

# STUDY FOR THE HFC CRITERIA REVISION AND SFC CRITERIA DEVELOPMENT



WORK PACKAGE 1  
PRELIMINARY REPORT

VERSION 28 November 2007

**Main Contributors** [Life Cycle Engineering (LCE), Torino, Italy – [www.studiolce.it](http://www.studiolce.it)]


Valeria Evangelista,

Marina Foschia

Marco Montani

---

**Internally (LCE) Approved by**

Gian Luca Baldo (Legal Representative)	Date
	<p style="text-align: center;">28 November 2007</p>


---

**APAT Approval by**

Stefania Minestrini, [[stefania.minestrini@apat.it](mailto:stefania.minestrini@apat.it)]

Roberta Alani, [[roberta.alani@apat.it](mailto:roberta.alani@apat.it)]

Laura Cutaia, [[laura.cutaia@apat.it](mailto:laura.cutaia@apat.it)]

	<p>Produced for the European Commission by Life Cycle Engineering.          Owner, Editor: European Commission, DG Environment-G2, B-1049, Bruxelles.          Disclaimer: The European Commission accepts no responsibility or liability whatsoever with regard to the information presented in this document.</p>
---	---

## SUMMARY

<b>1. INTRODUCTION AND SUMMARY .....</b>	<b>5</b>
<i>Nomenclature and HFC classification (natural and processed) .....</i>	6
<i>Project Framework.....</i>	10
<b>2. THE EU HARD FLOOR COVERINGS MARKET .....</b>	<b>12</b>
<i>Natural stones (CEN TC 246).....</i>	13
<i>Agglomerated Stones (CEN TC 246/229) .....</i>	17
<i>Concrete Paving Units (CEN TC 178).....</i>	18
<i>Terrazzo Tiles (CEN TC 229).....</i>	19
<i>Ceramic Tiles (CEN TC 67).....</i>	20
<i>Clay Tiles (CEN TC 178).....</i>	27
<i>Summary of the market analysis for HFC group .....</i>	28
<i>Market information about Ecolabelled HFCs and final comments .....</i>	29
<b>3. EU LEGISLATION ANALYSIS: REGULATORY IMPROVEMENTS FOR THE FLOOR COVERINGS SECTOR .....</b>	<b>31</b>
<i>Regulatory improvements related to raw materials selection.....</i>	31
<i>Air emission test methods update .....</i>	31
<i>Evaluation of legislation and reference documents for existing hurdles validity .....</i>	32
<b>4. TECHNICAL ANALYSIS (REVISION) OF EXISTING CRITERIA .....</b>	<b>39</b>
<i>Definition of the product group (Commission decision, Article 2).....</i>	41
<i>Framework (Assessment and verification requirements) .....</i>	43
<i>Extraction activities (Raw Material extraction, Criterion 1).....</i>	44
<i>Raw materials selection (Criterion 2).....</i>	47
<i>Finishing operations (Criterion 3) natural products .....</i>	50
<i>Energy consumption in the firing stage and CO<sub>2</sub> emissions (Criterion 4.1) .....</i>	51
<i>Water use (Criterion 4.2) .....</i>	55
<i>Air emissions (Criterion 4.3) .....</i>	56
<i>Emissions to water (Criterion 4.4) .....</i>	57
<i>Cement (Criterion 4.5) .....</i>	58
<i>Waste management (Criterion 5) .....</i>	59
<i>Use phase (Criterion 6).....</i>	59
<i>Fitness for use (Criterion 7) .....</i>	60
<i>Consumer information (Criterion 8) .....</i>	61
<i>Information appearing on the Ecolabel (Criterion 9).....</i>	61
<i>New Criteria Proposal.....</i>	62
<b>5. ISSUES RELATED TO SOFT COVERINGS PRODUCT GROUP DEFINITION.....</b>	<b>63</b>
<i>Other European or National Ecological Labels .....</i>	63
<i>Definition of the product groups according to different sources .....</i>	65

SOME MARKET INFORMATION ABOUT SOFT FLOOR COVERINGS ..... 67

*Carpets* ..... 69

*Wood floorings*..... 70

*Rubber floorings* ..... 72

*PVC coverings* ..... 73

*Other plastics coverings* ..... 75

*Linoleum* ..... 77

*Laminate coverings*..... 78

*Summary of the market analysis for SFC group* ..... 81

PRELIMINARY OVERVIEW OF SFCs PRODUCTION PROCESSES ..... 82

*Carpets* ..... 82

*Wood floorings*..... 85

*Rubber floorings* ..... 86

*Vinyl floorings (PVC floorings)*..... 87

*Linoleum* ..... 89

*Laminates* ..... 90

SUMMARY OF ENVIRONMENTAL ASPECTS LINKED TO SFCs..... 93

PRODUCT GROUP DEFINITION ..... 97

**6. FLOOR COVERINGS PRODUCT GROUP DEFINITION..... 98**

*1<sup>st</sup> Proposal*..... 98

*2<sup>nd</sup> Proposal*..... 99

*3<sup>rd</sup> Proposal*..... 100

*4<sup>th</sup> Proposal*..... 101

*Recommendation*..... 102

**7. APPENDIX..... 103**

    CONTACTS..... 103

    REFERENCES ..... 104

## 1. Introduction and summary

APAT, the Italian Agency for Environmental Protection and Technical Services, the technical support for the Italian C.B., has been entrusted by the European Commission for the development of the project entitled “**Study for the HFC (Hard Floor Coverings) revision and SFC (Soft Floor Coverings) criteria development**”.

APAT, subsequently, appointed Life Cycle Engineering (LCE) to act as technical support during the project development.

The overall aim of the project is to assess the need for updating/developing new Hard Floor Covering (HFC) criteria, and, eventually, to develop a new product category, Soft Floor Coverings (SFC).

The project is composed of 3 Work Packages (WPs).

**WP1** focuses on the development of a Preliminary Report for the revision of the existing HFC criteria and the (eventual) development of new criteria for the SFC product group.

Based on the WP1 results, the **WP2** would be implemented if a revision of the existing HFC criteria is needed, and the **WP3** would be implemented if the development of new SFC criteria is requested.

The **Work Package 1 Preliminary Report** constitutes an informative platform for the whole project. This Preliminary Report aims at:

- Presenting some basic market data, to highlight the relevance of the different HFC categories and the feasibility of Ecolabelled HFCs
- Defining the available technologies and production methods, to assess if the existing criteria have been overcome by technological improvements, and if some requirements need to be tightened.
- Analysing the existing EU and some specific national legislations as well as BAT documents influencing the HFC sector, to assess if new mandatory requirements have been introduced, and if the criteria are, at least, as strict as the current legislation is.
- Evaluating the feasibility of the development of Ecolabel criteria for a new product group: Soft Floor Coverings. A first analysis has been performed to identify a first proposal of SFCs to be considered. The results of the analysis reveal their diffusion within the EU market, the main environmental impacts and some relevant technical information.

## Nomenclature and HFC classification (natural and processed)

The existing criteria (Commission Decision 2002/272/EC of 25 March 2002, article 2) define the Hard Floor Coverings as “**hard products for internal/external flooring use, without any relevant structural function**”. This product group includes natural products (natural stones and “other” natural stones) and processed products (ceramic tiles, agglomerated stones, concrete paving units, terrazzo tiles, clay tiles).

### NATURAL PRODUCTS

#### Natural stones (CEN /TC 246)

Natural stones (CEN/TC 246) are pieces of naturally occurring rock, and include marble, granite and other natural stones. “Other” natural stones refers to natural stones whose technical characteristics are on the whole different from those of marble and granite as defined by CEN/TC 246/N.237 prEN 12670 ‘Natural stones — Terminology’. Generally, such stones do not readily take a mirror polish and are not always extracted by blocks: sandstone, quartzite, slate, tuff, schist.



## **PROCESSED PRODUCTS**

This group could be divided into hardened and fired products. Hardened products are agglomerated stones, concrete paving units and terrazzo tiles. Fired products are ceramic tiles and clay tiles.

### **Agglomerated Stones (CEN /TC 246 - JWG 229/246)**

Agglomerated Stones are industrial products manufactured from a mixture of aggregates, mainly from natural stone grit and a binder as defined by CEN/TC 246-229. The grit is normally composed of marble and granite quarry granulate and the binder is made from artificial components as unsaturated polyester resin or hydraulic cement. This group includes also artificial stones and compacted marble.



### **Concrete Paving Units (CEN/TC 178)**

Concrete paving units are products for outer floor-coverings obtained by mixing sands, gravel, cement, inorganic pigments and additives, and vibro-compression as defined by CEN/TC 178. This group also includes concrete flags and concrete tiles.



**Terrazzo Tiles (CEN /TC 229)**

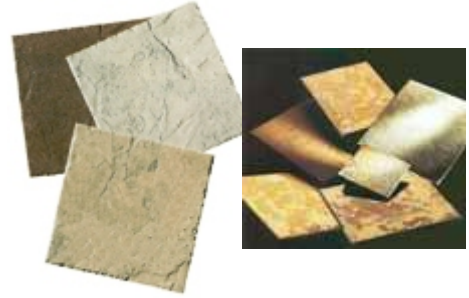
Terrazzo tiles are a suitably compacted element of uniform shape and thickness, which meets specific geometrical requirements as defined by CEN/TC 229. The tiles are single or dual-layered. The single-layered are tiles completely made of granulates or chipping of a suitable aggregate, embedded in grey and white cement and water. The dual-layered tiles are terrazzo tiles made up of the first face or wear layer (with single-layered composition) and a second layer, known as backing or base concrete layer, whose surface is not exposed during normal use and which may be partially removed.





### Ceramic Tiles (CEN/TC 67)

Ceramic tiles are thin slabs from clays and/or other inorganic raw materials, such as feldspar and quartz as defined by CEN/TC 67. They are usually shaped by extruding or pressing at room temperature, dried and subsequently fired at temperatures sufficient to develop the required properties. Tiles can be glazed or unglazed, are non-combustible and generally unaffected by light.



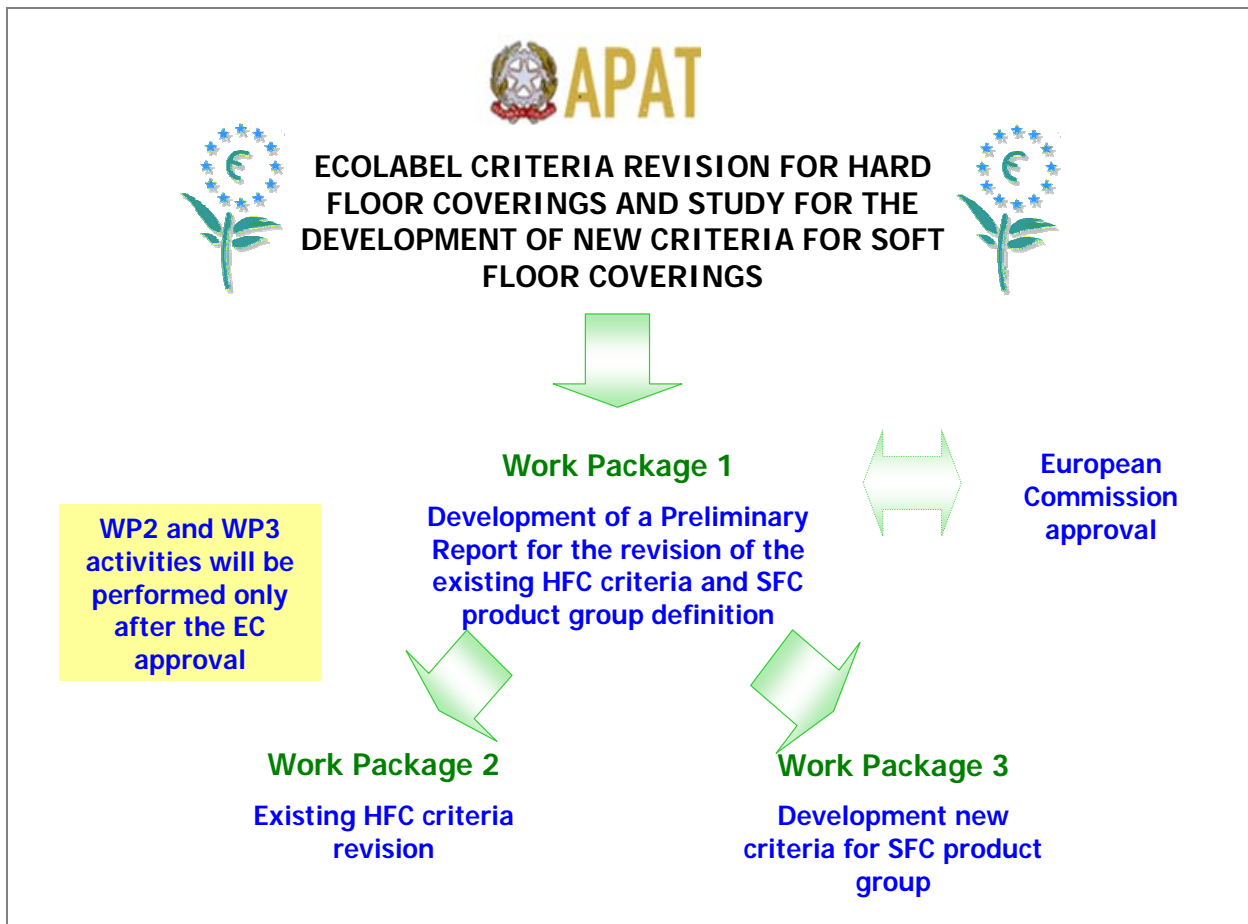
### Clay Tiles (CEN /TC 178)

Clay tiles are units that satisfy certain shape and dimensional requirements, used for the surface course of pavements and manufactured predominantly from clay or other materials, with or without additions as defined by CEN. The specific weight of such tiles shall not exceed 40 kg/m<sup>2</sup>.



## Project Framework

A general framework of the whole project is schematically presented in Figure 1.1.



**Figure 1.1** - The project framework.

Then, Table 1.1 highlights the main actions grouped in the Work Package 1, as well as the corresponding deadlines and responsibilities.

**Table 1.1 - Work Package 1 actions and timetable (LCE is Life Cycle Engineering).**

<b>ACTION</b>	<b>WHO</b>	<b>DEADLINE</b>	<b>DOCUMENTS REQUIRED</b>
Kick off meeting	LCE/APAT	13 March 2007	-
Drawing up of a questionnaire to require comments on existing HFC Ecolabel criteria to EU stakeholders	APAT/LCE	31 <sup>st</sup> May 2007;	-
Feedbacks from the questionnaires sent	APAT/LCE	14 July 2007	Filled questionnaires sent back by HFC manufacturers
Updated market analysis, regulatory review and information on Best Available Techniques for HFC manufacturing	LCE	July 2007	Updated market data for agglomerated stones, terrazzo tiles, concrete paving units. To be updated with APAT comments
Regulatory, economic and technical analysis of the Soft Floor Coverings sector	LCE	July 2007	To be updated with APAT comments
Preliminary Draft Report	LCE/APAT	24 August	Preliminary Draft Report
Preliminary Report diffusion to EC	APAT/LCE	31 <sup>st</sup> August 2007	Preliminary Report
Comments from EC	CE	10 <sup>th</sup> Sept. 2007	-
Documents for the 1° AHWG Meeting:	LCE	5 <sup>th</sup> Sept 2007	<ul style="list-style-type: none"> <li>▪ Preliminary report (updated with EC comments)</li> <li>▪ Meeting Invitation and Agenda</li> <li>▪ PPT presentation</li> </ul>
1° AHWG Meeting Presentation of the Preliminary Report on the WP1 activities	LCE/APAT	28 <sup>th</sup> Sept. 2007	WP1
Proposal for SFC product group definition	LCE/APAT	28 <sup>th</sup> Sept. 2007	WP1
Minutes of the 1 <sup>st</sup> AHWG meeting	LCE	Nov 2007	Minutes of the AHWG meeting
Management of the AHWG comments	LCE	Nov 2007	-
Preliminary Report updating consistently with the AHWG comments	LCE	Nov. 2007	WP1 (updated with AHWG comments)
Preliminary Report presentation at EU EB Meeting	LCE/APAT	12- 13 Dec. 2007	-
WP1 Final Report	LCE	31 <sup>st</sup> Dec. 2007	Final Report

## 2. The EU Hard Floor Coverings Market

This section focuses on main HFC market characteristics, to assess the state of the market, and to confirm/evaluate the Ecolabel feasibility.

The data here presented have been collected mainly contacting some relevant EU hard flooring manufacturing associations<sup>1</sup>. Also single manufacturers and national associations have been contacted, considering also the activities carried out in the previous HFC-related projects<sup>2</sup>.

Also EUROSTAT data have been considered, but it has to be emphasised that such data are not perfectly suitable for the aim of this study, since they are referred to HFC macro-categories, not completely comparable with the ones addressed by the EU Ecolabel.

The data collected considers, where possible, the EU-27 Member States (Figure 2.1) and, also the EU market relevance compared with global trends or other non-EU countries statistics.



**Figure 2.1 - The EU-27 Member States considered in the data collection.**

The following sections display the results obtained for each HFCs category.

<sup>1</sup> For further information, see the mailing list and comments & proposals that is available separately.

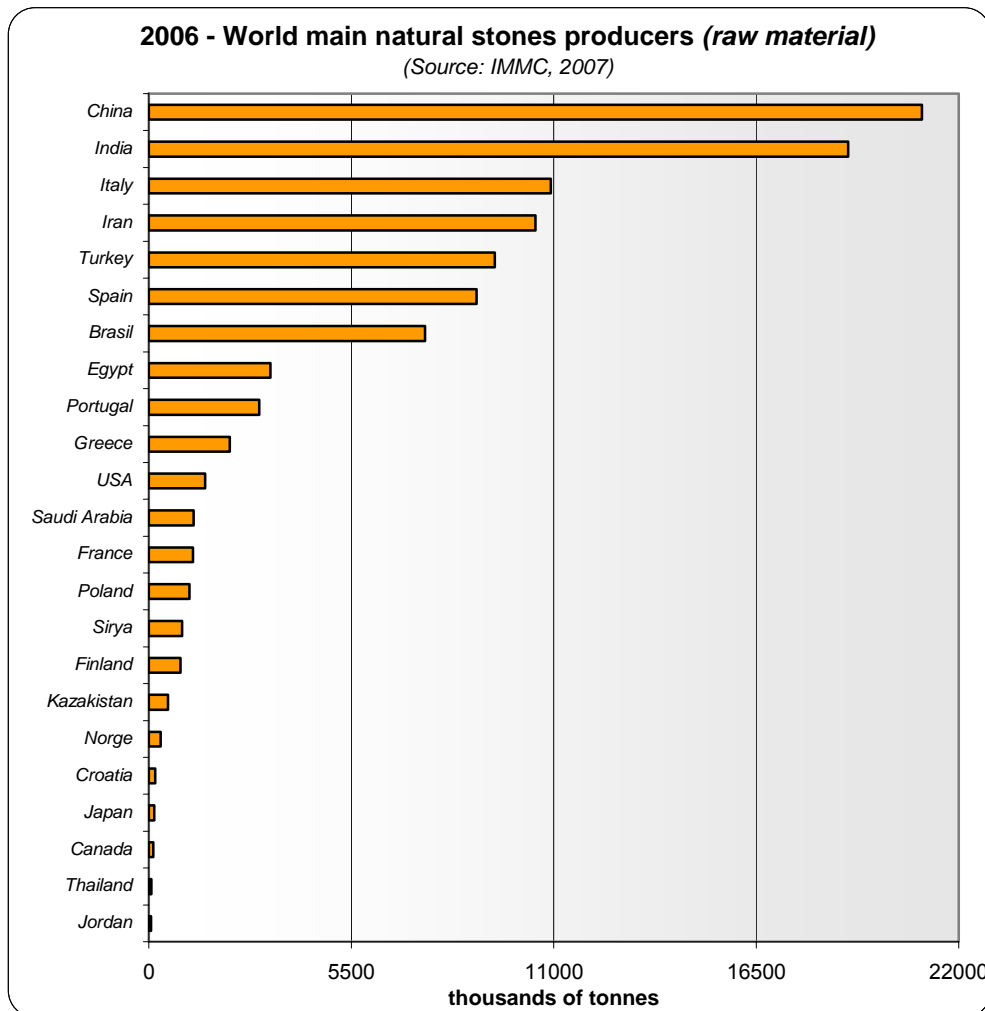
<sup>2</sup> LCE has already carried out two projects regarding the HFC sector: the first, as technical partner of APAT to develop the existing HFC Eco-label criteria; the latter, to develop a market strategy for the diffusion of Eco-labeled HFCs in Italy.

### Natural stones (CEN TC 246)

Consistently with the CEN and the Decision 2002/272/EC definitions, a natural stone is a piece of naturally occurring rock. The products considered in the market analysis are blocks and slabs, and they mainly come from white and coloured marbles, travertine, alabaster, slates, breccias, granite, diorite and gneiss.

The natural stones constitute a market sector in which there are a variety of product types, therefore different statistic sources can have different values. In fact, irrespective of the methodology adopted by different data sources, the main differences seem to derive from the cataloguing of current materials, to be used for structural use, together with marble and stone.

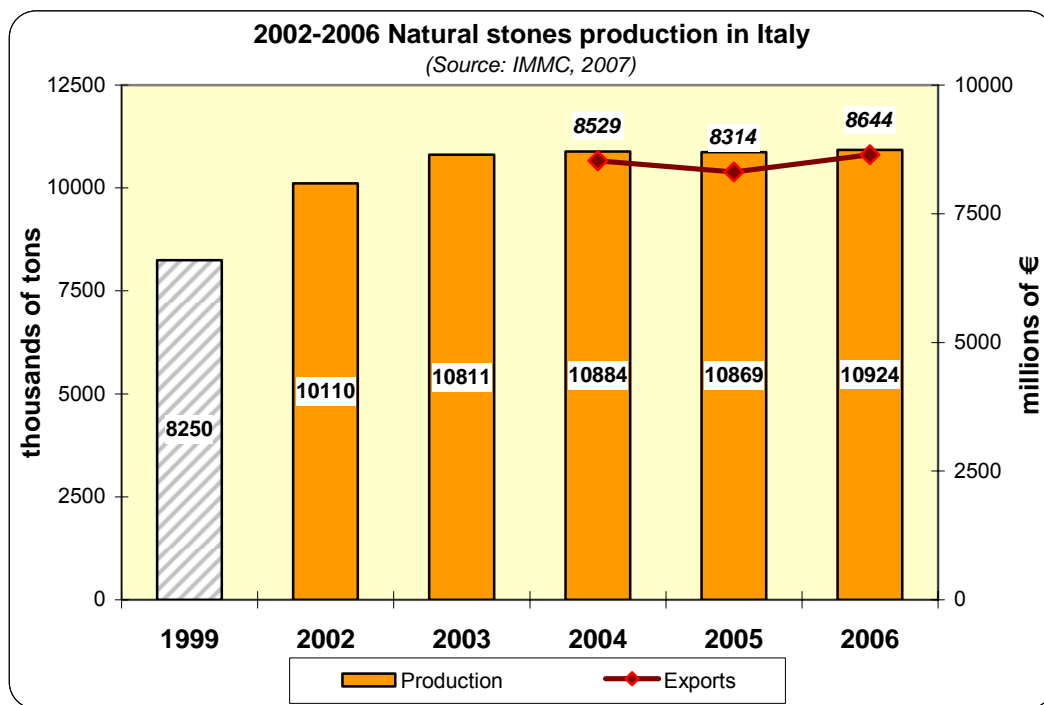
Figure 2.2 shows the main natural stones manufacturers worldwide. Within the first five producers, only one is a European Country (Italy was the third natural stones producer worldwide in 2006). Spain, at sixth place is, also an important EU natural stones manufacturer.



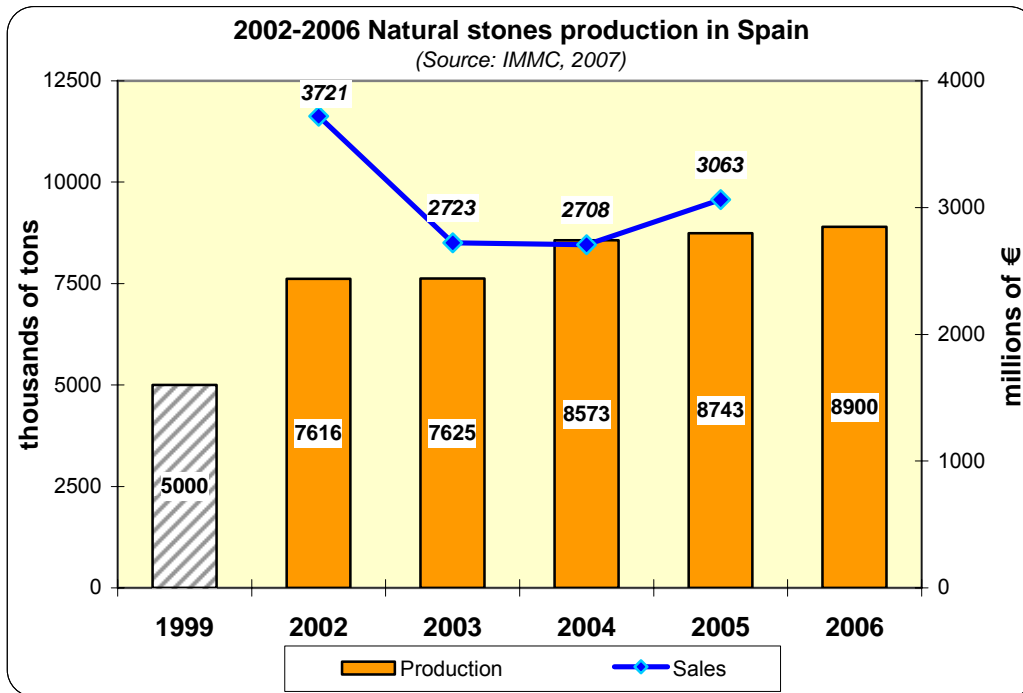
**Figure 2.2** Natural stones producers worldwide. [Source: Internazionale Marmi e Macchine Carrara, 2007 (table. A, pg. 91)]

The total production of natural stones in the European Union Countries (not considering EU new members) shows an increase in 2006 (26,5 million tons) compared with 1999, when it was nearly 21,5 million tons. With regard to the main European producers, Italy increased its production from 8.250 thousand tons in 1999, to about 11 million tons in 2006 (that is about 41% of EU production), while Spain, for the same period, increased from 5 to 8,9 million tons (that represents about 34% of EU production).

The following Figure 2.3 and Figure 2.4 highlight some natural stones production trends in Italy and Spain, the two main European producers. Other official market data are at present not available for the whole EU market. The figures show the comparison between old data (referred to 1999) that was used in the first HFC Ecolabel project and new data (from 2002 to 2006).

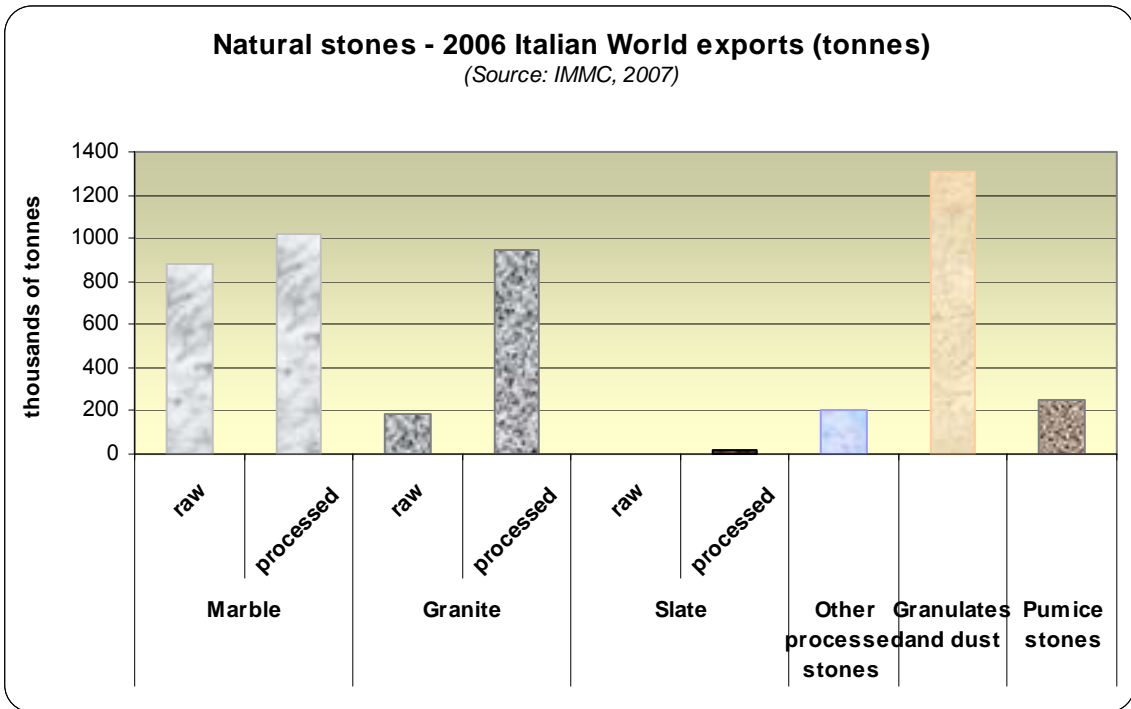


**Figure 2.3** - Natural stones production in Italy [Sources: Internazionale Marmi e Macchine Carrara, 2007 (table. A, pg. 91) and Montani – Stone 2000 World Marketing Handbook for the 1999 data].

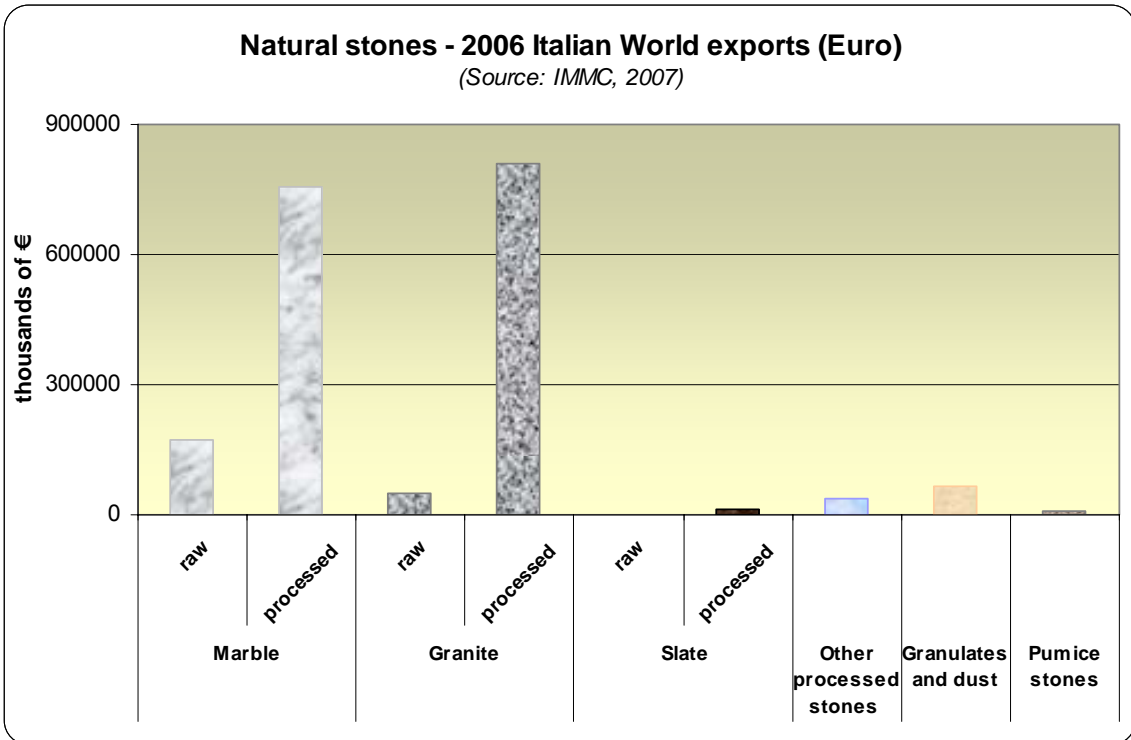


**Figure 2.4** - Natural stones production in Spain [Sources: Internazionale Marmi e Macchine Carrara, 2007 (table A, pg. 91) and Montani – Stone 2000 World Marketing Handbook for the 1999 data].

