



ALUMINUM  
STEEL  
CARBON FIBRE  
SPECIALTY GRAPHITES

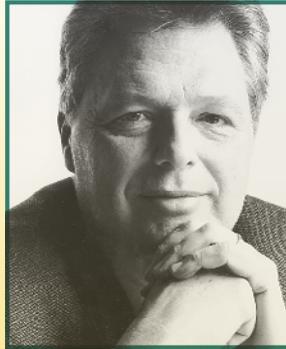


**ECGA**

**ECGA Annual Report 2014–15**  
European Carbon and Graphite Association

## Foreword

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The pace of the recovery remains slow as Europe continues to struggle to leave the legacies of the crisis behind. Economic growth remains also weighed down by missing macroeconomic adjustments and sluggish implementation of reforms, as well as long-standing weak growth trends. Moreover, uncertainty about the geopolitical situation, commitments to future policy initiatives and energy-price developments gained importance in 2014 and 2015. While private consumption was the main engine of growth in the current recovery, investment has failed to recover and exports have done little to support growth. The economic recovery in the EU and the euro area therefore lacked momentum in 2014 and 2015, with annual GDP increasing by just around 1%. New developments have occurred that are expected to brighten in the near term the EU's economic outlook which would otherwise further deteriorate. Oil prices have declined sharply, the euro has depreciated noticeably, the ECB has decided to expand the size and composition of its outright asset purchases by adding sovereign bond purchases, and the European Commission has presented its Investment Plan.

Over the ten years to 2014, demand for graphite was driven by strong growth in Chinese steel production averaging 12% per year. As Chinese steel growth looks set to fall for the first time in recent history (by -0.5% per year to 2020) many traditional markets are directly affected by these steel trends, the largest markets being that of synthetic graphite in electrodes for steelmaking furnaces and in refractory blocks for furnace linings. Other major markets include the recarburising of molten iron and steel, as well as foundry casting of iron and steel products.

On the other hand rapid growth is forecast in both electric/hybrid-electric vehicles and energy storage devices that could increase lithium-ion battery demand by 10-15% per year to 2020.

Carbon fibre is increasing as a desired material for various applications and new technologies. However, many developments hinge on the economic recovery of Europe which is still not happening except in a few sectors and a few EU states. Too high energy prices and a slumping Chinese economy with substantial overcapacities is giving many sectors worldwide serious challenges.

The EU's legislative framework, although announced to be simplified under Juncker, has not yet been weeded out and there are too many overlapping regulations and continuously increasing environmental constraints that threaten the overall performance and competitiveness of the EU industry. It is really high-time that the EU develop a strong industrial policy and protect its own manufacturing and the related employment.

President  
Bruno Toniolo

A handwritten signature in blue ink, appearing to read 'Bruno Toniolo', written in a cursive style.

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Today, manufacturing industry accounts for over 80% of Europe's exports; 80% of private research and innovation goes into industry. In total, 1 out of 4 private sector jobs are in industry and 1 job created in manufacturing industry generates up to 2 jobs in the services sector. The manufacturing industries are at the core of industrial clusters, and are important elements of the supply chain, thereby contributing to the EU's economy competitiveness. But the industrial basis of Europe has been continuously declining since the 1990s. Industry's share in Europe's GDP is now down to 15.1%. Since 2008, 3.5 million jobs have been lost in manufacturing.

The EU weakness has continued during 2014 and 2015 apart from some sectors in a few EU countries. Most EU countries have still not seen a lasting recovery.

Only exports contributed to growth, but with the slump in the Chinese economy these will also weaken.

The overall EU economic recovery and reversing trends in employment will not happen without industry and the highly efficient European manufacturing will continue to reduce global carbon emissions and contribute to greening the EU economy.

Although the calming of Grexit fears has led to an improvement in the business environment in the euro area in 2014 only a mild recovery took place for some parts, but 2015 again was a very difficult year.

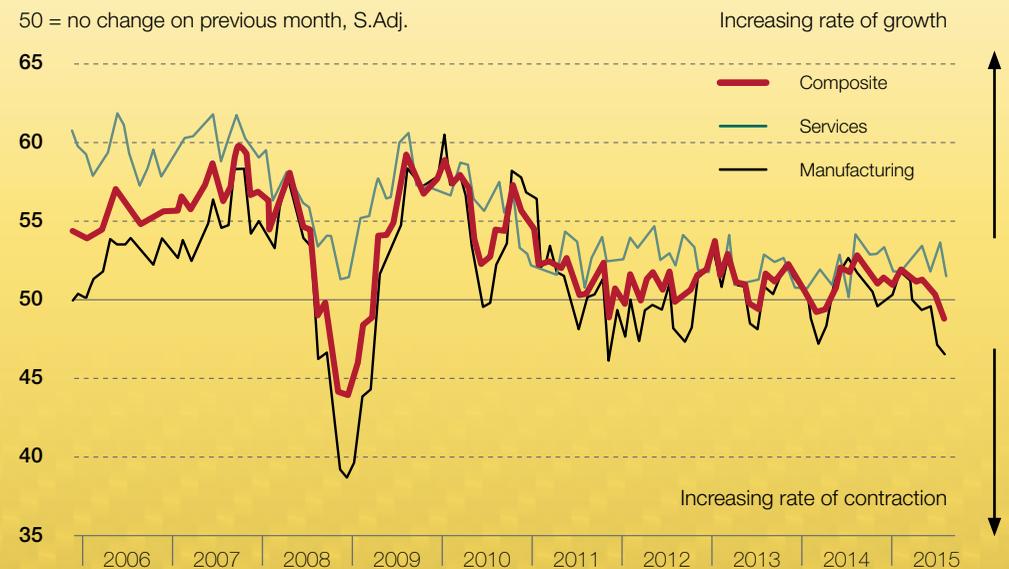
The European Commission' two Communications on Industrial Policy, one in 2010 and one in 2012 tried to address some of the hindrances, but till today, not much progress has been made.

Energy costs are still too high and the Climate Change agreement achieved in Paris at the end of 2015 will most likely not improve the situation.

## A major threat perceived by industry is the EU's unilateral granting China Market Economy Status (MES) at WTO

By August 2015 China's manufacturing activity shrank at its fastest rate in 3 years. However, it is still a major player.

### Caixin China Output PMI



According to agreements made at WTO, the EU should consider its position on China's market economy status by the end of 2016. Way back it agreed to grant China this status if certain conditions were fulfilled.

However, the question of Market Economy Status (MES) should be treated in accordance with WTO and EU rules and be based on its own merits. Over 30 European business sectors believe there is no requirement to automatically grant MES as a direct consequence of the expiry of Section 15 subparagraph (a)(ii) of the WTO agreement, because the remainder of the subparagraph, parts (a) and (a)(i), remains in place.

