

Ceramics Sector and MRV

陶瓷行业的MRV

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Ceramic installations under EU-ETS

EU-ETS中的陶瓷厂商

Rule/规则	Definition of ceramic installations/陶瓷厂商定义
Greenhouse Gas Emission Allowance Trading Directive 2003/87/EC 温室气体排放配额交易指南2003/87/EC	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tonnes per day, and/or with a kiln capacity exceeding 4 m ³ and with a setting density per kiln exceeding 300 kg/m ³ 产能超过75吨/天, 和/或窑容量超过4立方米并且每窑的设定密度超过300千克/立方米的, 按烧成方式包含瓦, 砖, 耐火砖, 地砖, 炻器和瓷器生产线。
Greenhouse Gas Emission Allowance Trading Directive 2009/29/EC 温室气体排放配额交易指南2009/29/EC	Manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tonnes per day. 产能超过75吨/天, 按烧成方式包含瓦, 砖, 耐火砖, 地砖, 炻器和瓷器生产线。

- There are currently 1097 ceramic installations included in the EU-ETS; EU-ETS第二阶段包含共1097家陶瓷厂商;
- According to the revised Directive 2009, the number will be increased to around 2000.

根据2009年指南的最新定义, 预计包含的厂商数将上升到2000家。

Ceramic installations under EU-ETS

EU-ETS中的陶瓷厂商

Table 1 Number of installations producing ceramic products per country (CITL, 2009a)

表一、EU-ETS下各国的陶瓷厂商数

Country / 国家	No. of installations / 数目	Country / 国家	No. of installations / 数目
Austria / 奥地利	33	Italy / 意大利	35
Belgium / 比利时	34	Latvia / 拉脱维亚	6
Bulgaria / 保加利亚	21	Lithuania / 立陶宛	8
Cyprus / 塞浦路斯	8	Netherlands / 荷兰	42
Czech Republic / 捷克	64	Norway / 挪威	3
Denmark / 丹麦	25	Poland / 波兰	50
Estonia / 爱沙尼亚	2	Portugal / 葡萄牙	70
Finland / 芬兰	4	Romania / 罗马尼亚	32
France / 法国	51	Slovakia / 斯洛伐克	11
Germany / 德国	138	Slovenia / 斯洛文尼亚	9
Greece / 希腊	45	Spain / 西班牙	287
Hungary / 匈牙利	43	Sweden / 瑞典	5
Ireland / 爱尔兰	3	United Kingdom / 英国	70

- In the next EU ETS trading phase, the ceramic installations with annual emissions below 25 kt CO₂ will be opted-out;
在2013年开始的EU-ETS新一轮交易期中，年排放量不足2.5万吨CO₂的陶瓷企业将被排除；
- Regarding bricks and roof tile production, 90% of installations in Spain and 60% of installations in France will be opted-out;
按此要求，西班牙90%的建筑陶瓷厂商和60%的法国建筑陶瓷厂商都将被排除。

Emissions and allowances

排放和配额

Table 2 Allocated allowances and estimated EU emission of greenhouse gasses (GHGs) for the ceramic sector from 2005 onwards (CITL, 2009a,b)

表2、从2005年起欧盟陶瓷行业的排放量和配额发放量

‘Ceramic products by firing’			
Year/年	Allocated allowances / 发放的配额 (Mt CO2 eq./百万吨二氧化碳当量)	Verified emissions/ 核证的排放量 (Mt CO2 eq./百万吨二氧化碳当量)	
2005	18.0	14.7	
2006	18.1	14.9	
2007	18.3	14.8	
2008	18.1	13.0	

According to estimates of Cerame Unie (2009c) as of 2013 the total emissions for ceramic installations in the ETS will increase to around 26.5 Mt CO2 eq.

