ENVIRONMENTAL DEVELOPMENT OF THE CERAMIC TILE MANUFACTURING SECTOR IN THE PERIOD 1992–2017

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1. INTRODUCTION

Despite being a traditional sector, the ceramic tile manufacturing sector is one of the most dynamic and competitive industrial sectors in Spain. The sector's development over the last few decades has not just been impacted by the economic crises, which have caused production rises and falls, but also by very important developments in company management regarding the environmental performance of their products and processes.

The improvement in environmental aspects of the ceramic tile manufacturing process has basically been driven by the development of more stringent regulation of every environmental issue arising in the manufacturing process. However, the approval and development of the Integrated Pollution Prevention and Control (IPPC) Directive at the end of the 1990s was a watershed, not just for the ceramic tile sector, but also for the entire European industrial fabric.

This development is evidenced, for instance, by the sectoral studies, also known as benchmarking studies, focusing on environment and energy issues, which ITC has conducted in recent years in collaboration with the Spanish Ceramic Tile Manufacturers' Association (ASCER). Specifically, these studies were performed in the years 1992, 2000, 2007–2008, and 2017.

From a generic standpoint, the benchmarking studies may be characterised as a constant quest for the best practices in industry, and for ongoing improvement of all business aspects and operations, aimed at matching or bettering these practices.

To be noted was the time chosen for performance of each study, as the studies coincided with times of considerable change for the ceramic sector in environmental issues (appearance of new regulations, development and application of actions pursuing excellence and competitiveness beyond applicable legal requirements, etc.), and they have yielded very valuable information on how legislation and the market have driven environmental improvement in the sector (see Figure 1).

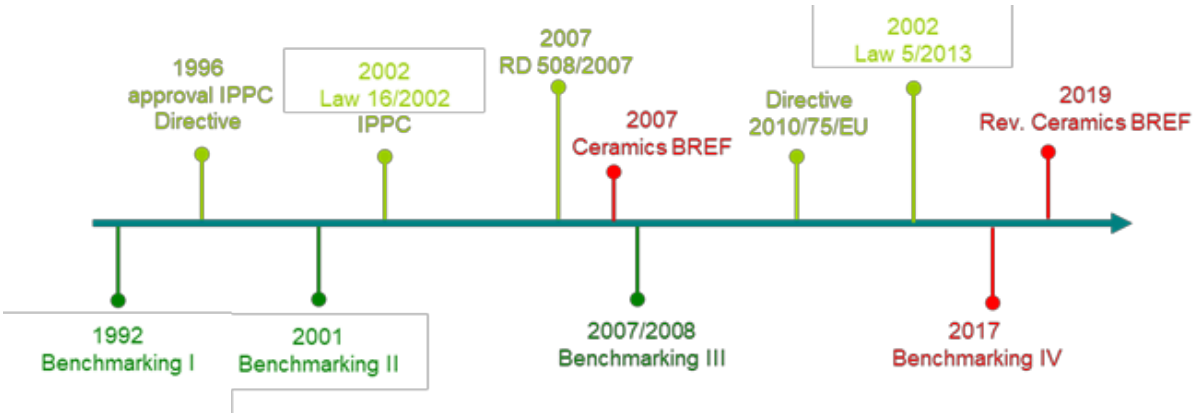

Figure 1. *Timeline of the different environmental benchmarking studies conducted by ITC.*

2. OBJECTIVES

The present study pursued the following objectives:

- Determining the situation in the ceramic sector regarding eco-management and its development over the last few years.
- Providing companies with reference values (environmental indicators) for targeting environmental improvements.
- Detecting the environmental strengths and weaknesses of the ceramic sector, as well as the trends in this regard.
- Obtaining robust and sufficiently representative data for life cycle assessment and for drawing up subsequent Environmental Product Declarations (EPDs).

3. METHODOLOGY

The methodology followed in every study has involved compiling the information supplied by spray-dried powder and ceramic tile manufacturers associated with ASCER, individual and sectoral treatment of this information, comparative analysis with data from previous years, and finally exploitation and dissemination of the results.