China has emerged as an important player on the world scene and is a key trade and investment partner of the EU. Any decision should therefore be based on a solid and comprehensive impact assessment which takes into account China's policies and their impact on EU interests.

There are deep concerns within major parts of the European business community including the graphite industry, on what the expiry of Section 15 subparagraph (a)(ii) could mean for the EU's anti-dumping procedures and industrial competitiveness. The EU should therefore in any case maintain effective trade defence instruments taking the real market situation in China into account.

The EU must also coordinate with and take into account the positions of other major WTO members such as the United States. Otherwise it is very likely that Chinese exports will be diverted towards Europe as a consequence of the differing status granted.

According to European industry China currently violates all of the five EU market economy status criteria, as follows:

1. Decisions of firms regarding prices, costs and inputs, including for instance raw materials, cost of technology and labour, output, sales and investment, are NOT made in response to market signals reflecting supply and demand, and without significant state interference in this regard, and costs of major inputs substantially do NOT reflect market values;
2. Firms do NOT have one clear set of basic accounting records which are independently audited in line with international accounting standards and are applied for all purposes;
3. The production costs and financial situation of firms are subject to significant distortions carried over from the former non-market economy system, in particular in relation to depreciation of assets, other write-offs, barter trade and payment via compensation of debts;
4. The firms concerned are NOT subject to bankruptcy and property laws which guarantee legal certainty and stability for the operation of firms; and
5. Exchange rate conversions are NOT carried out at the market rate.

The granting of market economy status to China would have the following consequences for Europe:

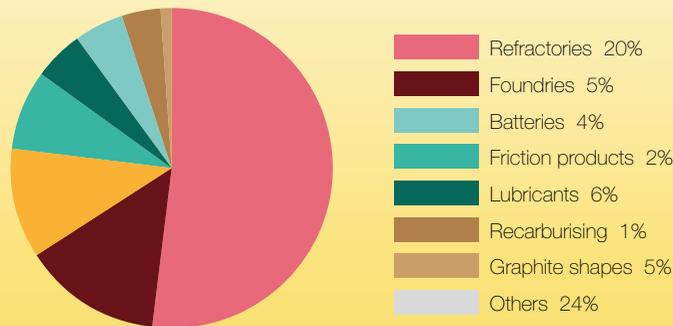
- China's currently existing overcapacity in the area when exported to Europe would suffocate the European industry.
- Granting market economy status to China would lead to the loss of several thousand jobs, most of them in regions already facing serious economic and social issues.
- Granting market economy status to China will lead to a decrease in the research and development investments in the European operations.
- Production in China is not compliant with the EU sustainable development value chain requirements (energy and climate change, environmental standards and the social license).
- If China was considered a market economy status, any anti-dumping measures would have to be recalculated to the disadvantage of the European industry.

The European Carbon and Graphite Association is a member of the AEGIS alliance (an industry alliance representing 30 key industries aiming to promote manufacturing investment, innovation, jobs and growth in Europe) of industrial sectors that are concerned with the developments and future trade relations with China.



The graphite industry's main market:  
Electrode Market for Steel Recycling

Global demand for graphite, 2014



Source: Roskill's Natural & Synthetic Graphite: Global Industry Markets and Outlook, 9th Edition 2015

Graphite electrodes are the largest market for synthetic graphite and account for about 37% of the worldwide graphite market, worth about 3.7 billion EUR. Major worldwide manufacturers are located in the USA, Europe, India, Russia and Japan and China.

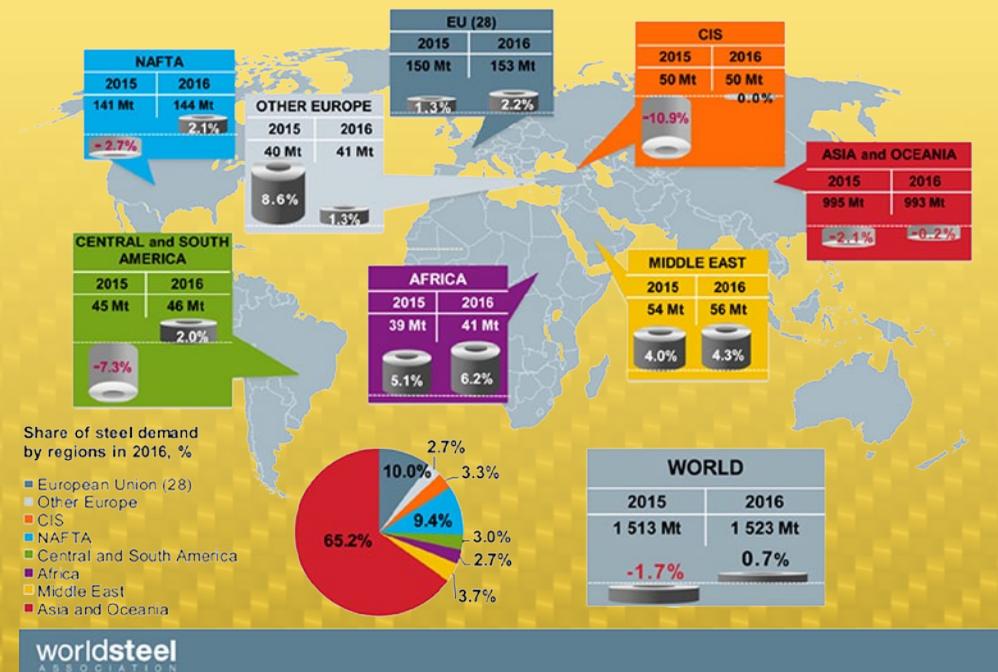
In the last quarter of 2015, steel prices have dropped 20% on the European market, and nothing suggests a change in this fall. It calls into question the profitability of the plants and the viability of the sector in the short term. This situation is all the more dramatic, given that after seven years of economic crisis that has hit the steel industry hard and led to the loss of 80 000 jobs, adjustment margins are almost non-existent. Plants which have overcome the crisis are operating with reduced staff and their room for manoeuvre is limited.

To this, one must add high energy prices and the impact of an environmental and climate policy that are additional handicaps in the race that the European steel industry is leading to regain its competitiveness at international level. Finally, the sector's difficulties are also related to austerity policies that penalise the steel industry, particularly in the markets for construction, building services, transport, infrastructure, etc.

Furthermore, if China, whose production overcapacities are twice the size of Europe's, is granted market economy status, it will be able without difficulty to flood the European market. It should be borne in mind that in 2015 Chinese exports have exceeded 110 million tons and doubled in 2 years.

