

Methodology for the free allocation of emission allowances in the EU ETS post 2012

Sector report for the cement industry

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Disclaimer and acknowledgements

Disclaimer

The views expressed in this study represent only the views of the authors and not those of the European Commission. The focus of this study is on preparing a first blueprint of an allocation methodology for free allocation of emission allowances under the EU Emission Trading Scheme for the period 2013 – 2020 for installations in the cement industry. The report should be read in conjunction with the report on the project approach and general issues. This sector report has been written by Ecofys.

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1 Introduction

The activity of the sector in Annex I of the amended Directive is defined as the “Production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day”. The respective NACE codes of the sector are:

NACE code (Rev. 1.1): 26.51
Description: Manufacture of cement

The European cement industry is one of the most concentrated in the world. The 5 largest European companies accounted for 57% of the total cement output in the EU25 in year 2003, and each comprises between 23 - 34 cement plants in the whole EU. According to Öko Institut and Ecofys (2008) the 10 largest producers together accounted for 75% of the total EU25 cement output.

Table 1 provided by the European Cement Association (CEMBUREAU) gives a list of installations currently reported in the CITL falling under the 4-digit NACE code 26.51 and their verified emissions (CEMBUREAU, 2009a).

Table 1 CO₂ emissions of cement clinker plants 2005 – 2008 (CEMBUREAU, 2009a)

Country	No. of instal.	CITL: Volume of CO ₂ verified emissions for annual production of cement clinker <u>only</u> (kt CO ₂)				Allocation
		2005	2006	2007	2008	Total 2005 - 2008
AT	9	2682	2966	3241	3221	12109
BE	5	4860	5133	5057	4849	19899
BG	5	0	0	3680	3463	7143
CY	2	1481	1471	1460	0	4412
CZ	6	2553	2796	3219	3015	11583
DE	48	20066	20433	22032	20434	82965
DK	1	2566	2695	2765	2236	10262
EE	1	746	802	1177	1179	3903
ES	36	27385	27366	27468	23405	105624
FI	2	921	963	989	1019	3892
FR	30	14005	14367	14651	13789	56813
GB ¹	16	9781	9827	10080	8259	26476
GR	8	10974	10745	10459	9878	42055
HU	4	2055	2123	2224	2111	8512
IE	4	3812	3793	3820	3391	14815
IT	54	27633	27861	28629	26156	110278

Continuation Table 1

Country	No. of instal.	CITL: Volume of CO ₂ verified emissions for annual production of cement clinker <u>only</u> (kt CO ₂)				Allocation
		2005	2006	2007	2008	Total 2005 - 2008
LT	1	783	1064	1092	902	3842
LU	1	732	697	678	641	2748
LV	1	285	358	363	358	1364
NL	1	621	563	615	616	2415
PL	11	8080	9638	11424	10466	39607
PT	6	6610	6505	6713	6376	26203
RO	7	0	0	6516	6594	13110
SE	3	2065	2277	2108	2203	8653
SI	2	776	836	898	968	3478
SK	4	2093	2138	2287	2357	8874
Total EU 27	268	153564	157417	173641	157884	631034

¹ CITL data for 2005-2007 could not be used for the UK, due to half of the UK installations being temporarily excluded in phase I of the EU ETS. Figures provided to CEMBUREA by the MPA (Mineral Products Association) as officially submitted to the UK National Air Emissions Inventory are reported here.

Installations producing cement clinker in the EU, to our knowledge, not produce electricity and also the amount of heat supplied to external costumers is limited. This was confirmed in the results from the questionnaire on sector classification (see final project report, Appendix 2 for more details). The emissions as indicated in the table therefore only refer to direct emissions that are, in principle, eligible for free allocation.

2 Production process and GHG emissions

More detailed descriptions of the production processes can be found in the pilot study on benchmarks for the EU ETS conducted in 2008 (Öko Institut and Ecofys, 2008) and in the best available technique reference document (BREF CLM - draft, 2009).

The production of cement follows three fundamental stages (based on Öko Institut and Ecofys, 2008):

1. Raw material preparation

At first the raw mixture of limestone (approx. 90%) and other materials (e.g. clay, iron ore, bauxite) is prepared. For this, blocks of raw materials are extracted from a local quarry or imported from other sites. These consist mostly of limestone but other materials are added to reach the desired chemical composition. After this the raw materials are crushed into smaller particles, homogenised and ground into a thin powder called “raw meal”.

