ECGA

Annual Report 2009

European Carbon and Graphite Association

ECGA

European Carbon
and Graphite Association asbl

Avenue de Broqueville 12
B-1150 Bruxelles
Belgium

Tel.: +32 2 7756320
Fax: +32 2 7706303
E-mail: ecga@ecga.net

Foreword by the President – Year 2009

The year 2009 will be remembered by all of us as the year of the crisis, which started with the bankruptcy of Lehman Brothers in September 2008. This was the sign that the extent of the crisis was much wider than just a sub-prime, US based phenomenon. The subsequent intervention of Central Banks and Governments was aiming at giving to the financial system sufficient liquidity and confidence in order to convince banks to continue funding the economy. 2009 was over-shadowed by a reduction in commercial and manufacturing activity which has been impacting our main customer industries such as steel and aluminium, where sales and production volumes continued to be severely reduced. Only the beginning of 2010 showed a slowly beginning recovery. However, most industrial and political leaders do not expect a major improvement for 2010.

The activities of the ECGA in 2009 were focused on the implementation of the wide-ranging and important European Union REACH (Registration, Evaluation, Authorisation of Chemicals) regulation. The aim in 2009 was two-fold:

- securing the exemptions for some substances such as natural graphite and cokes, which could so far be achieved, and
- developing the "REACH dossiers" for all those substances that the ECGA members have in common by way of producing or importing. The latter will continue in 2010 for those substances that have a legal deadline end of 2010 and will continue further for those that have a later deadline in 2013.

Through their consortia the ECGA members have taken the lead in synthetic graphite and sulphuric acid and acid treated graphite.

On the issue of Emission Trading Scheme (ETS), another stringent regulation introduced by the European Union in the framework of the reduction of greenhouse gases, the Association has been very successful in ensuring that the graphite industry is recognised as an "energy-intensive industry with risk of carbon leakage" i.e. that this industry might be forced, because of too high economic burdens deriving from ETS, to relocate their plants outside of the European Union. Furthermore the Association conducted a specialised study to demonstrate that the sector due to its limited direct CO_2 emissions and its vast product range was not in the position to develop a product benchmark. In 2010 this work will have to be continued by ensuring that the sector will be eligible for compensation for the expected price increase in electricity due to the ETS system being applied to the power generation sector.

With such crucial topics on the political and economic agenda the efforts of the Association are more widely recognised and so 2010 has seen another increase in membership. Schunk, Superior Graphite and Carbone Savoie joined the association and reinforce the market segment of speciality graphite in the Association as well as increase the representativity of the Association.

I want to sincerely thank our Secretary, Mrs Hebestreit, and her team for the work performed in this past year.

Dr B. Toniolo
President

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1.

Contributing to sustainable resource management

A world without carbon and graphite – not possible

Carbon and graphite plays an important role in the EU's industrial fabric. Main industrial sectors such as the aluminium and steel industries are dependent in their fabrication process on industrial products made from carbon and graphite. And as a consequence many downstream-industries in Europe, such as the automotive, construction, railway, infrastructure sectors, are dependent on the delivery of these industrial components.
But also in other areas many sectors rely on speciality applications without which many products of our day-to-day life would not function.

1.1 The Aluminium Industry

One of the major global markets for carbon and graphite products is the primary aluminium industry. The carbon and graphite industry supplies furnace linings for the primary aluminium industry in the form of cathode blocks with which the floor of the electrolytic reduction cells are lined as well as pieces for the surrounding sidewalls. Both types of blocks are manufactured in a number of different fired qualities. Carbon ramming pastes are used to seal the joints between the fired blocks.

The worldwide economic crisis hit the European aluminium industry very hard in the first half of 2009. The fall in demand for aluminium products slowed by the middle of the year, stabilising at a low level in the autumn 2009.

Primary production in 2009 had decreased by more than 20% in 2009 in the EU-27. Some smelters had to close down completely; others went into care and maintenance. Imports of unwrought metal declined by about 30% in 2009.
The semi-fabricated products also suffered from the economic crisis: rolled product orders declined by about 13 % compared to the previous year, extruded product orders went down by about 20%. Concerning the impact on end-use markets for the aluminium industry, the transport sector was hit hardest. Overall the building and construction sector was less hit due to the non-residential market segment, but its condition varied across the EU.
The packaging market was the least affected.
No restocking took place in 2009. For 2010 a modest recovery in Europe is expected.

