



**Intelligent Energy**  **Europe**

## **Energy saving concepts for the European ceramic industry CERAMIN**

### **Short<sup>1</sup> Public Final Report**

written by  
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<sup>1</sup> This report contains only the most important results and numbers of the project. It is addressed to the technical management of companies who produce ceramics. There is an official public final report available on <http://www.ceramin.eu/Ceramin/Index.htm> that summarizes all results and experiences of the project.



## Abbreviations

CERAMIN	Acronym of the Project
EEE	Extraordinary Energy Efficient OR Energy Efficiency Enhancement
BREF	Best available Techniques REFerence document
SEC	Specific Energy Consumption
EUTS	European Union Emission Trading Scheme
GHG	Green House Gas (e.g. CO <sub>2</sub> )
UK	United Kingdom
I	Italy
PL	Poland
F	France
E	Spain
D	Germany

## Tables

Table 1:	Number of companies per branch and country that take part in the CERAMIN project until 31.10.2009
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## Basic project data

Full title of the Project: Energy saving concepts for the European ceramic industry

Acronym of the Project: CERAMIN

Agreement Duration: 36 month

Starting date: 01.11.2006

End date: 31.10.2009

Coordinator: Leipziger Institut für Energie GmbH  
Torgauer Str. 116  
D 04347 Leipzig

### Project-Partner:

Participant name	Participant short name	Country
Instytut Szkła i Ceramiki (E)	ISIC	Poland
CERAM Research Ltd.(E)	CR	United Kingdom
Societe Francaise de Ceramique (E)	SFC	France
ETA – Energia, Trasporti, Agricoltura srl	ETA	Italy
Centre recursos d'iniciatives i autocupacio, s.l.	CRIA	Spain
KI Keramik-Institut Meißen GmbH (E)	KI	Germany

(E) ...Expert Partner



## 1 Objectives of the project

The CERAMIN project was created to encourage the European ceramics industry to decrease their specific energy consumption (SEC) by means of a competition and by a “Tutorial about energy saving” for the ones who haven’t won. The ceramics industry was divided into sub branches that are as similar as possible to the BREF *Ceramic Manufacturing Industry*. Focus is laid on items of mass-production with a high-energy input.

## 2 Course and methods of the project

The procedure of the championship was similar to a round robin that is executed to evaluate e.g. laboratories: Producers of ceramics from 6 European countries were invited to report energy consumption data to their national partner. This partner reported anonymous data to the KI Keramik-Institut GmbH, who was responsible to calculate energy consumption data as well as energy mitigation data by the comparison of energy consumption from two years. The calculation rules for energy mitigation and absolute specific energy consumption can be found in Annex 1. The results were distinguished by sub branches (refer to table 1).

The awarding rules were:

1. An Extraordinary Efficiency Energy award for a ceramic sub branch will be given if at least 6 companies from at least 2 European countries apply within one sub branch. The (one!) company with the lowest specific energy consumption per branch can be awarded.
2. An Energy Efficiency Enhancement award for a ceramic sub branch will be given if at least 6 companies from at least 2 European countries apply within that branch. The round down quarter (25%) with the greatest energy mitigation of the applying companies can be awarded.

If a company has won the national partner was informed. He informed the respective company and verified their data if not already done by the EUTS. After the national partner had the data of the respective company confirmed, the company could be



awarded if it agreed to it. The certificate document is handed out (Annex 3) and the name of the company is published.

### 3 Results of the championship

According to the rules of Annex 1 ceramic producing companies from the 6 partner countries were invited to share their energy consumption data with the respective partner. Table 1 shows the number of participating companies per branch and country per 31<sup>st</sup> of October 2009, it shows all branches that were covered and it shows the partner countries. The branches with the most participating companies are the pavements and wall bricks branch as well as the refractories and tableware branch. Unfortunately there was no reported data from Italy and only a few from Spain and France.

