

EU ETS Phase 3 benchmarks: Implications and potential flaws

Stephen Lecourt¹

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Keywords: EU ETS, Benchmarks, Preliminary amounts, Carbon leakage, Historical Activity Level

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Abstract

In its third Phase (2013-20), the European Union Emissions Trading Scheme allocation methodology is shifting from grandfathering to a combination of auctioning and benchmarking. Free allocation is now be devoted to non-electricity generators only (save exemption), and is linearly decreasing throughout the Phase with a view of no free allocation in 2027. Benchmark-based free allocation is meant to reward lowest CO₂-intensive installations as opposed to grandfathering, which allocated allowances based on historical emissions levels. This policy note describes the concrete implications involved by this shift in allocation methodology, and addresses the potential flaws of benchmarking-based allocation, using data from French installations' Phase 3 provisional free allocation.

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1. Introduction

The European Union Emissions Trading System (EU ETS), the largest emissions permits cap and trade market (Ellerman & Buchner, 2007), will undergo a radical change in Phase 3. Allocation methodology will shift from grandfathering to a combination of auction-based and free benchmark-based allowances allocation. Roughly, electricity generators, so far representing about two thirds of the Scheme's emissions, will not be allocated free European Union Allowances (EUAs) as stipulated in article 10a3 of the EU ETS Directive. Free allocation will be devoted to non-electricity generators (most of them being installations of the manufacturing sector) and will be transitional. They will receive a decreasing amount of free allowance through the Phase, with a target of no free allocation by 2027 (EC, 2011a). Consequently, Phase 3 will inaugurate a new market configuration where the value of emission permits is redistributed among market participants and public authority: allowance auctioning will progressively become the allocation standard, and emission permit primary and secondary markets will coexist. This will cause a change in the emission permit supply and demand structure and thus in permit transfers in between actors.

The shift from free allocation to auctions has been retained as the main change in allowance allocation. However, transitional free allocation will still represent an important share in Phase 3's cap and, as such, deserves specific attention, all the more that the amount of allowances to be auctioned in Phase 3 corresponds to all allowances that will not be allocated for free. This policy note thus focuses on transitional free allocation associated to the move from grandfathering to benchmarking and continues as follows: allocation redistribution among and installations' allocation entitlements interdependence are presented as the main implications of benchmarks in section 2. Section explains why benchmarks, as defined by the European Commission (EC), are potentially flawed already; due to the still presence of grandfathering and the introduction of the carbon leakage exposure provision. Last part concludes.

2. Two implications of switching to benchmarking

The introduction of benchmarks in Phase 3 of the EU ETS aims at addressing the main two drawbacks of grandfathering: first, the paradox where biggest polluters are treated the same way as the smallest, by now basing free allocation partly on CO₂ emission intensity (the amount of emitted CO₂ emissions per unit of output); second, sectoral distortion involved by National Allocation Plans – that have been in use in the first two Phases of the Scheme – by establishing harmonized Union-wide rules for transitional free allocation (EC, 2009). Indeed benchmark-based allocation involves a reduction associated with a redistribution of allocations among installations of a same sector (2.1). The intensity

of this redistribution is further affected by the Union-wide rule that limits the total annual amount of free emission permits to be allocated (2.2)¹.

2.1. Allocation is reduced and redistributed

Benchmarks have involved an allocation level downward momentum as most installations are less efficient than benchmark values. For those that are more efficient, increase in allocation levels compared to Phase 2 occur leading to “allocation redistribution”. The analysis of France’s National Implementation Measures (NIM) provides a concrete illustration of these two phenomena on manufacturing industries.

At the sectoral aggregated level, manufacturing industries see a rather homogeneous allocation variation rate, similar to that of the manufacturing sector taken as a whole – except the pulp and paper (resp. refining and glass) industry which undergo a smaller (resp. larger) allocation reduction. Also, most of the manufacturing sector’s allocation decline (in EUAs) occurs in three sectors: other non-metallic mineral products, basic metals and oil refining (Table 1).

