

Revision of the State aid Guidelines in the context of the amended EU Emissions Trading Scheme

Public consultation on draft ETS State aid Guidelines

Input submitted on behalf of the European Carbon and Graphite Association
for
**PRODCOM 23.99.14: Artificial graphite, colloidal, semi-colloidal graphite,
and preparations**

March 2020

ECGA position:

- PRODCOM 23.99.14 - the artificial graphite, colloidal, semi-colloidal graphite, and preparations industry is one of the most electrified and sustainable in the industrial production, exposed to a significant risk of carbon leakage for the EU ETS period 2021-2030 and should therefore be eligible for indirect emission costs compensation
- The subsector complies with the quantitative criteria included in the updated draft guidelines and the qualitative criteria of the consultant study initiated by DG COMP.
 - Indirect Emissions Intensity: **1.901 kgCO₂/EUR** > 1 kgCO₂/EUR
 - Trade Intensity: 66.2% (2013 – 2015) and **63.3%** (2014 -2016) > 20%
 - ICLI: 1.260 (2013 – 2015) and **1.19** (2014 – 2016) > 0.2
 - RAG rating to determine the risk of carbon leakage due to indirect carbon costs:

| PRODCOM code | Sector name | ICLI | RAG rating | RAG rating under high carbon scenario | RAG rating before fuel and electricity substitutability |
|-----------------|--|-------------|--------------------|---------------------------------------|---|
| 23.99.14 | Artificial graphite; colloidal or semi-colloidal graphite; preparations based on graphite or other carbon in the form of semi-manufactures | 1,19 | Medium-high | High | Medium-high |

- All qualitative criteria - laid out in the consultant report - are red indicating a very high risk of Carbon Leakage in particular as the products of the Carbon and Graphite Industry are essential for a low carbon society (Li-batteries, circular economy, solar energy, etc.)

| market characteristics | profit margins | abatement potential | overall RAG rating | remark |
|------------------------|----------------|---------------------|--------------------|--|
| Red | Red | Red | Red | The risk of carbon leakage is deemed high. |

- An individual assessment of the subsector 23.99.14 is necessary as a simple NACE approach is misleading. The NACE-code 23.99 accumulates energy and non-energy intensive productions in particular with respect to indirect emissions.

| NACE | PRODCOM | description | temperatures | |
|--|-----------------|---|----------------------|----------------------|
| | | | direct | indirect |
| 23.99 other non-metallic mineral products | 23.99.11 | articles of asbestos fibres, friction materials for brakes, etc. | app. 100 C | - |
| | 23.99.12 | articles of asphalt or similar | up to 150 C | - |
| | 23.99.13 | bituminous mixtures etc. | up to 150 C | - |
| | 23.99.14 | artificial graphite or carbon in form of semi-manufactures | up to 1.200 C | up to 3.000 C |
| | 23.99.15 | artificial corundum | - | up to 2.200 C |
| | 23.99.19 | slag/rock wool, articles of peat, stone, carbon fibres, etc. | up to 1.200 C | - |

This becomes evident in particular in the case of the Indirect Carbon Leakage Indicator (ICLI) and the trade intensity of the NACE-Code 23.99 and the subsector 23.99.14.

| NACE/ PRODCOM | | Trade Intensity | Direct Emission Intensity | Indirect Emission Intensity | Emission Intensity | Carbon Leakage Indicator (CLI) | Indirect Carbon Leakage Indicator (ICLI) |
|---------------|--|-----------------|---------------------------|-----------------------------|--------------------|--------------------------------|--|
| | | % | kg CO2/€ | kg CO2/€ | kg CO2/€ | | |
| 23.99 | manufacture of other non-metallic mineral products n.e.c. | 19,40% | 0,461 | 0,674 | 1,135 | 0,220 | 0,131 |
| 23.99.14 | Artificial graphite; colloidal or semi-colloidal graphite; preparations based on graphite or other carbon in the form of semi-manufactures | 63,30% | 0,527 | 1,901 | 2,428 | 1,537 | 1,203 |

The risk of Carbon Leakage for this subsector is confirmed by the EU Commission Regulation 2017/422^[4] in the antidumping case against India for machined graphite (= electrodes).

Table of Contents

| | |
|--|----|
| 1. Carbon and Graphite Industry | 4 |
| 2. Products and Downstream Users of Carbon and Graphite Industry..... | 4 |
| 3. Production Process | 7 |
| 4. SECTOR ELIGIBILITY – QUANTITATIVE CRITERIA..... | 8 |
| 4.1 Indirect Carbon Leakage Indicator | 9 |
| 4.2 Indirect Emissions Intensity | 10 |
| 4.3 Trade Intensity | 12 |
| 4.4 Representativeness of Data | 12 |
| 5. SECTOR ELIGIBILITY – QUALITATIVE CRITERIA (Red Amber Green (RAG) Qualitative Assessment and its applicability to the Carbon and Graphite Industry)..... | 13 |
| 5.1 Market Characteristics | 13 |
| 5.2 Profit margins - the current and future profitability of the sector in the EU ETS area..... | 27 |
| 5.3 Abatement potential - the scope for energy efficiency investments in order to reduce electricity consumption in the sector..... | 37 |
| 5.4 Fuel and electricity substitutability..... | 41 |
| 6. Aid Amount..... | 42 |
| 7. Degressivity | 43 |
| 8. References & Background Documents | 46 |

➤ **Carbon and Graphite Industry**

The European Carbon and Graphite Association (ECGA), represents European carbon and graphite producers, the activities concerned are those under PRODCOM code 23.99.14 which covers the most energy intensive but also the most critical activities in the sector.

The European carbon and graphite producing sector is mainly concentrated in eight European Economic Area (EEA) Member States (Spain, Norway, Austria, Poland, France, Germany, the United Kingdom and Slovakia) but trading activities are present all over Europe. It is a multimillion 'added value' generating sector, with a worldwide turnover volume of €3 to 5 billion annually. Roughly 40,000 people are employed either directly or indirectly through this industry.

The main downstream market of the sector is the electrode market, especially the steel industry, for which the recycling of scrap steel reduces the CO₂-emissions of the sector. Electrodes for electric arc furnaces make up the biggest revenue share and create considerable interdependencies between the two sectors. Other important downstream markets are refractories, the aluminium industry, electronics and lithium-ion batteries.

The European carbon and graphite sector is an energy intensive sector, whose products and raw materials are an integral part of any economy and society. Standing at the beginning of most value chains, the sector is a critical supplier of essential materials and products in other key economic sectors including electronics, steel and batteries. The carbon and graphite sector therefore generate added value and growth through employment, economic growth, development, innovation, generating trade and is essential for a zero CO₂ emitting economy.

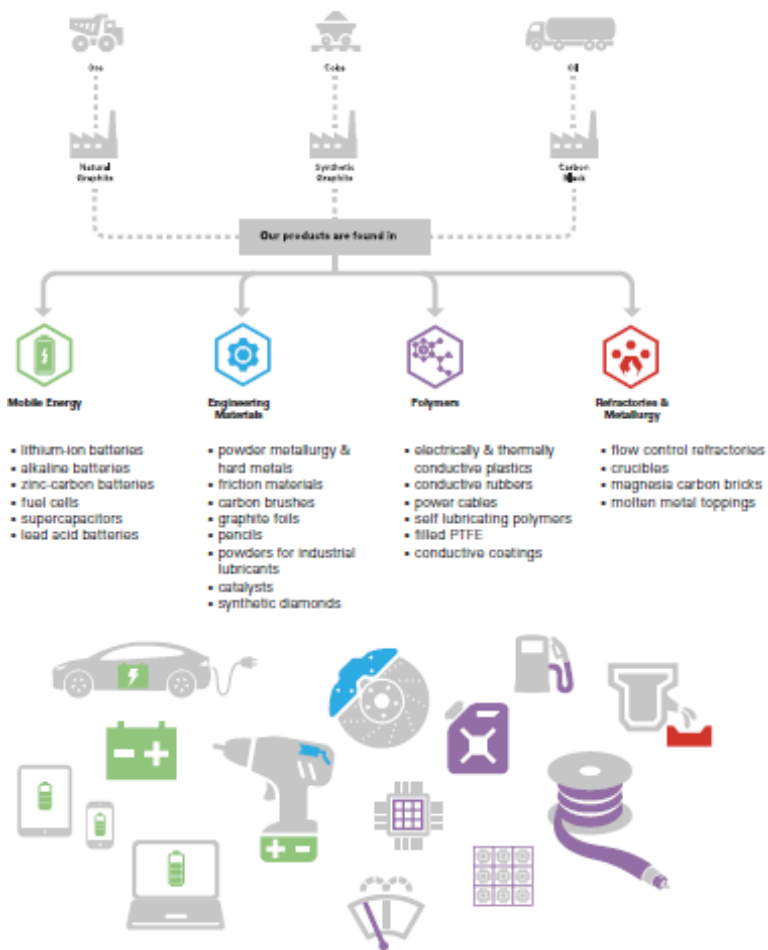
➤ **Products and Downstream Users of Carbon and Graphite Industry**

The main downstream market of the sector is the electrode market, especially the steel industry, for which the recycling of scrap steel reduces the CO₂-emissions of the sector. Electrodes for Electric Arc Furnaces make up the biggest revenue share and create considerable interdependencies between the two sectors. Other important downstream markets are refractories, the aluminum industry, electronics and Li-ion batteries.

Products of the Carbon and Graphite Industry support CO₂ neutral products^[6] and

APPLICATIONS

Imerys Graphite & Carbon is committed to producing and marketing highly specialized, environmentally friendly carbon-based materials for a variety of industrial fields such as Mobile Energy, Engineering Materials, Polymers and Refractories & Metallurgy.

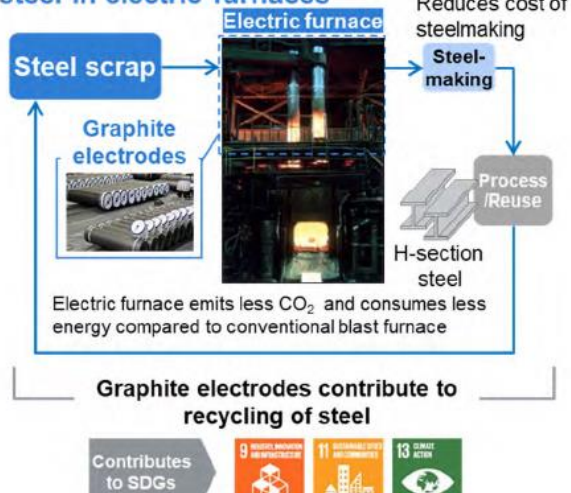


and contributes to largest recycling process^[5] in the world (steel recycling => circular economy) whereas Europe is still behind US, India etc. and still has potential which would contribute to the Circular Economy^[7].