	UK	E	F	I	D	PL	Sum of branches
Select		1					1
Masonry bricks					1	5	6
Pavement and wall bricks	9				13	2	24
Roof tiles						1	1
Refractories	2	2	1			2	7
Wall and floor tiles	1		1			1	3
Wall tiles (only)			1				1
Floor tiles (only)							0
Sanitary ware			1		1	1	3
Table ware	4		1			2	7
Technical ceramics							0
<b>Sum of Countries</b>	<b>16</b>	<b>3</b>	<b>5</b>	<b>0</b>	<b>15</b>	<b>14</b>	<b>53</b>

Table 1: Number of companies per branch and country that take part in the CERAMIN project at the 31<sup>st</sup> of Oct. 2009



Table 2 shows the results of the winners of the competition. The whole table of all participants will be found in Annex 2. According to chapter 2 only the data of the winners are verified (proofed). All other data was not verified initially with the exception of the heavy ceramics branches where verification according to EUTS was available for most of the applying companies. According to the rules of calculation (Annex 1), at least two years of production of one company had to be covered. From these two years, only one result of mitigation per company is calculated. For this reason both last columns of table 2 are empty for the base year. The participating companies are sorted by branch and the level of energy mitigation.

	Number of Enterprise	Number of Plant	Branch	Sum of energy consumption [GJ]	specific energy use [GJ/t]	Placement absolut	Energy mitigation	Placement mitigation
<b>PL</b>	<b>PL-10</b>	<b>PL-10</b>	<b>Masonry...</b>	<b>1.548.350</b>	<b>14,02</b>	<b>11</b>	<b>2,66</b>	<b>1</b>
<b>PL</b>	<b>PL-12</b>	<b>PL-12</b>	<b>Masonry...</b>	<b>65.850</b>	<b>0,99</b>	<b>1</b>	<b>0,18</b>	<b>6</b>
PL	PL-10	PL-10	Masonry...	1.509.927	16,68	12		
<b>UK</b>	<b>5</b>	<b>1</b>	<b>Pavement...</b>	<b>56.609</b>	<b>10,63</b>	<b>42</b>	<b>3,81</b>	<b>1</b>
<b>UK</b>	<b>3</b>	<b>1</b>	<b>Pavement...</b>	<b>21.388</b>	<b>4,24</b>	<b>32</b>	<b>1,63</b>	<b>2</b>
<b>UK</b>	<b>8</b>	<b>1</b>	<b>Pavement...</b>	<b>9.768</b>	<b>3,16</b>	<b>25</b>	<b>1,10</b>	<b>3</b>
<b>UK</b>	<b>1</b>	<b>1</b>	<b>Pavement...</b>	<b>4.024</b>	<b>1,37</b>	<b>1</b>		
UK	8	1	Pavement...	13.168	4,26	33		
UK	3	1	Pavement...	35.812	5,88	39		
UK	5	1	Pavement...	62.746	14,45	46		
<b>PL</b>	<b>PL-5</b>	<b>PL-5-1</b>	<b>roof...</b>	<b>78.481</b>	<b>4,27</b>	<b>1</b>	<b>12,08</b>	
<b>UK</b>	<b>9</b>	<b>1</b>	<b>refractories</b>	<b>90.397</b>	<b>16,31</b>	<b>14</b>	<b>6,27</b>	<b>1</b>
PL	PL-9	PL-9	refractories	225.906	4,11	4	-0,37	7
PL	PL-9	PL-9	refractories	204.396	3,75	2	-0,84	8
<b>PL</b>	<b>PL-9</b>	<b>PL-9</b>	<b>refractories</b>	<b>144.576</b>	<b>2,90</b>	<b>1</b>	<b>not awarded, look text</b>	
<b>UK</b>	<b>13</b>	<b>1</b>	<b>tiles</b>	<b>475.346</b>	<b>8,80</b>	<b>7</b>	<b>0,67</b>	<b>1</b>
<b>F</b>	<b>B</b>	<b>1</b>	<b>tiles</b>	<b>349.200</b>	<b>5,00</b>	<b>1</b>		
UK	13	1	tiles	491.282	9,46	8		
<b>F</b>	<b>A</b>	<b>1</b>	<b>sanitary...</b>	<b>176.090</b>	<b>20,79</b>	<b>5</b>	<b>3,02</b>	<b>1</b>
<b>PL</b>	<b>PL-7</b>	<b>PL-7</b>	<b>sanitary...</b>	<b>118.560</b>	<b>10,68</b>	<b>1</b>	<b>1,03</b>	<b>2</b>
<b>UK</b>	<b>11</b>	<b>1</b>	<b>table...</b>	<b>131.907</b>	<b>56,35</b>	<b>11</b>	<b>13,18</b>	<b>1</b>
<b>PL</b>	<b>PL-2</b>	<b>PL-2</b>	<b>table...</b>	<b>454.358</b>	<b>31,21</b>	<b>1</b>	<b>9,30</b>	<b>3</b>
UK	11	1	table...	169.593	76,12	13		