Figure 2.5 and Figure 2.6 focus on the Italian natural stones export statistics, presented respectively in terms of sold tons and in value. Marble and granite are the most exported natural stones, specially after some processing.



**Figure 2.5** - Italian natural stones exports worldwide; data in metric tons [Source: Internazionale Marmi e Macchine Carrara, 2007 (table 1, pg. 104)].



**Figure 2.6** - Italian natural stones exports worldwide; data in € [Source: Internazionale Marmi e Macchine Carrara, 2007 (table 1, pg. 104)].



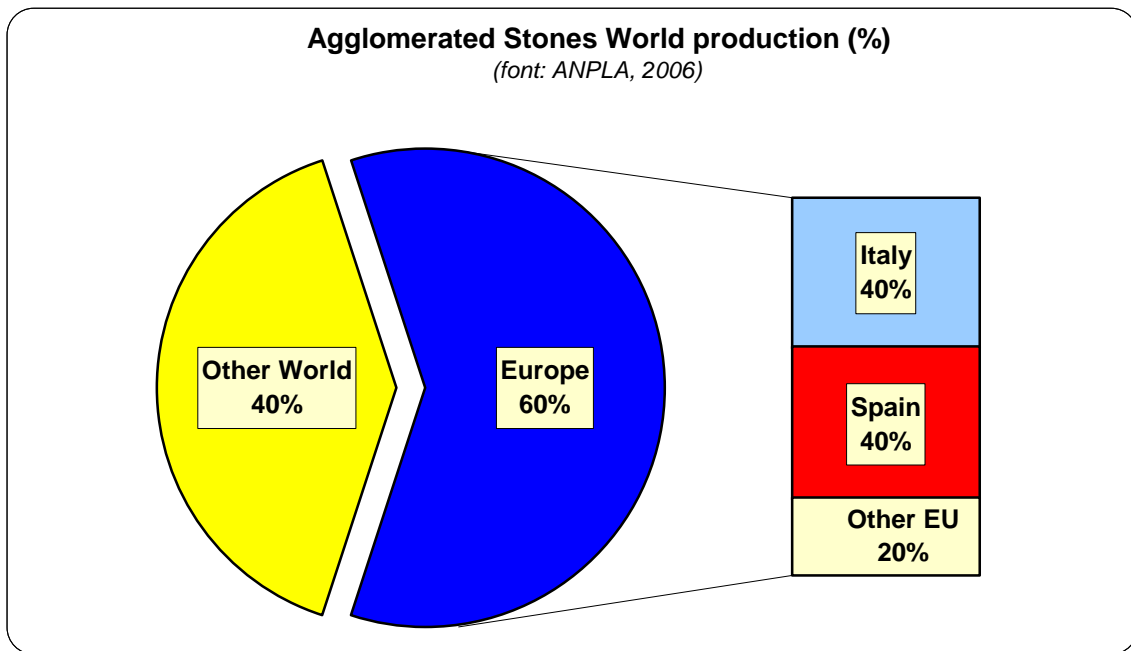
### Agglomerated Stones (CEN TC 246/229)

Agglomerated stones are industrial products manufactured from a mixture of aggregates, mainly coming from marble or granite grit, and a minimal amount of unsaturated polyester resin as binder. A European Association does not exist for the agglomerated stones sector; thus, official market data are not available at European level.

Nowadays the worldwide sold production of agglomerated stones is of about **25 Mm<sup>2</sup>**. The most important producers, at a global level, are Italy (25%) and Spain (25%).

At **European level** it is possible to estimate about **15 Mm<sup>2</sup>** of sold production, of which 50% is sold on the internal market, and 50% is exported outside the EU (data provided by the Italian Association of Agglomerated Stones Producers - ANPLA). Figure 2.7 summarizes these estimations.

Considering an average specific weight of 2,42 kg/dm<sup>3</sup> and a medium tile thickness of 20 mm, the weight of a m<sup>2</sup> of agglomerated stones amounts nearly to 48,4 kg, and the European sold production is estimable in **0,7 Mt**.



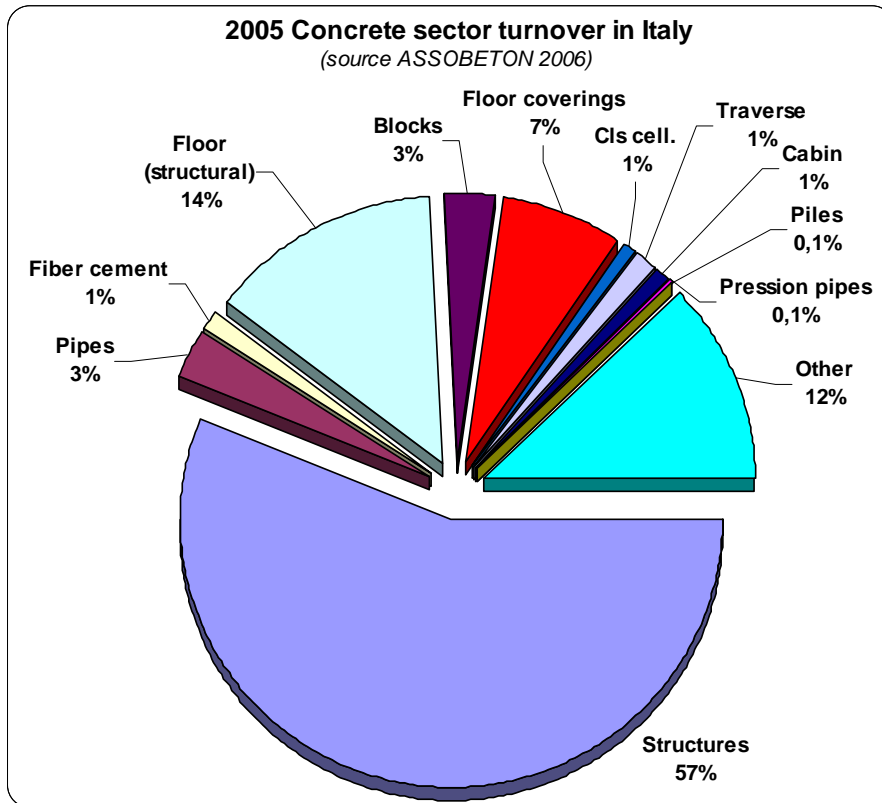
**Figure 2.7** - Estimation of agglomerated stones world and EU production [Source: ANPLA, informal communication to LCE, 2007].

### Concrete Paving Units (CEN TC 178)

Concrete paving units are mainly used for external purposes, and constitute a good alternative to ceramic tiles and to asphalt surfaces. A concrete paving unit is defined as a product for outer floor-coverings obtained by mixing sands, gravel, cement, inorganic pigments and additives, and vibro-compression.

The market data research for this review did not give positive results, the market data was also absent for analysis conducted in 2001 during the establishment of the criteria. At present no official EU market data are still available.

Some Italian national statistics from ASSOBETON<sup>3</sup> (Figure 2.8) refer to the relevance of the concrete paving units sector within the whole concrete internal sector.



**Figure 2.8** - Relevance of the Italian concrete paving unit sector, compared with other concrete uses [Source: ASSOBETON, 2006]

<sup>3</sup> ASSOBETON is the Italian concrete manufacturers association.

## **Terrazzo Tiles (CEN TC 229)**

This product family includes all the hard floor products, which are constituted by a binder and a grit. The binder is made of cement and the grit is normally composed by natural stones machining refuses.

It is quite difficult to trace the market situation of terrazzo tiles because statistical data are not available at European level. The market data research for this review did not give positive results, the market data was also absent for analysis conducted in 2001 during the establishment of the criteria. .

As far as it was possible to understand, the manufacturing technology is quite simple and the overall situation is characterized by many small producers whose specific market influence is not registered.

## Ceramic Tiles (CEN TC 67)

Ceramic tiles are, from an economic point of view, the most important product group within HFCs. This sector of the ceramics industry continues to be highly competitive internationally, with strong production concentrations in Italy (mainly in the Sassuolo area) and Spain (Castellon, industrial districts). Other sizeable activities are located in Portugal, Germany and France.

An important technological trend for ceramic tiles production refers to the possible alternative uses of these products. At the moment, there is no difference between wall and floor tiles production, both from a technological (the production methods are the same) and from an economic point of view (also market data are aggregated).

Thus, the information presented hereafter refers to the whole ceramic tiles sector, both for wall and floor coverings.

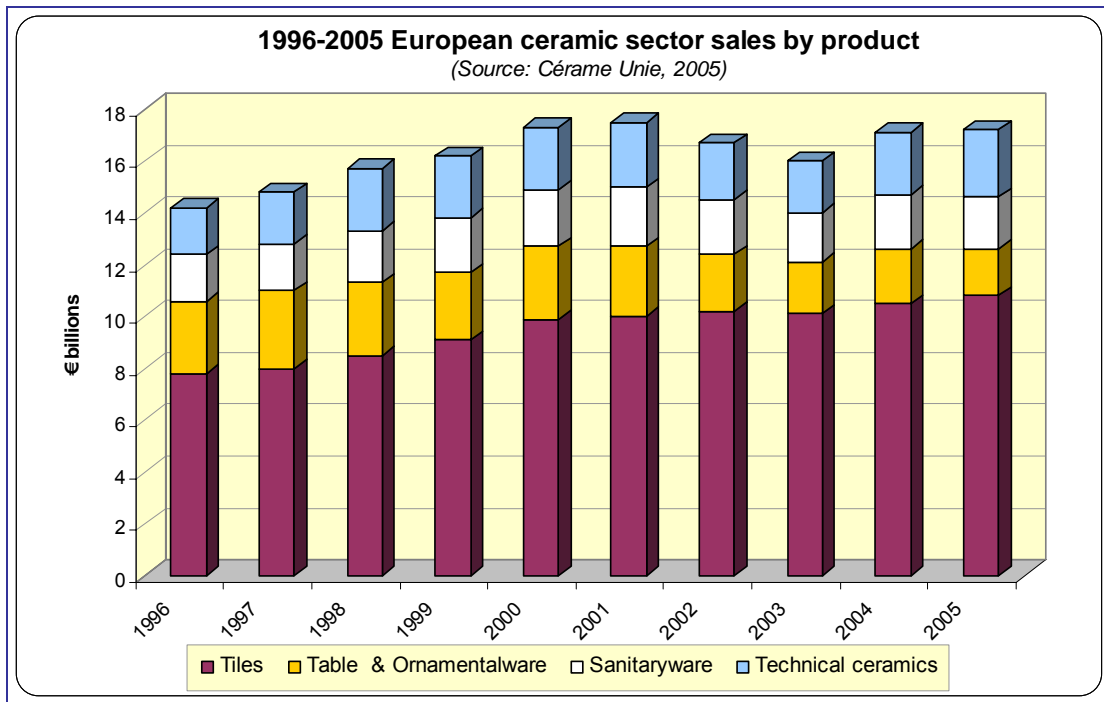
The European ceramics industry records **total sales of around €26 billion and employs 222.000 people**. Within the ceramic sector, wall and floor-tiles sales total over €10 billion, with around 70.000 employees. [Source: Cérame Unie, 2005].

Wall and floor ceramic tiles are, thus, the most important products of the whole sector, as reported in Table 2.1.

**Table 2.1** - European ceramic sector in 2003 [Source: Cérame Unie, 2005].

Sector	Sales (x bln Euro)	Manpower (x 1000)
Wall/floortiles	10,1	69
Bricks & rooftiles	6,8	50
Table/ornamentalware	2,0	48
Refractories	3,1	18
Sanitaryware	1,9	25
Technical ceramics	2,0	9
Clay pipes	0,3	3
<b>Total</b>	<b>26,2</b>	<b>222</b>

These data are confirmed also by the production trend reported in Figure 2.9. The EU ceramic market is dominated by wall and floor tiles production, which represents more than 50% of the annual industry turnover for the last 10 years. The 2005 data highlights that €10,8 billion of the € 17,2 billion annual turnover are generated by ceramic tiles production.

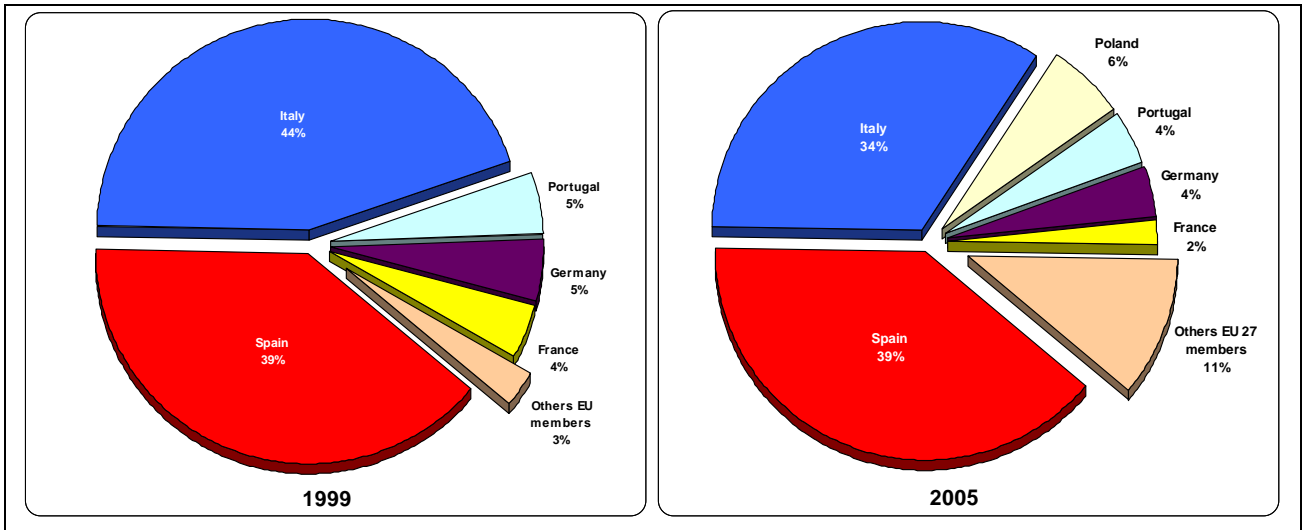


**Figure 2.9** - Ceramic sales by product in European Union Countries [Source: Cérame Unie, 2005]

The southern European countries are, together with Germany, the most important markets for both wall and floor tiles (Figure 2.10). Tiles are used not only in new buildings and construction; but also in maintenance and renovation which is also an important market. New applications are the use of tiles for façades of offices, swimming pools, public areas, etc.

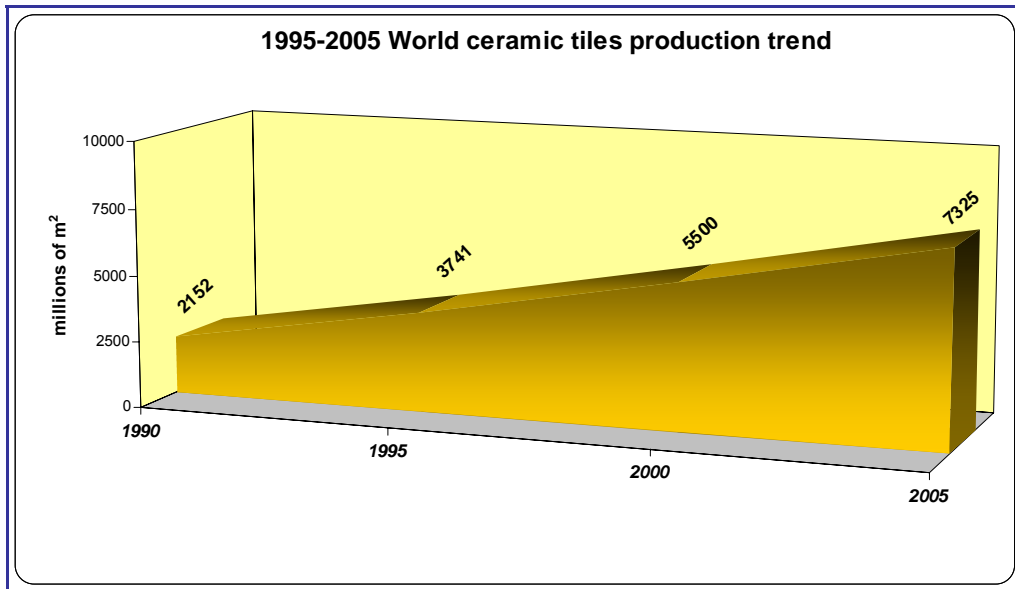
The total sold production quantity of the ceramic tiles in the European Union Countries in 1998 was nearly 1.300 million m<sup>2</sup> (ASSOPIASTRELLE, 1999) which corresponded to a value of about 7.835 million of € (EUROSTAT data). The 2006 statistics, comprehensive of new EU members, speaks about **1.630 million m<sup>2</sup>** (ASSOPIASTRELLE, 2006), that, considering a medium weight of 19 kg/m<sup>2</sup> amounts nearly to **31 million tonnes**, for a market value of about € 11.000 million (Cérame Unie, 2005).

In 1999 Italy was the first European producer, now instead the main manufacturer in EU countries is Spain (Figure 2.10).



**Figure 2.10** - EU ceramic tiles production trends by surface (m<sup>2</sup>) : situation in 1999 [Source: ASSOPIASTRELLE, 1999] and in 2005 [Source: ASSOPIASTRELLE, 2006 (Data elaborated by LCE, data from annex)].

At a global level, the production trends are increasing, as displayed in Figure 2.11.



**Figure 2.11** - World ceramic tiles production trend [Source: ASSOPIASTRELLE, 2006 (annex, pag. 5)]

Italy and Spain maintain their relevant positions also worldwide, but they have been overtaken by China, as highlighted in Figure 2.12.

Spanish production has grown from the 508 Mm<sup>2</sup> in 1999 (ASSOPIASTRELLE, 1999), to the present 656 Mm<sup>2</sup> (ASSOPIASTRELLE, 2006), becoming the first EU producer, followed by Italy, that has not significantly increased its production from 1999.

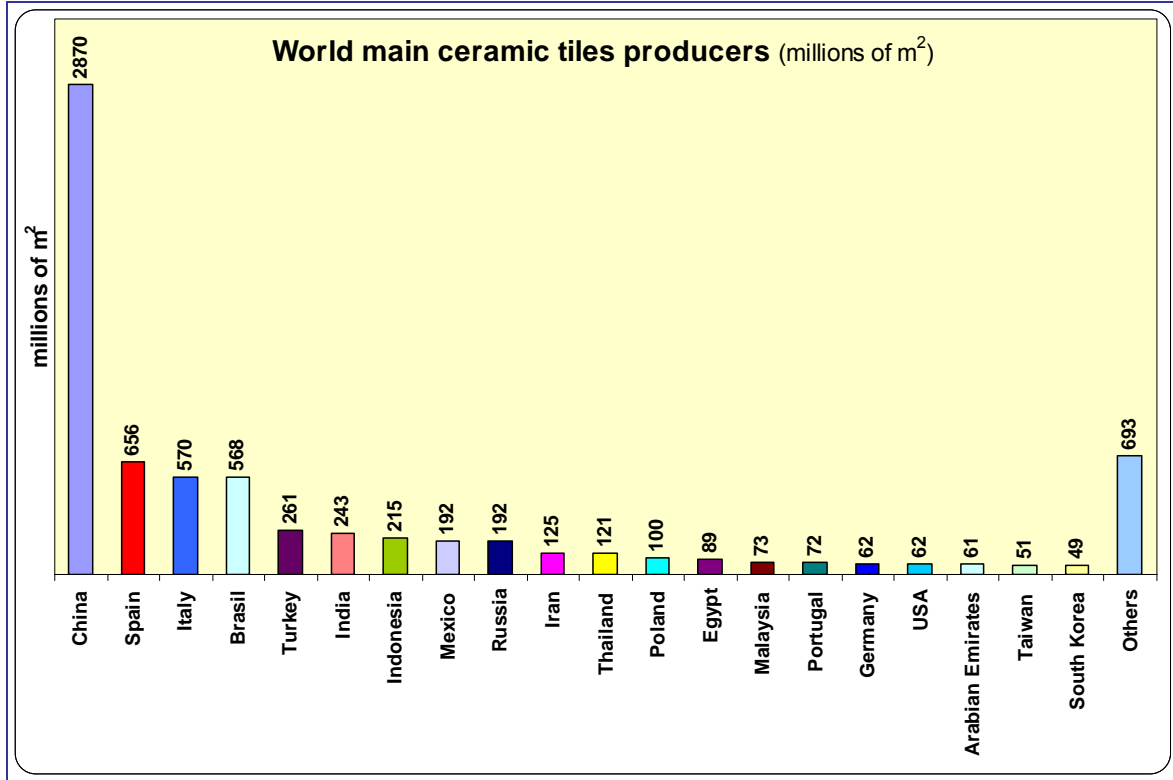


Figure 2.12 - World ceramic tiles producers [Source: Assopiastrelle, 2006 (annex, pag. 5)].

The strong Chinese increase, compared to the Italian and Spanish steady situation, can be better appreciated in Figure 2.13, showing the production trends from 1990 to 2005.

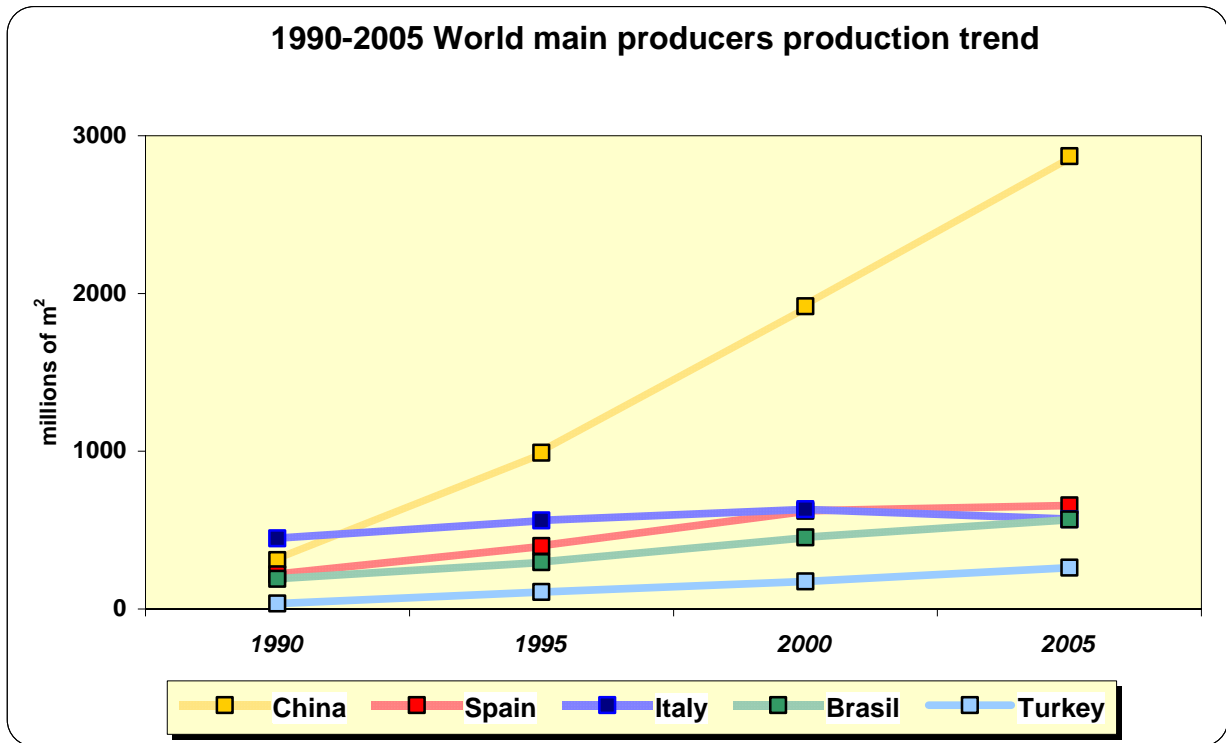


Figure 2.13 - World production trend from 1990 to 2005 [Source: Assopiastrelle, 2006 (annex, pg. 5)].

With regard to external trading, a quarter of the EU production is exported to third world countries; imports remain at a much lower level.

An important aspect to be underlined is that, while the EU production is intended both for internal sales and for exports, the Chinese one is aimed mainly at internal market, as displayed in Figure 2.14. However, the previsions for 2008, reported in Figure 2.15, show how the Chinese manufacturers are ready to approach also external markets.



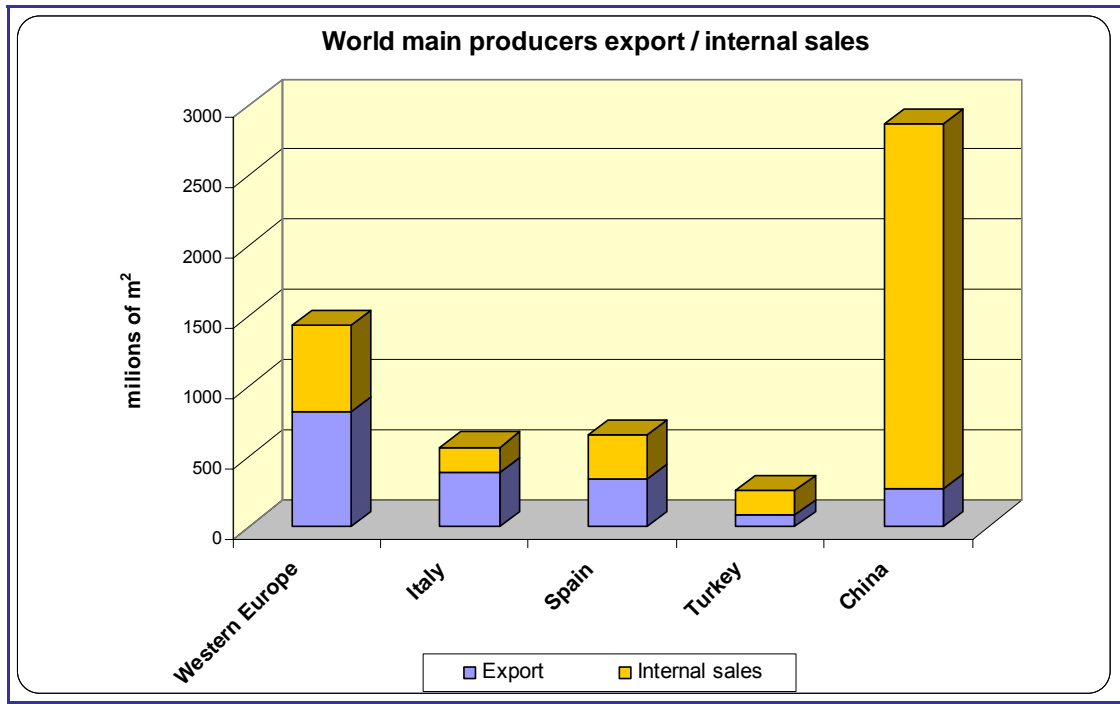


Figure 2.14 - World main producers export [Source: Assopiastrelle, 2006 (Data elaborated by LCE, data from annex)]

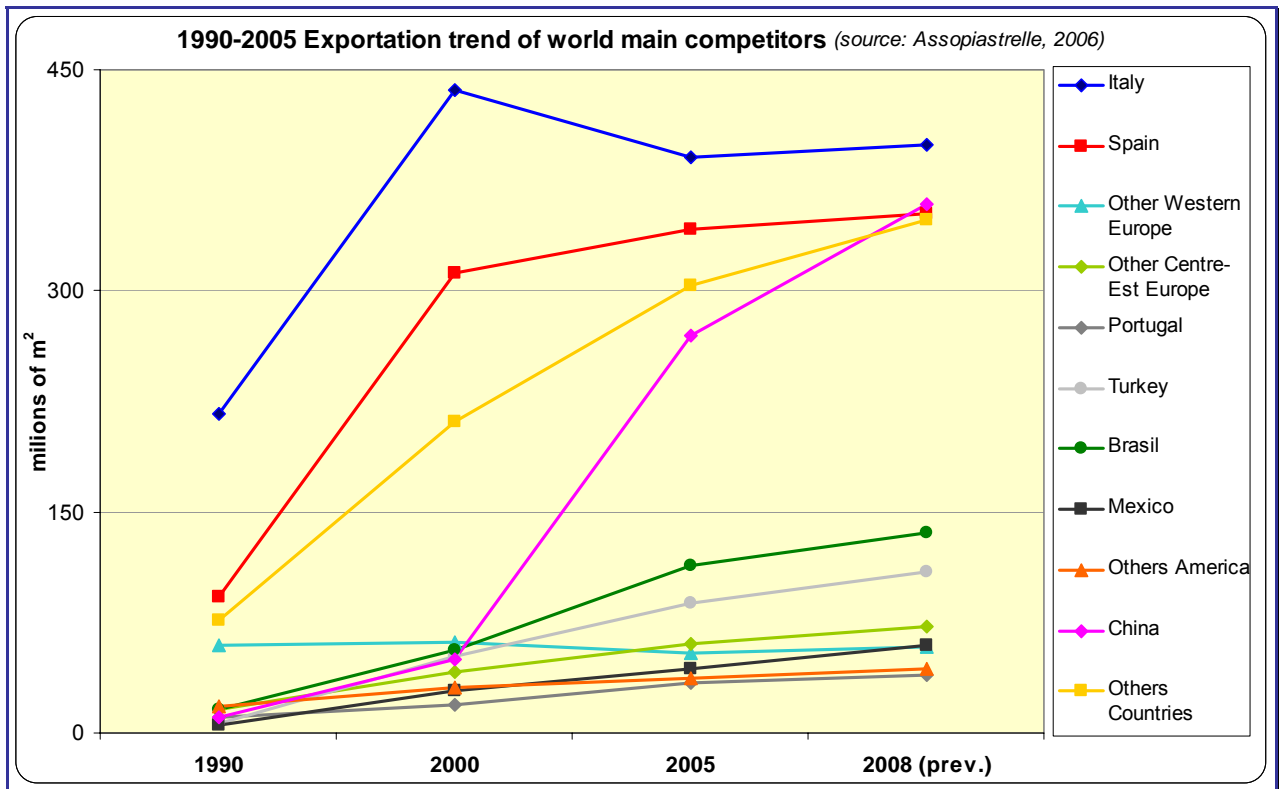


Figure 2.15 - World exports of the main ceramic tiles producers: trends and previsions to 2008. [Source: Assopiastrelle, 2006 (tab. 2.1.1, pg. 91)].