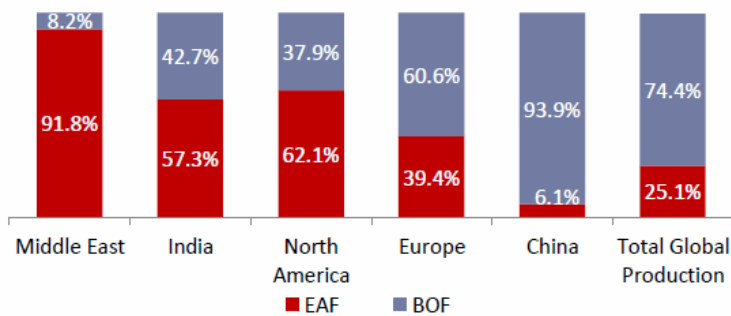
Case②: Graphite electrodes

Carbon

We produce graphite electrodes to melt steel in electric furnaces

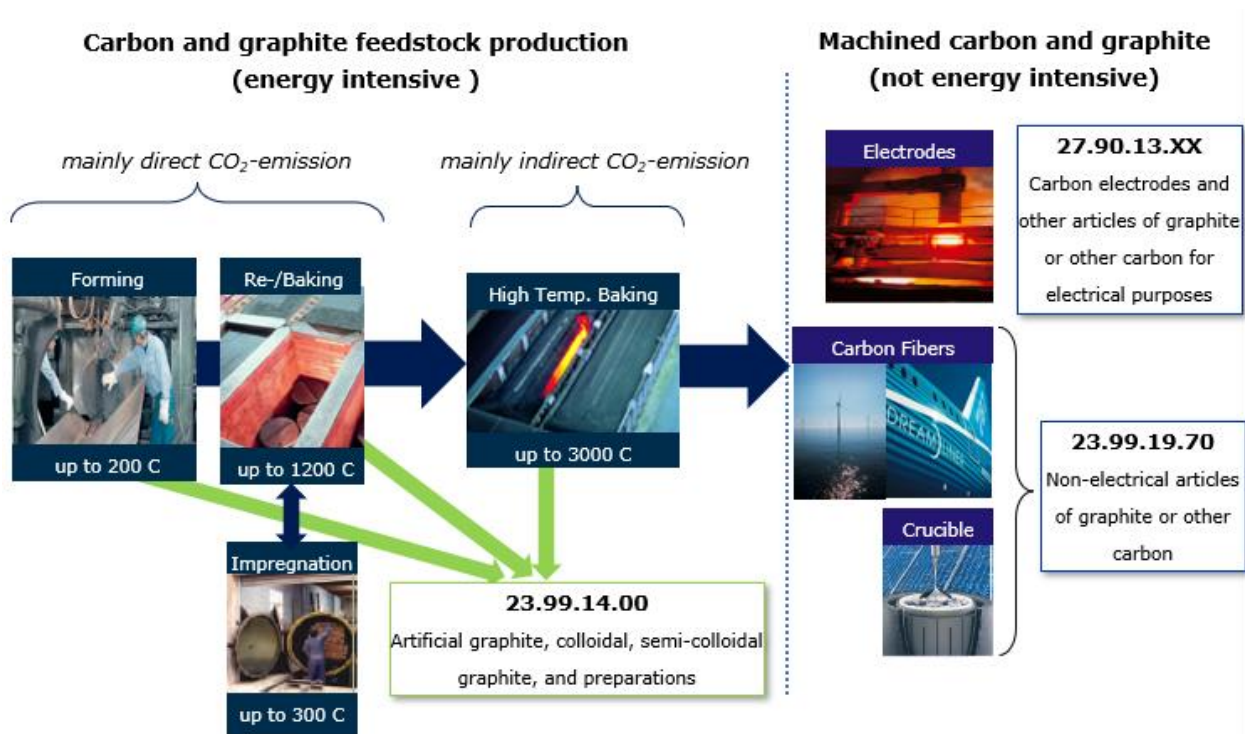


Process Wise Steel Production 2015



➤ Production Process

- Graphite production requires in general high electricity input to achieve the conversion from carbon to graphite (required temperatures app. 2.500 to 3.000 C) which are only possible by electrical heating. Depending on the individual products of a plant (carbon and/or graphite, fine/coarse grain, additional impregnation and purification steps, internal recycling of graphite, etc.) leads to significant differences in direct in indirect CO₂ emissions.



The production inputs used are natural and artificial graphite, needle and other cokes, and anthracite.

- In the first step, these raw materials are ground to a fine powder, and subsequently mixed with a liquid binder (e.g. pitch). In the next step, the homogeneous mixture is shaped using either extrusion, vibration moulding, die moulding or isostatic pressure processes.

- After the material has been formed, the next process step is the baking and impregnation (~300° C) of the blanks in the carbonizing step. In this step, the blanks are heated to temperatures of 1,000° C according to a precise time specification in electrically controlled ovens with the use of fuels. In this process, the pitch is converted into a solid coke. This step might be repeated several times if the material is impregnated depending on the required product quality.
- For very fine-grained graphite, this step can take up to two months. Process emissions are set free during baking. There is a small time-dependence of the emission rates which is, to a large extent, a result of the long baking time of the semi-finished products and the character of the furnace heating curve.
- The output of the baking process is a high-strength, hard and abrasive burned carbon with low thermal and electrical conductivity. This procedure is common industry practice and therefore applied in ETS installations, as well as non-ETS installations with similar inputs and outputs.
- Finally, the graphitising step (2,600-3,000° C) moves the carbon into its desired hexagonal molecular arrangement through electrical resistance heating. This process consumes a high amount of electricity. During this process, the properties of the material change to a synthetic graphite with high thermal and electrical conductivity.
- There are two common types of machinery used for graphitizing: Acheson furnace and Castner furnace, (i.e. lengthwise graphitization).

➤ **SECTOR ELIGIBILITY – QUANTITATIVE CRITERIA**

The draft updated ETS State Aid Guidelines methodology used to establish the list of eligible sectors relies on the carbon leakage indicator as defined in Article 10b of the revised ETS Directive, calculated based on indirect cost only. The indirect carbon leakage indicator required for eligibility is 0.2. In addition, eligible sectors need to have a trade intensity of at least 20% and an indirect emission intensity of at least 1 kgCO₂/EUR. These values are calculated at NACE code 4 level using the dataset also used for establishing the Carbon Leakage List used for the allocation of free ETS allowances.

| NACE or PRODCOM | Methodology | Time period | Trade intensity | Direct emission intensity | Indirect emission intensity | CL indicator | Indirect contribution to CL |
|-----------------|---|-------------|-----------------|---------------------------|-----------------------------|--------------|-----------------------------|
| 23.99.14 | Complementary (direct emissions only ETS) | 2013-2015 | 66.2% | 0.527 | 1.901 | 1.609 | 1.259 |
| 23.99.14 | Complementary (direct emissions only ETS) | 2011-2015 | 69.1% | 0.418 | 1.686 | 1.454 | 1.165 |

4.1 Indirect Carbon Leakage Indicator

NACE code 23.99 - The carbon and graphite sector is deemed exposed to the risk of carbon leakage and is included in the newly adopted Carbon Leakage List for the period 2021-2030 as part of NACE 23.99. The European Commission has calculated that for the sector under NACE 23.99 the carbon leakage indicator (CLI) value is 0.221, which is higher than the threshold value for determining carbon leakage risk of 0.2.

A more accurate calculation would be on a PRODCOM level for 23.99.14 – ‘Artificial graphite; colloidal or semi-colloidal graphite; preparations based on graphite or other carbon in the form of semi-manufactures’. Based upon a combination of Eurostat data on PRODCOM level trade intensity and actual electricity consumption data from companies, applying the same European Commission calculation reveals that:

- With indirect emissions intensity alone, the sector would have an average carbon leakage indicator value of 1.19 between 2014 and 2016. This is over 5 times higher than the threshold of 0.2 which the European Commission has used to determine if a sector is at risk of carbon leakage after 2020.

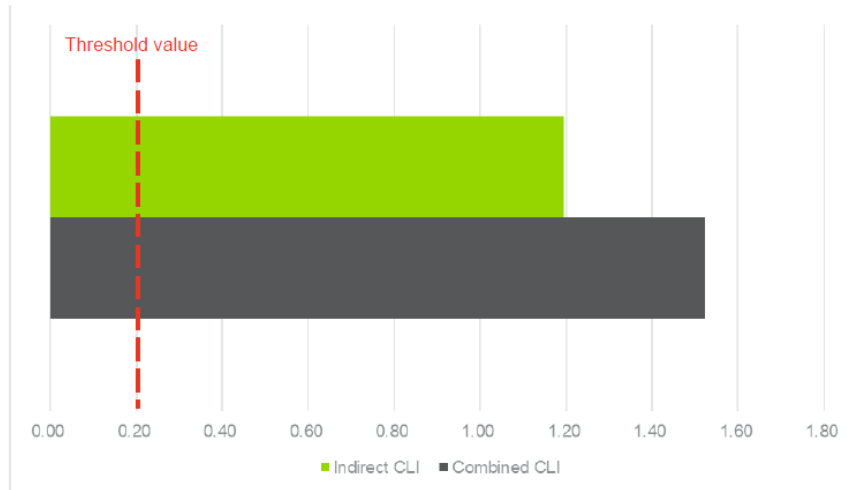


Figure 1-2: Average carbon leakage indicator values for 23.99.14 (2014-2016)

4.2 Indirect Emissions Intensity

The electro-intensity of the companies is based upon only electricity consumption for the production feedstock and shows that values range from less than 1MWh/t to nearly 12 MWh/t. The reason for the high spread of the electricity intensity is caused by the material qualities produced (carbon <-> graphite products, fine <-> coarse grain material) and not by efficiency of the production process. The weighted average electro-intensity of all the companies for 2014 to 2016 is around 4.65 MWh/t, while the unweighted average intensity is 2.85 MWh/t. The figure below shows the unweighted average the electricity intensity of the carbon and graphite sector (based upon total actual production and electricity consumption data provided by the companies) compared to the electricity intensity of other sectors previously considered eligible for indirect carbon cost compensation by the European Commission.

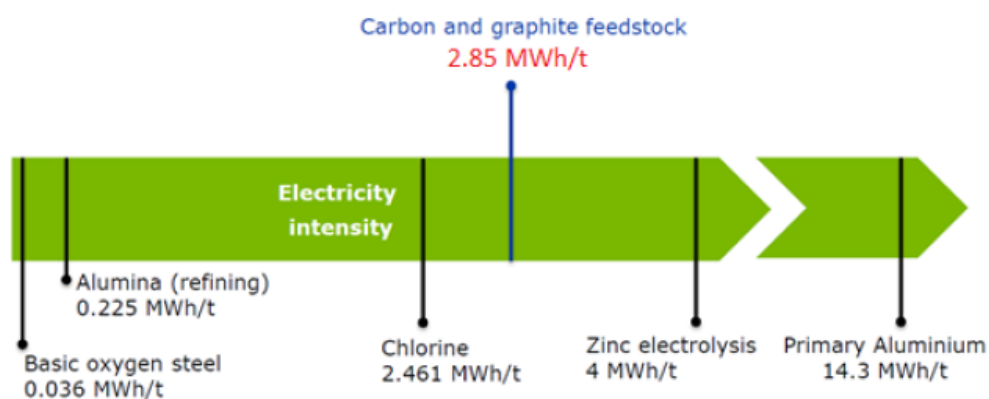
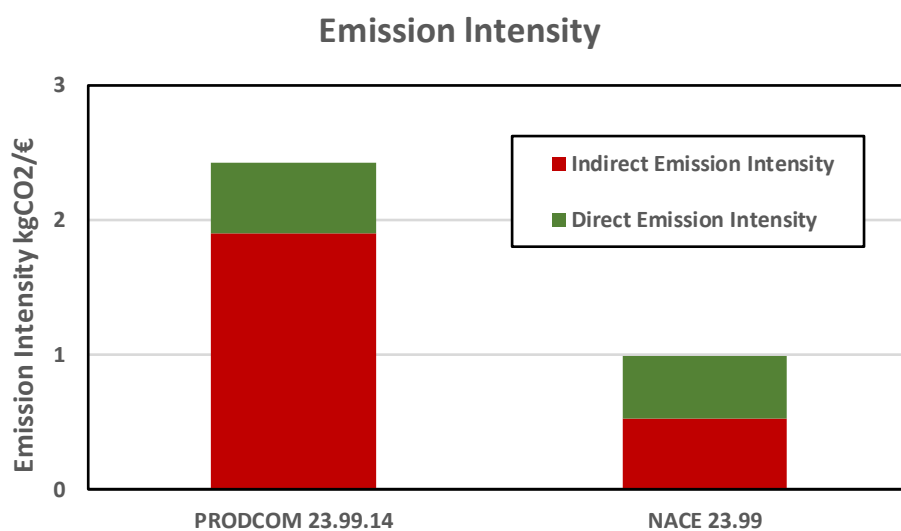


Figure 2-24: Comparison of average (unweighted) electricity intensity between the carbon and graphite sector and other sectors eligible for indirect emissions compensation²⁰

The indirect emission intensity of the Carbon and Graphite subsector (PRODCOM 23.99.14) is app. 3 times higher than the average of the sector (NACE 23.99) due to the required temperatures of up to 3000 C which requires electrical heating (see chapter production process).



4.3 Trade Intensity

Eurostat data shows that the average trade intensity of PRODCOM code 23.99.14 from 2014 to 2016 is at 63.3%.

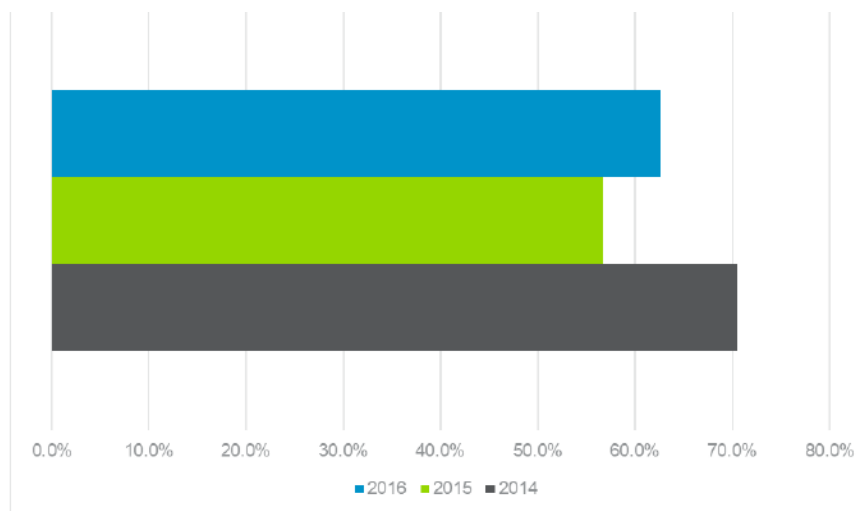


Figure 2-2: Trade intensity of European carbon and graphite products (PRODCOM 23.99.14)

4.4 Representativeness of Data

Data Collection used for the assessment of PRODCOM 23.99.14, audited and certified as per the attached annexes covered approximately 95% of the European production.