SRO 2015-16: Regional Overview

Steel demand forecasts, finished steel (SRO October 2015)



Commenting on the outlook, Hans Jürgen Kerkhoff, Chairman of the Worldsteel Economics Committee, said: *“It is clear that the steel industry has, for the time being, reached the end of a major growth cycle which was based on the rapid economic development of China. Combined with China’s slowdown we also face low investment, financial market turbulence and geopolitical conflicts in many developing regions. The steel industry is now experiencing low growth which will last for the time it takes for other developing regions of sufficient size and strength to produce another major growth cycle. We expect the current headwinds to moderate in 2016 but this is based on a belief that the Chinese economy will stabilise. Of particular concern is the vulnerability of the emerging economies to external shocks though we are also expecting some, like India, to show resilience to the global slowdown. On a positive note, the recovery of steel demand in the developed economies, even though the momentum has weakened a little, remains on track.”*

## Total Steel (MM MT)

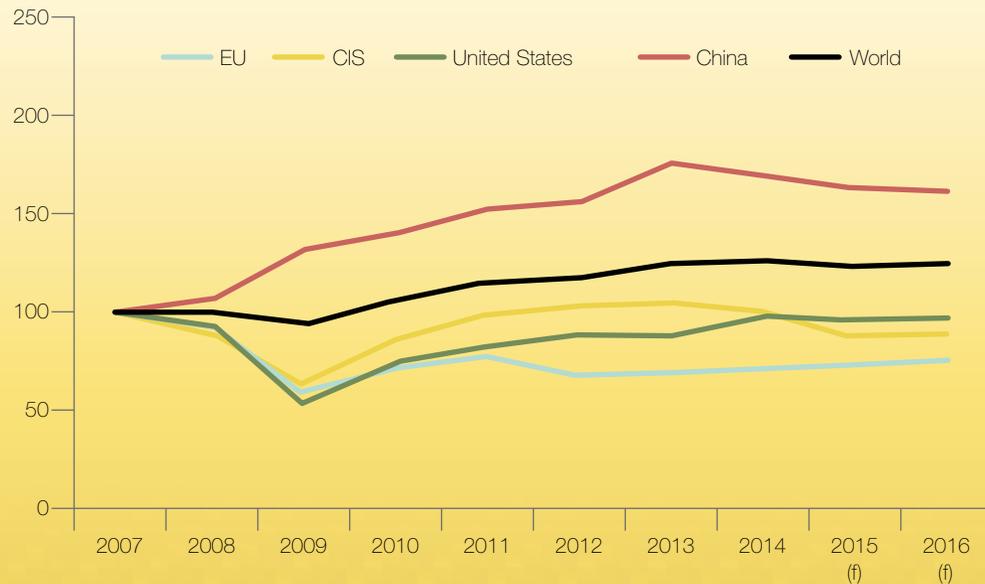
Region	2014 YTD	2015 YTD	YtY (%)
Asia Pacific	752.6	739.3	-1.8%
EU 28	113.6	113.8	0.2%
N. America	81.1	75.5	-6.9%
CIS	72.5	67.8	-6.5%
S. America	30.0	29.8	-0.6%
Other Europe	24.3	23.0	-5.6%
Middle East	18.4	18.7	1.8%
Africa	9.9	9.7	-2.2%
<b>Total</b>	<b>1102.4</b>	<b>1077.6</b>	<b>-2.3%</b>
China	551.3	540.6	-1.9%
ROW	551.2	537.0	-2.6%

Source: World Steel Association, Aug. 2015



## Regional steel demand evolutions (indices)

In million tonnes



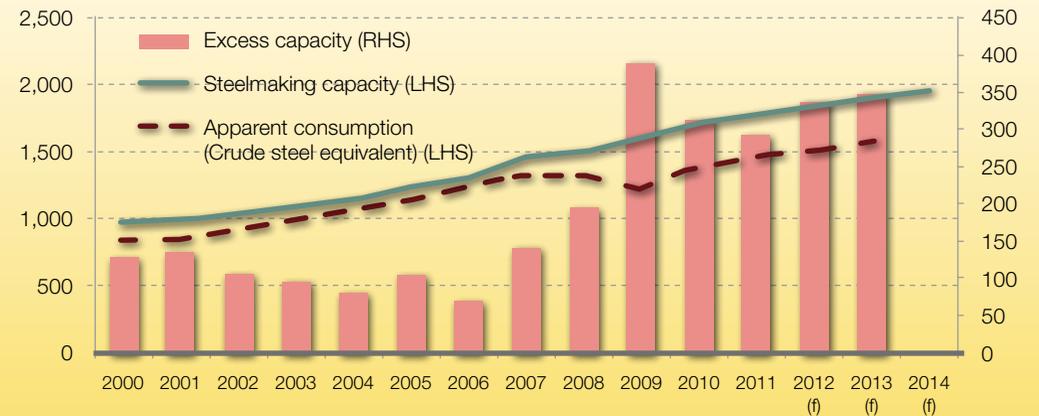
Source: Worldsteel, EUROFER 2015

However, the current situation is clearly dominated by the issue of overcapacities in Chinese steel mills, coke ovens and graphite electrode production and a slump in the market. This has of course severe consequences for the competing businesses worldwide, including Europe.

## Global Steel Capacity (effective) and demand

Million tonnes

Million tonnes



Source: Worldsteel, 2015



Manufacturing industry needs access to globally competitive energy. Electricity costs are 2 to 3 times higher in the EU than in the US, with a 70% increase since 2000 for EU industry (stable in the US). Regulatory costs (subsidies for renewables, taxes, grid costs, etc.) are the main reasons for this widening gap.

- Natural gas prices are 3 times higher in the EU than in the US.
- Energy intensive industry is a price taker and cannot pass on additional costs to its mainly global customers.
- Restoring global energy cost competitiveness is a priority. Solutions exist but must address all energy cost components and require a strong political support.

The transition to a low-carbon economy must drive on an acceptable cost and time axis.

Enabling the EU manufacturing industry to grow will reduce global greenhouse gas emissions and contribute to the “greening” of the EU economy since the EU industry is more energy efficient than its competitors. Due to technological limitations, the progress will slow down and further improvement will require economies of scale. This will require growth. Energy intensive industries are key contributors to greening the economy, but these industries are also confronted with a structural imbalance of climate and energy costs in comparison with their global competitors. Enabling the manufacturing industry to grow will not only stimulate innovation in technologies and products but consolidate EU’s leadership in the reduction of carbon emissions. Sufficient CO<sub>2</sub> allowances must be available for growth and new investments, including for indirect electricity emissions.

