



IQ Group
Turning Vision into Reality
(An ISO 9001:2008 Company)

16th Arab Steel Summit 2023

GRAPHITE MARKET OVERVIEW

Presented By:
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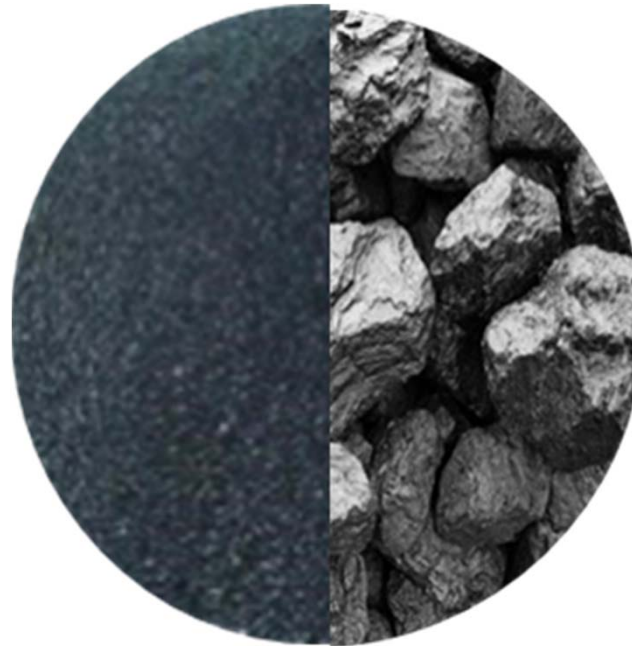
Agenda

- Brief Overview
- Distribution Of Graphite Resources
- Application
- Demand & Supply Side Factors
- Challenges In The Industry
- Impact Of Russia & Ukraine Crisis
- Shift From Surplus to Deficit By 2030
- Future Of Synthetic Vs Artificial Graphite
- Way Forward
- Q & A

TYPES OF GRAPHITE

SYNTHETIC GRAPHITE

- Energy Intensive Production Process
- Expensive To Make
- Large Carbon Footprints With Harmful Gases Emission
- Produces from Pet Coke & Coal Tar Pitch



NATURAL GRAPHITE

- Naturally Occuring
- Inexpensive To Produce
- Small Carbon Footprint
- Mined From The Ground Open Pit Mines

GRAPHITE APPLICATIONS

Electrodes:
Used in EAF

Refractory: Used in
graphite bricks, crucibles

Steel Making/ Foundries:
As carbon additive

Batteries: Used in Li- Ion
batteries

Pencils: In pencil
leads

Friction Material: Used in
brake linings/shoes



DISTRIBUTION OF NATURAL GRAPHITE RESOURCES



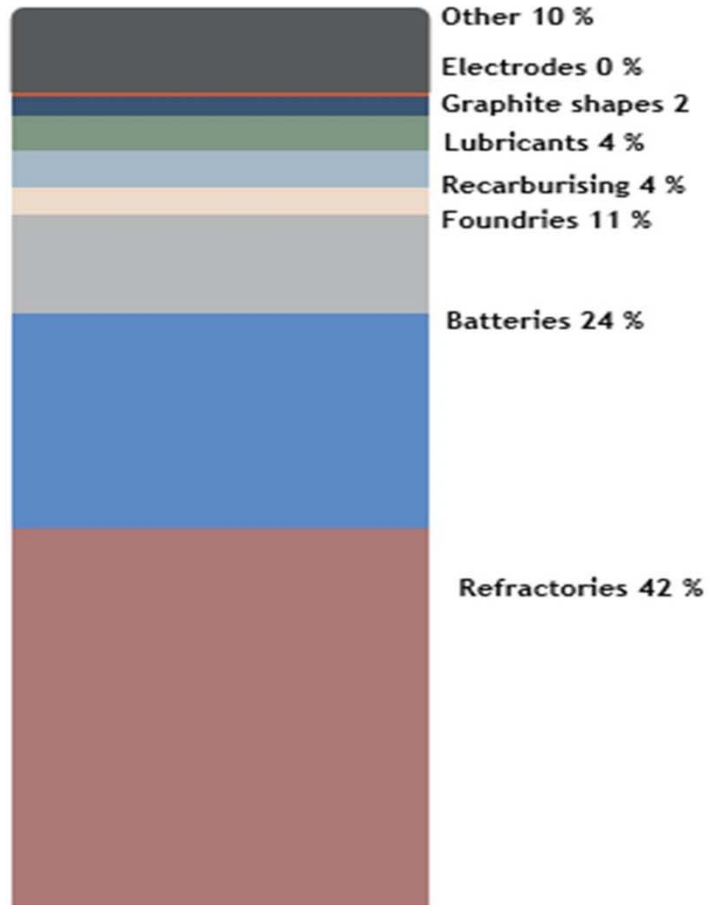
Data compiled April 28, 2022.
Map credit: Mahnoor Haider
Source: U.S. Geological Survey