2. Clinker production

Clinker production is the most energy-intensive step in the cement production. Temperatures over 900°C transform the limestone (CaCO_3) into lime (CaO), thus releasing CO_2 . This is called the calcination process. The calcinated raw meal reaches temperatures of up to 1450°C which allow its sintering to form clinker. This clinker lends the cement its binding properties. Once the clinker is formed, it is then rapidly cooled down to 100-200°C.

3. Cement grinding

The clinker produced is mixed with different ingredients to produce the cement. In the case of Ordinary Portland Cement (OPC), only around 5% gypsum is added. But so-called ‘blended cements’ are also widely used in Europe. These cements consist of a mixture of clinker and other products with cementitious properties. These are mostly by-products from other industries such as blast furnaces, slags from pig iron production, fly ash from coal power plants or other available pozzolans.

One of the most important indicators to measure the efficiency of a cement plant is the specific energy consumption for the production of clinker (in MJ/t clinker). Several different types of clinker kilns exist, with large differences in specific energy consumption and CO_2 emission intensity. Two main technology types are the shaft kiln and the rotary Kiln. The shaft kiln is an outdated technology, which is no longer used in Europe for reasons of high fuel consumption, low productivity and an inconsistent cement quality. According to recent figures (IEA, 2007) in the 2002 - 2006 period, 92% of the cement production in Europe was produced by dry process kilns. An estimated 4.5% of the production was from semi-wet or

semi-dry kilns and only 3.5% of the production was from wet kilns. The specific energy consumption for different technologies ranges from 2950 MJ/t clinker for dry kilns to 6700 MJ/t clinker for wet kilns. The specific heat consumption for the European cement industry has been constantly decreasing and is estimated in 2006 at 3700 MJ/t clinker (IEA, 2007).

Figure 1 shows the average CO₂ sources in clinker production and the corresponding energy demands.¹

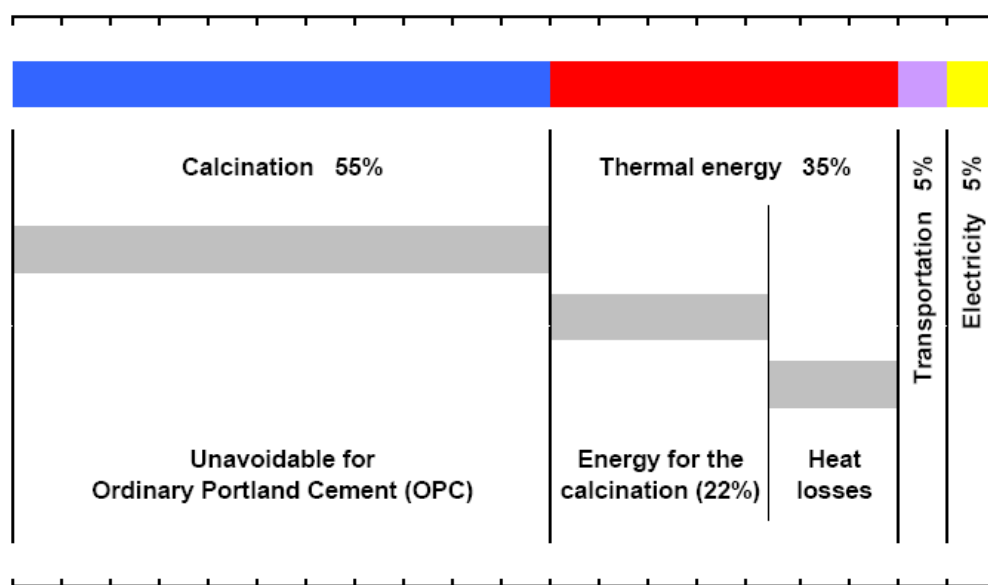


Figure 1 Average CO₂ sources in the production of clinker²

For modern kilns, around 55% of the CO₂ emissions released during the production of cement are from the calcination reaction, which transforms limestone (CaCO₃) into lime (CaO) and CO₂. The theoretical minimum energy required for the calcination reaction, is about 1700 MJ/t clinker (Pauksztat, 2004). In contrast, today the best performing plants consume around 2950 MJ/t clinker. The large difference in energy consumption compared to the theoretical minimum attributed to large heat losses during the process (over 40%). The energy consumed for drying the limestone (typically 900 MJ/t) represent a large share of heat losses. Some 5% of the CO₂ emissions are indirect, i.e. they result from the plant's electricity consumption. The consumed electricity amounts on average to 100-110 kWh / t cement (in OECD Europe) (IEA 2007).

It should be noted that the specific CO₂ emissions per tonne of cement are influenced by various factors. The most important of these factors are the clinker content in cement, the specific energy consumption (SEC), kiln size and the fuel mix used to provide the required energy.

