Steiger
engineering

Rohepöörde mõjust maavarade nõudlusele

Hardi Aosaar I EurGeol I Projektigeoloog

Minust

Haridus:
- 2009 Tartu Ülikooli BSc geoloogias („Rabakivigraniidi muutused Lumparni geostruktuuris“);
- 2011 Tartu Ülikoolis MSc geotehnoloogias („Attarat Um Ghudrani põlevkivi stratigraafia ning põlevkivi kasutamisest tulenevad tehnoloogilised- ja keskkonnariskid Jordaanias“).

Erialane töökogemus:
- 1 aasta ülikoolis erialaprojektide töörühmas töötamine (L-Virumaa ja Tartumaa strateegiliste maavarade perspektiivhinnangud);
- 7 aastat Eesti Energias uuringugeoloogina;
- 3+ aastat Inseneribüroos STEIGER projektigeoloog;
- Viinud läbi uuringuid Eestis, Jordaanias, Serbias, Türgis, USA-s, Marokos, Mongoolias, Myanmaris, Rwandas ja Indias.

Lisaks:
- EurGeol (nr. 1652);
- Eesti Geoloogia seltsi liige ja president;
- Euroopa geoloogide föderatsiooni volikogu liige, delegaat ja maavarade ekspertide paneeli liige;
- Eesti Mäeseltsi liige;
- Tallinna Tehnikaülikooli ja Tartu Ülikooli õppekavade programminõukogude liige;
- Portaali “Eesti Geoloog” asutajaliige ja toimetaja.

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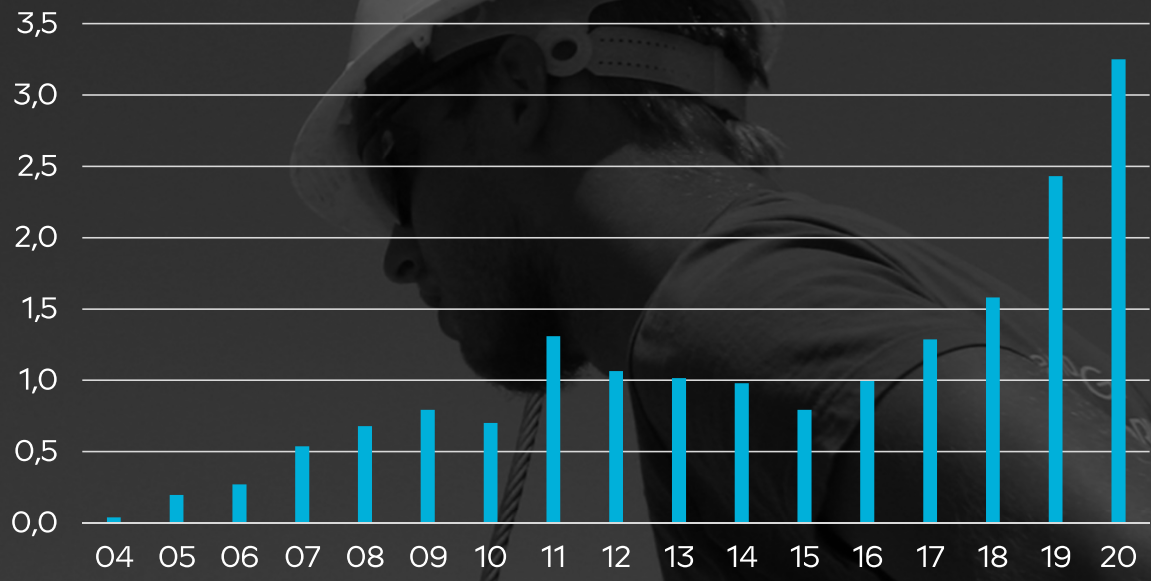
Steigeri faktika