The following Figure 2.16 and Figure 2.17 focus on the production trends of the two major EU manufacturers, Italy and Spain, displaying data about the quantities and types of tiles produced (data refer to 2004).

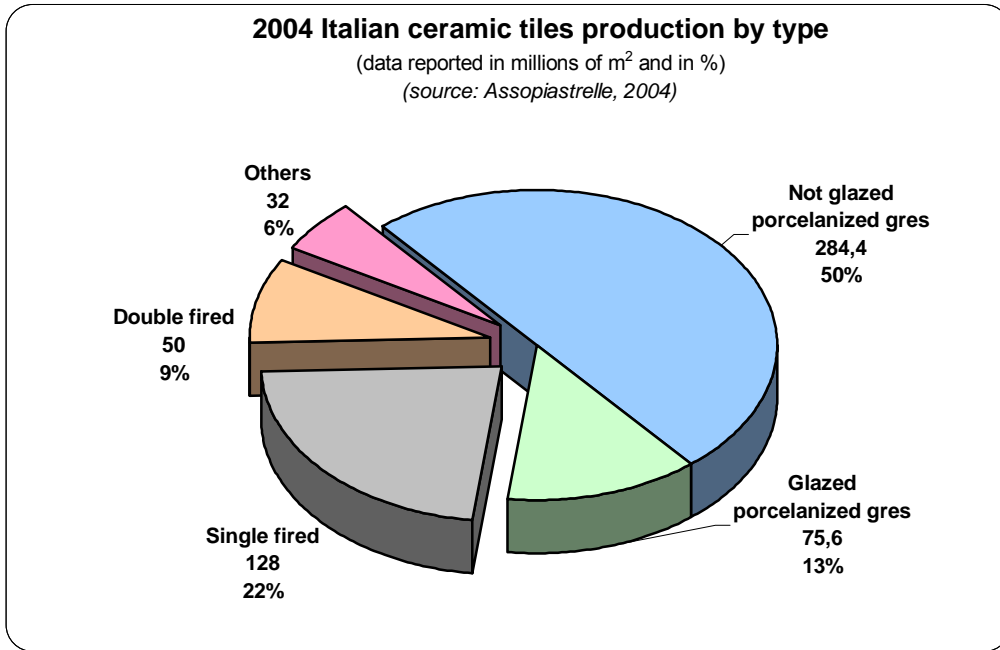


Figure 2.16 - Italian ceramic tiles production in 2004 [Source: Assopiastrelle, 2005 (statistical annex)].

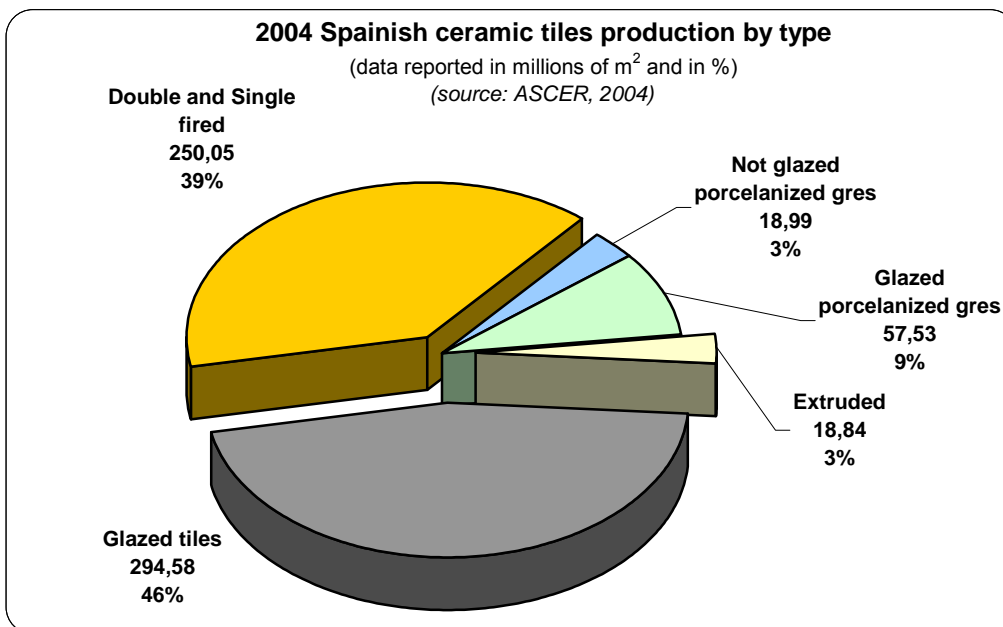


Figure 2.17 - Spanish ceramic tiles production in 2004 [Source: ASCER, 2004 (table 5, pg.4)].

## Clay Tiles (CEN TC 178)

Clay tiles are clay-fired products for hard floor coverings. The CEN definition, as well as the one provided by the Decision 2002/272/EC, refers to clay tiles as units that satisfy certain shape and dimensional requirements, used for the surface course of pavements and manufactured predominantly from clay or other materials, with or without any additions.

The market data available at EU level refer to the whole clay bricks and tiles sector (thus comprising floor tiles, facing bricks and structural construction bricks, as relining bricks, paving bricks, hollow bricks, light brick, but excluding refractory ones). This information is reported in Figure 2.18.

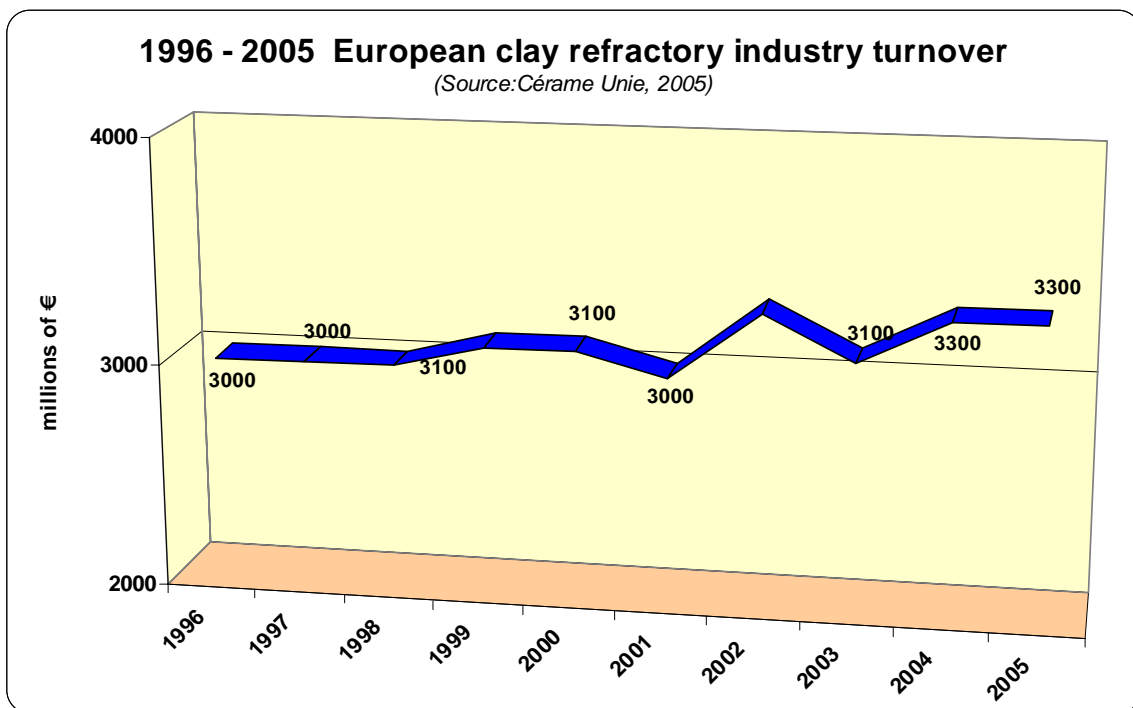


Figure 2.18 - Turnover of the EU clay bricks and tiles industry [Source: Cérame Unie, 2005]

From market data acquired from official sources<sup>4</sup> it emerges that the manufacture of products classifiable under the denomination “Refractory bricks, blocks, tiles and similar refractory ceramic constructional goods [...]”, and, then, not only for flooring purposes, amounts nearly to **2,5 Mt**.

Some additional market data, supplied by ANDIL, the Italian Association of clay manufacturers, show the relevance of clay tiles manufacturing compared with other clay products.

As displayed in Figure 2.19, clay tiles manufacturing is a niche sector within the whole clay bricks and tiles industry.

<sup>4</sup> Data used are taken from the EUROSTAT “Statistics on the production of manufactured goods Volume ANNUAL 2006”, published in the 2007. These statistics refer to PRODCOM categories.

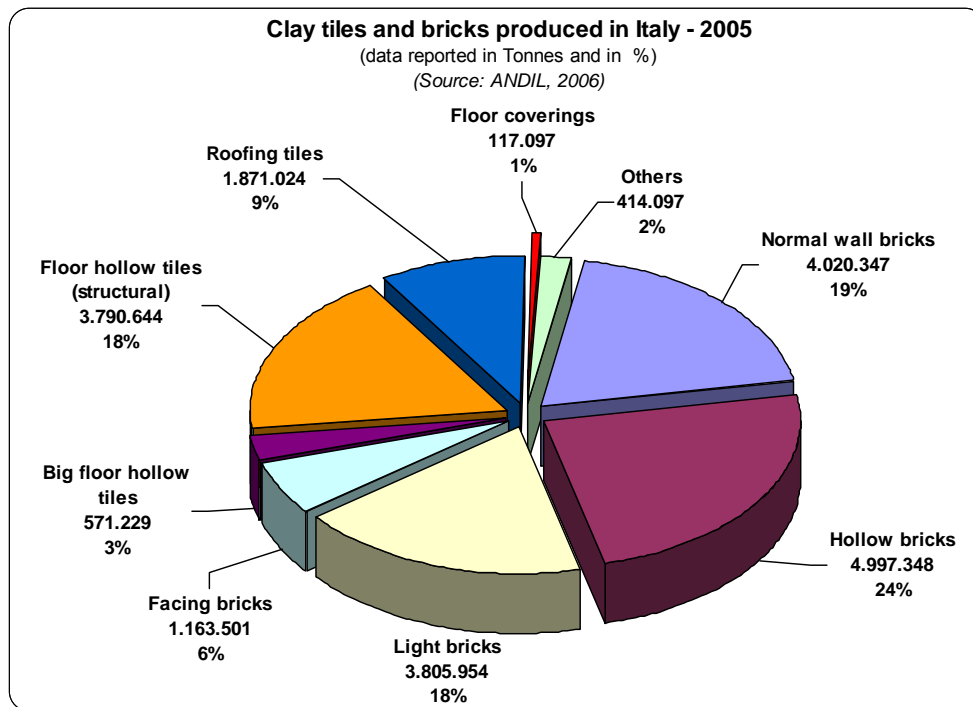


Figure 2.19 - Italian clay bricks and tiles industry [Source: ANDIL, 2006 (pag.307)]

### Summary of the market analysis for HFC group

Below is a table providing an overview of the results acquired through the market analysis carried out on HFC groups (Table 2.2).

Table 2.2 – HFCs European production [Data elaborated by LCE].

HFC Product Family	European production			
	M tonnes	Mm <sup>2</sup>	M €	Notes
<b>Natural Stones</b>	25,5 Mt	*	-	<i>*Not quantifiable, since the uses and the range of products can be various and different in shape and thickness</i>
<b>Agglomerated Stones</b>	0,7 Mt	15 Mm <sup>2</sup>	-	
<b>Concrete Paving Units</b>	-	-	-	<i>No official data available</i>
<b>Terrazzo Tiles</b>	-	-	-	<i>No official data available</i>
<b>Ceramic Tiles</b>	31 Mt	1.630 Mm <sup>2</sup>	11.000	
<b>Clay Tiles</b>	2,5 Mt	-	3.300	<i>Data referred to the whole refractory sector, not only for flooring purposes</i>

## Market information about Ecolabelled HFCs and final comments

The Ecolabel certification scheme is not so diffused in the hard floor coverings sector. The first version of the criteria was approved in 2002. Since then, only seven manufacturers have obtained the label (Table 2.3)

**Table 2.3** - European Ecolabelled HFC manufacturers.

Company	Country	Awarded in
<b>Ceramicas Diago SA</b>	Spain	2003
<b>Gruppo Concorde</b> (Ceramiche Atlas Concorde, Ceramiche Caesar, Ceramiche Refin, Ceramiche Atlas Concorde Keope, Ceramiche Novoceram, Mirage granito Ceramiche, Supergres ceramiche, Fap ceramiche, Ceramiche Marca Corona)	Italy	2004
<b>Marazzi Ceramiche S.p.a</b>	Italy	2004
<b>Ceramicas del Foix SA</b>	Spain	2005
<b>Iris Ceramica S.p.a</b>	Italy	2006
<b>Gruppo Florim Ceramiche S.p.a</b>	Italy	2006
<b>Rondine S.p.a.</b>	Italy	2007

Moreover, Table 2.3 shows a high concentration level in HFCs Ecolabelling, considering both:

- the manufacturers geographical distribution: all the manufacturers are from Spain or Italy;
- the Ecolabelled product group: only ceramic tiles have been awarded with EU Ecolabel;
- the Ecolabel product group: no EU Ecolabel has been awarded for natural stones and other processed products.

These considerations are strictly related to the fundamentals of the EU hard floor coverings market. The most important HFC sub-sector is the ceramic tiles industry. It is a straightforward conclusion that some European ceramic tiles manufacturers try to differentiate their products by means of an Ecolabel, recognized within the whole EU. Moreover, it is also consistent with this situation that the Ecolabelled manufacturers are all Spanish or Italian companies, as these two countries are the major ceramic tiles manufacturers, representing together more than 70% of the total European ceramic tiles production.

From the market analysis it emerges that the total production of the five Italian Ecolabelled manufacturers represents 28,6% (130 Mm<sup>2</sup>) of the total national production, and that the amount of Ecolabelled products sold is estimated to be 10% of total sales nationally (Source: ASSOPIASTRELLE, informal communication to LCE, 2007).

Furthermore, there are also two ceramic tiles producers awarded with the EU Ecolabel scheme, for which no data are available.

**ASCER** pointed out that one of the two awarded EU Ecolabel Spanish companies is no longer part of the EU Ecolabel scheme and the share market of the awarded company is very low ( approx. . 0,0001%) (ASCER, 1<sup>st</sup> AHWG meeting 28/09/2007).

The rest of the HFC product groups seem not to be very interested in the EU Ecolabel. This may be due to a low potential of market interest. A survey that has been conducted throughout some manufacturers associations shows that:

- for the natural stones sector, mandatory requirements in terms of safety and environmental recovery are stringent and seen by manufacturers as the first goal to be achieved; the culture of environmental claims and labels is not so diffused in this sector;
- for the other processed products (clay tiles, agglomerated stones in particular), the requests of environmental labels usually arrive from overseas markets (especially North America and Australia), so the use of the EU flower appears to be unsuitable for such applications. Nevertheless, these sectors may be the next group of applicants when green marketing needs will become more stringent in Europe.

In any case, a push from the “green purchasers” market (GPP) is coming to make HFC manufacturers aware of the potential of environmental claims by means of ISO 14020 Type I labels.

### 3. EU legislation analysis: regulatory improvements for the floor coverings sector

The first version of HFC Ecolabel criteria was adopted in 2002. Since the significant EU legislation referred to the HFC sector could have been improved (as well as the Member States regulations); a readjustment of the criteria may be therefore needed both to assure the consistency with the legislation and to guarantee that the criteria go beyond the legislation.

#### Regulatory improvements related to raw materials selection

The EU legislation forbids the use of asbestos in the production of goods.

The Directive CEE/CEE/EC n°769 of 27/07/1976 (and its updating) and the Directive CEE/CEE/EC n° 659 of 03/12/1991 forbid the use of some hazardous substances, among which asbestos, within goods production processes, as well as their introduction on the EU market.

Thus, the criterion set out by the Decision 272/2002/EC, requiring the *non use* of asbestos in raw materials selection, may be considered redundant, and thus could be deleted.

#### Air emission test methods update

The Decision 2002/272/EC requires that air emissions of some parameters, generated during the production processes, shall not exceed some hurdle values indicated in the Decision.

The Decision also specifies that *“the applicant shall provide appropriate documentation and test reports for each emission parameter [...] following the indications of the Technical Appendix — A5. Where no testing method is specified, or is mentioned as being for use in verification or monitoring, competent bodies should rely, as appropriate, on declarations and documentation provided by the applicant and/or independent verifications”*.

A survey on air emissions test methods has been started in co-operation with “Centro Ceramico” of Bologna (CCB), an Italian research & laboratory institute for the ceramic tiles sector as well as with ASCER, the institution which supports the Spanish ceramic tile sector. The proposed updated test methods for air emissions criteria are shown in Table 3.1. The Table also specifies the HFC product groups concerned with this criterion. As indicated in the table no test method has been set for the styrene parameter within this Decision.

**Table 3.1** - The updated set of test methods for criteria 4.3 (air emissions) proposal.

Parameters	Existing Hurdle mg/m <sup>2</sup>	Product group	Test Method Dec. 2002/272/EC	Updated Test Method proposal CEN/ISO
<b>Particulate matter</b> (Dust)	300	Agglomerated stones	ISO 9096	EN 13284-1 ISO 9096
	200	Ceramic Tiles		
	250	Clay Tiles		
	300	Terrazzo and Concrete		
<b>Fluorides</b> (as HF)	200	Ceramic Tiles	ISO/CD 15713	ISO 15713
	200	Clay Tiles		
<b>Nitrogen oxides</b> (as NO <sub>x</sub> )	1.200	Agglomerated Stones	ISO 11564	EN 14792
	2.500	Ceramic Tiles		
	3.000	Clay Tiles		
	2.000	Terrazzo and Concrete		
<b>Sulphur dioxides</b> (SO <sub>2</sub> )	850	Agglomerated Stones	ISO 7935	EN 14791
	1.500	Ceramic Tiles		
	2.000	Clay Tiles		
	1.500	Terrazzo and Concrete		
<b>Styrene</b>	2.000	Agglomerated Stones	-	-

Two standards can be considered as the existing test methods for the *Particulate hurdle matter*: the **ISO 9096** and the **EN 13284-1**: The first one, ISO 9096, is specifically addressed for “High Concentration Air Emissions”, between 20 and 1000 mg/Nm<sup>3</sup>. On the other hand, even if the method can be used also for higher concentration emission values, without reducing the precision of the method, the EN 13284-1 standard deals with test methods for the “Low Concentration Air Emissions”, lower than 50 mg/Nm<sup>3</sup> and, in particular, near to 5 mg/ Nm<sup>3</sup>.

The emission values required for the Ecolabel scheme are in the range of 200 – 300 mg/m<sup>2</sup>, corresponding, for the ceramic tiles, nearly to 3 – 5 mg/Nm<sup>3</sup> (Source: CCB; see also Tables 3.3 and 3.4), however this is far from the lower sensitivity limit of the ISO 9096: 2003 (i.e.: 20 mg/Nm<sup>3</sup>). Due to the above considerations it appears that the most appropriate standard for determining the concentration of particulate matter seems to be the **EN 13284-1**.

Furthermore, the correct denomination in the test method is dust instead of particulate matter.

For *Fluorides* parameter **ISO** standard **15713** is the only existing method, since no CEN methods are yet available.

### Evaluation of legislation and reference documents for existing hurdles validity

A check on existing legislation and reference documents, such as BREF, has started to look for variations on limits on emissions that are requested at local/regional level.



The values reported on the EU Ecolabel criteria could be discussed and compared with updated limits that are in force in Europe.

### ***Air emissions***

Table 3.2 focuses on regulatory limits for air emissions for ceramic tiles manufacturing: these limits are, in most cases, the same as those used in 2001-2002 as a reference for the existing values (for this reason, the Societ  Francaise de Ceramique is still used as main reference). However, since the Spanish and the Italian regulations have been improved, a new detailed analysis to compare existing Ecolabel hurdles with legislation limits has been carried out.

The ceramic tiles sector is included in the scope of IPPC Directive, so that the air emissions limits have to be defined by the single Competent Authorities in charge in each EU Member State.

The emission limits can vary within different areas and ceramic districts; an example is shown in Table 3.2, where the values imposed by the *Provincia di Ravenna* on an Italian producer to comply with the IPPC Directive are reported. It can be noticed that:

- the emission limits connected with the IPPC directive normally are more restrictive than the national law limits;
- in any case the values are strictly related to the limits indicated in the BREF document (Table 3.3).

**Table 3.2** - National legislation limits and industry recommendation on gaseous emissions for ceramic tiles manufacturing (provisional values). Note that the Ecolabel existing hurdles are defined in terms of mg of emissions per m<sup>2</sup> of ceramic tiles produced [sources: ASCER for Spanish limits, the Italian unique legislation text for environment for the Italian limits, Societ  Francaise de Ceramique for other limits].

Country		Particulate <sup>a</sup> (mg/Nm <sup>3</sup> )	SO <sub>x</sub> (mg/Nm <sup>3</sup> )	NO <sub>x</sub> (mg/Nm <sup>3</sup> )	HCl (mg/Nm <sup>3</sup> )	HF (mg/Nm <sup>3</sup> )	CO (mg/Nm <sup>3</sup> )
Belgium		(F > 0,5) 50 (F < 0,5) 150	500	500	30	5	100
France		(F > 0,5) 50 (F < 0,5) 150	500	500	50	5	-
Germany		50	500 <sup>b</sup> –1500	500	30	5	-
Greece		100	350	-	-	80	-
Italy	Law limits <sup>5</sup>	Spray drying 75	Kilns 1500	Kilns 1500	-	Kilns 10	
	IPPC <sup>6</sup> (example)	Kilns 5	Kilns 250	Kilns 120	-	Kilns 4	-
Netherlands		10	200	200	30	5	-
Portugal		150	1500	-	-	50	-
Spain <sup>7</sup>		Kilns 30	Kilns 200	Kilns 250	-	Kilns 10	-
United Kingdom		50	1500	-	30	5	200

<sup>a</sup> F= emission factor or maximal flow (kg/h).

<sup>b</sup> Clay sulphur contents < 0,12 %.

It has to be considered that, in many cases, it is not specified if the emission limits indicated in Table 3.2 refer to the entire production cycle or only to a specific production stage. For example: it is not known if particulate limit refers to total emissions or only to a specific phase of the cycle (except for Italy and Spain); many limits are generic and not directly applicable to a specific sector. Some indications provided by the **BREF** document for Ceramic Manufacturing Industry<sup>8</sup> highlight the current average emissions trends experienced by the ceramic tiles industry. Moreover, the Best Available Techniques (**BAT**, Cap. 5 of BREF doc) could be used as additional reference values to

<sup>5</sup> Source: *D.Lgs. n° 152 del 03/04/2006*.

<sup>6</sup> Source: *Provvedimento n°518 del 08/08/2007, Provincia di Ravenna*.

<sup>7</sup> Source: ASCER; emissions limits issued by the Spanish Competent Authority, to comply with the IPPC directive.

<sup>8</sup> European Commission, Reference Document on Best Available Techniques in the Ceramic Manufacturing Industry, Seville, Spain, Dec. 2006.

consider the minimum emissions level that could be obtained using the more efficient techniques available at present (see Table 3.3 for details).

**Table 3.3** - BREF observed current air emissions values and BAT emissions levels. Note that the Ecolabel existing hurdles are defined in terms of mg of emissions per m<sup>2</sup> of ceramic tiles produced [sources are indicated in the footnote as well as in the Appendix].

Reference	Particulate (mg / Nm <sup>3</sup> )	SO <sub>x</sub> (mg / Nm <sup>3</sup> )	NO <sub>x</sub> (mg / Nm <sup>3</sup> )	HCl (mg / Nm <sup>3</sup> )	HF (mg / Nm <sup>3</sup> )	CO (mg / Nm <sup>3</sup> )
BREF <sup>9</sup>	5 (firing stage) – 30	1 -300	5 – 150	20 – 150	5 -60	1 - 15
BAT (units as daily avg value)	Channelled dust : Spray drying 1-50  Glazing 1-10  Kilns 1-5	N.A.	Kilns <250 (<1300 °C) <500 (>1300 °C)	N.A.	1-5	-

The IPPC approach (from which BREFs are derived) aims at defining some indications to be taken into account consistently with some specific characteristics, rather than define a single unspecific mandatory limit. The specific characteristics to be considered are, among the others:

- local factors
- geographic localization
- technical characteristics of the production plant
- local environmental laws.

Thus, the BREFs do not set mandatory limits, but supply some reference information. BREFs limits represent some “standard” emissions levels generated in a “standard” plant.

The BATs indicate the best results reachable with the application of some specific techniques and technologies for the ceramic sector.

In summary, any change to the existing EU Ecolabel hurdles may arrive from technological considerations on process plants. A detailed discussion will be proposed in chapter 4.

In Table 3.4 shows the limits exposed in the previous Table 3.2 and Table 3.3 converted to **mg/m<sup>2</sup>**. At the bottom of the table the existing EU Ecolabel limits are also shown.

As it can be noticed, all the current hurdles values are under the converted law limits for every EU country. In particular, the limits imposed by the Spanish and by the Netherlands regulations (that are the only two that have been substantially improved from 2001) are respected.

<sup>9</sup> Operating data and raw gas values observed in firing stage, reported in Table 3.27 of the BREFs for Ceramic Manufacturing Industry.

**Table 3.4** – Air emission limits converted to mg/m<sup>2</sup> of finished product. Data elaborated by LCE.

Country	Particulate (mg/m <sup>2</sup> )	SO <sub>x</sub> (mg/m <sup>2</sup> )	NO <sub>x</sub> (mg/m <sup>2</sup> )	HCl (mg/m <sup>2</sup> )	HF (mg/m <sup>2</sup> )	CO (mg/m <sup>2</sup> )	
Belgium	2850 8550	28500	28500	1710	285	5700	
France	2850 8550	28500	28500	2850	285	-	
Germany	2850	28500-85500	28500	1710	285	-	
Greece	5700	19950	-	-	4560	-	
Italy	law limits	4275	85500	85500	-	570	-
	IPPC (example)	285	14250	6840	-	228	-
Netherlands	570	11400	11400	1710	285	-	
Portugal	8550	85500	-	-	2850	-	
Spain	1710	11400	14250	-	-	-	
United Kingdom	2850	85500	-	1710	285	11400	
BREF	285 – 1710 (firing stage)	57 -17100	285 – 8550	1140 – 8550	285 -3420	57 – 855	
BAT (units as daily avg value)	Channeled dust : Spray drying 57- 2850 Glazing 57- 570  Kilns 57-285	N.A.	Kilns <14250 (<1300 °C) <28500 (>1300 °C)	N.A.	57-285	-	
<b>Ecolabel existing hurdles (mg/m<sup>2</sup>)</b>	<b>200</b>	<b>1.500 (SO<sub>2</sub>)</b>	<b>2.500</b>	<b>-</b>	<b>200 (F)</b>	<b>-</b>	

The values for particulate and HF deriving from the BAT indicate that the current EU Ecolabel hurdles could be even lowered, while BREF values remain still higher.

Critical points are the hurdles values for SO<sub>x</sub> and NO<sub>x</sub>: also taking into consideration the more restrictive limits (often from the BREF indications), the ranges of respect remain very large. This is one of the reasons for which it is difficult to establish how much the Ecolabel limits are currently restrictive. Nitrogen and sulfur oxides are pollutants not directly associated to the ceramic process, but derived from combustion processes. Generally the levels produced by to the ceramics industry, however, are not so relevant.

Another reason for which it is complex to establish a threshold values for the NO<sub>x</sub> emissions is that NO<sub>x</sub> are not simple to estimate, because they are highly unstable compounds. When the combustion temperature is high and the air volume is low, the NO<sub>x</sub> emissions are greater: as the ceramic processes demands low temperatures and an air excess, these can generally be considered processes with a low NO<sub>x</sub> emission rate.

The SO<sub>x</sub> emissions, instead, are strictly related to the contents in sulphur of both raw materials and fuels used for kilns: the emission rate, therefore, is very variable between plants and different products. It must be considered that the modern ceramic industry uses natural gas as the main fuel, producing the lowest SO<sub>x</sub> emissions.

The EU Ecolabel hurdle of particulate cold emissions for ceramic tiles is 5 mg/m<sup>2</sup>, (page 19 of the Commission Decision official document) but the only specific information about this parameter derives from the BREF and from the BAT, because it is not clear to what type of emissions or production phase the EU countries legislation limits refer to. BREFs indicate a range of about 4 - 9 mg/m<sup>2</sup>, while BATs gives a more restrictive interval of 0,2 – 5,7 mg/m<sup>2</sup>. Also if, in both cases the values are respected, the Ecolabel limit could be lowered.

Finally, according to the new law limits (applied in some EU countries) and to the indications of the existing BREF and BAT, it does not seem necessary for any modification to the current EU Ecolabel limits, but a revision of some specific parameters (particulates and HF) is possible with also the inclusion of new parameters (e.g. CO<sub>2</sub> emissions)

### ***Water emissions***

Table 3.5 reports the existing regulatory water emissions limits in Italy and Spain, as well as some indications reported in the CET recommendation and in the BAT.

Also in this case, these limits are practically still the same of those used in 2001-2002 as a reference for the existing values.

**Table 3.5 - Regulatory limits for water emissions (provisional limits) [sources are indicated in the footnote].**

Parameter	Maximum limit according to					
	Italy (D. Lgs. 152 / 2006)		Spain *	CET** Recommen- dation (mg/l)	BAT (mg/l)	Ecolabel existing hurdles (mg/l)
	Surface water (mg/l)	Public sewers (mg/l)	Public sewers (mg/l)			
COD	160	500	1000	150	-	-
pH	5,5 – 9,15	5,5 – 9,15	5,5 – 9,0	5,5 – 9,5	-	-
Suspended solids	80	200	500	100	50	40
Boron	2	4	3	5	-	-
Lead	0,2	0,3	1	0,5	0,3	0,15
Cadmium	0,02	0,02	0,5	0,1	0,07	0,015
Zinc	0,5	1,0	5	5	2	-
Fluorine			12			-
Fe			5			1,5
Chrome (VI)			0,5			0,15

\*EPSAR (Entitat de Sanejament d'Aigües) - Generalitat Valenciana, 2007 (<http://epsar.cop.gva.es>): valores de concentration media diaria maxima.

\*\*Navarro J.E.E., 1998 – IPPC in the ceramic tile industry. Best Available Techniques (BAT)

## 4. Technical analysis (revision) of existing criteria

This Chapter focuses on HFCs production processes to highlight how the existing criteria have been developed and to open a discussion, justifying the criteria revision, if some technological improvements have occurred since 2002.

### Main environmental aspects linked to HFC

The following Tables 4.1 a and b, summarise the potential environmental impacts that were considered during the HFC criteria development in 2001. This is the starting point for any change to the existing criteria (the discussion was run during the first AHWG Meeting).

