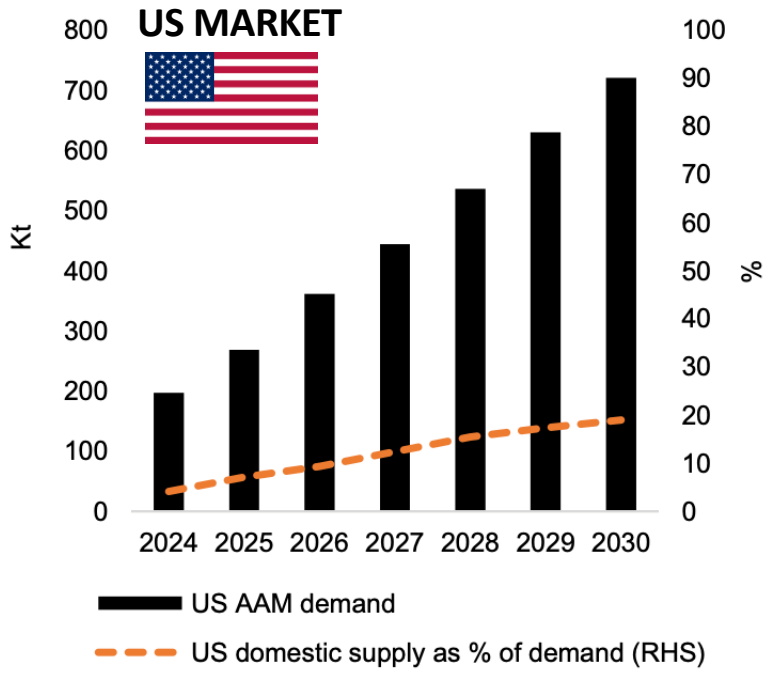
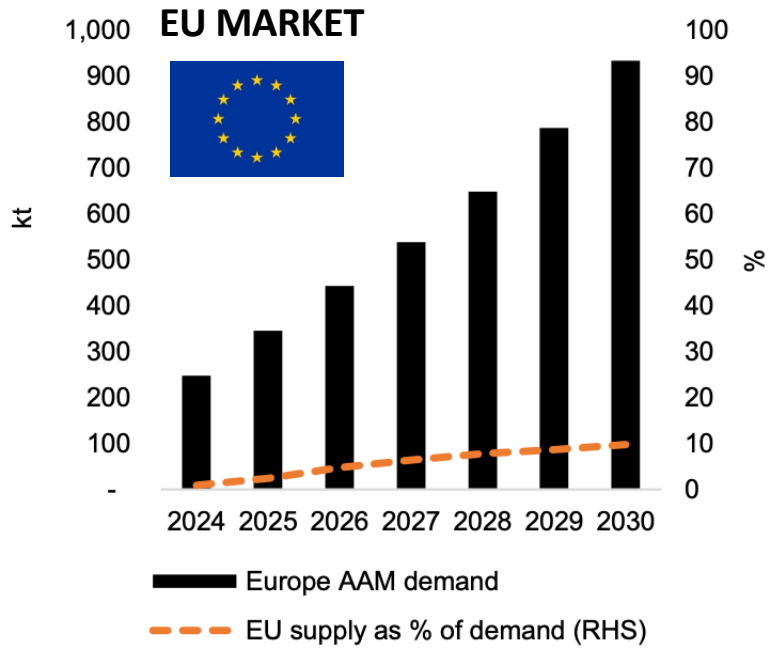
Turning CO_2 into Critical Materials:

