



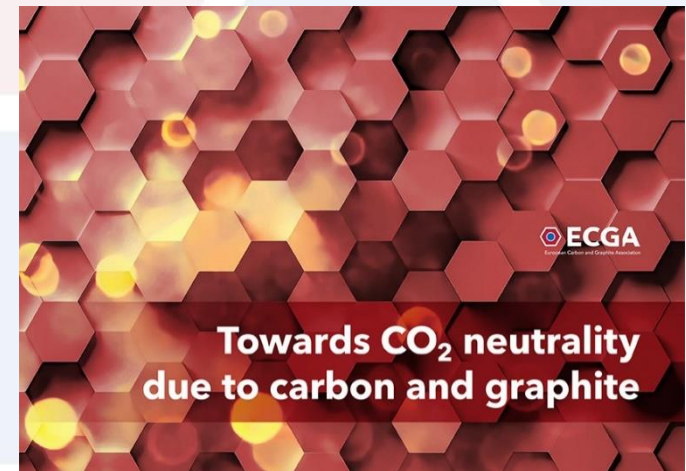
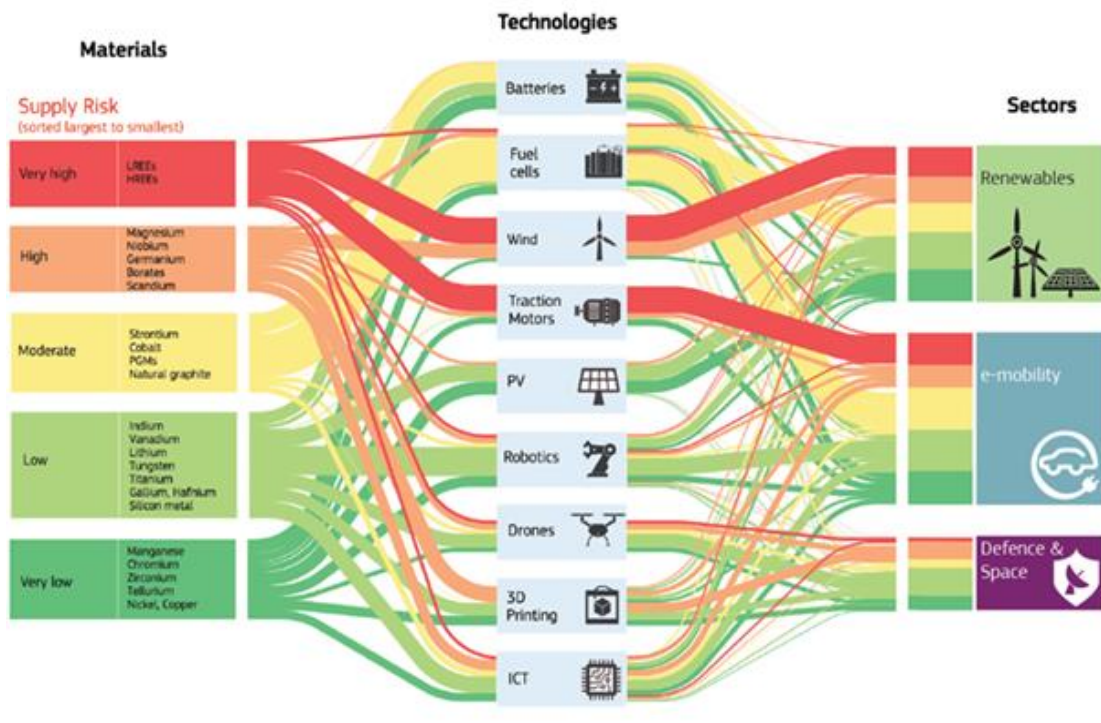
# **THE IMPORTANCE OF CRITICAL RAW MATERIALS THROUGH THE EYES OF ORGANISED CIVIL SOCIETY:**