However, the main demand drivers for future development will be infrastructure and business construction in developing economies, particularly in China, but also in other emerging regions, such as India and the Middle East.
At the same time, fully in line with the political goals of saving resources the recycling of aluminium has continued to grow.

The industry is undergoing substantial change in terms of expansion of capacity which – due to the economic crisis – is only temporarily on halt now. There is an estimation of a global capacity expansion potential up to 60 million tonnes by 2025. However, this will go hand in hand with the replacement of high cost production facilities (Europe, North America) by facilities in areas with low energy costs and in areas closer to the future end-user markets. And of course some of the older technology will have to be replaced.
As a consequence it is expected to see a strong expansion in the Middle East and in India.
For Europe energy and labour costs are far too high for longer term investments.

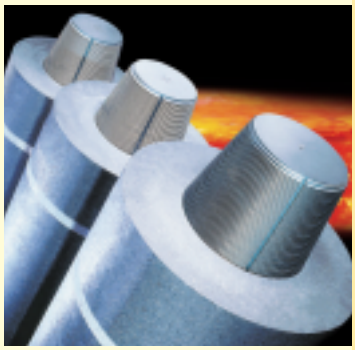
In contrast, for Asia although energy cost are relatively high, labour cost are still low, There are still hardly any environmental restrictions, hence there is a very good outlook for India and Indonesia as well as an opportunity for China to upgrade its old technology and to restructure.

The fact that many expansions will take place outside of Europe and North America also means for the European carbon and graphite business delivering into this industry that it needs to be become even more global than today.

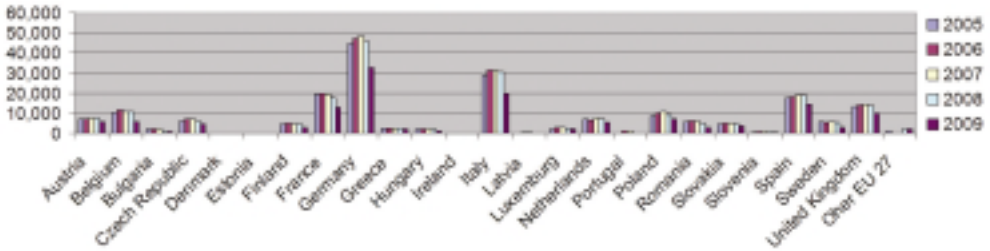
1.2 The Steel Industry

With the financial crisis and the following economic downturn in 2008 the steel industry saw itself faced with a considerable production cut-back in Europe and around the world which reached 50 % towards the end of the year 2008. Since April 2009 the steel production trend showed a continued increase, modest but still an increase. The main markets for the steel industry had collapsed considerably as could be seen in the slow markets in the construction and transportation sectors.
However, stocks had been reduced overall and hence the slightly increasing demand triggered as expected an uptake of production, even though at lower levels.

By the end of the year total worldwide steel production had reached 1.2 billion tonnes.
As a consequence also the graphite industry producing electrodes for the steel industry started to recover slightly.

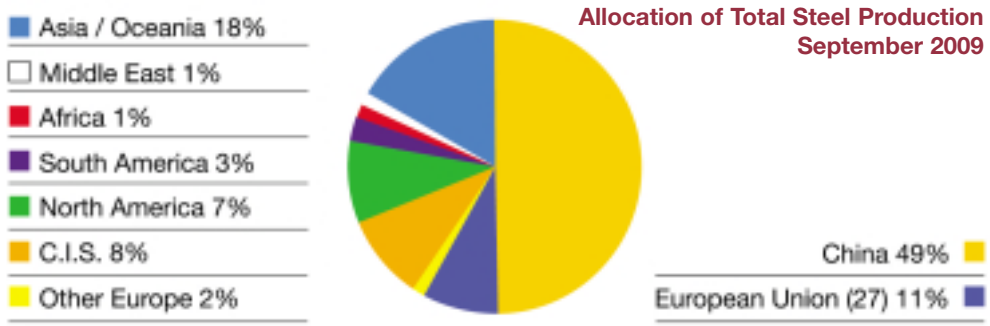


Crude Steel Production 2005 – 2009 (in thousand metric tons)



The only market that continued to grow was China. By the end of the year the Chinese crude steel production amounted to 50 % of world steel production. Asia and Oceania without China still accounted for 18 % or world production, with Japan accounting for 8 %.