Local, Green Carbon for Tomorrow's Supply Chains

Global Problem

Every EV requires Graphite – local demand vs local supply





Source: Benchmark Minerals

TOTAL DEMAND OF DOMESTIC MARKETS ONLY MET BY 10-20% OF DOMESTIC SUPPLY

CHALLENGE #1: SUPPLY CHAIN SECURITY

The EU does not produce graphite

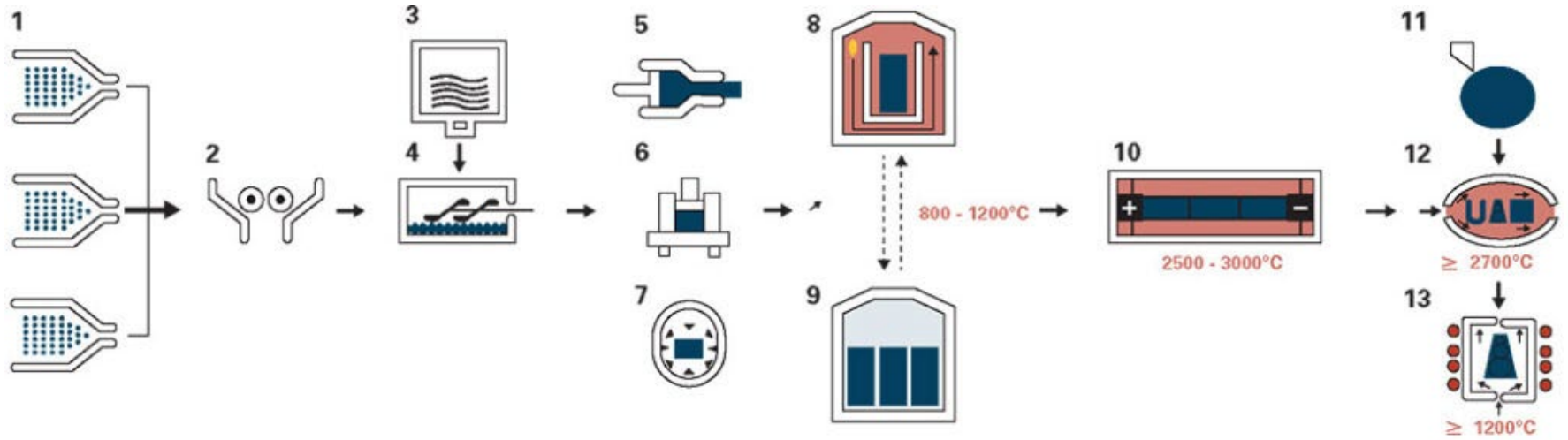
The EU, the US, Japan and Korea have declared graphite as a critical raw material.

China curbed graphite exports from 1st of December 2023.

77% of the global graphite need comes from China.

CHALLENGE #2: CARBON EMISSIONS

Synthetic Graphite



1 Coke , graphite
2 Grinding
3 Coal tar pitch
4 Mixing
5 Extruding
6 Vibro molding
7 Isostatic pressing
8 Carbonizing
9 Pitch impregnation
10 Graphitizing
11 Machining
12 Purifying
13 SiC coating

source:
SGL Carbon GmbH

CHALLENGE #2: CARBON EMISSIONS

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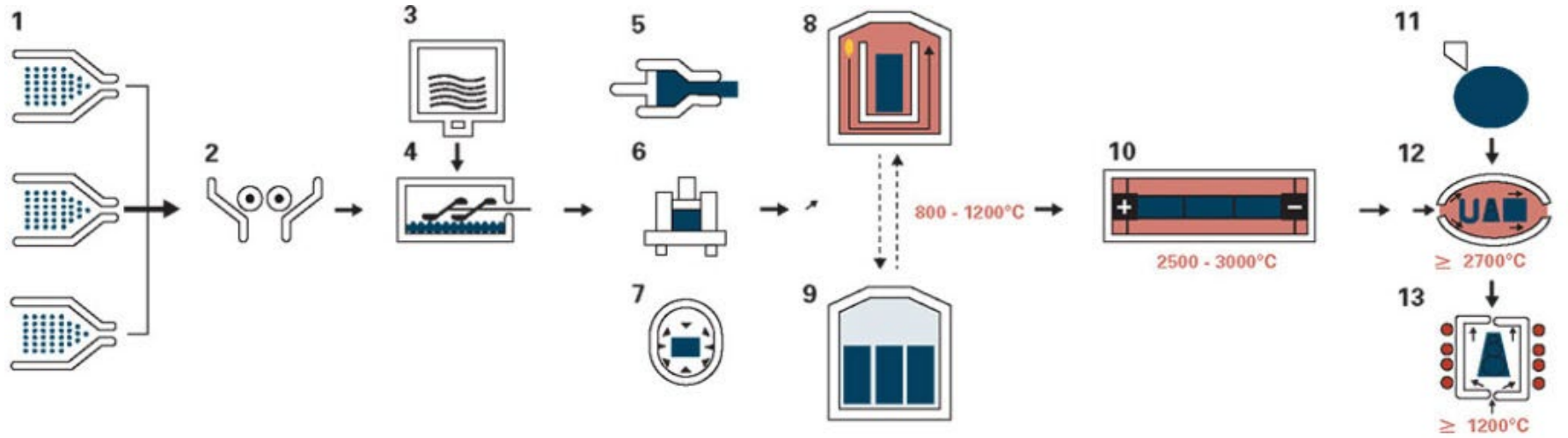