Table 2: Energy data of companies with lowest absolute energy consumption and largest energy mitigation per ceramic sub branch.

**Red bold:** Energy mitigation winners, **Green bold:** Absolute energy consumption winners, **Black bold:** Winner, but not awarded, because of “6 companies rule” (Look chapter 2)



The company PL9 from the refractories branch has the lowest specific energy consumption (SEC) in 2003. From 2003 to 2005 the SEC has increased. This might be due to new or different products. Generally exists a strong dependency between the kind of products and the SEC in the refractories branch, which makes it difficult to award SEC. The consortia together with the national partner decides that no SEC-award will be given for the refractories branch.

Table 3 lists the companies that have been awarded. Annex 3 shows an example of a certificate.

- ↪ In total nine companies were awarded in 2009
- ↪ Polish and UK-partners were winners of the „Triple-E-Label” awarding in 2009.
- ↪ In four sub branches industries partners were awarded.
- ↪ Three awards on the base of absolute figures were handed out
- ↪ Six awards of energy efficiency enhancement were established.

The consortium decided that additionally to the awarding of „Triple-E-Labels”, every participating industry partner will receive an official document, which certifies their participation in the CERAMIN project (2009) and allows the use of the “Triple-E” logo for advertisement and promotion. This on the other hand will promote the „Triple-E-Label” and its awarding procedure.



<b>Country – No.</b>	<b>Name of Company</b>	<b>Type of award / Branch</b>	<b>Web</b>
UK-1	Michelmersh Brick Group	Winner absolute energy consumption / Pavement and wall bricks branch	<a href="http://www.michelmersh.com">www.michelmersh.com</a>
UK-5	Cheshire Brick Makers	Winner energy mitigation / Pavement and wall bricks branch	
UK-3	Raeburn Brick Ltd	2 <sup>nd</sup> energy mitigation / Pavement and wall bricks branch	<a href="http://www.raeburnbrick.co.uk">www.raeburnbrick.co.uk</a>
UK-8	Phoenix Brick Company Ltd	3 <sup>rd</sup> energy mitigation / Pavement and wall bricks branch	<a href="http://www.bricksfromphoenix.co.uk">www.bricksfromphoenix.co.uk</a>
PL-10	Przedsiębiorstwo Ceramiki Budowlanej PLECEWICE S.A	Winner energy mitigation / Masonry bricks	<a href="http://pcb-plecewice.pl/">http://pcb-plecewice.pl/</a>
PL-12	Zakład Ceramiki Budowlanej MARKOWICZE S.A.	Winner absolute energy consumption / Masonry bricks	<a href="http://www.markowicze.com.pl">www.markowicze.com.pl</a>
UK-11	Portmerion Potteries Ltd	Winner energy mitigation / Tableware	<a href="http://www.portmerion.co.uk/">www.portmerion.co.uk/</a>
PL-2	Zakłady Porcelany Stolowej „LUBIANA” S.A.	Winner absolute energy consumption / Tableware	<a href="http://www.lubiana.com.pl">www.lubiana.com.pl</a>

Table 3: Winners of CERAMIN 2009





#### **4 Tutorial about energy saving**

Another main results of the CERAMIN-project is the “Tutorial about energy saving”. The recommendations or remarks collected in the “Tutorial about energy saving” are based on remarks of the winning companies, on general experiences and on a lot of references marked in the tutorial’s text and the references list at the end of this tutorial. All knowledge was given or collected by the expert partners. The tutorial about energy saving is divided into chapters covering the ceramic sub branches except refractories and technical ceramics. Each chapter of the covered sub branches gives advice for the technological steps of the respective sub branch. There are tutorials in 6 European languages, which can be found on: <http://www.ceramin.eu/Ceramin/downloads.htm>.

