Pasi Eilu (Geological Survey of Finland), 2 April 2019
Updated by Daniel Larsson (Geological Survey of Sweden) 6 December 2022

Commodity	**Germanium (Ge)**	**Data source**
Significance for the EU (2023)	*Critical and Strategic*	
Uses of the commodity	Main uses: *Fibre optics 40 %, Infrared optics 47 %* Minor uses: *Electrical equipment, solar cells, polymerisation catalysts, LEDs* Future uses: *Solar cells (CIGS), IR and fibre optics*	Latunussa et al. (2020); USGS (2022); Marscheider-Weidemann et al. (2021)
Resources and potential in Nordic countries	*There are no primary Ge ores anywhere in the world. Ge was extracted from leaching of zinc refinery residues in Finland, from imported ore at in significant amounts to, at least, up to 2015 when 13 t of Ge was produced from imported raw materials. Since 2016, Ge production in Finland has been minimal.* *Resources in the Nordic countries are unknown. Ge is recorded from zinc occurrences in North Greenland with up to 0.05 % Ge in sphalerite.*	Eilu et al. (2021); Lauri et al. (2018); Rosa et al. (2023)
Anthropogenic resources and potential in Nordic countries	*Fly ash from coal combustion. Zinc refinery and smelter wastes.*	
Main deposit types in Nordic countries	*Zinc-dominated massive sulphide ores are possible sources for Ge in Nordic countries. Ge is recorded from MVT deposits in Greenland.*	Eilu et al. (2021), Rosa et al. (2023)
Main global deposit types	*Massive sulphide Zn, Zn-Pb-Cu, and SSC-type copper-cobalt ores, coal, and lignite*	Marsh et al. (2016), USGS (2022)
Global production (2022)	*140 t (Refinery production). Mine production not known.*	USGS (2023)
Nordic production (2021)	*No production*	
Main producing countries (2021)	*Refinery production: China 68 %, Russia 5 %. Globally, only 3 % of the Ge contained in zinc concentrates is recovered. For 2022, USGS did not publish production data for any country.*	USGS (2022, 2023)
Technological challenges in production	*Ge recovery can have a negative impact on zinc recovery, detracting from the core business for these refineries.*	
Recycling	Present: *About 30 % of the global Ge consumed is produced from recycled materials* Future: *Assumed to increase when the Ge-bearing high-tech products are recycled.*	Marscheider-Weidemann et al. (2021); Latunussa et al. (2020); USGS (2022, 2023)

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