## **THE CASE OF GRAPHITE**

**Dr. Corina Hebestreit**  
**EESC CCMI, 13 July 2021**

# CARBON AND GRAPHITE INDUSTRY - OPPORTUNITIES

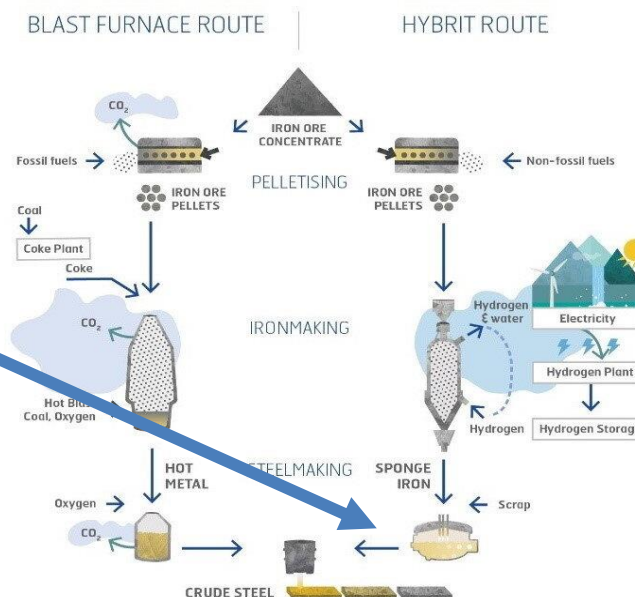
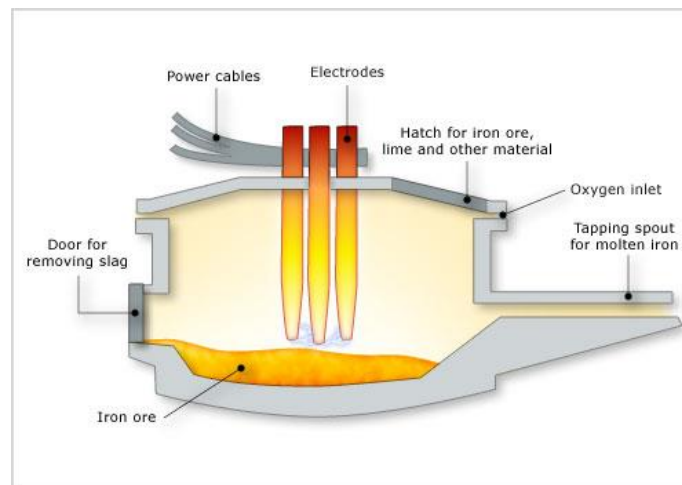
- The EU's **Green Deal** and higher climate ambition will accelerate Europe's demand increase for carbon and graphite products in low-carbon technologies including
- **steel recycling,**
- **clean steel technology with hydrogen,**
- **batteries and clean mobility, and**
- **renewable energy technologies.**



## Synthetic graphite electrodes

- **Classical steel scrap recycling (56% of EU steel comes from recycled scrap = 100 million t) – around 20 million t are currently exported and could be processed in Europe**

- **New clean steel technology with hydrogen requires electric arc furnaces and hence graphite electrodes are essential to the new technology!**



# CONTRIBUTION TO CIRCULAR ECONOMY AND CARBON NEUTRALITY

Graphite electrodes used in EAFs contribute to 84 million mt reduction in CO<sub>2</sub> emissions per year in the EU, equivalent to emissions from 28 million passenger cars.



EU EAF steel production	67,500,000	MT
Quantity of EAF CO <sub>2</sub> generated per year *	33,750,000	MT
Quantity of CO <sub>2</sub> generated per year should the same steel amount be produced at BOF	118,125,000	MT
CO <sub>2</sub> emissions savings by using EAF vs BOF	84,375,000	MT



# TURNING SYNTHETIC GRAPHITE CRITICAL CARBON MATERIALS AND THE FUNDAMENTAL FLAW WITH THE EC ASSESSMENT: NACE CODES ONLY!

Compensation for increased energy costs under ETS (Decision 2020):  
– the EU’s bias towards large sectors:  
the sector fulfils all criteria but is not eligible because there is no Prodcom assessment!!!

NACE CODE ONLY!

