these installations face as a proxy for the waste gases and EUAs they receive. This is the methodology we have applied within this report using waste gas donors and recipients that have been identified by the companies, and additional installations we have identified through our own research. We note, however, that this methodology is likely to produce a systematic bias which exaggerates the scale of allowances transferred and therefore underestimates the surpluses each company holds. This is because combustion installations generally face a shortfall of allowances independently of whether or not they are waste gas recipients. This bias has been confirmed in the rare cases where companies have been able to share precise figures with us."*

2 Methodological approach

2.1 Introduction

In this chapter we aim to give the methodological background for each of the additional profit components. As stated above, three components have been used for calculating the additional profits:

1. **Profits from overallocation**. In many countries, and for many industrial sectors, free allowances have been granted in excess to the verified emissions. This results in the fact that industry received more free allowances than they needed for compliance under the ETS regulation. The excess allowances have been either banked for future compliance or sold on the market to generate additional profits. Even if the allowances have been banked they can be considered as "additional profits" since they can be used or sold in the future.
2. **Profits from ERUs/CERs** used for compliance. Companies participating in the EU ETS are entitled to use a certain amount of ERUs/CERs for compliance. Since the costs of international credits are substantially lower than the EUA price, this contains an additional profit for companies involved as they can use the converted allowances for compliance and sell the excess freely allocated allowances on the ETS market.
3. **Profits from passing through (part) of the carbon costs.** Although the allowances have been granted for free, many studies have evidenced that the majority of sectors were able to pass through the opportunity costs of these allowances into product prices obtaining so-called windfall profits.

In this methodological chapter we will introduce in more detail the way we have calculated these additional profits.

2.2 Profits from overallocation

2.2.1 Mechanisms

Industrial installations have, in general, been overallocated in the first two phases of the ETS (2005-2012). National allocation plans, dominated in Phase 1 and Phase 2 of the EU ETS, in general tend to have favoured industrial installations at the expense of allocation to the power sector. The subsequent economic downturn in 2008 has resulted in a substantial amount surplus free allowances banked forward from Phase 2. However, there are important differences between countries and between industries in Phase 2.

This situation partly continues in Phase 3 as well. The Phase 3 allocation scheme is largely based on pre-recession activity levels and the hypothetical € 30/tCO_2 carbon price for carbon leakage assessments has prolonged largescale free allowances available for industrial installations. The additional allowances issued for free to industrial installations have in this way mitigated the impact of less allocation because of the introduction of benchmarks.

2.2.2 Calculation

The general formula for assessing the additional profits from overallocation can be given as:

$$Add.Profits\ Overallocation_{i,j,t} = \left(AE_{i,j,t} - VE_{i,j,t}\right) * P_{EUA,t}$$

Where AE = allocated emissions, VE = verified emissions, P_{EUA} is the price for emission allowances in the ETS, and subscripts i, j and t stand for company, sector and time [2008-2014] respectively. It is useful to notice that in case companies have been short of allowances (e.g. verified emissions were larger than the allocated emissions), they have experienced *costs* due to participating in the ETS. In these cases, these costs have been subtracted from the total profits.

2.2.3 Waste gases

One particular element in the ETS is that in some cases, the sector that receives allowances is a different sector than the sector that needs to verify its emissions. In this case a non-recorded transfer takes place where allowances from one sector are transferred to another sector, often at zero costs. This especially happens in the situation where waste gases from industrial processes are being used by installations that produce electricity and heat.

Waste gases occur as energy by-products in coke ovens, refineries, petrochemical installations and in the iron and steel industry. Refinery and coke oven gas typically have a CO_2 content more or less equivalent to natural gas. In that case, electricity companies do not experience a disadvantage from using these gases against natural gas. This is different, however, with respect to blast furnace gases from the iron and steel industries which tend to be much more carbon intensive than natural gas. Electricity companies subject to the EU ETS are facing a competitive disadvantage from using these gases for power and heat production compared to natural gas if they were not compensated for the higher carbon content. In these cases, the iron and steel industry has compensated electricity companies from using these gases by handing to them free allowances for the additional carbon emissions per caloric value.

The authorities thus hand these allowances to the iron and steel industry, while the emissions are recorded at the electricity company. Therefore, such emissions cannot be counted as “additional profits” from the iron and steel sector. It is part of a negotiation between the iron and steel manufacturer and the electricity companies how much free allowances they receive for the additional carbon content of the waste gases. We conservatively assume here, and in accordance with the ETS Guidance documents, that the electricity companies are compensated for the additional carbon content compared to natural gas, the least carbon intensive fossil fuel.[3]

[3] The ETS Guidance document (no. 8), also specifies that the reference value for calculation of the additional emissions should be natural gas. The reference value of natural gas can be regarded as taking a conservative approach towards the calculation of additional profits of the iron and steel sector. The additional carbon intensity of blast furnace gases have been determined at 259.4 tCO_2/TJ.

In this research we have substracted information on waste gases from the iron and steel industry from the *International Energy Agency* (IEA). This gives information on waste gases between 2008-2013. For 2014 we have taken the 2013 values. Using caloric value of blast furnace waste gases and comparing them with that of natural gas we have determined the assumed amount of emission allowances that have to be passed through to the electricity producers to be compensated for the higher carbon emissions from blast furnace gas.

2.2.4 Results

Table 1 gives the results of this analysis for the sector industry (manufacturing and mining) for the years 2008-2014 per investigated Member State. This table shows that industry in all countries, except Austria, have received more allowances than they needed for covering their emissions and thus have made additional profits from overallocation. In absolute size, industry in Spain, has received most additional profits from overallocation, which mounted to over 1.6 billion euro when expressed in value of these allowances at the price of emission allowances at the market. Other important beneficiaries have been Germany and the United Kingdom. When compared to the total amount of verified emissions, the additional profits have been largest in Sweden, Ireland and Spain respectively. In Sweden only 67% of allocated allowances were used for verification and 33% of allocated allowances could be sold for additional profits at the market. For Ireland and Spain, 27% and 26% of allocated emissions were used for creating additional profits. On the contrary, in Slovenia and Poland only 12% of allocated emissions were used for creating additional profits.

The majority of the additional profits have been established in the years 2008-2012. Since the start of Phase 3, the difference between allocated and verified emissions have been substantially lower. Where between 2008-2012 the allocated emissions to industrial installations (including mining) were almost 30% higher than the verified emissions for the 19 countries investigated, the amount of overallocation was reduced to 1.4% in 2013/14. However, the substantial overallocation in the past still creates a problem for the functioning of the ETS market as the banked allowances are still suppressing price development of the EUAs.

Table 1 Overview of verified and allocated emissions 2008-2014

	Verified	Allocated	O.w. waste gas transfers	Additional profits
Country		$MiotCO_2$		MioEur
AT	151.0	148.2	20.0	-226.3
BE	219.8	299.1	23.2	697.7
CZ	124.3	152.0	11.9	194.3
DE	916.3	1,081.9	100.8	1121.3
DK	42.8	51.7	0.0	110.1
ES	407.0	550.8	12.3	1672.5
FI	96.1	115.6	9.2	113.8
FR	507.3	603.1	30.4	817.6
GB	520.9	617.7	36.5	1,010.0
GR	92.4	120.3	0.0	359.4
HU	51.8	64.3	5.6	54.3
IE	34.0	46.8	0.0	162.9
IT	504.8	606.7	42.1	519.3
NL	254.8	304.5	32.8	236.2
PL	267.8	303.6	18.9	266.0
PT	74.4	92.5	0.0	227.3
SE	92.2	138.4	10.4	387.8
SI	12.4	14.3	0.0	15.1
SK	104.7	329.5	2.6	341.4

Sources: EUTL, IEA, EEX, own calculations.

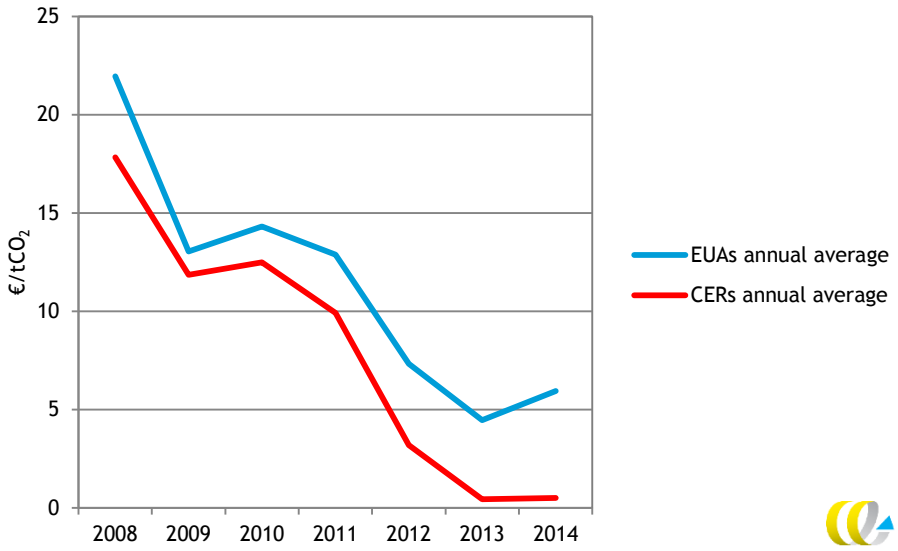
2.3 Conversion of CERS to EUAs

2.3.1 Mechanisms

Industrial companies have not only profited from the overallocation. One additional source of revenue was provided by the EU ETS directive by allowing companies to hand in a limited amount of CERs for compliance.[4] As CERs were normally cheaper than EUAs, companies received an additional profit as they received EUAs for free and used CERs for compliance (see Figure 1 of the relative annual price difference between CERS and EUAs).

[4] Article 11a of Directive 2003/87/EC (EC, 2003) provides for the use of certified emission reductions and emission reduction units from project activities before the entry into force of an international agreement on climate change, by setting up the possibility for operators to exchange such units against allowances. Directive 2004/101/EC (EC, 2004) regulated this in more detail. Commission Regulation 550/2011 of 7 June (EC, 2011) applied restrictions to the use of CERS from projects involving industrial gases.

Figure 1 Average annual prices of EUAs and CERs, 2008-2014



Note: Own calculations based on ECX. With respect to CER, emission prices are based on the Futures contract (Futures are traded on the Intercontinental Exchange).

Up to 2012 companies could hand in CERs for compliance and this was recorded in the CITL/EUTL. Since 2013, CER/ERUs no longer count as compliance units within the EU ETS and need to be exchanged prior to compliance into EUAs. The extent to which that is feasible has been laid out in Commission Regulation No 1123/2013 (EC, 2013a) (see Annex A). From 2013 and on, no information is provided in the EUTL regarding the surrendered ERU's and CER's. Therefore we did not calculate an additional value to this. We notice however, that in theory, an additional value could be calculated in future work (see Annex A).

2.3.2 Calculation

The general formula for assessing the additional profits from conversion of CERs has been calculated as:

$$Add.Profits\ Conversion_{i,j,t} = SE\_cer_{i,j,t} * (P_{EUA,t} - P_{CER,t})$$

Where SE_cer = surrendered CERs for compliance, P_{EUA} is the price for an emission allowances in the ETS, P_{CER} is the international price for CERs and subscripts i, j and t stand for company, sector and time {2008-2012] respectively. For the years 2013 and 2014 no additional profits from conversion have been calculated. Please also notice that we have not taken into account eventual profits from conversion of ERU's.

2.3.3 Results

The value of using CDM credits for compliance in the EU ETS has been calculated by us only for the top-15 sectors in the 19 countries under investigation for the years 2008-2012. In total, the additional profits mounted to over 630 million euro between 2008-2012. In absolute terms, most of the profits were generated in Germany, which gained 187 million euro from using cheaper CERs for compliance. In relative terms, industry in France profited most from using CERs for compliance.

French industry was capable of generating revenue equivalent to 25 cents per t/CO_2 from using CERs for compliance.

Although we have not calculated the exact amount of additional profits from converting CDM/JIs for 2013/14, the analysis in Annex A reveals that this source of income even increase in more recent years although quantitative information is not available at present.

2.4 Cost pass-through

2.4.1 General mechanism

Cost pass-through has been a heavily debated subject in the context of the EU ETS. The discussion refers to the question to what extent participants in the EU ETS have forwarded the opportunity costs of the freely obtained allowances forward in product prices. Many installations in the ETS receive all, or the majority, of their allowances for free. Companies use these allowances for compliances. However, they could also sell these allowances on the carbon exchange market. Economic theory predicts that companies would use these allowances up to the point where the marginal benefit of a unit additional production equals the marginal benefit of selling these allowances on the carbon markets. In other words, they would use the value of these allowances in their product prices rather than the cost of obtaining these allowances. In many areas one can observe that value rather than costs drive economic decision making. The neoclassical economic literature shows that cost pass-through of freely obtained allowances is thus likely for profit-maximising firms. However, the question whether firms do this can only be answered empirically.

In the relatively scant empirical literature that has investigated this issue, three approaches have been chosen: ex-ante modelling, ex-post econometric analysis and surveys. Ex-ante modelling has been used by e.g. Vivid Economics (2014) and they make clear that cost pass-through of freely obtained allowances is likely for the majority of sectors they have been analysing. Such observations have been restated in empirical ex-post work. An overview by CE Delft and Öko Institut (2015) shows that cost pass-through has been revealed in various ex-post studies although the exact sectoral cost pass-through rates differ between studies and are highly method-dependent. A third branch of studies has investigated common practice at companies by conducting surveys. Warwick & Ng (2012), for example, conclude that practices with respect to valuation of freely obtained allowances vary among EU firms where some firms value them (in financial accounts) with their opportunity costs, while others value them at nil value. However, as pointed out by CE Delft and Öko Institut (2015), the question is not if all firms adhere to opportunity cost pricing, the question is what competitors do if one firm raises prices because of opportunity cost pricing: do they follow the price in order to maximize profits, or do they ask a lower price to maximize market shares? Since the majority of firms, in questionnaires, regard themselves as price-takers instead of price-setters, it is more likely that they will follow eventually higher prices on product markets to obtain additional profits.

If opportunity costs are passed through in product prices, this may enhance the profitability of EU companies but come at the expanse of a potential loss in market shares since the products of EU manufacturers tend to become more expensive compared to foreign competitors from regions without carbon policies. It is important to notice that empirical work so far has not been capable to find evidence of such ‘carbon leakage’. In an extensive analytical

research study, Ecorys *et al.* (2013) were not able to find evidence of carbon leakage in the most energy-intensive sectors in the EU during Phase 1 and 2.

2.4.2 Quantitative Assessment

In the Impact Assessment accompanying the proposal for revision of the EU ETS (SWD(2015) 135 final) (EC, 2014), the European Commission has published a literature overview of available quantitative studies that have passed through the carbon costs. This literature review has later been further advanced in the study by CE Delft and Öko Institut (2015) on cost pass-through.
The EC literature review gives the following indicative values for cost pass-through.