Allocation of Total Steel Production September 2009



1.3 Other Industrial Applications

1.3.1 Deriving benefit from graphite – mechanical industrial applications

Many mechanical industrial applications contain carbon and graphite.

Seals, components for compressors and vacuum pumps, bearings and sliding components for dry and wet running applications as well as carbon tubes, blanks, fillers and granules are made out of graphite because of its good mechanical properties such as strength, good sliding properties, high temperature resistance, high thermal shock resistance, low wettability, high corrosion resistance, high thermal conductivity, high purity and good electrical conductivity.
Such seals are applied in all types of pumps such as pumps for fuel and cooling water in cars, for chemicals and water, household and garden appliances and many other industrial applications.

Carbon axial and radial bearings perform well in various applications ranging from machine tools to chemical engineering apparatus.

Sliding beams and **sliding rails** are used for linear motion applications. In those cases where mechanical forces are high, metallic bearings with graphite lubrications deposits are used.

1.3.2 Carbon brushes for extreme requirements – electrical industrial applications

Carbon brushes
So called brushes are indispensable hardware for electrical machines, also in the microelectronic era.

At the beginning of electrical engineering brushes were bundles of tiny copper wires, used as elastic contacts. Now the material has changed into carbon and graphite.

Examples of application of carbon brushes:
- Motors for stationary machinery
- Traction motors for railway technology in diesel and electric trains

Current collectors
Carbon current collectors provide a reliable contact with the electric wires. They show low wear, good electrical loading capacity, they are environmentally friendly and easy to maintain.

1.3.3 Carbon and graphite fibre for technical products

Since technical grade carbon fibres were developed in the mid 1960s, they have been gradually introduced in technical products. The application is connected with material questions such as matrix materials, fibre/matrix adhesion promoters and long term behaviour, component production techniques or textile semi-finished materials.
Fibre composites can be used in machine, equipment and apparatus construction, medical technology and vehicle building.

1.3.4 Carbon foil - meeting the exact requirements

Many applications today use composite materials with tailor-made properties.
The materials currently used are glass, aramid, carbon and graphite fibres in combination with epoxy and phenolic resins. Elements manufactured from fibre composites can be designed in such a way that they exactly meet the requirements imposed on them.
When the fibres are processed into knitted or woven fabrics, they make up a foil. This foil can be used for interior furnishings, protective clothing or as industrial applications for packaging and gaskets.

1.3.5 Graphite and carbon felt – unique textile, chemical and thermal properties

Felt has unique textile, chemical and thermal properties. Graphite felt as well as carbon felt are produced.
Felt is applied as thermal insulation, as filters, and as catalyst support. It can also be applied for porous electrodes, as backing strips for soldering and welding, as an adsorption agent and as a corrosion-resistant vessel lining.

1.3.6 Semiconductors – solutions for a broad number of market areas

In the semi-conductor technology the key properties of graphite provide the possibility of matching certain material properties with a given specification through varying raw materials and production methods.

Fiber-Optics
High purity iso-molded superfine graphite with its combination of thermal characteristics, chemical inertness, high purity, superfine grain texture, and structural integrity at elevated temperatures is eminently suitable.

Semiconductors
There are several major applications for graphite in the semiconductor sector with required purification to at least 10ppm ash.
Silicon is the most widely used material for the manufacture of integrated circuits and other semiconductor devices.
Graphite is extensively used in this application for a number of reasons related to its properties.

1.3.7 For difficult deployment in the atmosphere – aerospace industry

The vast field of rockets and missiles takes advantage of many of the properties of graphite. Rapid temperature rise and unusually high operating temperatures are encountered and unusual cone, nozzle and vane shapes are needed. Graphite is one of the few materials that can reasonably meet the demands encountered under these conditions.