根据Cerame Unie的估算, 2013年欧盟ETS下所有陶瓷厂商的总排放量将达到2650万吨二氧化碳当量。

Emissions sources

排放源

Basic production process/基本工序	Sources and sources stream for emission calculation ¹ /排放源
<p>1. Raw material preparation/原料粗加工</p> <p>2. Component mixing/配泥</p> <p>3. Forming and shaping of ware/压制成型</p> <p>4. Drying of ware/素胚干燥</p> <p>5. Firing of ware/素烧</p> <p>6. Product finishing/产品终加工</p> <p>7. Addition of auxiliary materials/添加辅料</p> <p>Over 70% of the emissions from the ceramic manufacturing industry are created in the firing process (Ceram data in BREF Ceramics, 2007). 超过70%的陶瓷制造排放产生于烧成环节。</p>	<ul style="list-style-type: none"> — conventional fossil kiln fuels/传统化石窑炉燃料, — alternative fossil-based kiln fuels/新型化石窑炉燃料, — biomass kiln fuels/生物质窑炉燃料, — calcination of limestone/dolomite and other carbonates in the raw material/石灰石、白云石和其他含碳酸盐的煅烧原料, — limestone and other carbonates for reducing air pollutants and other flue gas cleaning/石灰石和其他含碳酸盐的空气和烟气净化原料, — fossil/biomass additives used to induce porosity, e.g. polystyrol, residues from paper production or sawdust/用于增加孔隙度的化石或生物质添加剂,如聚苯乙烯或造纸废渣和锯末, — fossil organic material in the clay and other raw materials/粘土等原料中化石有机质.

¹ Annex X: 'Activity-specific guidelines for installations for the manufacture of ceramic products as listed in Annex I to Directive 2003/7/EC', Commission Decision 2007/589/EC

Emissions measurement/排放检测

Calculation of Emissions 基于计算的方法

Combustion emissions

燃烧排放

- Include emissions from the combustion of all fuels at the installation/包含所用的所有燃料;
- Include emissions from scrubbing processes for example to remove SO₂ from flue gas/包含清洁过程产生的排放, 例如烟气脱硫;
- Exclude emissions from internal combustion engines for transportation/不包含内燃机运输产生的排放;
- Include emissions from exported heat or electricity/包含输出的电力和热力的相应排放;
- Exclude emissions from imported heat or electricity/不包含购入的电力和热力的相应排放.

Process emissions

过程排放

CO₂ from input material/添加的原料的排放

CO₂ from carbonates and from carbon contained in other input materials/原料中碳酸盐和含碳物质产生的CO₂

CO₂ from limestone for reducing air pollutions and other flue gas cleaning/空气净化用石灰石和其他烟气净化剂产生的排放

calculated based on the amount of CaCO₃ input/根据成分中的碳酸钙量计算

Measurement of emissions/基于测量的方法

Emissions may be determined by a measurement-based methodology using continuous emission measurement systems (CEMS) from all or selected emission sources using standardised or accepted methods./可参照标准和方法学采用连续监测系统直接监测选定的或所有的排放源

The “compliance cycle” of the EU ETS

EU-ETS的排放审核体系

An annual procedure/年度流程:

- Have an approved monitoring plan (approved by competent authority at the beginning);
建立监测计划并取得主管单位的批复;
- Complete the annual emissions report;
根据监测计划监测并完成年度排放报告;
- Get the annual emissions report verified before 31 March each year by an accredited verifier;
在每年3月31日前聘用有资质的审核方,完成年度排放报告的审核;
- Once verified the equivalent number of allowances must be surrendered by 30 April of the same year;
同年4月30日前,与经审核的排放量对应的配额将从企业碳账户中扣除;
- If there is no enough allowance or equivalent credits, the operators will be punished.
- 如果企业碳账户中配额或相应碳信用额不足以抵扣排放量,企业将为超排受到相应惩罚;

For aviation activities, the Commission has published electronic templates for the monitoring plan and emission report

对于航空业排放,欧盟发布了电子模板用于上报监测计划和排放报告。



MRV

监测、报告和审核

- Monitoring, reporting and verification (MRV) key for reducing greenhouse gas emission cost-effectively (for any activity)

监测、报告和审核是经济有效的减少温室气体排放的关键

- MRV principles apply at project, sector, organization or national-level inventories. Principles include:

MRV的原则适用于项目、行业、组织或国家层面的碳盘查。原则包括：

- ✓ **Completeness** /完整性
- ✓ **Consistency** /一致性
- ✓ **Transparency** /透明性
- ✓ **Trueness** /真实性
- ✓ **Cost effectiveness** /经济有效性
- ✓ **Faithfulness** /诚信性
- ✓ **Improvement of performance in monitoring and reporting emissions** /对排放监测和报告改善的促进性



