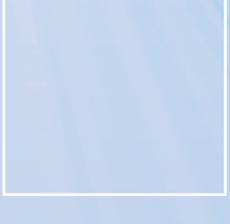
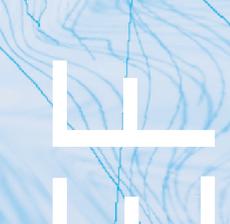
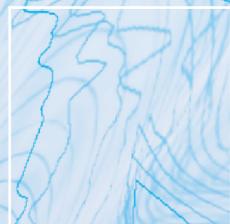
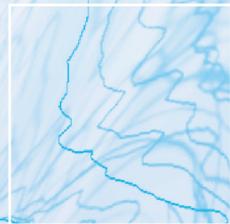
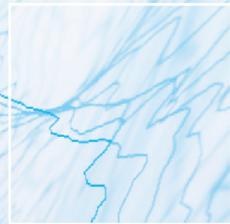
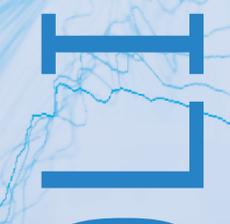
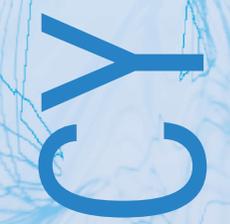




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Issue 2017/02  
March 2017

Energy & Climate



# POLICY BRIEF



## *Free allowance allocation in the EU ETS*

*Authors: Claudio Marcantonini, Jordi Teixido-Figueras, Stefano F. Verde and Xavier Labandeira*

### *Highlights*

- In the EU ETS, free allowance allocation is used to safeguard the competitiveness of the regulated industries and to avoid carbon leakage. In Phase I and II, most allowances were given for free. With Phase III, auctioning became the default method for allocation of allowances. However, industrial sectors receive free allowances according to emission efficiency benchmarks and depending on the sectoral risk of carbon leakage. Sectors at risk of carbon leakage are identified based on carbon and trade intensity.
- We analysed the empirical research on the EU ETS relevant to free allocation. First, no strong evidence has been found that the EU ETS affected the competitiveness of the regulated industries. Second, an overly conservative criterion for identifying the sectors at risk of carbon leakage meant that free allowances were given to installations which most likely were in fact not at risk. Third, evidence of pass-through of carbon costs was found not only for the electricity sector, but also for industrial sectors.
- The reform for Phase IV proposed by the European Commission introduces some changes relevant to free allocation. Notably, it devises a more efficient criterion for identifying the sectors at risk of carbon leakage and it sets a rule for updating the benchmark values.



## 1. Introduction

Since 2005, the EU Emissions Trading System (EU ETS) has been the main instrument adopted by the EU to decarbonise its economy, and the largest cap-and-trade scheme globally. It regulates the emissions of carbon dioxide, nitrous oxide and perfluorocarbons from more than 11,000 heavy energy-using and power generating installations and airlines, covering about 45% of the EU's greenhouse gas (GHG) emissions.

As the EU ETS poses a carbon cost, there are concerns that it may affect the international competitiveness of the firms operating in some of the regulated sectors, with the risk that production is moved to countries without similar climate policies. This would most likely result in carbon leakage, that is, a rise in emissions in countries where regulation is less stringent. Free allocation of emission allowances (hereafter, “free allocation”) is the approach used in the EU ETS to mitigate the risk of carbon leakage. In the context of the current reform of the EU ETS, the rules on free allocation have been reconsidered and are currently being discussed by the EU legislators and stakeholders. Under the LIFE SIDE project, the Florence School of Regulation-Climate (FSR-Climate) contributed to this debate by organising a workshop dedicated to the subject.<sup>1</sup>

After recalling some fundamental notions about free allocation, this policy brief summarises the evolution of free allocation in the EU ETS, the relevant empirical evidence, and the significant elements of the current reform. The brief draws on the assessment of the EU ETS that the FSR-Climate is carrying out as part of the LIFE SIDE project and the conclusions of the above-mentioned workshop.

