Håvard Gautneb (Geological Survey of Norway) 10.01.2023

Commodity	**Natural graphite (C)**	**Data source**
Significance for the EU (2023)	*Critical; Strategic if battery grade*	
Uses of the commodity	Main uses: *Electrodes, foundry industry, refractory materials, metallurgical industry. Li-ion batteries. Carbon brushes.* Minor uses: *Shapes, friction products, lubricants, pencils* Future uses: *Refractories for the steel industry remain the dominant market. Graphite is the second largest component in Li-ion batteries, this use has seen a rapid increase in recent years, a trend which is expected to continue. Li-ion batteries demand a "spherical-type" graphite that is produced by a specialised grinding of otherwise high-quality natural graphite deposits. Large-scale fuel cells. Modular nuclear reactors (PBNRs). Vanadium redox batteries.*	Taylor (2006), Latunussa et al. (2020), USGS (2023)
Resources and potential in Nordic countries	Known resources: *Finland 1,276,900 t, Norway 17,985,000 t, Sweden 12,440,000 t, Greenland 6,000,000 t.* Finland: *Several flake graphite and extensive amorphous graphite occurrences, probably contain several Mt of fine-grained graphite*. Greenland: *Historic mine production and known resources suggest additional major potential*. Norway: *About 70 registered graphite occurrences in four main graphite provinces* Sweden: *At least eight graphite deposits and occurrences are known.*	Lauri et al (2018), Thrane & Kalvig (2018), Beowulf Mining (2019), Leading Edge (2019), Gautneb et al. (2020), Talga Resources (2022), Rosa et al. (2023)
Anthropogenic resources and potential in Nordic countries	*Recycled Li-ion batteries*	
Main deposit types in Nordic countries	*All economic and potentially economic graphite occurrences the Nordics are of the flake graphite type. In addition, there are large occurrences of non-economic black schist hosted deposits.*	Gautneb et al. (2021)
Main global deposit types	*Graphite deposits world-wide are of three types, flake graphite (55 %), amorphous graphite (43 %), and vein graphite (2 %)*	Gautneb et al. (2021)
Global production (2022)	*1,300,000 t (mines)*	USGS (2023)
Nordic production (2021)	*12,000 t (refineries / smelters)*	USGS (2022)
Main producing countries (2022)	*China 65.4 %, Mozambique 13.1 %, Madagascar 8.5 %, Brazil 6.7 %, South Korea 1.3 %, Canada and Russia 1.2 %, Norway 0.8 %*	USGS (2023)

Technological challenges in production	*Synthetic graphite is expected to become more important in the future. In Norway, synthetic graphite is planned to be produced by Vianode, a company owned by Elkem, Hydro and Altor*	https://www.vianode.com
Recycling	Present: *Recycling of graphite is done to a very limited degree. Certain applications can use substitutes* Future: *Recycling from used batteries to increase significantly.*	Latunussa et al. (2020)

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