Differences between EU and Shanghai

上海体系和EU体系的区别

11 Dec. 2012, shanghai DRC announced the guidance for monitoring and reporting GHG emissions in shanghai. Except the general guidance, it also released 11 sectorial guidance. The ceramic has been included into non-metallic metals with cement and glass. In Shanghai's system, differences are:

2012年12月11日上海发改委公布了《上海市温室气体排放核算与报告指南》和11个行业的分指南。陶瓷和玻璃、水泥业一起归入了非金属矿物制品业。上海体系和欧盟体系区别如下：

Measurement related/与检测相关的：

- **No emissions caused by input materials are considered;**
不考虑原料和添加料产生的排放；
- **Include emissions from imported electricity and heat;**
考虑了外购电力和热力的相应排放；
- **No emissions from air and flue gas cleaning are considered.**
未考虑空气和烟气净化产生的排放；

Quality related/质检相关的：

Lack of lots of detailed rules for accuracy, uncertainty, risky and so on. For example/缺少大部分关于准确性、不确定性、风险性的详细规则，例如：

- **No “Tier” established based on size, technology, factor;**
没有根据规模、技术和参数划分等级
- **No uncertainty limitation, etc.**
没有不确定性的限值，等。



Energy saving 节能

Sector /行业	Europe/欧盟		China/中国
	Specific energy consumption/单位能耗 (GJ/t)	Specific energy consumption equal to standard coal/标煤的单位能耗 (kg coal/t)	Specific energy consumption equal to standard coal/标煤的单位能耗 (kg coal/t)
Bricks and roof tiles/砖瓦	2.31	78.92	
Wall and floor tiles/墙地砖	5.60 ¹	191.32	600
Refractory products/耐火制品	5.57	190.29	
Sanitary ware/卫生陶瓷	21.87	747.17	1700
Vitrified clay pipes/陶土管	5.23	178.68	
Table-and ornamental ware/日用陶瓷	45.18	1543.53	
Technical ceramics/技术陶瓷	50.39	1721.52	

¹ Cerame Unie indicated that this figure only includes drying and firing/Cerame Unie表示此值仅包含干燥和烧成部分

The above table indicate the specific energy consumption in the ceramics industry in Europe in 2003. And the china data is from JC712-1990 for the class 1 products.

以上表格显示了2003年欧盟陶瓷行业的单位能耗。其中用于对比的中国数据来源于JC712-1990的一类标准



Emission reduction 减排

- Reduction of the moisture content of the clay through dry forming techniques will result in energy savings in the drying step and the kiln;
通过干燥成型技术减少素胚中水的含量,可以减少干燥和烧成的能耗;
- Use of more efficient (tunnel) kiln design (including low-thermal mass carts, burner design, insulation);
采用更先进的窑炉技术和设计,比如隧道窑;
- Operating practices (process controls);
过程管理
- Fuel switching from coal to fuel oil, natural gas and biomass; (could apply for carbon credits, as CDM, CCER or VER);
采用油、天然气和生物质替代煤 (此类项目可开发CDM、CCER和VER);
- Waste heat recovery; (could apply for carbon credits, as CDM, CCER or VER);
and
余热回收利用 (此类项目可开发CDM、CCER和VER);
- Partial substitution of clay and shale by alternative raw materials such as fly-ash.
采用低排放原料,如粉煤灰,部分替代粘土和页岩;

Potential difficulties

潜在的困难

- The manufacture of ceramic products takes place in different types of kilns, with a wide range of raw materials and in numerous shapes, sizes and colours and consequentially has MRV challenges;
- 陶瓷行业所包含的技术、原材料类型广泛，丰富多样，因此对于MRV的实施 极富挑战；
- As the industry is dominated by middle to small size companies, the costs and resources required for MRV is a concern;
- 由于陶瓷企业多为中小型企业，需要关注实施MRV的成本和所需的资源；
- Since Guangdong is the top 1 ceramic products exporting province in China, how to connect the local MRV standard with the importing countries' standard will be a issue.
- 作为国内陶瓷出口的第一位，如何让广东的MRV标准和各主要陶瓷制品进口国的MRV标准相符合。



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