**Table 4.1a** - Hard Floor Covering main environmental features [CSERGE, 2000 (table A5, pg. 61)].

Environmental aspects		PROCESSED Products					NATURAL Products
		CERAMIC TILES	AGGLOMERATED STONES	TERRAZZO TILES	CONCRETE PAVING UNITS	CLAY PAVERS	NATURAL STONES
Raw Materials	<u>Composition</u>	Body Mix: Clay; Sand (quartz); Fluxes (recycled, feldspar, limestone).  Glazing: Alumina; Bentonine; Dolomite; Olivine; Quartz; Talc.	Natural stones quarry granule; Unsaturated Polyester Resins; Hydraulic cement; Glass and plastics for aesthetics; Additives.	Natural stones machining refuses; Cement; Sand; Dyes.	Cement; Sand; Gravel; Inorganic pigments; Additives.	Argillaceous material.	Marble; Granite; Others.
	<u>Impacts</u>	Resources depletion; Harmful substances content (F, Pb).	Resources depletion; Harmful content from resin's production; Additives production impacts.	Resources depletion; Cement production impacts.	Resources depletion; Inorganic pigments production impacts; Additives production impacts; Cement Production impacts.	Resources depletion.	Resources depletion.

**Table 4.1b** - Hard Floor Covering main environmental features [CSERGE, 2000].

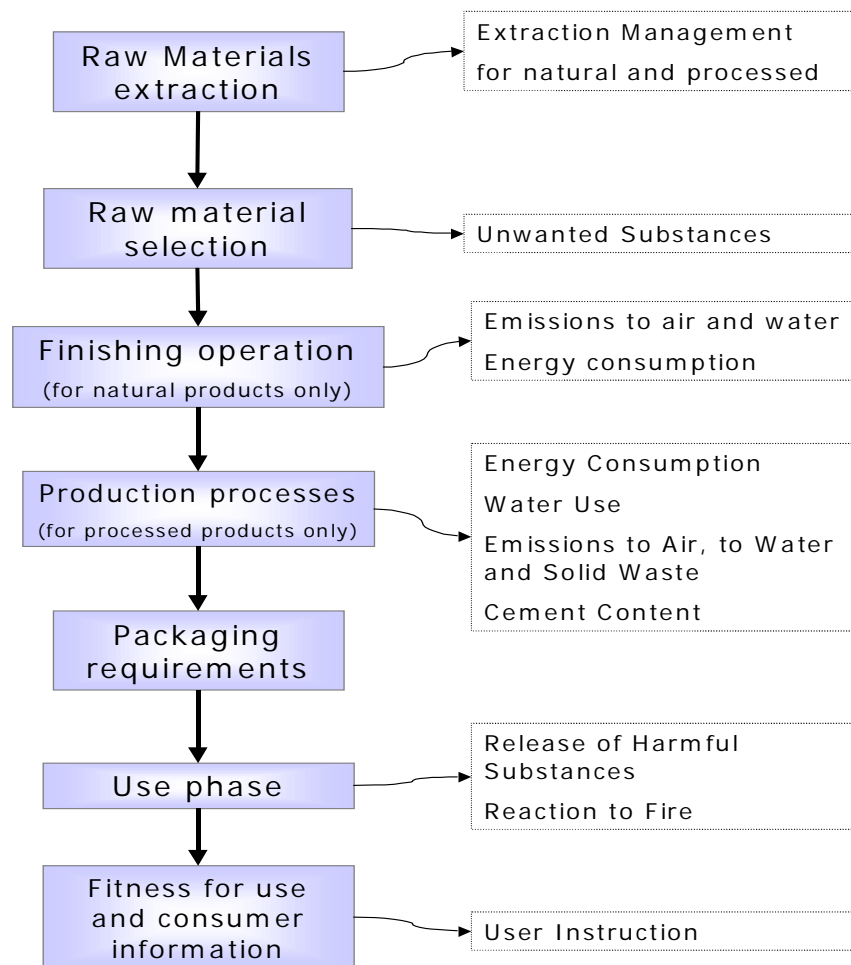
Environmental aspects		PROCESSED Products					NATURAL Products
		CERAMIC TILES	AGGLOMERATED STONES	TERRAZZO TILES	CONCRETE PAVING UNITS	CLAY PAVERS	NATURAL STONES
Energy Use	Production Phases	Milling; Shaping; Drying; Glazing; Firing	Drying; Mixing; Shaping; Cutting.	Mixing; Vibro-compaction shaping.	Mixing; Vibro compression shaping.	Shaping; Drying; Firing.	Quarry operations and cutting machines.
	Impacts	Energy Use	Energy Use	Energy Use	Energy Use	Energy Use	Energy Use
Atmospheric impacts		Air emissions from firing; Air emissions from glazing (depending on the chosen raw material quality).	Air emissions (dust; depending on the chosen raw material quality).	Air emissions (dust).	Air emissions (dust; depending on the chosen raw material quality).	Air emissions (dust).	Air emissions (dust).
Water impacts		Water emissions from process (metals, salts, solids content).	Water emissions from process.	Water emissions from process.	Water emissions from process.	Water emissions from process.	Water emissions from process.
Solid Waste		Process waste; Mineral waste production.	Process waste; Mineral waste production.	Process waste; Mineral waste production.	Process waste; Mineral waste production.	Process waste; Mineral waste production.	Mineral waste production.
Land Use		Habitat destruction from r.m. extraction.	Habitat destruction from r.m. extraction.	Habitat destruction from r.m. extraction.	Habitat destruction from r.m. extraction.	Habitat destruction from r.m. extraction.	Habitat destruction from quarrying.

In general, from the information available and received (comments) up to date, it is possible to say that no extreme changes have been advocated. However a detailed proposal for each of them will be later illustrated in order to have a definitive picture of what can or should be changed.

Furthermore a questionnaire (see Table 1.1) was prepared and distributed to ask all stakeholders to provide comments/proposals. A complete list with records of received questionnaires is available in an Excel file. This source of comments/proposals is part of the process for any amendments to the existing criteria.

The existing Ecolabel criteria structure is composed by 7 main phases as shown in Figure 4.1. Every criteria describes a specific stage of the productive chain of HFC products. For each main stage a set of criteria is proposed to describe the environmental impact both at general and at specific level.





**Figure 4.1** - The structure adopted for the first development of the Ecolabel Criteria.

Thus, in this Preliminary Report, main technical issues emerging from that analysis are reported. One of the major sources of information, in this field, is again represented by the **BREF document** for ceramic industry, which deals with several environmental, technological and regulatory issues related to the ceramics sector. Even if it refers to a specific product group within the whole HFC group, it constitutes a strong reference, from a scientific and geographical<sup>10</sup> perspective.

### **Definition of the product group (Commission decision, Article 2)**

This article defines the composition of the product group that can obtain the Ecolabel. *“The product group ‘hard floor-coverings’ shall comprise the following hard products for internal/external flooring use, without any relevant structural function: natural stones, agglomerated stones, concrete paving units, terrazzo tiles, ceramic tiles and clay tiles.”*

<sup>10</sup> BREF reports, in fact, the best available techniques at EU level.

The first relevant proposal is **to clearly separate, within this EU Decision, the EU Ecolabel criteria for natural stones and for processed products**. The applicant will benefit from this modification for several reasons: first, in terms of clearness and also because, as already illustrated, the natural stones sector has, in general, a very different approach to the environmental claims & labels issue.

Furthermore, many comments received highlight that the **division between wall and floor covering** is by now inconsistent, because the productive processes are the same and the same tiles are used for both flooring and wall coverings.

For this reason, a relevant issue to be faced during the HFC criteria revision is related to the possibility to include in the product group also the wall coverings.

While in the development of the first version of the criteria some technological and economic differences have arisen between wall and floor coverings production processes, these differences do not exist anymore for a few sub-products.

For example, also the BREF (note: indicate BREF reference) document for ceramic industry deals with “wall and floor tiles” as a single product group, because of the substantial equivalence among the different production methods:

*“The fundamental methods and steps in the production processes hardly differ in the manufacture of the various ceramic products, besides the fact that, for the manufacture of, e.g. wall and floor tiles, table- and ornamentalware (household ceramics), sanitaryware and also technical ceramics, often a multiple stage firing process is used. This is one historical reason why the various ceramics sectors can be summarised in two groups, the group of “coarse” or “construction” ceramics including the bricks and roof tiles, vitrified clay pipes, refractory products and expanded clay aggregates sectors, and the group of “fine” or “traditional and industrial ceramics”, including the wall and floor tiles, table- and ornamentalware, sanitaryware, technical ceramics and inorganic bonded abrasives sectors.”*

For example, tiles that are used for flooring may be very similar to tiles that are now used for kitchen or bathroom wall tiles.

Considering also the commercial and market issues, it has to be noticed that it is now common the use of tiles indifferently for wall or flooring purposes.

Many tiles manufactures support the idea that it is possible to extend the product scope without having to change the criteria or the product group definition. And this may be applicable also for the other products.

Hard wall coverings are used, in many cases, to provide a surface for a particular application, for example a surface that is easy to clean or that protects the structure of the wall from damage. In any case, the important is that this new category of products for wall coverings does not assume any structural function, as required by the Article 2 of the Commission Decision.

The contemporary consideration of wall and floor coverings could have positive effects on the number of products accessing the labelling scheme.

In case of extension of the group to wall coverings, the name of the product group could be changed to “**Hard Wall and Floor Coverings**” or to “**Hard Coverings**” only, since both *wall* and *floor* are similar coverings.

In particular, where the production processes remain the same for the different product families, using the same materials and the same manufacturing methods most of the existing EU Ecolabel criteria will not need to be changed, with the exception of the fitness for use criterion. Following its dispositions, a clear indication of the product use must be reported on the application dossier (as well as on the product itself), to identify if the HFC should be used for wall coverings, floor coverings or for both purposes.

For a synthesis of the modification proposals see Table 4.2.

**Table 4.2-** Review table of the criteria. Article 2 revision.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Article 2</b> (GUCE L 94/13)	Definition of the product group	Natural and processed products together	A clear division between natural and processed. For natural products, criteria n. 1.1; 2; 3; 5; 7; 8 For processed products, criteria n. 1.2; 2; 4(4.1, 4.2; 4.3; 4.4;4.5); 5; 5.1;6;7; 8	Clearness of the document	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Article 2</b> (GUCE L 94/13)	Definition of the product group	Only <i>Floor Coverings</i> are admitted to the label	Extension of product group to <i>Wall and Floor Coverings</i>	The division between wall and floor coverings has no reason to exist any more when the same productive process is used.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Notes: many manufacturers are for the extension of the product group to vertical coverings in order to obtain a larger accessibility of the brand from a wider range of products.

### Framework (Assessment and verification requirements)

This section of the document presents the structure of the HFC product group and its subdivision in the two families of *Natural* and *Processed Products*. For each product the definition, the CEN code identification and some specific characteristics it is included.

Furthermore, it is also stated that “*The competent bodies are recommended to take into account the implementation of recognised environmental management schemes, such as EMAS or*

ISO14001, when assessing applications and monitoring compliance with the criteria (note: it is not required to implement such management schemes).”

Due to some comments raised during the 1<sup>st</sup> AHWG meeting it is necessary to include the EPD System in the list of the schemes that must be taken into account by the competent bodies and can facilitate the EU Ecolabelling. The companies that comply with the EDP System, in fact, are facilitated in providing data for the Ecolabel award.

This proposal is also shown in Table 4.3.

**Table 4.3 - Review table for criterion 1.1. (Natural products)**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<p><b>Annex – Framework</b> (GUCE L 94/15)</p>	<p>Assessment and verification requirements</p>	<p>The competent bodies are recommended to take into account [...] EMAS or ISO14001 [...]</p>	<p>The competent bodies are recommended to take into account the implementation of recognised environmental management schemes, such as EMAS, ISO14001 <b>and EPD</b>, when assessing applications and monitoring compliance with the criteria (note: it is not required to implement such management schemes)</p>	<p>Companies that comply with the EDP System are facilitated to furnish data for the Ecolabel award</p>	<p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>Notes: the proposal arose from the comments received during the 1<sup>st</sup> AHWG meeting.</p>					

### Extraction activities (*Raw Material extraction, Criterion 1*)

Extraction activities determine several kinds of environmental impacts that need to be well managed.

For critierion 1.1, **for natural products only**, few comments have been received and the limited interest indicates that probably this criteria does not need to be changed. Often the requests for changes were common with the criteria 1.2 (see after: *visual impact* and *habitat and birds directives*). Other requests were, instead, for a general clarification of some parts of the text of the criteria or for the updating of the testing methods. In any case, a more precise request arrived from the *Swedish Stone Industries Federation* (comments received for the questionnaire see table 1.1), which indicates that in their experience sawing is applied only for some natural stone deposits, and most of the water passing through the quarries originates from rain and subsoil water, because in

most of Nordic quarries the exploitation level is situated under the water table and is conveyed out of the quarry. Thus, almost all water leaving the quarry is not *waste water* but fresh water. Furthermore, it was also indicated that most of the quarries can not recycle 80% of the water. The term waste water should be clearly defined as the water used in processing plants, since the refinement of stone products is the first part in the production line, where water is actually used.

About criterion 1.2, for processed products only, the criteria requires a series of technical documents. In many cases the manufacturer, especially for ceramic tiles, has direct contacts with commercial suppliers rather than with the extractor and thus has difficulty in collecting all the necessary information requested.

Hot spots are information about protected areas (**Habitats and Birds Directives**).

An issue was discussed during the 1<sup>st</sup> AHWG meeting to define of a mandatory list of documents to be provided (such as extraction authorizations, or documentation about the quarry localization....) and a clear link where to find information about the above mentioned Directives.

The Ecolabel criteria also consider the **visual impact** generated by the extraction management, defining a quantitative indicator to evaluate it. The threshold value had been chosen considering a value that could be effectively selective, and that takes into consideration several aspects, as: the human visual field, the distance from which the quarry can be seen, the several possible visual angles, and the geometrical characteristics of the compromised area. The criteria revision could, eventually, modify the value, that currently is fixed at 30%, both for natural and processed products. Another possibility is to substitute the visual impact requirement with others related to material transports or to quarry environmental recovery.

Furthermore a sustainable use of natural resources should be promoted with the aim of reducing waste, such as by reducing the amount of material extracted compared to that actually used (e.g. Indicator IA –natural stone =  $m^3$  usable material/extracted material  $m^3$ )

In general, more attention is requested for the environmental recovery of the quarry and the possibility to include also Environmental impact assessment information.

For a synthesis of the hot spots and of the modification proposals, see Table 4.4 and Table 4.5.

**Table 4.4 - Review table for criterion 1.1. (Natural products)**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Raw materials extraction management</b> (GUCE L 94/15)	Water recycling ratio	Exclusion hurdle = 80%	To lower the exclusion hurdle limits and recalculate the scoring classes on new percentage values	Most of the quarries can not recycle 80% of the water	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Visual impact of extraction activities	from 0 to 30% max	X ≤ 20%	The documentation received in the Ecolabel preliminary investigation (APAT) for ceramic tiles tells that the limit cannot be reduced lower than X % ≤ 20.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Environmental recovery	Any	A project should be provided where a program of environmental recovery is planned.	To show a layout of the restoration and rehabilitation areas versus compromised areas. It is yet required for processed product.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Notes: There are no changes in BREF or in legislation from 2002. The proposal is to modify the limit making it more restrictive. More emphasis on environmental recovery projects.					

**Table 4.5a - Review table for criterion 1.2. (Processed products)**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Raw materials extraction management</b> (GUCE L 94/17)	Visual impact of extraction activities	from 0 to 30% max	X ≤ 20%	The documentation received in the Ecolabel preliminary investigation (APAT) tells that the limit cannot be reduced lower than X % ≤ 20.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

**Table 4.5b - Review table for criterion 1.2. (Processed products)**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
	Documentation required	A technical report including a statement of the applicant is required.	To specify the necessary documents: <ul style="list-style-type: none"> <li>· authorization for the extractive activity;</li> <li>· environmental recovery plan;</li> <li>· map indicating the location of the quarry;</li> <li>· declaration of conformity to the Directive 92/43/EEC, 79/409/EEC</li> </ul>	To facilitate the acquisition of information for the drawing up of the required technical report also for companies that only buy material from intermediaries, without direct excavation.	<input type="checkbox"/> Yes  <input checked="" type="checkbox"/> No
<p>Notes: There are no changes in BREF or in legislation from 2002. The proposal is to modify the limit making it more restrictive. More emphasis on environmental recovery projects.</p>					

### Raw materials selection (Criterion 2)

The existing criterion for raw material selection requires that:

*“No substances or preparations that are assigned, or may be assigned at the time of application, any of the following risk phrases (or combinations thereof):*

*R45 (may cause cancer);*

*R46 (may cause heritable genetic damage);*

*R50 (very toxic to aquatic organisms);*

*R51 (toxic to aquatic organisms);*

*R52 (harmful to aquatic organisms);*

*R53 (may cause long-term adverse effects in the aquatic environment);*

*R60 (may impair fertility);*

*R61 (may cause harm to the unborn child);*

*as laid down in Council Directive 67/548/EEC of 27 June 1967 on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances, and its subsequent amendments, may be added to the raw materials.*

*Due to the environmental advantages of the recycling of materials, these criteria do not apply to the quota of closed-loop recycled materials used by the process and as defined in Appendix A2.*

*Where lead, cadmium and antimony (or any of their compounds) are used in the additives, their content shall not exceed the following specific limits:*

<b>Lead</b>	0,5% in weight of the glazes
<b>Cadmium</b>	0,1% in weight of the glazes
<b>Antimony</b>	0,25% in weight of the glazes

*No asbestos shall be present in the raw materials used for natural and processed products.*

*The use of polyester resins in the production shall be limited by 10 % of the total weight of raw materials.*

*Assessment and verification: in terms of chemical and mineralogical analysis, the raw material formulation shall be provided by the applicant together with a declaration of compliance with the abovementioned criteria.”*

Raw materials selection is strictly related to the mandatory regulation, especially for the criteria referring to the use of hazardous substances and chemicals in the production process.

The existing criteria exclude the use of substances associated, or that could be associated at the moment of the label application, with one of the risk phrases listed by the decision itself. This requirement causes several problems:

- First of all, the information needed to accomplish the criteria create additional work charge for the applying companies, as they are required to know all the evolution of the chemical regulation.
- This kind of criteria could apply to companies performing internally the whole production process, starting from the mixture creation. But in many cases, manufacturers buy externally semi-processed products (mixtures), that could not be associated to specific information about risk phrases.

During the 1<sup>st</sup> AHWG meeting it emerged the possibility of eliminating all the prohibited substances specified in the criterion and that the new EU REACH Regulation (EU Reg. n° 1907/2006)] should be taken into consideration. Furthermore, it was suggested in light of the above considerations to include the phrase *“the use of any dangerous substances prohibited at EU level is banned” for this criterion.*

. . The Council Directive 67/548/EEC indicated in the Decision should be up-dated with the Directive 91/45/EC.

In the case of **asbestos**, the improvements in the EU legislation have overcome the existing criteria. See Chapter 3 for further information.

In other cases, such as the use of raw materials with some **radioactivity** effects (e.g. presence of zirconium), further information is needed, to understand if the use of such materials, in the atomized mixture, have implications in terms of radioactivity emissions of the final products (and, thus, on the release of hazardous substances during the use phase, regulated in a following criterion specific for this phase), and to identify what testing methods could be used to assess such



emissions. Laboratories were contacted to obtain information about this issue and some indications have been received from Ecolabel certified manufacturers.

For the radioactivity value measurement, the European Union has proposed an index, named  $I_{\gamma}$ , that relates the concentrations of radionuclides in the materials with the external one. Moreover, it has been also proposed another index, named  $I_{\alpha}$ , that relates the concentrations of radio-226 in the materials with the inner exposure value. The same indices, moreover, are also used in China. Another possibility could be the use of **RP 112**: “Radiological protection principles concerning the Natural Radioactivity of Building Materials”, since this could save costs to the enterprises that want to apply to Ecolabel.

About the content of **lead**, a total exclusion of this substance could cause some problems. In many cases, in fact, the materials fact sheets report the presence of some “lead traces”; thus, the lead requirement could be made more pressing, but is very hard to propose a complete exclusion. For the other parameters the hurdle cannot be reduced since it is technically impossible. Test methods cannot measure lower than 0,1%.

It has to be considered also that, if an extension of the product group to wall coverings will be accepted, a lowering of the hurdle limit for lead could be difficult to be reached, since most of the ceramic tiles used for wall are treated with glazes containing lead.

Finally, the **use of recovered materials** (scraps) arising from the same process (closed-loop recycling) or from other processes (open-loop recycling) should be taken into consideration.

For a synthesis of the hot spots and of the modification proposals see Table 4.6.

**Table 4.6 - Review table for criterion 2**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Raw materials selection</b> (GUCE L 94/17)	Dangerous substances – risk phrases	Risk phrases list	To eliminate the list, mentioning only that: <i>“the use of any dangerous substances prohibited at EU level is banned”</i>	To simplify and complete the requirements.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Dangerous substances - radioactivity	none	Introduction of a parameter for the limitation of radioactivity in the atomized mixture.	In order to fulfil to EU recommendations, and CCC (China Compulsory Certification) norms.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Dangerous substances – Lead	<b>Pb</b> Wt% = 0,5 <i>(in the additives)</i>	<b>Pb</b> Wt% = 0,3 <i>(in the additives)</i>	The technological improvements occurred in the last years allow to lower the existing threshold.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Dangerous substances – Asbestos	<i>“No asbestos shall be present in the raw materials used for natural and processed products”</i>	Elimination of the requirement	The EU directive 1999/77/EC bans the use of asbestos from 2005: the issue is redundant.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Dangerous substances	There is a single criterion that comprises all the requirements	Subdivision of the criterion in more points, for example: <b>2.1</b> Absence of risk phrases in raw materials; <b>2.2</b> Limitation to the presence of some substances in the additives (if they are used); <b>2.3</b> Limitation to the presence of asbestos and polyester resins in raw materials.	More clear interpretation of the criterion and more simple application of requirements.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

### Finishing operations (Criterion 3) natural products

The existing criterion is valid only for natural products.

It imposes that finishing operations shall be made according to some requirements and limits for some parameters, specified in the Commission Decision document.

The comments received to the questionnaire asked for a clear specification of the test method adopted. Furthermore, a request was made to provide appropriate documentation about the re-use of by-products from finishing operations (sawing included).

It is also possible to include in the requirements a parameter for the “waste management”, because the criterion in which this is requested (i.e. 5.1) excludes the natural products.

Table 4.7 shows the main modification proposals for the criterion.

**Table 4.7 - Review table for criterion 3.**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Finishing operations</b> (GUCE L 94/18)	Waste management	none	The parameter “waste management” should be included in finishing operations	Criteria 5.1 ( <i>Waste management</i> ) is valid only for <i>processed products</i> and thus is not applicable to natural products.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Waste management	none	The applicant shall provide appropriate documentation about the re-use of by-products from finishing operations (sawing included).	To obtain a clear overview of the production processes	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Notes: there are no changes in BREF or in legislation from 2002 about threshold limits. The criterion is still valid, but needs of an extension in requirements on waste managing.

### Energy consumption in the firing stage and CO<sub>2</sub> emissions (*Criterion 4.1*)

The existing criterion states that:

*“The energy requirement for firing (ERF) stages for ceramic tiles and clay tiles shall not exceed:*

<b>Ceramic tiles (specific weight ≤ 19 kg/m<sup>2</sup>)</b>	Hurdle 50 MJ/m <sup>2</sup>
<b>Ceramic tiles (specific weight &gt; 19 kg/m<sup>2</sup>)</b>	Hurdle 70 MJ/m <sup>2</sup>
<b>Clay tiles (specific weight ≤ 40 kg/m<sup>2</sup>)</b>	Hurdle 60 MJ/m <sup>2</sup>

*Assessment and verification: the applicant shall calculate the ERF according to the Technical Appendix — A4 instructions and provide the related results and supporting documentation”.*

The value of 19 kg/m<sup>2</sup> is an average weight for ceramic floor tiles that has been adopted as a reference boundary for different tile classes.

The present tendency of the **ceramic tiles industry** is to move toward the manufacturing of **large format** products. This trend has effects on the efficiency of the production processes, especially in the firing stage (thus for processed HFC). Because of the larger format of the products, they could be not perfectly aligned in the kiln. This could cause a “virtual” increase in the energy consumption, considering the ratio MJ/m<sup>2</sup> used in the existing HFC criteria.

Thus, an issue to be considered in the revision of the criteria is related to the method used to express the energy consumption in the firing stage, to avoid distortions in the results, due to esthetical modifications.

A possible solution could be to consider a consumption ratio expressed **in terms of MJ/kg** instead of MJ/m<sup>2</sup>, as the one used in the BREF document or the introduction of **a new third ERF class** of limits (e.g. sp. Wt. 19 Kg/m<sup>2</sup> ≥ 70 MJ/m<sup>2</sup> and ≥ 40 Kg/m<sup>2</sup> for clay tiles).

Some technical documents and specific reports about the ceramic tiles sector<sup>11</sup> give the energy consumption in terms of GJ/t. The National Italian Guidelines<sup>12</sup> for the characterization of the BAT for ceramic sector, for instance, give an energy consumption range<sup>13</sup> at the firing stage, for different types of ceramic tiles.

With regard to clay tiles, it is clear that energy consumption is strictly linked to the mass and, thus, to the thickness of the tiles: the more mass has to be fired, the more process energy will be needed. Considering a medium density of 1900 kg/m<sup>3</sup>, the current limit of 40 kg/m<sup>2</sup> shall exclude most of the products for flooring uses, that usually have a thickness of over 2,1 cm ( $40 \text{ kg/m}^2 / 1900 \text{ kg/m}^3 = 2,1 \text{ cm}$ ). For this reason, a solution could be to introduce a hurdle limit variable with the tile thickness; for example: **50 MJ/m<sup>2</sup> \* t** (*thickness in cm*).

The value of 50 MJ/m<sup>2</sup> is derived from the ceramic tiles sector, usually having a thickness of 1 cm. It could be also taken into consideration the possibility to uniform the requirements and the limits for clay and ceramic tiles, removing the subdivision based on the specific weights and introducing a common hurdle limit variable with the tile thickness: **50 MJ/m<sup>2</sup> \* t** (*thickness in cm*).

<sup>11</sup> “Rapporto Integrato - Ambiente Energia Sicurezza-Salute Qualità, L'industria italiana delle piastrelle di ceramica e dei materiali refrattari verso uno sviluppo sostenibile, ASSOPIASTRELLE- SNAM, 1998”

<sup>12</sup> Decreto Ministero Ambiente 29 gennaio 2007 recante “Emanazione di linee guida per l'individuazione e l'utilizzo delle migliori tecniche disponibili, in materia di fabbricazione di vetro, fritte vetrose e prodotti ceramici” - Supplemento Ordinario alla Gazzetta Ufficiale n. 125 del 31/5/2007

<sup>13</sup> 1,9 – 4,8 GJ/t: the inner value refers to wall coverings, while at the upper value can be concentrated the most of ceramic tiles production, i.e. flooring products.

Moreover, useful information that could be supplied in this stage refers to **CO<sub>2</sub> emissions** generated during the firing activities (only deriving from fuels). To use a “climate declaration” is now very common and used by several organizations to qualify their processes/products from a greenhouse gases emissions point of view. This data could be reported as further information in the dossier elaborated for the Ecolabel requirement (not as mandatory criteria, but as additional information to complete the company environmental overview), as well as additional information for the final consumer.

Table 4.8 below shows how the ERF value table defined by the old criteria could be modified to insert CO<sub>2</sub> emissions data. It has to be specified that the emission values are referred only to the firing stage.

**Table 4.8 - (example)** A possible modification, including CO<sub>2</sub> emissions, of the ERF table that is at present available in the Appendix of the Commission Decision 2002/272/EC.

Production period	Day	From	To			
Quantity (tons or m <sup>2</sup> )						
Fuel	Quantity	Units	Conversion factor	Energy (MJ)	Emission factor (g CO <sub>2</sub> / MJ)	CO <sub>2</sub> emissions
Natural gas		kg	54,1		56,1	
Natural gas		Nm <sup>3</sup>	38,8		56,1	
Butane		kg	49,3			
Kerosene		kg	46,5		71,9	
Gasoline		kg	52,7		69,3	
Diesel		kg	44,6		74,1	
Gas oil		kg	45,2			
Heavy Fuel oil		kg	42,7			
Dry Steam Coal		kg	30,6			
Anthracite		kg	29,7		98,3	
Charcoal		kg	33,7		94,6	
Industrial Coke		kg	27,9			
Electricity		kWh	3,6			
Total energy						
Specific energy consumption (MJ/quantity)						
Total CO <sub>2</sub> emissions						
Specific CO <sub>2</sub> emissions (CO <sub>2</sub> /quantity)						

The emission factors reported in Table 4.8 derives from the *Commission Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC*.

The EU Emission Trading Scheme, in fact, has established a common regulation on how to calculate and report greenhouse gas emissions within certain activities set up in EU. The

emissions factors reported are indicated in the Decision as minimum reference values internationally defined by IPCC<sup>14</sup>.

It could be discussed if other reference emissions factors should be used. For example the use of specific national emission factors (also defined within the EU ETS regulation) could be preferable.

Table 4.9 shows the main modification proposals for the criterion.

**Table 4.9** - Review table for criterion 4.1.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Production processes</b> - <b>Energy consumption</b> (GUCE L 94/19)	Climate declaration in addition of the Energy requirement calculation (PER, ERF)	See Table A4 - <i>Technical appendix</i> of GUCE L 94/26	See Table 4.8 of the present document	The addition of the information in terms of CO <sub>2</sub> emission is functional to the new guidelines established by the Directive 2003/87/EC; it can be reported also for the final consumer.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Energy requirement for firing (ERF) only for ceramic tiles	Ceramic tiles sp. wt. < 19 kg/m <sup>2</sup> = 50 MJ/m <sup>2</sup> & sp. wt. > 19 kg/m <sup>2</sup> = 70 MJ/m <sup>2</sup>	Still not quantified	It is probably good to add a new class to take into consideration large formats due to market pressure	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Energy requirement for firing (ERF) only for clay tiles	Clay tiles sp. wt. < 40 kg/m <sup>2</sup> = 60 MJ/m <sup>2</sup>	No classes of sp. wt. Limit = <b>50 MJ/m<sup>2</sup> * t</b> <i>(thickness in cm)</i>	To take into consideration that energy consumption is strictly linked to the mass and, thus, to the thickness of the tiles. The current restrictions of sp. wt. and the limit of 40 MJ/m <sup>2</sup> could exclude most of clay tiles products from being labelled.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

<sup>14</sup> International Panel on Climate Change. The mentioned values are reported in the "Revised 1996 IPCC guidelines for national greenhouse gas inventories".

	Energy requirement (ERF)	See hurdle values in the Commission Decision	To change the functional unit used for the calculation of energy consumption <b>from MJ/m<sup>2</sup> to MJ/kg</b>	The approach would be more technically correct; it would have a single threshold value for all the ceramic tiles and clay tiles; the requirement would become insensitive to market and product dynamics (variations of thickness and form) maintaining its environmental value unchanged.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Notes: the main requirement is to modernize the limits to the BAT and to adapt the classification of the formats to the new production and market tendencies.					

### Water use (Criterion 4.2)

The existing criterion for water use states that:

*“The waste water produced by the processes included in the production chain shall reach a recycling ratio of at least 90%. The recycling ratio shall be calculated as the ratio between the waste water recycled, internally or externally at the plant, and the total water that leaves the process, as defined in the Technical Appendix — A3.*

*Assessment and verification: the applicant shall provide the calculation of the recycling ratio including raw data on total waste water produced, water recycled and the quantity and source of virgin water used in the process.”*

Also the BREF document refers to water consumption. In fact, the document reports that the practice of water recycling is, at preset, common in almost all the ceramic tiles industry.