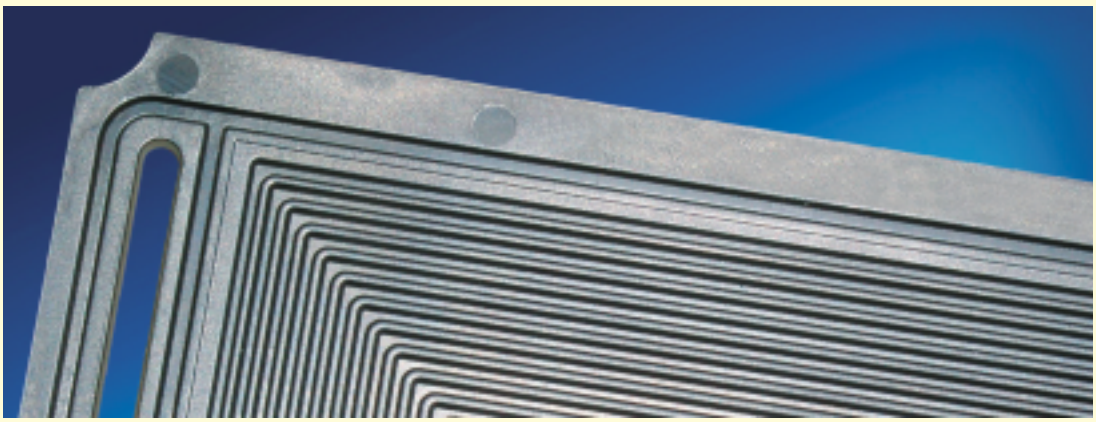
1.3.8 Widespread uses in nuclear technology

Graphite finds widespread use in many areas of nuclear technology based on its excellent moderator and reflector qualities, which are combined almost uniquely with strength and high temperature stability. Nuclear grade graphite was developed for fission reactors.

1.3.9 Carbon and graphite in innovative products

Industrial corrosion protection
Like graphite, hard carbon elements can be rendered impermeable by resin impregnation. In this impermeable form, it is used in the construction of thermally insulating, corrosion-resistant linings for columns and vessels.

The fuel cell
The bipolar plate that is made of graphite is one of the most important components for fuel cell. Until now no other material is able to meet the extremely high requirements with respect to chemical stability, conductivity and thermal stability. Graphite will surely play an important role in this technology of the future.



2.

Resource and energy efficiency through carbon and graphite products

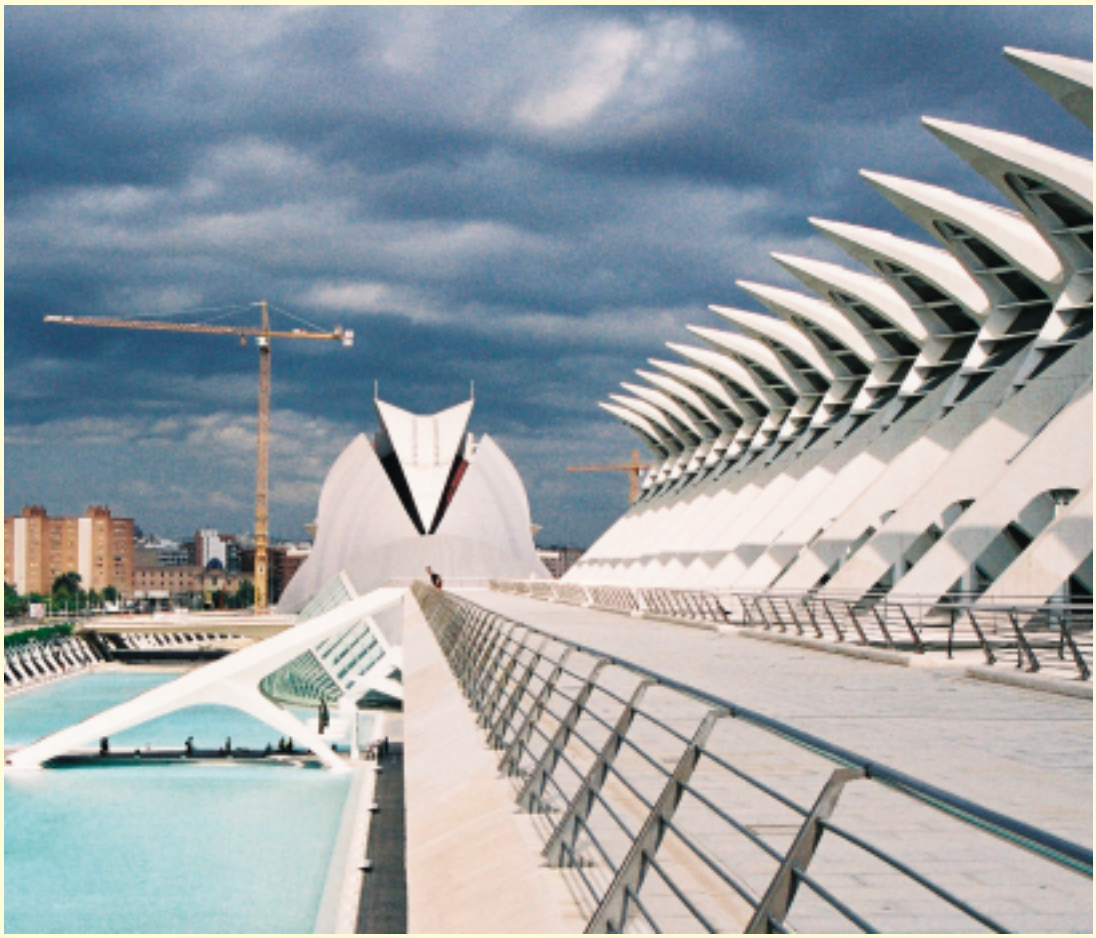
The carbon and graphite industry's products contribute actively to the saving of resources and energy.

