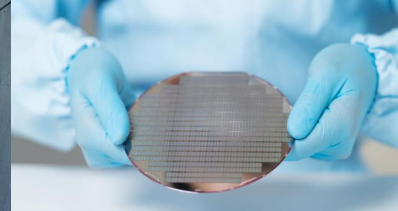




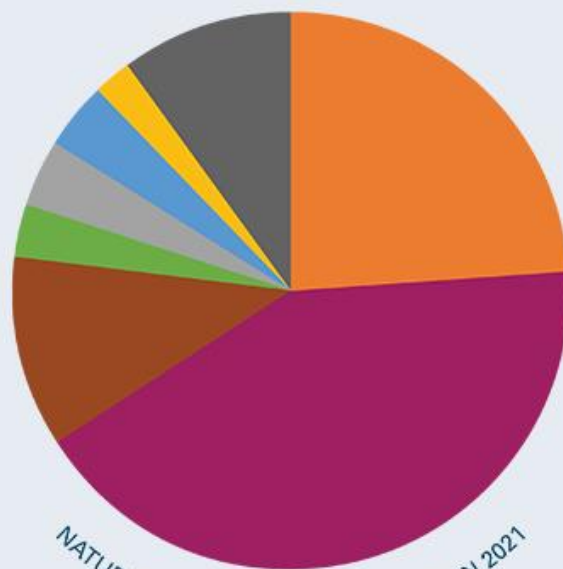
EXPERTS HEARING IN THE FRAMEWORK OF THE OPINION CCMI/211 CRITICAL RAW MATERIALS ACT

15TH MAY 2023

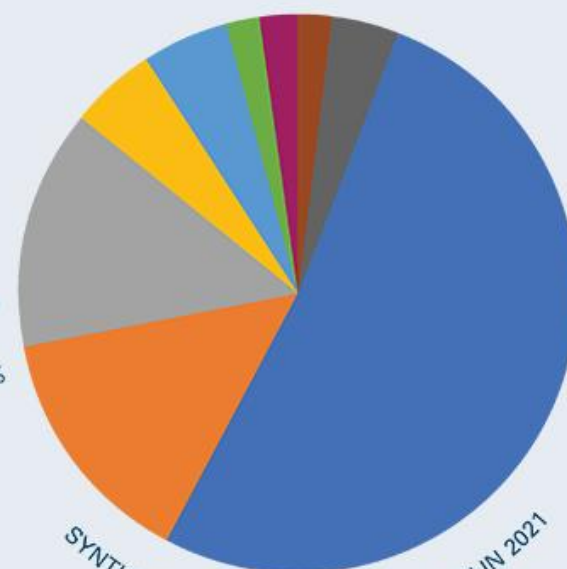
Dr. Corina Hebestreit, ECGA



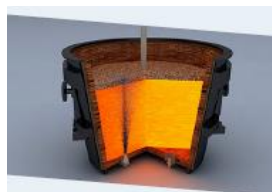
APPLICATIONS OF NATURAL AND SYNTHETIC GRAPHITE



| (1147 KT) | (2256 KT) |
|----------------------|----------------------|
| 0% Electrodes | Electrodes 52% |
| 24% Batteries | Batteries 14% |
| 4% Recarburising | Recarburising 14% |
| 2% Graphite shapes | Graphite shapes 5% |
| 4% Lubricants | Lubricants 5% |
| 3% Friction products | Friction products 2% |
| 42% Refractories | Refractories 2% |
| 11% Foundries | Foundries 2% |
| 10% Other | Other 4% |



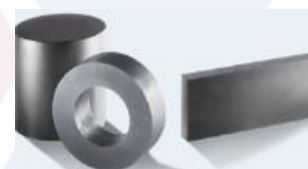
Batteries



Refractories
& foundries



Recarburising



Graphite shapes



Lubricants

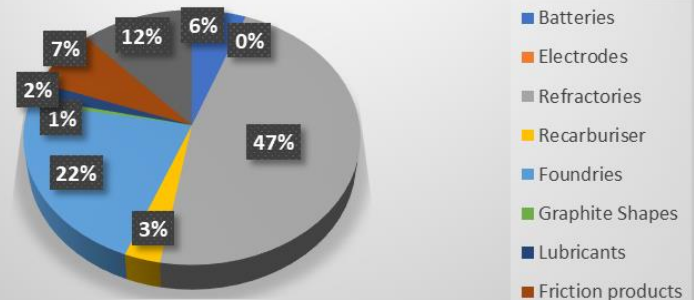
WHY NATURAL GRAPHITE IS STRATEGIC IN THE CRM ACT?

- **Because it was analysed as a critical raw material!**
- **Because China dominates the supply!**
- **Because it is serving strategic sectors!**
- **Why is natural graphite – battery grade strategic?**
 - Because they forgot to look at the other strategic applications!

Therefore, it should be **“natural graphite”** - not battery grade!