1. The programme and contents of the workshop are available here: [http://lifesideproject.eu/event/allocation-of-free-allowances-in-eu-ets-to-address-the-risk-of-carbon-leakage/?instance\\_id=1](http://lifesideproject.eu/event/allocation-of-free-allowances-in-eu-ets-to-address-the-risk-of-carbon-leakage/?instance_id=1).

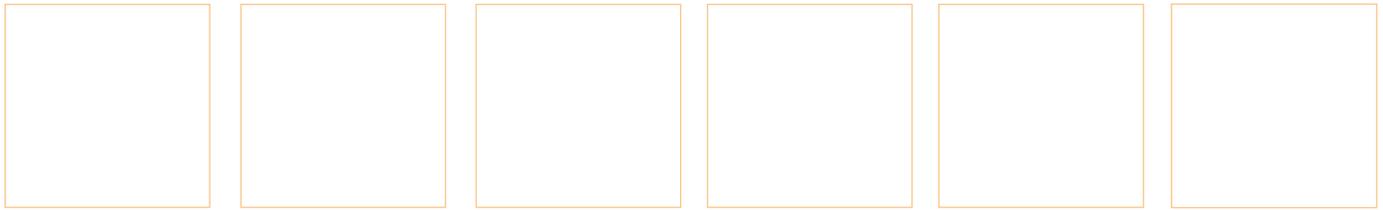
## 2. The basics of free allocation

In a cap-and-trade scheme such as the EU ETS, the emission allowances can be distributed through free allocation or auctions. Auctioning has some important advantages: it is efficient (in the allocative sense) and generates revenue. However, it poses an extra cost for the installation operators. As a consequence, some firms may see the deterioration of their international competitiveness with the risk of shifting production outside the EU. In the long run, this may even result in the diversion of investment to other regions with less stringent regulation. The shift in production to overseas would lead to carbon leakage. To prevent this outcome, the emission allowances can be granted for free to the firms operating in the sectors deemed to be at risk.

The free allowances can be allocated before or after the emissions are generated. With ex-ante allocation (often called “grandfathering”), the amount of allowances allocated to an installation is determined based on historical emissions or output. With ex-post allocation (often called “output-based allocation”), the amount of allowances is proportional to the emissions generated or to the corresponding output. With ex-ante allocation, firms have an incentive to reduce their output emission intensity, as the more efficient they become the more unused allowances they will hold. However, the unused allowances are retained by the firm also if emissions decline not due to improved efficiency, but because of reduced output (due, for example, to a negative demand shock or to deteriorating competitiveness).

## 3. Free allocation in the EU ETS

In Phase I (2005-2007) and Phase II (2008-2012) of the EU ETS, it was the responsibility of the Member States (MS) to set the national total of emission allowances and to distribute them. The allowances were mostly given for free based on past emissions, with only a few MS auctioning small quotas. Though the



National Allocation Plans had to be consistent with the criteria indicated in the ETS Directive (2003/87/EC), the heterogeneity in the allocation approaches adopted by different MS could have potentially distorted competition in the internal market (Ellerman *et al.*, 2010).

In 2009, a major reform of the EU ETS was agreed for Phase III (2013-2020). Since 2013, the total number of allowances – the “cap” – has been determined at EU level and a single set of rules governs their allocation. The EU ETS cap declines annually by 1.74% and auctioning is indicated as the default allocation method. The allowances for the installations that are power stations are in principle allocated through auctions (with exceptions for 8 lower-income MS). For the industrial installations, different rules of free allocation apply depending on whether the sector the installation belongs to is one deemed at risk of carbon leakage. As a rule, the installations in the sectors at risk of carbon leakage are allocated free allowances up to 100% of their efficient level of emissions (hence, allowances for emissions exceeding this level must be bought). The efficient level of emissions is determined by multiplying the relevant output emission intensity benchmark<sup>2</sup> by the installation’s previous output level (chosen between the median annual output over 2005-2008 and that over 2009-2010). For all other installations, free allowances cover emissions up to 80% of the efficient level in 2013 and progressively smaller proportions in subsequent years, reaching 30% in 2020. Moreover, a uniform Cross-Sectoral Correction Factor (CSCF) may be applied to installations to ensure that the total number of allocated free allowances does not exceed the annual limit.<sup>3</sup> The CSCF is being applied in Phase III. In 2013 it reduced the total number of free allowances by 5.7%. As a result of the annual reduction of the total available allowances, the CSCF has been decreasing yearly and it is estimated that by 2020 the