Table 2 Overview of the range of average expected cost pass-through in selected sectors from literature according to the IA of the EC

Sector	Product	Minimum	Maximum	*# of studies*	Estimated in:
Iron and steel sector	Flat products	60%	100%	3	McKinsey(2006); Vivid Economics (2014); CE Delft (2010)
	Long products	66%	80%	2	McKinsey(2006); Vivid Economics (2014)
Cement	Portland cement, white cement	35%	70%	4	McKinsey (2006); Vivid Economics (2014); Walker (2008); Alexeevi-Talebi (2010)
Glass	Container glass	20%	50%	2	Vivid Economics (2014); Oberndorfer (2010)
	Hollow and other glass	30%	80%	3	Vivid Economics (2014); Oberndorfer (2010); Alexeevi-Talebi (2010)
Refineries	Petrol	60%	120%	5	McKinsey(2006); Vivid Economics (2014); CE Delft (2010); Alexeevi-Talebi (2011); Oberndorfer (2010)
	Diesel	40%	70%	3	McKinsey (2006); Vivid Economics (2014); CE Delft (2010); Oberndorfer (2010)
Petrochemicals	Plastics, PE, PVC, PS	25%	80%	3	CE Delft (2010); Alexeevi-Talebi (2010), Oberndorfer (2010)
Fertilizers	Fertilizer and nitrogen compounds	0%	75%	2	Alexeevi-Talebi (2010), Oberndorfer (2010)

Note: Minimum and maximum values have been determined as the average of minimum and maximum values found in the cited studies weighted by the number of products listed in the studies and our own interpretation of the quality of the estimates and assessment of the potential range.

In the report of CE Delft and Öko Institut (2015), this literature review is revised and updated with own estimations for Phase 2/3.

Table 3 gives these results.

Table 3 Overview of the range of average expected cost pass-through in selected sectors from CE Delft and Öko Institut (2015)

		Revised literature overview		New estimates Phase 2/3 (2015 EC Study)	
Sector	**Product**	**Min**	**Max**	**Min**	**Max**
Iron and steel	Flat products	60%	100%	55%	100%
	Long products	66%	80%		
Cement	Portland cement, white cement	30%	50%	90%	100%
	Total cement			20%	40%
	Clinker			35%	40%
Glass	Container glass	0%	50%		
	Glass fibres				
	Hollow and other glass	30%	60%	40%	100%
Refineries	Petrol	50%	>100%	80%	95%
	Diesel	40%	>100%	>100%	>100%
Petrochemicals	Plastics, PE, PVC, PS	25%	80%		
	PE, ethylene, butadiene, etc.			0%	>100%
Fertilisers	Fertiliser and nitrogen compounds	15%	75%	0%	>100%

From this table, and the earlier tables in de CE Delft and Öko Institut (2015) we have calculated the following minimum and maximum cost pass-through ranges for the sectors taken into account in this study.

Table 4 CPT rates used in this study

		Minimum	Average	Maximum
06.10	Extraction of crude petroleum and gas	*40%*	*70%*	*100%*
19.10	Manufacture of coke oven products	*55%*	*75%*	*100%*
19.20	Refineries	40%	70%	100%
20.11	Industrial gases*	0%	0%	0%
20.13	Inorganic chemicals**	10%	24%	37%
20.14	Petrochemicals	15%	50%	100%
20.15	Fertilizers	10%	50%	100%
20.16	Manufacture of plastics	42%	70%	100%
23.11	Flat glass***	0%	40%	80%
23.13	Hollow glass 23.13;	30%	55%	80%
23.14;	Other glass 23.14;	24%	50%	80%
23.32	*Manufacturing of bricks*^^	*30%*	*40%*	*80%*
23.51	Cement	20%	39%	58%^
23.52	Lime***	0%	40%	80%
24.10	Iron and Steel	55%	75%	100%

Notes: * Nowhere estimated in empirical work; ** Only estimated ex-post in one study for two different products; *** Only estimated in one ex-ante study which has been taken here as max. value. ^ Maximum value calculated as average from maximum values literature review and new empirical estimates for a range of products. ^^Only estimated in two studies with three results, as average value is now taken the mean value.

A few observations should be made to explain this table. For one sector, chemical industrial gases, we could not find any literature that has quantitatively estimated the amount of cost pass-through for this sector. For that reason we have set the cost pass-through for the entire sector equivalent to zero. Also for the extraction of crude petroleum and gas and the manufacture of coke oven products, there were no studies that empirically estimated the amount of cost pass-through. However, the analysis in CE Delft and Öko Institut (2015) of the iron and steel and refineries sectors showed that it is likely that emissions earlier in the chain have been passed through, otherwise the cost pass-through ranges of the iron and steel and refineries sectors would be out of range and far above what could be expected on the basis of carbon emissions of these sectors alone. Therefore, we have set the cost pass-through of the extraction of crude petroleum and gas as equivalent to that of the refineries, and for the manufacture of coke oven products equivalent to that of the iron and steel sectors.

For petrochemicals and fertilizer sector, the new empirical evidence has listed that in some cases the null hypothesis of no cost pass-through could not be rejected. Therefore, the minimum values have been slightly lowered compared to those reported in the IA of the EC (2015).

2.4.3 Calculation

The additional profits from passing through the costs into product prices have been calculated by us as follows:

$$Add.Profits\ Costpassthrough_{i,j,t,m} = cpt_{j,m} * VE_{i,j,t} * P_{EUA,t}$$

Where = verified emissions, P_{EUA} is the price for an emission allowances in the ETS, and subscripts i, j and t stand for company, sector and time {2008-2014] respectively and the subscript *m* stands for {*Minimum, Average*} to take account of the two variants for which the additional profits from cost pass-through have been calculated.

2.4.4 Results

The additional profits from passing through carbon costs has been calculated by us with the minimum and average variant only for the top-15 sectors under investigation for the years 2008-2014. For the total of 19 countries, the additional profits mounted to over 15 billion euro in the minimum between 2008-2014. If we assumed *average* cost pass-through rates, the total additional profits would increase to 26 billion euros between 2008-2014.

One should notice that this calculation does not include the potential loss in market share from higher EU product prices. As explained above, existing ex-post research (Ecorys *et al*, 2013) has not been capable of finding empirical evidence of a loss in market shares during Phase 1 and 2. As more and more countries adhere to carbon pricing, it is unlikely that this situation has changed during Phase 3 of the EU ETS. However, if one wants to be prudent on the total profits from passing through the carbon costs, it would be safer to take the minimum values here rather than the average values.

2.5 Total additional profits

The total additional profits have been calculated by adding the three categories together. Since the additional profits from cost pass-through have been calculated in two variants, we have also calculated the total additional profits in two variants: *Minimum* and *Average*. These calculations have been performed for fifteen sectors in which the top-20 companies have been identified. We have not performed such calculations at the level of the total economy, or the whole industrial sector, except for the profits from overallocation (see Paragraph 2.2.4).

3 Austria

3.1 General description

Austrian industry participating in the EU ETS is dominated by the iron and steel sector which makes up of over 50% of the Austrian industry share in the EU ETS. There are fifteen installations identified in the EU ETS registry for the iron and steel sector, but most of these installations belong to the Voestalpine Stahl firm that has plants in Linz, Leoben (Styria) and Krems (Lower Austria).

Austria is the only country where industry was confronted with an underallocation of emission rights. If waste gas transfers are included, underallocation of emission rights occurred in every year between 2008-2014, most pronouncedly in the refineries, hollow glass and iron and steel sectors.[5] This is most likely since Austria used a system of benchmarks, including BAT_REFS for reduction potentials already in Phase 2 (Fraunhofer et al., 2007). The use of CDM/JI credits for compliance was set at 10% of verified emissions by the Austrian government, which is more or less the EU average.

3.2 Detailed tables

The following tables give the verified emissions per sector and company and the estimated profits.

[5] If no correction for waste gases is made, there was only underallocation in the years 2008-2010 and 2012.

Table 5 Verified emissions (ton CO_2) and additional profits (€) per sector, Austria, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	19,483,812	-14,434,976	4,192,084	88,952,745	155,667,304	78,709,854	145,424,413
Industrial gases	-	-	-	-	-	-	-
Inorganic chemicals	123,325	3,246,023	76,551	149,950	352,382	3,472,525	3,674,957
Petrochemicals	1,738,655	1,263,309	-	3,650,966	10,952,899	4,914,276	12,216,208
Fertilizers	2,439,452	8,488,368	367,735	2,573,034	8,576,781	11,429,137	17,432,884
Manufacture of plastics in primary form	262,861	-868,691	13,577	1,251,016	2,085,026	395,902	1,229,913
Flat glass	-	-	-	-	-	-	-
Hollow glass	1,198,484	-1,381,996	205,383	4,156,530	7,620,305	2,979,917	6,443,692
Other glass	49,639	157,439	17,686	143,844	299,676	318,969	474,800
Manufacturing of bricks	1,749,540	6,422,149	278,614	6,209,998	8,279,998	12,910,762	14,980,761
Cement	18,270,989	10,084,190	3,725,695	43,374,676	84,580,617	57,184,561	98,390,503
Lime	5,285,623	4,813,829	1,343,884	-	24,114,055	6,157,712	30,271,768
Iron and steel	78,516,584	-278,947,419	3,987,240	491,004,010	669,550,923	216,043,831	394,590,744
Total	129,118,964	-261,157,774	14,208,450	641,466,770	972,079,967	394,517,447	725,130,644

Note: ** Profit CERs only for 2008-2012.

Table 6 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Austria, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
voestalpine Stahl GmbH	Iron and steel[1]	80,035,679	-278,049,012	4,426,514	486,706,579	674,070,741	213,084,082	400,448,243
OMV Refining & Marketing GmbH	Refineries	19,483,812	-14,434,976	4,192,084	88,952,745	155,667,304	78,709,854	145,424,413
Lafarge Zementwerke GmbH	Cement	6,186,665	-5,393,023	1,382,769	14,498,266	28,271,618	10,488,012	24,261,364
w&p Zement & Kalk GmbH	Cement[2]	3,816,161	10,323,045	799,526	8,128,469	18,226,293	19,251,040	29,348,864
Zementwerk Leube Gesellschaft m.b.H.	Cement	2,867,575	-2,089,233	611,909	5,013,645	13,731,001	3,536,321	12,253,678
Wopfinger Baustoffindustrie GmbH	Lime	2,509,597	4,434,225	589,907	4,077,663	11,373,534	9,101,795	16,397,666
Borealis GmbH	Fertilizers[3]	2,664,681	7,551,435	381,312	3,727,487	10,500,869	11,660,234	18,433,616
Zementwerk Hatschek GmbH	Cement	2,337,051	604,601	-	5,503,186	10,731,212	6,107,786	11,335,813
Kirchdorfer Zementwerk Hofmann GmbH	Cement	1,481,860	4,007,780	484,938	3,464,371	6,755,523	7,957,089	11,248,241
Schretter & Cie GmbH & Co KG	Cement	1,418,418	3,756,242	525,806	2,689,076	6,400,451	6,971,125	10,682,500
Jungbunzlauer Austria AG	Petrochemicals	1,369,078	941,670	-	3,036,289	9,108,867	3,977,959	10,050,538
Vetropack Austria GmbH	Manufacturing of bricks	862,246	-912,358	168,495	2,984,441	5,471,475	2,240,578	4,727,612
Wienerberger Ziegelindustrie GmbH	Manufacturing of bricks	590,303	1,794,540	76,545	2,003,367	2,671,157	3,874,452	4,542,241
Böhler Edelstahl GmbH & Co KG	Iron and steel	458,410	-687,660	85,088	2,273,850	3,100,705	1,671,279	2,498,133
"BAUMIT" Baustoffe Gesellschaft m.b.H.	Lime	345,261	-554,165	42,888	-	1,595,665	-511,277	1,084,387
Stölzle-Oberglas GmbH	Hollow glass	327,498	-525,008	36,888	1,129,539	2,070,821	641,419	1,582,701
DSM Fine Chemicals Austria Nfg GmbH & CoKG	Petrochemicals	313,388	362,700	-	556,490	1,669,471	919,190	2,032,170
Tondach Gleinstätten AG	Manufacturing of bricks	272,527	527,492	21,284	999,510	1,332,680	1,548,286	1,881,456
Ziegelwerk Eder GmbH & Co.KG.	Manufacturing of bricks	260,937	744,704	106,602	960,791	1,281,055	1,812,097	2,132,361
Ernstbrunner Kalktechnik GmbH	Lime	225,833	-44,078	-	-	1,111,792	-44,078	1,067,714

Note: ** Profit CERs only for 2008-2012 | 1 includes lime | 2 includes lime | 3 includes manufacturing of plastics.

4 Belgium

4.1 General description

Refineries, iron and steel and petrochemicals are the most important sectors in Belgium with respect to verified emissions under the EU ETS between 2008-2014. Each of these sectors contribute to about 20% of total emissions under the EU ETS. Industry received, in total, excess allowances up to 700 million euro worth between 2008-2014. Only 74% of allocated emissions were used for verification in Belgium, the remaining 26% was used as an alternative source of income to industry. All of the investigated sectors have profited from this source of income.

In contrast to the more generous allocation, Belgium has restricted use of CDM/JI credits on average more than other countries during Phase 2.
In total 8.40% of allowances were eligible for use as compliance unit.

4.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 7 Verified emissions (ton CO_2) and additional profits (€) per sector, Belgium, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	633,225	2,152,876	65,590	4,147,849	5,656,157	6,366,315	7,874,623
Refineries	42,755,660	19,548,338	-	196,814,509	344,425,391	216,362,847	363,973,729
Industrial gases	2,933,706	20,436,908	219,048	-	-	20,655,956	20,655,956
Inorganic chemicals	1,996,182	9,500,518	345,843	2,231,500	5,244,025	12,077,861	15,090,386
Petrochemicals	39,827,402	117,080,362	1,769,921	86,994,458	260,983,374	205,844,741	379,833,658
Fertilizers	3,462,496	2,303,544	118,813	4,072,729	13,575,764	6,495,087	15,998,122
Manufacture of plastics in primary form	4,487,578	8,834,573	421,389	20,988,336	34,980,560	30,244,298	44,236,522
Flat glass	5,114,495	19,613,386	740,814	-	25,658,418	20,354,200	46,012,618
Hollow glass	732,646	1,431,415	88,474	2,455,011	4,500,853	3,974,901	6,020,743
Other glass	764,743	2,186,302	115,215	2,190,120	4,562,751	4,491,637	6,864,268
Manufacturing of bricks	3,510,861	24,459,574	487,297	12,623,559	16,831,411	37,570,429	41,778,282
Cement	29,341,092	45,663,363	2,329,255	69,100,252	134,745,491	117,092,869	182,738,108
Lime	18,232,820	42,602,365	2,161,561	-	85,468,618	44,763,926	130,232,544
Iron and steel	43,153,876	307,141,905	14,456,758	309,527,415	422,082,838	631,126,077	743,681,501
Total	196,946,782	622,955,430	23,319,977	711,145,738	1,358,715,653	1,357,421,145	2,004,991,060

Note: ** Profit CERs only for 2008-2012.