¹ The share of transportation is shown for completeness and is not subject of this study.

² The CO₂ emissions due to calcination can not be avoided for Portland cement unless Carbon Capture and Storage technologies would be considered.

Clinker substitutes

By-products such as slags from the steel industry or fly ash from coal combustion can be mixed with clinker to produce blended cements. As these substitutes do not require most of the production steps of the clinker which they replace, they are often an economically viable option. Blended cements can be manufactured with up to 65% of slags or 35% of fly ash. Compared to CEM I (Ordinary Portland Cement – OPC), equivalent strength classes can be achieved. By comparison, CEM I typically contains 95% clinker. Blended cements are already widely used in Europe but production depends on the local availability of clinker substitutes, markets and applications. By reducing the relative clinker production per tonne of cement, the associated energy related and process emissions of CO₂ are avoided, resulting in significantly lower specific emissions (i.e. t CO₂/t cement) compared to Ordinary Portland Cement. According to CEMBUREUA, not all types of fly ashes and slags are appropriate for cement production and the European cement sector is already using most of the available by-products. Also there is a decreasing tendency in the generation of those by products due to the new power plants and the evolution of the steel industry (CEMUREAU, 2009c). The following table 1 highlights the different shares of clinker in various cement types. Blended cement can be used instead of Ordinary Portland Cement in most applications. However, certain cement characteristics can be impacted by the use of additives, e.g. initial strength, drying time, seawater resistance. Therefore, quality standards divide cements on the basis of their contents of clinker substitutes with an allowed range for their chemical composition. Within the EU, five major categories of cements are defined (EN 197³), see Table 2.

Table 2 Share of clinker in different cements

Category	Share of clinker
CEM I: Ordinary Portland Cement	95 %
CEM II: Portland Composite Cement	65 - 94 %
CEM III: Blast Furnace Cement	5 - 64 %
CEM IV: Pozzolanic Cement	45 - 89 %
CEM V: Composite Cement	20 - 64 %

Fuel mix

Beside carbon-intensive fuels traditionally used in the cement industry, there are alternatives leading to lower fossil CO₂ emissions, which are also being already widely used. Up to 40% of biomass can be used as a fuel in cement production. Cement kilns are also an alternative way to incinerate combustible wastes compared to waste incinerators. Several industrial wastes are for example used in cement kilns. The substitution rate of coal by waste in the cement industry in most European countries is between 0 - 100%.

Kiln capacity

In addition to kiln technology, kiln capacity is another important factor influencing the energy efficiency of a cement plant. Large kilns have lower heat losses per unit of clinker produced and therefore show lower specific heat consumption and CO₂ emissions.

³ Cement - Part 1: Composition, specifications and conformity criteria for common cements; German version prEN 197-1:2009

3 Benchmarking methodology

3.1 Background

The manufacture of cement falls under the following PRODCOM codes:

- 26.51.11.00: Cement clinker
- 26.51.12.10: White Portland cement
- 26.51.12.30: Grey Portland cement (including blended cement)
- 26.51.12.50: Alumina cement
- 26.51.12.90: Other hydraulic cements

3.1.1 *Clinker or cement*

The primary choice regarding benchmarking is between cement or clinker based benchmark. In Table 3 below we summarize the key arguments used in favour of either cement or clinker benchmarking⁴.

Table 3 Key arguments for cement or clinker benchmarking

Issue	In favour of Clinker benchmarking	In favour of Cement benchmarking
1) Scope of the amended Directive	In Annex I of the amended Directive, the reference is to clinker, not to cement. As a result, grinding stations as such are not included in the EU-ETS and the benchmark should therefore be based on clinker.	Article 3 of the amended Directive includes “directly associated activities which have a technical connection with the activities carried out on that site ...” At least for integrated (clinker and cement) facilities, this means that blending is also included.
		There is a link between the definition of activity in the EU ETS and the definition of activity in the Integrated Pollution Prevention and Control (IPPC) Directive. From the Best Available Technique Reference Documents for cement, it becomes clear that cement grinding is included within the scope of the IPPC Directive

⁴ In compiling this text we made use of several personal communications with stakeholders within and outside the cement sector.