Asutatud	2004
Tegutsemisala	Mäetööstuse teenused
Tööstus	Mäendus ja energeetika
Ettevõtte nimi	Inseneribüroo STEIGER
Töötajaid	Ca 60
Liik	Osaühing
Peakontor	Tallinn, Eesti
Käive	3.25 miljonit EUR (2020)
Juhid	CEO EESTI: **Erki Niitlaan**, (mäeinsener, MSc) CEO INDIA: **Karunakar Gandarapu**, (geoloog/geofüüsik)
Peamised turud	Euroopa, Aasia, Lähis-Ida, Aafrika



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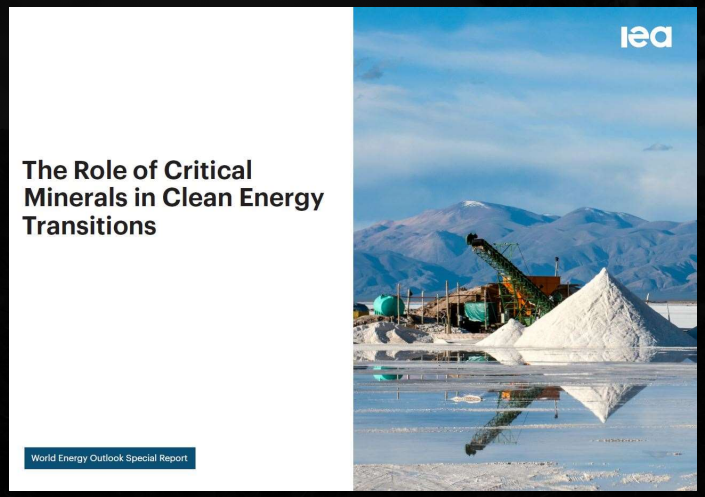
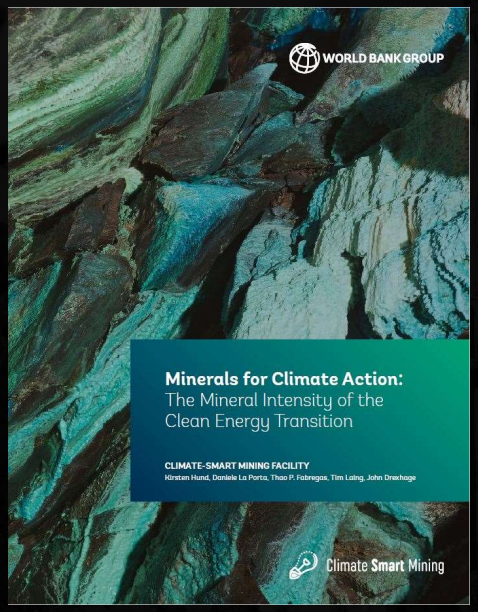
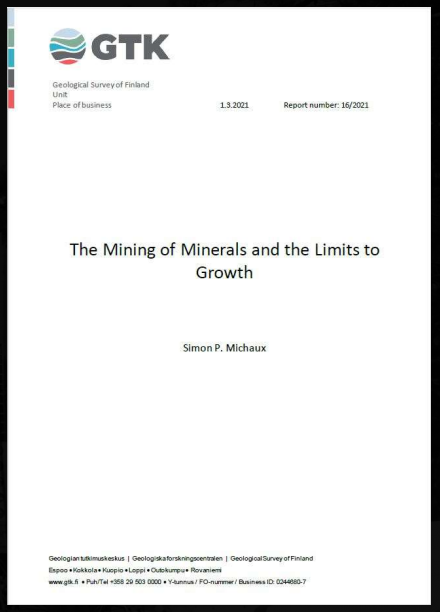
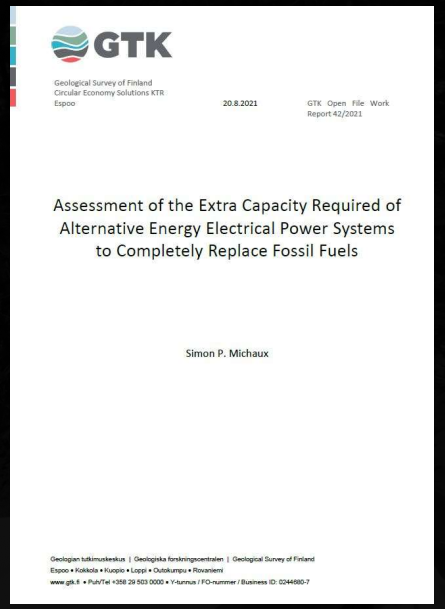
Soovitused lugemiseks