Table 8 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Belgium, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
ArcelorMittal Belgium	Iron and steel[1]	36,463,611	137,617,806	13,156,372	252,757,555	344,669,393	403,531,733	495,443,572
Total	Refineries[2]	33,750,680	22,910,067	-	140,818,501	266,261,599	163,728,568	289,171,667
BASF	Petrochemicals[3]	16,606,418	35,875,814	-	35,019,281	104,977,169	70,895,095	140,852,983
Exxonmobil Petroleum & Chemical	Refineries[4]	13,373,611	11,230,627	-	59,961,890	104,799,135	71,192,516	116,029,762
Cimenteries CBR Cementbedrijven	Cement	12,263,067	20,240,352	756,753	28,600,631	55,771,231	49,597,736	76,768,335
CCB - Italcementi Group	Cement	9,023,979	9,458,041	706,530	21,136,024	41,215,247	31,300,596	51,379,819
Holcim	Cement	8,054,046	15,964,970	865,972	19,363,596	37,759,012	36,194,538	54,589,954
Carrières et fours à chaux Dumont Wautier	Lime	7,806,626	6,392,515	740,555	-	36,014,401	7,133,070	43,147,471
Carmeuse	Lime	5,254,982	19,718,226	751,265	-	24,832,885	20,469,490	45,302,375
AGC Flat Glass Europe	Flat glass	4,399,837	10,001,193	529,551	-	21,639,074	10,530,744	32,169,818
Independent Belgian Refinery	Refineries	3,449,198	3,205,954	-	16,148,645	28,260,129	19,354,599	31,466,083
INEOS	Petrochemicals	3,259,249	11,005,673	485,729	7,579,459	21,318,205	19,070,860	32,809,606
Evonik Degussa Antwerpen	Petrochemicals	3,185,764	8,660,424	-	6,866,605	20,599,816	15,527,029	29,260,240
Lhoist Industries	Lime	3,130,406	3,214,598	309,621	-	14,421,491	3,524,218	17,945,710
BP Chembel	Petrochemicals	2,754,129	10,390,666	218,246	6,434,059	19,302,177	17,042,971	29,911,089
Yara Tertre	Fertilizers	2,703,592	2,840,469	118,813	3,487,950	11,626,501	6,447,232	14,585,783
Air Liquide Large Industry	Industrial gases	2,553,332	19,394,296	148,622	-	-	19,542,918	19,542,918
Carsid	Iron and steel	2,420,410	164,858,688	419,122	29,184,544	39,797,106	194,462,354	205,074,916
Dolomies de Marche-les-Dames	Lime	2,040,806	13,277,027	360,120	-	10,199,841	13,637,147	23,836,988
Wienerberger	Manufacturing of bricks	1,856,279	16,436,824	239,042	6,940,251	9,253,668	23,616,118	25,929,535

Note: ** Profit CERs only for 2008-2012|1 includes coke oven products | 2 includes plastics and petrochemicals | 3 includes inorganic chemicals | 4 includes plastics.

5 Czech Republic

5.1 General description

CO_2 emissions regulated by the EU ETS are dominated by the iron and steel industry in the Czech Republic which is responsible for about 40% of total emissions under the EU ETS. Total overallocation amounted to 27.7 mio t/CO_2 which had a market value of almost 195 million euro. All industrial sectors received profits from overallocation, in relative terms most important recipients have been the manufacture of bricks and the manufacturers of coke oven products. The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which can be regarded as an EU average.

5.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 9 Verified emissions (ton CO_2) and additional profits (€) per sector, Czech Republic, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	1,001,131	7,135,264	231,904	7,116,645	9,704,516	14,483,813	17,071,684
Refineries	6,793,124	4,633,918	1,495,778	32,198,818	56,347,932	38,328,514	62,477,628
Industrial gases	2,970,120	-698,146	276,255	-	-	-421,891	-421,891
Inorganic chemicals	207,516	1,393,512	18,530	139,961	328,908	1,552,003	1,740,951
Petrochemicals	18,932,257	31,875,755	1,818,257	43,215,019	129,645,058	76,909,032	163,339,070
Fertilizers	5,023,722	-2,502,919	845,082	8,039,116	26,797,055	6,381,280	25,139,218
Manufacture of plastics in primary form	9,408	81,795	-	20,678	34,463	102,473	116,258
Flat glass	1,835,931	12,169,183	771,462	-	8,976,535	12,940,644	21,917,179
Hollow glass	1,567,290	4,272,969	356,173	5,442,622	9,978,141	10,071,764	14,607,282
Other glass	641,938	1,922,276	235,436	1,786,833	3,722,568	3,944,545	5,880,281
Manufacturing of bricks	1,549,591	13,616,362	276,452	5,673,463	7,564,618	19,566,278	21,457,432
Cement	16,556,667	21,471,590	2,637,472	39,898,457	77,801,992	64,007,519	101,911,054
Lime	6,519,251	4,821,322	1,431,718	-	30,464,124	6,253,040	36,717,164
Iron and steel	47,117,549	39,777,388	4,838,383	319,522,407	435,712,373	364,138,178	480,328,144
Total	110,725,495	139,970,269	15,232,902	463,054,020	797,078,282	618,257,192	952,281,453

Note: ** Profit CERs only for 2008-2012.

Table 10 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Czech Republic, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
ArcelorMittal CZ	Iron and steel	25,571,898	76,702,489	1,177,780	183,713,186	250,517,981	261,593,456	328,398,251
TŘINECKÉ ŽELEZÁRNY, a. s.	Iron and steel	18,399,735	-40,096,374	2,898,785	115,131,769	156,997,867	77,934,180	119,800,278
UNIPETROL RPA, s.r.o.	Industrial gases	18,068,667	27,622,774	1,665,662	34,965,037	104,895,110	64,253,473	134,183,546
Českomoravský cement, a.s.	Cement	7,299,489	4,920,870	554,052	17,542,311	34,207,506	23,017,232	39,682,427
Česká rafinérská, a.s.	Refineries	5,946,100	1,848,505	1,285,335	27,557,224	48,225,142	30,691,064	51,358,982
Cement Hranice, a. s.	Cement	3,649,951	2,548,476	748,263	8,916,999	17,388,149	12,213,738	20,684,887
Synthesia, a.s.	Fertilizers	2,960,551	377,448	588,472	5,188,088	17,293,628	6,154,008	18,259,548
Holcim (Česko) a.s., člen koncernu	Cement	2,928,373	8,451,443	576,498	7,034,947	13,718,147	16,062,888	22,746,088
Lafarge Cement, a.s.	Cement	2,678,854	5,550,800	758,660	6,404,200	12,488,190	12,713,661	18,797,651
Vápenka Čertovy schody a.s.	Lime	2,527,010	-1,305,717	619,633	-	11,634,474	-686,084	10,948,390
VÁPENKA VITOŠOV s.r.o.	Lime	1,945,943	2,271,033	65,885	-	8,729,628	2,336,919	11,066,547
Spolana, a.s.	Petrochemicals	1,916,871	-222,294	220,740	4,562,735	13,688,204	4,561,181	13,686,650
AGC Flat Glass Czech a.s., člen AGC Group	Flat glass	1,835,931	12,169,183	771,462	-	8,976,535	12,940,644	21,917,179
Lovochemie, a.s.	Fertilizers	1,719,612	-3,346,509	256,610	2,585,636	8,618,787	-504,263	5,528,888
EVRAZ VÍTKOVICE STEEL, a.s.	Iron and steel	1,486,491	1,349,453	341,694	10,546,734	14,381,910	12,237,881	16,073,056
DEZA, a.s.	Petrochemicals	1,070,469	1,784,157	156,355	1,947,109	5,841,328	3,887,621	7,781,839
OKK Koksovny, a.s.	Manufacture of coke oven products	1,001,131	7,135,264	231,904	7,116,645	9,704,516	14,483,813	17,071,684
CARMEUSE CZECH REPUBLIC s.r.o.	Lime	998,710	2,465,341	380,139	-	5,065,412	2,845,480	7,910,892
PARAMO, a.s.	Refineries	847,024	2,785,413	210,443	4,641,594	8,122,790	7,637,450	11,118,646
KOTOUČ ŠTRAMBERK, spol. s r. o.	Lime	814,786	57,922	256,645	-	3,915,157	314,567	4,229,724

Note: ** Profit CERs only for 2008-2012.

6 Denmark

6.1 General description

The largest sector in Denmark is the extraction of crude oil and gas which has been responsible for about 25% of verified emissions. Cement manufacturing is another large emitter of carbon emissions.

Industry in Denmark has profited from overallocation of about 9 million allowances worth 110 million euro. Of these, about 90 million euro accrued to the fifteen sectors under investigation in this study. The use of CDM/JI during Phase 2 has been set at 17% of verified emissions, considerably above the EU average. Various larger companies, however, have not used these enlarged opportunities provided by the Danish government to create additional profits (see Table 9).

6.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 11 Verified emissions (ton CO_2) and additional profits (€) per sector, Denmark, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	12,484,156	27,798,237	361,977	58,915,135	103,101,486	87,075,349	131,261,700
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	6,397,028	-3,302,143	478,746	28,981,995	50,718,491	26,158,597	47,895,093
Industrial gases	-	-	-	-	-	-	-
Inorganic chemicals	-	-	-	-	-	-	-
Petrochemicals	84,003	168,755	20,627	211,366	634,099	400,748	823,481
Fertilizers	-	-	-	-	-	-	-
Manufacture of plastics in primary form	-	-	-	-	-	-	-
Flat glass	-	-	-	-	-	-	-
Hollow glass	394,345	255,303	-	1,364,275	2,501,170	1,619,577	2,756,473
Other glass	58,212	134,974	12,298	164,486	342,679	311,758	489,951
Manufacturing of bricks	714,557	2,976,597	138,051	2,628,955	3,505,274	5,743,604	6,619,922
Cement	11,876,767	59,446,556	1,795,846	28,105,440	54,805,608	89,347,842	116,048,010
Lime	385,384	2,689,968	113,539	-	1,920,362	2,803,507	4,723,869
Iron and steel	553,698	-67,156	-	3,566,041	4,862,784	3,498,885	4,795,628
Total	32,948,150	90,101,090	2,921,084	123,937,693	222,391,953	216,959,868	315,414,127

Note: ** Profit CERs only for 2008-2012.

Table 12 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Denmark, 2008-2014

Company		Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Aalborg Portland A/S	Cement	11,876,767	59,446,556	1,795,846	28,105,440	54,805,608	89,347,842	116,048,010
Maersk Olie og Gas	Extraction of crude oil and gas	10,432,021	21,120,887	361,977	49,196,807	86,094,411	70,679,671	107,577,275
Statoil Refining Denmark A/S	Refineries	3,541,180	-4,960,513	478,746	15,961,628	27,932,848	11,479,860	23,451,081
A/S Dansk Shell	Refineries	2,855,848	1,658,370	-	13,020,367	22,785,643	14,678,737	24,444,013
Hess Denmark	Extraction of crude oil and gas	1,292,286	83,271	-	5,901,379	10,327,413	5,984,650	10,410,684
DONG E&P A/S	Extraction of crude oil and gas	759,849	6,594,078	-	3,816,950	6,679,662	10,411,028	13,273,741
NLMK DanSteel A/S	Iron and steel	457,371	19,292	-	2,927,506	3,992,054	2,946,798	4,011,346
Ardagh Glass Holmegaard A/S	Hollow glass	394,345	255,303	-	1,364,275	2,501,170	1,619,577	2,756,473
Faxe Kalk A/S	Lime	385,384	2,689,968	113,539	-	1,920,362	2,803,507	4,723,869
Pipers Teglværker A/S	Manufacturing of bricks	164,120	742,475	49,324	612,342	816,456	1,404,140	1,608,254
Vedstaarup Teglværk A/S	Manufacturing of bricks	100,354	-11,658	19,766	331,352	441,802	339,459	449,910
Wienerberger A/S	Manufacturing of bricks	97,444	789,377	7,018	383,402	511,203	1,179,798	1,307,598
Duferco Danish Steel A/S	Iron and steel	90,891	-223,727	-	576,084	785,569	352,357	561,843
Novozymes AS	Petrochemicals	84,003	168,755	20,627	211,366	634,099	400,748	823,481
Vesterled Teglværk A/S	Manufacturing of bricks	58,784	232,210	15,557	206,401	275,201	454,168	522,968
Saint Gobain Isover A/S	Other glass	58,212	134,974	12,298	164,486	342,679	311,758	489,951
Petersen Tegl A/S	Manufacturing of bricks	55,288	97,201	-	191,685	255,580	288,886	352,781
Gråsten Teglværk	Manufacturing of bricks	34,016	205,950	-	114,778	153,037	320,728	358,987
Lundgaard Teglværk A/S	Manufacturing of bricks	32,818	244,413	13,054	138,845	185,126	396,311	442,593
Helligsø Teglværk A/S	Manufacturing of bricks	30,908	97,238	7,655	106,102	141,469	210,995	246,362

Note: ** Profit CERs only for 2008-2012.

7 Finland

7.1 General description

Verified emissions in Finland from industrial sources mostly take place in the iron and steel sector followed by the refineries sector. Between 2008-2014 36% of verified emissions from the industrial sectors was coming from the iron and steel industry. However, the sector was slightly underallocated with allowances when correcting for waste gas transfers. Also refineries and petrochemicals were underallocated with allowances. The sectors producing construction materials (e.g. cement, glass, bricks, lime) were however largely overallocated. Total overallocation to Finnish industry mounted to almost 20 million euro EUAs between 2008 and 2014, with a net worth of almost 115 million euro.

In total, only seventeen companies have to report under the EU ETS in the selected fifteen sectors. The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which can be regarded as an EU average. Most of the larger companies have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

7.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 13 Verified emissions (ton CO_2) and additional profits (€) per sector, Finland, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	22,984,627	-16,330,222	4,125	106,472,927	186,327,623	90,146,830	170,001,526
Industrial gases	-	1,641,474	-	-	-	1,641,474	1,641,474
Inorganic chemicals	140,567	191,270	10,784	165,628	389,227	367,682	591,280
Petrochemicals	3,248,748	-1,281,372	386,479	7,216,334	21,649,002	6,321,442	20,754,109
Fertilizers	378,065	900,615	-	305,856	1,019,521	1,206,472	1,920,136
Manufacture of plastics in primary form	-	-	-	-	-	-	-
Flat glass	-	-	-	-	-	-	-
Hollow glass	43,640	463,138	-	248,772	456,083	711,910	919,220
Other glass	223,658	1,435,285	31,708	696,280	1,450,583	2,163,273	2,917,577
Manufacturing of bricks	145,980	977,708	14,771	543,747	724,996	1,536,226	1,717,475
Cement	5,603,692	29,418,462	730,033	13,417,582	26,164,285	43,566,077	56,312,780
Lime	4,188,378	12,782,018	986,841	-	19,414,243	13,768,859	33,183,102
Iron and steel	35,045,935	-11,357,841	5,016,125	230,604,125	314,460,170	224,262,409	308,118,455
Total	72,003,290	18,840,535	7,180,867	359,671,252	572,055,732	385,692,654	598,077,134

Note: ** Profit CERs only for 2008-2012.

Table 14 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Finland, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Ruukki Metals Oy	Iron and steel	27,359,449	-39,971,904	4,220,870	176,128,288	240,174,938	140,377,254	204,423,904
Neste Oil Oyj	Refineries	22,984,627	-16,330,222	4,125	106,472,927	186,327,623	90,146,830	170,001,526
Finnsementti Oy	Cement	5,603,692	29,418,462	730,033	13,417,582	26,164,285	43,566,077	56,312,780
Outokumpu Chrome Oy ja Outokumpu Stainless Oy	Iron and steel	4,098,126	18,739,068	169,147	25,215,417	34,384,659	44,123,632	53,292,874
Nordkalk Oy Ab	Lime	3,252,665	13,024,228	986,841	-	15,434,757	14,011,069	29,445,827
Borealis	Petrochemicals	3,248,748	-1,281,372	386,479	7,216,334	21,649,002	6,321,442	20,754,109
FNsteel Oy Ab:n konkurssipesä	Iron and steel	3,240,551	10,393,570	555,846	27,017,381	36,841,884	37,966,797	47,791,299
SMA MINERAL OY	Lime	904,675	-265,505	-	-	3,915,644	-265,505	3,650,139
Ovako Imatra Oy Ab	Iron and steel	347,809	-518,575	70,262	2,243,039	3,058,689	1,794,727	2,610,377
Yara Suomi Oy	Fertilizers	299,921	-37,882	-	244,830	816,100	206,948	778,218
J.M. Huber Finland Oy	Inorganic chemicals	140,567	191,270	10,784	165,628	389,227	367,682	591,280
Saint-Gobain Rakennustuotteet Oy	Other glass	128,783	590,324	31,708	290,380	668,800	912,412	1,290,832
Ahlstrom Glassfibre Oy	Other glass	96,820	856,574	-	369,844	770,508	1,226,418	1,627,082
Wienerberger Oy Ab	Manufacturing of bricks	79,987	400,743	14,771	302,813	403,751	718,327	819,265
O-I Manufacturing Finland Oy	Hollow glass	43,640	463,138	-	248,772	456,083	711,910	919,220
Keramia Oy	Manufacturing of bricks	35,534	189,449	-	126,768	169,024	316,217	358,473
Ylivieskan Tiili Oy	Manufacturing of bricks	30,459	387,516	-	114,166	152,221	501,682	539,737

Note: ** Profit CERs only for 2008-2012.