Table 1: Sectoral allocation variation from Phase 2 to 2013 (in kEUAs)²

	Avg Phase 2 allocation	2013 allocation	Net variation	%
Manufacturing	88 417³	75 034	-13 382	-15
Food	4 799	3 965	-834	-17
Pulp and paper	3 942	3 852	-90	-2
Other non-metallic minerals	23 808	20 253	-3 554	-15
<i>Cement</i>	<i>15 372</i>	<i>13 394</i>	<i>-1 978</i>	<i>-13</i>
<i>Lime</i>	<i>3 368</i>	<i>2 967</i>	<i>-401</i>	<i>-12</i>
<i>Glass</i>	<i>3 778</i>	<i>2 865</i>	<i>-912</i>	<i>-24</i>
Basic metals	26 385	23 738	-2 647	-10
<i>Iron and steel</i>	<i>26 156</i>	<i>23 382</i>	<i>-2 774</i>	<i>-11</i>
Oil Refining	16 403	11 262	-5 142	-31

Source: Author’s calculation based on France’s NIM and CITL data

Allocation redistribution involved by benchmarks is assessed focusing on variations at the installation level. Although net variation is negative for the aggregated manufacturing sector as well as its subsectors mentioned in Table 1, it results in a combination of allocation increases and reductions: the

¹ Section 2 aims at providing a sense of the changes that are involved by the shift from grandfathering to benchmarks rather than providing technical aspects of benchmark-based free allocation in details. Interested reader can find such technical details in (Lecourt, 2012).

² The allocation variation is determined comparing average Phase 2 allocation with 2013 allocation level.

³ Figures are rounded.

situation for each installation can differ significantly from the sectoral picture depending on its location on the CO₂ intensity curve relative to the benchmark value, as illustrated in (Pauer, 2012).

In the case of the French NIM, it can be observed that allocation increases are marginal and that total reductions are thus very close to sectoral net allocation variations (Table 2). This is in line with the way product benchmarks have been defined: a given product benchmark corresponds to the average CO₂ intensity of the 10% best performing installations, for the production of the benchmarked product in question. Consequently, only installations that are more efficient than benchmarks witness an increase in allocation.

Table 2: Sectoral allocation variation from Phase 2 to 2013 (in kEUAs) decomposition at the installation level

	Number of installations	Total reduction	Total addition	Min	Max	Median	Average
Manufacturing	516	-17 731	4 267	-1 706	439	-7	-26
Food	109	-1 168	334	-193	68	-5	-8
Pulp and paper	91	-1 341	1 250	-310	341	-4	-1
Other non-metallic minerals	149	-3 689	135	-222	21	-12	-24
<i>Cement</i>	30	-1 987	9	-222	9	-49	-66
<i>Lime</i>	20	-450	49	-85	16	-11	-20
<i>Glass</i>	46	-926	6	-92	6	-15	-20
Basic metals	26	-2 826	178	-1 706	21	-12	-101
<i>Iron and steel</i>	24	-2826	51	-1 706	49	12	-116
Oil Refining	13	-5 184	42	-1 273	42	-162	-395

Source: Author's calculation based on France's NIM and CITL data

The pulp and paper industry stands out as the net reduction of 90 kEUAs from Phase 2 to 2013 hides similar and larger reduction and increase in allocation (1 341 kEUAs and 1 250 kEUAs respectively). Although several product benchmarks are used in the pulp and paper industry⁴ (involving allocation redistribution based on installations' performances relative to these product benchmarks), the main factor accounting for this remarkable redistribution pattern is the rule change in the allocation for emissions related to heat exchanges, which is concomitant to the introduction of benchmarks in Phase 3. Under this new rule, free allocation is now given to heat producers under specific circumstances only and, as a general rule allowances are allocated to the heat consumer to ensure that their amount is independent from the heat supply structure (EC, 2011c). Since the industry is a high heat consumer some installations see their average Phase 2 allocation multiplied several times in 2013 (Table 3).