DISTRIBUTION OF GRAPHITE RESOURCES

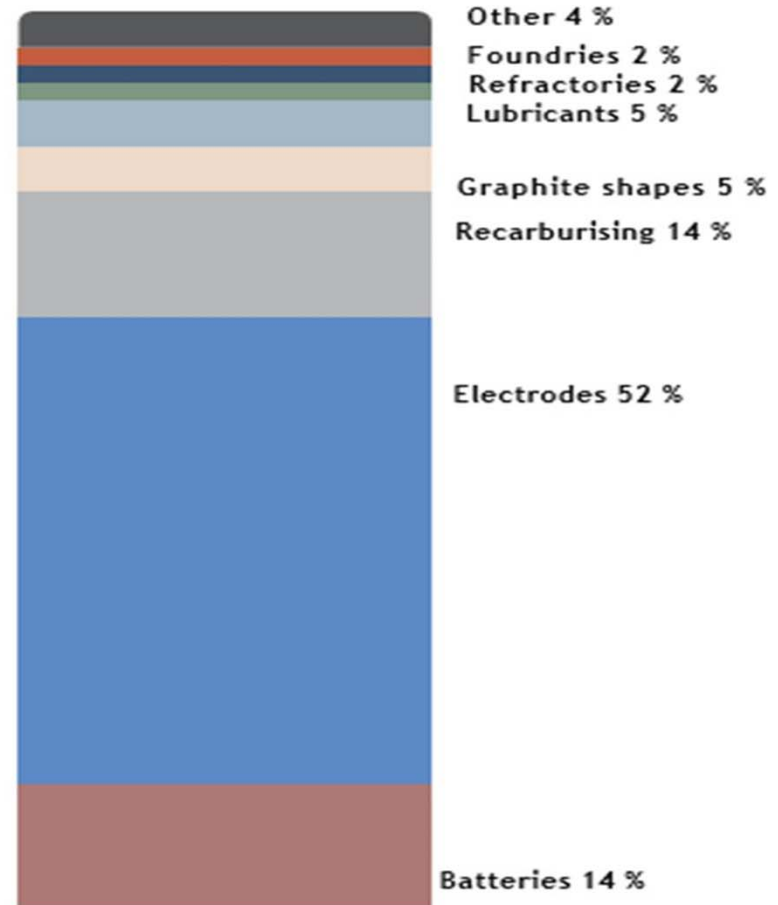
	Mine production		Reserves ³
	<u>2020</u>	<u>2021^e</u>	
United States	—	—	(⁴)
Austria	500	500	(⁴)
Brazil	63,600	68,000	70,000,000
Canada	8,000	8,600	(⁴)
China	762,000	820,000	73,000,000
Germany	300	300	(⁴)
India	6,000	6,500	8,000,000
Korea, North	8,100	8,700	2,000,000
Madagascar	20,900	22,000	26,000,000
Mexico	3,300	3,500	3,100,000
Mozambique	28,000	30,000	25,000,000
Norway	12,000	13,000	600,000
Russia	25,000	27,000	(⁴)
Sri Lanka	4,000	4,300	1,500,000
Tanzania	—	150	18,000,000
Turkey	2,500	2,700	90,000,000
Ukraine	16,000	17,000	(⁴)
Uzbekistan	100	110	7,600,000
Vietnam	<u>5,000</u>	<u>5,400</u>	(⁴)
World total (rounded)	966,000	1,000,000	320,000,000

World Resources:³ Domestic resources of graphite are relatively small, but the rest of the world's resources ex