The BREF document, in the section addressed to the Best Available Techniques (hereafter BAT), states that, in the wall and floor tiles sector:

*“BAT is to re-use process waste water in the manufacturing process, with process waste water recycling ratios of 50-100% (depending on the type of tile to be manufactured) by applying a combination of process optimisation measures and process waste water treatment systems”.*

Consistently with this approach, an issue to be considered in the criteria revision is the option to increase the process waste water recycling ratio, at present set at 90%, to close to 100%.

Should this approach be adopted, the existing criterion defining the threshold values for some types of water emissions would become unnecessary. Furthermore, a precise indication of the term "recycling" is needed.

Table 4.10 shows the main modification proposals for the criterion.

**Table 4.10 - Review table for criterion 4.2.**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Production processes</b> – <b>Water use</b> (GUCE L 94/20)	Waste water recycle	Waste water recycling ratio = 90 %	Waste water recycling ratio = 100 %  <i>(with internal reuse equalized to the external recycle)</i>	It is known that the new technologies allow the integral recovering of process waters.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
			Insert of a requirement for the “water consumption”	Reducing the amount of water used at the beginning stage.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Notes: the new Bref Ceramics associates to the BAT for the field Floor and Wall Tiles a recycle ratio of 50-100%. In many production sites the integral recovery of waste water is still applied to fulfil requirement of other certification. The possible modification of the criterion imposes a revision of the point 4.4 “Emissions to water”.					

### Air emissions (Criterion 4.3)

At present, existing criteria set out some air emissions threshold values, for emissions of particulate, phosphor (F), nitrous oxides (NO<sub>x</sub>) and sulphur dioxides (SO<sub>2</sub>) occurring in the firing stage of processed HFCs as indicated in the Decision.

These emissions are verified using ISO testing methods. Laboratories have been contacted to have information about new testing methods (as EN methods) that could have been introduced for such verifications. See Chapter 3 for further details.

Table 4.11 shows the main modification proposals for the criterion.

**Table 4.11a - Review table for criterion 4.3.**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Production processes</b> – <b>Emission to air</b> (GUCE L 94/20)	Emissions to air	Ecolabel limits specified in the tables at the criterion 4.3	New test methods See Chapter 3	The existing Ecolabel limits respects all the legislation and the technical and technological values (BREF, BAT). Update test methods.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No



**Table 4.11b** - Review table for criterion 4.3.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
	Emissions to air (only for clay tiles)	Ecolabel limits specified in the tables at the criterion 4.3	To adopt the same limits applied for ceramic tiles, multiplied for the thickness value (in cm).	The emission to air deriving from the firing stage is strictly linked to mass and, thus, to the thickness of the clay tiles.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Notes: also if a modification of the existing limits is not necessary, some variations could be applied to make the requirements more restrictive.					

### Emissions to water (Criterion 4.4)

The existing criterion for water use states that:

*After waste water treatment, whether on-site or off-site, the following parameters shall not exceed the following limits:*

Parameter	Current Hurdle	Methods
<i>Suspended solid emission to water</i>	40 mg/l	ISO 5667-17
<i>Cd emission to water</i>	0,015 mg/l	ISO 8288
<i>Cr(VI) emission to water</i>	0,15 mg/l	ISO 11083
<i>Fe emission to water</i>	1,5 mg/l	ISO 6332
<i>Pb emission to water</i>	0,15 mg/l	ISO 8288

In case water recovery reaches the level of 100% (see water consumption paragraph or comments to criterion 4.2) the criterion would become superfluous and could be eliminated.

In any case, some demands are for the elimination of the “Fe emission to water” parameter.

Table 4.12 shows the main modification proposals for the criterion.

**Table 4.12** - Review table for criterion 4.4.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Production processes – Emission to water</b> (GUCE L 94/21)	Emission to water	Ecolabel limits specified in the tables at the criterion 4.4	If the recycling ratio at the criterion 4.2 become of 100%, then the current requirements at the point 4.4 can be deleted	If the recycling ratio at the criterion 4.2 is of 100%, there will not be any water process emissions	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Notes: The criterion will change only if criterion point 4.2 will be modified.					

### Cement (Criterion 4.5)

The existing criterion for cement use states that:

*The use of raw materials for cement production shall be consistent with extraction management for processed products requirements (Criterion 1.2).*

*Those products that use cement in the production process shall provide the following information:*

- *cement included in any product shall be produced using not more than 3800 MJ/t of process energy requirement (PER), calculated as explained in the Technical Appendix — A4;*
- *the cement included in any product shall be produced respecting the following air emission limits:*

⇒ Dust	65	g/t
⇒ SO <sub>2</sub>	350	g/t
⇒ NO <sub>x</sub>	900	g/t

Also for cement, the “Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries” (European Commission, Dec. 2001) constitutes one of the most important references.

At present, there are no requests for a change. A brief survey on existing Environmental Product Declarations (EPDs) on cement shows that the existing hurdle is still restrictive.

Table 4.13 shows the modification proposals for the criterion.

**Table 4.13 - Review table for criterion 4.5.**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Production processes</b> – <b>Cement</b> (GUCE L 94/21)	Use of Cement	Ecolabel limits specified in the tables at the criterion 4.5	To reduce the presence of cement in the concrete paving units.	To reduce the energy consumption.	<input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No

Notes: proposal emerged during the I AHWG meeting.

### Waste management (Criterion 5)

The existing criterion for waste management states that:

*All plants involved in the production of the product shall have a system for handling the waste and residual products deriving from the production of the product. The system shall be documented and explained in the application.*

In order to ensure consistency in the documentation that the applicant is asked to present, it would be useful if a template structure was produced.

The second part of criterion (5.1) identifies a minimum percentage of waste recovery (at least 70% of waste must be recovered).

Considering the technological improvements, which have been implemented over recent years, a possible issue to be discussed refers to an increase of the minimum waste recovery percentage. But, in this case, it has to be noted that the identification of a minimum threshold value of non-fired waste to be reused in the process, could exclude some types of processes from the labelling procedure.

A clarification of the type of wastes that have to be recovered would also be necessary. It would be useful to give more emphasis to the procedures adopted to re-use the by-products from process, in order to have a more precise description of the recycle operations.

Table 4.14 shows the main modification proposals for the criterion.

**Table 4.14 - Review table for criterion 5.**

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Waste Management</b> (GUCE L 94/21)	Recovery of waste	Total waste recovery % (by weight) = 70%	Total waste recovery % (by weight) = 90%	The technological improvements allow an increase of recovery %	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

### Use phase (Criterion 6)

The criterion 6.1 establishes that:

*In order to control the potential release of dangerous substances in the use phase and at the end of the glazed tile's life, the products shall be verified according to the EN ISO 10545-15 test. The following limits shall not be exceeded:*

Parameter	Current Hurdle	Methods
Pb	Hurdle 80 mg/m <sup>2</sup>	Method ISO 10545-15
Cd	Hurdle 7 mg/m <sup>2</sup>	Method ISO 10545-15

A specific request has been received to up-date the test methods and the eventual revision of the parameter values (Table 4.15).

Another possible modification could be the inclusion for this criterion to control and limit radioactive emissions for the finished tile. This request should be extended to all the product families and not only to glazed tiles.

Since the current limits for the release of dangerous substances (Pb and Cd) and the relative test methods are those established for the ceramic products destined to the alimentary sector, the criterion does not need a revision as the limit is already very stringent.

Some comments, during the 1<sup>st</sup> AHWG, proposed the introduction for the finished product of a new requirement: Cr<sub>6</sub> limitation . It is clear that the test method used for Cr<sub>6</sub> cannot be the same adopted for the other parameters included in the criterion. Furthermore, it should be considered that the presence of this parameter is very low in the product and that the additional test methods could be very expensive for the applicant.

**Table 4.15-** Review table for criterion 6.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Use phase</b> (GUCE L 94/22)	Use Phase	none	Introduction of a parameter for the limitation of radioactivity in the finished tile.	In order to fulfil to EU recommendations, and CCC (China Compulsory Certification) norms.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
		Hurdle limits to Pb and Cd presence in the finished products.	To add a requirement of Cr <sup>VI</sup> control in the final product.	To control the potential release of dangerous substances in the use phase.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

### Fitness for use (Criterion 7)

The criterion cites that:

*The product shall be fit for use. This evidence may include data from appropriate ISO, CEN or equivalent test methods, such as national or in-house test procedures.*

Some proposals are to force EC marking in order to declare the fitness for use (Table 4.16).

**Table 4.16-** Review table for criterion 7.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Fitness for use</b> (GUCE L 94/22)	Communication	Any	Clear indication of the uses for which the product is suitable for floor and if accepted the proposal also for wall covering	Eventual extension to wall coverings	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Notes: the review proposal is valid only in the case of extension of the scope to vertical coverings.					

### Consumer information (Criterion 8)

The criterion says that the product has to be sold with information about the EU Ecolabel award, with the recommendations for its use and maintenance, with an indication of the route of recycling or disposal and with information on the EU Ecolabel and its related product groups.

No specific request of change has reached about this criterion (Table 4.17).

**Table 4.17 -** Review table for criterion 8.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Consumer information</b> (GUCE L 94/22)	Consumer information	-	-	-	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

### Information appearing on the Ecolabel (Criterion 9)

*Box 2 of the Ecolabel shall contain the following text:*

**Natural products:**

- *reduced impact of extraction on habitats and natural resources,*
- *limited emission from finishing operations,*
- *improved consumer information and waste management.*

**Processed products:**

- *reduced energy consumption of production processes,*
- *reduced emissions to air and water,*
- *improved consumer information and waste management.*

Table 4.18 shows that there are no modification proposals for this criterion.

**Table 4.18** - Review table for criterion 9.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation	The Criterion is still valid?
<b>Information appearing on the Ecolabel</b> (GUCE L 94/23)	Information appearing on the Ecolabel	-	-	-	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

### New Criteria Proposal

Some proposals emerged during the 1<sup>st</sup> AHWG meeting with the request to introduce a new criterion for **packaging**, and the inclusion 100% recycled material for packaging

**Table 4.19** - Review table for criterion

Criterion	Theme	Existing requirements	New requirements proposal	Motivation
<b>New proposal</b>	Packaging	none	Use of 100% recycled material for packaging.	Reducing the environmental impacts related to the packaging production.

## 5. Issues related to Soft Coverings product group definition

Soft coverings represent an important category within floor coverings. The CSERGE study<sup>15</sup> performed in 2000 and used as a source of information for the HFC first criteria development, stated that carpeting was the second type of flooring products manufactured in Europe (in monetary terms), after ceramic tiles.

For this reason, the evaluation of the possible inclusion SFC in the in the Ecolabelling scheme it could have important effects on the diffusion of the label and on the increasing of the number of labelled products.

A key issue is related to the definition of the Soft Coverings product group and the experiences made from other existing national labels will be very useful.

### Other European or National Ecological Labels

Existing approaches have been considered such as the **Nordic Swan** labelling, the **Blue Angel** label, the Austrian environmental protection label **UZ 5** and **GUT** that is a European specific label for carpets.

The approach used by the Nordic Swan labelling (**Swan regulation**) scheme for the floor-covering sector states that:

*“Examples of floor coverings that can be Swan labelled include solid wood, parquet, laminate, linoleum and carpeting.*

*The floor covering must be intended for indoor use and suitable for a concrete, timber joist or similar subfloor. The floor covering shall not have a supporting function. Floor coverings with integrated heating cannot be Swan labeled.*

*Seamless floor coverings that are applied as a curing liquid cannot be Ecolabeled. Mineral floor coverings such as stone and clinker cannot be Swan labeled but can be awarded the EU Flower”*

Currently, there are six flooring producers with the Swan label, for a total of 40 products. The types of products awarded are mostly wooden coverings and linoleum<sup>16</sup>.

The approach adopted by Germany’s **Blue Angel** label, identifies three different groups of criteria for products belonging to the Soft Floor Coverings family:

1. *Floor coverings made of wood:* these criteria apply to ready to use final products for indoor use (e.g. furniture, interior doors, panels, floorings with painted surfaces, laminate floorings, prefabricated parquet/linoleum) which are mainly made, i.e. for more than 50%, from wood/flower, wood powder or wood-based materials (chipboards, coreboards, fibreboards,

<sup>15</sup> CSERGE (2000): Feasibility study of wall and floor coverings with a view to establishing EU Eco-labelling criteria.

<sup>16</sup> For more information, please, visit the site <http://www.svanen.nu>

veneer panels, each non-coated or coated). Window frames and semi-finished products do not fall within the scope of these criteria.

This family of products is included in widest Basic Criteria for *Low-Emission Wood Products and Wood-Base Products*, that comprises also furniture, panels, prefabricated parquet and similar.

For the Blue Angel label there are eleven manufacturers that registered 33 products, which include different products such as laminates, parquet and linoleum coverings.

2. *Adhesive floor coverings*: the criteria apply to different category of products:

- solvent-free adhesives according to German legislation (emulsion adhesives, powdered adhesives, fixing materials);
- some solvent-free base coats and primers, cement-containing surfaces and calcium sulphate-based surfaces intended for use as installation materials in indoor environments. In addition, these criteria apply to floor covering adhesives based on silane-modified polymers (SMP-adhesives).

Wallpaper pastes, tile adhesives and joint fillers are excluded from this criteria.

The Basic Criteria of the adhesive floor coverings is named *Low-Emission Floor Covering Adhesive and other Installation Materials*.

Currently, there is only one manufacturer awarded with this label, with 8 products awarded.

3. *Flexible floor coverings*: these criteria apply to elastic floor coverings (plastic floorings; coverings made of natural and synthetic rubber; linoleum), designed for use as covering materials in indoor areas, where with the term “elastic” is intended the ability of a material to recover to a certain extent after compression.

Two producers are currently awarded for rubber floorings, for a total of 3 products<sup>17</sup>.

The Austrian environmental protection label “**UZ 56**” for the floor coverings, instead, recognizes the following typology of products:

1. *Resilient floor coverings* in accordance with the definitions laid down in standard EN 12466, with the exception of loose mats;
2. *Floor panels for loose flooring*, in accordance with standard EN 14085;
3. *Textile floor coverings*, with the exception of loose mats and adjusted carpets;
4. *Parquet and timber floorings*, in accordance with standard EN 14342.

Flooring criteria for the **Austrian Eco Label** do not include laminates.

<sup>17</sup> For more information about the license holders, please, see the site: <http://www.blauer-engel.de>.



At present, 4 companies are awarded with the Austrian Ecolabel for floor coverings, all producers of resilient floor coverings. In particular, three are awarded for linoleum coverings and one for floor coverings made of rubber<sup>18</sup>.

The European Carpet Industry has created the **GUT label** for carpets in the early 90's. The scope of GUT is to test products against the highest standards, to promote environmentally friendly solutions for carpet installation as well as recycling projects and, in general terms, during the whole life cycle of the product. Today, on voluntarily bases three out of four carpet manufacturers include GUT's standards.

Other existing certifications that have to be considered in the approach for the Ecolabel criteria development are:

- the **Nature Plus**: an international environmental organisation whose aim is the development of a culture of sustainability within the building sector. It comprises also wooden products and linoleum.
- the **IBO**: an Austrian organisation for construction products certification and research;
- the **Milieukeur**: a Dutch ecological label.

Furthermore, it should be emphasized that Soft Floor Coverings do not include wall coverings products. In fact, while hard floor and wall coverings have in common the same production process (i.e. a ceramic tile could be indifferently used for wall or floor covering purposes), wall soft coverings are specifically obtained for this purpose, and cannot constitute a floor covering.

An issue to be considered is that Soft Floor Coverings group incorporates a wide series of products, using very different raw materials and production processes (i.e. laminates, carpets and wood floorings, as well as linoleum or rubber ones).

Therefore, the relevance market data for each series of products illustrated within this report should be taken into consideration.

### Definition of the product groups according to different sources

Based on information acquired from the previous National labels (i.e.: the Nordic Swan, the Blue Angel and the Austrian UZ 56), the **CERGE** (2000) study, the **European Standard EN 12466** (*Resilient floor covering vocabulary*) and the **NALFA Standards** (2003) for laminates only, the floor coverings have been distinguished in six groups, as reported in Table 5.1:

<sup>18</sup> For more information, visit the site <http://www.umweltzeichen.at>.

**Table 5.1 - Floor coverings product groups [Data elaborated by LCE].**

Product group		Products
Hard Floor Coverings	1. Processed hard flooring	Ceramic tiles Terrazzo tiles Agglomerated stones Concrete tiles Clay tiles
	2. Natural hard flooring	Natural stones (Marble, Granite, ecc...)
Other Floor Coverings	3. Resilient flooring	Linoleum PVC coverings Plastic coverings ( <i>not containing PVC</i> ) Rubber
	4. Textile flooring	Carpets
	5. Processed timber flooring	Pre-finished ( <i>wood</i> ) Mosaic ( <i>wood</i> )
	6. Natural timber flooring	Blocks and Parquet Cork
	7. Laminates	HPL and DPL ( <i>made of wood or pressure laminates</i> )

According to the above table, a possible approach to define the SFC product group for a preliminary investigation is to consider all the above-mentioned product groups not classified as Hard Floor Coverings.

Thus, it will be taken into consideration the following subdivision into product groups:

- **Carpets:** *“heavy, durable floor covering, usually of woven, knitted, or needle-tufted fabric; commonly installed with tacks or staples, or by adhesives”;*
- **Wood floorings:** *“coverings made from the timber of hardwoods or of spruce or hard pine. A wood floor can be **unfinished**, and once installed sanded, then finished on site or, more modernly, **pre-finished** in a factory”;*
- **Rubber floorings:** *“floor covering in roll or tiles. based on natural or synthetic rubber”<sup>19</sup>;*
- **PVC coverings:** *“floor covering with a surface layer which is produced using polyvinyl chloride (and modification thereof) as binder”<sup>16</sup>;*
- **Other plastics coverings:** *floor coverings made of polymers not including PVC;*
- **Linoleum coverings:** *“floor covering produced by calendaring a homogeneous mixture of linoleum cement, cork flour and/or wood flour, pigments and inorganic fillers onto a fibrous backing. The product is then converted into its final form by an oxidative curing process”<sup>16</sup>;*
- **Laminates:** *“rigid floor covering with a surface layer consisting of one or more thin sheets of a fibrous material (usually paper), impregnated with aminoplastic thermosetting resins (usually melamine), pressed or bonded on a substrate, normally finished with a backer”<sup>20</sup>;*

<sup>19</sup> Definition in conformity with the European Standard EN 12466

## SOME MARKET INFORMATION ABOUT SOFT FLOOR COVERINGS

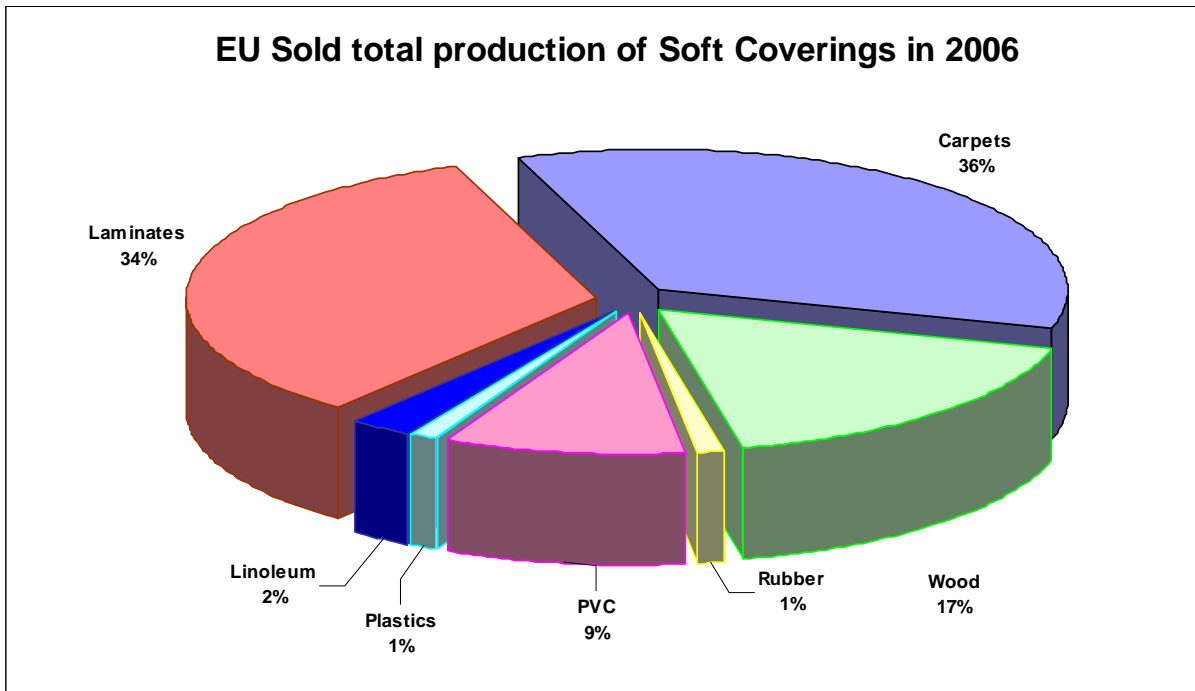
The market data reported below have been taken by EUROSTAT. Thus, the categories reported<sup>21</sup> could be quite different compared with the classification used in this Report. In the following sections the Countries and product categories which data refer to will be specified.

Figure 5.1 shows the composition of SFC market in EU. In the data acquire from EUROSTAT-Prodcom the following categories for each product group have being considered:

- **Carpets:** knotted carpets and other knotted textile floor coverings, woven carpets and other woven textile coverings, tufted carpets and other tufted textile floor coverings, needle-felt carpets and other needle-felt textile floor coverings, carpets and other textile floor coverings;
- **Wooden flooring:** oak blocks; strips or friezes for parquet or wood block flooring; planed but not assembled, plywood, parquet panels of wood for mosaic floors, parquet panels of wood;
- **Rubber floorings:** plates; sheets; strips for floor covering of solid vulcanised rubber. *Only data for Spain, Italy, Portugal and UK are freely available on EUROSTAT;*
- **PVC flooring:** floor coverings in rolls or in tiles, and wall or ceiling coverings consisting of a support impregnated, coated or covered with polyvinyl chloride;
- **Other Plastic coverings:** floor coverings in rolls or in tiles, and wall or ceiling coverings of plastics excluding of polymers of vinyl chloride;
- **Linoleum:** linoleum coverings. *Data are available for European Countries as a whole and for Italy and Denmark separately;*
- **Laminates** particleboard and similar board of wood surfaced with decorative laminates of plastics or of melamine resin impregnated paper, excluding wafer board or oriented strand board. Since it is not specified that these are used only for floor coverings purposes, data should also be referred for other types of coverings (wall, table, etc...): for this reason, the production values could be overestimated.

<sup>20</sup> NALFA Standards (2003).

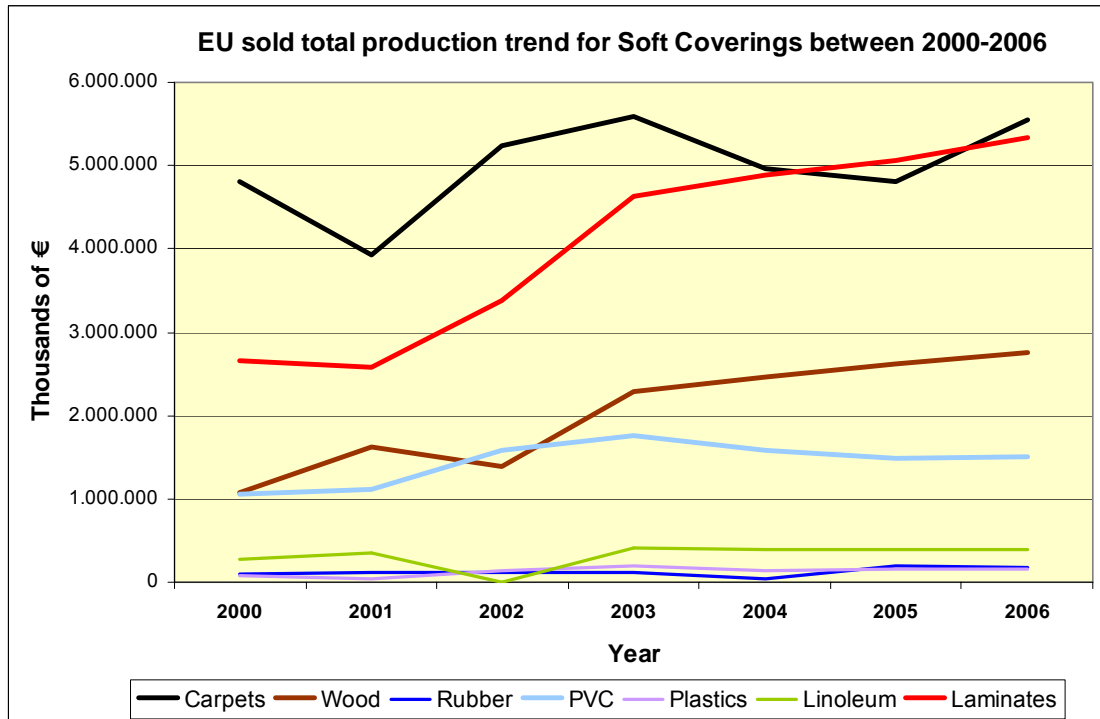
<sup>21</sup> Data used to draw out graphs and other information are taken from the EUROSTAT "Statistics on the production of manufactured goods Volume ANNUAL 2006", published in the 2007. These statistics refer to PRODCOM categories.



**Figure 5.1** - 2006 Soft Coverings production in EU in monetary terms (€).

The value referred to the laminates group includes not only floor coverings products [Source: EUROSTAT, 2007 (Data elaborated by LCE)].

Figure 5.2 shows the trend of the SFC sold total production in Europe from the year 2000.



**Figure 5.2** - Soft Coverings sold trend in EU from 2000 to 2006

The value referred to the laminates group includes not only floor coverings products [Source: EUROSTAT, 2007 (Data elaborated by LCE)].

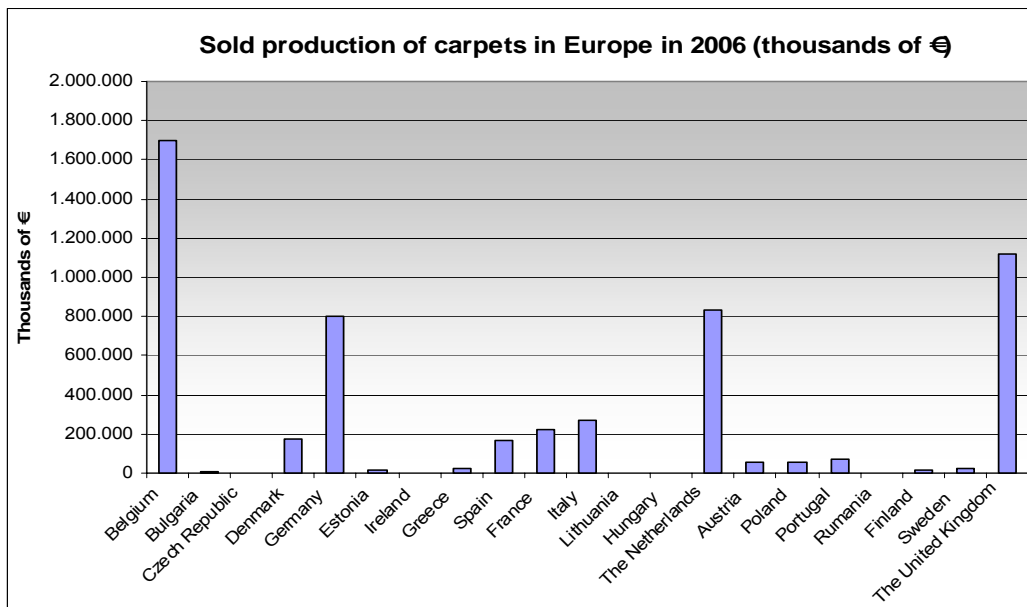
## Carpets



Carpets are one of the most important SFC category. Figure 5.3 presents the value of the carpets industry (in terms of monetary value) in some EU Countries.

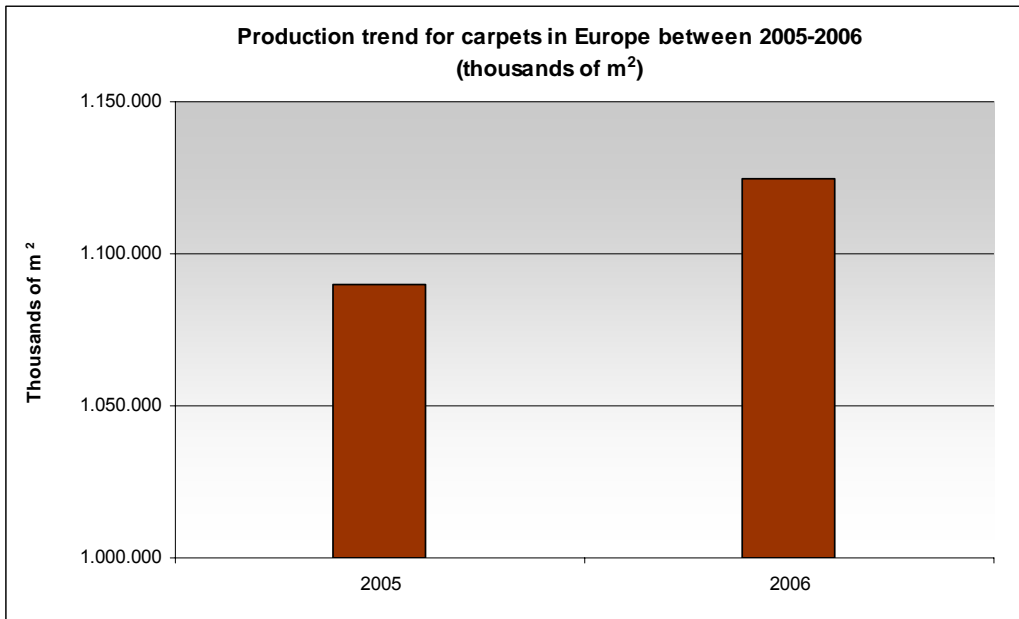
The tufting process, using polyamide or woollen pile, makes about 85% of carpets. Polypropylene is used for the backing cloth and styrene butadiene rubber and limestone used for the adhesive and the foam backing. Often, instead of “carpet”, the French term “*moquette*” is also used.

**EU 25 total production amount nearly 5.541 million €, corresponding to 1.125 Mm<sup>2</sup>.**



**Figure 5.3 - Carpets production in Europe in 2006 (in €)** [Source: EUROSTAT, 2007 (Data elaborated by LCE) ; national data available only for the Countries indicated in the graph].

Figure 5.4 shows the carpets production trend in Europe between 2005 and 2006. It must be specified that it has not been possible to use data prior to year 2005 since it was expressed in a different measure unit (i.e.: kg) and comparison was not possible.