⁴ See all 53 defined benchmarks in annex I of (EC, 2011a)

Table 3: Sectoral allocation variation percentage from Phase 2 to 2013 at the installation level

	Number of installations	Min	Max	Median	Average
Manufacturing	516	-100	1478	-17	-5
Food	109	-72	117	-21	-16
Pulp and paper	89	-84	1478	-20	29
Other non-metallic minerals	149	-88	89	-15	-17
<i>Cement</i>	30	-33	4	-13	-13
<i>Lime</i>	20	-56	28	-12	-13
<i>Glass</i>	46	-92	23	-19	-23
Basic metals	26	-88	471	-9	9
<i>Iron and steel</i>	24	-88	169	-10	-11
Oil Refining	13	-100	18	-29	-28

Source: Author's calculation based on France's NIM and CITL data

2.2.NIM's preliminary amounts can be further cut down by adjustment factors

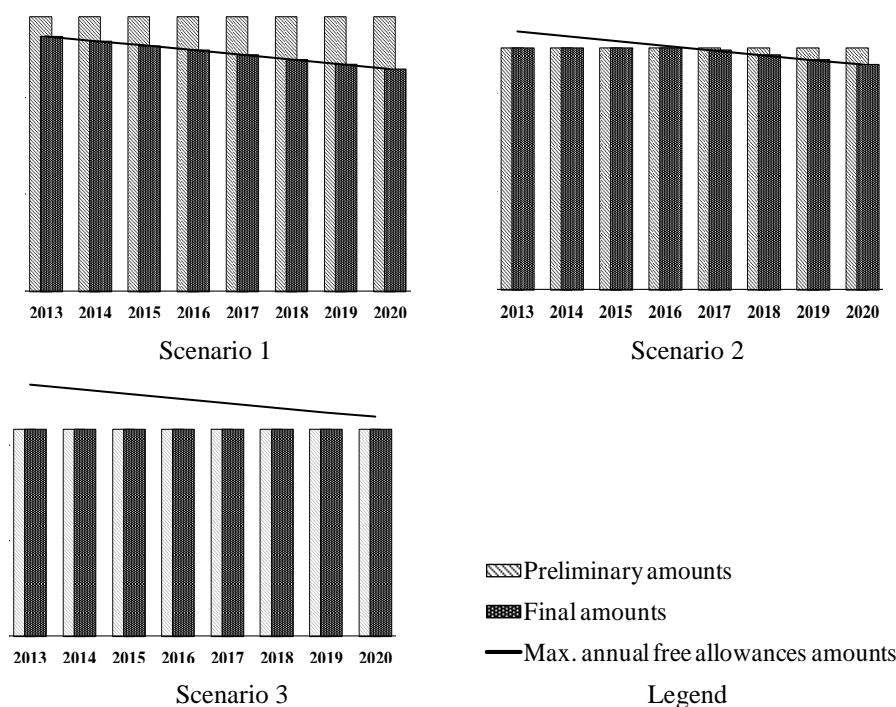
Harmonizing transitional free allocation rules in Phase 3 involves that the amount of allowances to be allocated for free is now annually capped at the Union level, rather than at the national level. Preliminary Amounts (PAs) are determined at the installation level based on benchmarks, without consideration of any cap. As such, should their sum exceed the annual maximum amount of allowances to be allocated for free, PAs will be applied an annual Cross Sectional Correction Factor (CSCF) to bring their sum back to the annual cap, which would further accentuate the aggregated allocation reduction observed in section 2.1.

The independence in the definitions of the annual maximum amounts and of PAs implies that PAs of all Member States must be known to determine final free allocation. In other words, an installation's allocation final entitlement depends on all other installations⁷. As of January 2013, all required NIM have been submitted to the EC and are being under assessment. The requirement for CSCFs and their potential magnitudes have thus not been determined yet. Annual maximum amounts⁵ have not been made publicly either.