2.1 Raw materials

The European Carbon and Graphite industry supports EU Vice-President Verheugen's initiative on the sustainable access to resources which was published in 2008 and which will address five basic pillars:

- increasing access to resources from European sources;
- improving the transparency and level playing field with regard to resource inputs from outside of Europe;
- improving the efficiency of resource use in the EU;
- improving the human capacity in and outside of Europe in order to deal with resource management in a sustainable manner; and
- increasing the knowledge base about our resources.

The expectation is that this will give a boost to the development of raw materials and eventually also intermediate products which are needed by the EU's downstream industries.
Raw material prices have increased substantially in the past years and have an impact on the competitiveness of the carbon and graphite, but also the downstream user industries.
The working group that has been established to look at the "criticality" of raw materials for Europe's industrial fabric and the economic growth will have considerable impact on the EU's policy for securing future supplies of vital raw materials.



2.2 Energy and climate change

Cost of energy and competitiveness

Of equal importance is securing energy at competitive prices for European industries.
In this context in particular the sector, itself also a user of considerable amounts of electrical energy, has been monitoring the rising costs in the past years which have threatened its competitiveness in comparison to its global competitors.

Parts of the carbon and graphite industry can be considered energy-intensive due to the fact that for example the graphitisation step in the production leading to electrodes – an integral part of all types of steel making - requires substantial amounts of energy in order to achieve higher longevity of the electrode in the steel furnace.

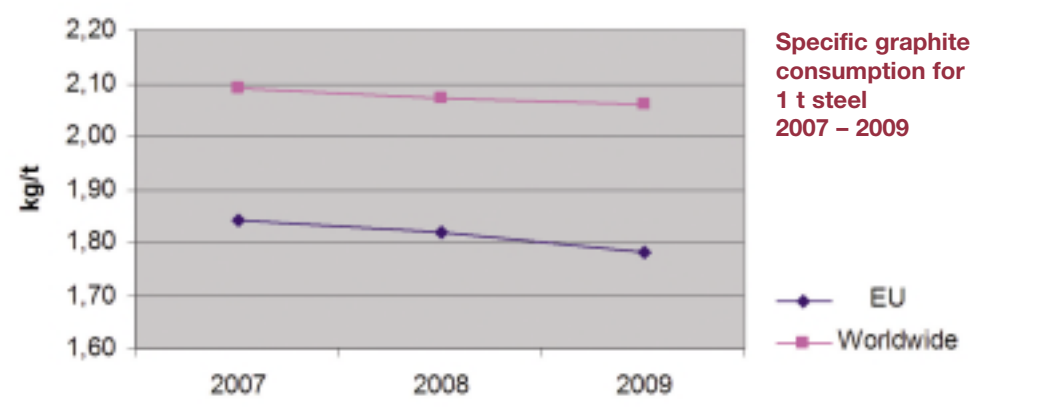
The EU's climate change policy – the ETS scheme