- **Currently under discussion and timelines for Commission proposals all being published 14<sup>th</sup> June 2021 with the same flaw:**

- |   |  |      |
|---|--|------|
| – ETS IV Amendment                            | Elimination of Carbon Leakage List                           |      |
| – General environmental subsidies             | Elimination of national structural subsidies                 | NACE |
| – Revision of the Energy Efficiency Directive | New targets for efficiency                                   |      |
| – Revision of the Energy Taxation Directive   | Increase/harmonisation of taxation                           | NACE |
| – Carbon Border Adjustment Mechanism          | Potential elimination/replacement of the Carbon Leakage List | NACE |
| – Revision of the Renewable Energy Directive  | Increase of share of renewables in national grids            |      |

# EC REQUIREMENTS FOR COMPENSATION OF INDIRECT CO<sub>2</sub>-COSTS

**Audited Report provided to the Commission and ignored !**

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	bituminos 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	-

Carbon & Graphite Industry **differs** from the **other subsectors** in NACE-Code 23.99

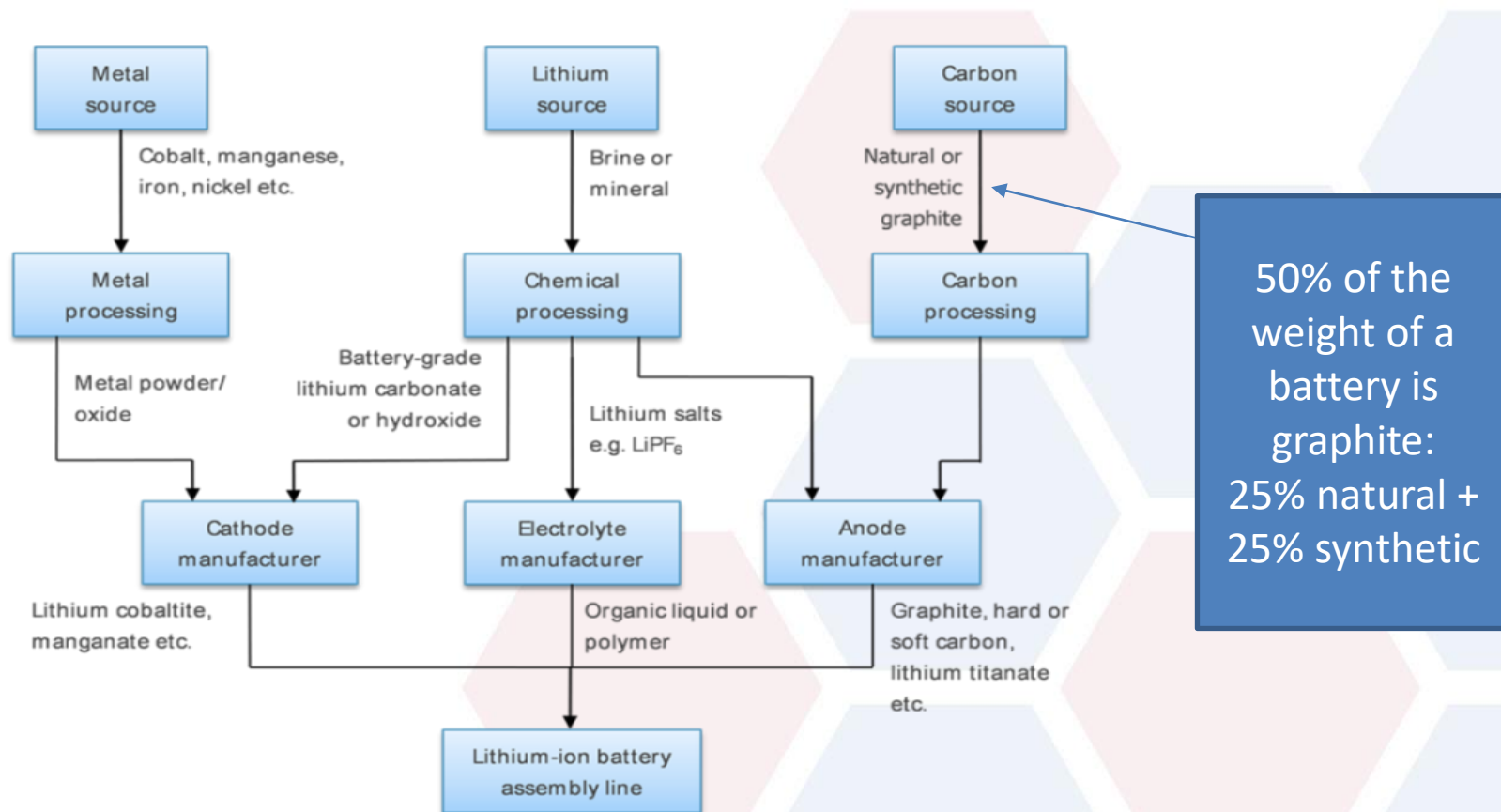
NACE/ PRODCOM		Trade Intensity	Direct Emission Intensity	Indirect Emission Intensity	Emission Intensity	Carbon Leakage Indicator (CLI)	Indirect Carbon Leakage Indicator (ICLI)
		%	kg CO <sub>2</sub> /€	kg CO <sub>2</sub> /€	kg CO <sub>2</sub> /€		
23.99	manufacture of other non-metallic mineral products 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