Annual CSCF is determined comparing the sum of Member States' PA of manufacturing installations to the corresponding annual maximum amount. The PAs sum and the annual maximum amounts being constant and decreasing quantities respectively involves that the chances that the former exceeds the latter increase with time. Three scenarios for CSCFs, affecting the amount of free allowances to be allocated for free over Phase 3, can thus be developed (Figure 1):

⁵ See annex for an estimation of the annual maximum amounts of transitional free allocation.

1. The PAs sum exceeds the annual maximum amount as soon as 2013. An annual CSCF is applied during the entirety of Phase 3;
2. The PAs sum exceeds the annual maximum amount at a later stage. An annual CSCF applies from this date only;
3. The PAs sum is below the upper limit all Phase 3 long. No CSCF is applied.



Source: Author calculation based on (EC, 2011a)

Figure 1: Cross Sectional Correction Factor scenarios over Phase 3

Scenarios 2 and 3 clearly show that annual maximum amounts can possibly not be allocated in their entirety. Should CSCFs be defined and applied from 2013 (as in scenario 1), it would mean that the overall Phase 3 cap of free allocation is independent from benchmarks, i.e. that benchmarks' actual purpose is to redistribute free allowances among market participants⁶, which remains in line with their stated aims in the consolidated EU ETS Directive of “(...) avoid[ing] distortions in the internal market (...)” and “ensur[ing] that allocation takes place in a manner that provides incentives for reductions in greenhouse gas emissions (...)”.

3. Two potential flaws of implemented benchmarking

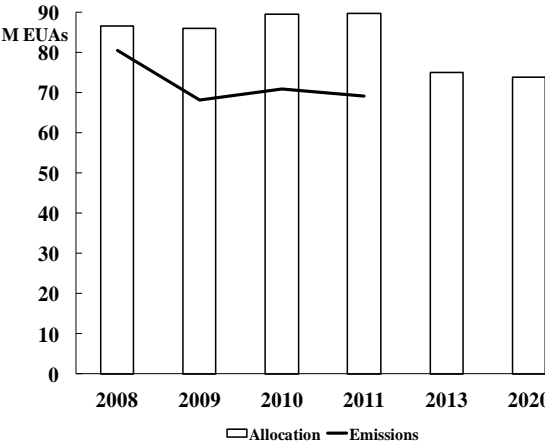
Although benchmarks target installations with higher efficiency, the “historical dimension” that has been criticized in grandfathering will remain in Phase 3 with the use of historical activity levels (HALs) in the determination of PAs. This is made more obvious in a context of economic downturn

⁶ Installations that have more efficient than benchmarks receive a larger share of their emitted CO₂ emissions in allocation (and vice versa).

(3.1). Furthermore, the transitional character of free allocation in Phase 3 may be challenged by the provision for installations considered as deemed at risk of carbon leakage, for which free allocation remains constant over Phase 3 (3.2).

3.1.A certain type of grandfathering remains

As mentioned in section 2, the level of PAs, derived from the benchmarking methodology, is *partly* based of CO₂ emission intensity. Where allocation was directly derived from historical emissions level under grandfathering, an installation’s PA is derived from its HAL⁷ multiplied by the benchmark value⁸: the preliminary amount will be proportionate with the installation’s output level of a past reference period, as grandfathering was. *Therefore, under the seal of benchmarks lays the concept of grandfathering now associated with production level rather than emissions level.*



Source: France’s NIM and CITL data

Figure 2: CO₂ verified emissions vs. allocation levels in Phase 2 and Phase 3 of the French manufacturing sector

All things held equal (production levels identical to HALs, physical capital, carbon price feedback etc.), benchmark-based allocation has led to the expectation of most manufacturing installations (and thus the manufacturing sector as a whole) being allocated less free allowances than the emissions corresponding to their activity levels (due to most installations having CO₂ intensities above benchmarks values). However, the economic recession has strongly affected European Union’s activity levels since 2008, making current ones below those from which HALs have been defined. *As a consequence, the manufacturing sector will receive in Phase 3’s first years, depending on the economic recovery, a greater share of its emissions in free allowances than if the economic recession had not happened.* Figure 2 provides an illustration of this for the French manufacturing sector, where its aggregated emissions level stands below its 2013 free allocation amount.