However, the new proposal for the European Emission trading scheme post 2013 will be another constraint on the competitiveness of the European graphite industry by imposing further costs on the enterprises which competing producers worldwide do not have to reckon with.
It is therefore crucial that energy-intensive industries which face fierce competition are given special allowances in this new scheme.
In 2009 the ECGA actively engaged with success in the political process of establishing criteria for selecting EU industries which are energy-intensive and with a high risk of carbon leakage. Having provided arguments and evidence of this carbon leakage to the respective Commission officials, the graphite sector was included in the Commission's documents as a "carbon leakage sector".
The potential impact of the legislation after 2013 is immense and hence the sector will continue to argue its case vis-à-vis the authorities. The ECGA therefore decided through an external study conducted by Ecofys, a Dutch consultancy, to demonstrate that the application of a product benchmark was not possible due to the large range of diversified products.
This leaves the members of ECGA still with a major task in the first half of 2010 to ensure that the sector will be eligible for compensation for the price hike expected in the electricity prices due to the application of the ETS scheme to power generators.

2.3 The products and their contribution to energy efficiency

The carbon and graphite sector is contributing to the goal of energy efficiency in many different ways. On the one hand through its products and on the other had through a continued strive of the operations to reduce their own energy consumption and optimisation of processes.

Example: steel making
In the steel making process, the industry has actively contributed to a saving in resources and energy consumption through the continuously increased efficiency of the specific graphite electrode consumption.
The specific consumption of electrodes per ton of steel made as steadily decreased over the past decades and continues to decrease. However, improvements in electrode and steel quality and the additional environmental protection measures to be allied in both industrial processes of graphite electrode and steel production have increased the overall energy consumption.
Thus the increase in efficiency in electrode consumption could only partly offset the increased energy consumption per tonne of final product.



Graphite electrodes also contribute to creating the so called cycle economy which makes optimal use of the resource iron and steel. With the ever growing share of Electric Arc Furnaces which are operated to recycle steel scrap this trend continues.

Example: aluminium industry
The product quality improvement in the area of cathodes and anodes used for the aluminium industry have seen similar improvements and therefore – also here – contribute to resource and energy savings.

Example: Energy generation
In other areas such as new developments in the fuel cell technology or in wind power generators for example, graphite contributes to the generation of new and cleaner energy generation which will in the long term save fossil fuels and reduce emissions.

Example: Transportation
Energy savings are also achieved when applying carbon fibres in transportation since its light-weight factor reduces fuel consumption whilst at the same time providing strength and performance.

2.4 The operations and their contribution

But not only the carbon and graphite products are contributing to resource and energy savings, the operations itself have also made a continuous strive to improve their EHS and energy management in order to become more sustainable and more competitive in an international context.

In fact, the carbon and graphite industry has for years been actively contributing to the efficient resource management by making for example best possible use of wastes and by-products from the coal and oil industry and turning them into valuable carbon and graphite products, some of them substituting the use of natural graphite.

Since ECGA members operate manufacturing sites across Europe and outside of Europe their performance improvement is based on a global approach and very often international standards whilst respecting the local legislative requirements.

Amongst the performance highlights are a reduction across various environmental parameters over the past decade:

- ECGA members have reduced CO_2 emissions per produced tonne of material from their factories by more than 20% over the last ten years;
- the emission of non-hazardous wastes was reduced by 20% over a ten-year period;
- the reduction of cooling water consumption per tonne of produced material over ten years amounted to 45%;
- dust emissions were reduced by 50% over the same period of ten years.

The capital expenditure of ECGA members for environmental protection and improvement of the working and safety conditions will amount to more than 50 million EUR within the next few years, the first projects have almost been started. To protect the environment and meet future legal requirements based on EU directives, the carbon and graphite industry is investing significantly in environmental protection installations to prevent air pollution in the coming years.