2. As a rule, the benchmark is the average output emissions intensity of the 10% most emissions efficient installations over 2007- 2008. The European Commission defined 54 benchmarks.
3. If the CSCF is triggered, free allowances may not cover 100% of the emissions of the most emissions efficient installations.

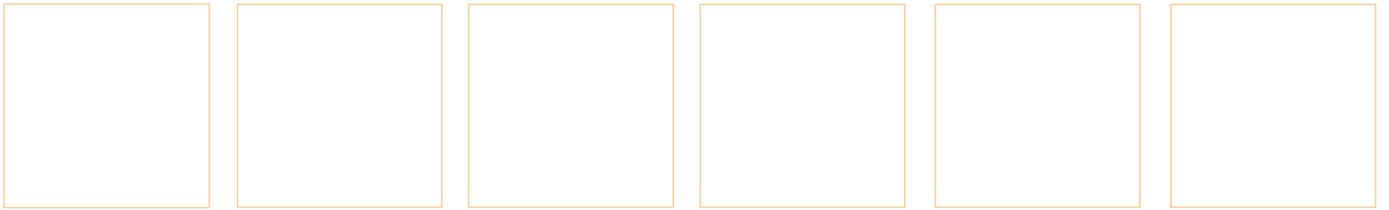
total amount of free allowances will be reduced by 17.6%.<sup>4</sup> Finally, an ex-post allocation adjustment is applied in the following cases: if annual output falls below 50%, 25% or 10% of the historical level, the amount of already allocated allowances is reduced by 50%, 75% and 100%, respectively.

The identification of the sectors at risk of carbon leakage is based on two indicators: Carbon Intensity (CI) and Trade Intensity (TI). CI is measured by the ratio of A) the sum of direct and indirect emissions (i.e., through electricity consumption) valued at €30/tCO<sub>2</sub>, to B) gross value added. TI is measured by the ratio of A) the sum of exports and imports respectively to and from third countries, to B) the sum of turnover and imports from third countries. A sector is classified as being at risk of carbon leakage if it falls in at least one of these categories: “High CI” (>30%), “High TI” (>30%), or “both sufficiently high CI and TI” (CI >5% and TI >10%). The sectors for which CI or TI cannot be quantified have been assessed based on qualitative analysis. The first carbon leakage list was defined in 2009, for the years 2013 and 2014. Out of 258 sectors, 165 were classified to be at risk of carbon leakage. These sectors made up 95% of industry emissions in the EU ETS (de Bruyn, 2013). More than 70% of the sectors deemed at risk of carbon leakage fall in the “High TI” category and not in the others. The second carbon leakage list was adopted in 2014 for the years 2015-2019.

#### 4. The empirical evidence

Within the EU ETS literature, more than 80 studies (including peer reviewed papers, working papers, book chapters and reports) were found providing empirical evidence relevant to free allocation. These studies can be classified according to three thematic areas. The first area concerns the effects of the EU

4. These values were determined by the EC in 2013. As a result of the judgment of the European Court of Justice of 28 April 2016, in January 2017, the Commission recalculated the CSCF factors. The new values are higher than the previous ones but they are applied only to decisions on free allocations that are adopted after 1 March 2017. Hence, for the majority of industrial installations, the values adopted will remain the initial ones.