8 France

8.1 General description

Verified emissions in France from industrial sources mostly take place in the iron and steel sector followed by the refineries and cement sectors. The iron and steel sector takes about 1/4th of total CO_2 emissions reported by France under the EU ETS between 2008-2014. All of the investigated fifteen sectors profited from overallocation of emission allowances in France. In total, nearly 100 million allowances in excess of demand were issued in France for industry between 2008-2014, with a net worth of over 800 million euro. In absolute size, the largest profits from overallocation were generated in the cement sector. In relative size, the overallocation to the extraction of oil and gas was highest. The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which can be regarded as an EU average. Most of the larger companies have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

8.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 15 Verified emissions (ton CO_2) and additional profits (€) per sector, France, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	1,066,293	12,219,577	92,652	7,009,091	12,265,909	19,321,320	24,578,138
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	99,244,150	56,765,286	15,394,178	488,771,721	855,350,512	560,931,186	927,509,977
Industrial gases	2,051,923	-1,121,369	-	-	-	-1,121,369	-1,121,369
Inorganic chemicals	16,381,578	28,149,362	3,286,793	18,116,083	42,572,794	49,552,237	74,008,949
Petrochemicals	52,218,524	97,626,111	6,955,190	118,472,038	355,416,115	223,053,340	459,997,417
Fertilizers	6,081,730	3,652,504	-	6,170,231	20,567,437	9,822,736	24,219,942
Manufacture of plastics in primary form	919,510	3,460,738	178,109	4,615,667	7,692,778	8,254,514	11,331,626
Flat glass	4,796,243	11,384,536	1,858,665	-	22,912,252	13,243,201	36,155,453
Hollow glass	13,911,188	35,907,264	4,870,113	49,539,972	90,823,282	90,317,349	131,600,659
Other glass	1,139,812	4,082,913	497,175	3,008,510	6,267,729	7,588,598	10,847,818
Manufacturing of bricks	5,252,903	28,822,152	1,373,893	18,606,381	24,808,508	48,802,425	55,004,553
Cement	76,922,971	187,832,721	24,410,974	181,290,435	353,516,349	393,534,130	565,760,044
Lime	19,802,292	42,923,253	6,994,397	-	90,116,025	49,917,651	140,033,675
Iron and steel	136,400,492	-11,151,745	46,253,529	884,704,122	1,206,414,712	919,805,907	1,241,516,496
Total	436,189,609	500,553,303	112,165,669	1,780,304,252	3,088,724,404	2,393,023,224	3,701,443,376

Note: ** Profit CERs only for 2008-2012.

Table 16 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, France, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
BERSILLON	Iron and steel	128,196,233	-20,996,166	43,639,486	839,311,873	1,144,516,190	861,955,193	1,167,159,510
TOTAL	Refineries[1]	57,754,975	3,084,991	11,447,306	283,713,398	496,498,447	298,245,695	511,030,744
LAFARGE CIMENTS	Cement	30,554,965	90,528,562	12,681,742	72,881,729	143,594,566	176,092,034	246,804,871
TOUFFAIT	Petrochemicals	27,704,996	14,089,127	680,702	110,982,250	215,403,249	125,752,079	230,173,078
CIMENTS CALCIA	Cement	26,650,406	40,307,917	7,325,210	61,593,418	120,107,165	109,226,545	167,740,292
VICAT	Cement	14,611,271	38,641,430	3,560,988	34,358,862	66,999,780	76,561,279	109,202,198
COMPAGNIE PETROCHIMIQUE DE BERRE	Petrochemicals	12,034,043	54,879,899	3,683,867	40,457,242	96,851,792	99,021,009	155,415,558
NAPHTACHIMIE	Petrochemicals	11,034,497	4,793,426	1,783,462	25,917,147	77,751,442	32,494,036	84,328,331
LEUCKX	Petrochemicals	10,982,941	40,588,789	-	25,836,275	77,508,825	66,425,064	118,097,614
PETROINEOS MANUFACTURING FRANCE SAS	Refineries	8,767,937	9,410,674	1,476,915	40,108,008	70,189,014	50,995,597	81,076,603
PETROPLUS RAFFINAGE PETIT-COURONNE SAS	Refineries	5,867,724	7,840,896	825,093	34,885,842	61,050,224	43,551,831	69,716,213
SAINT GOBAIN FRANCE	Hollow glass[2]	5,732,814	7,245,648	1,961,282	16,007,721	35,711,717	25,214,651	44,918,647
RHODIA OPERATIONS	Inorganic chemicals	5,076,291	5,505,658	-	6,705,731	17,266,338	12,211,389	22,771,996
HOLCIM SAS	Cement	4,832,625	19,642,106	991,293	11,846,273	23,100,232	32,479,671	43,733,631
CHAUX ET DOLOMIES DU BOULONNAIS	Lime	4,565,771	4,599,816	1,511,954	-	20,855,269	6,111,770	26,967,038
POLIMERI EUROPA FRANCE SAS	Petrochemicals	4,227,707	3,113,076	-	9,406,807	28,220,421	12,519,883	31,333,497
O-I MANUFACTURING FRANCE	Hollow glass	4,118,612	14,983,398	1,761,616	14,902,016	27,320,363	31,647,030	44,065,377
LHOIST FRANCE OUEST	Lime	3,731,400	4,722,560	1,397,377	-	16,791,601	6,119,937	22,911,538
SOLVAY CARBONATE FRANCE	Inorganic chemicals	3,463,997	-1,594,979	352,224	3,750,562	8,813,820	2,507,807	7,571,065
NOVACARB	Inorganic chemicals	3,008,173	377,112	473,429	3,109,238	7,306,709	3,959,779	8,157,250

Note: ** Profit CERs only for 2008-2012 | 1 includes extraction of oil and gas | 2 includes flat glass and other glass.

9 Germany

9.1 General description

Verified emissions in Germany from industrial sources mostly take place in the iron and steel sector followed by the refineries and cement sectors. The iron and steel sector takes almost 30% of total verified CO_2 emissions reported by Germany under the EU ETS between 2008-2014. Twelve out of fifteen sectors investigated have profited from over allocation of emission allowances in Germany. In total, over 165 million allowances in excess of demand were issued in Germany for industry between 2008-2014, with a net worth of over 1 billion euro. In absolute size, the largest profits from overallocation were generated in the iron and steel sector. In relative size, the overallocation to the manufacture of bricks was highest.

The use of CDM/JI during Phase 2 has been set at 20% of verified emissions, which can be regarded as double the EU average. Virtually all companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

9.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 17 Verified emissions (ton CO_2) and additional profits (€) per sector, Germany, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	1,252,107	-2,167,303	4,015	5,669,241	9,921,172	3,505,953	7,757,884
Manufacture of coke oven products	25,038,727	-92,300,100	2,958,458	155,434,985	211,956,798	66,093,343	122,615,156
Refineries	160,004,855	122,816,496	25,295,964	729,232,080	1,276,156,140	877,344,541	1,424,268,601
Industrial gases	6,695,346	-1,352,372	-	-	-	-1,352,372	-1,352,372
Inorganic chemicals	13,519,757	18,453,897	3,114,961	12,393,431	29,124,564	33,962,289	50,693,421
Petrochemicals	81,583,618	104,063,898	14,042,286	179,424,126	538,272,378	297,530,310	656,378,562
Fertilizers	18,021,191	4,267,096	1,498,518	21,187,846	70,626,154	26,953,461	76,391,768
Manufacture of plastics in primary form	8,985,068	-3,456,849	4,742,366	44,744,929	74,574,882	46,030,446	75,860,399
Flat glass	10,004,868	8,061,640	5,154,771	-	45,380,706	13,216,410	58,597,116
Hollow glass	11,900,326	8,965,967	2,989,570	41,595,141	76,257,758	53,550,678	88,213,296
Other glass	1,818,136	4,083,201	769,581	5,017,222	10,452,546	9,870,004	15,305,328
Manufacturing of bricks	8,920,937	38,290,584	2,844,111	29,307,762	39,077,016	70,442,457	80,211,711
Cement	136,226,778	78,164,851	34,082,568	312,646,826	609,661,310	424,894,245	721,908,730
Lime	53,236,381	129,262,492	22,486,382	-	246,770,272	151,748,874	398,519,146
Iron and steel	264,718,131	376,741,673	67,436,242	1,654,195,142	2,255,720,649	2,098,373,058	2,699,898,564
Total	801,926,226	793,895,172	187,419,793	3,190,848,733	5,493,952,347	4,172,163,698	6,475,267,311

Note: ** Profit CERs only for 2008-2012.

Table 18 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Germany, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
ThyssenKrupp Steel Europe AG	Iron and steel	93,391,952	50,325,168	24,106,517	598,370,072	815,959,189	672,801,757	890,390,874
Salzgitter Flachstahl GmbH	Iron and steel	52,395,134	-89,457,600	9,033,121	323,768,503	441,502,504	243,344,024	361,078,025
BASF SE	Petrochemicals[1]	37,896,895	46,035,900	806,124	75,804,691	227,851,547	122,646,715	274,693,571
HeidelbergCement AG	Cement	34,090,961	20,598,782	181,122	76,054,057	153,291,958	96,833,960	174,071,862
RUHR OEL GmbH	Refineries	32,887,331	-13,312,132	4,212,553	150,150,569	262,763,495	141,050,989	253,663,916
ArcelorMittal Germany	Iron and steel	32,017,283	370,344,857	20,751,468	194,193,974	268,752,313	585,290,299	659,848,639
Hüttenwerke Krupp Mannesmann GmbH	Iron and steel	31,168,428	186,897,099	8,304,361	194,135,122	264,729,712	389,336,582	459,931,172
ROGESA Roheisengesellschaft Saar mbH	Iron and steel	29,927,938	75,795,666	5,154,239	195,642,643	266,785,423	276,592,548	347,735,328
Shell Deutschland Oil GmbH	Refineries	25,957,833	24,795,731	998,238	120,195,480	210,342,090	145,989,450	236,136,060
Rheinkalk GmbH	Lime	21,350,618	53,529,265	11,984,542	-	100,736,491	65,513,807	166,250,297
Mineralölraffinerie Oberrhein GmbH & Co. KG	Refineries	20,113,498	2,232,350	2,005,611	92,906,808	162,586,915	97,144,769	166,824,875
INEOS	Petrochemicals[2]	19,157,411	10,447,714	219,327	42,062,891	126,472,336	52,729,932	137,139,378
Basell Polyolefine GmbH	Petrochemicals[3]	19,088,202	4,283,305	12,095,313	60,458,360	138,421,052	76,836,978	154,799,671
PCK Raffinerie GmbH	Refineries	16,361,465	-9,706,093	-	65,538,817	114,692,929	55,832,724	104,986,837
SCHWENK Zement KG	Cement	14,658,793	4,206,682	2,983,891	33,189,651	64,719,820	40,380,224	71,910,393
Dyckerhoff AG	Cement	14,197,304	10,329,992	4,572,024	32,629,104	63,626,752	47,531,119	78,528,768
Total	Refineries	14,124,823	31,342,019	3,150,783	63,897,335	111,820,336	98,390,137	146,313,138
PRUNA Betreiber GmbH	Manufacture of coke oven products	14,009,526	-81,610,577	411,784	87,303,838	119,050,688	6,105,045	37,851,895
CEMEX Deutschland	Cement	13,326,272	12,444,261	1,882,237	30,868,788	60,194,137	45,195,286	74,520,635
Fels-Werke GmbH	Lime	13,323,069	23,177,199	4,346,383	-	61,365,639	27,523,582	88,889,221

Note: ** Profit CERs only for 2008-2012 | 1 includes industrial gases, inorganic chemicals, fertilizers | 2 includes fertilizers | includes plastics.

10 Greece

10.1 General description

Verified emissions in Greece from industrial sources mostly take place in the cement sector followed by the refineries. The cement sector takes almost 40% of total verified CO_2 emissions reported by Greece under the EU ETS between 2008-2014. *The cement* sector is also the largest beneficiary from overallocation. In general, the sector was capable of earning over 250 million euro from selling, or banking, overallcoated emission allowances between 2008-2014. In relative size, the overallocation to the manufacture of bricks and production of lime was the highest.

The use of CDM/JI during Phase 2 has been set at 9% of verified emissions, slightly below the EU average. Most of the larger companies in Greece have used the opportunity to hand in CDM/JI credits for compliance in Greece.

10.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits. With respect to the sectoral tables, we should mention that the IEA did not report waste gases for the iron and steel industry in Greece, which is the main reason why we did not correct Greece emission allocation for the production of waste gases.

Table 19 Verified emissions (ton CO_2) and additional profits (€) per sector, Greece, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	599,295	4,037,285	77,143	2,685,482	4,699,593	6,799,910	8,814,021
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	30,708,764	-19,177,061	5,692,345	133,451,769	233,540,595	119,967,053	220,055,879
Industrial gases	-	-	-	-	-	-	-
Inorganic chemicals	42,589	31,637	-	22,460	52,781	54,097	84,418
Petrochemicals	-	-	-	-	-	-	-
Fertilizers	532,496	179,717	-	419,794	1,399,312	599,511	1,579,029
Manufacture of plastics in primary form	-	-	-	-	-	-	-
Flat glass	-	-	-	-	-	-	-
Hollow glass	319,657	702,335	-	1,100,615	2,017,794	1,802,950	2,720,129
Other glass	-	-	-	-	-	-	-
Manufacturing of bricks	1,472,781	38,108,705	332,419	6,697,195	8,929,594	45,138,319	47,370,718
Cement	44,944,662	262,895,099	11,836,214	112,134,375	218,662,032	386,865,688	493,393,345
Lime	2,802,699	34,919,846	568,662	-	13,363,664	35,488,507	48,852,171
Iron and steel	6,679,685	27,585,314	1,713,192	43,182,336	58,885,004	72,480,843	88,183,510
Total	88,102,628	349,282,877	20,219,975	299,694,026	541,550,368	669,196,878	911,053,220

Note: ** Profit CERs only for 2008-2012.