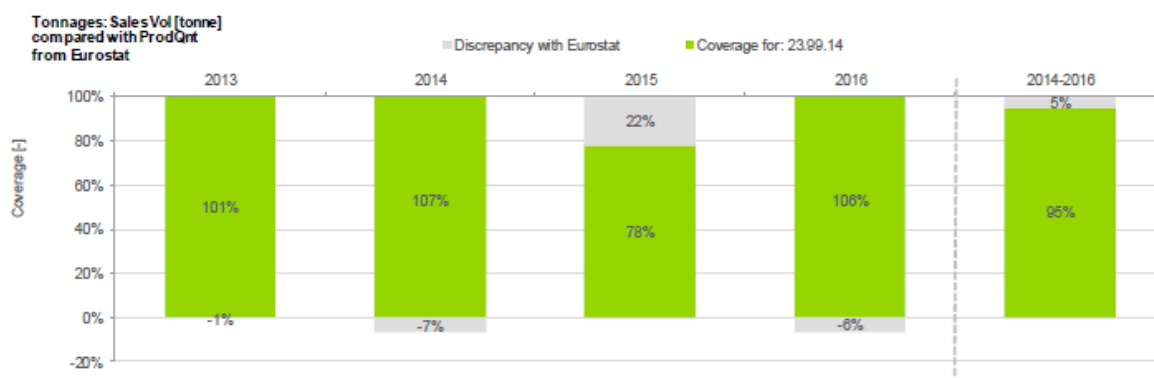


Figure 4-2 Production volume coverage

➤ **SECTOR ELIGIBILITY – QUALITATIVE CRITERIA (Red Amber Green (RAG) Qualitative Assessment and its applicability to the Carbon and Graphite Industry)**

5.1 Market Characteristics - the extent to which producers can pass on cost increases to customers, and the ability to pass on higher electricity costs

| Category | Criteria | Parameter | Green | Amber | Red |
|---|--|---|-------|--|--|
| Link between cost and output prices / Price taker | Link between cost and output prices | Comparison between output price evolution and inputs/production costs evolution | | - output prices are partly linked to input prices as raw materials represent up to more than 50% of the production costs '- but all of other costs have to be absorbed by graphite producers showed by the negative profit margins across the world | |
| | Price taker | Compare trends in sector output prices in the EU with trends in sector output prices outside EU countries | | | - prices within the EU had been always under pressure demonstrated by several anti dumping cases against China and India |
| | | Common reference price set globally | | | - graphite prices (e.g. graphite electrodes) are strongly correlated - price differentials exists only for several months until balanced by im-/exports |
| Market structure and bargaining position | Bargaining position- industry structure | Share of each firm- size band in sector/ concentration of sector | | | - company size of downstream users is in general always bigger than of the graphite producers (e.g. steel, aluminum, automotive, etc.) |
| | Bargaining position- interdependence between downstream customers and sector | Downstream sector's purchases of input Sales to downstream customers | | | sales of Carbon and Graphite Industry represents only minor percentage of of upstream users turnover (app. 0,1 t to 5% => solar, semiconductor, automotive, aluminum, steel, etc.) |
| | Bargaining position- pricing power | Pricing power over downstream customers | | | - graphite costs represents less than 1% (automotive) over 3% (steel) to max. 5% of costs of end customers |
| Existing and future trade patterns | Trade patterns- domestic demand | Trends in expected growth of demand | | - demand by steel industry and efficiency improvements will decrease demand - demand by Li-Ion batteries is expected to grow but producers are located in Asia | |
| | Trade patterns- import penetration | The role imports play in meeting demand and trend in import penetration | | | - prices within the EU had been always under pressure demonstrated by several anti dumping cases against China and India |
| | Trade patterns- import prices | Levels of import prices and trends | | | - prices within the EU had been always under pressure demonstrated by several anti dumping cases against China and India |

5.1.1 CRITERIA: Link between cost and output prices; PARAMETER: Comparison between output price evolution and inputs/production costs evolution

ECGA conclusion after applying the criteria: There is a partial correlation between output price evolution and production costs (Amber)

Justification:

Due to a combination of global competition, market factors and rising costs, the European carbon and graphite sector is facing a challenging period where, on average the earnings before tax (EBIT) of European carbon and graphite producers under 23.99.14 has halved from 2011 to 2016. **This period has also seen a reduction in Europe's production capacity due to plant closures such as Narni, Italy in 2014 and Griesheim, Germany in 2016.** In addition, carbon and graphite producers are much smaller than both their upstream suppliers of raw materials and downstream consumers of their products. The main raw materials are petroleum and needle coke which are supplied by large petrochemical companies while downstream customers are large steel and electronic companies. The size difference between the carbon and graphite producers and their suppliers and customers means that the sector is caught between organisations which have much greater bargaining power. This in turn means that the sector faces price rise pressures from suppliers of raw material as well as energy.

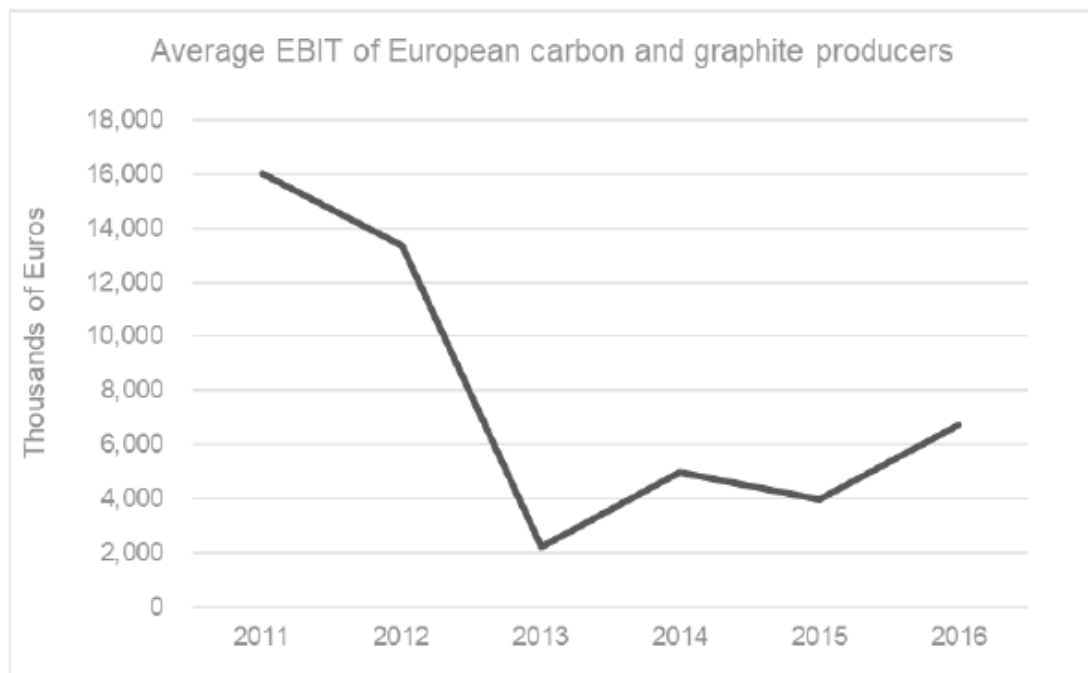
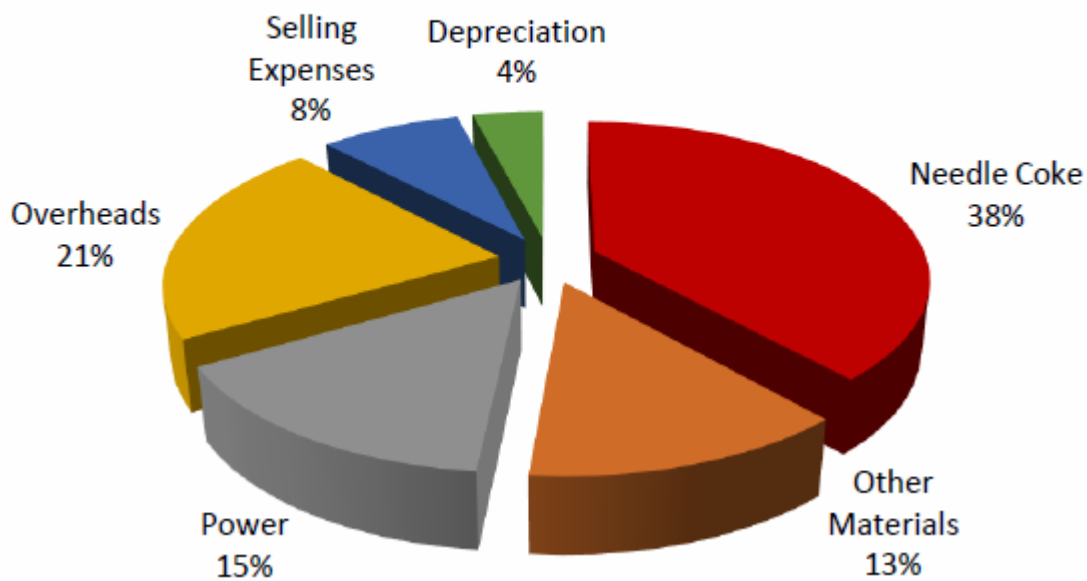


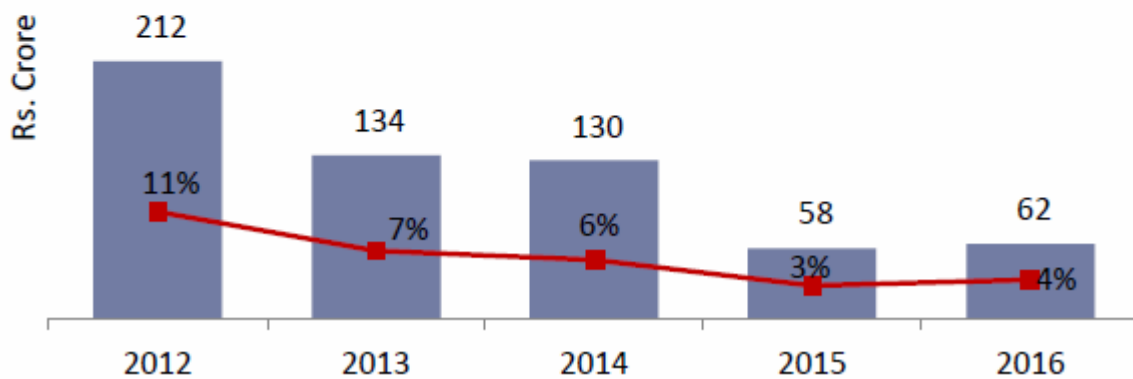
Figure 2-10: EBIT for carbon and graphite producers under 23.99.14

The app. 50% of the production costs are driven by globally traded raw materials ^[7] by large chemical companies driving the profit margins of the graphite producers down worldwide (example EBIT margin of Graphite India ^[7]).

FY2016 COGS Breakdown



Net Profit (in Crore) and Margins (%)



The correlation between outprice and production costs is also shown by the antidumping investigation of the EU-Commission ^[4] (see section 5.1.3).

5.1.2 CRITERIA: Price taker; PARAMETER: Compare trends in sector output prices in the EU with trends in sector output prices outside EU countries

ECGA conclusion after applying the criteria: There is a clear correlation between trends in sector output prices in EU and sector prices outside EU (Red)

Justification:

Based on historic trends, European carbon and graphite producers are likely to continue facing strong competition from non-EU producers. China dominates the export market as the largest exporter of artificial graphite products in the world with nearly half of the export market share. Continued cost and competition pressure on European feedstock producers are likely to lead to issues such as security of supply up the value chain such as European producers of high value end products such as batteries that rely on carbon and graphite feedstock products.

The European carbon and graphite industry finds itself squeezed between high electricity and CO₂ costs in Europe and competition from China and other major exporters. Ultimately Europe will

find itself in complete dependency on Chinese and other non-EU feedstock materials and eventually the whole value chain especially the battery chain, if the European carbon and graphite sector cannot compete.