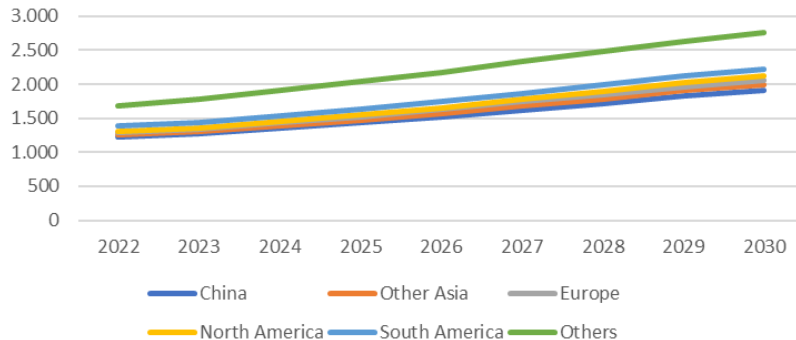
EU natural graphite demand by application in 2030

(source: Wood Mackenzie 2030)



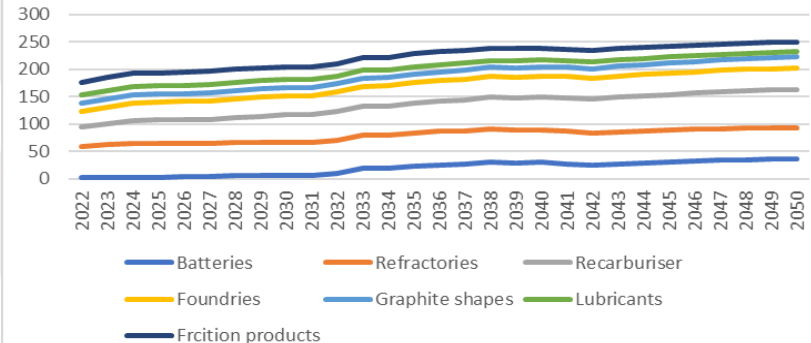
Natural graphite production (kt) by region 2022-2030

(source: Wood Mackenzie 2023)

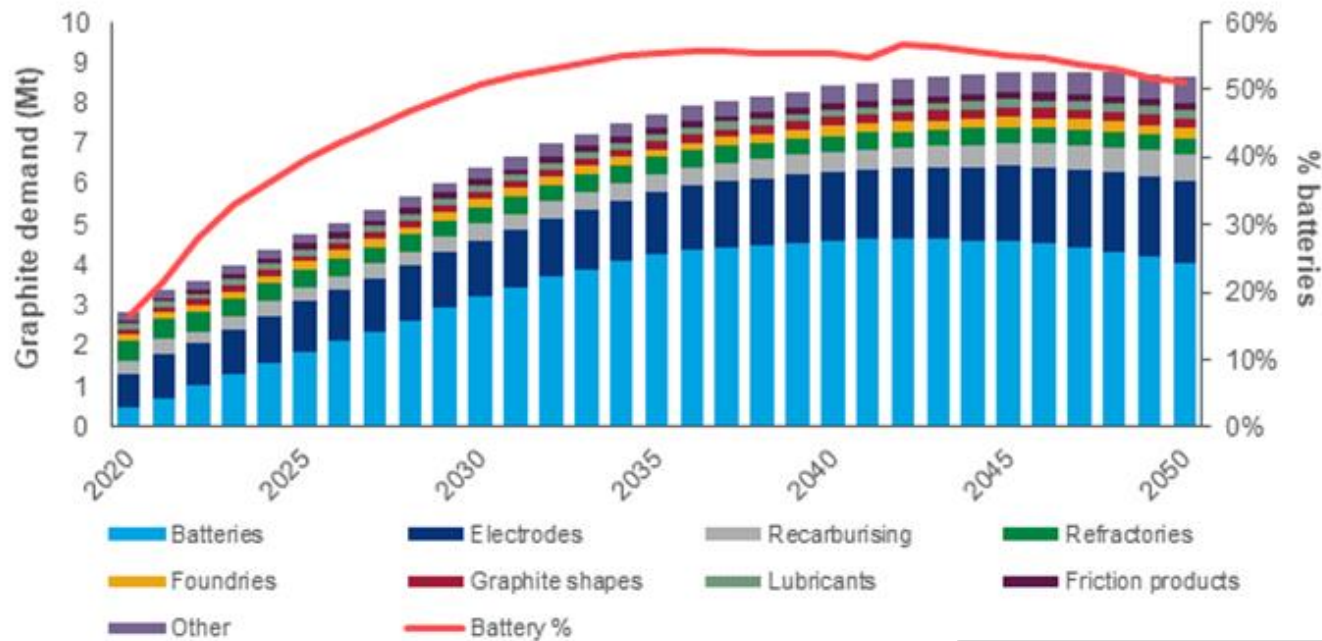


Forecast for European applications of natural graphite 2022 - 2050

(source: Wood Mackenzie 2023)