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

However, the sector is a high energy consumer when it comes to the graphitization process, when developing the feedstock for its final products. Therefore also in 2013 the sector was preparing – together with the consultant Ecofys- a detailed study on its trade and energy intensity in order to submit updated

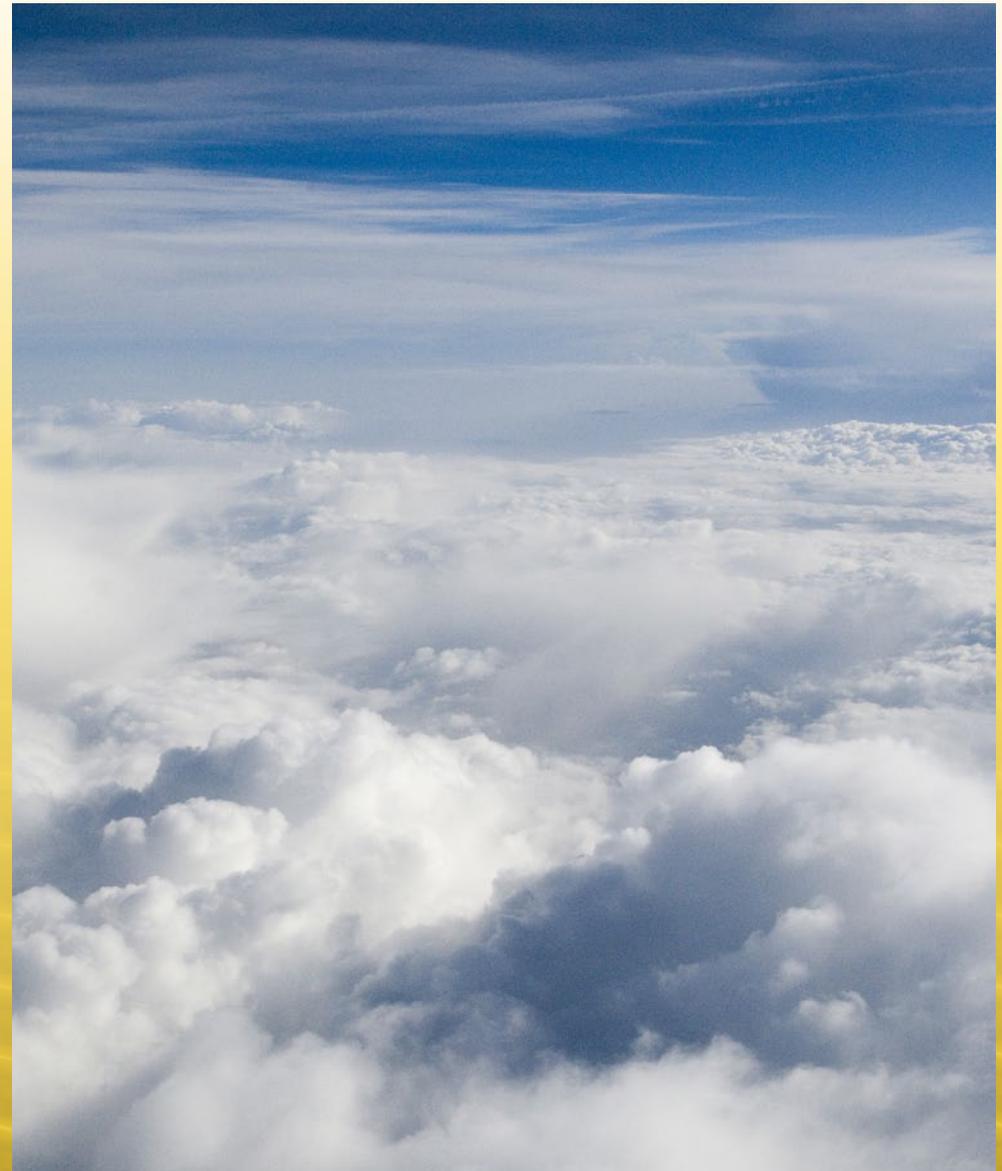
figures to DG Clima to remain on the so-called Carbon Leakage List, i.e. those sectors that should receive free CO<sub>2</sub> allowances under the ETS Directive due to the fact that their competitors worldwide would not be exposed to a similar regime and related costs. The study was submitted to the European Commission towards the end of 2013 and a consultative meeting took place in March 2014.



### The revision of the EU Emissions Trading System Review

The objectives of the new EU legislative Energy and Climate Package 2030 will be to tighten standards even more and reduce greenhouse gas emissions even further. The declared targets are:

- Gas Emissions (GHG):
  - Reduction factor for available allowances from 1.74% per year to 2.2% per year from 2021;
  - GHG reduction by at least 40% domestically by 2030 (the sectors covered by the ETS to reduce their emissions by 43% compared to 2005) 43% reduction in GHG by 2030 2050 compared to 2050 2030;
  - Member States are asked to use a share of their EU ETS auction revenues to finance climate action in countries outside the EU, including for actions to adapt to the impacts of climate change. Member States allowed to decide how to spend auction revenues –½ should be spend on climate action.
- Concerning free allocation and benchmarks:
  - 5 year period instead of 8 years;
  - Production increase leading to allowances increase;
  - Benchmarks based on the 10% most efficient installations.
- Concerning the carbon leakage phenomenon:
  - Reduction to 50 sectors on the carbon leakage list (down from 177 at present) accounting for 90% of EU industrial emissions;
  - The carbon leakage criteria are based on the multiplication of the trade intensity and the carbon intensity. Everyone above the 0.2 threshold gets 100% free allocation, even though only sectors above the 2.5 threshold are at very high risk of carbon leakage. Sectors below the 0.2 threshold (but above a 0.18 threshold) can still be added to the carbon leakage list based on a qualitative assessment by the European Commission taken certain criteria into account, but without specifying how



## Indirect carbon costs

Concerning the compensation of increased energy costs due to passed through CO<sub>2</sub> allowances costs, Member States should be encouraged to compensate through state aid rules.

## Innovation fund (similar to the existing NER 300)

A new innovation fund should allow for future research and investment into innovation:

- Up to 60% of project costs can be funded in the future;
- It will be financed by the sale of 400 million allowances, which could raise up to €10 billion.
- 50 million unallocated allowances from phase 3 would be taken from the Market Stability Reserve in order to enable the fund to start before 2021.