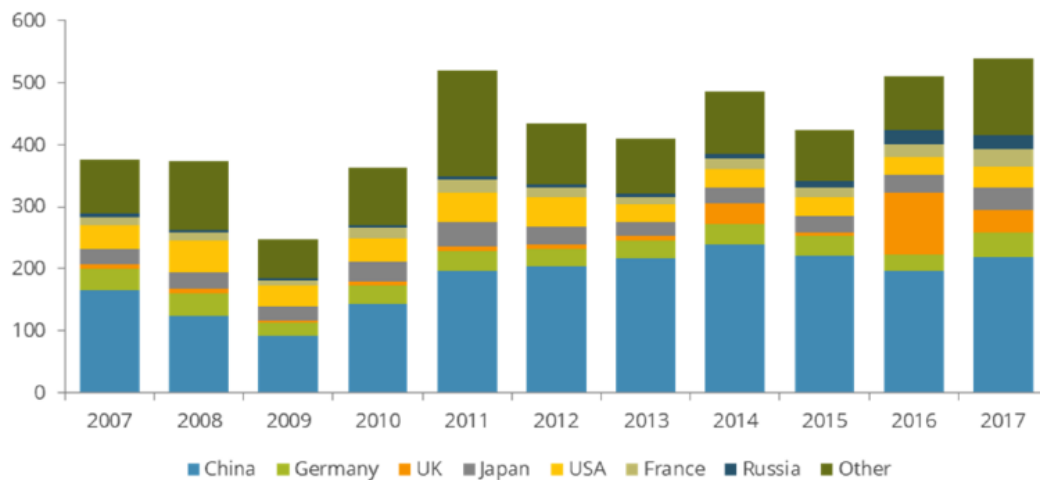


Figure 2-11: Global exports of artificial graphite by main country, 2007-2017 (kt)¹⁰

5.1.3 CRITERIA: Price taker; PARAMETER: Common reference price set globally

ECGA conclusion after applying the criteria: The reference price for the PRODCOM 23.99.14 is set globally (Red)

Justification:

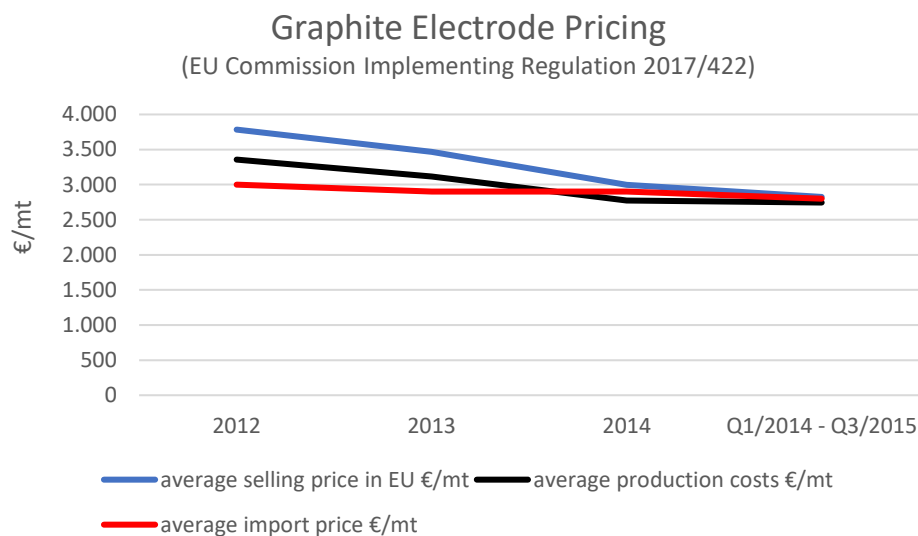
Carbon and graphite sector products are commodities that are traded worldwide and at high intensity as was also evidenced by the high trade intensity ratios for the EU. In general, high trade volumes in a global market lead to world market prices and companies compete mainly on price. Therefore, ultimately electricity cost increases to European companies cannot be passed to consumers precisely because the carbon and graphite companies compete at global level and must maintain cost structures comparable to the ones of their international competitors.

For specialty graphite products there is slightly more scope for product differentiation, but also in this segment, products are increasingly following international price setting. The sector is also faced with fierce competition from low-cost manufacturing countries, as is illustrated by the several trade defense investigations and measures taken to enhance a global level playing field. These measures include the anti-dumping and anti-subsidy levies imposed by the EU against

India, and the dumping inquiry against China , as well as similar such cases in other parts of the world (US anti-dumping order against small diameter graphite electrodes from China, anti-dumping duties by Mexico against graphite electrodes from China, safeguard case launched by the Russian Customs federation in 2012, etc.)

The European carbon and graphite sector is considerably exposed to world markets and global price setting. The largest share of its production is sold to sectors characterized by high concentration and strong bargaining power. Price differentiation based on quality is increasingly difficult, especially for graphite electrodes, and producers are price takers for this product segment. Trade ratios in the sector are high and European companies must compete increasingly with low-cost manufacturing countries, like China, as is evidenced by the several anti-dumping cases and investigation worldwide.

The international price pressure is confirmed by the antidumping investigation of the EU-Commission against India showing an international price setting mechanism ^[4].



5.1.4 CRITERIA: Bargaining position; PARAMETERS:

- **Share of each firm-size band in sector/ concentration of sector**
- **Downstream sector's purchases of input / Sales to downstream customers**

ECGA conclusion after applying the criteria: The PRODCOM 23.99.14 is less concentrated than downstream sectors, or small firms accounting for larger share of value added (Red)

Justification:

For the carbon and graphite sector, this context of global price competition means that prices are to a considerable extent determined by costs (a characteristic of price competition). Costs of raw materials and costs of energy are therefore important factors for the companies. For graphite electrodes (end product in PRODCOM 27.90.13 for which electricity-intensive feedstock 23.99.14.00 is used as main input), the main customer segment is the steel industry. The steel sector is a moderate to highly concentrated market with considerable bargaining power, as is illustrated by a Herfindahl-Hirsch index¹³ of 0.23 in 2009 for the global steel market.

The figure below shows that most companies in NACE 23.99 have fewer than 250 employees, which suggests that these smaller companies do not have strong bargaining power. This is particularly true for carbon and graphite producers whose main customers are from the steel sector, dominated by big multinational companies globally.

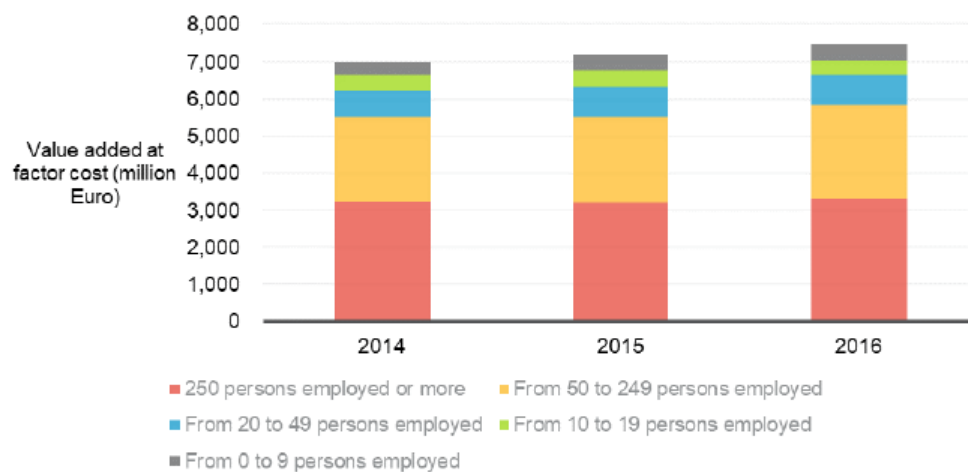


Figure 2-14: Value added at factor cost for NACE 23.99 by company size (Eurostat)

5.1.5 CRITERIA: Bargaining position- pricing power; PARAMETER Pricing power over downstream customers

ECGA conclusion after applying the criteria: - the output of the PRODCOM 23.99.14 has a low-value added content with regards to the pricing power (Red)

Justification:

The steel sector works with global purchasing organizations that compare prices across suppliers worldwide and buy in large quantities, as such the steel sector also has significant bargaining power with suppliers. Companies in the European carbon and graphite sector are responding by also establishing dedicated sales organizations within their companies. However, price differentiation as a result of quality or specific product characteristics and service is only possible to a limited extent and price is more and more seen as the determining factor.

For specialty graphite products there is slightly more scope for product differentiation, but also in this segment, products are increasingly following international price setting. The sector is also faced with fierce competition from low-cost manufacturing countries, as is illustrated by the several trade defence investigations and measures taken in an attempt to enhance a global level playing field. These measures include the anti-dumping and anti-subsidy levies imposed by the EU against India, and the dumping inquiry against China¹⁵, as well as similar such cases in other parts of the world (US anti-dumping order against small diameter graphite electrodes from China, anti-dumping duties by Mexico against graphite electrodes from China, safeguard case launched by the Russian Customs federation in 2012, etc.)

The European carbon and graphite sector is considerably exposed to world markets and global price setting. The largest share of its production is sold to sectors characterized by high concentration and strong bargaining power. Price differentiation based on quality is increasingly difficult, especially for graphite electrodes, and producers can be seen as price takers for this product segment. Trade ratios in the sector are high and European companies have to compete increasingly with low-cost manufacturing countries, like China, as is evidenced by the several anti-dumping cases and investigation worldwide.

5.1.6 CRITERIA: Trade patterns- domestic demand; PARAMETER Trends in expected growth of demand

ECGA conclusion after applying the criteria: There is a stable trend in expected growth of demand (Amber)

Justification:

The main driver for demand globally and in Europe is the growth of the steel industry and expected developments in battery technology. Recycling of steel is carried out in electric arc furnaces (EAF) which uses graphite electrodes to obtain the temperatures to melt the steel scrap and to ensure the steel qualities of the recycled steel. Energy storage in all forms will be crucial in the future and it will not only secure the energy supply, but it will also enable electric mobility. The lithium-ion battery is one such example where carbon and graphite are crucial and where both natural and synthetic graphite are being used.

Today the estimated consumption of active materials in battery anode manufacture are estimated to be in the order of 117kt, of which at least one third would come from synthetic graphite. Future demand for graphite is expected to keep a stable trend in demand, generated by the increase in global electrification, steel demand and developments in the energy storage and battery field. However, the carbon and graphite sector in Europe is still recovering slowly from the impacts of the market crash in 2013 and overall supply capacity has also fallen. The current supply situation could be an issue of security of supply for European value chains as China massively dominates the supply for natural and synthetic graphite today

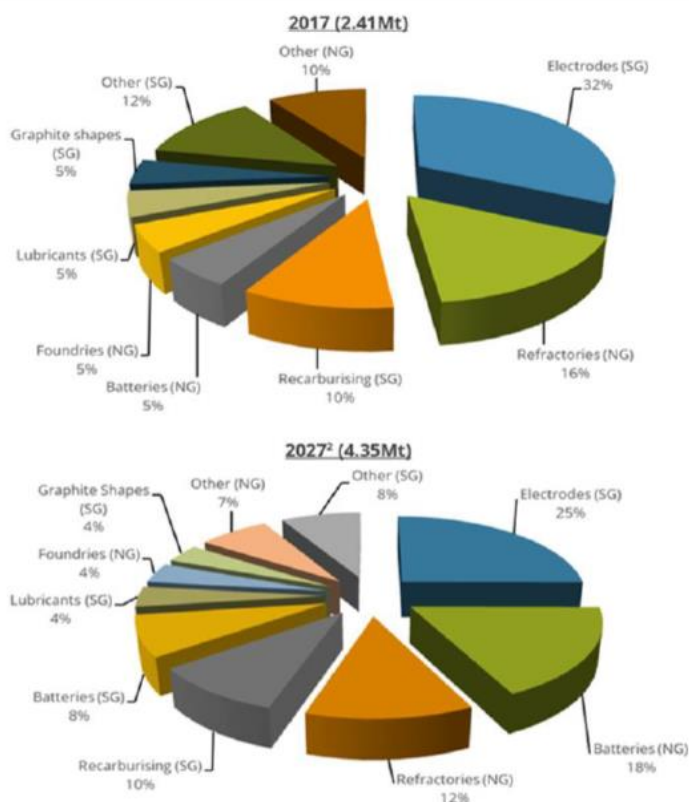


Figure 2-12: Current and expected future use of graphite¹¹

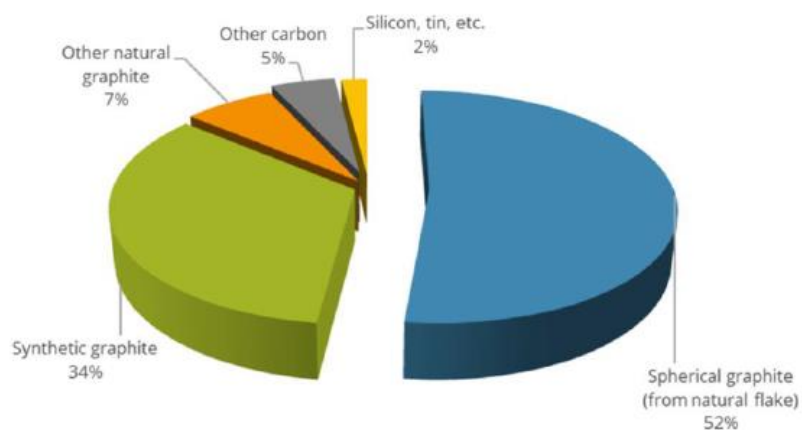


Figure 2-13: Current consumption of battery anode active materials¹²

5.1.7 CRITERIA: Trade patterns- import penetration; PARAMETER The role imports play in meeting demand and trend in import penetration

ECGA conclusion after applying the criteria: There is a high/ growing market penetration (Red)

Justification:

The European carbon and graphite sector is trade intensive and faces strong competition from global producers in the domestic EU market. Imports represent on average 161% of domestic demand in value and 158% in volume over the period 2014-2016.