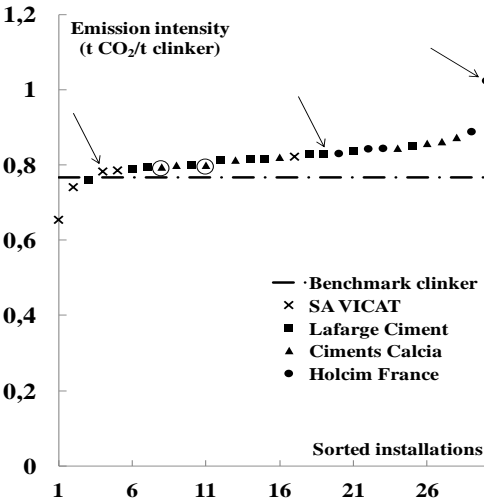
⁷ HAL is defined as the highest production level median between the 2005-08 and 2009-10 periods.
⁸ i.e. in the simple and specific case where the installation in question only produces a product for which a product benchmark exists.

At the installation level, it even can be observed that installations with larger CO₂ emission intensity than benchmarks receive more allowances than their actual emission levels as illustrated in the case of French cement producing installations (Figure 3). First their CO₂ intensities have been determined (Equation 1) so they could be compared to the grey clinker product benchmark value.

$$i_{Clinker} = \frac{Em_{Ref}}{PA} \times BM_{GreyClinker} \tag{1}$$

Where $i_{Clinker}$ is the installation’s CO₂ intensity and Em_{Ref} its HAL corresponding level of CO₂ emissions⁹.

Then, their PAs have been compared to their 2011 emission levels. This comparison exercise shows that about two thirds (17 out of 27) of cement producing installations above the grey clinker benchmark value (except non-circled Ciments Calcia and the arrowed three installations) hold allocation amounts above their 2011 emission levels (figures are provided in Table 7 of the annex).



Source: Author calculation based on France’s NIM and CITL data

Figure 3: Distribution of EU ETS cement installations by CO₂ intensity

3.2.The transitional aspect of Phase 3 free allocation in question

Full auctioning of allowances should be the rule in 2027 (EC, 2011a). In order to reach this objective an annual carbon leakage exposure factor (CLEF) is applied to the manufacturing installations’ PAs. CLEF linearly decreases from 0.8 in 2013 to 0.3 in 2020 and should continue to a value of 0 in 2027 (Table 4) according to the Commission Decision on benchmarking (i.e. (EC, 2011a)).

⁹ These HAL corresponding emissions levels have been defined as the highest of the two emission level medians over the 2005-08 and 2009-10 periods.

Table 4 Factor ensuring the transitional character of free allocation in Phase 3

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
%	80	73	66	59	51	44	37	30	26	21	17	13	9	4	0

Source: Annex VI of (EC, 2011a) till 2020 included, author's estimation from 2021

However, a provision has been introduced to exempt from the application of annual CLEF installations belonging to some sectors and subsectors that are considered deemed to be exposed to a significant risk of carbon leakage¹⁰. Such installations are instead applied a CLEF equal to 1 each year of Phase 3, meaning that their annual allocation entitlement stays constant and equal to their PA (absent any application of CSCFs).

Therefore, the underlying questions are how are these allocation amounts, not subject to transitional free allocation, taken care of in 2021? How will the “carbon leakage exposure” provision be conciliated with the view of no free allocation in 2027? These interrogations are all the more relevant given that, based on the French NIM, most of free allocation in the manufacturing sector are related to installations considered at risk of carbon leakage, that is, a large share of 2013 free allocation will still be allocated free of charge in 2020 (Table 5). As a result, total preliminary amount in 2013 decreases by 1.4% in 2020 only, as opposed to the wide spread belief of a 63% decrease in free allocation throughout Phase 3¹¹. So far, no indication has been given, either in the EU ETS Directive or the benchmarking Decision, about the outcome of carbon leakage free allocation when Phase 3 ends, or in 2027 where no free allocation is targeted.