ICLI of PRODCOM 23.99.14 **app. 1,2** far above 0,2 => **quantitative criteria fulfilled**

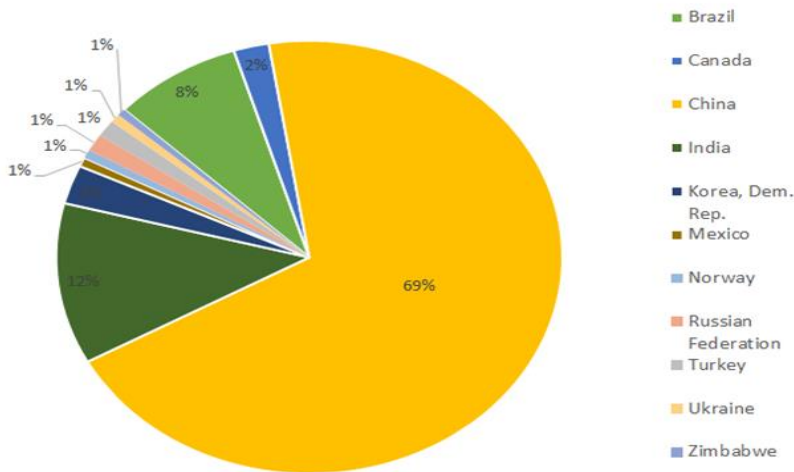
PRODCOM code	Sector name	ICLI	RAG rating	RAG rating under high carbon scenario	RAG rating before fuel and electricity substitutability
23.99.14	Artificial graphite; colloidal or semi-colloidal graphite; preparations based on graphite or other carbon in the form of semi-manufactures	1,19	Medium-high	High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

Carbon & Graphite Industry has the **highest RAG-Rating** together with aluminum industry

# ENABLING E-MOBILITY AND DECARBONISATION OF TRANSPORT THE STRATEGIC VALUE CHAIN: LITHIUM-ION BATTERY MATERIALS



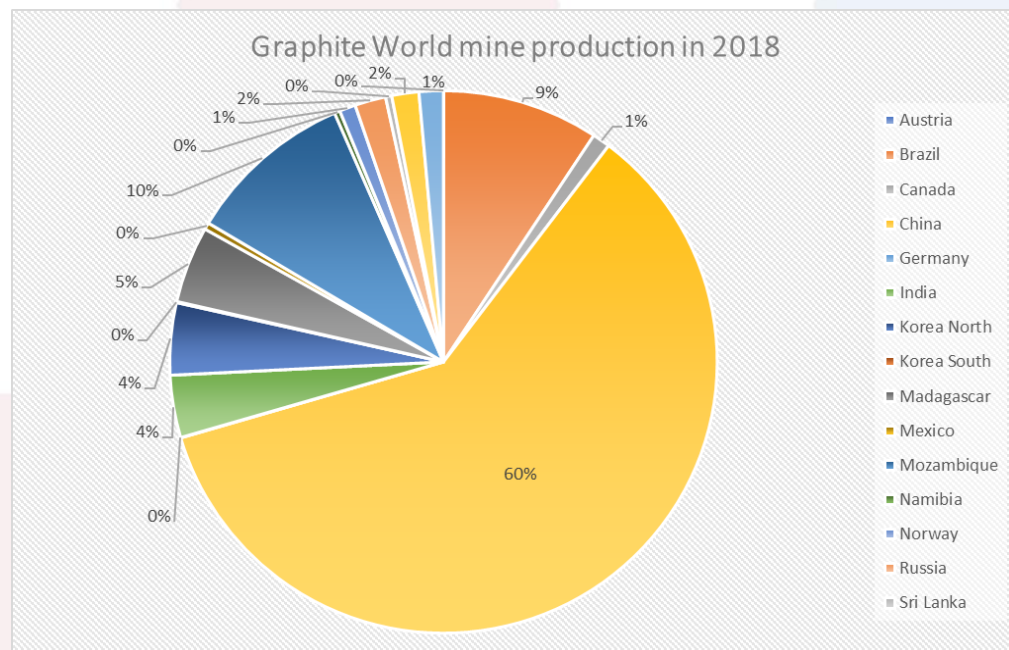
# CRITICAL: DIVERSIFICATION OF NATURAL GRAPHITE SUPPLY



Global mine production of natural graphite, average 2010–2014 (Data from World Mining Data, 2016) and 2018 data.