IPPC Directive

In 2009 the EHSA Committee has continued to monitor the development of further EU and national EHS legislation and the revision of the Integrated Prevention Pollution and Control Directive (IPPC) as well as the related updating of the so-called BREF note (Reference Document for Best Available Techniques) for Non-ferrous metals which also covers a part of the carbon and graphite sector.

The revision of the IPPC Directive into the new Industrial Emissions Directive – like for many other industrial sectors – will have substantial impact in terms of permitting requirements.
The merging of several directives into one new Industrial Emissions Directive is leading to a series of complications in the procedures for implementing the directive as well as updating the BREF notes. In particular the discussion about turning BAT related Emission Limit Values into maximum Emission Limit Values is of course causing major concern in the industrial sectors. The ECGA therefore joined an alliance of other industrial sectors to increase its political weight in the discussion with Commission, Parliament and Council. It became active in visiting various national representations in Brussels to represent the alliance's point of view. The negotiations in the Council were concluded in the summer 2009.

At the same time, the BREF note for the non-ferrous metals sector was under review. This BREF document also covers the carbon and graphite industry in as much as it supplies to the non-ferrous metals industry. The EHSA Committee provided input for the revision by collecting up-to-date data and held several discussions with the desk officer in Seville. The discussions proved difficult and lengthy and therefore the revision process will only be concluded end of 2010.

3. Safety

3.1 REACH and the safety of substances

According to this regulation all chemical substances and their different applications have to be registered, evaluated and finally authorised. In 2009 the ECGA was active in two ways: on the one hand to ensure that certain substances remained exempted such as natural graphite and cokes, and on the other hand to begin the development of the necessary REACh dossiers for some of the substances that ECGA members are importing and producing such as synthetic graphite, sulphuric acid and acid treated graphite.

For the exemption of natural graphite the ECGA held a meeting with all natural graphite producers, assisted in developing an industry wide position and communicating it to the relevant institutions. The discussion on the exemptions of the different cokes began in 2009 and continues in 2010.

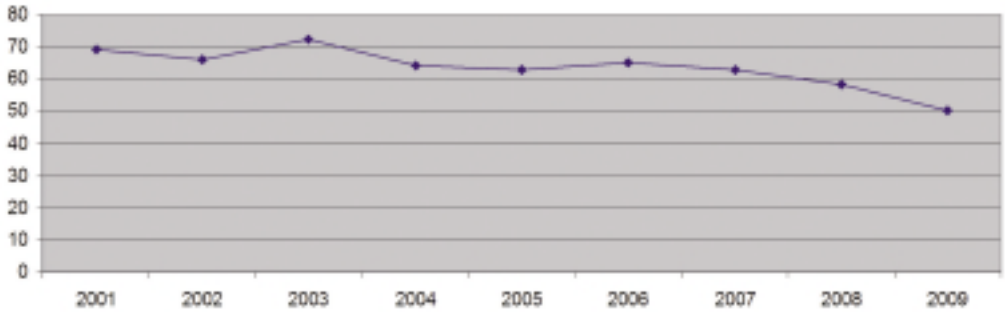
For those different substances that needed to be registered consortia were set up, SIEF meetings were held with all the other pre-registrants, consultants were appointed, data and literature research was conducted and where necessary testing strategies developed. All this was launched in 2009 and most of the work will be concluded in 2010 for the legal deadline for most of the substances. Some are due only in 2013.

At the same time the sector had to cooperate in the completion of the risk assessment on coal tar pitch as a downstream user. This was completed at the end of 2008 into a transitional dossier under REACh in order to be forwarded to the European Chemicals Agency (ECHA) where it would be assessed for possible prioritisation for authorisation or restrictions in use under REACH.
In this context the ECGA collected and needs to continue to collect downstream user exposure data which will be useful for the further progress of the dossier. The registration dossiers under REACH as well as the cooperation with the coal tar pitch producers for the authorisation will be a substantial part of the work in ECGA in 2010 and thereafter.