Continuation Table 3

Issue	In favour of Clinker benchmarking	In favour of Cement benchmarking
2) Article 10 a (1) of the amended Directive that indicates that for each sector and sub-sector, in principle, benchmarks should be developed for products rather than for inputs, in order to maximise GHG emissions reduction and energy-efficiency savings throughout each production process	Based on the scope of the amended Directive (see above), the “product” is clinker, not cement	Based on the scope of the amended Directive (see above), the “product” is cement, not clinker.
	Given the scope of the amended Directive, “throughout each production process” rules out technology-specific benchmarks, but does not “prescribe” cement benchmarking.	Given the scope of the amended Directive, “throughout each production process” means that the incentive to reduce the clinker factor should be fully included in the EU ETS. This can only be accomplished via cement benchmarking.
3) Clinker imports and exports out of the EU-27	Cement benchmarking can create a perverse incentive to replace domestically produced clinker with imported clinker.	Cement benchmarking can be applied only to domestically produced clinker, thereby taking away this perverse incentive. This should thus not be a limiting factor to applying cement benchmark.
4) Clinker trade between installations	Cement benchmarking can not be applied to individual installations due to the trade of clinker between installations including trade with grinding stations.	Cement benchmark is possible by using 1 An installation-specific clinker ratio. This ratio could be applied to the cement produced with clinker produced on-site. For clinker crossing the system boundaries, clinker benchmarking could be applied. 2 Apply a company-specific clinker to cement ratio in the allocation formula Clinker trade between installations should thus not be a limiting factor to applying cement benchmark.

Continuation Table 3

Issue	In favour of Clinker benchmarking	In favour of Cement benchmarking
5) Need for multiple benchmarks	Only a clinker benchmark does not require correction factors. In case of cement benchmarking, the differentiated availability of clinker substitutes and quality differences between blended cements should be accounted for, adding to the complexity of the system.	Also in the case of cement benchmarking, there is no need for differentiation. Using a single cement benchmark fully includes the incentive to use blending materials to the extent possible.

In particular, based on the 4th issue (clinker trade between installations), we conclude that a benchmarking methodology based on clinker is the most practical approach for the cement sector, also in line with the following starting point outlined in the report on the project approach and general issues:

- Intermediate products that are traded between installations could be given separate benchmarks, because otherwise the allocation to installations producing only the intermediate would become very difficult.

The solutions (conceptually described in the table and a bit further discussed in Section 4.3) to solve these practical difficulties in case of cement benchmark either result in a hybrid system in which for a single product (clinker), two different benchmark methodologies are developed or in a situation that a new entity (the company) is introduced in the allocation methodology⁵. Both are not in line with the approach as outlined in the report on project approach and general issues.

We do realize that with clinker benchmarking, clinker substitution is not incorporated as such in the benchmarking methodology. Assuming that benchmarking will also be applied for the allocation in trading periods after 2020, clinker benchmarking could give a negative incentive for blending in the sense that increased blending could result in lower allowances in the next trading period (an update problem)⁶. Regarding new installations, a clinker benchmark could distort incentives to invest in blended cement. However, in view of the practical difficulties associated with cement benchmarking (issue 3, 4 and 5) and in view of the ambiguity regarding the scope of the amended Directive (1, 2), we regard this as acceptable.

⁵ In addition, the problem of clinker trade between companies would not be solved in this methodology.

⁶ Of course, cement benchmarking would also result in a different distribution of initial allowances between the various cement companies. As such, the real costs for buying allowances and the distribution of these costs over installations and companies will be different than with clinker benchmarking.

3.1.2 Other issues

In the report by Öko Institut and Ecofys (2008), several secondary factors are listed that could be included as correction factor in the benchmark methodology such as:

1. Technology differentiation
2. Plant age and size
3. Moisture content raw materials
4. Fuel emission factors
5. Alternative fuels
6. By-pass factor
7. Self-generation of power from waste heat

Some of these factors (1, 2, 3, 6) directly conflict with the general starting points as used in this study, whereas others (4, 5) are “automatically” taken into account in determining the average of the 10% most GHG efficient installations (see below). Therefore, no correction factors are proposed for these factors in line with Öko Institut and Ecofys (2008). Also for the self-generation of power from waste heat, no correction factor (or additional allocation) is proposed.

One additional issue is the small production volume of clinker for white cement. The production process differs in a number of ways from that of grey cements⁷. The difference between grey and white cement is an aesthetical one, but that two cements have the same application. Only aesthetics are not a valid argument to distinguish between the two types of clinker. Furthermore, is not yet clear whether existing production classifications allow distinguishing between clinker for white cement and what the production volume for white cement is. The PRODCOM classification seems to indicate that such a differentiation is difficult to make. We therefore propose not to make a distinction between various types of cement clinker.

3.2 Final proposal for products to be distinguished

Based on the above, and the arguments laid out in Section 3.1.1 on a clinker vs. cement benchmark, we propose one single EU-wide benchmark for clinker production, applicable also to clinker for white cement. The relevant PRODCOM code is 23.51.11.00.