#### **5 Prospects**

The championship will continue from 2010 to 2015. The rules of the championship are unchanged. New awards can be given if at least new data from 3 industry partners are collected within one sub-branch until the 30<sup>th</sup> of October each year. The calculation of new energy data and the update of the order concerning energy consumption or mitigation will be free of charge. Companies who can be awarded and agree to it as well, have to pay a fee for the efforts of awarding.



## Annex 1: Rules for calculation from collected data

### Absolute specific energy consumption

$$\text{specific energy used} = \frac{\text{energy used [MJ / a]}}{\text{net Production [tons / a]}} \left[ \frac{\text{MJ}}{\text{ton}} \right]$$

Net Production: saleable products without scrap.

Energy used: total amount of yearly energy input, scrap or saleable products being produced

### Specific energy mitigation

$$\text{Energy Mitigation} = \frac{\text{SpecificEnergyuse}_{\text{baseyear}} - \text{SpecificEnergyuse}_{\text{comp.year}} [\text{MJ / ton}]}{\Omega} [\text{MJ / ton}]$$

### Definition of Omega $\Omega$

The same amount of energy saved has a higher value if the compared years are closer to each other.  $\Omega$  shall never be smaller than 1.

The expert team has agreed on the **Quotient  $\Omega$** . All stated definitions have to apply.

Difference between compared years	1	2	3	4	5	6	7	8	9	10	11	12
Omega $\Omega$	1	1,5	2	2,5	3	3,5	3,6	3,7	3,8	3,9	4	4

### Calculation example

Base year: 1998

Comp. year: 2005

Omega: from 7 years = 3,6

$$\text{Energy Mitigation} = \frac{2.500[\text{MJ / ton}] - 2.000[\text{MJ / ton}]}{\Omega (2005 - 1998)} = \frac{500}{3,6} [\text{MJ / ton}] = 138,8 [\text{MJ / ton}]$$



## Annex 2: Results of data collection and energy consumption

The whole list with all data are available on <http://www.ceramin.eu/Ceramin/Index.htm>.

For explanation look Chapter 4 of the final public report (complete version).