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CHALLENGE #2: CARBON EMISSIONS

Conventional Graphite and Nanotube production methods emit large amounts of CO_2

GRAPHITE

million tons of annual CO_2 emissions by 2030

MWCNTs

UP Catalyst: Turning CO_2 into Critical Materials

Split CO_2 molecule into oxygen and carbon

$$CO_2 \longrightarrow C + O_2$$

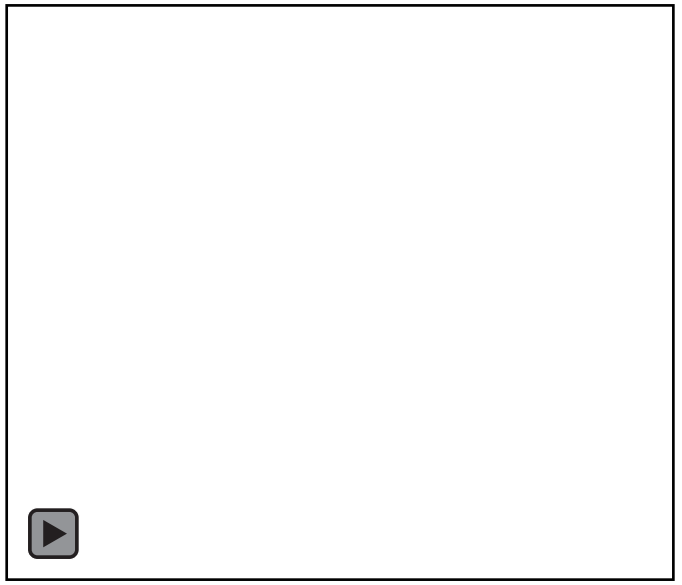
At the lowest temperatures

700°C 18-24 hours	VS	**OTHERS**	**2800°C** Several weeks

Low Energy ⟶ **Lowest Cost**

Local, Green Carbon for Tomorrow's Supply Chains

Renewable electricity



Sustainable Graphite

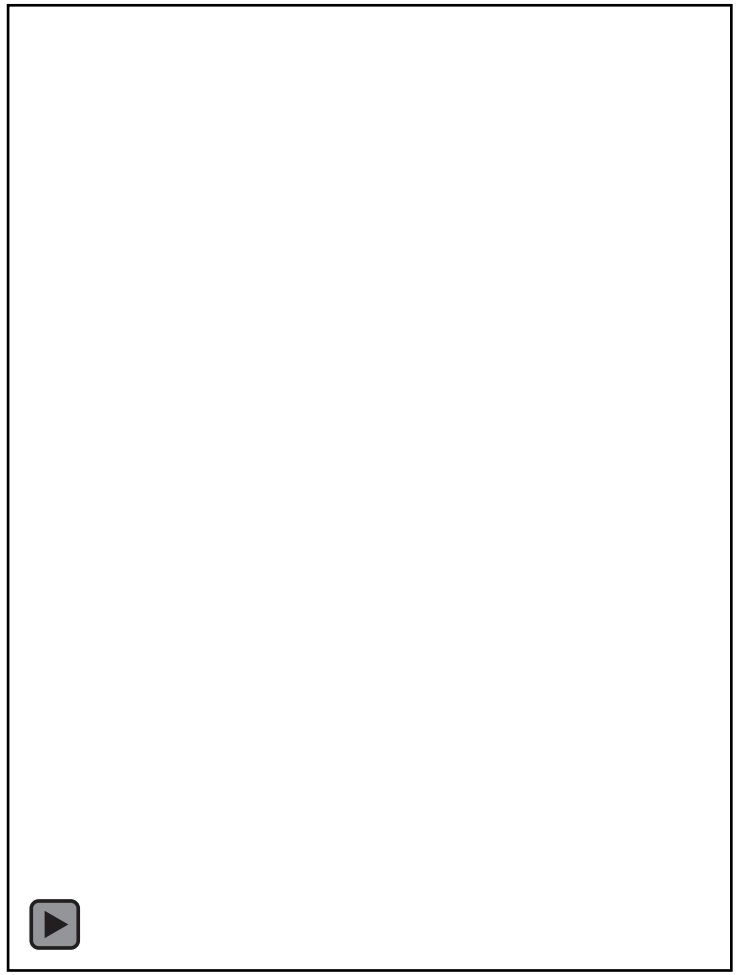
CO_2 emission from hard-to-abate industries