- Increase from 11 to 15 countries,
- Production dropped to 900.000 t in 2017 and is now rising again
- Reduction of Chinese % with more mines coming on stream

More EU mines need faster permits!





- **Plans to add 557 GWh/yr of battery manufacturing capacity in Europe by 2024 will require an additional 450,000 t/yr of anode material.**

## Europe

- **Mineral Commodities is building an active anode material plant in Norway to supply European battery plants. The facility will initially produce 10,000 t/yr of coated spherical graphite and fines from flake supplied by its Skaland mine in Norway from 2023. It plans to add two 20,000 t/yr modules to process concentrate from its Munclinup mine in Australia when it begins output in 2024.**
- **Australia-based Talga Resources, which is focused on European graphite projects, is building a 19,000 t/yr coated anode plant in Sweden processing material from the Vittangi mine in Sweden.**
- **Norwegian silicon and carbon producer Elkem is building a pilot plant to produce anode materials that is scheduled for completion in early 2021.**
- **US based Superior Graphite is going to adapt its Swedish operation to produce additional battery grade material.**
- **SGL Carbon investing in synthetic graphite battery material.**
- **Leading Edge Materials investing in Sweden's Woxna mine and processing plant.**

## Other Parts of the World

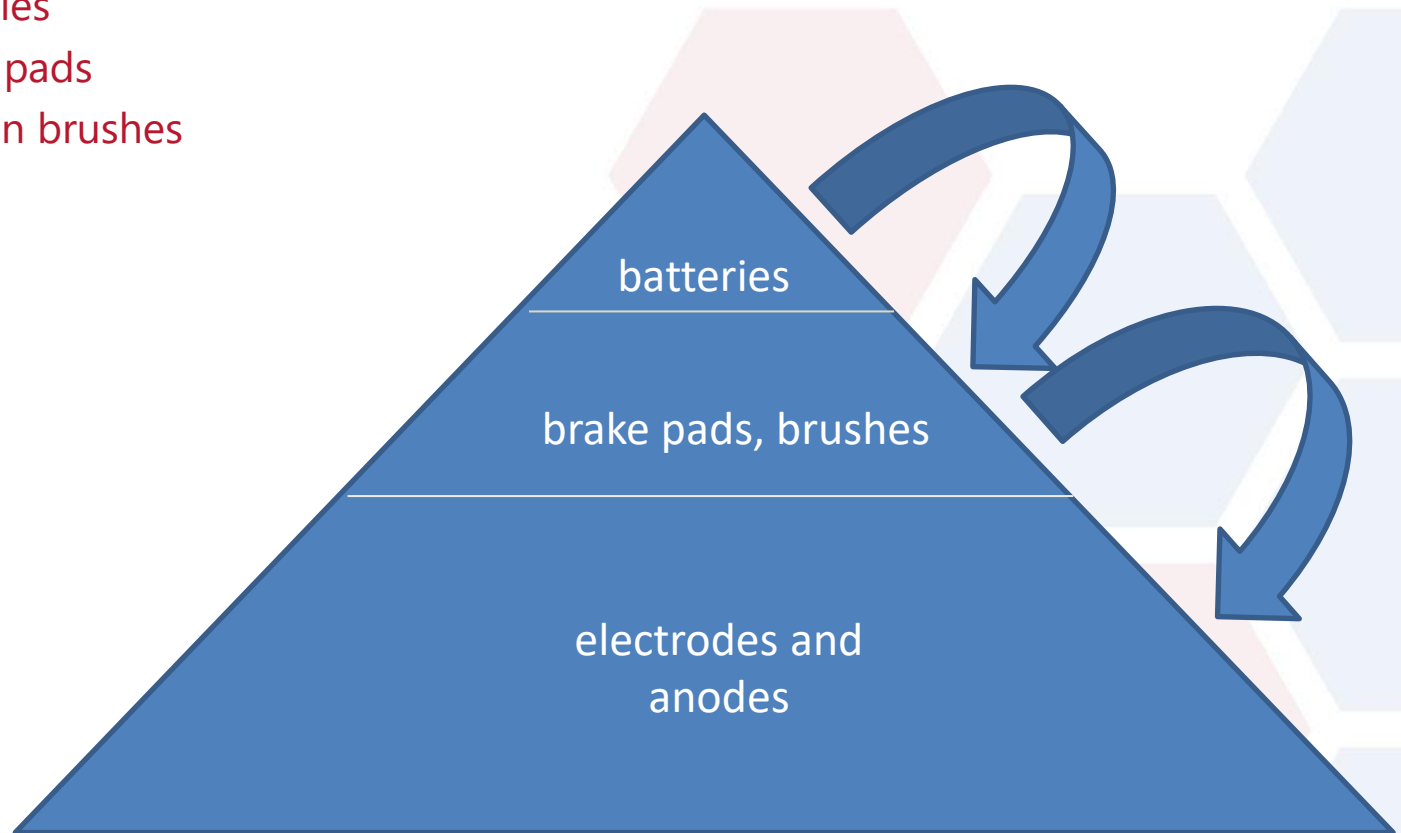
- **Syrah Resources is assessing the feasibility of producing 10,000 t/yr of anode material at its plant in the US and scaling up to 40,000 t/yr.**
- **Australia-based EcoGraf is planning to become fully integrated, with its Epanko graphite mine in Tanzania due to produce 60,000 t/yr of flake, and an anode plant in Australia planned to start production at 5,000 t/yr, scaling up to 20,000 t/yr by 2022.**
- **Other sources are being developed in Sri Lanka and Brazil, Madagascar.**