## Modernisation Fund

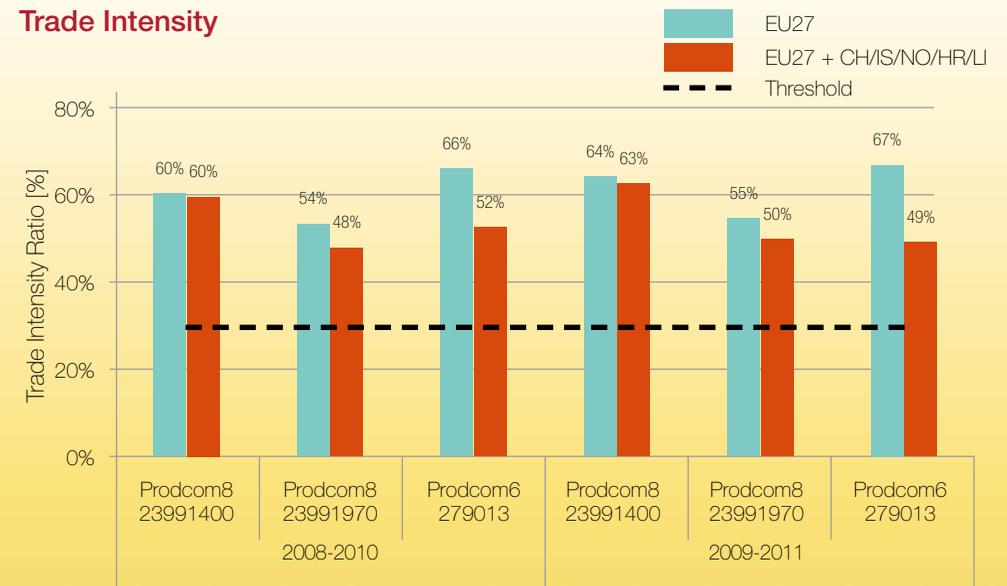
**A modernisation fund would make investments available for energy systems:**

- New fund for modernisation of energy systems in lower-income Member States;
- Financed by the auction of 310 million allowances.

The graphite sector has been first and foremost concerned with remaining on the carbon leakage list and obtaining eventually the compensations for the increased electricity charges.

The sector carried out two studies with regard to its carbon leakage status with the consultancy ECOFYS. The results clearly demonstrated that the sector fulfils the criteria of trade intensity and energy intensity and therefore should be eligible for free allowances and compensation. 2016 will see the revision of the listings.

## Trade Intensity



Source: Ecofys 2015



## Energy/CO<sub>2</sub> Intensity

Assumptions:

Carbon price: 30 Euro/tCO<sub>2</sub>

Emission factor: 0.465 tCO<sub>2</sub>/MWh

Auctioning factor 0.75

Non-ETS emissions are priced at fictitious carbon tax of: 30 Euro/tCO<sub>2</sub>



- Process emissions estimate (Non-ETS)
- Process emissions (ETS)
- Fuel combustion (Non-ETS)
- Fuel combustion (ETS)
- Electricity consumption
- - - Threshold

Source: Ecofys 2015

In 2016, the sector therefore will continue its request to be included not only on the Carbon Leakage List, but also on the Annex II of the subsidy regulation for indirect emissions arising from the ETS scheme.



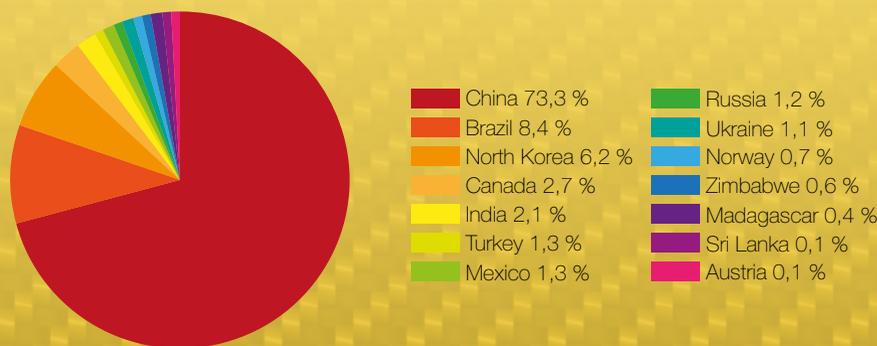
Natural graphite – an EU “critical” raw material

EU trade flows

Overall, the EU is a net importer of graphite and imports around 100,000 tonnes per year. The major destinations for the EU’s exports of natural graphite products are Japan, Turkey, South Korea and Russia. Significant intra-EU trade also takes place.

According to the findings of IM’s updated “Natural Graphite Report – Strategic Outlook to 2020”, the proliferation and frenzied pace of prospecting for graphite from Alaska to Australia has added more than 3.7bn tonnes to the global graphite resource base. Total contained graphite from identified resources is estimated to be in excess of 350m tonnes, or 245m tonnes of product covering all flake sizes, assuming a mining yield of 70%.

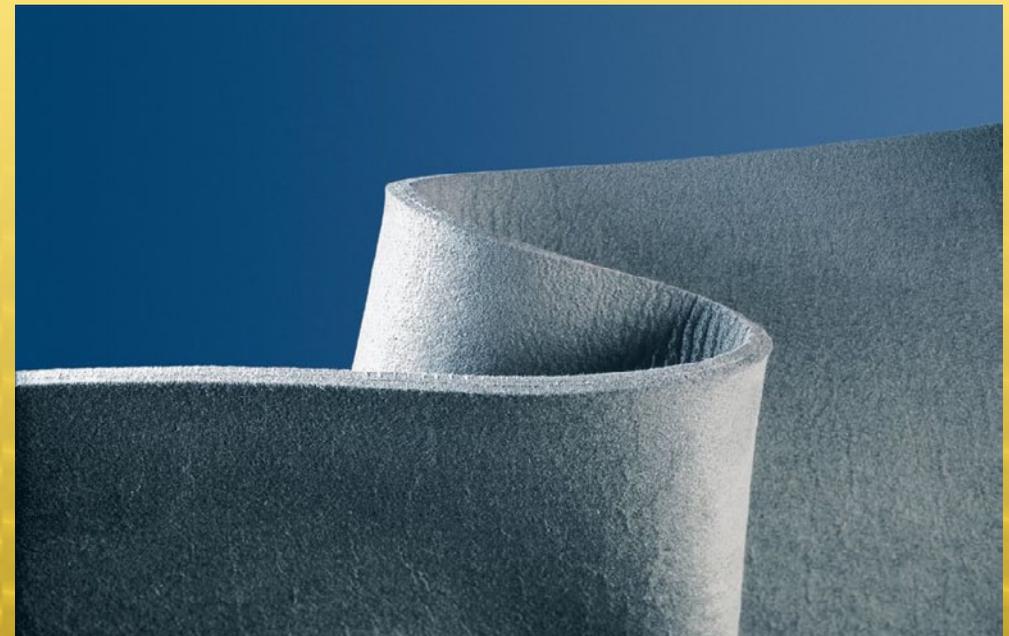
China remains the largest country supplier of natural graphite to the world market, accounting for 67% of production in 2014, while Brazil, India, Canada and North Korea collectively made up 27% of the market and the remainder came from smaller production bases in Europe, Africa and Sri Lanka.