⁷ The kilns operate at a higher peak temperature and after the kiln, quenching is applied in which the sensible heat is not recycled as in normal clinker manufacture. As a result the specific energy consumption is between 5 and 10 GJ / t white clinker (CEMBUREAU, 2009e).

4 Benchmark values

4.1 Background and source of data

The benchmark curve as shown in the following section is based on the Getting the Numbers Right (GNR) database developed as part of the World Business Council for Sustainable Development Cement Sustainability Initiative (WBCSD - CSI). The CSI systematically collects data on CO₂ emissions using a uniform protocol. A selection of data gathered via this protocol is included in a database, called the “Getting the numbers right (GNR)” database. The EU ETS monitoring and reporting guidelines cover only a fraction of the parameters that are available in the CSI protocol. The protocol for example includes also information on indirect emissions from electricity, allows aggregation at the company level and includes also baseline setting.

The data provided by the Cement Sustainability Initiative (CSI) covers over 94% of the clinker production facilities in the EU27 (or 226 plants). The EU 27 clinker kilns that are not included in the GNR database are minor producers with small production volumes. (CEMBUREAU, 2009b) The data might include also some white clinker facilities as these are sometimes combined with grey clinker kilns and production might have been reported in an aggregated way.

CEMBUREAU provided the following correspondence Table 4 between the GNR data for the EU27 and the data based on CITL.

Table 4 Differences between verified emissions in CITL and in the GNR database (values in kt CO₂)

CO ₂ emissions (kt CO ₂)	2005	2006	2007	Tot. 2005 -2007
CITL - Total EU 27	148881	152661	171608	473151
CITL (corrected for the UK) - Total EU 27	153564	157417	173641	484622
GNR Absolute gross CO ₂ emissions over time - EU 27	151612	156019	Not available	Not available
GNR - CITL	2730	3358	Not available	Not available
GNR - CITL (corrected for the UK)	-1953	-1398	Not available	Not available

In relation to the direct emissions from clinker production at the installation level (between CITL and the GNR database), small differences (less than 2%) may occur as a result of the inclusion of non-kiln fuels and differences in default emissions factors and definitions. Specific differences between the EU ETS Monitoring and Reporting Guidelines (MRG) and the GNR are:

1. The WBCSD CSI protocol does account mixed biomass and fossil waste as 100% fossil, whereas, in the EU ETS, companies may report a certain biomass fraction on the basis of laboratory analyses. The CSI Protocol considers only “pure” biomass as climate neutral.”
2. The WBCSD CSI protocol uses as default emission factor for process emissions from clinker making a value of 538 kg CO₂/t clinker, whereas the EU ETS MRG use a default value of 523 kg CO₂/t clinker. Both the EU ETS MRG and the CSI protocol allow the use of input based methods. A frequency distribution (Figure 2) of the specific process CO₂ emissions from the GNR database explains the default value of 538 kg CO₂/t clinker from the GNR database. (CEMBUREAU, 2009a)