GRAPHITE END USE MARKET BY PERCENTAGE

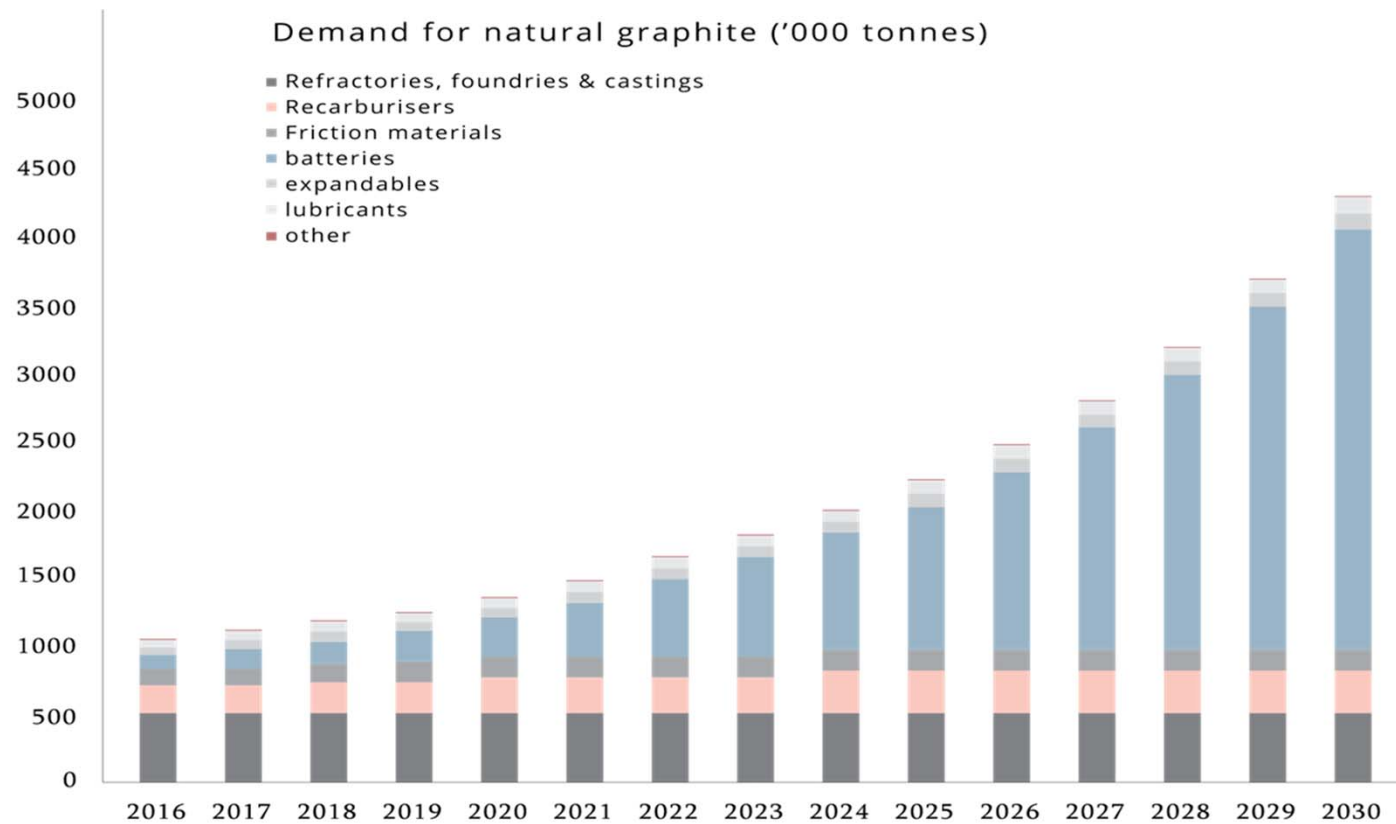


Natural Graphite



Synthetic Graphite

GRAPHITE APPLICATION MARKET DEMAND GROWTH



SOURCE: [HTTPS://WWW.TIRUPATIGRAPHITE. CO. UK/ GRAPHITE- MARKETS/](https://www.tirupatigraphite.co.uk/graphite-markets/)