4. RESULTS

To be noted, generally, is the constant positive development in every aspect relating to environmental issues. This clearly underscores the rising environmental awareness in the companies in recent years, a situation that has largely been driven, as mentioned above, by the adoption of numerous environmental regulations that have, broadly speaking, entailed tightening existing regulations. In this sense, the impact of the adoption of the IED (Industrial Emissions Directive), better known as Integrated Pollution Prevention and Control (IPPC), has been crucial, as these regulations have practically affected the entire ceramic tile sector.

The most noteworthy results of the benchmarking study performed in 2017 are discussed below:

- **Representativeness of the study**. 28% (in number) of sector companies responded, accounting for 39% of overall production. Participation was of a similar order to that of previous studies and was deemed sufficiently representative.
- **Eco-management**. Of the studied sample, 50% had implemented and certified implementation of an environmental management system, the main option chosen being the scheme proposed by the ISO 14000 standards. As for the degree of implementation of eco-features (eco-labels or similar certificates), 48% of the companies declared having implemented some such eco-feature.

- **Raw materials and ancillary materials**. A smaller amount of glaze was applied (generally speaking) compared to previous years, possibly owing to the spread of digital printing technology.
- **Energy consumption**. The figures supplied by the companies indicate that energy consumption decreased slightly in both thermal and electric energy in 2017, possibly as a result of company efforts to save more energy.
- **Waste management**. Waste management improved noticeably compared to previous years, as waste regulations became stricter (new duties on waste disposal at landfills), in addition to greater corporate awareness in valorising the waste generated, in particular, within the company's own process.

  With regard to the amount of waste generated in the company's own production process, to be noted was a slight increase in unfired tile scrap compared to that of the previous study. Even so, this was of no great importance as the waste was reused within the same process.
- **Water management**. None of the companies declared discharging wastewater, a clear indication that water management is one of the ceramic sector's strengths. Generally, industrial wastewater is introduced in the spray-dried powder manufacturing process and in the case of other stages such as tile machining, wastewater circulates in a closed circuit.
- **Air pollution–Diffuse emissions**. Outdoor ceramic raw materials storage is deemed one of the most critical diffuse emissions-generating operations. To be noted is a change in the way raw materials are stored: from 100% outdoor storage, now only 7% of the companies stored all their raw materials outdoors.

  In this sense, a noteworthy effort has thus been made by the sector to mitigate the impact of diffuse emissions and it may be noted that, to assure the effectiveness of each and every implemented measure, it must be ensured that these measures are upheld.
- **Air pollution–Channelled air emissions**. All companies performed the relevant controls of the emissions generated at their sources. The degree of implementation of cleaning systems for kiln emissions was practically negligible (<1%).

5. CONCLUSIONS

Analysis of the survey results revealed the strengths and weaknesses set out below.

The sector's **weaknesses** are as follows:

- **Channelled air emissions**. Some investments have yet to be made, some of which are subject to the emission limit values to be set after review of the ceramics BREF. The review will start in 2020. In this sense it may be noted that, with the new Industrial Emissions Directive (IED), the BREFs have a binding character, at least as regards the section on Best Available Techniques (BATs), in which the BAT-related emission limit values are detailed.
- **Waste generation**. The slight increase in the amount of unfired tile scrap with respect to the previous benchmark study is deemed a minor issue and may be incidental to the sample considered in this study.

The sector's **strengths** are as follows:

- The current regulatory context (former IPPC Directive, currently IED), together with the technological innovations, has led to **overall improvement of the sector's environmental management**. Particularly noteworthy is the increased number of companies that have implemented Environmental Management Systems, in most cases according to ISO 14000.
- **Review of the BREF documents** assures updating environmental impacts of the processes and allows identification of real environmental management needs. These needs may change, depending on technological innovations in processes or on modifications in products or processes. This **process is deemed beneficial for both the industry and society** in general.
- In regard to **technological innovations**, tile decoration by digital inkjet printing and tile dry machining operations will provide **considerable savings in water consumption** for companies even though, in the study performed, no significant reduction was as yet detected.

6. ACKNOWLEDGEMENTS

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