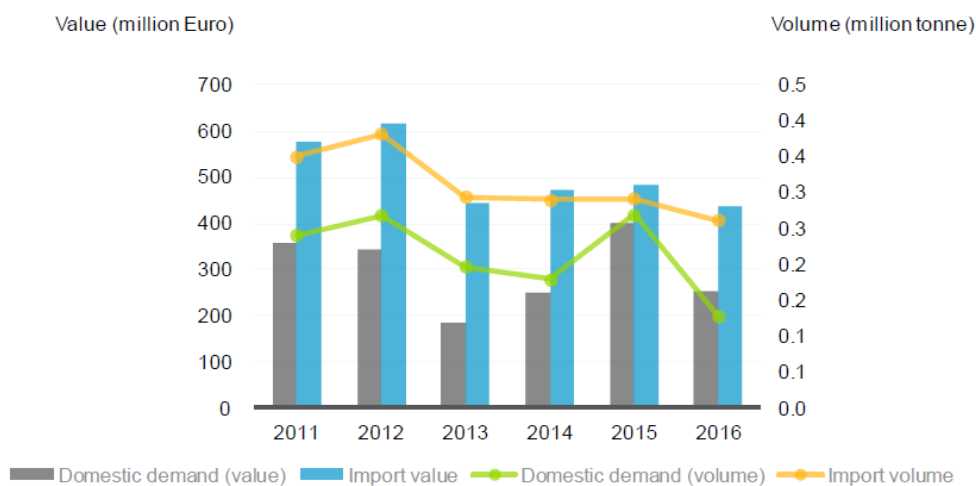


Figure 2-1 Domestic demand of PRODCOM 23.99.14 in the EEA in Euro and tonne from Eurostat

Eurostat data shows that the average trade intensity of PRODCOM code 23.99.14 from 2014 to 2016 is at 63.3%.

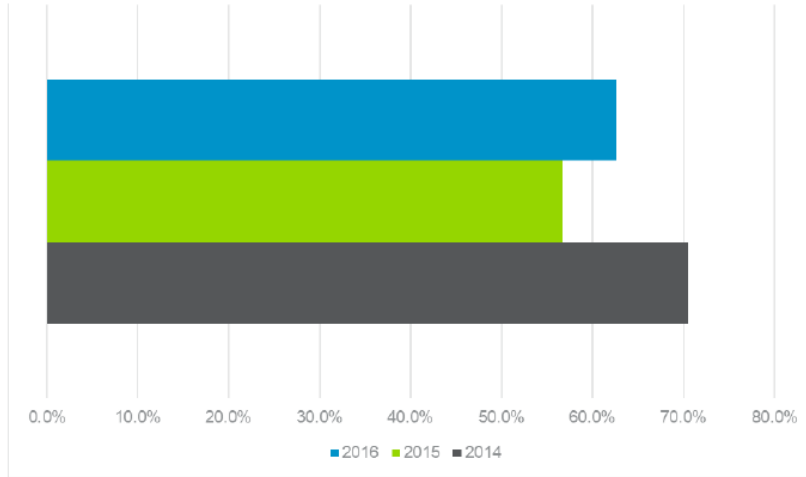


Figure 2-2: Trade intensity of European carbon and graphite products (PRODCOM 23.99.14)

5.1.8 CRITERIA: Trade patterns- import prices; PARAMETER Levels of import prices and trends

ECGA conclusion after applying the criteria: the import prices are falling (Red)

Justification:

Carbon and graphite feedstock products are integral materials in the production of numerous high value end products as well as steel recycling. Hence demand is linked to market situations in those sectors and changes such as for example the potential future growth in the electrification of the transport sector and associated battery. However, the European carbon and graphite producers only make up roughly around 4% of the global production and faces competition mainly from China which produces more carbon and graphite feedstock products than the rest of the world combined. Outside of China, major producers and competitors include USA, Japan, Russia, and India.

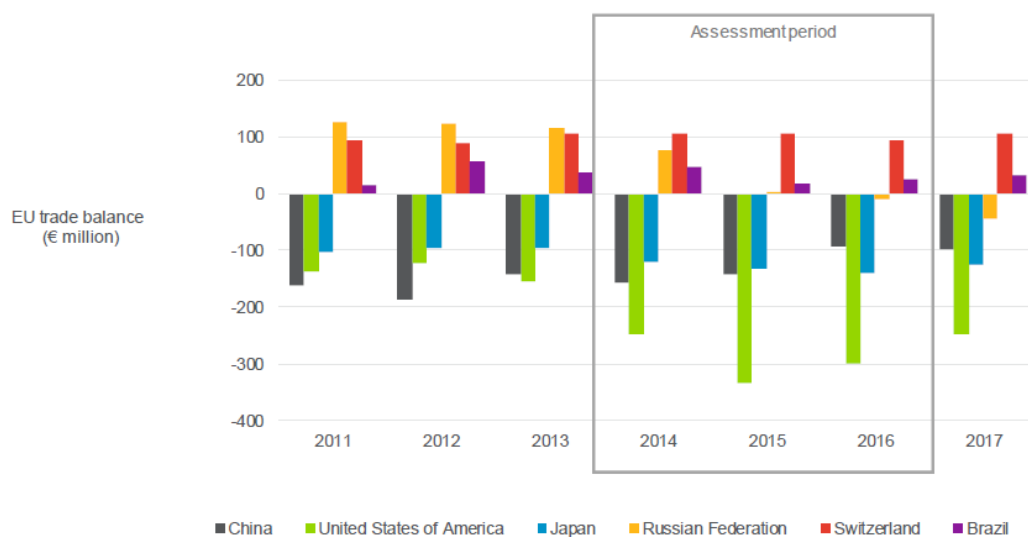


Figure 2-3 EU trade balance for PRODCOM 23.99.14 with top trade partners for imports

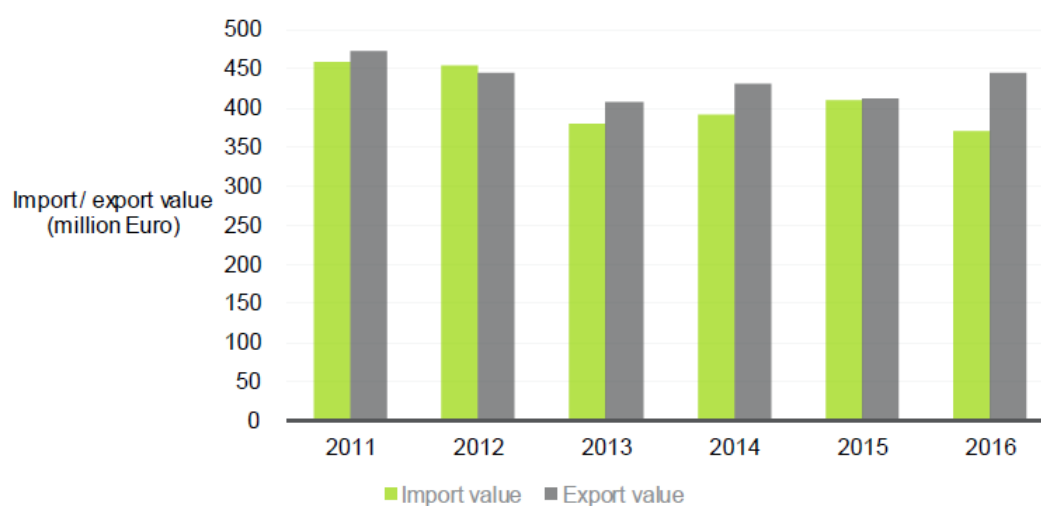


Figure 2-4 Import and Export value for PRODCOM 23.99.14 from Eurostat

5.2 Profit margins - the current and future profitability of the sector in the EU ETS area

| Category | Parameter | Green | Amber | Red |
|---|--|-------|---|--|
| Current investment in the sector in EU ETS area | Current financial situation of the sector | | | low single digit profitability and declining from 2014 to 2016 |
| | Investment in sector in EU ETS area compared with outside countries | | | low investments and declining new capacity only added in Asia since several decades |
| | Products substitutable with other products with indirect costs compensation (competition within EU ETS area) | | artificial graphite is in certain applications substitutable by natural graphite (e.g. batteries) | |
| Long-term investment in EU ETS area | Projections of demand in EU ETS area (ideally compared with outside area) | | | demand for shrinking for graphite electrodes in EU (reduced steel production) demand for batteries faster growing in Asia than in Europe |
| | Projections of costs/ prices/ margins | | | margins lower in EU due to higher labor costs and environmental regulations |
| | Business demography (birth rate/ death rate/ churn/ survival rate) | | | no new graphite plant in Europe since decades closure of several graphite plants within the last decades |
| Feasibility of relocation | Current trade patterns | | | graphite products are already heavily traded and imports exceeds domestic demand |
| | Net trade balance | | | trade balance with main graphite producers outside EU already negative |

5.2.1 CATEGORY: Current investment in the sector in EU ETS area; PARAMETER: Current financial situation of the sector

ECGA conclusion after applying the criteria: There is a low profitability, lower than in outside EU ETS countries (Red)

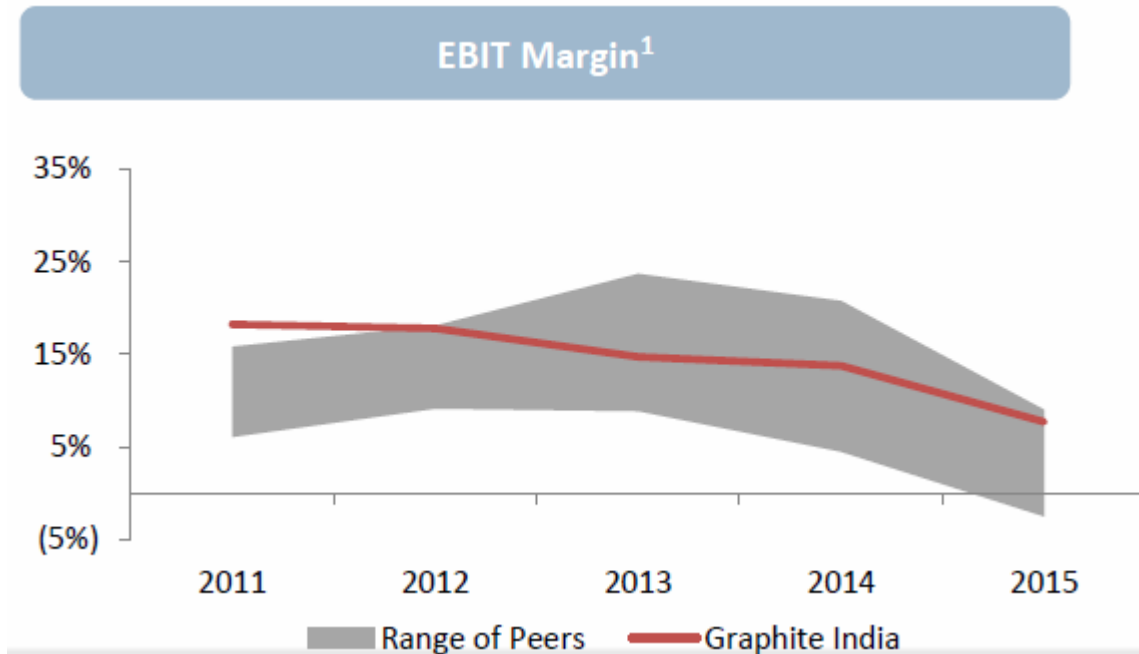
Justification:

The indirect carbon costs passed on to the sector by electricity suppliers are difficult to pass on to customers given the global market and high trade intensity. This implies that such costs would have to be absorbed by the companies in the sector itself, at the expense of profit margins. Graphite producers operate at low profit margins, especially in the last few years due to the sharp drop in profitability. Given the low profit margins of the sector, the sector has limited capacity to absorb the cost pass through. For the EU graphite sector, carbon costs would eat up a significant percentage of profits. The table below shows how increases to electricity price would translate to impact on the profitability of the sector as an equivalent percentage decrease of the original turnover value for that year.