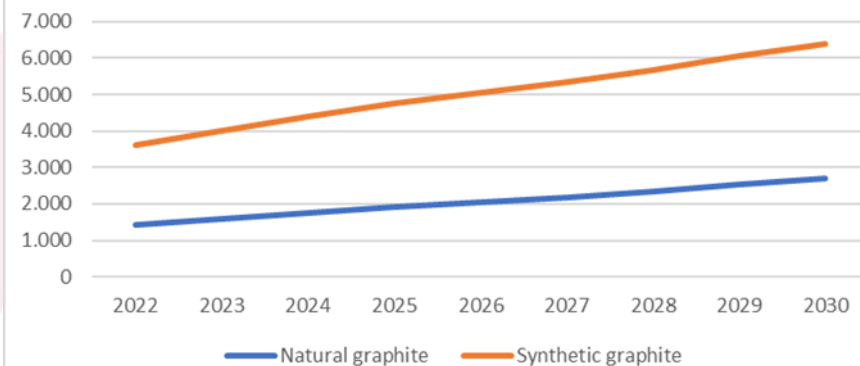
DEMAND FORECASTS FOR GRAPHITE



Source: Wood Mackenzie

Demand forecast by type of graphite (kt) 2022-2030

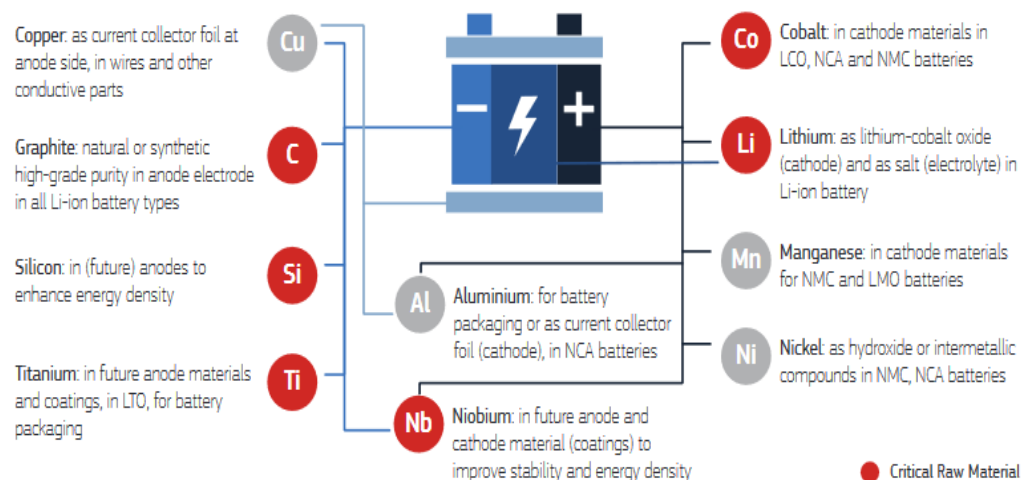
(Source: Wood Mackenzie 2023)



Today on average up to 50% in weight of a lithium-ion (Li-ion) battery is graphite, with the varying degrees of use of synthetic and natural graphite depending on the application of the battery.

- A battery for an electric vehicle or for stationary applications contains on average 65% synthetic, 35% natural graphite.
- Batteries for electronics contain both at varying ratios, but roughly 50%/50% of both.

Raw materials used in batteries.



Graphite is used in batteries to improve electrical conductance while remaining chemically inert and stable against corrosion.

In lithium-ion batteries, graphite is a main constituent of the anode, acting as a host for the lithium ions.

Graphite is also used in smaller amounts in other battery types, mainly as an electrically conductive additive.

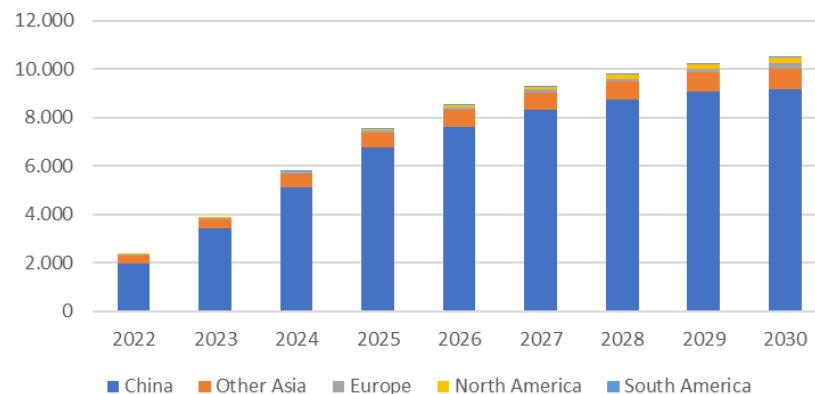
Fuel cells have taken an increasing part of the battery market. While traditional batteries only store electrical energy, fuel cells also have generation capability.

The supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study
- published in March 2023 by JRC states:

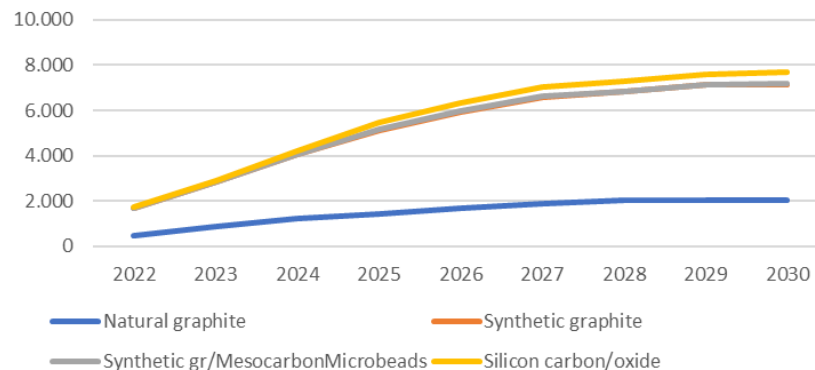
“that compared to 2020, graphite (natural and synthetic) demand for batteries in the EU is expected to grow 12 times as large in 2030 and 21 times as large in 2050.

Globally, the increase with respect to 2020 is 18 times in 2030 and 90 times in 2050. By 2050, global lithium and graphite demand for batteries reaches 19 and 9 times the current global supply, respectively.”