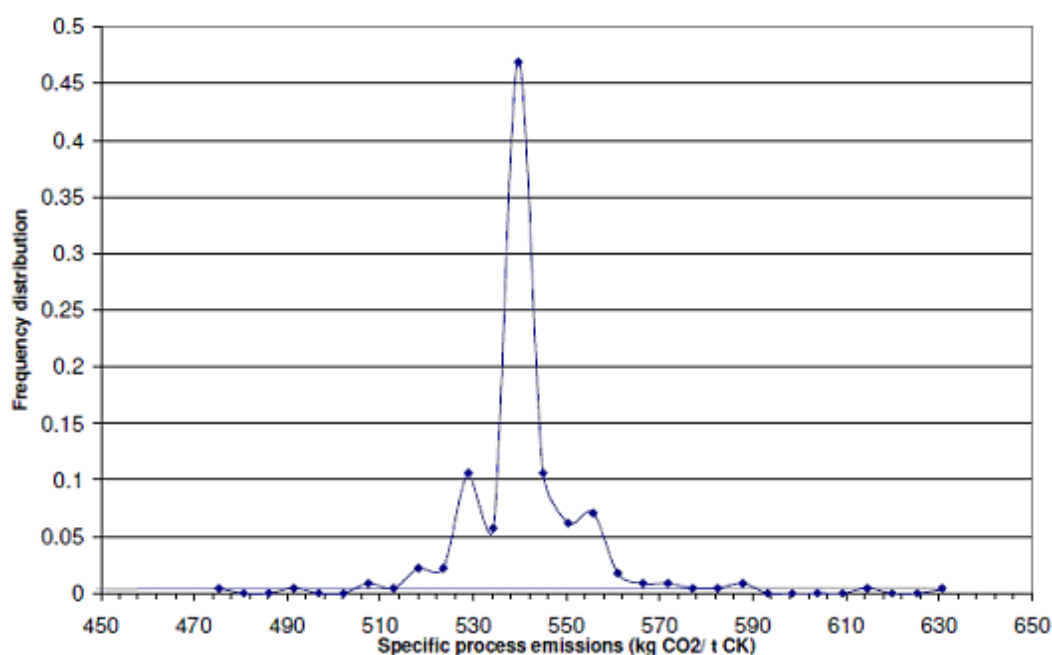
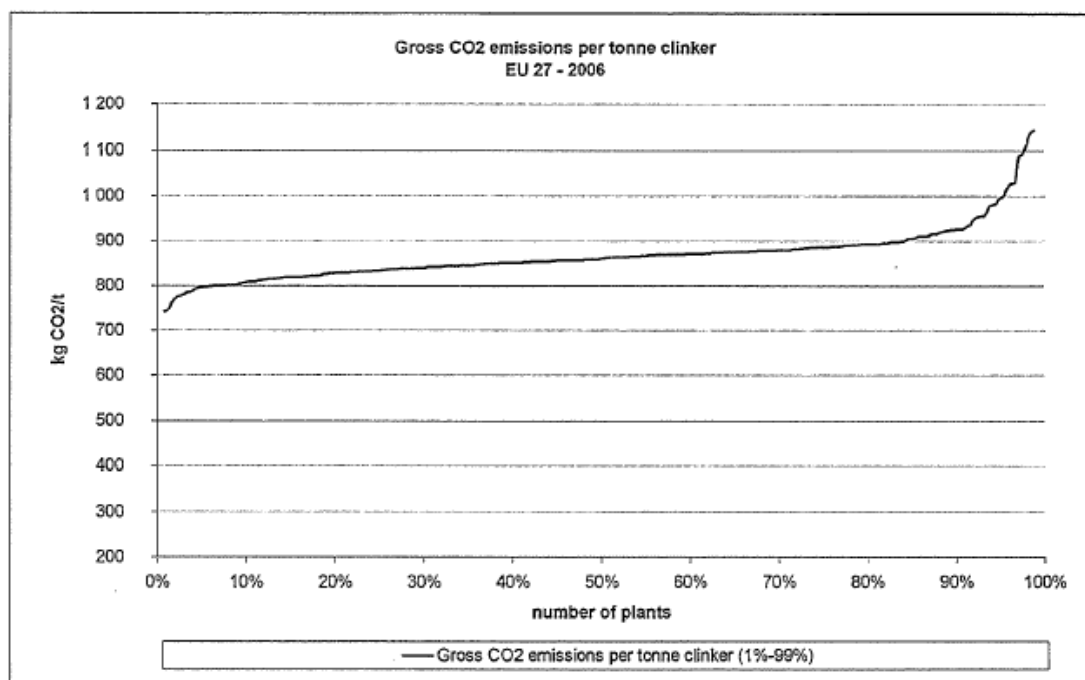


Figure 2 Frequency distribution of specific process CO₂ emissions of grey clinker cement plants (CEMBUREAU, 2009a)

We recommend basing the final benchmark value on data that are fully in line with the EU ETS monitoring and reporting guidelines i.e. base the final benchmark value on data from the CITL register and to include also the white clinker production facilities in the curve (see also Section 5). Given the above, it is expected the changes of basing the benchmark on CITL will in any case be quite small.

4.2 Final proposed benchmark values

The proposed benchmark is based on a full intensity curve as provided by CEMBUREAU through the CSI initiative. The final curve for the year 2006 is shown in Figure 3.



Formula of the linear regression between 10% and 90%: $y = 1,17x + 802$

Figure 3 Gross CO₂ emissions per t clinker

This curve is based on the curve shown in Figure 2 meaning that reported site specific process emissions are taken into account and not an average value. From this curve a preliminary benchmark value of 780 kg CO₂/t clinker can be derived as the average of the 10% best performing plants (estimate based on visual inspection of the curve). This final value should be corrected for the specific differences between the EU ETS Monitoring and Reporting Guidelines and the CSI protocol. The necessary correction for the difference in emission factor for process emission is maximal 15 kg CO₂/t clinker (downwards). The necessary correction for mixed biomass and fossil waste is unknown. Furthermore, the curve does not yet include clinker kilns in Norway and Iceland.