ETS on competitiveness and carbon leakage. The second concerns the efficiency of the rules of free allocation. The third concerns the costs pass-through of emission allowances to consumers.<sup>5</sup>

#### *4.1 Effects on competitiveness and carbon leakage*

Our literature review identified 32 econometric studies searching for the effects of the EU ETS on competitiveness. Though the studies looking at stock value effects stand out as a more homogenous subset, the literature identified is diverse in several respects. First, different dependent variables related to competitiveness are considered, including net exports, number of employees, turnover, value added, profits, total factor productivity, and stock value, among others. Second, different data are used, which are most often firm-level data or, in some cases, sector-level data. Third, different effects are tested, as most studies search for sector-specific and/or country-specific effects, while the others search for more general average effects. Fourth, different methods are used, difference-in-differences and standard panel data analyses being the most popular. Fifth, different time periods are analysed, with most studies covering Phase I or both Phase I and II, and few stretching as far as Phase III.

By far the most frequent conclusion is that no evidence is found of negative, statistically significant effects of the EU ETS on economic performance. A few studies find some negative effects, which however are generally modest and fragmentary across sectors, countries, and time. The non-occurrence so far of significant negative effects is principally explained by: a) the generous supply of free allowances, b) low allowance prices, and c) the partial pass-through of the cost of the allowances to consumers. What is more, the studies examining the correlation between the carbon price and company stock values consistently find positive relationships in Phase I and often also in Phase II. The results for Phase III are instead

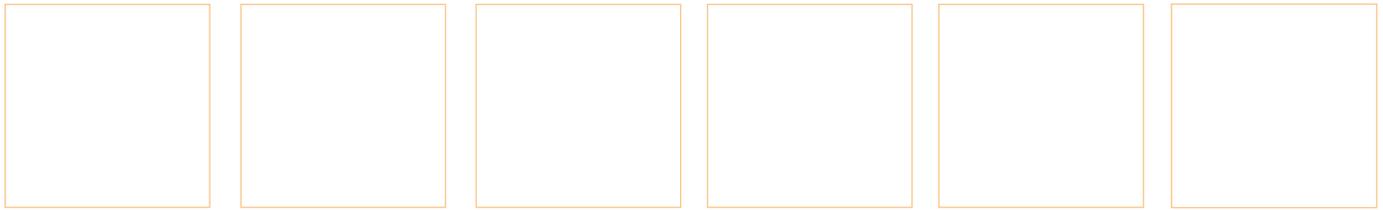
mixed. Finally, the only econometric study directly searching for carbon leakage (Dechezlepretre et al., 2014) finds no evidence of emissions shifting from the EU ETS to overseas.

#### *4.2 Efficiency of free allocation*

Nine studies were found assessing the efficiency of free allocation in Phase III (described above). This particular literature comprises two subsets: the studies (3) concerned with the definition of the sectors at risk of carbon leakage and those (6) focusing on the allocation method. The first subset shows that the risk of carbon leakage can vary widely across countries, depending on differences in production, technology, fuel mix and process emissions, amongst others. Moreover, there is evidence that the method for identifying the sectors at risk of carbon leakage was probably too conservative, in the sense that many sectors considered to be at risk were in fact not as exposed. Using alternative assumptions (notably, a €12/tCO<sub>2</sub> carbon price instead of €30/tCO<sub>2</sub>), de Bruyn et al. (2013) calculate that only 33% of all sectors should be deemed at risk of carbon leakage. Consistent with this finding, Martin et al. (2015), who use results from a survey, showed that the risk of firm relocation under the EU ETS is correlated with carbon intensity, not with trade intensity. Yet, most of the sectors at risk of carbon leakage are deemed as such only because of high trade intensity.

The second set of works looked at the allocation method. It was found that the total number of free allowances in the industrial sector was reduced by about 20% compared to Phase II, quite uniformly across sectors. There was also a redistribution of allowances within the sectors, rewarding the more efficient installations thanks to the benchmarking system. However, some critical issues were highlighted. It was found that the EU procedure to estimate the benchmark is best suited to homogeneous sectors, such as cement, where the production process is similar across countries, but less for other sectors, such as pulp and paper, which are very heterogeneous

5. The list of the works considered will be available in a report which will be produced by the LIFE SIDE project ([lifesideproject.eu](http://lifesideproject.eu)).



with many different products and production processes. Moreover, some studies showed, at least for the cement sector, that the ex-post adjustment based on the production thresholds (which was present also in Phase I and II) may have created incentives to maintain higher production levels.