Anode material capacities worldwide 2022- 2030 (kt)
(Source: Wood Mackenzie 2023)

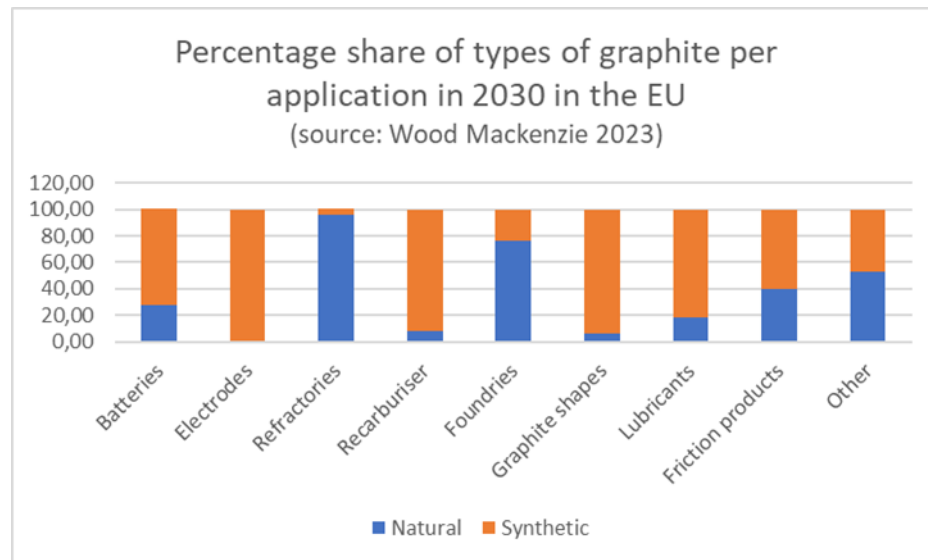


China Capacity development for anode material 2022 -2030
(kt)
(source: Wood Mackenzie 2023)



USE OF GRAPHITE IN MODERN TECHNOLOGIES

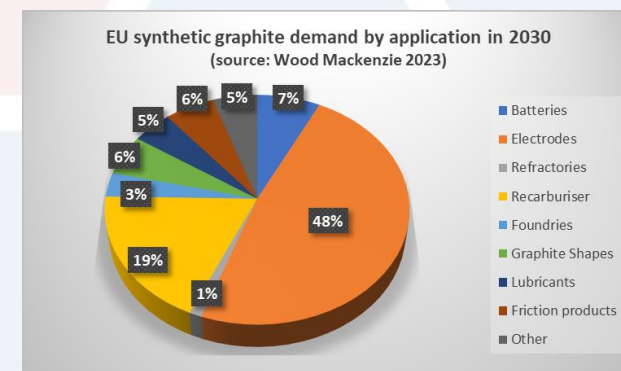
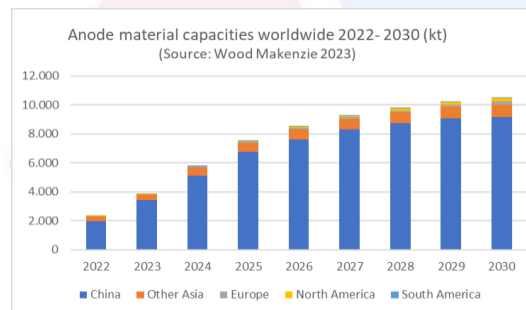
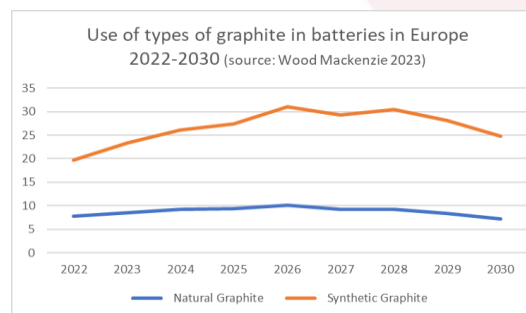
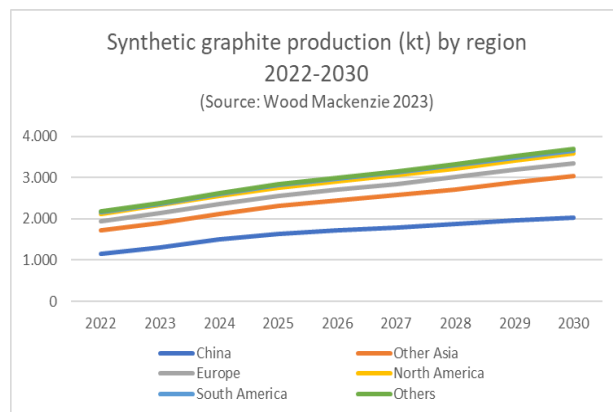
| Technology | Natural Graphite | Synthetic Graphite |
|----------------------------------|------------------|--------------------|
| Li-ion batteries | ✓ | ✓ |
| Fuel cells | ✓ | ✓ |
| Electrolysers | ✓ | |
| Wind turbines | ✓ | ✓ |
| Traction motors | ✓ | ✓ |
| Solar PV | | ✓ |
| Heat Pumps | | ✓ |
| H2 -DRI | | ✓ |
| Data transmission networks | ✓ | |
| Data storage and services | | ✓ |
| Smartphones, tablets and laptops | ✓ | ✓ |
| Additive manufacturing | ✓ | ✓ |
| Robotics | ✓ | ✓ |
| drones | ✓ | ✓ |
| Space launchers and satellites | ✓ | ✓ |



Natural graphite: up to 83%
into strategic sectors
Synthetic graphite: up to 70%
into strategic sectors

WHY IS SYNTHETIC GRAPHITE NOT MENTIONED AS CRITICAL OR STRATEGIC IN THE CRM ACT?