Table 5: Share of carbon leakage exposed allocation in the French manufacturing sector

Manufacturing sector free allocation	2013 (kEUAs)	2020 (kEUAs)	2013 (%)	2020 (%)
Total	75 034	73 976	100	100
Deemed at carbon leakage	73 342	73 342	98	99
Transitional	1 693	635	2	1

Source: Author's calculation based on France's NIM

¹⁰ The EC has defined a list of products which are deemed at risk of carbon leakage (EC, 2011b). Current list runs through 2014 included (unless sector additions). A new carbon leakage list will be defined for the 2015-19 period. Until then, no sector can be removed from the current list. More information on the methodology to establish the carbon leakage list is provided at http://ec.europa.eu/clima/policies/ets/leakage/index_en.htm

¹¹ This 63% decrease in free allocation corresponds to the reduction that would have happened from 2013 to 2020 if the “carbon leakage exposure” provision had not been introduced. In such case, free allocation would have gone from 80% of PAs in 2013 to 30% of PAs in 2020, which is equivalent to a 63% reduction.

4. Conclusion

Phase 3 of the EU ETS will start on new allowance allocation grounds as auction is supposed to become the basic principle for allocation. Nevertheless, transitional free allocation remains for non-electric generators (most of them belonging to the manufacturing industries) and allocation based on benchmarking will replace grandfathering, thus targeting most efficient installations as opposed to largest emitters. Two main implications of this shift to benchmarks have been identified: first, free allowances will be redistributed among installations as benchmarks outperforming installations should see their entitlement increase and less efficient installations see the largest declines; second, an installation's final free allocation amounts will depend on all others'.

It was also identified two features of the benchmarks design that could question the actual efficiency of the newly introduced and complex allocation system. First, the still use of historical reference levels (now of production rather than emissions) for the allocation amount determination, highlighted by the economic recession, suggests that the critics (e.g. over-allocation) that faced grandfathering in the Scheme's first two Phases are only partly addressed with benchmarks, which contributes to the *ex ante* versus *ex post* allocation discussion. Second, the provision for installations that are considered exposed to carbon leakage, which consists in keeping their free allocation entitlement constant throughout the Phase, significantly reduces the free allocation transitional character. The ways these large free amounts, reported from 2013 to 2020, are dealt with until 2027, where no free allocation is aimed at, is not addressed in official documents yet.

Finally, although benchmarks are challenging as they represent current 2007-08 best practices in Europe, it remains that they are used until 2020. One may wonder whether historical business as usual CO₂ intensity improvements would not lead to outperforming benchmarks before 2020.

5. Cited works

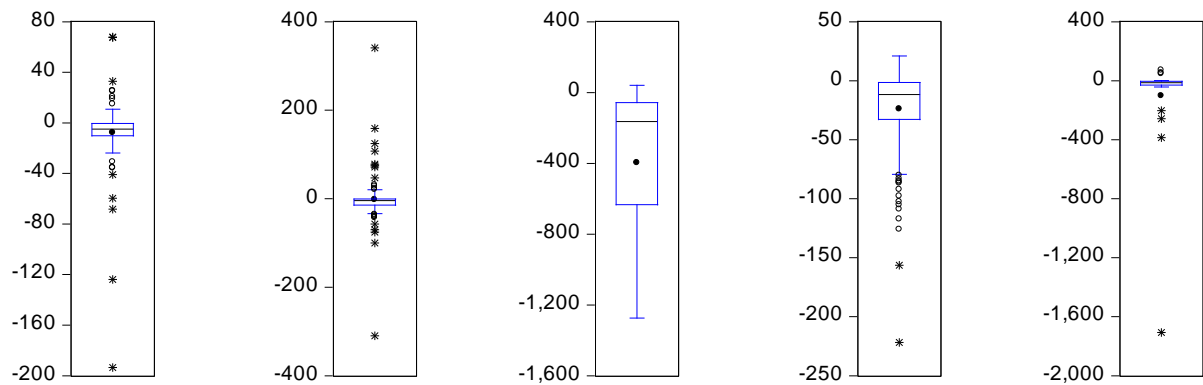
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6. Annex