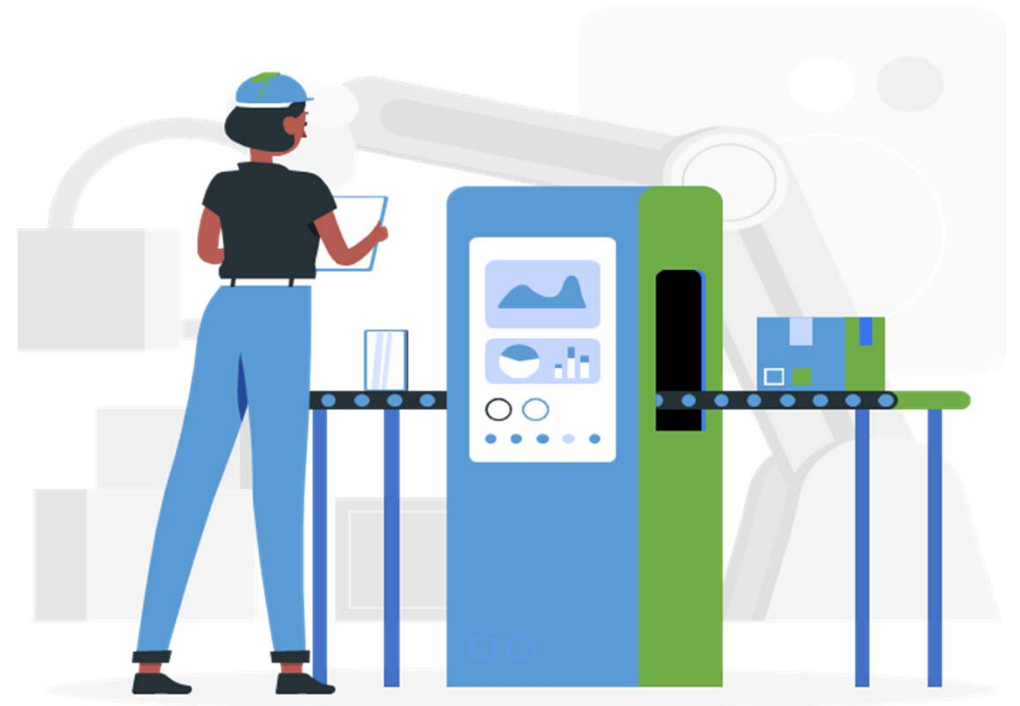
FACTORS AFFECTING DEMAND SIDE :

- THE INCREASING DEMAND OF HIGH- QUALITY STEEL AND CASTINGS THE ELECTRIC ARC FURNACE IS THE MODERN TREND .
- HIGH- GRADE NEEDLE COKE, COAL TAR PITCH AND PET COKE SHORT IN SUPPLY .
- STRONG GROWTH IN DEMAND FOR GRAPHITE ON LI-ION BATTERIES .
- HIGH DEMAND FROM REFRACTORIES MANUFACTURING .
- TRADE WARS BETWEEN THE WORLD'S MAJOR ECONOMIES .



FACTORS AFFECTING SUPPLY SIDE:

- DEPENDENCY ON CHINA
- ENERGY CRISIS
- COVID- 19 PANDEMIC
- RUSSIA- UKRAINE WAR



CHALLENGES IN GRAPHITE SUPPLY CHAIN

NOT ALL GRAPHITE
SEEMS TO BE
SUITABLE FOR
SATISFYING
GROWING
DEMAND

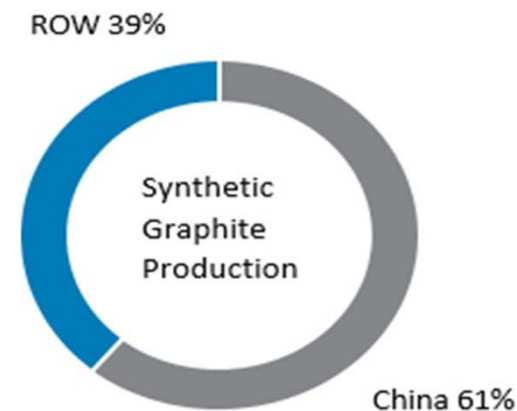
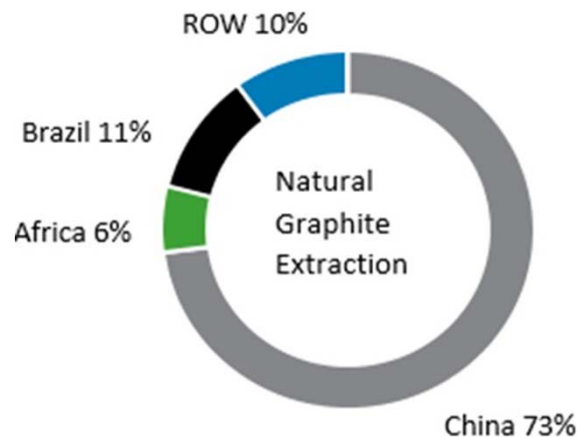
POLLUTING
MANUFACTURING
PROCESS