Table 20 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Greece, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
ΤΙΤΑΝ ΑΕ	Cement	22,207,565	69,491,818	4,913,073	52,656,716	102,680,595	127,061,607	177,085,487
ΑΓΕΤ ΗΡΑΚΛΗΣ	Cement	20,594,066	181,565,420	6,452,189	53,612,434	104,544,247	241,630,043	292,561,856
ΕΛΛΗΝΙΚΑ ΠΕΤΡΕΛΑΙΑ ΑΕ	Refineries	16,922,542	-9,201,753	4,083,413	71,040,227	124,320,397	65,921,888	119,202,058
ΜΟΤΟΡ ΟΙΛ - Δ. ΚΟΡΙΝΘΟΥ	Refineries	13,786,222	-9,975,308	1,608,931	62,411,542	109,220,198	54,045,165	100,853,822
ΓΜΜΑΕ ΛΑΡΚΟ	Iron and steel	4,956,020	8,517,140	1,024,314	30,427,351	41,491,842	39,968,805	51,033,296
HALYPS BUILDING MATERIALS S.A (HALYPS CEMENT)	Cement	2,134,320	11,171,552	470,952	5,835,878	11,379,963	17,478,381	23,022,466
CaO HELLAS ΜΑΚΕΔΟΝΙΚΗ ΑΒΕΕ	Lime	636,609	9,325,416	195,625	-	2,736,621	9,521,041	12,257,662
SOVEL AE	Iron and steel	581,419	5,530,378	282,215	4,058,920	5,534,891	9,871,513	11,347,484
ΧΑΛΥΒΟΥΡΓΙΑ ΕΛΛΑΔΟΣ ΑΕ	Iron and steel	535,539	5,681,000	247,264	3,917,279	5,341,744	9,845,543	11,270,009
HELLENIC FERTILIZERS AND CHEMICALS ELFE S.A.	Fertilizers	532,496	179,717	-	419,794	1,399,312	599,511	1,579,029
Π. ΠΑΥΛΙΔΗΣ ΕΠΕ	Lime	413,678	2,080,799	105,292	-	2,031,544	2,186,091	4,217,635
ΚΑΒΑΛΑ OIL AE	Extraction of crude oil and gas	392,734	3,647,673	77,143	2,028,749	3,550,312	5,753,566	7,275,128
GRECIAN MAGNESITE S.A.	Lime	387,734	-42,794	-	-	804,239	-42,794	761,445
ΓΙΟΥΛΑ Α.Ε.	Hollow glass	319,657	702,335	-	1,100,615	2,017,794	1,802,950	2,720,129
ΣΙΔΕΝΟΡ ΒΙΟΜ ΚΑΤ ΣΙΔΗΡΟΥ ΑΕ	Iron and steel	315,227	3,330,753	159,400	2,274,375	3,101,420	5,764,527	6,591,573
ΧΑΛΥΒΟΥΡΓΙΚΗ ΑΕ	Iron and steel	291,480	4,526,043	-	2,504,411	3,415,107	7,030,454	7,941,150
Κ. ΡΑΪΚΟΣ Α.Ε.	Lime	252,047	3,186,871	-	-	1,566,707	3,186,871	4,753,578
ΧΑΛΚΙΣ ΑΒΕΕ ΒΑΒΟΥΛΙΩΤΗΣ ΓΟΥΝΑΡΗΣ ΜΗΤΑΚΗΣ	Manufacturing of bricks	233,894	3,988,009	-	975,668	1,300,891	4,963,677	5,288,900
HELLENIC GAS TRANSMISSION SYSTEM OPERATOR	Extraction of crude oil and gas	206,561	389,612	-	656,732	1,149,281	1,046,344	1,538,893
ΑΛ. & ΑΝ. ΤΣΙΡΙΓΩΤΗΣ Α.Ε.	Lime	204,773	1,987,445	-	-	1,224,300	1,987,445	3,211,745

Note: ** Profit CERs only for 2008-2012.

11 Hungary

11.1 General description

Verified emissions in Hungary from industrial sources mostly take place in the refineries sector followed by the cement and petrochemical sectors. Refineries take about 20% of total verified CO_2 emissions reported by Hungary under the EU ETS between 2008-2014. Eleven out of fifteen sectors investigated have profited from over allocation of emission allowances in Hungary. Overallocation in absolute size was highest for cement manufacturing. The iron and steel industry in Hungary was considerably underallocated for emission allowances according to our calculations. The reasons for this have not been investigated further.

In total, 12.5 million allowances in excess of demand were issued in Hungary for industry between 2008-2014, with a net worth of over 50 million euro. In relative size, the manufacturing of bricks has been mostly overllocated. The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which can be regarded as an average figure. Virtually all companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

11.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 21 Verified emissions (ton CO_2) and additional profits (€) per sector, Hungary, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	62,616	469,366	30,599	299,148	523,510	799,113	1,023,474
Manufacture of coke oven products	1,303,768	689,069	90,798	8,098,405	11,043,280	8,878,272	11,823,147
Refineries	10,209,202	-7,959,836	573,599	47,215,025	82,626,294	39,828,789	75,240,057
Industrial gases	215,837	-171,499	-	-	-	-171,499	-171,499
Inorganic chemicals	1,170,849	1,983,743	-	1,297,562	3,049,270	3,281,305	5,033,014
Petrochemicals	7,861,061	7,847,093	536,836	18,202,755	54,608,266	26,586,684	62,992,195
Fertilizers	1,685,604	-1,263,571	9,257	1,503,171	5,010,569	248,857	3,756,255
Manufacture of plastics in primary form	580,208	1,277,279	85,494	2,396,093	3,993,488	3,758,865	5,356,260
Flat glass	869,610	1,649,798	263,470	-	4,180,969	1,913,268	6,094,237
Hollow glass	400,076	554,321	56,710	1,357,116	2,488,045	1,968,147	3,099,077
Other glass	11,079	154,908	-	53,438	111,329	208,346	266,237
Manufacturing of bricks	1,569,972	22,119,691	259,217	6,416,288	8,555,051	28,795,196	30,933,959
Cement	8,545,044	55,293,739	956,721	22,502,589	43,880,048	78,753,049	100,130,508
Lime	1,785,759	9,270,819	428,642	-	9,183,763	9,699,461	18,883,224
Iron and steel	6,009,964	-55,641,096	1,061,545	41,836,321	57,049,528	-12,743,231	2,469,977
Total	42,280,649	36,273,823	4,352,888	151,177,911	286,303,412	191,804,622	326,930,123

Note: ** Profit CERs only for 2008-2012.

Table 22 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Hungary, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
MOL Magyar Olaj- és Gázipari Nyrt	Refineries	10,209,202	-7,959,836	573,599	47,215,025	82,626,294	39,828,789	75,240,057
Tiszai Vegyi Kombinát NyRt.	Petrochemicals	7,351,288	7,295,609	505,017	17,306,231	51,918,692	25,106,857	59,719,318
ISD Dunaferr Zrt.	Iron and steel	5,779,917	-53,259,722	1,061,545	39,884,012	54,387,289	-12,314,165	2,189,112
Duna-Dráva Cement Kft.	Cement	5,427,658	27,973,126	502,377	13,833,950	26,976,202	42,309,452	55,451,705
Holcim Hungária Cementipari ZRt.	Cement	2,338,811	25,276,880	454,344	7,593,446	14,807,220	33,324,670	40,538,444
Nitrogénmûvek ZRt.	Fertilizers	1,685,604	-1,263,571	9,257	1,503,171	5,010,569	248,857	3,756,255
ISD Kokszoló Kft.	Manufacture of coke oven products	1,303,768	689,069	90,798	8,098,405	11,043,280	8,878,272	11,823,147
Columbian Tiszai Koromgyártó Kft.	Inorganic chemicals	1,170,849	1,983,743	-	1,297,562	3,049,270	3,281,305	5,033,014
Guardian Orosháza Üvegipari Kft.	Flat glass	803,082	558,725	263,470	-	3,695,662	822,195	4,517,857
Carmeuse Hungária Kft.	Lime	788,321	2,403,835	205,802	-	3,894,352	2,609,637	6,503,989
LAFARGE Cement Magyarország Kft.	Cement	778,575	2,043,733	-	1,075,193	2,096,627	3,118,926	4,140,360
Calmit Hungária Kft.	Lime	700,664	1,925,306	118,617	-	3,196,277	2,043,923	5,240,200
BorsodChem Zrt.	Manufacture of plastics in primary form	580,208	1,277,279	85,494	2,396,093	3,993,488	3,758,865	5,356,260
Wienerberger Téglaipari ZRt.	Manufacturing of bricks	547,896	14,719,765	169,111	2,591,289	3,455,053	17,480,166	18,343,929
O-I Manufacturing Magyarország Üvegipari Kft.	Hollow glass	400,076	554,321	56,710	1,357,116	2,488,045	1,968,147	3,099,077
Tondach Magyarország Zrt.	Manufacturing of bricks	344,597	1,653,494	-	1,268,728	1,691,637	2,922,222	3,345,131
Leier Hungária Építõanyaggyártó Kft.	Manufacturing of bricks	320,455	2,350,256	35,791	1,230,624	1,640,832	3,616,671	4,026,879
Kalcinátor Kft.	Lime	296,774	4,941,678	104,223	-	2,093,134	5,045,901	7,139,035
Pannonia Ethanol Zrt.	Petrochemicals	235,582	-927,858	-	270,766	812,299	-657,091	-115,559
Ózdi Acélmuvek Kft.	Iron and steel	179,299	-1,814,114	-	1,339,777	1,826,969	-474,337	12,854

Note: ** Profit CERs only for 2008-2012.

12 Ireland

12.1 General description

Ireland has a very small energy-intensive industrial basis when compared to the other countries and many of the investigated sectors have no Irish installations in the EU ETS Registry. Verified emissions in Ireland from industrial sources mostly take place in the cement sector which take over 40% of Irish EU ETS emissions. All of the six sectors active in Ireland have profited from over allocation of emission allowances. Overallocation was highest in the cement sector, both in absolute as in relative terms.

The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which can be regarded as an EU average. About half of the companies listed in the top-10 have used this opportunity.

12.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits. Only ten companies have been identified in the relevant sectors. There is no iron and steel sector complying to the EU ETS, so there have been no correction for waste gases.

Table 23 Verified emissions (ton CO_2) and additional profits (€) per sector, Ireland, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	2,164,323	4,150,143	25,894	10,217,436	17,880,512	14,393,472	22,056,549
Industrial gases	-	-	-	-	-	-	-
Inorganic chemicals	-	-	-	-	-	-	-
Petrochemicals	481,786	928,249	35,622	1,114,420	3,343,259	2,078,291	4,307,131
Fertilizers	-	-	-	-	-	-	-
Manufacture of plastics in primary form	-	-	-	-	-	-	-
Flat glass	-	-	-	-	-	-	-
Hollow glass	16,526	303,489	-	101,439	185,971	404,928	489,460
Other glass	-	-	-	-	-	-	-
Manufacturing of bricks	23,498	831,970	-	119,433	159,244	951,403	991,214
Cement	14,634,983	119,758,406	1,288,817	36,246,834	70,681,327	157,294,058	191,728,550
Lime	1,033,141	9,488,474	86,201	-	4,764,924	9,574,675	14,339,599
Iron and steel	-	-	-	-	-	-	-
Total	18,354,257	135,460,732	1,436,534	47,799,561	97,015,238	184,696,827	233,912,503

Note: ** Profit CERs only for 2008-2012.

Table 24 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Ireland, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
CRH plc	Cement	8,638,420	94,948,129	86,201	19,502,616	42,056,181	114,536,946	137,090,511
Quinn Cement Ltd.	Cement	4,328,990	21,948,257	1,288,817	10,906,541	21,267,755	34,143,615	44,504,830
LAGAN	Manufacturing of bricks	2,583,321	11,375,373	-	5,957,110	11,542,714	17,332,484	22,918,088
Phillips 66 Whitegate Refinery Limited	Refineries	2,164,323	4,150,143	25,894	10,217,436	17,880,512	14,393,472	22,056,549
Carbery Milk Products Limited	Petrochemicals	293,399	706,260	35,622	657,525	1,972,574	1,399,407	2,714,456
BASF Ireland Limited	Petrochemicals	182,714	142,721	-	431,996	1,295,987	574,717	1,438,709
Gypsum Industries Limited	Lime	140,891	1,807,090	-	-	738,844	1,807,090	2,545,935
Waterford Crystal Ltd.	Hollow glass	16,526	303,489	-	101,439	185,971	404,928	489,460
Moy Isover Ltd.	Petrochemicals	5,673	79,267	-	24,899	74,698	104,167	153,966
ADM Ringaskiddy	Petrochemicals	-	-	-	-	-	-	-

Note: ** Profit CERs only for 2008-2012.

13 Italy

13.1 General description

Verified emissions in Italy from industrial sources mostly take place in the refineries sector followed by the cement sector. The refineries sector takes almost 30% of total verified CO_2 emissions reported by Italy under the EU ETS between 2008-2014. 11 out of 15 sectors investigated have profited from over allocation of emission allowances in Italy, but the largest sector (refineries) was short of allowances according to our calculations. In total, 100 million allowances (17% of total allocated allowances) were allocated in excess of emissions creating additional profits worth over 500 million euro. In absolute size, the largest profits from overallocation were generated in the cement sector. In relative size, the overallocation to the manufacture of bricks was highest.

The use of CDM/JI during Phase 2 has been set at 15% of verified emissions, which is above the EU average. Most of the companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12, although some refineries and petrochemical industries have not used this opportunity.

13.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 25 Verified emissions (ton CO_2) and additional profits (€) per sector, Italy, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	3,069,297	-5,555,155	-	13,050,081	22,837,641	7,494,926	17,282,486
Manufacture of coke oven products	937,842	-936,638	191,797	6,086,203	8,299,368	5,341,362	7,554,527
Refineries	145,997,864	-377,770,975	9,505,395	694,106,636	1,214,686,613	325,841,056	846,421,033
Industrial gases	1,443,692	1,400,967	1,840	-	-	1,402,808	1,402,808
Inorganic chemicals	4,328,321	15,808,388	486,564	4,847,485	11,391,590	21,142,437	27,686,542
Petrochemicals	28,870,538	125,486,755	1,151,581	69,014,129	207,042,387	195,652,465	333,680,723
Fertilizers	3,555,954	1,460,857	-	3,866,092	12,886,974	5,326,949	14,347,830
Manufacture of plastics in primary form	1,216,337	3,385,114	165,942	5,835,397	9,725,662	9,386,453	13,276,718
Flat glass	4,896,010	9,526,583	1,154,337	-	23,027,188	10,680,920	33,708,108
Hollow glass	12,782,375	1,992,106	1,909,871	44,527,950	81,634,576	48,429,927	85,536,553
Other glass	517,662	3,728,782	151,566	1,533,783	3,195,382	5,414,131	7,075,730
Manufacturing of bricks	3,411,366	23,597,651	221,774	8,366,696	11,155,595	32,186,121	34,975,020
Cement	133,188,589	487,808,257	22,017,236	336,794,054	656,748,406	846,619,548	1,166,573,899
Lime	15,036,861	65,303,511	2,804,310	-	69,954,015	68,107,821	138,061,837
Iron and steel	85,451,900	-6,388,410	12,810,552	554,650,332	756,341,361	561,072,474	762,763,504
Total	444,704,608	348,847,794	52,572,766	1,742,678,839	3,088,926,758	2,144,099,399	3,490,347,317

Note: ** Profit CERs only for 2008-2012.