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---------------------------------|------|------|------|------|------|------|
| Recorded Turnover (million EUR) | 385 | 330 | 324 | 347 | 412 | 398 |
| Increase of 0.05 EUR/KWh | 19% | 21% | 20% | 21% | 17% | 18% |
| Increase of 0.10 EUR/KWh | 38% | 41% | 41% | 42% | 33% | 35% |

Table 2-1: Equivalent loss of turnover value due to electricity price increases¹⁶

The low profitability of the sub sector is shown in the company presentations of the Indian competitor (Gaphite India^[7]). The profit margin of the Indian competitor is at the high end of all producers worldwide whereas EU producers show already negative margins in 2015.



5.2.2 CATEGORY: Current investment in the sector in EU ETS area; PARAMETER: Investment in sector in EU ETS area compared with outside countries

ECGA conclusion after applying the criteria: Investments in EU ETS area compared with outside countries have been falling as compared to those in outside countries

Justification:

Gross investments in tangible goods have been declining since 2011, which can be viewed as a potential indicator of decreased attractiveness of the EU as a location for the sectors covered by NACE 23.99.

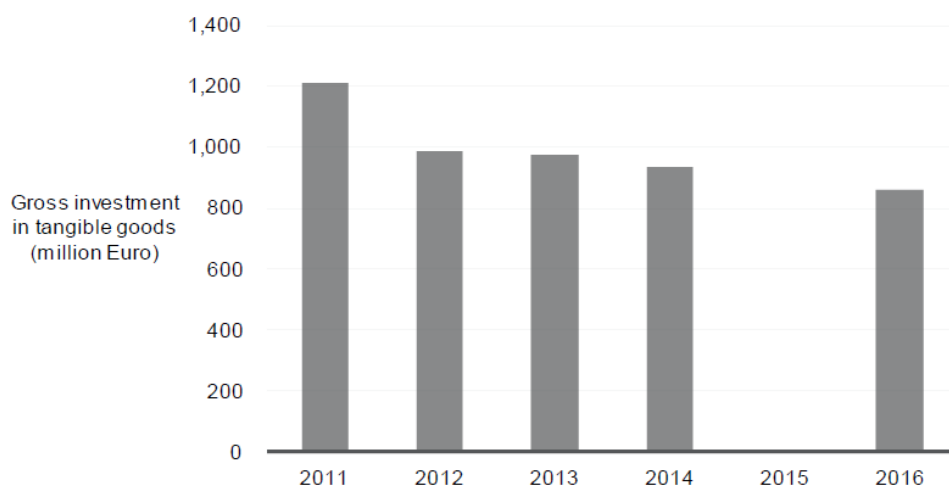
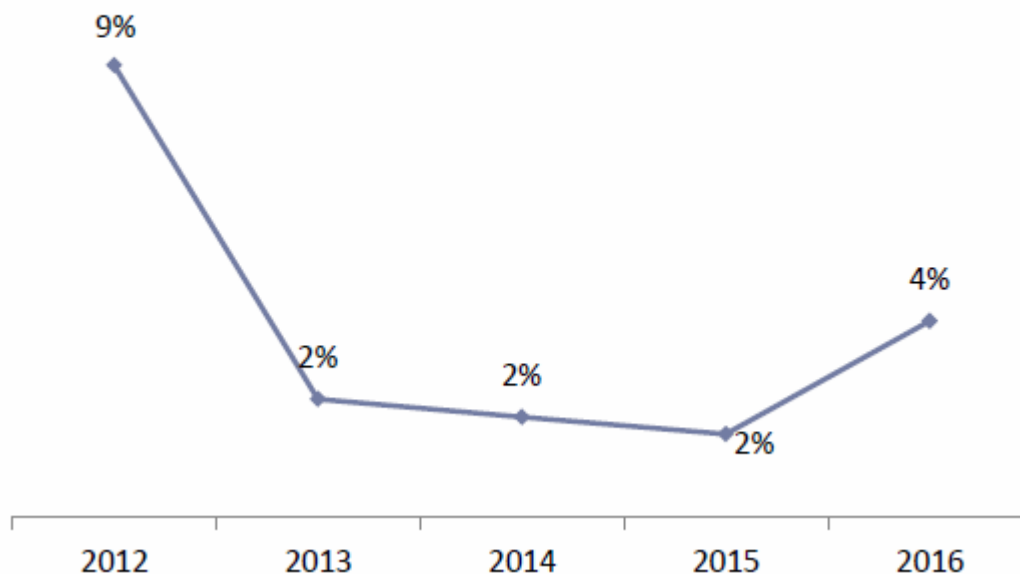


Figure 2-21 Gross investment in tangible goods for NACE 23.99 (Eurostat)

The investments in the EU^[4] are lower than outside the EU (example Graphite India^[7]).

| Derived Calculations from EU Commission Implementing Regulation 2017/422 | | | | | |
|--|---|------|------|------|-------------------|
| | | 2012 | 2013 | 2014 | Q1/2014 - Q3/2015 |
| investment as % of sales | % | 2,9% | 2,9% | 3,2% | 2,1% |

Capex to Sales Ratio



5.2.3 CATEGORY: Current investment in the sector in EU ETS area; PARAMETER: Products substitutable with other products with indirect costs compensation (competition within EU ETS area)

ECGA conclusion after applying the criteria: Products are partially substitutable with other products with indirect costs compensation (competition within EU ETS area) (Amber)

Justification:

Synthetic graphite feedstock could be substituted by natural graphite in certain applications. Natural graphite is mainly imported into Europe from Canada, Brazil or China. It requires less energy in processing and has often very high-quality specifications in terms of purity and is often used as a material added in products to achieve certain functionality.

Synthetic graphite is produced in large quantities in many countries around the world and its purity depends on the amount of energy intensive processing. For some applications natural graphite and synthetic graphite could be used interchangeably, hence the carbon and graphite sector is also competing to some extent with natural graphite supplies. The cost of extraction, availability of natural graphite and the cost of production of synthetic graphite determines the

rate of substitution. However, historically global of consumption synthetic graphite is much higher than natural graphite.

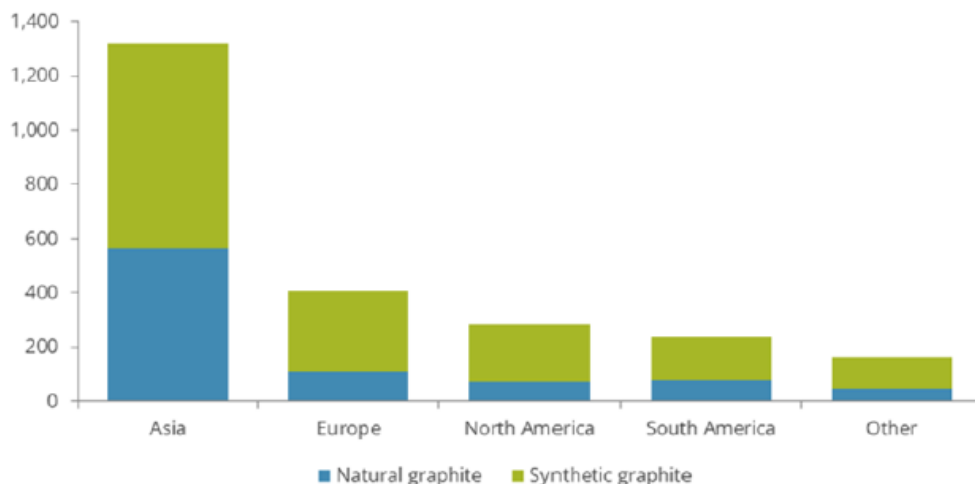


Figure 2-25 Estimated consumption of natural and synthetic graphite by region, 2017 (kt)²²

5.2.4 CATEGORY: Long-term investment in EU ETS area; PARAMETER: Projections of costs/ prices/ margins

ECGA conclusion after applying the criteria: Projections of costs/ prices/ margins are smaller than in other countries outside EU ETS area (Red)

Justification:

Graphite producers operate at low profit margins, especially in the last few years due to the sharp drop in profitability as shown in Figure 2-10. Given the low profit margins of the sector, the sector has limited capacity to absorb the cost pass through. For the EU graphite sector, carbon costs would eat up a significant percentage of profits. Compared to other regions of the world, that are part of the same global market, this would imply a loss of competitiveness for EU graphite producers, which may lead to decrease in profit and market share vis-a-vis non-EU producers not facing such additional costs. As a result of this there is a risk to carbon leakage given that major competitors in other regions of the world do not have similar cost issues when producing the

same products. This problem is likely to be further exacerbated by the rising price of EUAs which in turn is likely to result in rising electricity prices.



Figure 2-16: EUA prices 2014 to 2018¹⁷

5.5.5 CATEGORY: Long-term investment in EU ETS area; PARAMETER: Business demography (birth rate/ death rate/ churn/ survival rate)

ECGA conclusion after applying the criteria: Business demography (birth rate/ death rate/ churn/ survival rate) – a low birth rate correlated with a higher death rate have been recorder for the PRODCOM 23.99.14 (Red)

Justification:

Eurostat data on company size shows that a large majority of firms in NACE 23.99 are small companies with less than 10 employees.

Number of enterprises per firm size band as average for 2014-2016 for NACE 23.99 in the EU

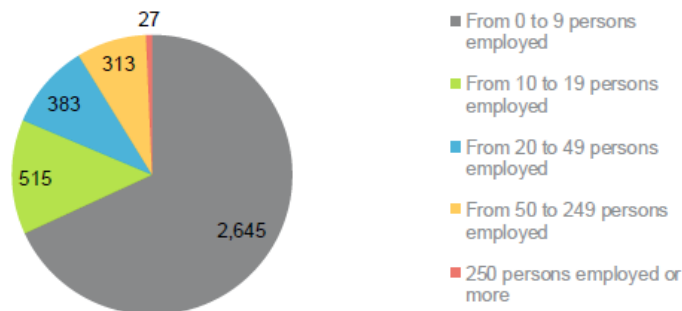


Figure 2-18 Number of enterprises per firm size band as average for 2014-2016 for NACE 23.99 in the EU from Eurostat

In general companies have been closing with a death rate that has been somewhat higher than the birth rate, which itself has been declining suggesting lower attractiveness of Europe as a location for establishment.

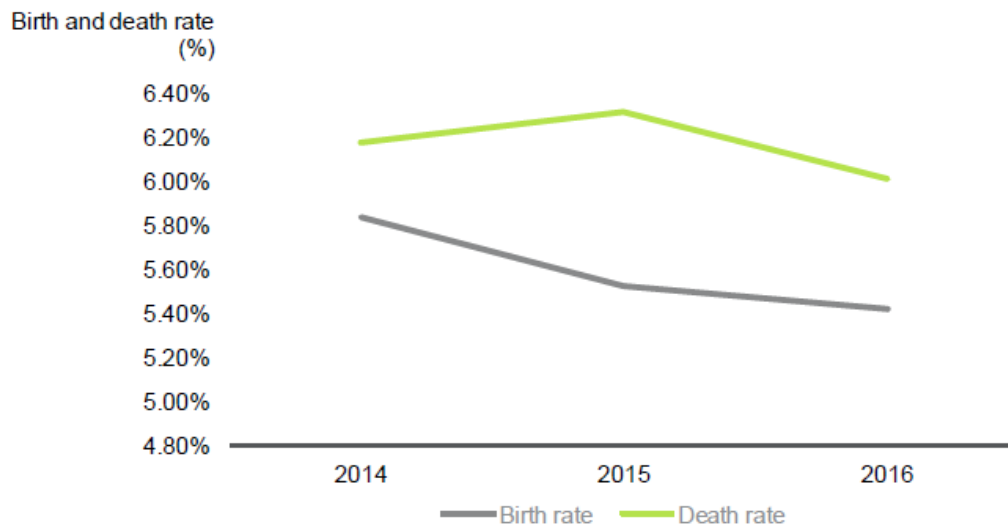


Figure 2-20 Business birth and death rate for NACE 23.99 from Eurostat

5.2.6 CATEGORY: Feasibility of relocation; PARAMETER: Current trade patterns

ECGA conclusion after applying the criteria: The PRODCOM 23.99.14 products are already heavily traded with routes and infrastructure in place (Red)

Justification

The European carbon and graphite sector is trade intensive and faces strong competition from global producers in the domestic EU market. Imports represent on average 161% of domestic demand in value and 158% in volume over the period 2014-2016.

Carbon and graphite feedstock products are integral materials in the production of numerous high value end products as well as steel recycling. Hence demand is linked to market situations in those sectors and changes such as for example the potential future growth in the electrification of the transport sector and associated battery. However, the European carbon and graphite producers only make up roughly around 4% of the global production and faces competition mainly from China which produces more carbon and graphite feedstock products than the rest of the world combined. Outside of China, major producers and competitors include USA, Japan, Russia, and India.