- It was not assessed under the criticality assessment.
- It was partially assessed by the JRC in the Foresight Study, but not taken over by the Commission.
- It was not recognised as a substitute/complementary substance to EU and Chinese batteries.



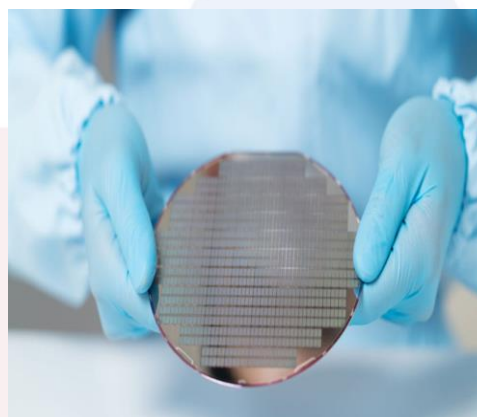
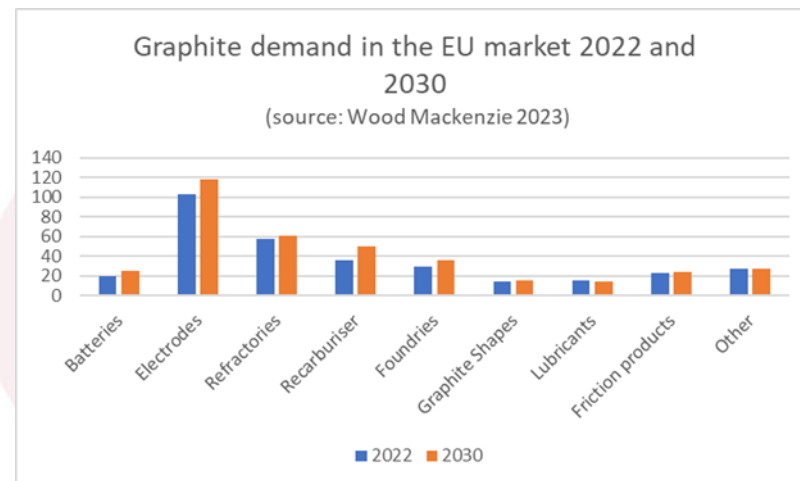
- ***“Graphite electrodes are used as electricity conductors inside the EAF to create the electric arc that melts the raw materials. They are consumed throughout the steelmaking process, at a rate of 1.5 kg to 3 kg per tonne of steel” (JRC, 2017).***
- ***“Thus, the demand for graphite electrodes is directly correlated to the amount of EAF steel being produced.”***
- ***“Long-term growth demand of EAF steelmaking (via secondary route steelmaking as well as new natural gas and hydrogen DRI-EAF) will result in an increased demand for graphite electrodes.”***

WHY SYNTHETIC GRAPHITE IS STRATEGIC

Synthetic graphite is critical and strategic because it is serving other strategic sectors:

No semi-conductor without isostatic graphite (synthetic)!

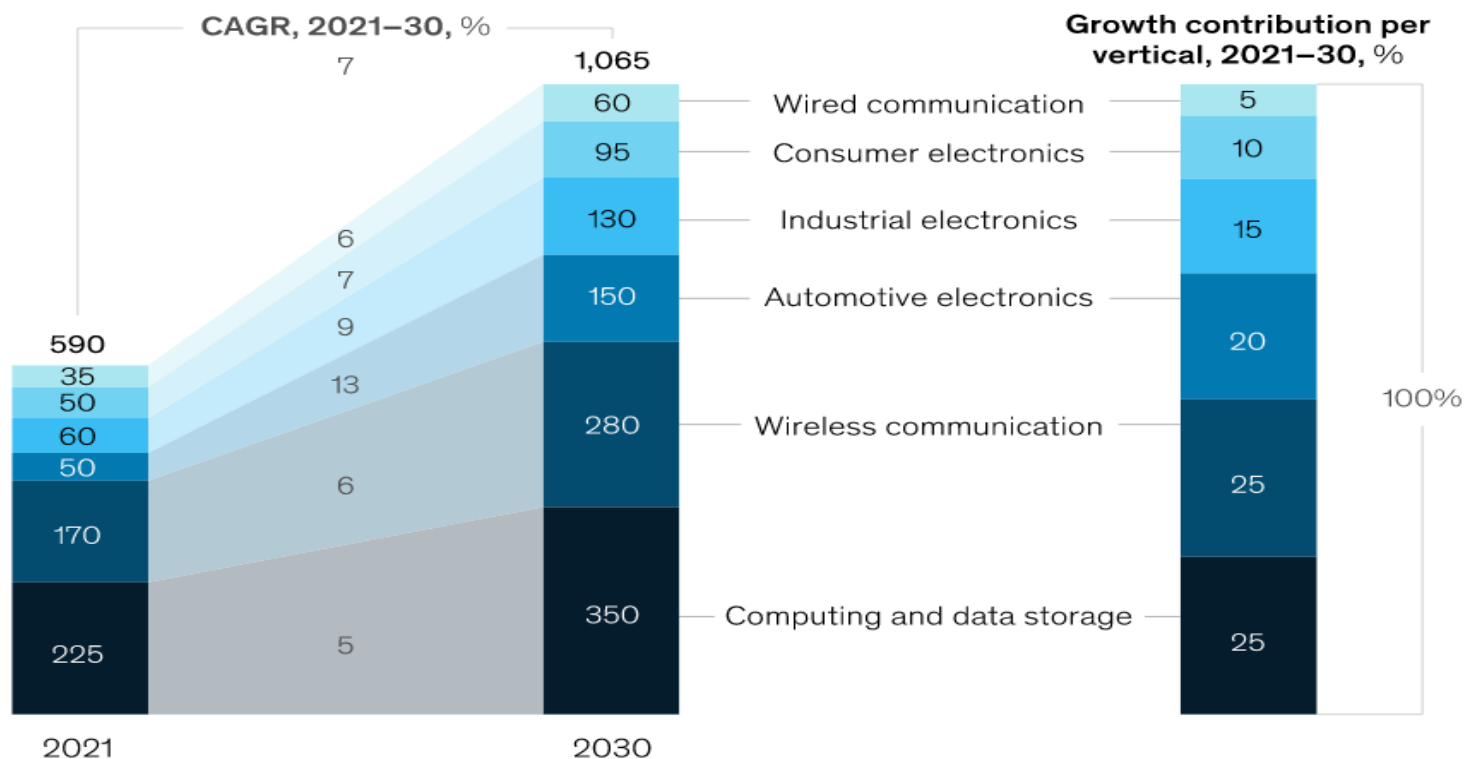
No solar panels, no heat pumps, no fuel cells, etc.