- **today's recycling from a wide range of uses**

- Batteries
- Brake pads
- Carbon brushes
- Etc.

**Today recycling back into battery material is not possible!**

**Research into repairing crystallography will be needed.**



# CRITICAL: SUSTAINABLE INVESTMENTS

## JRC STUDY ON GRAPHITE PRODUCTION IN BATTERIES

### JRC Technical Report 2020 – Responsible and sustainable sourcing of battery raw materials

- ❑ The objective of the analysis was to determine potential criticalities in the materials value chain, thus using country-based data to identify which material supplier countries can be at risk in relation to selected aspects
- ❑ Several indicators were used to determine the level of risk (low-risk, medium-risk, high risk, very high-risk n/a) for each risk category

### Conclusions:

- ❑ Natural graphite is also extracted in areas of high-risk regarding child labour issues: Mozambique and Tanzania among others
- ❑ Other countries where this material is produced present high risks in the governance and conflict category (Brazil, China)
- ❑ Compared with other battery materials, awareness of social and environmental issues seems lower

## Sustainable Finance: EU Taxonomy

Both EU synthetic and natural graphite production should be assessed considering their performance on the basis of their contribution to decarbonisation, environmental protection and social contribution.

# WAY FORWARD TO POLICIES TO ADDRESS CRITICALITY

- **EC Criticality assessment:**
    - [Higher granularity of assessment](#) needed to cover and capture substitution situation in markets and applications.
    - Relevance for future technologies under development should be covered in an anticipative way.
  - **Synthetic graphite:  
Existing and economic substitution of natural graphite through synthetic graphite under threat from EU policies**
    - Energy costs and decarbonisation – increased renewables in grids is key to decarbonisation
    - CSS – recognition of “essential use” of some raw materials to achieve substitution
    - Environmental Subsidies, CO2 cost compensation - higher granularity in the assessment required to maintain viable substitution
  - **Natural graphite:**
    - Diversification under way, but investments in natural graphite in the EU needed.
    - Further exploration needed.
    - Permitting needs to be improved.
- Both:**
- **Trade Policy**
    - Imports need to fulfil EU standards and need to prove this in a reliable way.
  - **Sustainable Finance Taxonomy needs to**
    - take into consideration the supply chains in a more comprehensive form
    - needs to look at social criteria for raw materials and products along the value chain
    - needs to understand supply chains and substitution
  - **Horizon Europe needs to**
    - Address chemical and energy related issues in case of substitution
    - Address current technological limitations for achieving higher performance and circularity.



**THANK YOU!**

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