Applications

Due to its combination of metallic and non-metallic properties, natural graphite is used for a wide variety of applications such as automotive industry, electric vehicle batteries and fuel cells, lubricants, batteries, carbon brushes as well as other applications such as antiknock gasoline additives, drilling mud, electrical and electronic devices, industrial diamonds, thermally conductive polymers, magnetic tape, mechanical products, pencils, advanced ceramics, paints and polishes and soldering/welding.

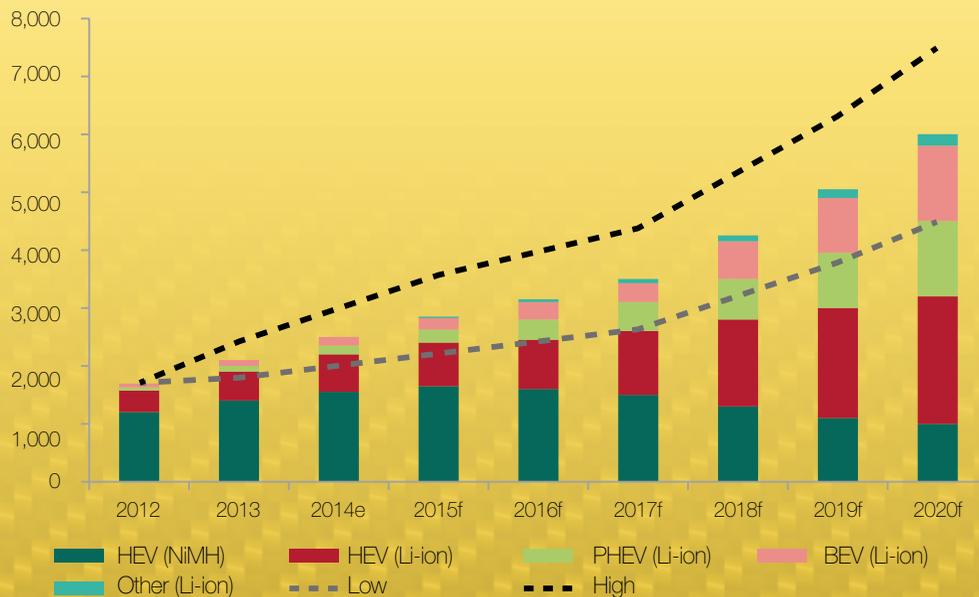
Emerging applications for natural graphite include: fuel cells, pebble bed nuclear reactors (PBNRs), Li ion batteries, vanadium redox batteries, ceramic armour tiles, oil sand recovery, electro-consolidation, non-slip paving and graphene.



High-tech emerging applications such as fuel cells and Li-ion batteries will require flake or high grade synthetic graphite. A number of new natural graphite mines are under development in North America, Africa and Asia - most are for flake graphite, spurred by excitement around batteries and graphene. According to Roskill production of natural graphite could reach 1.1Mt by 2020, of which flake graphite could account for 0.7 Mt. The demand for natural graphite is estimated to reach 1.2Mt by 2020. Whilst the refractories will continue to underpin graphite demand but will remain slow growing at less than 2% py, the largest growth will come from the batteries sector at 10-15% py.

**Graphite in batteries**

World: Forecast production of EVs/HEVs bz battery type, 2012 to 2020



Source: Roskill’s Natural & Synthetic Graphite: Global Industry Markets and Outlook, 9th Edition 2015

**Critical for the EU**

In 2013/2014 the consortium of Fraunhofer, Oakdene Hollins, and Roskill were asked to review and revise where necessary the EU’s report on Critical raw materials. The final updated report was published in June 2014.

**Picture of criticality**

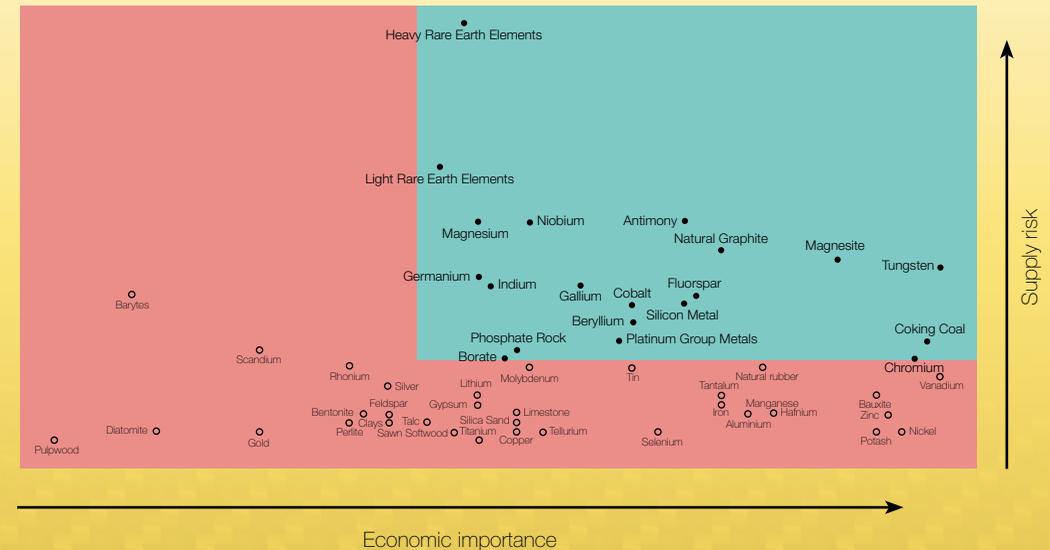


Figure: Updated criticality assessments for the EU for 2014, using the highest value for supply risk

Following this assessment, the Commission developed an in-depth study of the mass flow of these critical raw materials throughout the EU economy. The ECGA was instrumental in providing relevant information. The Commission in 2015 updated its methodology for the assessment of critical raw materials and the new assessment is planned to take place during 2016.

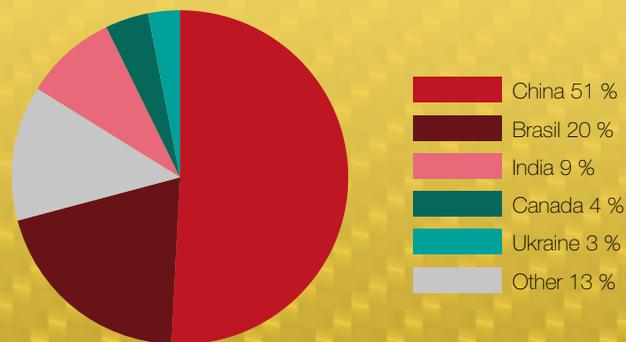
With regard to the market outlook forecast for world natural graphite supply and demand the current small surplus is expected to widen to around 15% of world supply by 2017. Much of the recent expansion in primary production of graphite has taken place in China and Brazil, though there are potentially large increases in world flake production planned from North and South America, which could represent around 40% of flake natural graphite supply by 2020. There are also plans to open a new mine in Sweden.