SEMI-CONDUCTOR GROWTH FACTORS

The overall growth in the global semiconductor market is driven by the automotive, data storage, and wireless industries.

Global semiconductor market value by vertical, indicative, \$ billion

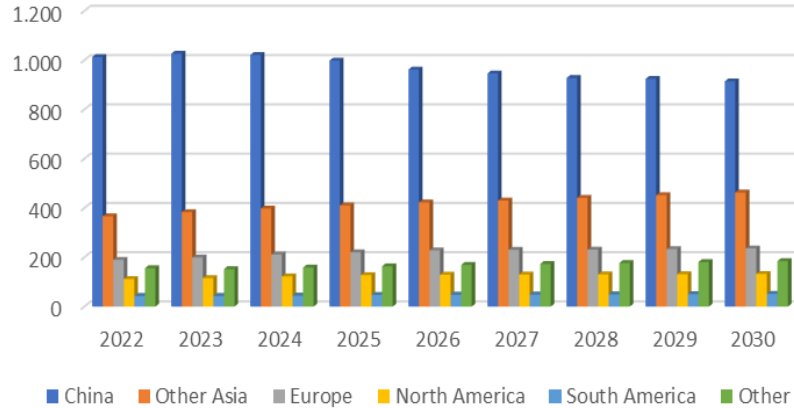


Note: Figures are approximate.

SYNTHETIC GRAPHITE ELECTRODES AND RECYCLING STEEL

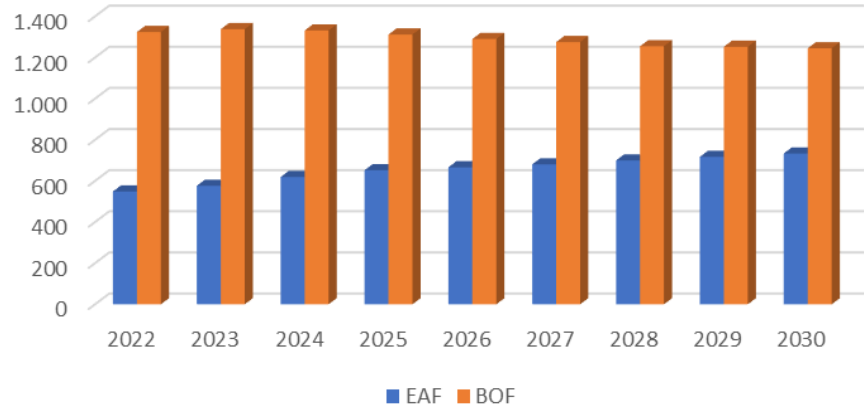
Crude steel production worldwide 2022-2030

(source: Wood Mackenzie 2023)



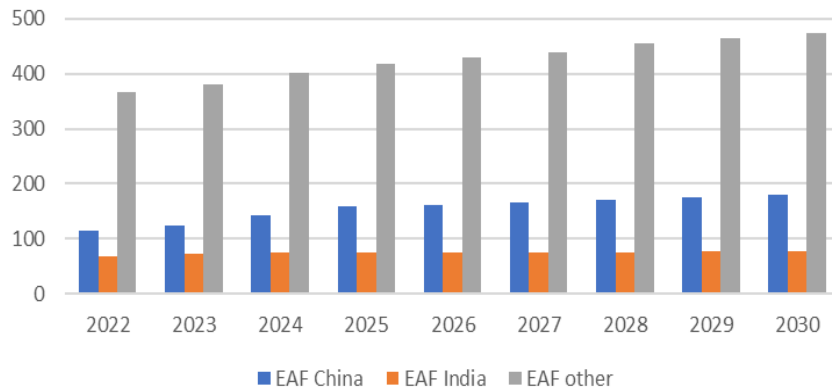
Steel technology (BOF versus EAF) 2022-2030

(source: Wood Mackenzie 2023)