### 4.3 Cost pass-through of emission allowances

Several works deal with firms' ability to pass through the cost of the allowances to consumers. This is relevant to free allocation in that if a firm can pass its carbon cost, it should be able to pay for the allowances it needs without hampering its competitiveness. Pass-through rates are estimated by quantifying the extent to which changes in output prices are explained by underlying changes in CO<sub>2</sub> prices. Time-series econometric analysis is the most used methodology. Most of these works analyse the electricity sector, mainly with reference to Phase I and Phase II, while only few contributions cover some industrial sectors. This is partly explained by data availability: the power sector has a relatively simple input structure (with primary energy sources as the main input) and abundant information is generally available.

For the power sector, most of the literature reviewed finds a relatively high pass-through rate, although with significant variation across countries and over time, partly due to different data and methods used. High pass-through in the power sector is related to low elasticity of demand and to lack of exposure to international competition. By passing through the value of the allowances that they received for free, power companies could increase their profits – so-called windfall profits. This was seen as an unjustified transfer from taxpayers to companies and, as a result, most emission allowances have been auctioned to the power sector since 2013.

For the industrial sectors, the cost pass-through rate widely varies across sectors, products and countries. High rates were found for some sectors, notably iron,

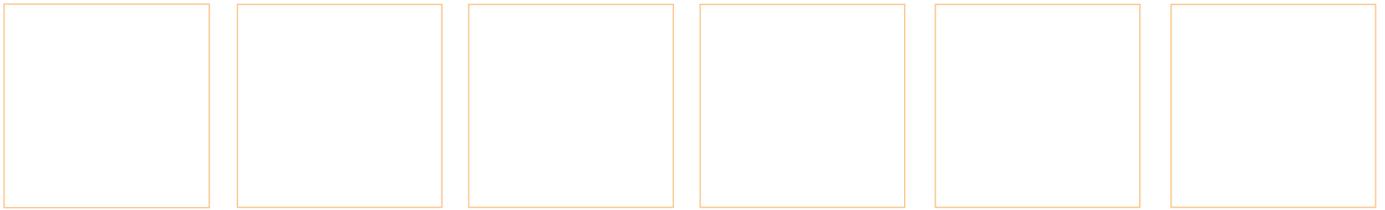
steel and refinery. For the chemicals sector, the cost pass-through rate varies among products with many of them showing high rates. The same is true for the ceramics sector. With regard to the cement sector, the cost pass-through rate varies significantly from one country to another: it is very high in Portugal or Poland, but low in the UK. By contrast, other sectors, such as the paper sector, present low or null pass through. Using the minimum pass-through rate found in the literature, it was estimated that the windfall profits of the 15 most polluting industrial sectors, in 19 EU countries, amounted to 15 billion euro over the period 2008-2014 (de Bruyn et al., 2016).

## 5. Phase IV reform

In July 2015, the EC proposed a revision of the EU ETS for Phase IV (2021-2030). The proposal is consistent with the EU target of 40% reduction of overall GHG emissions by 2030 (with respect to the 1990 levels) and with the international commitment under the Paris Agreement. The proposal needs to be approved by the EU Parliament and by a majority of MS in the EU Council.

With regard to free allocation, while the proposed reform does not fundamentally change the working of the system, it introduces some noteworthy modifications.

- The EC has proposed to maintain the share of allowances to be auctioned at 57%, as at the end of Phase III. The lower-income MS can continue to give allowances to electricity facilities for the modernisation of the energy sector. The installations in the sectors at risk of carbon leakage would continue to receive free allowances covering 100% of their efficient level of emissions according to the benchmark. For the other sectors, free allowances would cover 30% of the efficient emissions level, without further reductions.
- A sector would be deemed at risk of carbon leakage only if the product of its trade and carbon



intensities exceeds 0.2. This is a more stringent criterion which, according to the EC, should reduce the number of sectors deemed at risk from 177 to around 50.