There are currently around 70 graphite projects worldwide at an early exploration stage, around 50 of which are located in Canada. It is probable that many of these projects will not ultimately be successful, so the supply growth forecast for flake graphite could be nearer to 3% per year, rather than the 6% forecast here. Supply growth in Asia for both flake and amorphous grades will be steadier, at approx. 2% growth per year.

Natural graphite has been recognised as a critical raw material by the European Commission, the British Geological Survey and the US Department of Energy Critical Materials strategy. The British Geological Survey ranks natural graphite right behind rare earths in terms of criticality of supply.

**Supply of natural graphite**

World: Supply of flake graphite by major producing country, 2014 (0.5Mt)

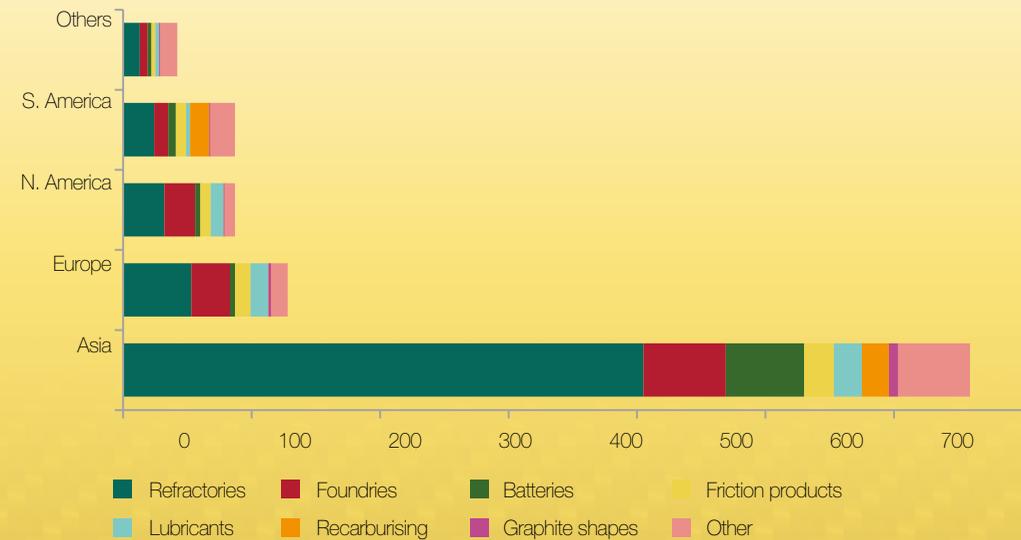


Source: Roskill’s Natural & Synthetic Graphite: Global Industry Markets and Outlook, 9<sup>th</sup> Edition 2015

From the OECD’s inventory of restrictions on exports of raw material it can be seen that China has export restrictions on natural graphite in place. China applies a 20% export tax on natural graphite.

**Global demand for natural graphite**

World: Regional demand for graphite by application, 2014



Source: Roskill’s Natural & Synthetic Graphite: Global Industry Markets and Outlook, 9<sup>th</sup> Edition 2015

## Resource efficiency and recycling

The carbon and graphite industry's products contribute actively to the saving of resources and energy through its efficient process management and through its products.

It contributes to steel recycling by providing its energy efficient electrodes. The European steel industry's CO<sub>2</sub> balance is positive. It provides steel for numerous gas emissions mitigation applications, such as wind and solar energy farms. High-strength steel helps building lighter cars with lower emissions. On eight CO<sub>2</sub> savings applications for which steel cannot be replaced by other materials, the yearly CO<sub>2</sub> savings for the EU would be at least 440 mill. tonnes in 2030, more than six times the CO<sub>2</sub> released by producing the corresponding steel.

Beyond providing electrodes for the steel recycling, the sector has also increased the quality of its products to reduce the specific consumption of its products in the steel industry over the years.

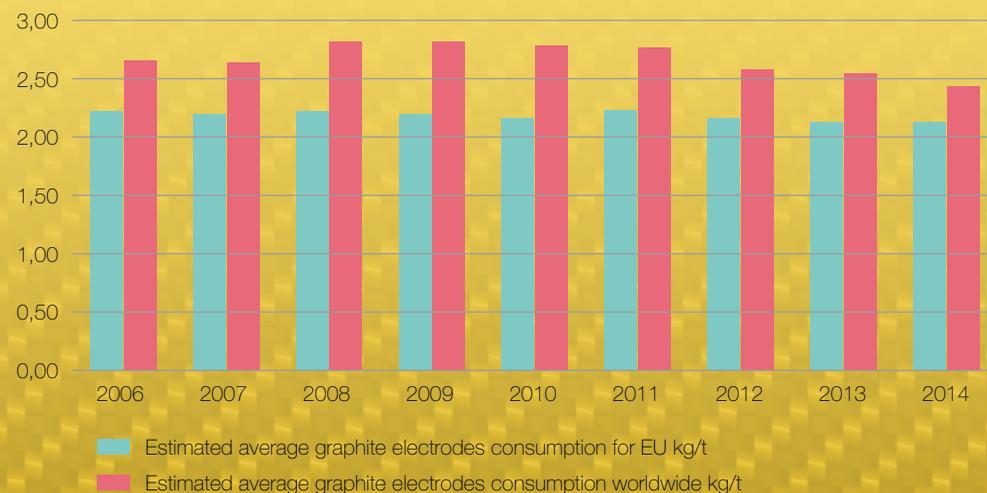
The carbon and graphite industry provides anodes and cathodes for the aluminium industry which itself has been reducing fossil fuel consumption by developing the use of this material in lighter cars. The endless recycling possibilities of aluminium reduce waste.

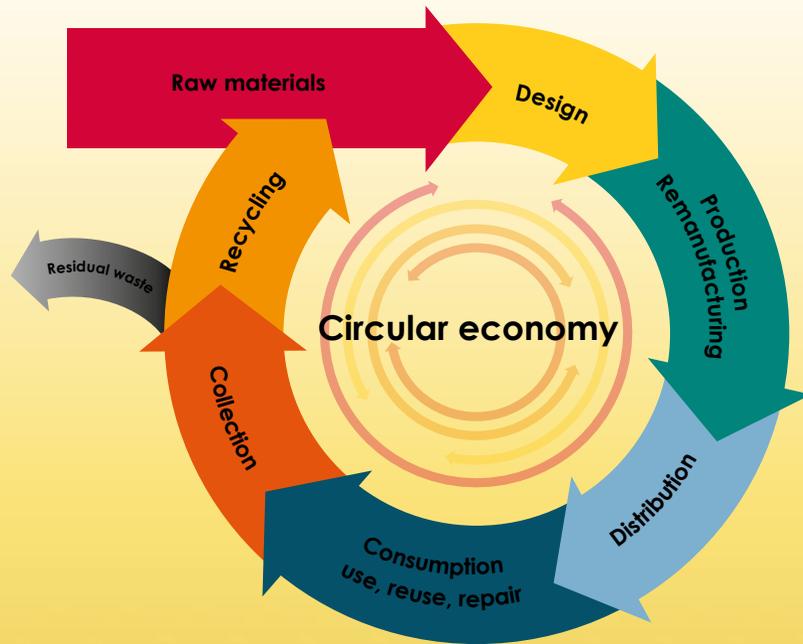
The European car industry is applying more and more light-weight materials such as carbon fibres to achieve fuel efficiency and CO<sub>2</sub> reduction.