CHINA'S
GRAPHITE
MONOPOLY

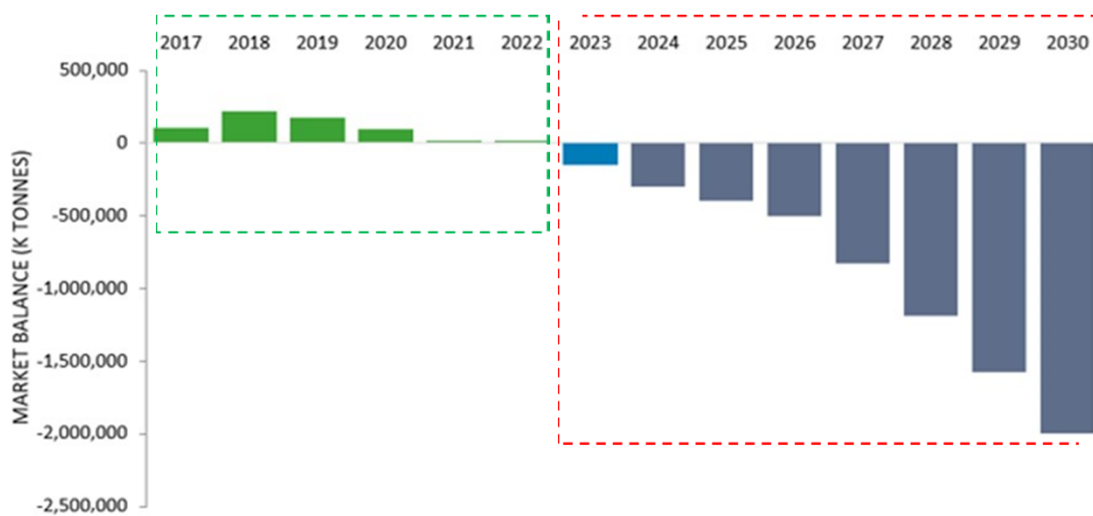
EXPENSIVE
MANUFACTURING
PROCESS

CHINA'S DOMINATION OF GRAPHITE SUPPLY

- *GRAPHITE SUPPLY, BOTH NATURAL AND SYNTHETIC, HAS BEEN CONCENTRATED IN CHINA DUE TO THE CURRENT LOCATION OF PROCESSING CAPACITY. CHINA ACCOUNTS FOR AN ESTIMATED 61 % OF SYNTHETIC GRAPHITE.*
- *AS IT RELATES TO GRAPHITE USAGE IN LIB, CHINA CURRENTLY ACCOUNTS FOR APPROXIMATELY 100 % OF SPHERICAL GRAPHITE PRODUCTION (BOTH SYNTHETIC AND NATURAL), THE KEY GRAPHITE PRECURSOR FOR BATTERY ANODE PRODUCTION.*