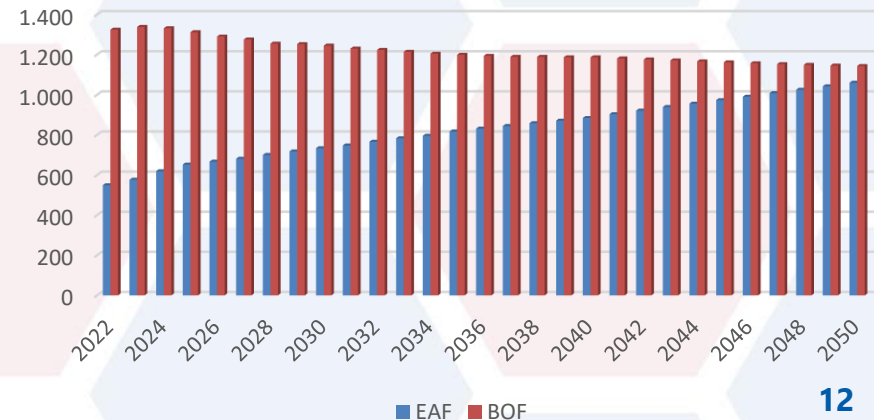
EAF steel production requiring graphite electrodes 2022-2030

(source: Wood Mackenzie 2023)



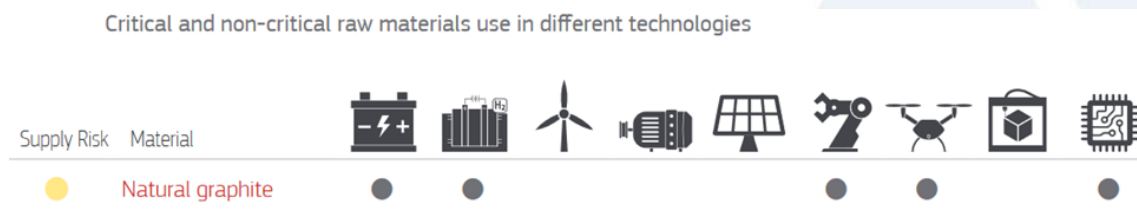
Development of BOFs and EAFs 2022 -2050

Source: Wood Mackenzie 2023



GRAPHITE IS A STRATEGIC MATERIAL

- The European Commission classified natural graphite as a critical raw material (CRM) because its assessment was limited to the “raw material”.
- Graphite has also been recognised as a critical raw material by Japan, Canada and the US.
- CRMs are those materials that are economically important and where the supply chain is potentially under threat.
- The European Commission identified the strategic use of natural graphite in the battery sector, but the material is complemented in the battery sector by synthetic graphite which therefore is equally strategic.
- Secondly, both can be prerequisites for the development of other strategic sectors such as renewable energy, electric mobility, defence and aerospace, fuel cells, robotics, drones and information and digital and communication technologies.



European Commission, Critical Raw Materials for Strategic Technologies and Sectors in the EU, <https://ec.europa.eu/docsroom/documents/42881/attachments/1/translations/en/renditions/native>

- Although synthetic graphite is not a CRM, both natural and synthetic graphite types are equally important, critical materials strategic to Europe’s economy and vital to the implementation of the Joint European action for more affordable, secure energy, the increased resilience of EU economy as well as of EU Green Deals objectives.

OTHER ARGUMENTS: THE CURRENT LIST OF MATERIALS

ANNEX I /SECTION 1 /LIST OF STRATEGIC RAW MATERIALS

The following raw materials shall be considered strategic:

- (a) Bismuth**
- (b) Boron - metallurgy grade**
- (c) Cobalt**
- (d) Copper**
- (e) Gallium**
- (f) Germanium**
- (g) Lithium - battery grade**
- (h) Magnesium metal**
- (i) Manganese - battery grade**
- (j) Natural Graphite - battery grade**
- (k) Nickel - battery grade**
- (l) Platinum Group Metals**
- (m) Rare Earth Elements for magnets (Nd, Pr, Tb, Dy, Gd, Sm, and Ce)**
- (n) Silicon metal**
- (o) Titanium metal**
- (p) Tungsten**

There is an issue with inconsistency since some are ores, some are metals, but are still called raw materials? Secondly, do they also include recycled materials or not?

Targets in the CRM Act

- **The EU will be able to achieve its targets for**
 - Extraction of natural graphite 10% (maybe)
 - Processing of natural graphite 40% (only by importing material from China and other places)
 - But it could achieve its processing target if synthetic graphite was included and supported equally.
 - Recycling of critical raw material 15% only if the two are taken together since they are being used together and if RTD was invested in recycling graphite from all possible sources into graphite applications.
 - And let's not forget the other new sources of carbon and "graphite"
 - Lignin into hard carbon
 - Methane into hydrogen and carbon/graphite
 - Recycled battery materials
 - CO2 sequestration into carbon and O2
 - ...

CONCLUSION:

WHAT THE CRM ACT AND THE NET-ZERO ACT SHOULD DELIVER

- **The list of strategic materials therefore should be amended to include**
 - Graphite
Or
 - Natural graphite and its substitute with the same chemical composition.
- **Set up the basis of a coherent, environmental, socio-economic support framework for this eco-system allowing the implementation of most efficient measures while ensuring that long-time goals the future and international competitiveness of all industry is not undermined;**
 - Ensuring access to raw materials for the whole eco-system
 - Ensure that EU legislation is not counterproductive in other areas and jeopardises the efforts
 - Ensures access to adequate targeted investment and financial support;
 - Enhances supply chain resilience and market transparency.
 - Regular raw materials and market assessments and periodic stress-tests, coupled with emergency response exercises, can help policy makers identify points of potential weakness, evaluate potential impacts, and devise necessary actions;
 - Ensures and protects fair international trade practices.
Overconcentration of supply in China for both natural and synthetic graphite poses a major challenge already today and for the future;
 - Stimulates investments in low-carbon products and technologies.
 - It is essential that the new technologies are cost-effective. The financing instruments at EU and Member States level should continue to be present and to facilitate investments.