4.3 Possibility of other approaches

Although it is proposed to apply a clinker benchmark as allocation methodology it is still worthwhile to consider how an allocation based on cement benchmarking could look like. The basic allocation formula based on cement benchmarking would be:

$$A = B_c * P_c$$

With A being the allocation, B_c the cement benchmark in t CO₂ / t cement and P_c the cement production in a given year. Clinker and cement production are related via the clinker to cement ratio (the clinker content in the cement produced). Since clinker production is the CO₂ emitting process and clinker is traded between installations, the production of cement by an

installation⁸ in combination with the clinker to cement ratio of the cement produced by that installation (defined as clinker consumed divided by cement produced) does not directly correlate to the emissions of that installation. A grinding station not included in the EU ETS and receiving all clinker from other facilities, does not have emissions, but clearly produces cement with a certain clinker to cement ratio. At the other extreme, a clinker production facility delivering all clinker to a grinding station, does not have any cement production, but clearly has the emissions related to clinker production.

This situation could be solved by applying the cement benchmark only to cement production which is produced with clinker produced by the installation and apply clinker benchmarking for clinker flows over the system boundary. However, this could result in an incentive for clinker flows between installations if that would yield a higher allocation and furthermore strongly contradicts with the principle of having only benchmark per product. Alternatively, a company specific clinker to cement ratio could be introduced, thereby levelling off at the company level the clinker flows between companies⁹. However, this might create a good distribution of allowances at the company level, but obviously not at an installation level. Also the company is not a relevant entity within the EU ETS.

Based on this analysis, we maintain the conclusion that, albeit not strictly impossible, cement benchmarking significantly complicates the benchmarking methodology.

⁸ Another issue regarding cement production figures is that the definition of cement according to the GNR databases includes also ground slag and fly ash that is sold directly to be used as cement substitution. This is not consistent with the definition of cement according to the European Standard. Before applying cement benchmarking, a consistent definition for cement therefore needs to be agreed on.

⁹ Information on clinker trade is not available to the authors, but industry experts indicate that the majority of clinker trade between installations is between installations owned by the same company.

5 Additional steps required

The curve that forms the basis for the benchmark values derived in this report is based on data for 2006 and on data collected via the CSI protocol. To further improve the accuracy of the resulting benchmark value it is recommended to:

- Use emissions according to CITL rather than based on the CITL to be fully in line with the EU ETS Monitoring and Reporting Guidelines¹⁰
- To include all clinker production facilities in the EU 27 and Norway and Iceland in the curve including also facilities producing white cement
- To update the curves with values for 2007 and 2008

It can be expected that the resulting benchmark value will not differ much from the value of 780 kg CO₂ / t clinker as derived in this report.

¹⁰ In practice it will be difficult to use the CITL data for creating benchmark curves, because the entity managing the GNR database (including clinker production volume) does not have the CITL emissions available at the GNR installation level and probably needs approval from the Cement Sustainability Initiative (CSI) to combine the GNR database with other sources. Still, the possibilities of using CITL data could be further discussed with CEMBUREAU.

6 Stakeholder comments

The comments as included here are based on CEMBUREAU comments (CEMBUREAU 2009c) to an earlier draft of this report.

Based on the text of article 10a (2) of the amended Directive stating that “in defining principles for setting ex-ante benchmarks in individual sectors or sub-sectors, the starting point shall be the average performance of the 10% most efficient installations in a sector or sub-sectors in the Community in the years 2007-2008. CEMBUREAU does not share Ecofys’ view that “most efficient” should always be interpreted as ‘most greenhouse gas efficient’.

As outlined in the CEMBUREAU benchmark proposal sent on 18 May 2009 (CEMBUREAU, 2009d), CEMBUREAU proposes a benchmark based on the average performance in terms of energy efficiency of the 10% most efficient installations, taking into account a fixed fuel mix.

CEMBUREAU advocates such a step-wise approach in which energy efficiency and fuel mix are separately assessed and combined in an overall benchmark as the CO₂ efficiency curve is mainly influenced by the biomass use percentage in the case of the cement industry. As illustrated below in Figure 4, all plants belonging to the P10 (i.e. the first percentile in the benchmark curve) in terms of CO₂ efficiency have a biomass use percentage significantly higher than the average.