No public transport, tram or train, is running without graphite being used in electrical motors and connectors. Public transport is a key factor in reducing energy consumption and CO<sub>2</sub> emissions.

The European Carbon and Graphite industry supports the EU's Initiative on the sustainable access to resources which was published in 2008 and was reinforced by the new Communication in 2011 followed up by the Commission in 2012 with the announcement of the creation of a European Innovation Partnership (EIP) on Raw Materials as well as the Commission's latest Communication in 2015 on the Circular Economy.

**Estimated average graphite electrode consumption (kg/t of steel) 2006–2014**





Source: COM(2014) 398 "Towards a circular economy: A zero waste programme for Europe"

At present, recycling of graphite from old scrap is very limited and only occurs for a few applications of graphite. A lack of economic incentives combined with technical challenges has stalled the market for recycled graphite. There is little to no information available on the global quantities and values of recycled graphite.

Synthetic graphite can be used as a substitute for natural graphite in some applications. The rising price of natural graphite may lead to increasing substitution with synthetic graphite. Applications where synthetic can be used in place of natural graphite include: batteries, brake linings, lubricants and carbon brushes. Synthetic graphite cannot be used as a substitute for natural graphite in refractory applications.

## Improving health and safety

### EU Chemicals Management: Graphite and graphite related substances

Following the REACH regulation the sector had submitted a series of REACH dossiers (synthetic and expanded graphite, sulphuric acid treated graphite, and acid treated graphite) on the substances produced by the sector. The second wave of registrations for the tonnage band below 1000 t was under preparation through 2012 and resulted in further registrations.

In 2013 ECHA, the European Chemicals Agency, came back with some questions with regard to the sulphuric acid treated graphite which requested an update of the dossier which was tackled in 2015 and will be submitted in 2016.

### HT coal tar pitch

HT coal tar pitch is an indispensable substance in the production of anodes, cathodes and electrodes and therefore crucial for the carbon and graphite industry. In the past the industry has conducted many times research into substitutes which never yielded any success. All proposed substitutes so far have are either not delivered on performance, or failed on the side of environmental, health and safety improvements. Therefore the sector is spending much time and effort on making its workplaces as safe as possible.

Having developed its own CSR on HT coal tar pitch, the sector as a downstream user continued to monitor the development and provided input to the update of the dossier prepared by the pitch producers. It also updated its own CSR which was submitted to ECHA in 2015.

In the meantime coal tar pitch high temperature (CTPht) was included in the 6th recommendation for inclusion of substances in Annex XIV of the REACH regulation.

The chemical processing of CTPht into coal tar pitch coke includes mixing of CTPht and filler grains (coke, graphite, anthracite) and forming in order to define the space/volume in which the chemical processing (transformation to coal tar pitch coke) takes place.

Most ECGA members use CTPht to produce coke (coal tar), high-temperature pitch; CAS 140203-12-9, which in subsequent processing steps (graphitizing, grinding, machining, etc.) is used to manufacture carbon-/graphite electrodes, cathodes and side wall blocks and specialty graphite and blast furnace linings.

In the graphite industry CTPht is used as an on-site isolated intermediate and transported as isolated intermediates and therefore should be exempted from authorisation under REACH Art. 2(8b).

In order to achieve this status a technical dossier was prepared in the summer 2015 and submitted in the autumn. The opinion of ECHA is expected for the first quarter of 2016.

## Technological Best Practices in the industry – the EU’s IED BREF note on Non-ferrous Metals

The graphite industry is covered by the scope of the so-called Best Reference document (BREF) of the Industrial Emissions Directive which has been under revision now for some time. From 2012 to 2014 the sector continued to contribute to the debate of updating the technology description and related emission limit values to be achieved by best technology and best practices.

In 2014 the final meeting of the Technical Working Group was held in Seville and the finalised document was presented to Member States experts for adoption. It took till the end of 2015 to finally have the document adopted which sets limit values; these values will have to be met by industry upon the issuing of new or revised permits within 2 years of adoption of this document, which means by 2017.

## Health and safety at the workplace

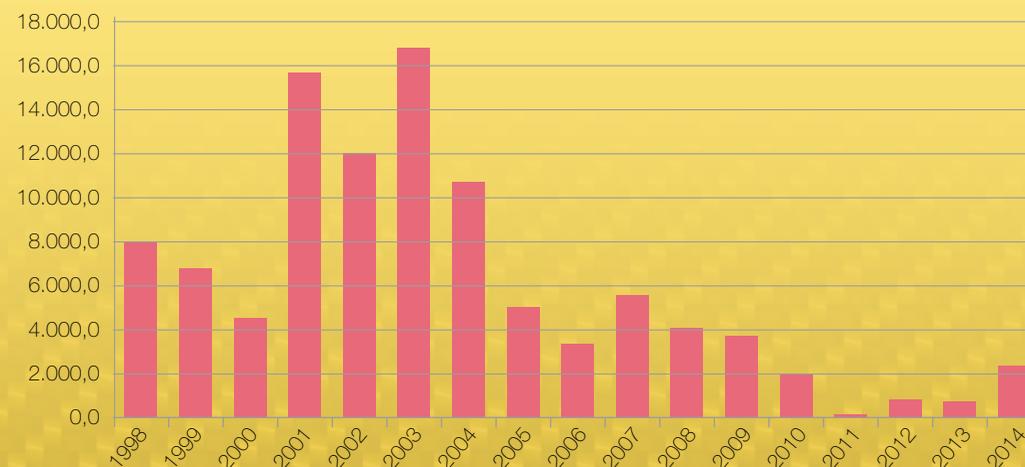
In order to continuously improve its sustainability, the ECGA members are striving to reduce their accident frequency and their accident severity. This is achieved through risk assessments at the workplace, continuous training and monitoring of accident rates.

The sector has been very successful over the years in reducing the frequency, but also the severity rates of accidents.

Hence the overall performance index of the sector has been improved steadily and the industry will continue to do so.

## Safety performance index for ECGA members

(the overall performance independently of the number of employees)



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