	Number of Enterprise	Number of Plant	Branch	Sum of energy consumption [GJ]	specific energy use [GJ/t]	Place-ment absolut	Energy mitigation	Placement mitigation
E	1	1	not assignable	50.731	5,12		0,93	
E	1	1	not assignable	36.669	6,98			
<b>PL</b>	<b>PL-10</b>	<b>PL-10</b>	<b>Masonry bricks</b>	<b>1.548.350</b>	<b>14,02</b>	<b>11</b>	<b>2,66</b>	<b>1</b>
D	1	1	Masonry bricks	15.308	2,69	6	0,92	2
PL	PL-3	PL-3	Masonry bricks	181.290	1,34	2	0,38	3
PL	PL-5	PL-5-2	Masonry bricks	145.052	2,17	4	0,29	4
PL	PL-11	PL-11	Masonry bricks	102.312	3,78	9	0,20	5
<b>PL</b>	<b>PL-12</b>	<b>PL-12</b>	<b>Masonry bricks</b>	<b>65.850</b>	<b>0,99</b>	<b>1</b>	<b>0,18</b>	<b>6</b>
PL	PL-12	PL-12	Masonry bricks	83.599	1,53	3		
PL	PL-5	PL-5-2	Masonry bricks	138.090	2,61	5		
PL	PL-3	PL-3	Masonry bricks	287.464	2,76	7		
D	1	1	Masonry bricks	20.885	3,60	8		
PL	PL-11	PL-11	Masonry bricks	123.069	4,07	10		
PL	PL-10	PL-10	Masonry bricks	1.509.927	16,68	12		
<b>UK</b>	<b>5</b>	<b>1</b>	<b>Pavement/wall</b>	<b>56.609</b>	<b>10,63</b>	<b>42</b>	<b>3,81</b>	<b>1</b>
<b>UK</b>	<b>3</b>	<b>1</b>	<b>Pavement/wall</b>	<b>21.388</b>	<b>4,24</b>	<b>32</b>	<b>1,63</b>	<b>2</b>
<b>UK</b>	<b>8</b>	<b>1</b>	<b>Pavement/wall</b>	<b>9.768</b>	<b>3,16</b>	<b>25</b>	<b>1,10</b>	<b>3</b>
UK	6	1	Pavement/wall	19.413	5,83	38	0,97	4
D	6	1	Pavement/wall	90.670	4,72	35	0,40	5
D	4	2	Pavement/wall	76.105	2,41	15	0,26	6
D	7	1	Pavement/wall	112.318	2,60	20	0,21	7
PL	PL-6	PL-6	Pavement/wall	159.715	2,41	16	0,17	8
PL	PL-5	PL-5-3	Pavement/wall	55.007	2,22	9	0,17	9
D	5	1	Pavement/wall	103.324	2,32	13	0,15	10
D	11	1	Pavement/wall	53.612	2,26	10	0,04	11
D	2	1	Pavement/wall	27.440	2,16	7	0,02	12
D	8	1	Pavement/wall	153.260	2,60	21	0,01	13
D	12	1	Pavement/wall	57.340	3,31	27	-0,02	14
D	5	2	Pavement/wall	81.191	1,92	6	-0,03	15
UK	1	1	Pavement/wall	4.135	1,43	2	-0,05	16
D	4	1	Pavement/wall	64.694	1,67	4	-0,07	17
D	9	1	Pavement/wall	151.609	2,37	14	-0,07	18
UK	14	1	Pavement/wall	171.116	3,78	30	-0,20	19
UK	7	1	Pavement/wall	36.716	11,36	44	-0,21	20
D	10	1	Pavement/wall	30.765	4,33	34	-0,70	21
UK	4	1	Pavement/wall	195.518	5,04	36	-0,81	22
UK	2	1	Pavement/wall	142.367	15,42	48	-0,91	23
D	3	1	Pavement/wall	16.056	12,35	45	-1,27	24
<b>UK</b>	<b>1</b>	<b>1</b>	<b>Pavement/wall</b>	<b>4.024</b>	<b>1,37</b>	<b>1</b>		
D	4	1	Pavement/wall	56.722	1,60	3		
D	5	2	Pavement/wall	95.331	1,88	5		