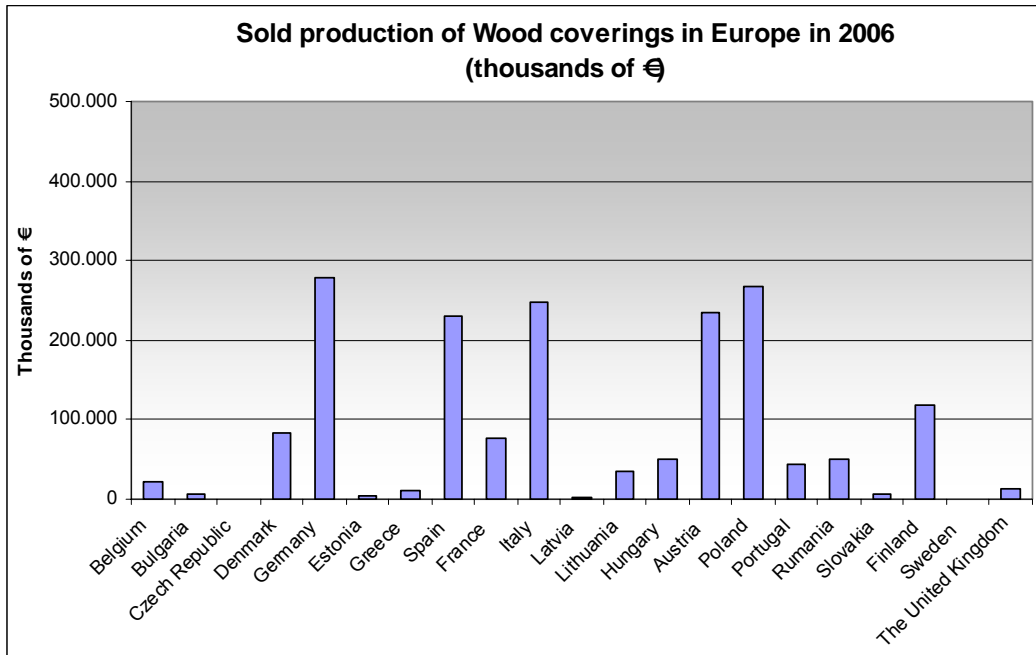
**Figure 5.4** - Production trend for carpets in Europe between 2005-2006 (in mass) [Source: EUROSTAT, 2007 (Data elaborated by LCE) ].

### Wood floorings



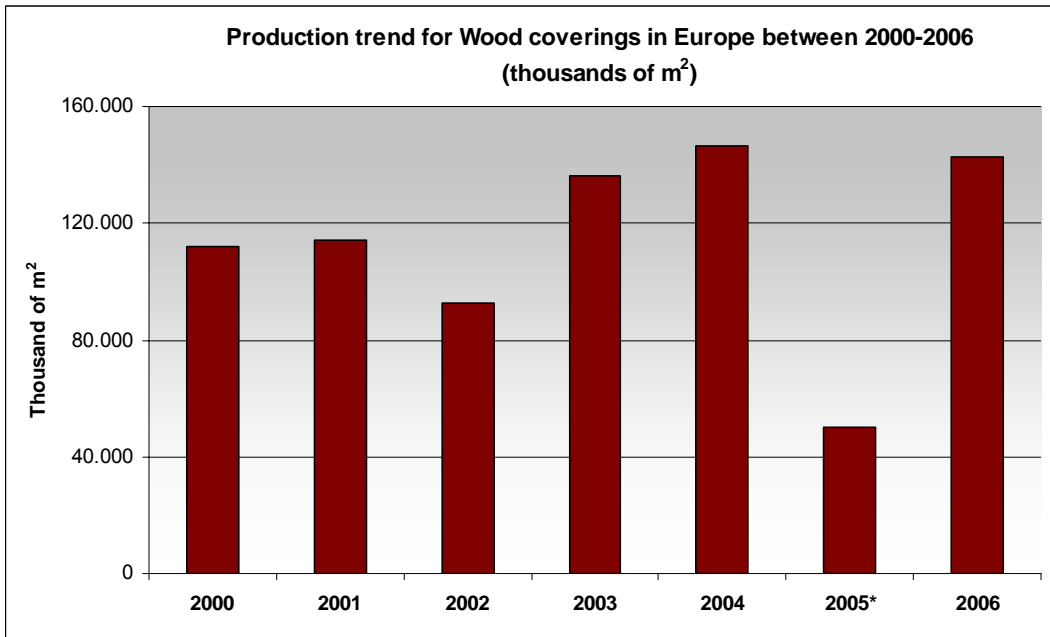
Wood flooring is a type of flooring made from the timber of hardwoods, which can be installed and finished on site or pre-finished in a factory. With the term *parquetry* is defined a mosaic of wood used for ornamental flooring.

Figure 5.5 shows some production data (in terms of value) for the EU wood flooring sector. **EU 25** total production amounts nearly to **2.748 million €** corresponding to **143 Mm<sup>2</sup>**.



**Figure 5.5** - Wood floorings production in Europe in 2006 (in €) [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

Figure 5.6 presents the situation of the production trend for the wood coverings sector in Europe from 2000. Data for the year 2005 were not consistent due to lack information for some Countries.



**Figure 5.6** - Production trend for wood coverings in Europe between 2000-2006 (in mass)  
 [Source: EUROSTAT, 2007 (Data elaborated by LCE);].

Furthermore, from 2002, there is a lack of data from Sweden that, at that time, was one of the major producers of wood coverings.

### Rubber floorings

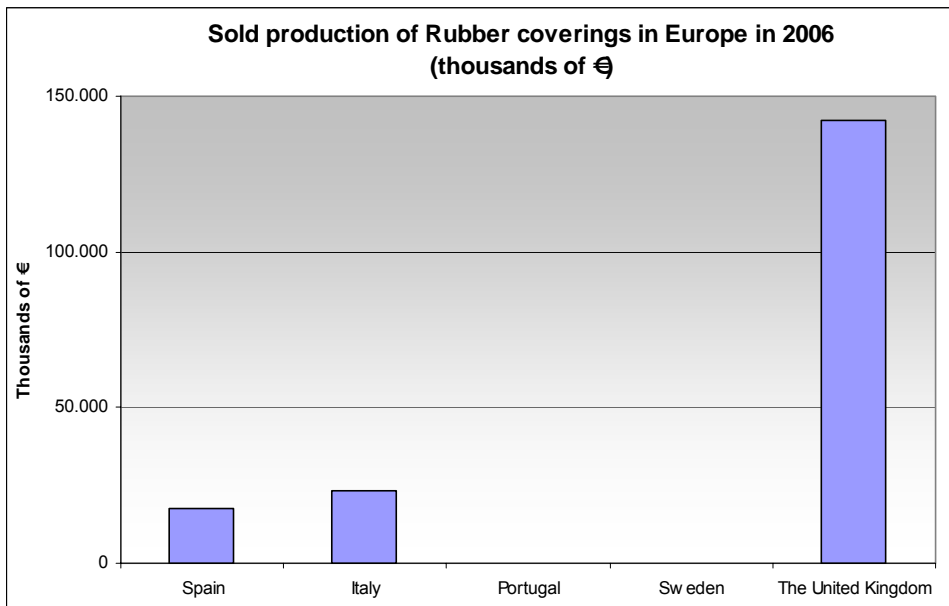


Rubber floorings are often used in laboratories, manufacturing facilities, or locations where a non-conducting floor is required.

Figure 5.7 shows some EU production data in terms of value: it has not been possible to quantify the production in terms of mass because some Eurostat data were not explained.



It has to be highlighted that from 2003 there is a lack of data from Sweden and there is no information about UK and Portugal sold total production for 2004,



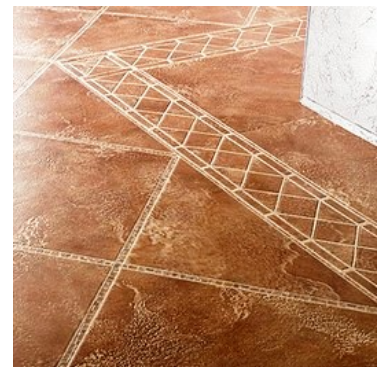
**Figure 5.7 - Rubber floorings production in Europe in 2006 (in €)**

[Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

This type of covering could be manufactured in a wide variety of colours, thickness, dimensions to answer to different technical and esthetical requirements. The total production of the four main European contributors amount nearly **183 million €**.

The lack of data about the production in terms of mass does not allow an evaluation of the European production of rubber coverings.

### PVC coverings



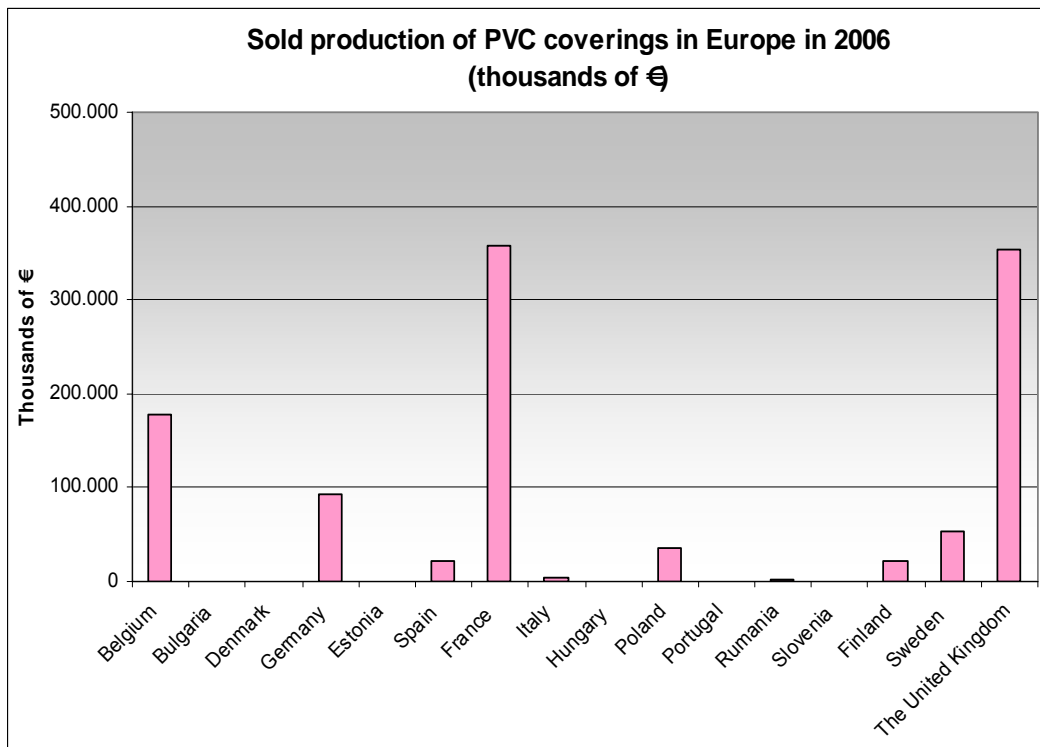
PVC and other vinyl-based floorings are made from mixtures of polyvinyl chloride, plasticiser, limestone, stabilisers, pigments and other additives.

The mixture of above mentioned raw materials and semi-products is usually applied to a non-woven layer of glass fibre and baked. Cushioned vinyl consists of several layers of foam vinyl also on a non-woven layer of glass fibre. A design is usually applied by deep pressure using a solvent.

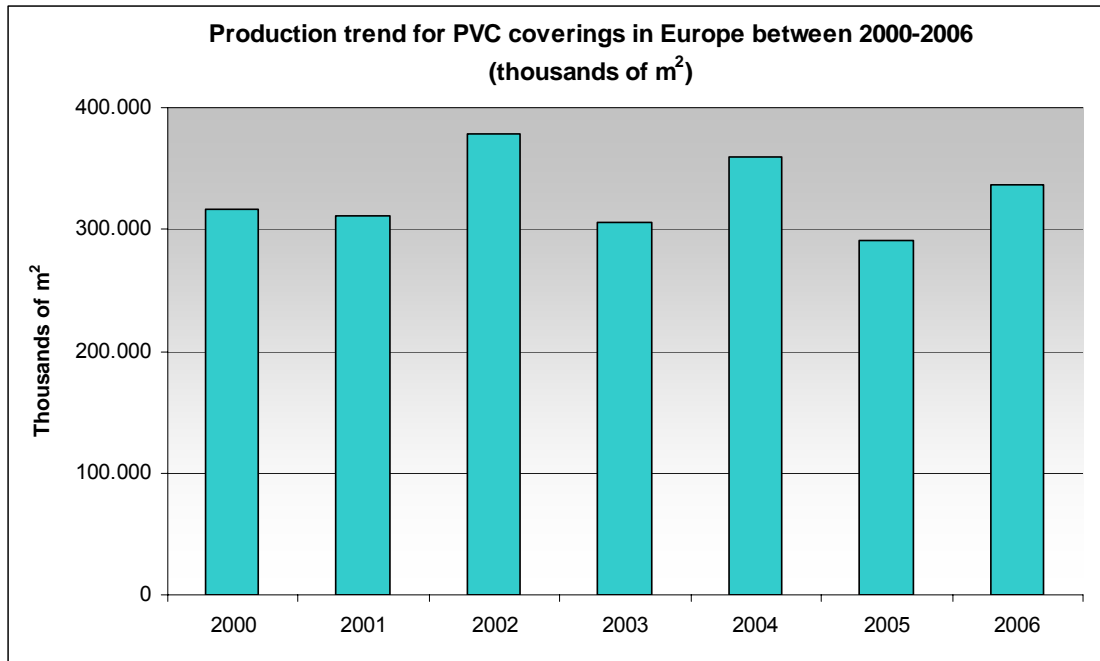
Figure 5.8 shows the production trends in some EU Countries. **EU 25** total production amount nearly to **1.700 million €** corresponding to **337 Mm<sup>2</sup>**.

Figure 5.9 presents the European production trend for the PVC coverings from 2000 (in m<sup>2</sup>).

However, for the period between 2003 and 2005 there is no data provided by Belgium.



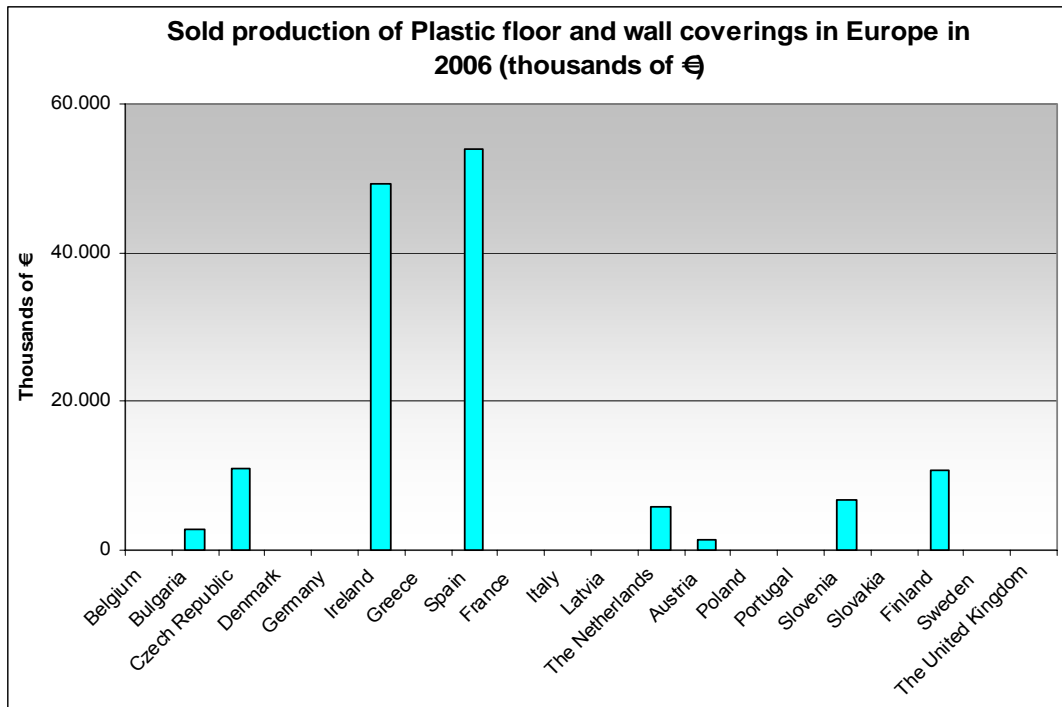
**Figure 5.8** - PVC floorings production in Europe in 2006 (in €) [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].



**Figure 5.9** - Production trend for PVC floorings in Europe between 2000-2006 (in mass) [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

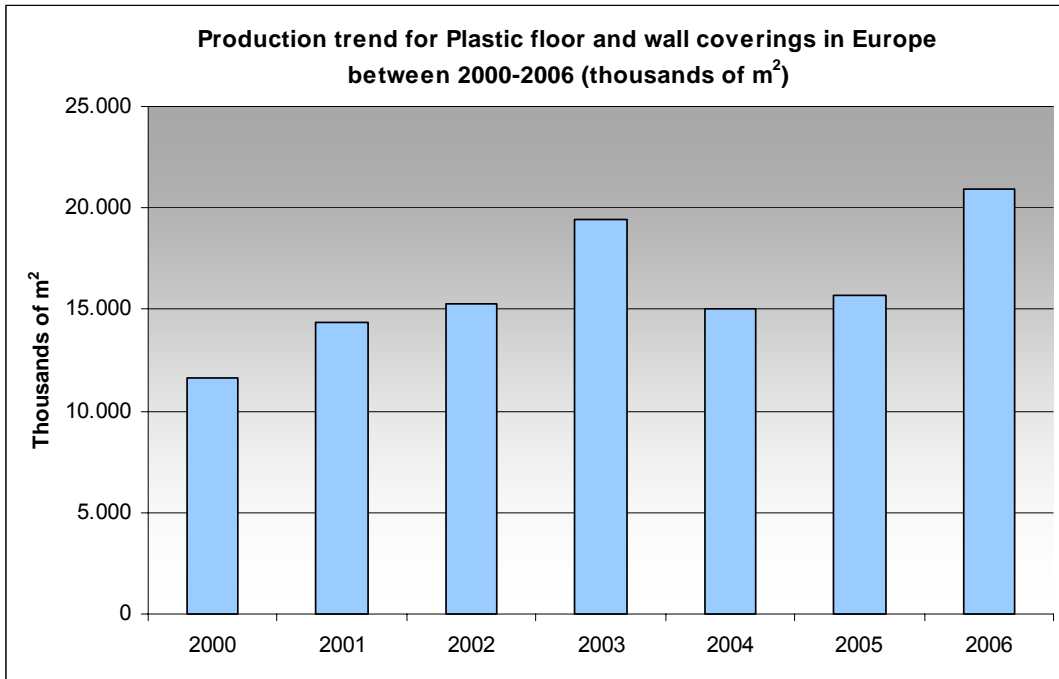
### Other plastics coverings

Figure 5.10 highlights the EU production of plastics covering (both for floor and wall surfaces), others than PVC presented above (example: Polyolefin).



**Figure 5.10** - Plastic (other than PVC) coverings production in Europe in 2006 (in €) [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

In Figure 5.11 are shown the values of the annual European production of plastic floor and wall coverings (in terms of mass) from the year 2000.



**Figure 5.11** - Production trend for PVC floorings in Europe between 2000-2006 (in mass) [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

**EU 25** total production amount nearly **162 million €** corresponding to **21 Mm<sup>2</sup>**.

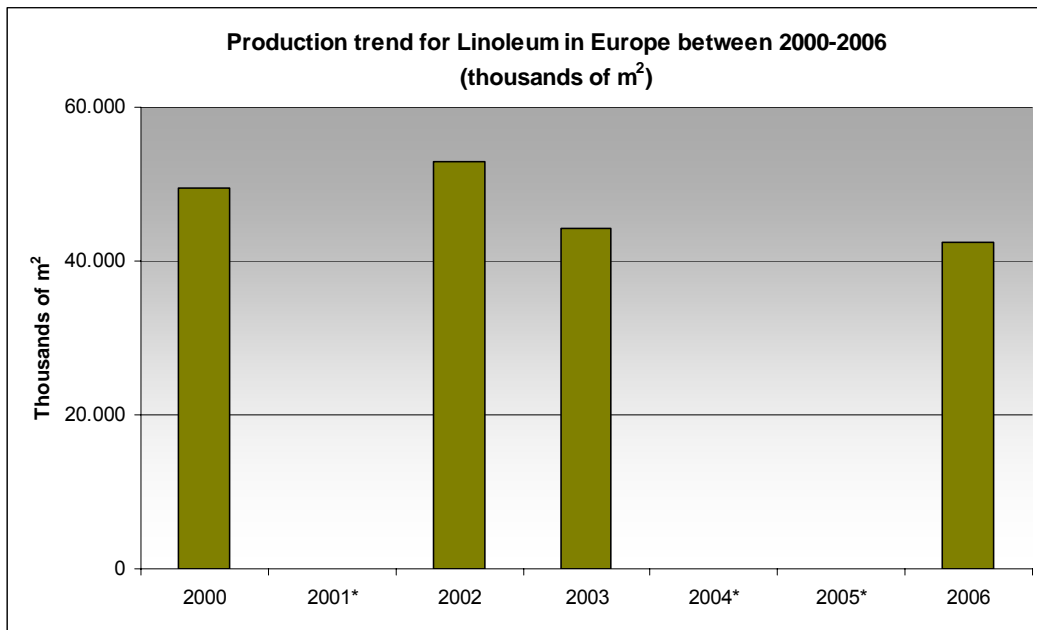
### Linoleum

Linoleum is a floor covering made from solidified linseed oil (linoxyn) in combination with wood flour or cork dust over a burlap or canvas backing. Pigments may be added to the materials used. The finest linoleum floors, known as 'inlaid', are extremely durable; they are made by joining and inlaying solid pieces of linoleum. Cheaper patterned linoleums came in different grades or gauges, and were printed with thinner layers which were more prone to wear and tear. Good quality linoleum is sufficiently flexible to be used in buildings in which more rigid material (such as ceramic tile) would crack.

Data are available for EU 25 Countries as a whole. Only for Italy and Denmark data are accessible separately.

Figure 5.12 shows production data from 2000: there is no information for the years 2001, 2004 and 2005.

**EU 25** sold total production amounts nearly **394 million €** corresponding to **43 Mm<sup>2</sup>**.



**Figure 5.12** - Production trend for Linoleum floorings in Europe in 2006 (in mass) [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].  
*\*Data for the years 2001, 2004 and 2005 are missing.*

### Laminate coverings

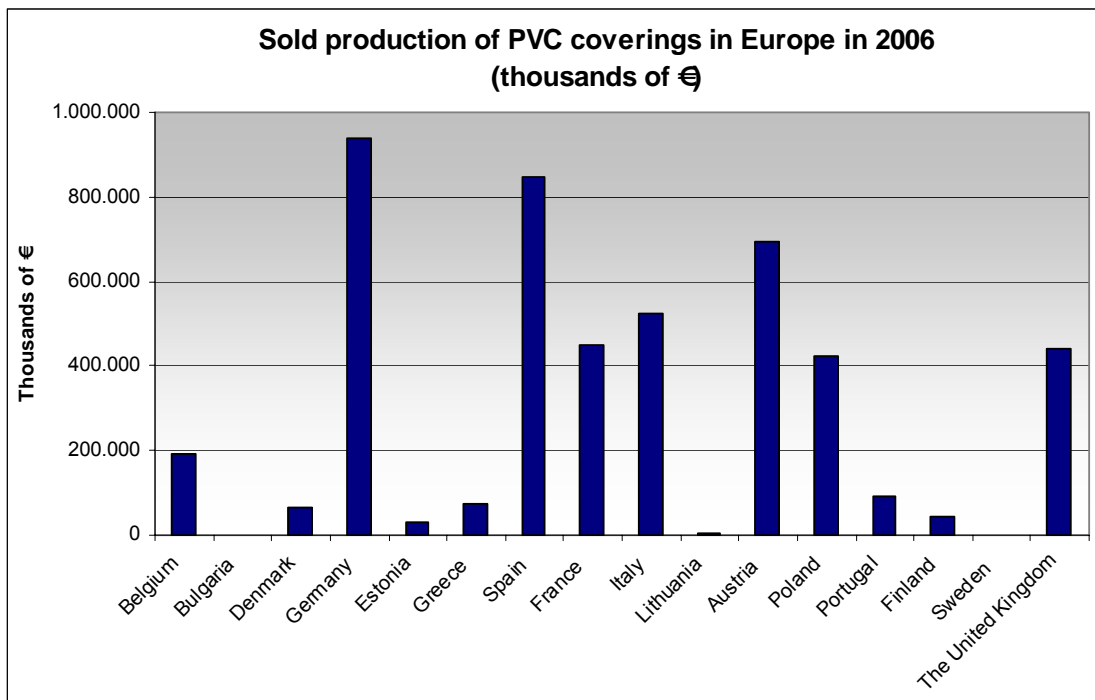


Laminates are made of a particleboard layer, covered with a decorative surface; the decoration could be made of laminated plastics or melamine resin impregnated paper. Probably the biggest change in laminate technology in recent years is the creation and acceptance of laminate flooring. Most laminate floorings are made with what manufacturers used to call low-pressure laminate. The current name is Direct-Pressure Laminate (DPL). However, High-Pressure Laminates (HPL) are

proving to be more satisfactory for commercial applications, including heavily trafficked businesses such as restaurants.

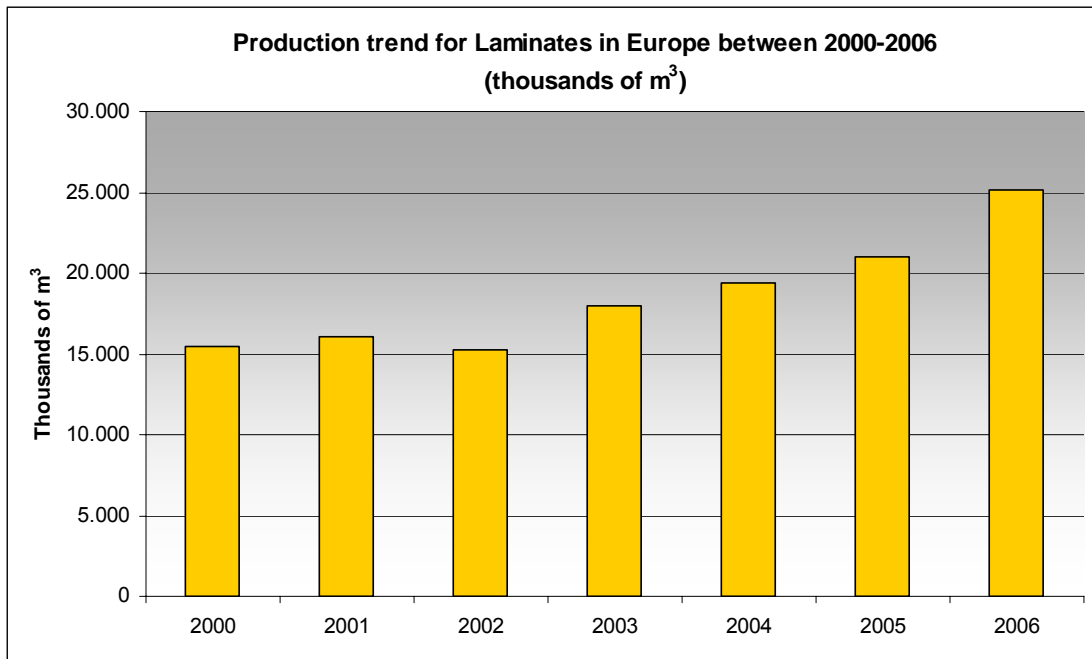
The EUROSTAT data for laminates production (Figures 5.1 and 5.13) are referred to all purposes, not only to coverings production. Thus, the values here presented overestimate the real dimension of the laminates floor and wall coverings industry.

The *European laminate floorcovering industry* determines its technical position in the European commission of normalisation **CEN/TC 134**.



**Figure 5.13** - Laminates (not only for flooring purposes) production in Europe in 2006 (in €)  
 [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

Figure 5.14 presents the trend of production (in terms of mass) of laminates in the European context since year 2000.



**Figure 5.14** - Production trend for Laminates (*not only for flooring purposes*) in Europe in 2006 (in mass)  
 [Source: EUROSTAT, 2007 (Data elaborated by LCE); national data available only for the Countries indicated in the graph].

**EU 25** total production amount nearly **5.375 million €** corresponding to **25 Mm<sup>3</sup>**. Considering a medium thickness of 9 mm for laminates on the market (for flooring and for other uses) this data correspond nearly to **2.800 Mm<sup>2</sup>**.



## Summary of the market analysis for SFC group

Here is presented a synthetic overview of the results acquired through the market analysis carried out on SFC groups (Table 5.2).

**Table 5.2 – SFCs European production in 2006 expressed in monetary terms (€) and in mass [(Data elaborated by LCE)].**

SFC Product Family	Sold production for paving Million €			European Production	
	EU	Notes	% on SFC total EU 25 Market	EU 25	Notes
<b>Carpets</b>	5.541		36	1.125 Mm <sup>2</sup>	
<b>Wood floorings</b>	2.748		17	143 Mm <sup>2</sup>	
<b>Rubber floorings</b>	183	Only referred to Spain, Italy, Portugal, UK	1	-	No available data
<b>PVC coverings</b>	1.700		9	337 Mm <sup>2</sup>	
<b>Plastics coverings (PVC excluded)</b>	162		1	21 Mm <sup>2</sup>	
<b>Linoleum coverings</b>	394		2	43 Mm <sup>2</sup>	No available data
<b>Laminates<sup>22</sup></b>	5.375		34	25 Mm <sup>3</sup>	= 2.800 Mm <sup>2</sup> <sup>23</sup>

<sup>22</sup> Data referred to the entire EU production of laminates, not only for floor coverings.

<sup>23</sup> Calculated on a medium thickness of 9 mm.





## PRELIMINARY OVERVIEW OF SFCs PRODUCTION PROCESSES

The aim of this chapter is to define the main characteristics of the manufacturing processes of the product families candidates to be included in the *SFC Product Group*.

For each family of products a synthetic description of the manufacturing process is given, including, when available, some information about composition and the total energy requirement indicator (GER)<sup>24</sup>. More environmental information will be given in the next point.

This is of course a preliminary and not exhaustive way of introducing a first element to discuss about environmental burden of considered products.