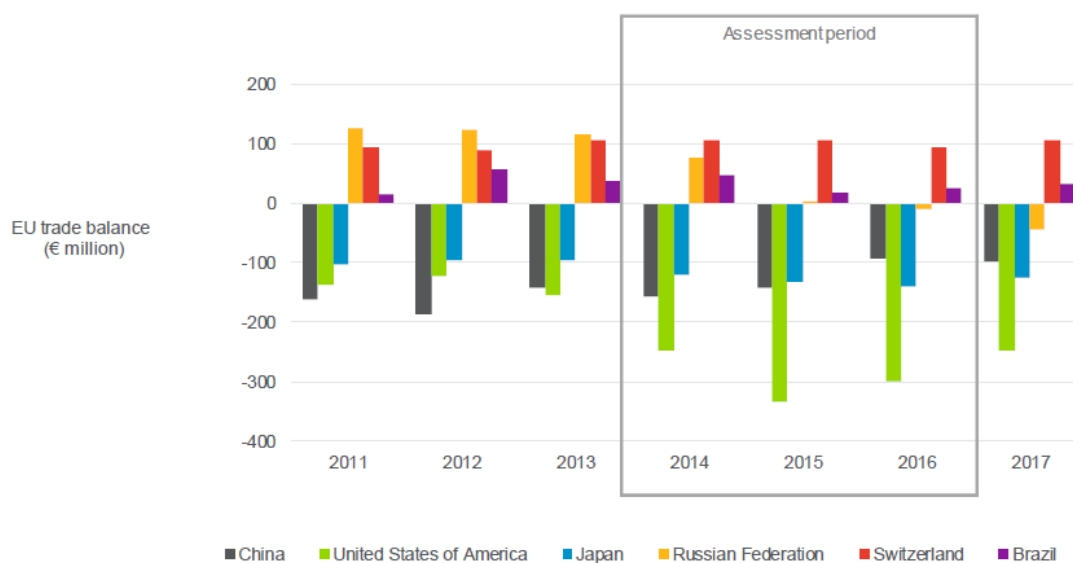


Figure 2-3 EU trade balance for PRODCOM 23.99.14 with top trade partners for imports

5.2.7 CATEGORY: Feasibility of relocation; PARAMETER: Net trade balance

ECGA conclusion after applying the criteria: Net trade balance has registered a negative trend (Red)

Justification:

The trade balance data for NACE 23.99 shows that imports from the United States have been growing significantly, mainly at the expense of China. At the same time, trade with Russia has moved from a positive to a negative trade balance. While this is data for a heterogeneous NACE code, carbon and graphite only makes a part of this code and it is necessary to also look at the PRODCOM data.

In addition, relocation of Europe's production has already taken place due to plant closures such as Narni, Italy in 2014 and Griesheim, Germany in 2016.

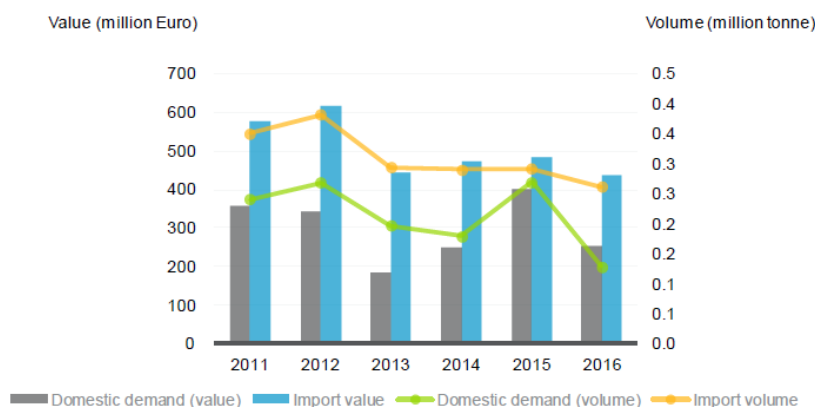


Figure 2-1 Domestic demand of PRODCOM 23.99.14 in the EEA in Euro and tonne from Eurostat

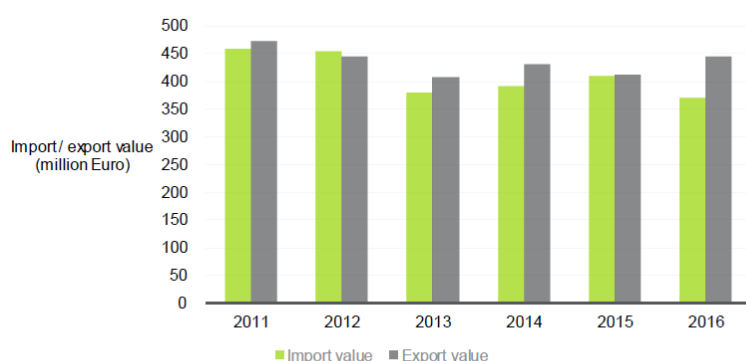


Figure 2-4 Import and Export value for PRODCOM 23.99.14 from Eurostat

Annual imports and exports have been stable over the past few years in absolute numbers, even if year-on-year growth rates have been quite volatile, reflecting mainly price movements.

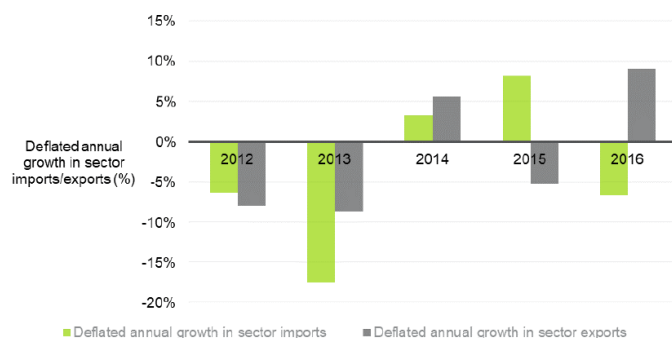


Figure 2-5 Annual growth in sector imports and exports for PRODCOM 23.99.14 from Eurostat

5.3 Abatement potential - the scope for energy efficiency investments in order to reduce electricity consumption in the sector.

| Category | Parameter | Green | Amber | Red |
|---|--|-------|-------|--|
| Current electricity consumption | Current level of electricity intensity | | | below sector average in outside EU ETS countries as transfer to LWG technology done in all European facilities where possible (=> product quality) |
| | Indirect emission intensity | | | below sector average in outside EU ETS countries as transfer to LWG technology done in all European facilities where possible (=> product quality) |
| Adoption of best available technologies | Penetration of best available technologies | | | see above |

5.3.1 CATEGORY: Current electricity consumption; PARAMETER: Current level of electricity intensity

ECGA conclusion after applying the criteria: Current level of electricity intensity - Low/below sector average in outside EU ETS countries (Red)

Justification:

The electricity consumption and production volumes from European carbon and graphite companies between 2014 and 2016 for each European installation which provided data for this response.

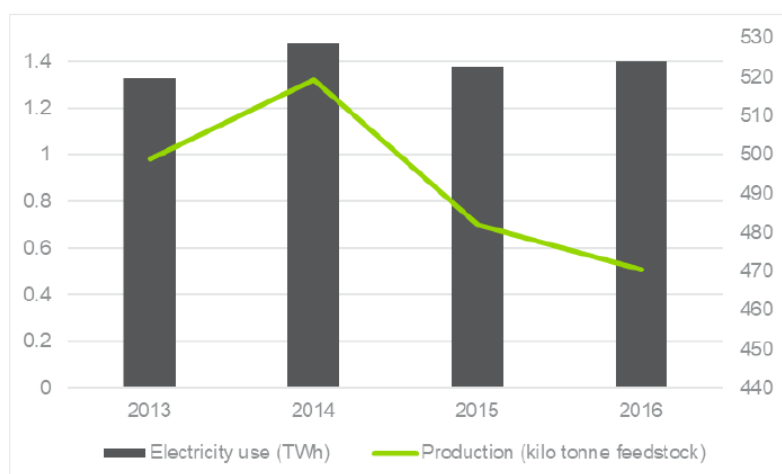


Figure 2-22: Annual electricity consumption and production of the European carbon and graphite sector from collected sector data

The inherently electricity intensive nature of the carbon and graphite feedstock production is reflected in the Figure below, where more than half of the emission intensity is due to indirect emissions. The exposure of the sector to indirect emissions carbon leakage can be more clearly seen when the electricity intensity on a per tonne product basis is examined.

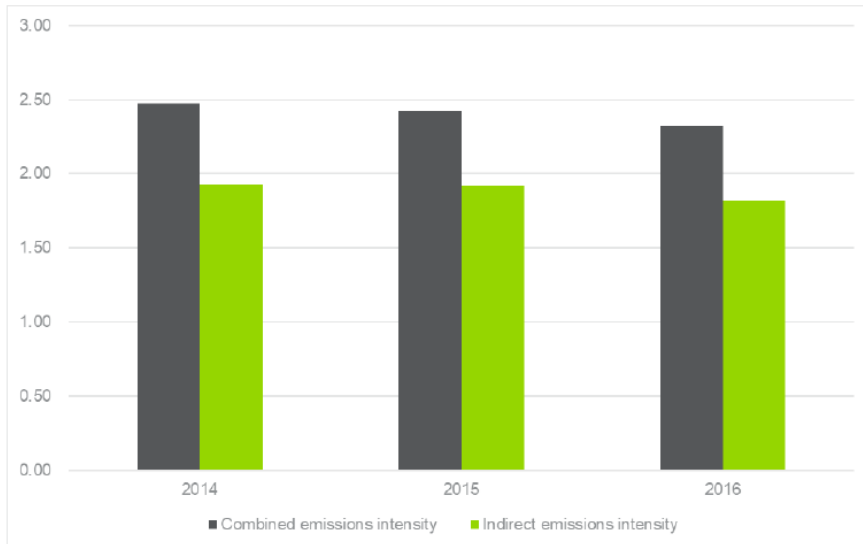


Figure 2-23: Combined and indirect emissions intensity of 23.99.14 (kgCO₂e/EUR)

5.3.2 CATEGORY: Current electricity consumption; PARAMETER: Indirect emission intensity

ECGA conclusion after applying the criteria: The indirect emission intensity is below sector average in outside EU ETS countries (or below average for manufacturing sector) (Red)

Justification:

The electro-intensity of the companies is based upon only electricity consumption for the production feedstock and shows that values range from less than 1MWh/t to nearly 12 MWh/t. The weighted average electro-intensity of all the companies for 2014 to 2016 is 4.65 MWh/t, while the unweighted average intensity is 2.85 MWh/t. The below figure shows the unweighted average the electricity intensity of the carbon and graphite sector (based upon total actual production and electricity consumption data provided by the companies) compared to the electricity intensity of other sectors previously considered eligible for indirect carbon cost compensation by the European Commission.

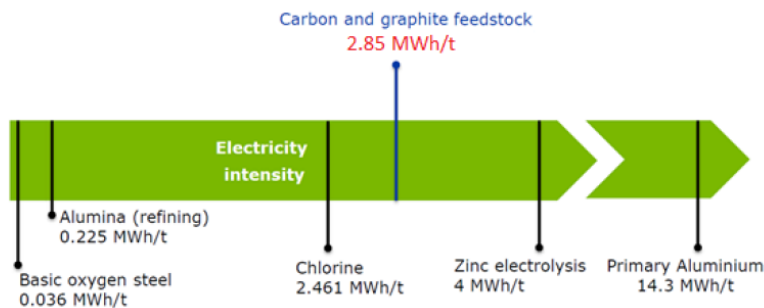


Figure 2-24: Comparison of average (unweighted) electricity intensity between the carbon and graphite sector and other sectors eligible for indirect emissions compensation²⁰

5.3.3 CATEGORY: Adoption of best available technologies; PARAMETER: Penetration of best available technologies

ECGA conclusion after applying the criteria - Penetration of best available technologies is already high for the PRODCOM 23.99.14 (Red)

Justification:

The carbon and graphite industry is covered by the EU BREF note for the non-ferrous metals industry.

