Håvard Gautneb (Geological survey of Norway) 10.01.2023

Commodity	**Si metal (Si)**	**Data source**
Significance for the EU (2023)	*Critical and Strategic*	
Uses of the commodity	Main uses: *Silicon and silane chemicals (54 %) aluminium alloys (38 %), solar photovoltaic (6 %)* Minor uses: *Semiconductors* Future uses: *Photovoltaic and semiconductor demand assumed to increase most. Other demand steady.*	Latunussa et al. (2020)
Resources and potential in Nordic countries	*Mine production: 240,000 t (Norway).* *Known resources: Greenland 2.8 Mt; Norway 28.3 Mt; Sweden 0.5 Mt.* Estonia: *None* Finland: *A large number of small quartz vein occurrences with at least some having a potential for high-purity quartz, but none with a resource estimate.* Greenland: *Numerous occurrences but no data on the quartz quality except for the Ivittuut deposit.* Norway: *Extensive additional potential across the country* Sweden: *Major potential in parts of Sweden.*	Eilu et al. (2021), Jonsson et al. (2022), Rosa et al. (2023)
Anthropogenic resources and potential in Nordic countries	*Recycled Si metal*	
Main deposit types in Nordic countries	*Pure quartzites and kyanite quartzites.* *Pegmatites and hydrothermal vein quartz*	Lauri rt al. (2018), Jonsson et al (2022)
Main global deposit types	*Quartz veins, quartzites*	
Global production (2021, 2022)	*2.5 Mt of quartz for Si metal* *8.8 Mt of ferrosilicon and Si metal combined (USGS 2023). Since ferrosilicon accounts for over 60 % of global production in 2022, Si metal production is estimated to be approximately 3.5 Mt.*	USGS (2022, 2023)
Nordic production (2021)	*250,000 t (mines). Norway 240,000 t (refineries / smelters) which includes 200,000 imported quartz. Iceland 36,000 t.*	Eilu et al. (2021)
Main producing countries (2022)	*China 69.9 %, Russia 7 %, Brazil 4.3 %; Norway 4 % (smelting, refining)*	USGS (2023)
Technological challenges in production	*Production of Si metal is very energy intensive*	
Recycling	Present: *Only the Si metal from photovoltaic and electronic use can be and are recycled*	Latunussa et al (2020)

	Future: *Assumed to increase*

References

Eilu, P., Bjerkgård, T., Franzson, H., Gautneb, H., Häkkinen, T., Jonsson, E., Keiding, J.K., Pokki, J., Raaness, A., Reginiussen, H., Róbertsdóttir, B.G., Rosa, D., Sadeghi, M., Sandstad, J.S., Stendal, H., Þórhallsson, E.R. & Törmänen T. 2021. The Nordic supply potential of critical metals and minerals for a Green Energy Transition. Nordic Innovation

Jonsson, E., Törmänen, T., Keiding, J., Bjerkgård, T., Eilu, P., Pokki, J., Gautneb, H., Reginiussen, H., Rosa, D., Sadeghi, M., Sandstad, J. & Stendahl, H. 2022. Critical metals and minerals in the Nordic countries of Europe: diversity of mineralization and green energy potential. Geol. Soc. London Spec. Publ. 526. https://doi.org/10.1144/SP526-2022-55

Latunussa, C.E.L., Georgitzikis, K., Torres de Matos, C., Grohol, M., Eynard, U., Wittmer, D., Mancini, L., Unguru, M., Pavel, C., Carrara, S., Mathieux, F., Pennington, D. & Blengini, G.A. 2020. European Commission, Study on the EU's list of Critical Raw Materials, Factsheets on Critical Raw Materials. 819 p.

Lauri, L.S., Eilu, P., Brown, T., Gunn, G., Kalvig, P. & Sievers, H. 2018. Identification and quantification of primary CRM resources in Europe. Deliverable 3.1 of the H2020 project SCRREEN. 63 p. Online at: http://scrreen.eu/wp-content/uploads/2018/03/SCRREEN-D3.1-Identification-and-quantification-of-primary-CRM-resources-in-Europe.pdf.

Rosa, D., Kalvig, P., Stendal, H. & Keiding, J.K. 2023. Review of critical raw material resource potential in Greenland. MiMa rapport 2023/1. 121 p. https://doi.org/10.22008/gpub/32049

USGS 2022. Mineral commodity summaries 2022. U.S. Geological Survey. 202 p. https://doi.org/10.3133/mcs2022

USGS 2023. Mineral commodity summaries 2023. U.S. Geological Survey. 210 p. pubs.usgs.gov/periodicals/mcs2023