D	2	1	Pavement/wall	27.442	2,18	8		
D	11	1	Pavement/wall	54.716	2,30	11		
D	9	1	Pavement/wall	146.616	2,30	12		
PL	PL-5	PL-5-3	Pavement/wall	38.293	2,47	17		
D	5	1	Pavement/wall	105.437	2,54	18		
PL	PL-6	PL-6	Pavement/wall	170.985	2,58	19		
D	8	1	Pavement/wall	192.608	2,62	22		
D	4	2	Pavement/wall	81.834	2,67	23		
D	7	1	Pavement/wall	119.668	2,81	24		
D	12	1	Pavement/wall	55.593	3,29	26		
UK	14	1	Pavement/wall	171.478	3,59	28		
D	10	1	Pavement/wall	30.846	3,63	29		
UK	4	1	Pavement/wall	206.573	4,23	31		
UK	8	1	Pavement/wall	13.168	4,26	33		
D	6	1	Pavement/wall	99.921	5,12	37		
UK	3	1	Pavement/wall	35.812	5,88	39		
UK	6	1	Pavement/wall	21.743	6,80	40		
D	3	1	Pavement/wall	20.887	10,44	41		
UK	7	1	Pavement/wall	33.227	11,15	43		
UK	5	1	Pavement/wall	62.746	14,45	46		
UK	2	1	Pavement/wall	135.379	14,51	47		
PL	PL-5	PL-5-1	roof tiles	78.481	4,27		12,08	
PL	PL-5	PL-5-1	roof tiles	34.822	22,38			
UK	9	1	refractories	90.397	16,31	14	6,27	1
E	2	2	refractories	44.031	8,16	10	1,72	2
PL	PL-4	PL-4	refractories	304.986	4,91	6	1,13	3
F	D	1	refractories	50.026	10,88	11	0,51	4
E	2	1	refractories	57.675	3,77	3	0,24	5
UK	15	1	refractories	260.154	7,70	8	0,12	6
PL	PL-9	PL-9	refractories	225.906	4,11	4	-0,37	7
PL	PL-9	PL-9	refractories	204.396	3,75	2	-0,84	8
PL	PL-9	PL-9	refractories	144.576	2,90	1		
E	2	1	refractories	53.184	4,66	5		
PL	PL-4	PL-4	refractories	347.730	6,04	7		
UK	15	1	refractories	268.268	7,82	9		
F	D	1	refractories	45.543	11,39	12		
E	2	2	refractories	51.487	13,32	13		
UK	9	1	refractories	145.421	25,72	15		
UK	13	1	tiles	475.346	8,80	7	0,67	1
PL	PL-1	PL-1	tiles	505.728	5,13	3	0,28	2
F	C	1	tiles	212.677	8,33	5	0,13	3
F	B	1	tiles	300.240	5,12	2	-0,12	4
F	B	1	tiles	349.200	5,00	1		
PL	PL-1	PL-1	tiles	356.082	5,55	4		
F	C	1	tiles	196.815	8,73	6		
UK	13	1	tiles	491.282	9,46	8		
F	A	1	sanitary ware	176.090	20,79	5	3,02	1
PL	PL-7	PL-7	sanitary ware	118.560	10,68	1	1,03	2
D	13	1	sanitary ware	81.472	10,76	2	0,65	3
D	13	1	sanitary ware	82.198	12,07	3		



PL	PL-7	PL-7	sanitary ware	138.484	14,69	4		
F	A	1	sanitary ware	178.351	25,33	6		
UK	11	1	table ware	131.907	56,35	11	13,18	1
UK	16	1	table ware	18.788	54,46	8	12,34	2
PL	PL-2	PL-2	table ware	454.358	31,21	1	9,30	3
PL	PL-8	PL-8	table ware	259.203	44,57	5	4,96	4
F	E	1	table ware	125.536	52,39	6	3,90	5
UK	12	1	table ware	241.809	33,13	2	1,01	6
UK	10	1	table ware	212.099	56,59	12	-2,30	7
UK	12	1	table ware	277.784	34,65	3		
PL	PL-2	PL-2	table ware	475.088	36,10	4		
UK	10	1	table ware	263.633	54,29	7		
PL	PL-8	PL-8	table ware	287.050	54,50	9		
F	E	1	table ware	122.729	56,30	10		
UK	11	1	table ware	169.593	76,12	13		
UK	16	1	table ware	24.480	85,30	14		

### Annex 3: Example of a Certificate

# WINNER




EXTRAORDINARY ENERGY EFFICIENT CHAMPIONSHIP  
MASONRY BRICKS BRANCH

The CERAMIN consortia<sup>1</sup> certifies that  
**Zakład Ceramiki Budowlanej  
MARKOWICZE S.A.**  
 shows an extraordinary energy efficient production<sup>2</sup>  
 among 6 masonry bricks producers from 2 European countries.

Energy data were checked and proved by: \_\_\_\_\_ For CERAMIN consortia<sup>1</sup>: \_\_\_\_\_

Mr. Zbigniew Jaegermann, responsible employee  
Instytut Szkła, Ceramiki, Materiałów Ogniotrwałych i Budowlanych  
National CERAMIN-partner<sup>1</sup>

Werner Bohmschäfer-Bleidesel, Managing Director  
Leipziger Institut für Energie GmbH, CERAMIN project coordinator<sup>1</sup>

Intelligent Energy

Europe

1) Contract number EIE/06/222/SI2.444565 Intelligent Energy Program of the European Commission.  
 2) Numbers and rules of the championship are published on [www.ceramin.eu](http://www.ceramin.eu)