In the past years the carbon and graphite industry has improved its productivity and energy efficiency recognizing the potential cost savings from reduced energy use. The sector is still implementing new solutions aiming at further reducing the energy consumption/unit and improving CO₂-intensive operations, these measures includes waste heat/waste gas recovery. As the world shifts to a low-CO₂ future, companies explore its future contribution to reducing CO₂ and to leveraging "decarbonisation" in other sectors by supporting the circular economy and saving resources and by providing products for the energy transition. Data from industry indicates that the combined emission intensity has been improving from 2.48 KgCO₂e/ EUR in 2014 to 2.32 KgCO₂e/ EUR in 2016. Facilities have introduced measures that aims to improve energy efficiency and reduce CO₂ emissions and include

- Furnace design
- Choice of quality input products,
- Improved insulation
- Improved systems using recycling of heat. cooling and compressed air
- Internal scrap recycling

These measures are generally now an integral part of the production processes and in European facilities have led to CO₂ reductions of about 7 % in the past 4 years. Due to the relatively high energy consumption and its high trade intensity, also reflected in some EU anti-dumping and anti-subsidy measures against other non-European producers, energy savings have always been a key factor in maintaining a competitive cost structure the sector. However, with its high share of indirect emissions the European carbon and graphite industry is highly dependent on CO₂ neutral electricity supply. Indirect emissions are dependent on the electricity grid's performance.

5.4 Fuel and electricity substitutability

If the RAG score is higher than Green for the fuel and electricity substitutability, then the overall RAG rating generated in the other three categories (market characteristics, profit margins, abatement potential) will be increased to a higher score reflecting a higher risk of carbon leakage.

| Category | Parameter | Green | Amber | Red |
|---------------------------------------|---|--|-------|--|
| Fuel and electricity substitutability | Variability between undertakings in sector based on | not applicable as 3.000 C (= graphitization) requires electrical heating | | |
| | fuel/electricity consumption | not applicable as 3.000 C (= graphitization) requires electrical heating | | |
| | Unequal treatment of direct and indirect costs compensation within sector | | | Unequal compensation between direct and indirect costs |

5.4.1 CRITERIA: Fuel and electricity substitutability; PARAMETER Variability between undertakings in sector based on fuel/electricity consumption

ECGA conclusion after applying the criteria – There is a high variability in the sector (Red)

Justification

As production of artificial graphite requires 3.000 C electrical heating can't be substituted by any other energy source. Other processes with a lower energy intensity (forming, impregnation, etc.) had been treated unequal as PRODCOM 23.99.14 had been listed in the previous Carbon Leakage List.

➤ Aid Amount

Market Characteristics, Profit Margins, Abatement

Any compensation of indirect CO₂ costs versus electricity costs by fossil fuels w/o ETS (e.g. China, Russia, India, USA, etc.) below 100% will always disadvantage the European Carbon and Graphite Industry. Additionally, it is extremely important that this 100% compensation will be in place if not all other countries follow the European rules. Otherwise any new investments are impossible.

| RAG rating of market characteristics category | Pass-through level of sector | New RAG rating after compensation | | |
|---|--|---|---|---|
| | | Baseline- 75% | >75% | <75% |
| red | The sector is a price taker so the pass-through level to end-customers is close to zero. | Sub sector is a price taker (high international trade) with large end customers | Sub sector is a price taker (high international trade) with large end customers | Sub sector is a price taker (high international trade) with large end customers |

| RAG rating of profit margins category | Profit margins of sector | New RAG rating after compensation | | |
|---------------------------------------|---|---|---|---|
| | | Baseline- 75% | >75% | <75% |
| red | Current situation of sector and future outlook in EU ETS are not favourable for sector and put it at high risk of relocating. | low profit margin and relocation had already been taken place | low profit margin and relocation had already been taken place | low profit margin and relocation had already been taken place |

| RAG rating of abatement potential category | Scope to reduce consumption of sector | New RAG rating after compensation | | |
|--|---|---------------------------------------|---------------------------------------|---------------------------------------|
| | | Baseline- 75% | >75% | <75% |
| red | No scope to reduce electricity consumption due to a lack of available technology in sector. | abatement potential already performed | abatement potential already performed | abatement potential already performed |

New RAG Rating after Compensation

Any compensation of indirect CO₂ costs versus electricity costs by fossil fuels w/o ETS (e.g. China, Russia, India, USA, etc.) below 100% will always disadvantage the European Carbon and Graphite Industry

Additionally, it is extremely important that this 100% compensation will be in place if not all other countries follow the European rules. Otherwise any new investments are impossible.

| Initial market Characteris-tics rating | Initial profits margins rating | Initial abatement potential rating | Overall initial RAG rating | New RAG rating after compensation | | |
|--|-----------------------------------|--|-------------------------------|-----------------------------------|-----------------|------|
| | | | | Baseline- 75% | >75% | <75% |
| Red | Red | Red | Red | Amber | Green- Amber | Red |

➤ Degressivity

Degressivity Rating

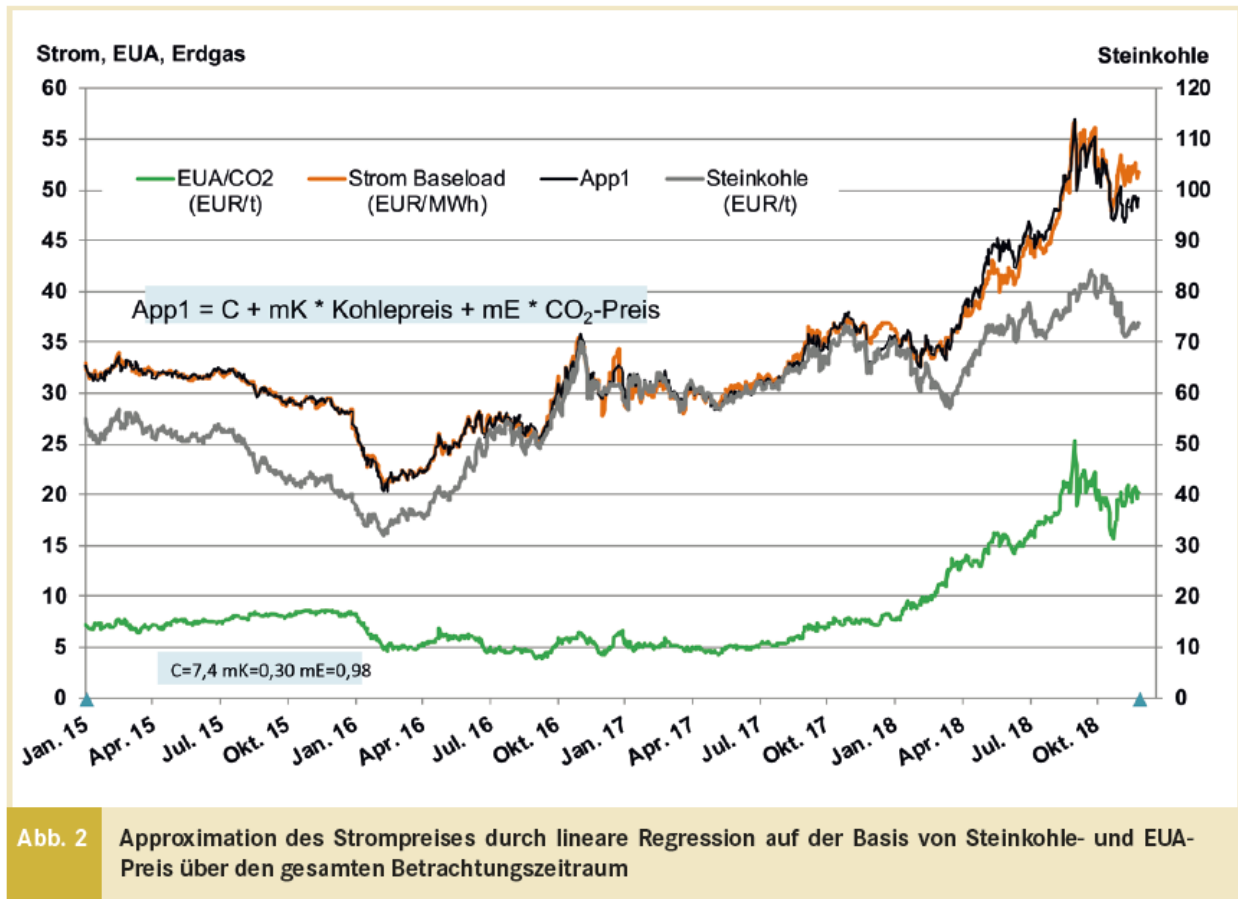
Any compensation of indirect CO₂ costs versus electricity costs by fossil fuels w/o ETS (e.g. China, Russia, India, USA, etc.) below 100% will always disadvantage the European Carbon and Graphite Industry. Additionally, it is extremely import that this 100% compensation will be in place if not all other countries follow the European rules. Otherwise any new investments are impossible.

| RAG rating of abatement potential category | Degressivity option | Explanation |
|---|---------------------|--|
| abatement potential already performed | No degressivity | The sector cannot perform any further electricity consumption reduction over the next trading period. We would therefore recommend no degressivity. |

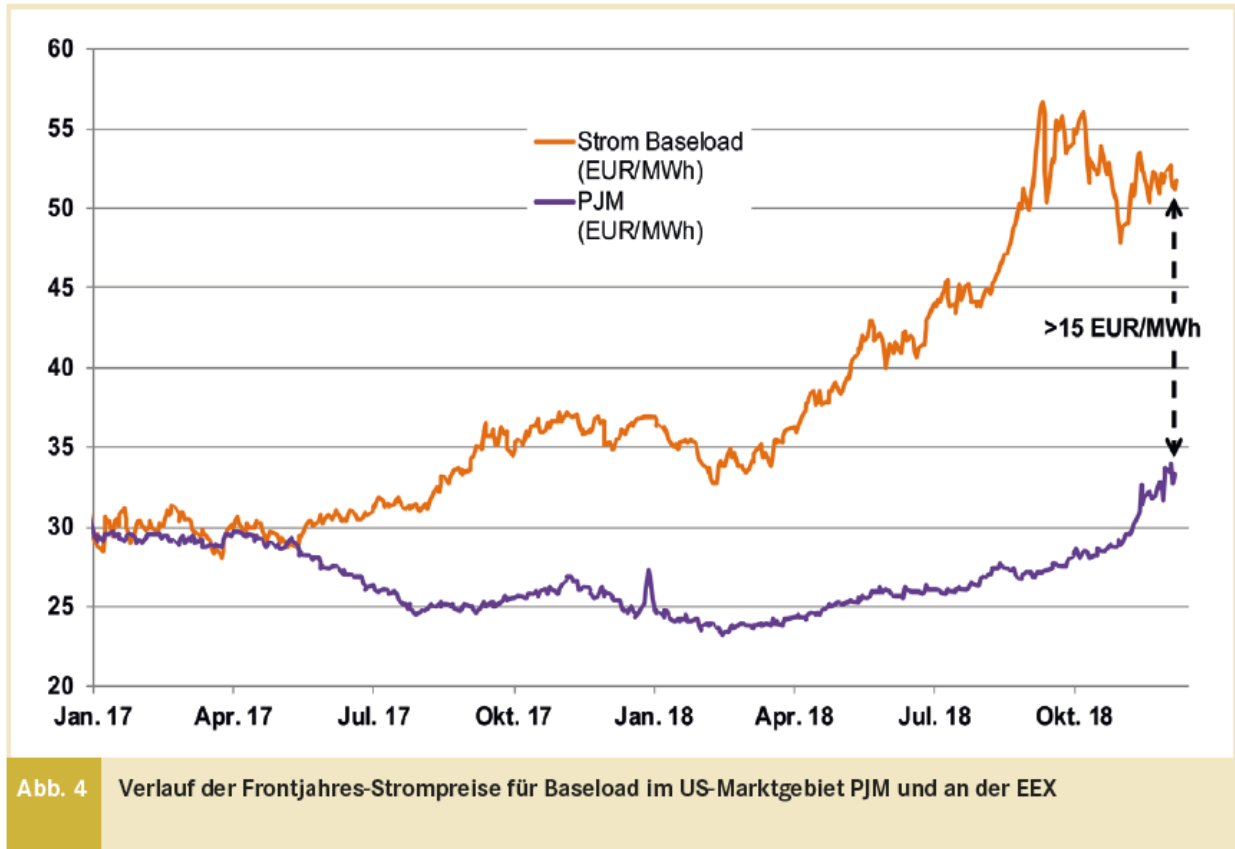
Scientific investigations^[8] show that

- the emission factor for the financial compensation should be 1 mt CO₂/MWh
- and not degressive.

This demonstrated by correlation analysis of the electricity and CO₂ price



and the comparison of European and US electricity pricing.



➤ References & Background Documents

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[2] Targeted Consultation Response for Indirect Cost compensation Carbon and Graphite sector - Evidential Support; Prepared for the European Carbon and Graphite Association (ECGA) by Navigant Energy Germany GmbH; Am Wassermann 36; 50829 Cologne; Germany

[3] Audited financial documents / Excel

[4] EU Commission Implementing Regulation 2017/422

[5] SDK: Circular Economy:
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[6] IMERYS: Carbon and Graphite Products for a Low Carbon Environment:
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[9] Energiewirtschaftliche Tagesfragen 69 Jg. (2019) Heft 1/2