Founded in 1995, ECGA is the representative association of EU carbon and graphite producers, including EU based graphite electrode producers going into Europe's steel and foundry industry, electrodes and cathodes for the aluminium and ferroalloy industry as well as a wide variety of specialty graphite and carbon products for applications ranging from electric motors to modern battery technology.

THE FORUM ⇒ ECGA provides a formal platform in which the members evaluate the impact of European policies and legislation on the industry and define common positions and actions as well as foster cooperation in technological developments.

THE INTERFACE ⇒ ECGA is the interface between the European carbon and graphite industry and the European authorities as well as international or intergovernmental bodies.

THE ADVOCATE ⇒ ECGA is the advocate of the European carbon and graphite industry promoting the benefits and values of both the products as well as the industrial sector with regard to the Sustainable Development Goals in general and for the EU society, endeavouring to uphold the industry's interests and raising public awareness accordingly.

In 2022 the sector represented by ECGA had a turnover of over 3 billion Euro.

NATURAL GRAPHITE MARKET IS DOMINATED BY CHINA



- **Production:** China accounts for over 70% of the total world production of natural graphite.
- **Overcapacity:** China production base of natural graphite has been in overcapacity in recent years. Although some overcapacity has been reduced by the ongoing environmental closures, there will still be room for increased production at existing operations in the short term.
- **State support:** Considering the strategic importance of natural graphite, several subsidy programmes have been implemented by the Government of China to encourage the production of natural graphite:
 - ⇒ **"Made in China 2025"** aims to upgrade and transform 10 key industries in China, including the "New Materials Industries", which also comprises materials composing lithium batteries.
 - ⇒ **"13th Five Year Plan for Development of Strategic Emerging Industries"** aims to guide/support the development of strategic emerging industries, including *"a negative electrode with a lithium ion battery graphite"*.
 - ⇒ **"14th Five-Year Plan for the High-quality Development of Tianjin's manufacturing industry"** provides for *"focusing on the key materials, batteries and battery systems of lithium-ion batteries, we will focus on the development of high nickel, high voltage and other cathode materials and high-end graphite, carbon silicon and other negative electrode materials."*
 - ⇒ **"Inner Mongolia's Plan for the High-quality Development of Emerging Industries in the Autonomous Region"** provides for *"Protective development and utilization of graphite resources. Actively participate in the research on key technologies in the fields of energy storage, electrical conductivity (...)"*
 - ⇒ **"Implementation plan for the construction of a national new-type raw material base project in Liaoning Province"** names specifically companies specialized in natural graphite products entitled for the support set out in the plan for each industrial sector. Dalian Hongguang Lithium Industry has been named by this plan as entitled for subsidies is a producer of both, natural and synthetic graphite.

SYNTHETIC GRAPHITE MARKET IS DOMINATED BY CHINA



- **Production:** China accounts for around 56% of the global synthetic graphite supply.
- **Overcapacity:** Chinese capacity for synthetic graphite electrodes has increased significantly in recent years and is now in overcapacity. The major electrode producers are highly competitive and likely to increase capacity in the coming years to maintain market position.
- **State support:** Like for natural graphite, several subsidy programmes have been implemented by the Government of China to encourage the production of synthetic graphite
 - ⇒ ***"Catalogue for the Guidance of Industrial Structure Adjustment (2019 version)"*** classifies as 'encouraged' *"special graphite (high strength, high density, high purity, high modulus), graphite (quality) ionisation"*, as well as *"battery anode material"*. This Catalogue is of the highest importance for each industry in China since they guide the government of China to administer investment projects, and to formulate and enforce policies on public finance, taxation, credit, land, import and export.
 - ⇒ ***"Notice of Heilongjiang Provincial People's Government on Printing and Distributing the Construction Plan of Heilongjiang Province"*** provides for *"(1) Development focus - Graphite and further processed materials - ①Graphite. Focus on the development of high-purity graphite, anode materials (...)"*
 - ⇒ **Example of Chinese producer of Li-ion battery anode material benefitting from subsidies:** Beiterui New Material Group

In 2021 semi-annual report, the company expressly mentions that it received grants and subsidies from the government of China: *"Government grants including in the current profit and loss, but are closely related to the company's normal business operations and are in line with national policies"*. The part of the semi-annual report entitled *"Government subsidies"* details various subsidies received by the company, amongst which some target *"artificial graphite"*: special equipment subsidy for the promotion of high-capacity density artificial graphite anode materials; development and industrialization subsidies for key electrode materials for new high-performance lithium-ion batteries; subsidy for artificial graphite productive technical transformation project; subsidy for the development of equipment of anode materials for high-capacity, long-cycle lithium-ion batteries; special subsidy for deep processing construction project of Jixi Graphite Industrial Park.

EU producers of graphite have so far successfully launched two separate proceedings against imports of graphite electrodes from India and China.

⇒ Anti-dumping and anti-subsidy measures on imports of certain graphite electrodes from India

2004: Imposition of definitive duties

2009: Partial interim review

2010: Expiry review extending the duties for additional five years

2017: Expiry review extending the duties for additional five years

2022: Expiry review on-going (current duties range between 7,0% - 15,7%)



⇒ Anti-dumping measures on imports of certain graphite electrodes from China

2021: Initiation of the investigation

2022: Imposition of definitive duties ranging between 23,0% - 74,9%