Table 26 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Italy, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
ILVA S.P.A.	Iron and steel	59,934,589	18,418,674	6,367,277	392,454,340	535,165,010	417,240,291	559,950,961
Sarlux Srl	Refineries	41,484,437	-270,604,109	3,424,124	191,173,219	334,553,134	-76,006,766	67,373,149
ITALCEMENTI S.P.A.	Cement	34,595,272	132,941,757	6,372,630	90,400,893	176,281,742	229,715,280	315,596,129
ENI SpA - DIVISIONE REFINING & MARKETING	Refineries	29,294,917	-38,829,394	-	136,367,471	238,643,074	97,538,077	199,813,680
Buzzi Unicem S.p.A.	Cement	24,185,401	108,430,741	3,984,776	60,011,694	117,022,802	172,427,210	229,438,319
COLACEM SPA	Cement	23,728,921	71,546,236	3,912,795	57,834,688	112,777,642	133,293,719	188,236,673
Versalis S.p.A.	Petrochemicals	23,297,925	96,643,634	-	57,977,141	173,345,164	154,620,775	269,988,798
Raffineria di Gela S.P.A.	Refineries	16,809,965	-13,761,699	-	90,183,327	157,820,822	76,421,628	144,059,123
ISAB S.r.l.	Refineries	14,671,130	-12,963,744	1,576,534	68,761,595	120,332,791	57,374,386	108,945,582
ESSO ITALIANA S.r.L.	Refineries	13,102,639	-17,983,580	-	60,844,637	106,478,114	42,861,057	88,494,534
Raffineria di Milazzo S.C.p.A.	Refineries	12,346,297	-18,564,594	2,501,026	55,743,136	97,550,487	39,679,568	81,486,919
CEMENTIR ITALIA S.P.A.	Cement	8,758,282	31,522,060	825,093	22,668,840	44,204,239	55,015,993	76,551,392
SACCI S.p.A.	Cement	8,292,774	32,427,404	1,696,461	20,925,128	40,804,000	55,048,994	74,927,866
LUCCHINI SPA	Iron and steel	8,140,244	51,430,396	4,723,657	56,423,511	76,941,151	112,577,563	133,095,203
Unicalce S.p.A.	Lime	7,810,931	25,819,098	1,550,267	-	36,740,579	27,369,366	64,109,945
Industria Cementi Giovanni Rossi SpA	Cement	7,721,358	26,477,772	1,614,376	19,803,394	38,616,618	47,895,541	66,708,765
S.A.R.P.O.M S.R.L.	Refineries	7,602,388	-5,494,155	118,748	35,482,946	62,095,155	30,107,539	56,719,748
HOLCIM (ITALIA) SPA	Cement	7,385,360	37,755,896	1,201,243	19,168,359	37,378,301	58,125,499	76,335,440
CEMENTERIE ALDO BARBETTI SPA	Cement	5,700,715	12,084,163	609,435	14,327,343	27,938,320	27,020,942	40,631,918
Cementizillo S.p.A.	Cement	4,833,363	12,913,609	894,828	12,212,485	23,814,346	26,020,922	37,622,783

Note: ** Profit CERs only for 2008-2012.

14 The Netherlands

14.1 General description

Verified emissions in the Netherlands from industrial sources mostly take place in the refineries sector followed by petrochemicals. The refineries sector takes almost 30% of total verified CO_2 emissions reported by the Netherlands under the EU ETS between 2008-2014. 12 out of 15 sectors investigated have profited from over allocation of emission allowances in the Netherlands. In total, almost 50 million allowances were issued in excess of verified emissions creating direct additional profits worth over 230 million euro. In absolute size, the largest profits from overallocation were generated in the petrochemicals sector. In relative size, the overallocation to the cement sector was highest.

The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which the EU average. About 2/3 of the companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-2012. The largest company reported under the ETS in the Netherlands (Royal Shell) has for example not used this opportunity according to the EU ETS Registry.

14.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 27 Verified emissions (ton CO_2) and additional profits (€) per sector, Netherlands, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	851,126	2,125,110	99,244	3,349,991	5,862,484	5,574,346	8,086,839
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	76,092,619	26,168,438	2,059,674	353,520,350	618,660,612	381,748,462	646,888,724
Industrial gases	5,574,833	5,867,616	501,674	-	-	6,369,290	6,369,290
Inorganic chemicals	4,094,572	6,310,088	689,341	4,833,414	11,358,524	11,832,844	18,357,953
Petrochemicals	57,081,277	66,212,693	3,578,259	126,769,371	380,308,112	196,560,323	450,099,065
Fertilizers	13,358,081	24,678,435	107,839	14,009,924	46,699,747	38,796,198	71,486,021
Manufacture of plastics in primary form	3,295,345	3,784,657	677,665	14,244,849	23,741,414	18,707,171	28,203,737
Flat glass	540,628	-751,038	206,273	-	3,200,774	-544,765	2,656,010
Hollow glass	2,814,589	-79,598	290,759	9,560,597	17,527,761	9,771,758	17,738,922
Other glass	605,417	558,115	135,623	1,713,585	3,569,968	2,407,322	4,263,706
Manufacturing of bricks	2,916,919	6,112,263	294,468	10,505,884	14,007,845	16,912,614	20,414,575
Cement	3,678,021	13,443,969	220,925	8,932,229	17,417,847	22,597,123	31,082,741
Lime	85,819	-247,020	-	-	177,967	-247,020	-69,053
Iron and steel	42,692,907	23,724,398	18,581,054	271,133,048	369,726,883	313,438,500	412,032,335
Total	213,682,153	177,908,128	27,442,798	818,573,241	1,512,259,939	1,023,924,166	1,717,610,865

Note: ** Profit CERs only for 2008-2012.

Table 28 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Netherlands, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
SHELL Nederland	Refineries[1]	45,022,329	35,980,665	-	175,838,559	348,575,907	211,819,224	384,556,572
Tata Steel IJmuiden B.V.	Iron and steel	42,383,865	25,564,774	18,527,011	269,167,644	367,046,788	313,259,429	411,138,572
Chemelot Site Permit B.V.	Petrochemicals	24,145,148	40,675,820	340,170	49,209,547	147,367,646	90,225,537	188,383,637
DOW Benelux B.V.	Petrochemicals	17,599,543	3,898,547	2,904,470	39,802,313	118,994,332	46,605,330	125,797,349
Esso Nederland B.V.	Refineries	15,784,625	1,190,144	-	73,021,582	127,787,769	74,211,726	128,977,913
Netherl. Refining Company (BP Refinery) B.V.	Refineries	14,966,949	-18,128,862	807,097	68,426,040	119,745,569	51,104,274	102,423,804
Zeeland Refinery N.V.	Refineries	10,464,362	6,891,504	308,838	48,723,659	85,266,404	55,924,002	92,466,746
Yara Sluiskil B.V.	Fertilizers	9,227,610	19,179,643	-	10,291,071	34,303,569	29,470,714	53,483,212
Enci B.V.	Cement	3,678,021	13,443,969	220,925	8,932,229	17,417,847	22,597,123	31,082,741
Kuwait Petroleum Europoort B.V.	Refineries	3,604,303	-715,258	743,109	16,720,882	29,261,543	16,748,733	29,289,395
Air Products Nederland B.V.	Industrial gases	3,415,516	1,150,028	501,674	-	-	1,651,702	1,651,702
SABIC Innovative Plastics B.V.	Manufacture of plastics in primary form	2,329,597	4,269,807	632,285	11,319,188	18,865,313	16,221,280	23,767,405
O-I Manufacturing Netherlands B.V.	Hollow glass	1,806,458	1,101,558	201,307	6,229,922	11,421,524	7,532,787	12,724,389
Cabot B.V.	Inorganic chemicals	1,557,031	-181,463	454,812	1,755,090	4,124,462	2,028,439	4,397,811
Abengoa Bioenergy Netherlands B.V.	Petrochemicals	1,265,682	-2,642,885	-	2,060,581	6,181,742	-582,304	3,538,858
Air Liquide Nederland B.V.	Industrial gases	1,254,428	683,666	-	-	-	683,666	683,666
AKZO Nobel Chemicals B.V.	Inorganic chemicals[2]	1,232,726	4,497,934	25,619	1,470,827	3,460,864	5,994,380	7,984,417
Exxonmobil Chemical Holland	Petrochemicals	1,164,051	1,019,076	-	1,438,861	4,316,584	2,457,938	5,335,660
Wienerberger B.V.	Manufacturing of bricks	1,124,222	3,510,679	135,967	4,174,238	5,565,651	7,820,884	9,212,297
DuPont Holding Netherlands B.V.	Petrochemicals	1,030,940	4,000,900	333,618	2,325,006	6,975,018	6,659,525	11,309,537

Note: ** Profit CERs only for 2008-2012 |1 includes petrochemicals | 2 includes petrochemicals.

15 Poland

15.1 General description

Verified emissions in Poland from industrial sources mostly take place in the cement sector followed by iron and steel. The cement sector represents 25% of total verified CO_2 emissions reported by Poland under the EU ETS between 2008-2014. 11 out of 13 sectors investigated have profited from over allocation of emission allowances in Poland. Twelve percent of allocated emissions were issued in excess of demand in Poland. This is a relatively low share of overallocation when compared to other countries. Fertilizers and iron and steel (when corrected for waste gas transfers) were underallocated in Poland. In total, almost 36 million allowances were issued in excess of verified emissions creating direct additional profits worth over 260 million euro. In absolute size, the largest profits from overallocation were generated in the cement and manufacture of coke oven products sectors. In relative size, the overallocation to the inorganic chemicals sector was highest.

The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which the EU average. About 2/3 of the companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

15.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 29 Verified emissions (ton CO_2) and additional profits (€) per sector, Poland, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	16,148,436	57,474,049	935,676	107,919,016	147,162,295	166,328,741	205,572,019
Refineries	24,166,944	10,748,455	2,073,810	104,373,553	182,653,719	117,195,819	195,475,984
Industrial gases	-	-	-	-	-	-	-
Inorganic chemicals	1,457,717	8,165,416	49,823	1,170,774	2,751,319	9,386,013	10,966,558
Petrochemicals	10,663,451	25,715,651	1,346,062	23,367,728	70,103,183	50,429,441	97,164,897
Fertilizers	20,508,318	-18,496,781	-	25,043,556	83,478,520	6,546,775	64,981,739
Manufacture of plastics in primary form	90,928	200,913	-	199,298	332,164	400,212	533,077
Flat glass	3,651,886	8,255,581	832,004	-	15,453,402	9,087,585	24,540,987
Hollow glass	4,916,992	5,345,320	414,866	17,079,344	31,312,130	22,839,530	37,072,316
Other glass	318,371	600,913	61,739	945,007	1,968,764	1,607,659	2,631,416
Manufacturing of bricks	3,265,885	12,485,118	524,669	11,936,810	15,915,747	24,946,597	28,925,534
Cement	68,361,594	61,790,535	7,357,599	159,010,809	310,071,078	228,158,943	379,219,212
Lime	13,217,416	19,163,793	2,148,130	-	60,908,351	21,311,922	82,220,273
Iron and steel	44,329,542	-12,465,879	4,575,447	287,383,706	391,886,872	279,493,274	383,996,440
Total	211,097,480	178,983,084	20,319,825	738,429,602	1,313,997,545	937,732,511	1,513,300,453

Note: ** Profit CERs only for 2008-2012.

Table 30 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Poland, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
ArcelorMittal Poland S.A.	Iron and steel[1]	50,306,300	30,257,277	4,213,912	319,756,463	444,308,339	354,227,652	478,779,528
Grupa Azoty S.A.	Fertilizers[2]	21,972,983	-18,648,538	763,458	30,709,606	100,070,200	12,824,526	82,185,120
Polski Koncern Naftowy ORLEN S.A.	Refineries	21,109,084	26,454,626	1,326,019	80,485,820	157,385,066	108,266,465	185,165,711
Górażdże Cement S. A.	Cement	14,082,968	13,336,367	-	33,282,501	64,900,877	46,618,868	78,237,244
LAFARGE CEMENT SPÓŁKA AKCYJNA	Cement	13,923,170	9,205,523	3,523,347	32,377,134	63,135,412	45,106,005	75,864,282
Grupa Ożarów S.A.	Cement	13,698,413	7,488,352	1,920,858	32,474,877	63,326,011	41,884,088	72,735,221
Cemex Polska Sp. z o.o.	Cement	9,896,080	21,465,708	547,761	23,591,030	46,002,509	45,604,499	68,015,978
CEMENTOWNIA WARTA S.A.	Cement	8,470,529	-160,981	-	17,855,965	34,819,132	17,694,984	34,658,150
GRUPA LOTOS S.A.	Refineries	8,308,701	-2,112,056	1,098,948	34,051,256	59,589,698	33,038,148	58,576,590
Dyckerhoff Polska Sp.z o.o.	Cement	5,942,151	4,001,543	1,365,633	14,135,702	27,564,619	19,502,878	32,931,795
Zakłady Przemysłu Wapienniczego Trzuskawica S.A.	Lime	4,723,235	5,380,016	633,367	-	21,478,911	6,013,383	27,492,294
Zakłady Wapiennicze Lhoist S.A.	Lime	3,601,884	6,167,142	867,406	-	17,036,822	7,034,548	24,071,369
Koksownia Przyjaźń	Manufacture of coke oven products	2,992,506	9,335,195	412,377	18,037,092	24,596,035	27,784,665	34,343,607
Lhoist Bukowa Sp. z o.o.	Lime	2,899,044	1,068,762	623,803	-	13,532,518	1,692,565	15,225,082
Cementownia "Odra" SA	Cement	2,182,393	-918,645	-	4,828,740	9,416,043	3,910,095	8,497,398
ANWIL S. A.	Fertilizers	1,707,261	254,753	-	1,388,405	4,569,996	1,643,158	4,824,749
CMC Poland Sp. z o.o.	Iron and steel	1,558,483	-3,485,879	-	9,924,090	13,532,850	6,438,211	10,046,971
KOMBINAT KOKSOCHEMICZNY ZABRZE S.A.	Manufacture of coke oven products	1,554,217	5,073,169	-	9,719,323	13,253,623	14,792,492	18,326,792
O-I Produkcja Polska S.A.	Hollow glass	1,481,059	87,147	299,636	5,115,053	9,377,597	5,501,836	9,764,380
Saint-Gobain Poland	Flat glass[3]	1,283,265	5,200,282	481,261	511,349	5,622,947	6,192,893	11,304,490

Note: ** Profit CERs only for 2008-2012; 1 also manufacture of coke oven products and lime | 2 includes petrochemicals | 3 includes other glass.

16 Portugal

16.1 General description

Cement manufacturing is the largest sector in Portugal when it comes to emissions reported under the EU ETS. In total, the sector emits nearly 50% of Portugal's industrial emissions between 2008-2014. Industry in Portugal reaped 227.3 million euro of additional profits due to overallocation between 2008-2014 of which, again, nearly 50% was allocated to the cement sector. In relative terms, the small flat glass industry received most additional allowances when compared to their verified emissions.

Although Portugal has an iron and steel sector, no emission transfers for waste gases was reported by the IEA. During Phase 2, Portugal had the often used rule that 10% of verified emissions could be covered by using CDM/JI credits.

16.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 31 Verified emissions (ton CO_2) and additional profits (€) per sector, Portugal, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	20,531,052	22,204,993	-	91,163,063	159,535,361	113,368,056	181,740,354
Industrial gases	127,508	-284,399	-	-	-	-284,399	-284,399
Inorganic chemicals	500,176	5,238,284	182,616	623,173	1,464,456	6,044,072	6,885,355
Petrochemicals	2,916,983	14,816,404	389,449	6,636,816	19,910,448	21,842,669	35,116,301
Fertilizers	462,953	1,460,722	264,242	833,811	2,779,371	2,558,775	4,504,334
Manufacture of plastics in primary form	331,684	1,205,751	104,261	1,521,294	2,535,491	2,831,307	3,845,503
Flat glass	100,350	2,613,706	-	-	851,508	2,613,706	3,465,214
Hollow glass	4,033,695	6,512,004	846,321	13,594,000	24,922,333	20,952,324	32,280,657
Other glass	-	-	-	-	-	-	-
Manufacturing of bricks	1,861,502	17,544,596	302,224	5,364,285	7,152,380	23,211,105	24,999,200
Cement	34,445,244	104,818,670	3,609,932	83,560,102	162,942,199	191,988,704	271,370,801
Lime	2,825,855	10,372,500	834,921	-	12,707,913	11,207,421	23,915,334
Iron and steel	1,207,392	13,544,505	693,037	7,799,498	10,635,679	22,037,039	24,873,220
Total	69,344,394	200,047,735	7,227,002	211,096,042	405,437,138	418,370,779	612,711,874

Note: ** Profit CERs only for 2008-2012.