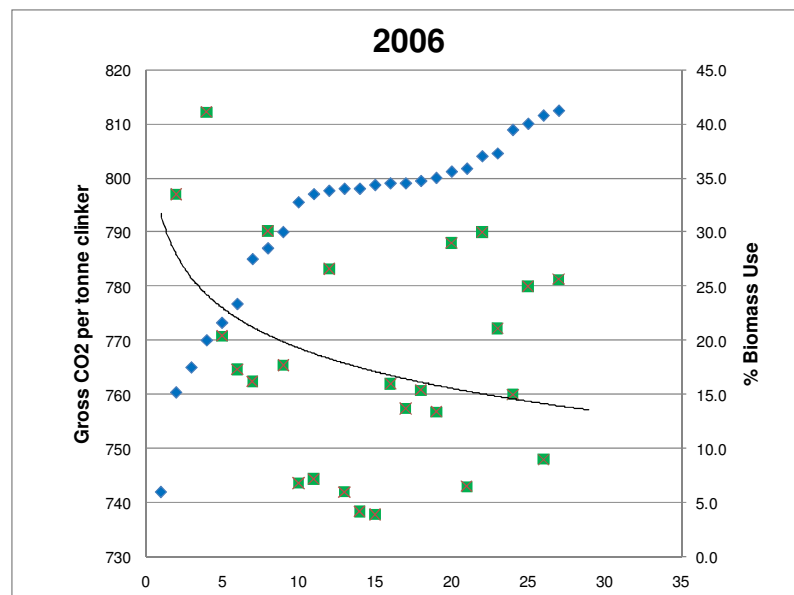


Figure 4 Relation of biomass percentage and gross CO₂ emissions

Furthermore CEMBUREAU stated that the installations belonging to the P10 are not the most efficient ones in terms of energy efficiency and that there is, in the P10, no correlation between energy efficiency and CO₂ emissions. This can be seen in Figure 5.

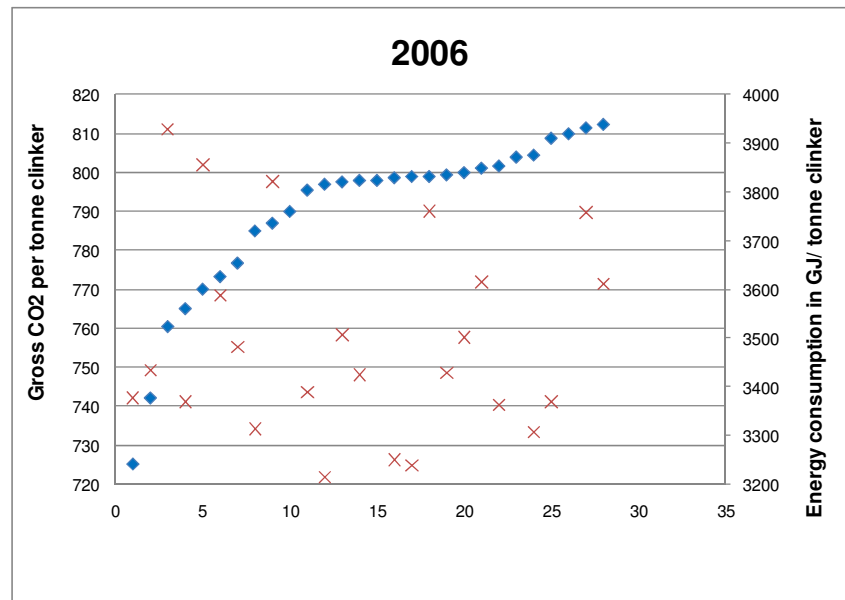


Figure 5 Relation of energy consumption and gross CO₂ emissions

Hence CEMBUREAU proposes a benchmark based on the average performance in terms of energy efficiency of the 10% most efficient installations, taking into account a fixed fuel mix. In their 18th of May proposal (CEMBUREAU), they derive an energy benchmark of 3.2 GJ / t clinker and an average emission factor of 93.57 kg CO₂/ GJ to arrive at a proposed benchmark value of 837 kg CO₂ / t clinker.

Contrary to ECOFYS' statement, CEMBUREAU believes that the incentive to increase the blend in cement is equally present with a clinker benchmark (clinker production) as with a cement benchmark. CEMBUREAU also remarks that a clinker benchmark does not bring about a negative incentive to reduce CO₂ emissions. Indeed there are not enough active clinker substitutes in Europe to cover the cement demand in Europe in 2020 and 2030. All companies will therefore be naturally forced to use the maximum amount of additions that are available to them without necessarily reducing clinker production. The most sustainable path in the long term for the cement industry in Europe is to trigger improved energy efficiency, closing low efficient kilns and upgrading equipment according with best available technology. This is appropriately addressed through a clinker benchmark.

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