DEMAND IS EXPECTED TO OUTSTRIP SUPPLY BY 2023 – AND CONTINUE BEYOND

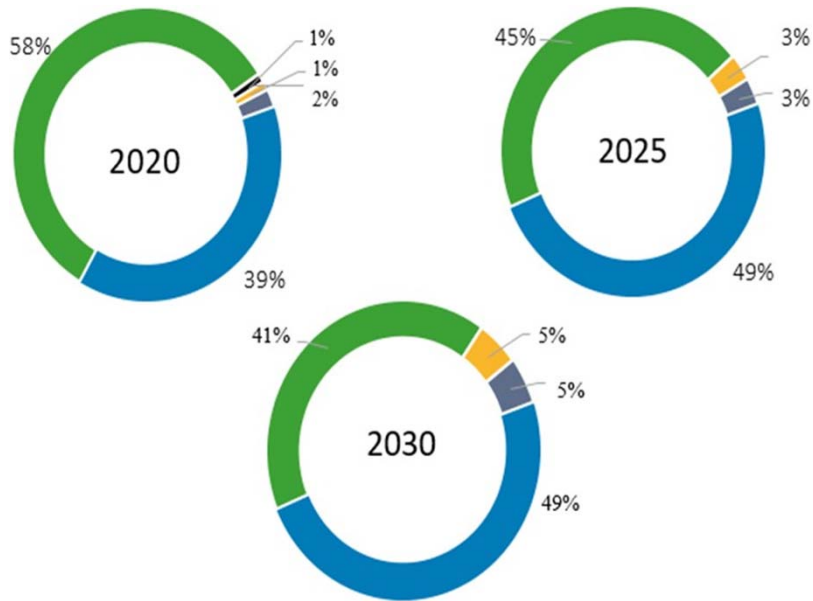


Source: Benchmark Mineral Intelligence

- *Graphite demand exceeding global supply by 400,000 tonnes by 2026 .*
- *New production needs to be implemented to meet the strong growth market*
- *Significant supply shortages emerging as EV demand ramps up*

Natural Or Synthetic Graphite ? What Holds The Future ?

NATURAL GRAPHITE IS EXPECTED TO TAKE MARKET SHARE FROM SYNTHETIC THROUGH 2030 .



■ Natural ■ Synthetic ■ Mesocarbon Microbeads ■ Silicon ■ Other

Natural Graphite Demand for Li-ion (tonnes)	2020	2025	2030
	224,538	1,209,953	3,078,757

Expected shift toward natural graphite driven by lower cost and increased performance

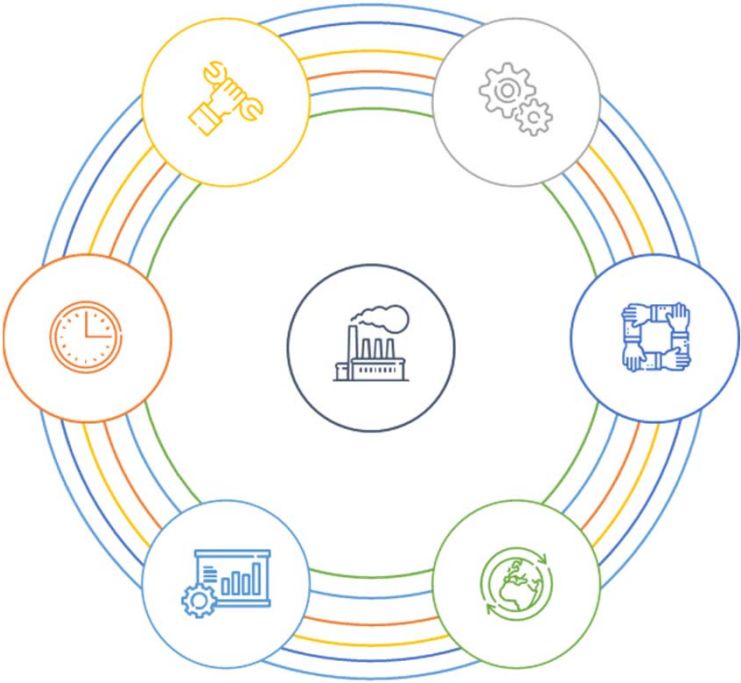
Source: Benchmark Mineral Intelligence Q1 2021

WAY FORWARD

COMMITMENT TO EU AND US' CLIMATE GOALS

FOCUS MORE ON PRODUCING NATURAL GRAPHITE

GOVERNMENT'S SUPPORT TO GRAPHITE PROCESSING COMPANIES



INCREASE ACCESSIBILITY TO GRAPHITE ORE

INCLUDE PRODUCERS OF END-APPLICATION INTO THE MINING PROCESS

PROMOTING INTERNATIONAL FREE TRADE AGREEMENTS

THANK YOU FOR YOUR ATTENTION!