Table 32 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Portugal, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Petróleos de Portugal - Petrogal S.A	Refineries	20,531,052	22,204,993	-	91,163,063	159,535,361	113,368,056	181,740,354
CIMPOR – Indústria de Cimentos, S.A.	Cement	19,925,558	77,834,723	3,228,273	47,604,179	93,487,341	128,667,175	174,550,337
SECIL	Cement	8,532,417	14,620,836	421,742	20,410,416	40,086,725	35,452,994	55,129,303
CMP - Cimentos Maceira e Pataias, S.A	Cement	6,157,523	14,934,330	-	15,545,507	30,313,738	30,479,837	45,248,069
Repsol Polímeros, Lda.	Petrochemicals	2,854,511	14,691,766	389,449	6,576,068	19,728,203	21,657,282	34,809,417
Lusical - Companhia Lusitana de Cal S.A	Lime	2,126,034	4,062,771	645,051	-	9,363,776	4,707,822	14,071,598
BA Vidro, S.A.	Hollow glass	1,359,535	2,264,247	478,121	4,563,908	8,367,164	7,306,276	11,109,532
Santos Barosa - Vidros, S.A	Hollow glass	871,944	2,156,930	1,304	2,926,106	5,364,528	5,084,340	7,522,761
Saint-Gobain Glass Portugal, Vidro Plano, S.A.	Hollow glass[1]	637,854	3,300,639	125,351	1,849,355	4,241,993	5,275,345	7,667,983
SN Seixal Siderurgia Nacional,SA	Iron and steel	637,008	7,560,489	392,068	4,020,681	5,482,746	11,973,238	13,435,303
GALLOVIDRO, S.A.	Hollow glass	542,252	1,065,513	66,783	1,861,721	3,413,154	2,994,017	4,545,450
Sotancro, embalagem de vidro, S.A.	Hollow glass	458,503	144,800	153,195	1,501,882	2,753,451	1,799,877	3,051,446
SN Maia - Siderurgia Nacional, SA	Iron and steel	456,084	4,949,688	241,909	3,074,940	4,193,100	8,266,537	9,384,697
Carbogal Engineered Carbons, S.A.	Inorganic chemicals	409,073	3,210,298	182,616	581,725	1,367,053	3,974,638	4,759,967
DOW Portugal, Produtos Químicos, SUL	Manufacture of plastics in primary form	331,684	1,205,751	104,261	1,521,294	2,535,491	2,831,307	3,845,503
Crisal - Cristalaria Automática, S.A.	Hollow glass	263,957	193,580	21,568	891,028	1,633,550	1,106,175	1,848,698
MICROLIME - Produtos de Cal e Derivados, S.A.	Lime	263,044	52,746	77,896	-	1,192,463	130,642	1,323,104
Quimigal, Quimica de Portugal, S.A.	Fertilizers	241,020	357,836	64,642	401,361	1,337,871	823,838	1,760,348
Calcidrata	Lime	226,397	3,968,512	71,891	-	1,047,048	4,040,403	5,087,451
Preceram - Indústrias de Construção, SA	Manufacturing of bricks	211,334	1,570,289	92,365	689,668	919,557	2,352,321	2,582,211

Note: ** Profit CERs only for 2008-2012 | 1 includes flat glass.

17 Slovak Republic

17.1 General description

Industrial CO_2 emissions in the Slovak Republic are for over 50% the result from the iron and steel sector in one location: US Steel in Kosice. This installation also received more allowances than needed for their verified emissions, even when corrected for waste gases, contributing to an additional profit of over 100 million euro. Industry in Slovakia reaped over 300 million euro of additional profits due to overallocation between 2008-2014. In relative terms, the manufacture of bricks received most additional allowances when compared to their verified emissions.

Slovakia had a relatively limited use of CDM/JI credits for compliance: only 7% of verified emissions could be used in Phase 2.

17.2 Tables

The following tables give the verified emissions per sector and company and the estimated profits.

Table 33 Verified emissions (ton CO_2) and additional profits (€) per sector, Slovakia, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	8,824,732	29,045,249	-	45,580,685	79,766,198	74,625,934	108,811,447
Industrial gases	-	-	-	-	-	-	-
Inorganic chemicals	-	-	-	-	-	-	-
Petrochemicals	2,914,513	8,977,817	161,419	6,864,269	20,592,806	16,003,506	29,732,043
Fertilizers	2,390,508	386,724	117,525	2,368,992	7,896,639	2,873,241	8,400,889
Manufacture of plastics in primary form	-	-	-	-	-	-	-
Flat glass	-	-	-	-	-	-	-
Hollow glass	604,737	1,228,247	94,427	2,154,109	3,949,201	3,476,784	5,271,875
Other glass	317,409	1,755,836	-	914,516	1,905,241	2,670,351	3,661,077
Manufacturing of bricks	314,573	5,212,185	50,926	1,245,047	1,660,063	6,508,159	6,923,174
Cement	13,338,179	50,903,205	2,922,203	31,593,232	61,606,802	85,418,640	115,432,210
Lime	6,400,612	36,675,399	1,764,705	-	30,553,876	38,440,103	68,993,979
Iron and steel	59,943,136	111,646,830	8,195,739	377,130,016	514,268,203	496,972,585	634,110,773
Total	95,048,399	245,831,494	13,306,945	467,850,865	722,199,029	726,989,304	981,337,468

Note: ** Profit CERs only for 2008-2012.

Table 34 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Slovakia, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
U. S. Steel Košice, s.r.o.	Iron and steel	59,628,351	106,534,797	8,163,724	374,416,688	510,568,211	489,115,209	625,266,733
SLOVNAFT, a.s.	Refineries	11,153,274	35,829,034	-	51,152,266	96,480,944	86,981,300	132,309,978
Holcim (Slovensko) a. s.	Cement	7,618,408	32,717,860	1,375,527	18,494,116	36,063,526	52,587,503	70,156,913
Carmeuse Slovakia, s.r.o.	Lime	4,355,220	21,443,870	1,253,380	-	20,773,040	22,697,250	43,470,289
Považská cementáreň, a.s.	Cement	3,446,648	14,698,833	988,282	7,804,034	15,217,866	23,491,149	30,904,982
Duslo, a.s.	Fertilizers	2,354,133	445,652	117,525	2,339,806	7,799,352	2,902,983	8,362,529
CEMMAC a.s.	Cement	2,273,123	3,486,513	558,394	5,295,082	10,325,409	9,339,988	14,370,316
Calmit, spol. s r.o.	Lime	1,130,993	10,225,769	343,497	-	5,494,639	10,569,266	16,063,905
DOLVAP, s.r.o.	Lime	914,399	5,005,760	167,828	-	4,286,197	5,173,587	9,459,784
ENVIRAL, a.s.	Petrochemicals	428,233	2,485,560	135,889	943,587	2,830,762	3,565,037	5,452,212
VETROPACK NEMŠOVÁ s.r.o.	Hollow glass	370,019	209,659	85,284	1,284,891	2,355,634	1,579,834	2,650,577
Johns Manville Slovakia, a.s.	Other glass	317,409	1,755,836	-	914,516	1,905,241	2,670,351	3,661,077
Wienerberger slovenské tehelne, spol. s r.o.	Manufacturing of bricks	204,989	1,475,762	32,941	795,994	1,061,326	2,304,697	2,570,028
RONA, a. s.	Hollow glass	175,358	395,931	-	579,004	1,061,507	974,935	1,457,438
SIDERIT s.r.o. Nižná Slaná	Iron and steel	168,151	2,781,670	-	2,029,594	2,767,629	4,811,264	5,549,299
Evonik Fermas s.r.o.	Petrochemicals	157,738	-291,528	25,531	349,099	1,047,298	83,102	781,301
SLOVAKIA STEEL MILLS, a.s.	Iron and steel	94,565	-485,211	-	255,875	348,920	-229,337	-136,291
Metalurg_Steel, s.r.o.	Iron and steel	50,682	2,824,063	32,016	423,375	577,330	3,279,454	3,433,408
IPEĽSKÉ TEHELNE a.s.	Manufacturing of bricks	41,014	702,590	14,288	199,339	265,786	916,217	982,664
HNOJIVÁ Duslo, s.r.o.	Fertilizers	36,375	-58,928	-	29,186	97,287	-29,741	38,359

Note: ** Profit CERs only for 2008-2012.

18 Slovenia

18.1 General description

Cement manufacturing is the largest sector in Slovenia where emissions mount to about 40% of the industrial total. The two largest cement manufacturers were Salonit and Lafarge. Where Salonit had shortage of emission allowances between 2008-2014, Lafarge experienced substantial additional profits from overalloaction which contributed to about 50% of their additional profits. Next to profits from overallocation, Slovenia had a relatively generous provision for using CDM/JI credits for compliance. On average, 15.8% of verified emissions could be used for compliance. The ETS registry shows that many companies have not used this option.

18.2 Tables

Various sectors have no production units in Slovenia. Within the chosen sectors, only seventeen companies were active in Slovenia and that is why the company table shows all of these companies (including some very small ones).

Table 35 Verified emissions (ton CO_2) and additional profits (€) per sector, Slovenia, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	-	-	-	-	-	-	-
Industrial gases	150,706	1,523,385	77,431	-	-	1,600,816	1,600,816
Inorganic chemicals	179,613	142,900	3,595	210,224	494,027	356,719	640,522
Petrochemicals	-	-	-	-	-	-	-
Fertilizers	-	-	-	-	-	-	-
Manufacture of plastics in primary form	70,992	-64,256	-	333,640	556,066	269,383	491,810
Flat glass	-	-	-	-	-	-	-
Hollow glass	407,406	895,530	-	1,440,858	2,641,573	2,336,388	3,537,103
Other glass	70,191	203,259	45,038	235,217	490,035	483,513	738,331
Manufacturing of bricks	158,990	821,445	11,837	683,243	910,990	1,516,525	1,744,273
Cement	4,422,161	5,050,689	724,552	10,901,486	21,257,898	16,676,727	27,033,139
Lime	596,652	625,678	-	-	3,001,206	625,678	3,626,884
Iron and steel	1,316,417	-663,756	110,023	8,108,393	11,056,899	7,554,660	10,503,167
Total	7,373,128	8,534,873	972,476	21,913,060	40,408,695	31,420,409	49,916,044

Note: ** Profit CERs only for 2008-2012.

Table 36 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Slovenia, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
SALONIT ANHOVO, D.D.	Cement	3,185,916	-1,666,938	310,515	7,579,244	14,779,527	6,222,821	13,423,103
LAFARGE CEMENT, D.O.O	Cement	1,236,245	6,717,627	414,037	3,322,242	6,478,372	10,453,906	13,610,036
ACRONI, D.O.O.	Iron and steel	665,398	-142,441	80,118	4,133,817	5,637,023	4,071,494	5,574,700
IGM ZAGORJE, D.O.O.	Lime	528,972	86,189	-	-	2,643,437	86,189	2,729,626
METAL RAVNE, D.O.O.	Iron and steel	431,821	-309,540	-	2,598,580	3,543,518	2,289,040	3,233,978
STEKLARNA HRASTNIK D.D.	Hollow glass	335,219	704,565	-	1,186,804	2,175,807	1,891,369	2,880,373
ŠTORE STEEL D.O.O.	Iron and steel	219,198	-211,775	29,906	1,375,996	1,876,358	1,194,127	1,694,489
NAFTA - PETROCHEM D.O.O.	Industrial gases	150,706	1,523,385	77,431	-	-	1,600,816	1,600,816
BELINKA PERKEMIJA, D.O.O.	Inorganic chemicals	125,326	-87,870	3,595	150,986	354,817	66,711	270,542
OPEKARNA	Manufacturing of bricks	72,323	871,854	1,380	27,493	394,425	900,727	1,267,660
STEKLARNA ROGAŠKA D.D.	Hollow glass	72,187	190,965	-	254,054	465,765	445,019	656,730
MELAMIN D.D. KOČEVJE	Manufacture of plastics in primary form	70,992	-64,256	-	333,640	556,066	269,383	491,810
URSA SLOVENIJA, D.O.O.	Other glass	70,191	203,259	45,038	235,217	490,035	483,513	738,331
GORIŠKE OPEKARNE, d.d.	Manufacturing of bricks	67,678	264,407	-	298,385	397,847	562,792	662,254
TKI-HRASTNIK, D.D.	Inorganic chemicals	54,287	230,770	-	59,238	139,210	290,008	369,979
WIENERBERGER, D.D.	Manufacturing of bricks	49,771	253,966	10,457	198,270	264,359	462,692	528,782
TONDACH SLOVENIJA, D.O.O.	Manufacturing of bricks	36,898	-29,294	-	159,095	212,127	129,801	182,833

Note: ** Profit CERs only for 2008-2012.

19 Spain

19.1 Sectoral approach

Verified emissions in Spain from industrial sources between 2008-2014 mostly took place in the cement sector followed by the refineries sector. The cement sector took more than 25% of total verified CO_2 emissions reported by Spain under the EU ETS between 2008-2014. Twelve out of fourteen sectors investigated have profited from over allocation of emission allowances in Spain. In total, over 140 million allowances in excess of demand were issued in Spain for industry between 2008-2014, with a net worth of over 1.6 billion euro. Spain has benefited more than any other country investigated from overallocation. In absolute size, the largest profits from overallocation were generated in the cement sector where additional profits were generated worth over 780 million euro. In relative size, the overallocation to the manufacture of bricks was highest.

Not only overallocation, but also the use of CDM/JI during Phase 2 has been used as an important source of additional profits. Spain has set the limit for use of CDM/JI credits at 20% of verified emissions, which can be regarded as double the EU average. Virtually all companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

19.2 Top-20 companies

The following tables give the verified emissions per sector and company and the estimated profits.

Table 37 Verified emissions (ton CO_2) and additional profits (€) per sector, Spain, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	339,865	2,871,923	56,387	2,356,176	3,212,967	5,284,486	6,141,277
Refineries	95,111,303	169,415,663	9,321,035	429,262,205	751,208,860	607,998,904	929,945,558
Industrial gases	1,785,021	-1,541,796	-	-	-	-1,541,796	-1,541,796
Inorganic chemicals	7,401,251	9,785,391	905,431	7,861,083	18,473,546	18,551,905	29,164,368
Petrochemicals	21,359,350	34,396,699	2,046,988	48,270,013	144,810,039	84,713,700	181,253,726
Fertilizers	10,881,758	-12,398,208	598,525	16,500,918	55,003,059	4,701,235	43,203,376
Manufacture of plastics in primary form	1,028,947	7,935,344	78,076	4,625,175	7,708,625	12,638,595	15,722,045
Flat glass	3,795,238	10,893,347	988,526	-	17,314,162	11,881,873	29,196,035
Hollow glass	7,441,231	11,023,375	1,270,444	26,039,923	47,739,858	38,333,741	60,033,677
Other glass	303,277	2,777,436	55,811	848,219	1,767,122	3,681,466	4,600,370
Manufacturing of bricks	8,965,152	177,151,781	1,892,062	37,394,000	49,858,667	216,437,843	228,902,509
Cement	113,939,181	781,354,325	16,460,397	287,118,991	559,882,032	1,084,933,712	1,357,696,754
Lime	14,139,395	29,317,123	1,763,630	-	65,462,272	31,080,753	96,543,026
Iron and steel	48,245,772	261,315,914	13,734,945	306,308,876	417,693,921	581,359,734	692,744,780
Total	334,736,741	1,484,298,317	49,172,257	1,166,585,578	2,140,135,130	2,700,056,152	3,673,605,704

Note: ** Profit CERs only for 2008-2012.