- The benchmarks would be updated at the beginning and in the middle of the Phase to take into account the technological progress made since 2008. The benchmark values would be reduced by a standard rate of 1% for each year since 2008. If the data shows a difference in the annual emission intensity reduction greater than 1.5% or smaller than 0.5%, the reduction rate applied is 1.5% or 0.5%, respectively.
- To reach the EU target of 40% GHG emissions reduction by 2030, the EC has proposed to decrease the EU ETS cap by 2.2% annually (instead of 1.7%).

The reform is currently under discussion among the Parliament, the Council and the Commission. The final approval of the reform is expected in the next months. Considering the current debate at the institutional level, the key elements of the EC proposal are likely to be retained in the final version of the reform.

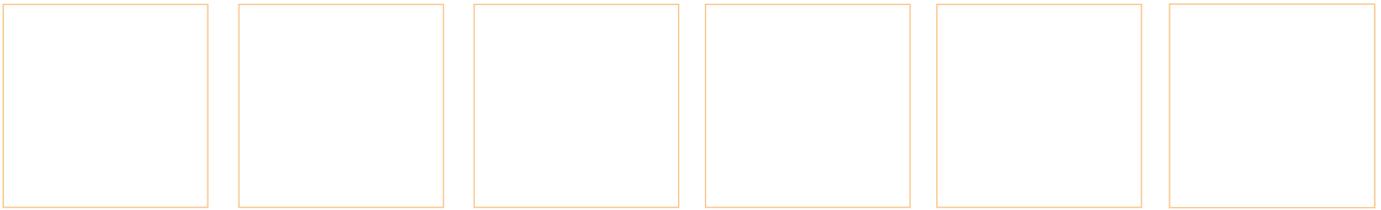
## 6. Discussion and conclusion

The purpose of free allowance allocation is to safeguard the competitiveness of the regulated industries and, thus, to avoid carbon leakage. With Phase III, the EU ETS has moved from granting almost all emission allowances for free towards a system where auctioning is the default allocation method. Free allowances are still granted to the manufacturing industry, with higher shares allocated to the sectors deemed at risk of carbon leakage based on carbon and trade intensities. Overall, the current allocation system is transparent, relatively simple and uniform across the EU. However, the criteria for identifying the sectors at risk of carbon leakage were shown to be overly conservative. The empirical research showed that many sectors considered at

risk of carbon leakage did not actually face such risk. Moreover, there is little empirical evidence of the EU ETS having had a negative impact on the regulated industries so far.

The reform for Phase IV proposed by the EC offers some improvements on the current regulation of free allocation. Notably, it devises a better calibrated and, therefore, more efficient criterion for identifying the sectors at risk of carbon leakage. This is important both to reduce the risk of unjustified windfall profits and to improve the efficiency of the system. Indeed, given the annual reduction of the cap and the associated declining amount of free allowances, the more sectors are defined at risk, the fewer allowances will be available for each sector. Moreover, the proposed modification aims to take into account the technological progress of the regulated sectors by updating the benchmark values.

As the cap declines over time, fewer allowances will be available. It is therefore crucial that both the industry and public institutions invest in the development of low carbon technologies, especially in those sectors having limited potential for emissions abatement with existing technologies. In this context, it is recommendable that the MS use significant shares of their auction revenues to foster such investments. Finally, to safeguard the EU industry and, ultimately, to mitigate climate change, it is important to continue working towards an international agreement on carbon pricing, which may come with the implementation of the Paris Agreement.



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*This policy brief has been produced within the framework of the LIFE SIDE project (lifesideproject.eu), co-funded by the LIFE Programme of the European Union.*

*The project supports European policy makers with the design and implementation of the European Union Emissions Trading Scheme (ETS).*

*This is the first policy brief in a series of four that will be produced by the LIFE SIDE team as part of the project work and will lead to an Economic Assessment of the EU ETS report.*

*The next policy briefs will focus on:*

- *EU ETS and its interaction with other climate and energy policies;*
- *Low carbon investment and innovation in the EU ETS;*
- *International dimension.*

Florence School of Regulation  
Robert Schuman Centre  
for Advanced Studies

European University Institute  
Via delle Fontanelle 19  
I-50014 San Domenico di Fiesole (FI)  
Italy



LIFE SIDE is co-financed by the LIFE  
Programme of the European Commission

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