Different steps of the productive cycle attributable to the same phase are grouped together and underlined with the same colour:

-  Pre-production and agricultural phases
-  Raw materials extraction and procurement
-  Production operations
-  Finishing operations

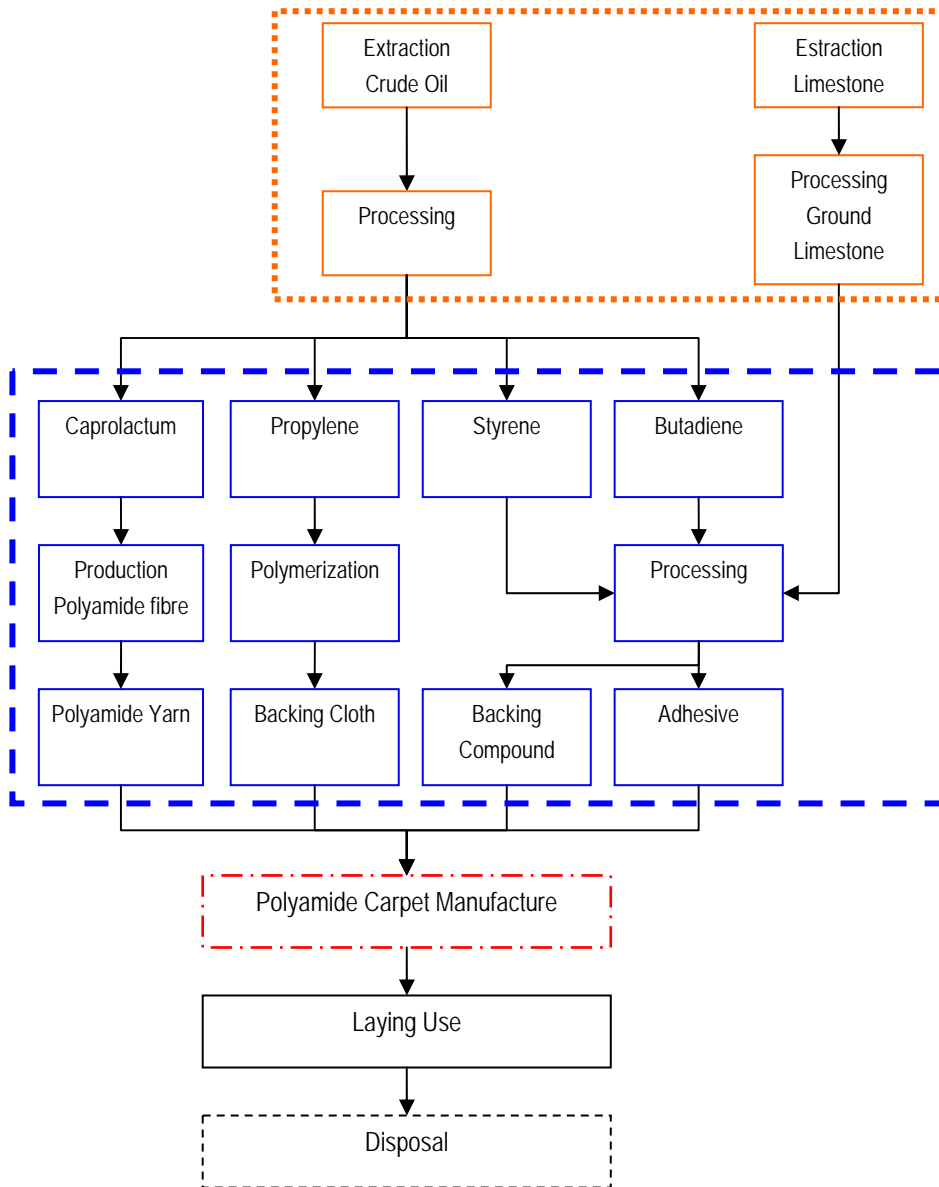
### Carpets

The manufacture of tufted carpet can be split into three processes:

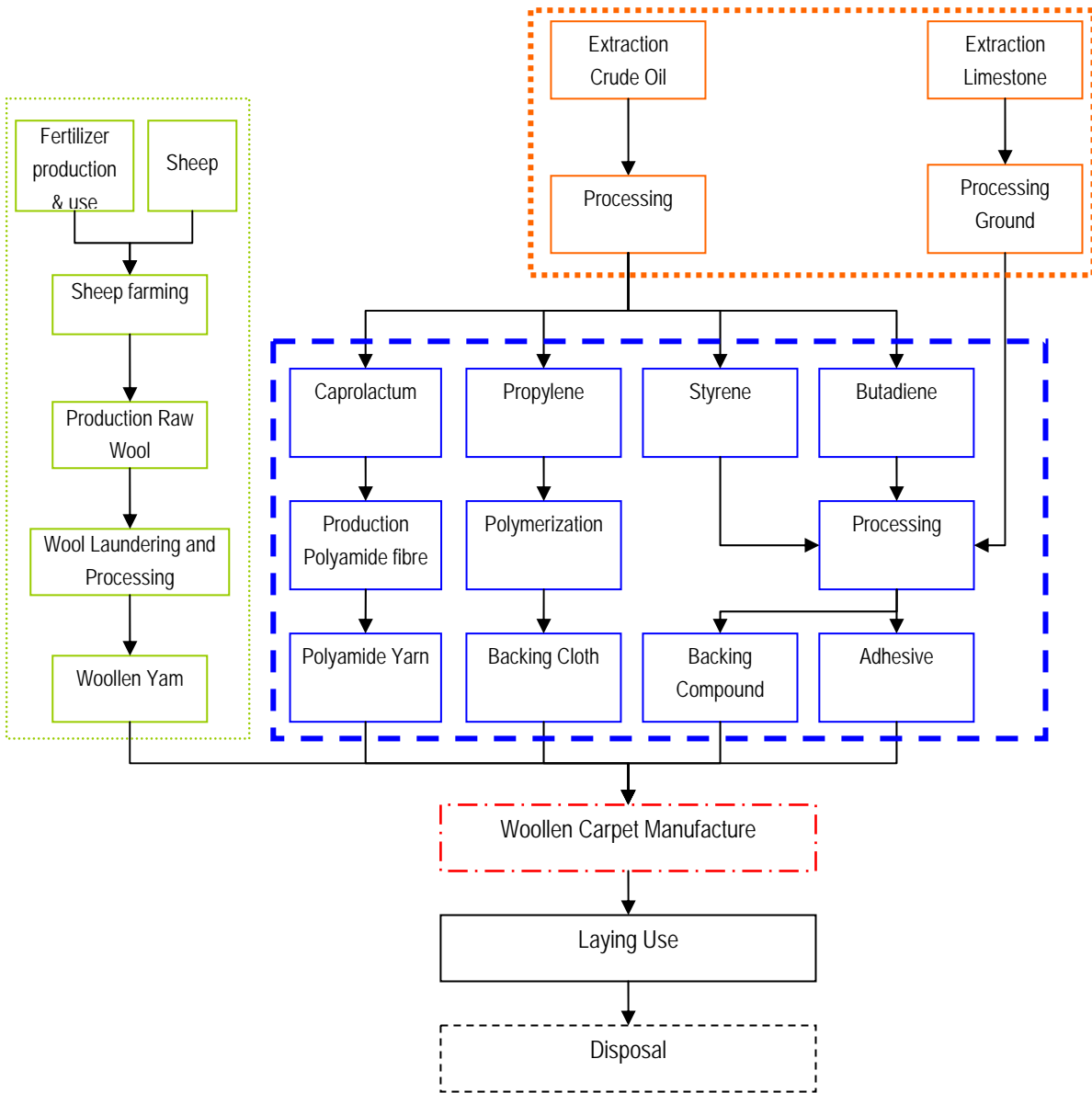
1. *Tufting*: in this phase of process a multi needled tufting machine is used to form the pile in the backing cloth.
2. *Dyeing*: the product is coloured unless the yarn was dyed beforehand.
3. *Backing*: the backing is then coated in adhesive and a foam or secondary backing applied.

Two examples of manufacturing processes are given in Figure 5.15 (polyamide carpet) and in Figure 5.16 (woollen carpet).

<sup>24</sup> This is a preliminary indication of the environmental burden linked to the production process. The Gross Energy Requirement indicator represents the total energy that is necessary to the investigated process from cradle to gate.



**Figure 5.15** - A flow chart of polyamide carpet manufacture.

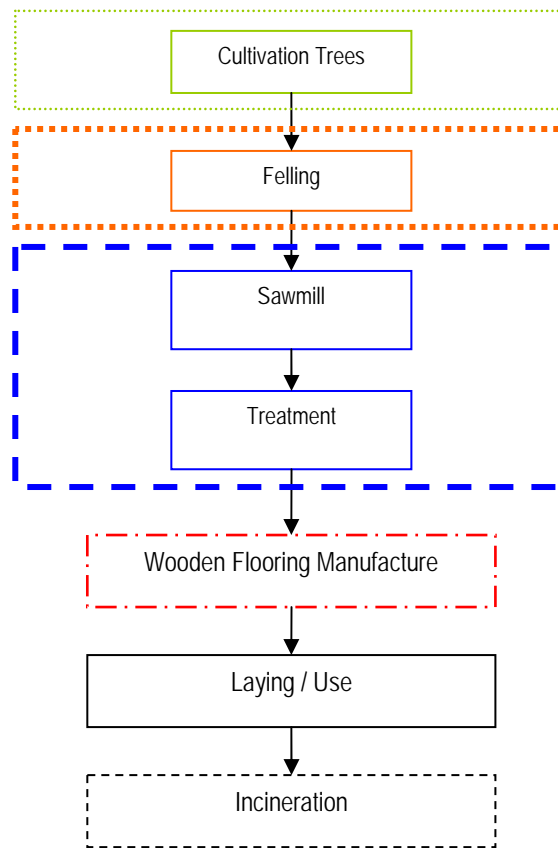


**Figure 5.16** - A flow chart of woollen carpet manufacture.

## Wood floorings

The manufacture of wooden flooring is relatively simple. However the timber has to be planted, grown, thinned, felled, soil-cultivated and re-planted. After felling, the trees are transported to sawmills where barking, sawing to the desired dimensions and drying take place. However some types of wooden flooring would require an intermediate processing/treatment stage. This may include the application of oil or lacquer.

Figure 5.17 shows an example of wooden flooring manufacturing processes.



**Figure 5.17** - A flow chart of wooden flooring manufacture.

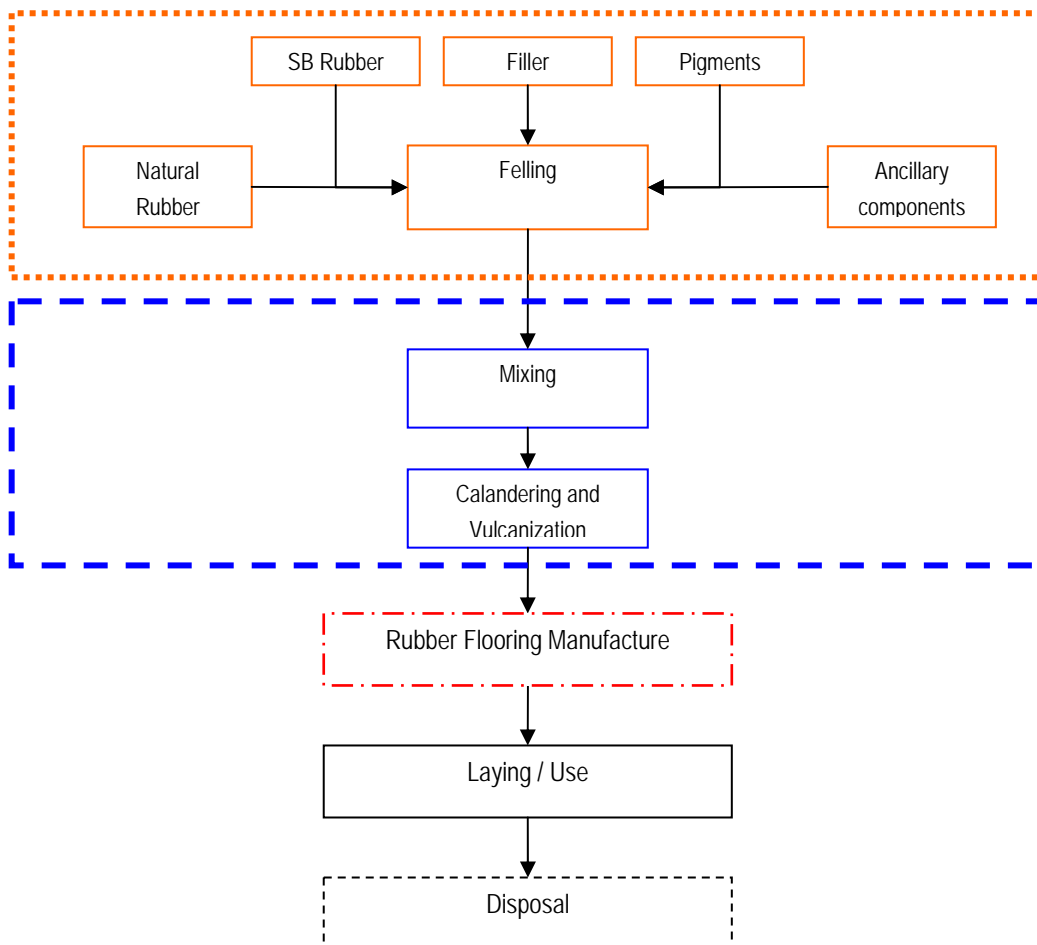
Table 5.3 shows a common composition formula for the wood floorings, with some indicative information about the energy requirement for the production of each component.

**Table 5.3** – A typical composition for the wood floorings production, including the gross energy requirement indicator for the production. (Data elaborated by LCE).

Wood floorings	Presence % in mass	GER (MJ/kg)
Wood ( <i>various layers</i> ) (prod & delivery)	95	8-12
Rag felt, adhesives (adhesive production)	5	130-150

### Rubber floorings

Rubber floorings are made of solid vulcanised rubber, in rolls of tiles. Today rubber flooring tiles are made most of all from synthetic rubber. It comes in ribbed, studded or other raised patterns. Figure 5.18 shows an example of rubber flooring productive cycle.



**Figure 5.18** - A flow chart of rubber flooring manufacture.

Table 5.4 shows a common composition formula for the rubber floorings, with some indicative information about the energy requirement for the production of each component.

**Table 5.4** – A typical composition for the rubber floorings production, including the gross energy requirement indicator for the production. (Data elaborated by LCE).

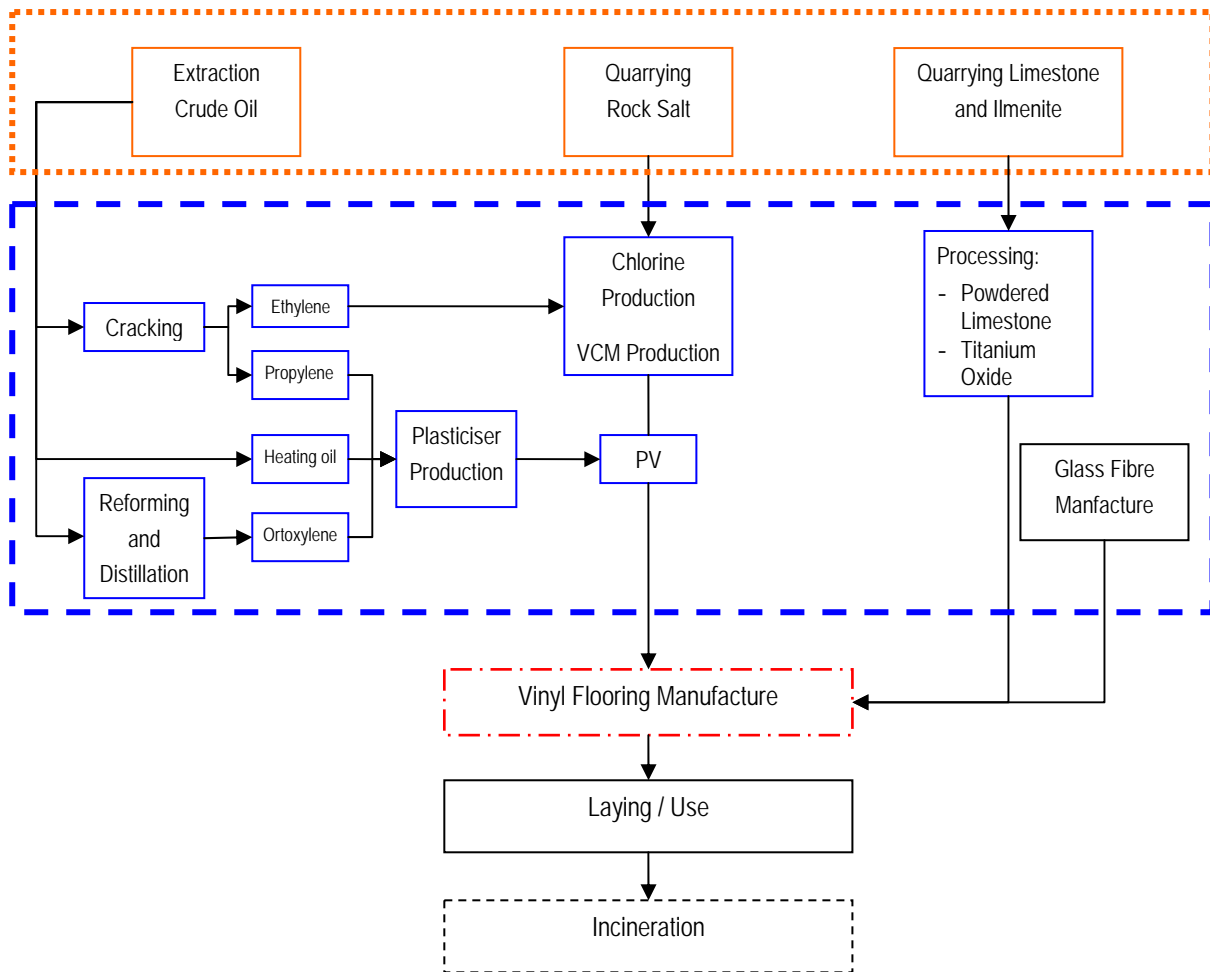
Rubber	Presence % in mass	GER (MJ/kg)
Clay(quarrying & milling)	35	1-3
Kaolin (production)	25	1-3
SB-rubber (production)	20	71 (feedstock 50)
Natural rubber	15	na
Pigments (production)	5	45-55

### Vinyl floorings (PVC floorings)

Vinyl is made from mixtures of polyvinyl chloride, plasticiser, limestone, stabilisers, pigments and other additives. Polyvinyl chloride is made from sodium chloride, ethylene and using electrical power. Some products have a final surface layer of polyurethane. The cutting waste is recycled into other products.

A flow chart of the main processes are shown in fig 5.19.

.



**Figure 5.19** - A flow chart of vinyl flooring manufacture.

Table 5.5 shows a common composition formula for a PVC floorings, with some indicative information about the energy requirement for the production of each component.

**Table 5.5** – An average composition for a PVC floorings production, including the gross energy requirement indicator for the production. (Data elaborated by LCE from PlasticsEurope ecoprofiles).

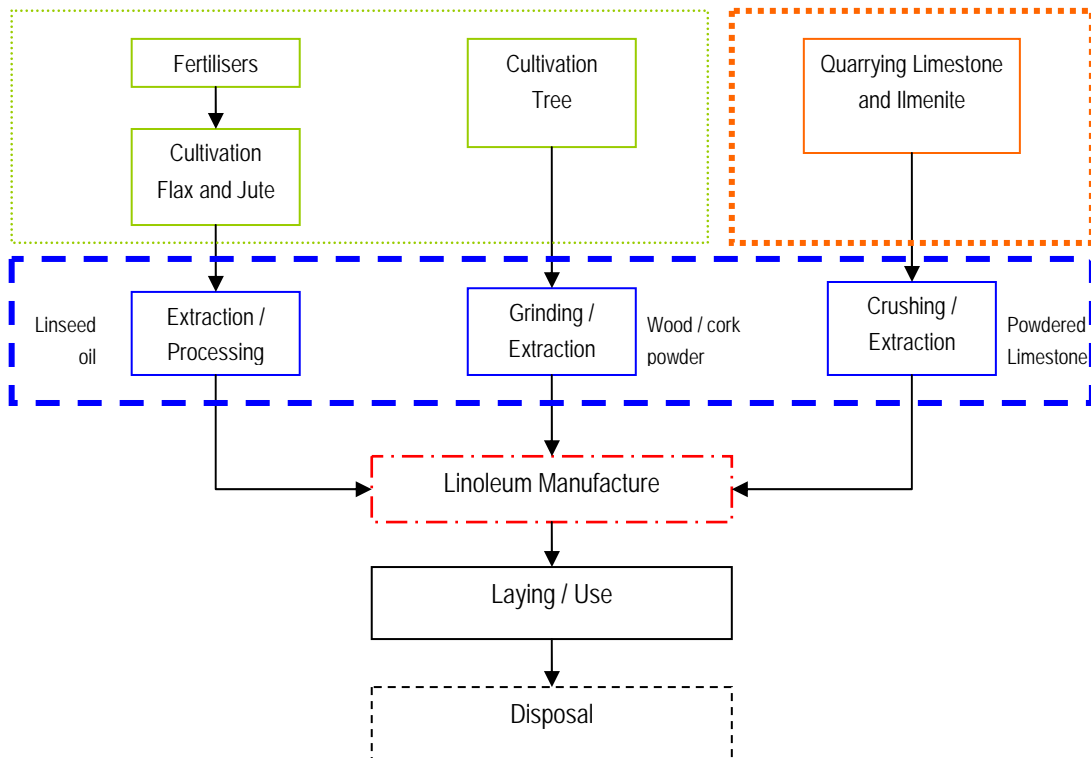
PVC (vinyl)	Presence % in mass	GER (MJ/kg)
PVC (plastisol production)	40-45	92 (feedstock 30)
Limestone (quarrying & milling)	20-30	1-3
Plasticiser	15-20	n.a.
Foaming agent (polyester)	0-5	n.a.
Pigments (production)	0-5	45-55



## Linoleum

Linoleum floorings consists of a very hard layer of linoleum compound on a backing cloth of jute. The compound is a mixture of linseed oil, colophonium (a resin from coniferous trees), limestone, ground wood, ground cork, and pigment. Linseed oil and colophonium are oxidised and then mixed with the other ingredients. Titanium dioxide is used as the main pigment. The mixture is pressed with a roller onto a woven backing of jute and dried. It is then finished with an acrylate dispersion layer. The cutting waste is recycled into the process of linoleum manufacture.

A flow chart of the process is shown in figure 5.20.



**Figure 5.20** - A flow chart of linoleum manufacture.

Table 5.6 shows a common composition formula for the linoleum floorings, with some indicative information about the energy requirement for the production of each component.

**Table 5.6** – A typical formula for the linoleum floorings production, including the gross energy requirement indicator for the production. (Data elaborated by LCE).

Linoleum composition	Presence % in mass	GER (MJ/kg)
Wood powder (growing, drying, milling)	30	20-30
Linseed oil	25	n.a.
Limestone (quarrying & milling)	20	1-3
Jute	10	n.a.
Colophony (pitch prod)	5	40-50
Cork	5	n.a.
Pigments (production)	5	45-55

## Laminates

Laminate flooring is a rigid floor covering with a surface layer consisting of one or more thin sheets of a fibrous material (or “particleboard”), impregnated with aminoplastic thermosetting resins (usually melamine). A particleboard is a panel made from small discrete wood elements, mainly wood processing waste, with a water-resistant adhesive binder mainly for indoor uses. A huge variety of particle size and board thickness is manufactured. There are two main sources of wood raw material: forest thinnings and sawmill residues such as slab wood, hacked or pulp chip, dockings, planer shavings and sawdust (Rivera, 2006).

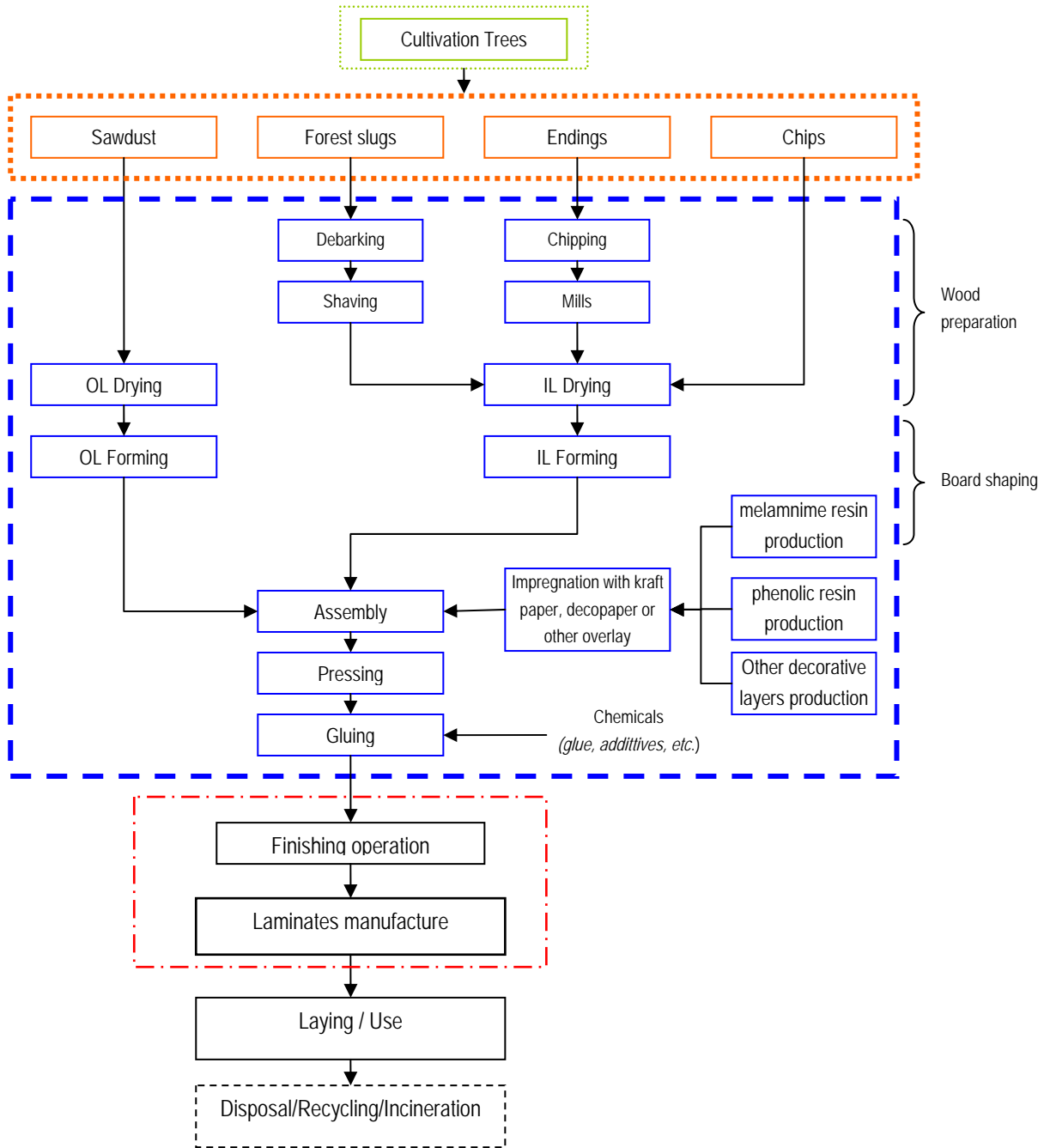
The process chain for particleboard manufacture can be subdivided in three main subsystems:

- *Wood preparation*: the raw material in input is refined, classified and dried;
- *Board shaping*: the material is blended with binding agents and pressed;
- *Board finishing*: the material is cut and sanded into the final product.

After these phases, the particleboards need to be covered with a laminated covering. Two methods are typically used in the manufacturing of laminate flooring. High Pressure laminate (HPL) and Direct Pressure Laminate (DPL). Direct pressure laminate is made up of three layers, while a High Pressure Laminate is made up of a minimum of five layers and is superior in terms of resistance but more expensive. The various sheets are pressed and, in the case of HPL, bonded on a substrate, or, in the case of DPL, directly pressed on a substrate. The laminate flooring is normally finished with a backing primarily used as a balancing material.

Laminate cores range in thickness from 6 mm to 12 mm, with a thicker core usually denoting a more stable product. An exception to this rule is High Pressure Laminate (HPL), which although has a much thinner core compared to DPL, is stronger and more durable.

An exemplificative flow chart of the production process is shown in Figure 5.21 also if each chipboard factory has its own process condition, the general flow sheet is common in all of them.



**Figure 5.21** - A simplified flow chart of laminates manufacture (Data elaborated by LCE). *OL=Outside Layer; IL=Internal Layer.*

Table 5.7 shows a typical composition formula for wood laminates, with some indicative information about the energy requirement for the production of each component.

**Table 5.7** – A typical formula for the laminates production, including the gross energy requirement indicator for the production. (Data elaborated by LCE).

Laminate composition	Presence % in mass	GER (MJ/kg)
Chips & Shavings (int. layer) (growing, drying, milling)	60	20-30
Shavings & sawdust (ext. layer) (growing, drying, milling)	30	20-30
Adhesives (UF, PF, MF resin)	9	130-150
Paraffin	0,3	n.a
Ammonium sulphate	0,1	n.a

## SUMMARY OF ENVIRONMENTAL ASPECTS LINKED TO SFCs

A qualitative indication of the environmental impacts from the whole life-cycle of some floor covering products and the identification of the lifecycle stages where they usually occur arises from a CSERGE comparative study between different floor coverings (CSERGE, 2000).

Moreover, also the following studies have been used:

- Günther, A. & Langowski, H-C. (1997) Life Cycle Assessment Study on Resilient Floor Coverings. Includes: PVC, cushioned PVC, polyolefin, rubber, linoleum, textiles and parquet.
- Gorrée Marieke; Jeroen Guinée; Gjalt Huppes & Laurant van Oers. (2002) - Life Cycle Assessment of Linoleum.

Of course, this preliminary summary will introduce the LCA methodology application to the SFC products that will be selected for the Ecolabel purposes.

Table 5.8 shows a possible matrix of environmental aspects that should be considered as starting point for the future eventual LCA assessment study on each product group.

**Table 5.8** - Example of assessment matrix for life cycle of products for SFC group families.

Legend: “H” indicates *high significance*, “M” indicates *medium significance*, “L” indicates *low significance*, “nd” indicates *not detectable* [source: CSERGE, 2000 (data from tab. 7 and tab. 8, elaborated by LCE)]

		Soft Floor Covering product group		
		Type A	Type B	Type C
Environmental aspects	Energy requirements	M	H	L
	Global Warming Potential	H	M	M
	Acidification	H	M	L
	Tropospheric Ozone Depletion	H	M	L
	Eutrophication	H	L	M
	Waste production	H	H	H
Water demand	nd	nd	L	
Lifecycle stages	Pre-production	H	H	L
	Raw materials	L	L	nd
	Production	L	nd	L
	Use <sup>[2]</sup>	H	H	M
	Disposal	M	M	L

[2] Cleaning of floors can require more energy over the lifetime of flooring than the production stage.

CSERGE document specifies that the results of different studies are not always comparable as their boundaries are different and different assumptions are made.

Some LCAs included the use phase in the system boundaries, while others do not. In addition, different assumptions are made about the disposal of the end of life product: some assume that the waste products are incinerated with energy recovery, others assume a situation in which a percentage of waste is directed to landfill and the remaining to incineration. The studies also include different transport distances and energy sources production.

The results collected by different studies and used for this preliminary analysis, however, can be used to highlight the main environmental impacts linked to production and use of some families of soft floor coverings.

Another point is that there are great differences within the material groups due to the different formulas for individual products, as shown in the tables exposed in the sections concerning the productive processes (*see Chapter 5.2*).

These above are some of the reasons because the Table 5.8 cannot be used for all the product families at the same time. The matrix can be used to compare different products belonging to the same group (*for instance: polyamide vs. woollen carpet, HPL vs. DPL laminates, etc...*), but it would be senseless to compare very different groups (*for instance: laminates vs. carpet, linoleum vs. PVC coverings, etc...*).

Some studies<sup>25</sup> refer that, between resilient floor coverings, linoleum has a limited contribution to almost all types of environmental impact. Woollen tufted carpet, instead, makes a high contribution to eutrophication, global warming, stratospheric ozone creation, acidification and waste. The polyamide carpet has a considerable energy requirement.