Table 38 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Spain, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Repsol Petróleo, s.a.	Refineries	48,281,222	100,675,666	5,260,329	217,511,775	380,645,606	323,447,770	486,581,601
ARCELORMITTAL ESPAÑA, S.A.	Iron and steel	38,055,793	232,040,772	12,489,726	243,379,551	331,881,206	487,910,049	576,411,704
Compañía Española de Petróleos, S.A.	Refineries	22,946,891	53,766,403	3,650,427	103,489,739	181,107,042	160,906,569	238,523,873
Cemex España Operaciones, S.L.U.	Cement	22,676,427	266,442,447	2,515,719	58,742,908	114,548,670	327,701,074	383,506,836
Petróleos del Norte, SA	Refineries	15,383,759	4,065,416	14,579	70,613,387	123,573,427	74,693,382	127,653,422
Cementos Portland Valderrivas, S.A.	Cement	14,975,952	124,881,822	1,791,512	40,248,834	78,485,226	166,922,167	205,158,559
Cementos Tudela Veguín SA	Lime	13,309,072	41,372,604	1,759,731	23,532,005	60,821,257	66,664,341	103,953,593
Holcim España S.A.	Cement	12,533,457	85,180,350	66,073	31,007,997	60,465,594	116,254,420	145,712,017
Lafarge Cementos, S.A	Cement	11,906,686	86,811,962	3,813,320	29,690,604	57,896,677	120,315,887	148,521,960
Sociedad Financiera y Minera S.A	Cement	8,909,945	21,994,031	1,510,906	21,431,648	41,791,714	44,936,585	65,296,650
Uniland Cementera S.A.	Cement	8,858,298	52,179,202	752,967	22,802,657	44,465,181	75,734,826	97,397,350
BP OIL ESPAÑA, S.A.U	Refineries	7,508,105	6,975,959	345,774	33,167,670	58,043,423	40,489,403	65,365,156
Dow Chemical Iberica, SL	Petrochemicals[1]	6,956,300	9,610,136	1,149,034	17,114,239	49,191,361	27,873,409	59,950,532
Cementos Molins Industrils, S.A.	Cement	6,633,535	14,892,908	1,147,235	15,645,978	30,509,658	31,686,121	46,549,801
Repsol Química, SA	Petrochemicals	5,395,470	3,827,703	-	12,463,236	37,389,709	16,290,940	41,217,413
CEMENTOS COSMOS, S.A.	Cement	5,150,455	15,787,636	1,284,528	13,171,102	25,683,648	30,243,265	42,755,812
Solvay Química S.L.	Inorganic chemicals	5,119,190	523,570	708,971	5,405,764	12,703,546	6,638,305	13,936,086
Sociedad de Cementos y Mat. de Construcción de And	Cement	4,756,727	18,992,683	1,174,359	11,110,588	21,665,646	31,277,630	41,832,689
Saint Gobain Spain	Hollow glass[2]	4,224,360	6,462,850	913,398	9,476,782	24,122,813	16,853,030	31,499,062
Cepsa Química S.A	Petrochemicals	2,898,431	16,827,525	774,696	6,503,760	19,511,280	24,105,981	37,113,501

Note: ** Profit CERs only for 2008-2012 | 1 includes plastics | 2 includes flat glass, other glass and lime.

20 Sweden

20.1 Sectoral approach

Verified emissions in Sweden from industrial sources mostly take place in the iron and steel sector followed by refineries. The iron and steel sector represents 30% of total verified CO_2 emissions reported by Sweden under the EU ETS between 2008-2014. All of the sectors active in Sweden have profited from overallocation except the manufacturing of bricks. In total, 33% of allocated emissions were issued in excess of demand in Sweden. This is the highest share of overallocation for the nineteen countries investigated in this study. Moreover, this problem has not been tackled during Phase 3 as Sweden remains to receive substantial additional allowances compared to their verified emissions.

In absolute terms most of the overallocation occurred in the iron and steel sector in Sweden where about half of the overallocated profits were generated. The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which the EU average. About 2/3 of the companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

20.2 Top-20 companies

The following tables give the verified emissions per sector and company and the estimated profits.

Table 39 Verified emissions (ton CO_2) and additional profits (€) per sector, Sweden, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	-	-	-	-	-	-	-
Manufacture of coke oven products	-	-	-	-	-	-	-
Refineries	20,187,176	16,954,162	2,893,573	93,591,510	163,785,143	113,439,246	183,632,879
Industrial gases	734,586	1,911,644	131,845	-	-	2,043,488	2,043,488
Inorganic chemicals	762,474	2,612,898	2,972	844,274	1,984,044	3,460,145	4,599,915
Petrochemicals	5,150,723	22,644,164	852,294	11,565,476	34,696,429	35,061,934	58,192,887
Fertilizers	100,636	273,169	-	78,858	262,860	352,026	536,028
Manufacture of plastics in primary form	484,982	2,562,287	90,950	2,123,577	3,539,295	4,776,814	6,192,532
Flat glass	754,864	350,666	181,225	-	4,265,028	531,891	4,796,919
Hollow glass	438,135	2,159,580	-	1,504,186	2,757,675	3,663,766	4,917,255
Other glass	174,185	154,521	49,162	482,493	1,005,194	686,176	1,208,877
Manufacturing of bricks	66,229	-10,970	1,141	231,130	308,173	221,300	298,344
Cement	15,051,758	19,092,209	893,572	34,269,292	66,825,119	54,255,073	86,810,900
Lime	4,942,074	15,732,069	721,646	-	23,024,259	16,453,715	39,477,974
Iron and steel	27,608,542	181,105,292	8,960,444	181,318,289	247,252,212	371,384,025	437,317,948
Total	76,456,364	265,541,692	14,778,824	326,009,085	549,705,430	606,329,600	830,025,945

Note: ** Profit CERs only for 2008-2012.

Table 40 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, Sweden, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
SSAB EMEA AB	Iron and steel	22,394,051	188,914,379	7,750,386	147,879,768	201,654,230	344,544,534	398,318,995
Preem AB	Refineries	15,479,677	13,841,471	1,609,075	71,762,075	125,583,631	87,212,622	141,034,178
Cementa AB	Cement	15,049,764	18,741,016	893,572	34,260,540	66,808,053	53,895,128	86,442,641
Borealis	Petrochemicals[1]	4,620,056	21,063,996	831,145	10,996,449	31,644,101	32,891,589	53,539,241
St1 Refinery AB	Refineries	3,532,462	2,407,597	1,000,871	16,305,795	28,535,141	19,714,262	31,943,608
Nordkalk AB	Lime	2,164,327	2,574,950	431,371	-	9,937,807	3,006,322	12,944,129
Höganäs Sweden AB	Iron and steel	1,609,531	-155,260	406,086	10,303,404	14,050,097	10,554,230	14,300,922
SMA Svenska Mineral AB	Lime	1,551,901	8,620,199	-	-	7,452,758	8,620,199	16,072,957
Nynas AB	Refineries	1,175,037	705,094	283,627	5,523,641	9,666,371	6,512,362	10,655,092
Outokumpu Stainless AB	Iron and steel	1,088,174	238,866	291,840	6,961,851	9,493,433	7,492,557	10,024,139
OVAKO AB	Iron and steel	1,070,364	-2,752,921	262,847	6,984,225	9,523,943	4,494,151	7,033,869
Kalkproduktion Storugns AB	Lime	1,026,890	2,739,523	283,900	-	4,728,571	3,023,424	7,751,995
Pilkington Floatglas AB	Flat glass	754,864	350,666	181,225	-	4,265,028	531,891	4,796,919
AB Sandvik Materials Technology	Iron and steel	743,013	-3,577,867	175,444	4,785,882	6,526,203	1,383,459	3,123,779
PERSTORP OXO AB	Industrial gases	734,586	1,911,644	131,845	-	-	2,043,488	2,043,488
Norcarb Engineered Carbons AB	Inorganic chemicals	529,834	2,238,759	-	627,530	1,474,695	2,866,289	3,713,454
Akzo Nobel	Petrochemicals[2]	434,753	1,483,114	-	823,537	2,419,812	2,306,651	3,902,926
Ardagh Glass Limmared AB	Hollow glass	422,549	1,657,163	-	1,432,114	2,625,543	3,089,277	4,282,706
Perstorp Specialty Chemicals AB	Petrochemicals	322,227	895,960	63,910	740,523	2,221,569	1,700,394	3,181,440
Uddeholms AB	Iron and steel	273,350	-961,689	54,559	1,710,719	2,332,799	803,589	1,425,669

Note: ** Profit CERs only for 2008-2012 | 1 includes plastics | 2 includes inorganic chemicals.

21 United Kingdom

21.1 Sectoral approach

Verified emissions in United Kingdom from industrial sources most dominantly take place in the iron and steel sector and the extraction of crude oil and gas. Each of these sectors represents about 23% of total verified CO_2 emissions reported by United Kingdom under the EU ETS between 2008-2014. Almost all sectors have profited from over allocation of emission allowances in United Kingdom. In absolute size, the largest profits from overallocation were generated in the cement sector. In relative size, the overallocation to the other glass sector and the manufacturing of bricks was highest.

The use of CDM/JI during Phase 2 has been set at 10% of verified emissions, which the EU average. About 2/3 of the companies in the top-20 have used opportunities to hand in JI/CDM credits for compliance between 2008-12.

21.2 Top-20 companies

The following tables give the verified emissions per sector and company and the estimated profits.

Table 41 Verified emissions (ton CO_2) and additional profits (€) per sector, United Kingdom, 2008-2014

Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Extraction of crude oil and gas	117,834,652	70,793,305	11,252,494	558,690,181	977,707,817	640,735,980	1,059,753,616
Manufacture of coke oven products	322,217	568,935	10,196	2,037,874	2,778,919	2,617,005	3,358,050
Refineries	105,999,846	126,327,960	4,474,457	503,887,597	881,803,294	634,690,014	1,012,605,711
Industrial gases	506,560	-343,637	-	-	-	-343,637	-343,637
Inorganic chemicals	1,978,468	11,572,330	147,881	1,978,651	4,649,830	13,698,862	16,370,040
Petrochemicals	27,979,352	122,607,659	5,728,565	64,048,022	192,144,067	192,384,246	320,480,291
Fertilizers	4,712,511	9,648,357	84,461	4,963,372	16,544,573	14,696,189	26,277,390
Manufacture of plastics in primary form	983,557	1,519,681	203,757	4,890,178	8,150,297	6,613,617	9,873,736
Flat glass	3,714,730	18,670,746	1,010,106	-	17,943,880	19,680,852	37,624,732
Hollow glass	7,651,860	12,048,339	626,523	26,299,402	48,215,570	38,974,264	60,890,432
Other glass	834,464	7,769,128	136,786	2,349,333	4,894,445	10,255,248	12,800,359
Manufacturing of bricks	4,738,076	38,172,543	992,545	17,790,822	23,721,096	56,955,910	62,886,184
Cement	43,522,577	255,107,700	8,000,820	103,960,893	202,723,740	367,069,412	465,832,260
Lime	12,116,068	83,213,939	3,584,127	-	56,445,417	86,798,066	143,243,483
Iron and steel	118,822,001	77,824,836	22,088,557	744,294,585	1,014,947,162	844,207,978	1,114,860,555
Total	451,716,939	835,501,821	58,341,275	2,035,190,910	3,452,670,107	2,929,034,006	4,346,513,203

Note: ** Profit CERs only for 2008-2012.

Table 42 Verified emissions (ton CO_2) and additional profits (€) top-20 companies, United Kingdom, 2008-2014

Company	Sector	Verified emissions	Profits over-allocation	Profits CERs**	Profits CPT Minimum	Profits CPT Average	Total profits Minimum	Total profits Average
Tata Steel UK Limited	Iron and steel	103,751,208	163,749,961	21,520,610	685,360,639	943,612,597	870,631,210	1,128,883,168
Esso Petroleum Company Limited	Refineries	20,408,960	15,652,947	-	94,795,701	165,892,476	110,448,648	181,545,423
Lafarge UK	Cement	19,396,886	118,399,063	5,976,100	39,641,183	90,770,395	164,016,345	215,145,557
Essar Oil UK Ltd	Refineries	18,167,187	545,666	412,546	84,518,927	147,908,122	85,477,140	148,866,335
Sahaviriya Steel Industries UK Ltd	Iron and steel	16,176,876	-77,771,547	1,055,170	53,220,933	72,574,000	-23,495,444	-4,142,378
Total	Refineries[1]	15,800,356	48,452,916	379,114	73,556,502	128,723,878	122,388,532	177,555,909
Valero Energy Ltd	Refineries	15,587,612	-16,720,265	1,070,639	73,089,857	127,907,250	57,440,230	112,257,623
Shell U.K. Limited	Extraction of crude oil and gas	15,310,714	5,836,375	1,579,652	73,451,157	128,539,525	80,867,185	135,955,552
BP Exploration Operating Company Ltd	Extraction of crude oil and gas	14,112,595	1,922,999	668,871	68,019,163	119,033,535	70,611,034	121,625,406
Phillips 66 Limited	Refineries	13,280,631	35,910,155	236,743	60,606,987	106,062,228	96,753,885	142,209,125
Petroineos Manufacturing Scotland Ltd	Refineries	10,915,758	-2,205,317	1,574,306	51,142,515	89,499,401	50,511,503	88,868,389
Hanson Cement UK	Cement	10,480,302	102,571,624	967,693	24,449,484	47,676,494	127,988,802	151,215,812
Cemex UK Cement Limited	Cement	9,599,264	19,507,103	585,553	23,589,626	45,999,770	43,682,282	66,092,426
INEOS[2]	Petrochemicals	8,825,747	28,704,434	1,602,596	21,423,854	61,237,327	51,730,883	91,544,357
Talisman Sinopec Energy UK Limited	Extraction of crude oil and gas	8,426,114	9,858,379	2,533,596	41,612,082	72,821,143	54,004,057	85,213,118
CNR International (UK) Limited	Extraction of crude oil and gas	8,027,860	-18,852,593	1,589,236	39,368,664	68,895,161	22,105,306	51,631,804
Petroplus Refining & Marketing Ltd	Refineries	7,987,649	35,885,703	700,547	47,398,215	82,946,876	83,984,465	119,533,126
Sabic UK Petrochemicals Limited	Petrochemicals	7,867,793	31,349,186	1,845,503	17,534,676	52,604,029	50,729,366	85,798,718
Murco Petroleum Limited	Refineries	6,900,494	9,197,871	-	32,900,594	57,576,040	42,098,465	66,773,911
Hope Cement Limited	Cement	6,594,768	7,106,809	1,348,826	14,953,592	29,159,504	23,409,227	37,615,139

Note: ** Profit CERs only for 2008-2012 | 1 includes extraction of oil and gas | 2 includes plastics.

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Annex A Potential calculation of international credit profits in 2013 and 2014

Since in Phase 3 CERs and ERUs are no longer directly surrendered but exchanged for allowances, it is impossible to trace how many CERs and ERUs were used in a particular compliance year. Every year, in April, the EC publishes the amounts of CERs/ERUs that have been converted into EUAs. Nevertheless, the regulations (Commission Regulation No 1123/2013) allow widespread use of the conversion facilities.

EU ETS participants operating stationary installations will be entitled to use international credits during the 2008-2020 period up to the higher of three limits, whichever is the highest:

1. The international credit entitlement specified in the national allocation plan for the Phase 2. Or
2. 11% of the free allocation of EU allowances granted to them in 2008-2012.
3. 4.5% of verified emissions between 2013-2020.

In this research, we cannot specify under which regime each installation operates and this information is not available. Therefore we only included 2008-2012 information about the surrendered CERs for compliance. Future work could enhance this information by making specific calculations for 2013 and on.