3.2 Safety Performance at the work place

Thanks to the continuous and sustainable application of highly developed Health and Safety practices by the ECGA members in the last years a successful improvement of the Safety Performance Index and a significant regression of the key accident indicators could be attained.
By the means of plant modernisation and streamlining, specific process instructions, consistent internal auditing and detailed accident and incident investigations this improvement could be made possible. As it can be seen in the presented chart not only the number of accidents (frequency rate) declined but also the absence of the job – time (severity rate) caused by accidents.

Severity Rate Index for ECGA members
(Number of lost calendar days related to 200.000 hours worked)



Also, the review of the exposure data in the sector with regard to PAHs has lead to even stricter risk management measures in many a plant across Europe.
The sector expects that as a result of the REACH registration exercise after 2010 many more reviews of health and safety practices in the plants will be due, although already much effort has been put into making work places in the carbon and graphite industry safe.

Although the efforts and measures of the ECGA members to establish and maintain high-level environmental standards during the last years as a result of stringent legislative requirements. Future requirements might hamper the industrial activities and the global competition.

Full members

RHEINFELDEN CARBON GMBH&CO.KG
Postfach 1140
D - 79618 Rheinfelden
GERMANY

Tel: +49 76 23 93 314
Fax: +49 76 23 93 540
www.alurheinfelden.com

BAWTRY CARBON INTERNATIONAL LTD
High Street, Austerfield 2
UK - DN10 6QT Doncaster
UNITED KINGDOM

Tel: +44 1302 71 81 00
Fax: +44 1302 71 81 11

CARBONE LORRAINE GROUP
Immeuble La Fayette, 2-3, Place des Vosges,
La Défense 5
FR- 92400 Paris
FRANCE

Tel: +33 1 41 85 44 88
Fax: +33 1 41 85 43 52
www.carbonelorraine.com

CARBONE SAVOIE
Notre-Dame-De-Briançon
BP 5
FR – 73265 Aigublanche Cedex
FRANCE

Tel: +33 4 79 22 34 40
Fax: +33 4 79 22 34 14
www.carbone-savoie.fr

ELKEM ASA Carbon
P.O. Box 8040, Vaagsbygd
NO-4675 Kristiansand S.
NORWAY

Tel: +47 3801 70 00
Fax: +47 3801 74 93
www.elkem.com

TOKAI ERFTCARBON GMBH
Aluminiumstrasse 4
D - 41515 Grevenbroich
GERMANY

Tel: +49 2181 49 52 124
Fax: +49 2181 49 52 157
www.erftcarbon.com

GRAFTECH INTERNATIONAL
(UCAR SA)
Carretera de Astrian s/n
ES-31171 Orobia (Navarra)
SPAIN

Tel.: +34 948 321200
Fax: +34 948 322184
www.graftech.com

GRAPHITE COVA GMBH
Grünthal 1-6
DE- 90552 Röthenbach
GERMANY

Tel: +49 911 5708 217
Fax: +49 911 5708 246
www.graphitecova.com

SCHUNK KOHLENSTOFFTECHNIK GMBH
Rodheimer Str. 59
D-35452 Heuchelheim
GERMANY

Tel.: +49 (0)641/608-1301
Fax.: +49 (0)641/608-1961
www.schunk-group.com

SGL GROUP
The Carbon Company
Rheingaustrasse 182
D - 65203 Wiesbaden
GERMANY

Tel: +49 611 602 92 06
Fax: +49 611 602 92 07
www.sgl.com

SUPERIOR GRAPHITE EUROPE LTD
Box 13000
SE – 85013 Sundsvall
SWEDEN

Tel: +46 60 134 118
Fax: +46 60 134 128
www.superiorgraphite.com

TIMCAL SA
Timcal stratmin
CH-6743 Bodio
SWITZERLAND

Tel.: +41 91 873 20 10
Fax: +41 91 873 20 29

Associate member

CONOCO PHILIPS LTD
Portman House, 2 Portman Street
UK - LONDON W1H 6DU
UNITED KINGDOM

Tel.: +44 20 7408 66 69
Fax: +44 20 7408 69 68
www.conocophillips.com

ECGA

European Carbon
and Graphite Association asbl

Avenue de Broqueville 12
B-1150 Bruxelles
Belgium

Tel.: +32 2 7756320
Fax: +32 2 7706303
E-mail: ecga@ecga.net