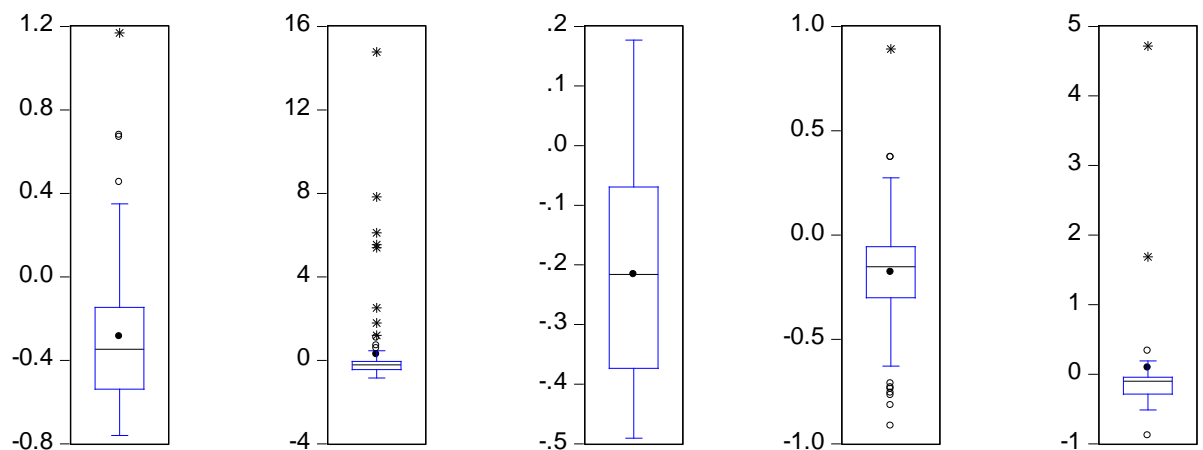
6.1. Sectoral allocation variation sectoral box plots

Food, pulp and paper, oil refining, other non-metallic minerals and basic metals sectors respectively are represented below.

6.1.1. Average Phase 2 to 2013 variation in thousand EUAs



6.1.2. Average Phase 2 to 2013 variation in %



6.2. Estimation of Phase 3 free allocation annual maximum amounts

The EC has defined a limit for the allocation of free allowances to non-electricity generators (EC, 2009) in each year of Phase 3. In a nutshell, this maximum annual amount is composed of two elements:

1. The annual EU ETS cap in Phase 3 (not including sector and gas coverage extension) multiplied by the share of emissions from installations covered in Phase 2 and not considered electricity generators, in Phase 1 average verified emissions;
2. The amount of allocation corresponding to the emission coverage perimeter extension.

The maximum amount of free allocation in 2013 can be estimated using a combined database derived from CITL verified emissions and NACE code attribution to EU ETS installations (EC, 2009). Installations with NACE codes belonging to the mining and quarrying (section C) and manufacturing (section D) sections of the rev.1 classification were used as a proxy for non-electricity generators. In the first phase of the scheme the sum of their emissions represented about 35% of total EU ETS emissions. The cap of the non-extended perimeter in 2013 is set at 1 931 M EUAs and the new coverage extension concerns 107 M EUAs in 2013 (EC, 2010).

Thus, a potential maximum amount of free allowances for installations belonging to the manufacturing sector is obtained summing both quantities a) and b). This amounts to **792 million allowances in 2013**, annually declining by a constant amount estimated at 15 million.