Sustainable MWCNTs

SCALABLE TECHNOLOGY

Known technology and already applied in

- Aluminium
- Magnesium



Scalable reactor design

SCALABLE TECHNOLOGY

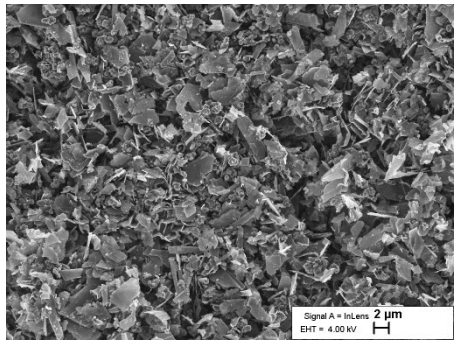
Molten salt electrolysis:
Known and already applied in

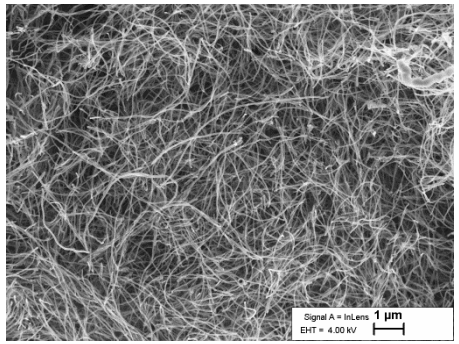
- Aluminium
- Magnesium

Deployable Pilot Reactor

OUR IMPACT: Localized supply chain of sustainable raw materials

		CO_2 EMISSIONS PER TON OF MATERIAL	FEEDSTOCK
GRAPHITE	Benchmark, synthetic	20 tons	Fossil
		0.07 ton	CO_2
MWCNTs	Benchmark, CVD method	170 tons	Fossil
		0.7 ton	CO_2





Emission avoidance through CO_2 utilisation

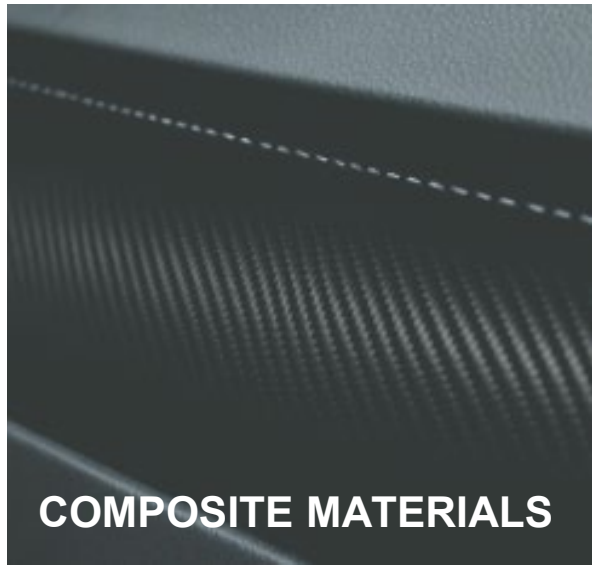
Tons of CO_2 per ton of material produced

Synthetic Graphite	Natural Graphite	Graphite
25-50 t	**10-15 t***	**0.07 t****

*Carrère, et. al, (2024). https://doi.org/10.1016/j.est.2024.112356
**LCA validated by Research Institutes of Sweden (RISE) and Bureau Veritas (2024)

OUTLOOK: MARKET OPPORTUNITY

Market opportunity is larger than for battery applications alone



Leading the world to renewable carbon