Another aspect that has to be considered is that vinyl manufacture presents safety risks associated with the production and transport of chlorine. Nevertheless, as the valuation of risk is not normally taken into consideration in an LCA, this aspect does not appear in the assessment matrix of Table 5.8.

Significant is the finding that the actual achieved lifetime of flooring has major impact on the environmental performance. In general, wall and floor coverings are not used for the full duration of their technical lifetime. The premature disposal of the flooring, both due to inappropriate selection or due to a decision to replace the floor because of changes in consumer taste, can have greater environmental impacts than most other options for improvement, and is the reason for the high values for waste production. Clearly, the environmental impacts over the life of a product vary considerably with the different lifetimes. An indication of the medium lifetime of different types of floorings, that take into consideration technical and voluntary (i.e. choice of consumer) aspects, is shown in Table 5.9.

The “use phase” can have a significant impact on the overall results: the energy used in cleaning the flooring, i.e. the electricity consumption of a vacuum cleaner, in fact, often exceeds the gross

<sup>25</sup> Potting & Blok (1995)

energy value of the production and disposal phases<sup>26</sup>. Similarly, the water demand in the use phase greatly exceeded the quantity used in production.

Generally, all the studies agree that environmental improvements could be made in all the production processes for all flooring at all lifecycle stages.

**Table 5.9** - Average lifetime of alternative types of soft floor coverings [CSERGE, 2000 (Data elaborated from LCE) – ceramic tiles are reported as well to compare data].

Type of flooring	Lifetime [years]	Reference
<b>Carpets &amp; Vinyl</b>	8	Forbo Novilon (1993); Caesar (1992) cited by Potting & Blok (1995)
<b>Vinyl</b>	20	Hydro Plast AB & Tarkett AB. (1993-4) cited by Jonsson <i>et al</i> (1997)
<b>Linoleum</b>	15	Forbo Krommenie (1993) cited by Potting & Blok, (1995)
	25	Forbo Krommenie (1993) cited by Jonsson <i>et al</i> (1997)
<b>Solid wood</b>	7 - 40	Hydro Plast AB, & Tarkett AB (1994) cited by Potting & Blok (1995) Günther & Langowski (1997)
<b>Textile</b>	5	Günther & Langowski (1997)
<b>Parquet</b>	50	Günther & Langowski (1997)
<b>Ceramic tiles</b>	ca. 50	Günther & Langowski (1997)

Some points that have to be highlighted are:

- in the use phase the environmental impacts arising from floor maintenance are particularly high, especially when vacuuming cleaning is considered;
- the agricultural system associated with woollen carpets and the disposal of flooring are also stages that can have considerable environmental impacts;
- most production processes have opportunities for improvement in the environmental impacts that can be influenced by consumer choice.

About laminate floorings, it is possible to say that environmental impacts of production are limited: in fact, most of raw materials used for the manufacture of particleboards (structural part of laminates) usually comes from other factories (sawmills, etc.) or represents the refuse material of other processes (forest slugs, chips, etc.).

From the results of some LCAs studies, one of which realized with data from manufacturers of nine European countries, representing 70% of the total European market (Table 5.10), to determine

<sup>26</sup> Günther & Langowski (1997)

laminates sustainability<sup>27</sup>, and another realized for an EPD document on wood particleboards<sup>28</sup> and others<sup>29</sup> it emerged that laminates:

- have a low impact on the ozone layer over their whole life;
- have an high calorific value and are ideal for thermal recycling;
- do not deplete biotic resources such as wood because their lifetime is longer than cultivated forests need to grow;
- reduce the impact on abiotic resources when treated after their long life using thermal recovery. Abiotic depletion is due to the use of non-renewable resources, such as oil, natural gas, coal, and metals.

**Table 5.10** - Example of eco profiles of high-pressure decorative laminate (HPL) and its elements [Source: ABET INFOTEC, 1999 (pag.3)].

ENVIRONMENTAL IMPACT CLASS		High Pressure Decorative Laminate, 1 m <sup>2</sup> A		Chipboard 1 m <sup>2</sup> B	HPL Element 1 m <sup>2</sup> C			Total life cycle A+B+C
		Raw materials	Production	Raw materials and Production	Gluing and packing	Service Life	Waste treatment	
Abiotic depletion	(*)	12	3	41	2.09	3,1	0,42	20
Biotic depletion	yr	0	0	0	0	0	0	0
Greenhouse effect	Kg	4,5	1.4	19	2,00	1,2	5	33
Depletion of the ozone layer	10 kg	0,77	0,52	15	0,68	0	0,21	4,2
Energy	MJ	63	20	271	34	17	0,3851	24
Waste	Kg	0,066	0.074	0,446	0.062	0,001	0,381	0,267

\*It has been indicated with no unit, since the use of materials necessary for the product is related to the (estimate) amount of recoverable nowadays existing reserves.

However, is clear that the main impacts from laminate flooring are energy consumption and the possible emission of formaldehyde from additives used in the production phases<sup>30</sup>.

Another environmental issue related to laminates is the way to bond it to a substrate. In most applications, the use of *floating floorings* gives the advantage not to use any glue or other substances to fix the product to the substrate.

<sup>27</sup> ABET INFOTEC (1999).

<sup>28</sup> SAIB (2006).

<sup>29</sup> RIVELA (2006).

<sup>30</sup> CSERGE (2000)



## PRODUCT GROUP DEFINITION

The European Regulation 1980/2000 article 2 states that *"product group must fulfil the following conditions:*

- (a) it shall represent a significant volume of sales and trade in the internal market;*
- (b) it shall involve, at one or more stages of the product's life, a significant environmental impact on a global or regional scale and/or of a general nature;*
- (c) it shall present a significant potential for effecting environmental improvements through consumer choice as well as an incentive to manufacturers or service providers to seek a competitive advantage by offering products which qualify for the Ecolabel; and*
- (d) a significant part of its sales volume shall be sold for final consumption or use"*

From the market analysis, it is clear that **carpets** (36%) are the most important SFC category (in terms of sold production value). **Wood floorings** (17%) and **laminates** (34% *not only for covering uses*) are then other important product categories. However, the laminates value, as stated previously, includes not only floor coverings products, but also other goods as office furniture (i.e.: desks, etc...)

Considering the environmental aspects, analysed, it appears that:

- among the resilient floor coverings group linoleum makes the smallest contribution for almost all types of environmental impacts;
- among carpets group, woollen carpets makes a great contribution for almost all types of environmental impacts compared to polyamide carpets;
- polyamide carpets have a considerable energy requirement;
- the environmental impacts are particularly high in the use phase, floor maintenance, for some products;
- the main impacts for laminates flooring are energy consumption and emission of formaldehyde in the production phase that can be reduced using floating flooring;
- other stages of production process have high environmental impacts, such as the agricultural system associated with woollen carpets and the disposal of flooring;
- considering the medium lifetime of flooring solid wood (7-40 years) and parquet (50 years) have the highest lifetime duration compared to HFC ceramic tiles (ca. 50 years);
- the production processes evaluated for these products have opportunities for improvement, at all lifecycle stage, with the aim of reducing the environmental impacts.

However, it must be taken into account that there are great differences within the material groups due to the different formulas for individual products.

The product group definition will consider all the previous paragraphs outcomes, based on market data, on environmental life cycle approach analysis and national labels experience.

The candidate categories for new product groups for which a specific set of criteria for the Ecolabel Scheme will be proposed are shown in Table 5.11.

**Table 5.11 - Proposal of Product Group definition categories.**

Category	Description
<b>Carpets</b>	Heavy, durable floor covering, usually of woven, knitted, or needle-tufted fabric, commonly installed with tacks or staples, or by adhesives.
<b>Wood and Timber floorings</b>	Coverings made from the timber of hardwoods or of spruce or hard pine. A wood floor can be <b>unfinished</b> , and once installed sanded, then finished on site or, more modernly, <b>pre-finished</b> in a factory.
<b>Laminates</b>	Rigid floor covering with a surface layer consisting of one or more thin sheets of a fibrous material (usually paper), impregnated with aminoplastic thermosetting resins (usually melamine), pressed or bonded on a substrate, normally finished with a backer.

- These are the most relevant categories in terms of production sold in the European markets (see Figure 5.1) In the last decade, there has been a strong trend of sales increases (see Figure 5.2) for these products. Furthermore, as indicated previously the production processes for these products have opportunities for improvement reducing environmental impacts during their lifecycle.

It should also be considered to omit the term “Soft” in the group definition, since it could imply the exclusion of the wood coverings and laminates groups, which cannot be properly considered as *soft coverings*.

## 6. Floor Coverings product group definition

From the discussions on the SFC criteria development it emerged that it would not be correct to use “Soft Coverings” terminology” for every product family: for instance, wood and laminates floorings are not properly “soft”, indeed, they can almost be defined as “Hard Coverings”, because of their structural rigidity.

Proposals for the new product group definition are listed below with relevant comments.

### 1<sup>st</sup> Proposal

This scheme must be used only if the proposal of extension of HFC group to wall coverings is not accepted, so that the product group name can be modified in “Floor coverings” (see figure 6.1).

This group is then divided into six main product categories ,which have the same function, comparable production processes and similar environmental impacts. It should be taken into account that some of these categories require further subdivision since the products differ in an important way in the manufacturing process (DPL and HPL) or in the raw materials used (e.g.: woollen and polyamide carpets).

This main group will include different categories in one single Decision named “Floor Coverings”

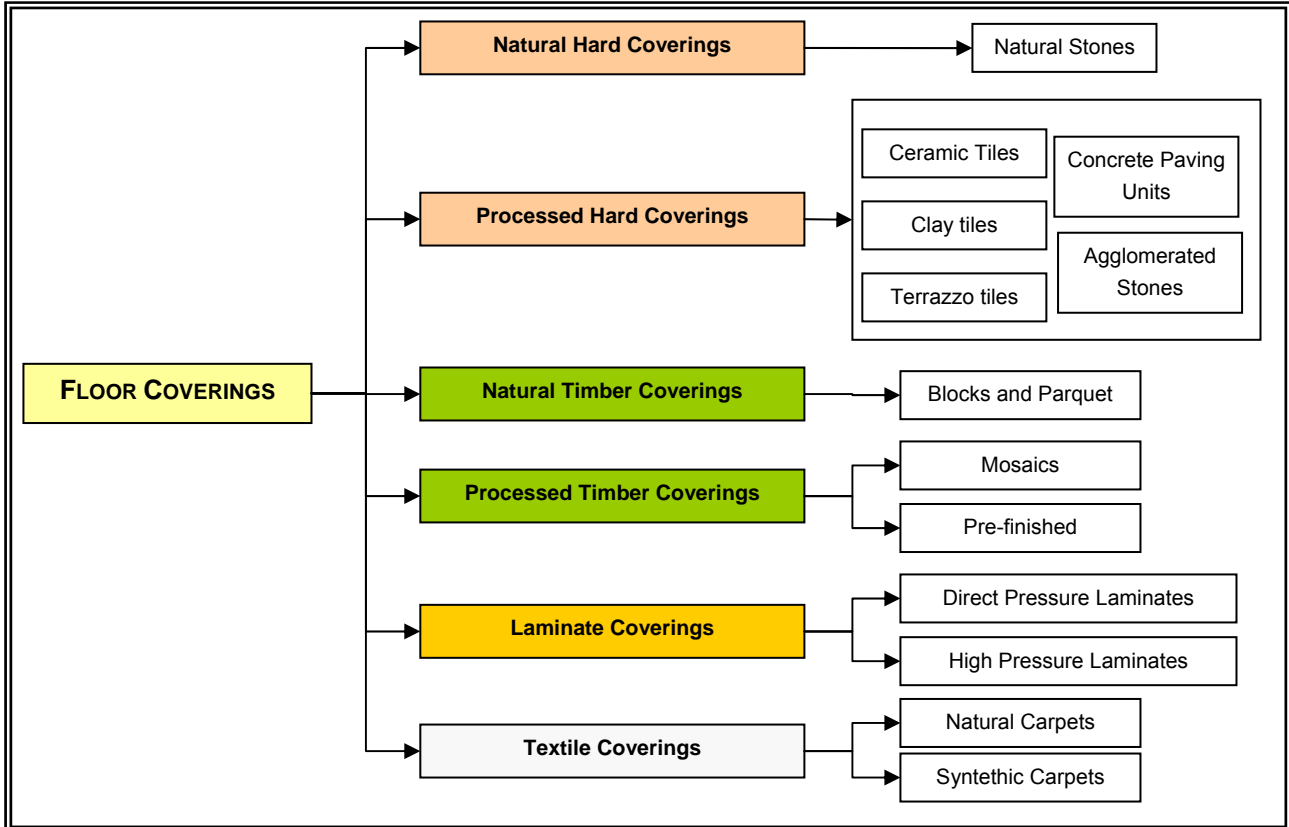


Figure 6.1 - Flow chart of the 1<sup>st</sup> proposal of Product Group definition scheme and categories.

## 2<sup>nd</sup> Proposal

The proposal considers the possibility that HFC group is extended also to wall coverings and that the group name is then modified to “Hard Coverings” instead of "Hard floor coverings" (see Figure 6.2). For the other families, instead, it is specified that the criteria are restricted only to flooring uses, since the products themselves and production processes differ clearly between floor and wall coverings.

The main group, in this case, consists of heterogeneous categories and must be as wide as possible, thus it is generically named “Coverings” (see Figure 6.2). This group is then divided into four categories comprising products with similar characteristics: in this option , “Hard Coverings” become a subdivision of the principal group as well. The other three families are considered separately “Wood and Timber Floor Coverings”, “Laminates Floor Coverings” and “Textile floor Coverings” (i.e. carpets). Some of these categories require further subdivision since the products

differs differ in an important way in the manufacturing process (DPL and HPL) or in the raw materials used (e.g.: woollen and polyamide carpets).

This main group will include different categories in one single Decision named "Coverings" .

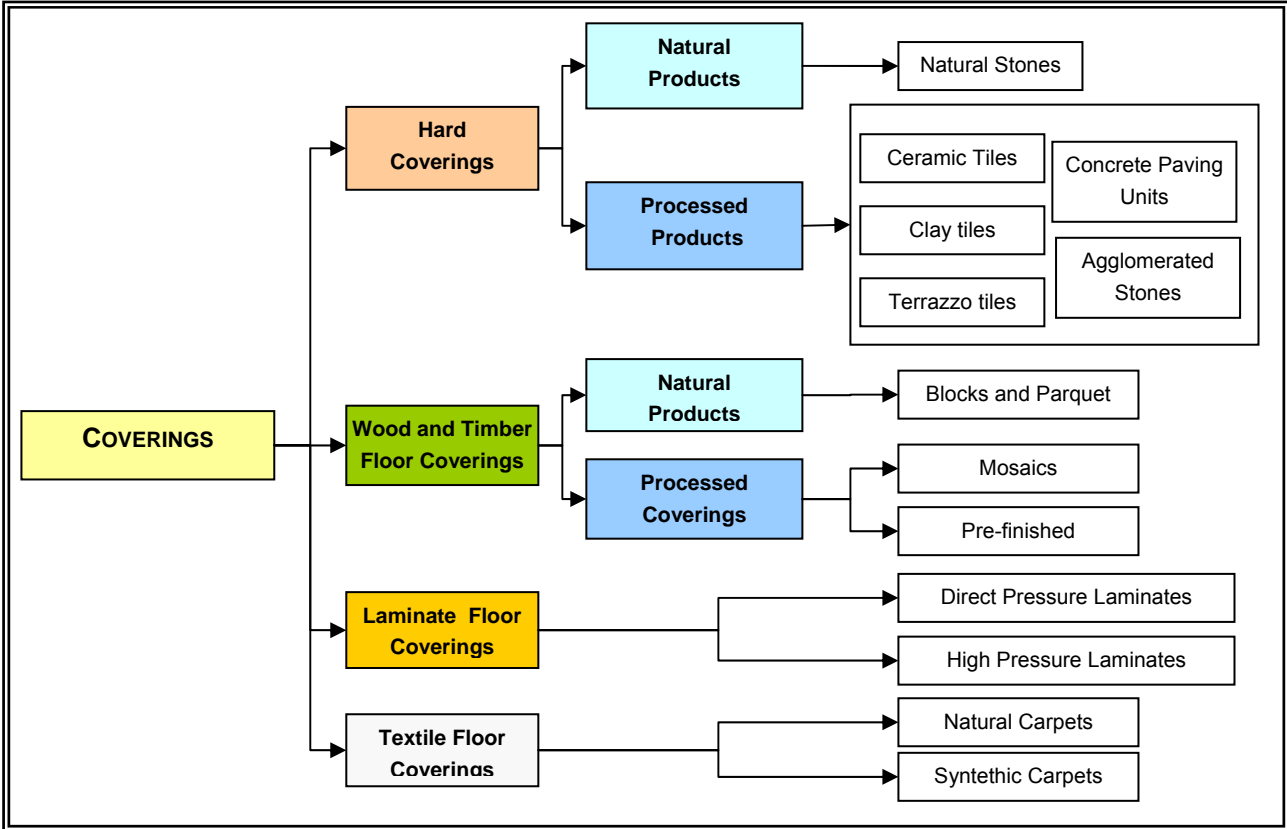


Figure 6.2 - Flow chart of the 2<sup>nd</sup> proposal of Product Group definition option and categories.

### 3<sup>rd</sup> Proposal

This proposal classifies a wider group consisting of heterogeneous categories, called generically “Coverings” (see Figure 6.3)

A further distinction takes place in two main categories in which all products have the same function and comparable environmental impacts - “Natural Products” and “Processed Products”. These include the product groups previously singled out and for which specific sets of criteria will be proposed.

This group will include "natural covering" and "processed covering" in one single Decision named "Coverings"

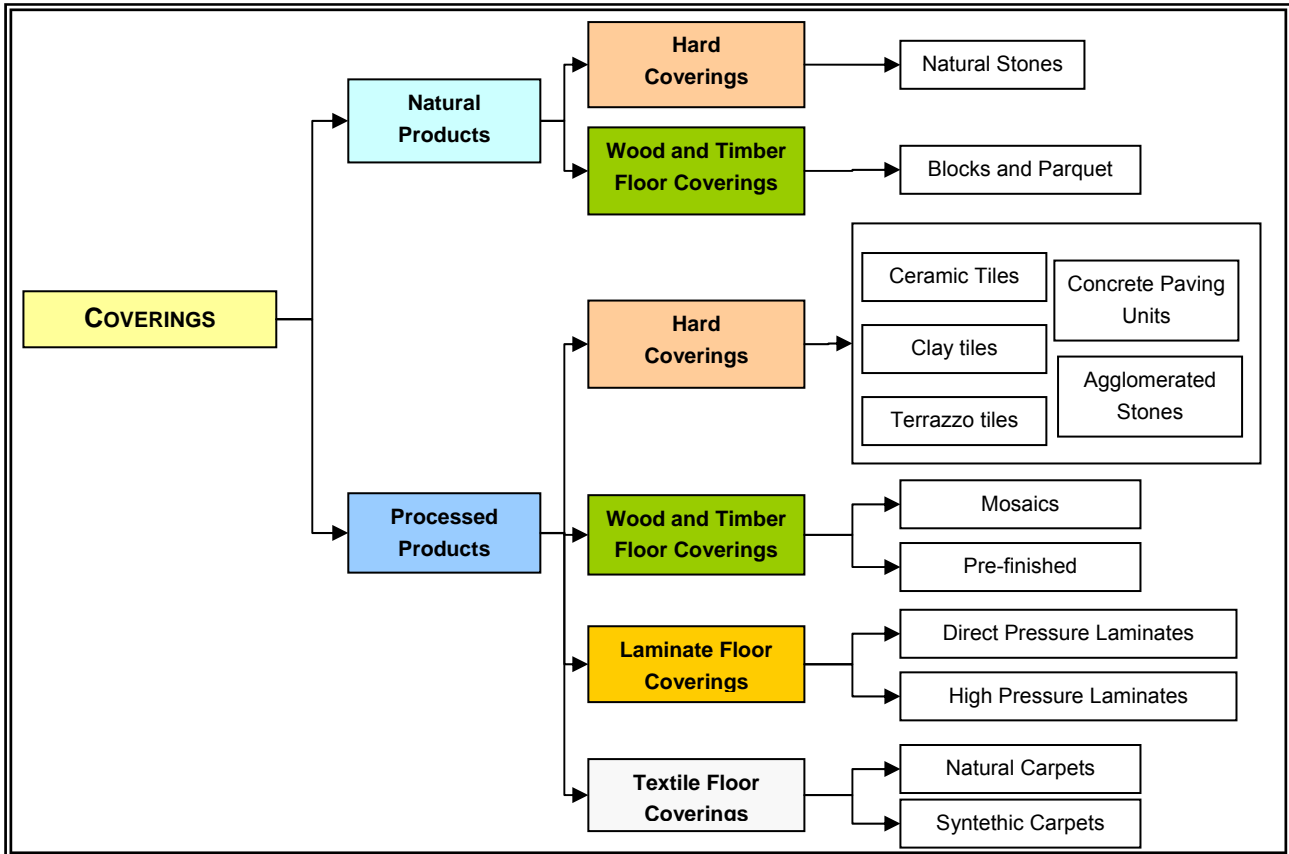


Figure 6.3 - Flow chart of the 3<sup>rd</sup> proposal of Product Group definition option and categories.

### 4<sup>th</sup> Proposal

A further final possibility is to define three main product groups (see Figure 6.4): “Hard Floor Coverings” (or “Hard Coverings”, in the case the inclusion of Wall Coverings is accepted); “Wood Based Floor Coverings”, divided into “Wood and Timber Flooring” and “Laminates”, mostly composed of particleboard and covered by a “non wooden decorative layer” and “Textile Floor Coverings”, containing only the Carpet group.

This proposal would result in three different Decisions namely:

- “Hard Floor Coverings” or “Hard Coverings”
- “Wood Based Floor Coverings”
- “Textile Floor Coverings”

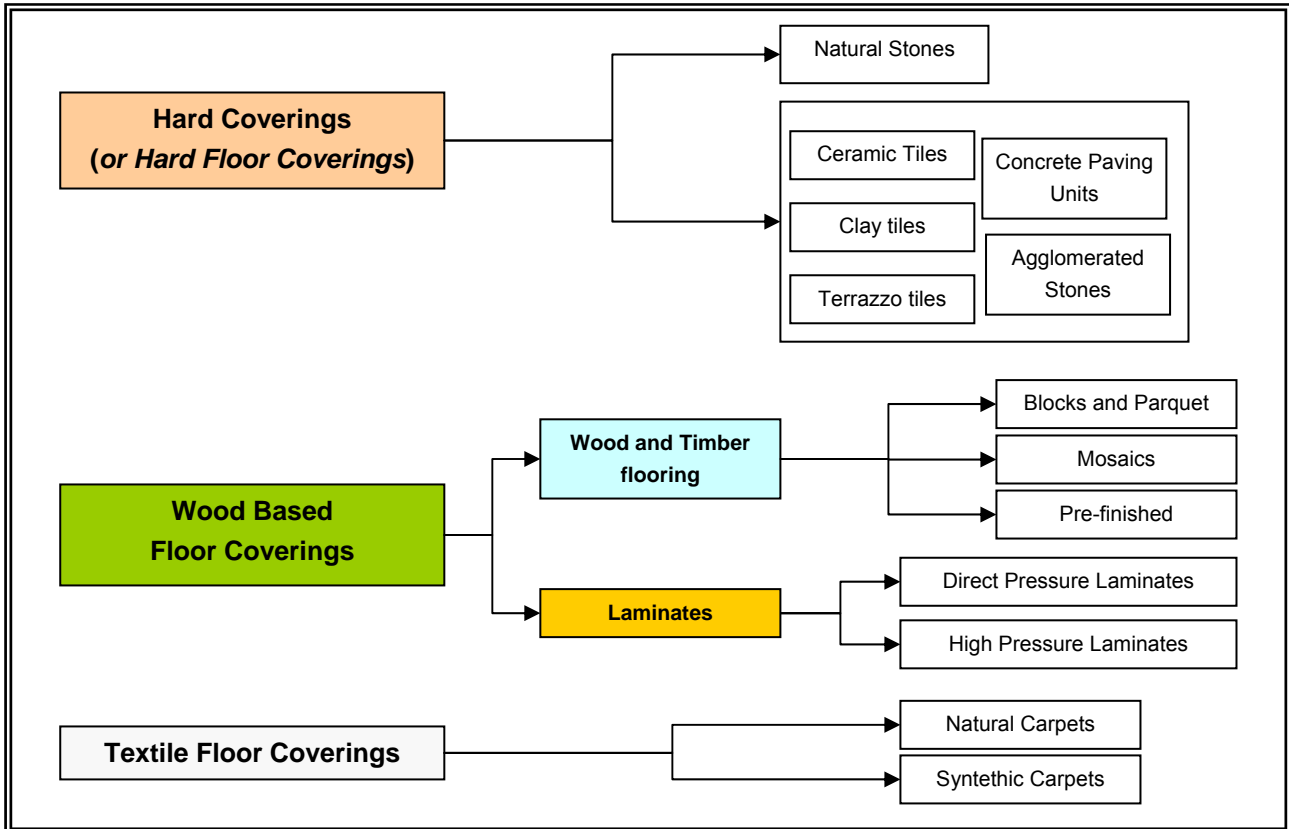


Figure 6.4 - Flow chart of the 4<sup>th</sup> proposal of Product Group definition option and categories.

## Recommendation

Taking into account the different product group definition proposals listed previously, APAT recommends that the best option is the "4<sup>th</sup> proposal" (see figure 6.4). The reasons are as follows: this option would be most practical, feasible, comprehensive and straight forward for the applicant. In addition, the hard floor covering criteria revision could be clearly separated from the development of the new product groups.

Furthermore, the establishment of three distinct Decisions would facilitate and simplify the inclusion of these product groups in a GPP context.

## 7. Appendix

### CONTACTS

APAT (TECHNICAL SUPPORT TO THE ITALIAN C.B.)	EXTERNAL TECHNICAL ASSISTANCE FOR THIS PROJECT
<p>Ecolabel Sector - Service for Environmental Certifications</p> <p><b>APAT</b> - Italian National Agency for the Protection of the Environment and for Technical Services</p> <p>48, Via Vitaliano Brancati 00144 Rome – Italy</p> <p>Ph. +39 06 5007 2274</p> <p>Fax +39 06 5007 2078</p> <p>e-mail: roberta.alani@apat.it</p>	<p><b>Life Cycle Engineering</b></p> <p>Via Livorno, 60 10144 Torino, Italy</p> <p>Tel. +39 011 2257311 Fax +39 011 2257319</p> <p>e-mail: revHFCecolabel@studioIce.it</p>

## REFERENCES

1st AD HOC WORKING GROUP (AHWG) Meeting Minutes on the Revision of the EU Ecolabel criteria for Hard Floor Coverings and the development of EU Ecolabel criteria for Soft Floor Coverings -European Commission - DG Environment, Brussels, 28 September 2007, BU 5 – C.

ABET INFOTEC (1999), Life cycle assessment for an European HPL - Environmental declaration for High Pressure Laminate HPL and its elements, ICDLI, R605 LCA Life Cycle Assessment, May 1999 Special edition.

ANDIL Assolaterizi (2005), Secondo Rapporto Ambientale dell'industria Italiana dei Laterizi, EDIGRAF, 2005.

ANDIL Assolaterizi (2006), Osservatorio 2005 sull'industria italiana dei laterizi, in "L'industria dei laterizi", settembre-ottobre 2006, 101, pagg. 302-307.

ANPLA (2007), Italian Association of Agglomerated Stones Producers, information about agglomerated stones market (informal communication).

ASCER; emissions limits issued by the Spanish Competent Authority, to comply with the IPPC directive (confidential communication).

ASCER (2004), Los sectores español y mundial de fabricantes de baldosas cerámicas 2004.

ASSOBETON (2006), Osservatorio Previsionale sul settore dei manufatti cementizi (*aggiornato al 5 maggio 2006*).

ASSOPIASTRELLE (2005), Indagine Statistica Nazionale Industria Italiana delle piastrelle in ceramica, Centro Studi Assopiastrelle.

ASSOPIASTRELLE (2006), Osservatorio Previsionale sul mercato mondiale delle piastrelle di ceramica: Italia e principali competitori a confronto, Dicembre 2006.

BLUE ANGEL (2007), German labelling for Floor coverings; at <http://www.blauer-engel.de>.

CERAME UNIE (2005), the Ceramic Tiles European Manufacturers Association, statistics on ceramic tiles market at <http://www.cerameunie.net>.



COMMISSION DECISION of 25 March 2002 establishing the ecological criteria for the award of the Community Ecolabel to hard floor-coverings (notified under document number C(2002) 1174 (Text with EEA relevance) (2002/272/EC)

COMMISSION DECISION of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC.

COMMENTS TO QUESTIONNAIRES (2007) – Answers to questionnaires on the modification of the existing criteria, LCE, May –September 2007.

CSERGE (2000) – Feasibility Study of Wall and Floor Coverings with a View to Establishing EU Ecolabelling criteria – Norwich, March 2000.

EUROPEAN COMMISSION, Reference Document on Best Available Techniques in the Ceramic Manufacturing Industry, Dec. 2006. (<http://eippcb.jrc.es/pages/FActivities.htm>)

EUROSTAT (2007), “Statistics on the production of manufactured goods Volume ANNUAL 2005”, 15/03/2007.

GORRÉE', Marieke; Guinée, Jeroen; Huppel, Gjalte; Oers, Laurant van: Environmental Life Cycle Assessment of Linoleum. Vol. 7, No. 3 (2002), p. 158–166

GÜNTHER A. & H.C. Langowski (1997), Life Cycle Assessment Study on Resilient Floor Coverings, IJLCA 2(2) 73-80. (*Includes: PVC, cushioned PVC, polyolefin, rubber, linoleum, textiles and parquet*).

GUT - Carpet Tested for a better living environment; at <http://193.201.162.104>.

IBO - Österreichisches Institut für Baubiologie und Bauökologie; at <http://www.ibo.at/>.

INTERNAZIONALE MARMI E MACCHINE CARRARA SpA (2007), Stone sector 2006, Carrara, Italy.

IPCC, Revised 1996 IPCC guidelines for national greenhouse gas inventories.

LIFE CYCLE ENGINEERING (2002) - European Ecolabel on Hard Floor Coverings Preparatory Action and Development of a Marketing Strategy in Italy, Final Report, Project B4-3040/2001/329137/MAR/D3, December 2002.

NORDIC ECOLABELLING (2006), Swan labelling of Floor coverings, Version 4.0 • 7 December 2006 — 31 December 2010.

MONTANI C. (2000) – STONE 2000 World Marketing Handbook – Gruppo Editoriale Faenza Editrice.

NALFA Standards (2003) - Publication LF 01-2003, The North American Laminate Flooring Association.

NATURE PLUS - For better living; at <http://www.natureplus.org>.

NAVARRO J.E. (1998) – Integrated Pollution Prevention and control in the Ceramic Tile Industry. Best Available Techniques (BAT) – Qualior98.

RIVELA B., H. Almudena, M.T. Moreira & G. Feijoo (2006) - Life Cycle Inventory of Particleboard: A Case Study in the Wood Sector, IJLCA 11(2) 106-113.

SAIB (2006) - Environmental Product Declaration of Raw Melamine faced Wood Particleboard, downloadable on [www.environdec.com](http://www.environdec.com).

SMK Milieukeur - labelling voor non-food; at <http://www.milieukeur.nl>.