Table 6: Mining and quarrying and manufacturing sectors EU ETS emissions

	2005	2006	2007
EU ETS emissions (Mt CO ₂)	2,018	2,040	2,166
Of which sections C and D emissions (Mt CO ₂)	712	722	774
Share in EU ETS emissions (%)	35	35	36

6.3.French cement producing installations in the EU ETS

Table 7: French EU ETS covered cement installations statistics

Grey clinker product benchmark = 0.766 kg/t grey clinker

Installation Operator	Installation ID	HAL emissions (tCO₂)	CO₂ intensity (tCO₂/tclinker)	Allocation 2013 (EUA)	Emissions 2011 (tCO₂)
SA VICAT	6102824	863 924	0,654	1 011 705	937 206
SA VICAT	6103108	271 527	0,741	280 737	221 657
Lafarge	5401296	197 146	0,759	198 856	103 341
SA VICAT	6200725	340 497	0,783	333 309	336 293
SA VICAT	5600024	278 079	0,785	271 210	226 926
Lafarge	6102350	55 357	0,790	53 699	46 261
Lafarge	6300908	1 006 228	0,794	970 610	886 195
Ciments Calcia	6102348	182 848	0,794	176 317	161 605
Ciments Calcia	5701701	823 473	0,799	789 301	828 918
Lafarge	6600262	563 439	0,799	540 057	446 862
Ciments Calcia	7201542	708 871	0,799	679 437	659 009
Lafarge	6401567	442 615	0,812	417 302	341 561
Ciments Calcia	5300463	333 900	0,813	314 648	318 092
Lafarge	5800433	750 796	0,815	706 047	558 395
Lafarge	6102435	649 146	0,815	610 040	542 736
Ciments Calcia	7203926	540 715	0,820	504 845	510 392
SA VICAT	6400280	669 424	0,822	623 881	529 967
Lafarge	7201529	664 293	0,829	613 655	588 738
Lafarge	6103586	298 863	0,830	275 896	292 056
Holcim	6201370	577 845	0,830	533 045	488 845
Lafarge	6400259	284 630	0,836	260 884	204 427
Holcim	5900978	316 291	0,843	287 468	281 053
Holcim	6700701	302 191	0,844	274 261	270 947
Ciments Calcia	6503289	320 715	0,844	290 919	352 363
Lafarge	6802598	566 248	0,852	509 319	464 869
Ciments Calcia	6600453	554 968	0,857	495 858	521 688
Ciments Calcia	10000648	276 681	0,862	245 883	260 591
Ciments Calcia	10003878	433 684	0,873	380 489	403 312
Holcim	7000190	328 883	0,888	283 560	235 500
Holcim	7000785	616 244	1,024	461 094	608 753

6.4. Definitions of acronyms and technical terms

Annual maximum amount: maximum amount of free allowances to be annually allocated. It corresponds to the annual “cap” of free allowances. However it may not be allocated in its entirety since the annual amount of free allowances that will be allocated is the minimum between the annual maximum amount and the sum of preliminary amounts. The methodology to determine these annual amounts is defined in article 10a of the consolidated EU ETS Directive. An estimation of the maximum amount of free allowances to be allocated in 2013 is provided in annex 6.2.

CLEF (Carbon Leakage Exposure Factor): annual factor that is applied to preliminary amounts. It ranges from 0.8 in 2013 and linearly decreases to 0.3 in 2020. It is used to make Phase 3 free allocation transitional. This factor is equal to one every year of Phase 3 for preliminary amounts of installations to be considered at risk of carbon leakage (i.e. free allocation is constant for them in Phase 3).

CSCF (Cross Sectional Correction Factor): annual factor, applied to preliminary amounts, which ensures that the amount of free allowances to be allocated in a given year is below the maximum amount of the corresponding year.

HAL (Historical Activity Level): reference that is used, in combination with benchmarks, to determine preliminary amounts. It is defined as the highest activity level median between the two following periods: 2005-08 and 2009-10.

NIM (National Implementation Measure): National document that contains, among other, the preliminary amounts of installations participating in Phase 3. This document had to be submitted to the European Commission for assessment.

PA (Preliminary Amount): amount of free allocation of an installation participating in Phase 3, derived from benchmarks and historical activity levels (HALs). It serves as the basis for an installation’s free allocation over Phase 3. It is named preliminary as it may be modified (e.g. application of cross sectional correction factor, carbon leakage exposure factor) as required by the European Commission, before becoming final amount.

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