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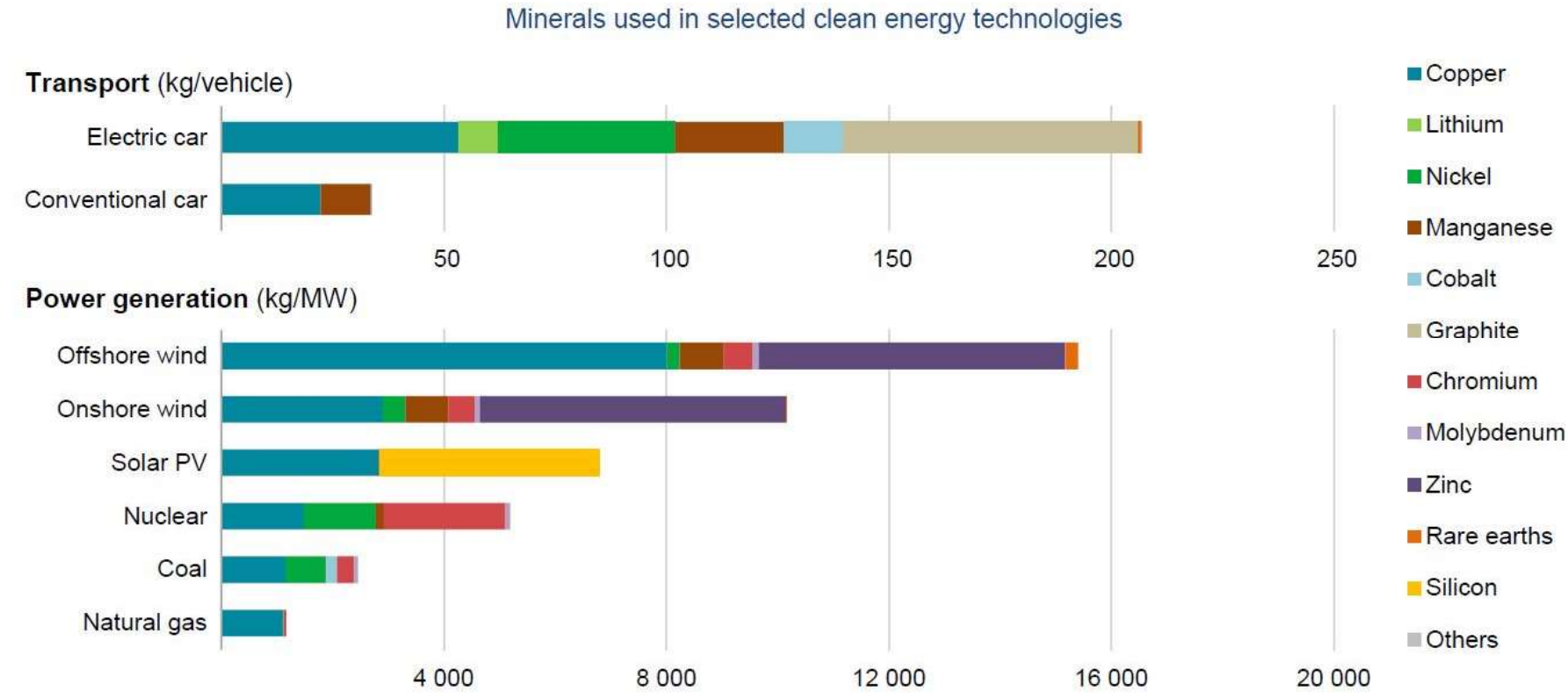
Maavarade nõudluse kasvu tagamaad

The rapid deployment of clean energy technologies as part of energy transitions implies a significant increase in demand for minerals



Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

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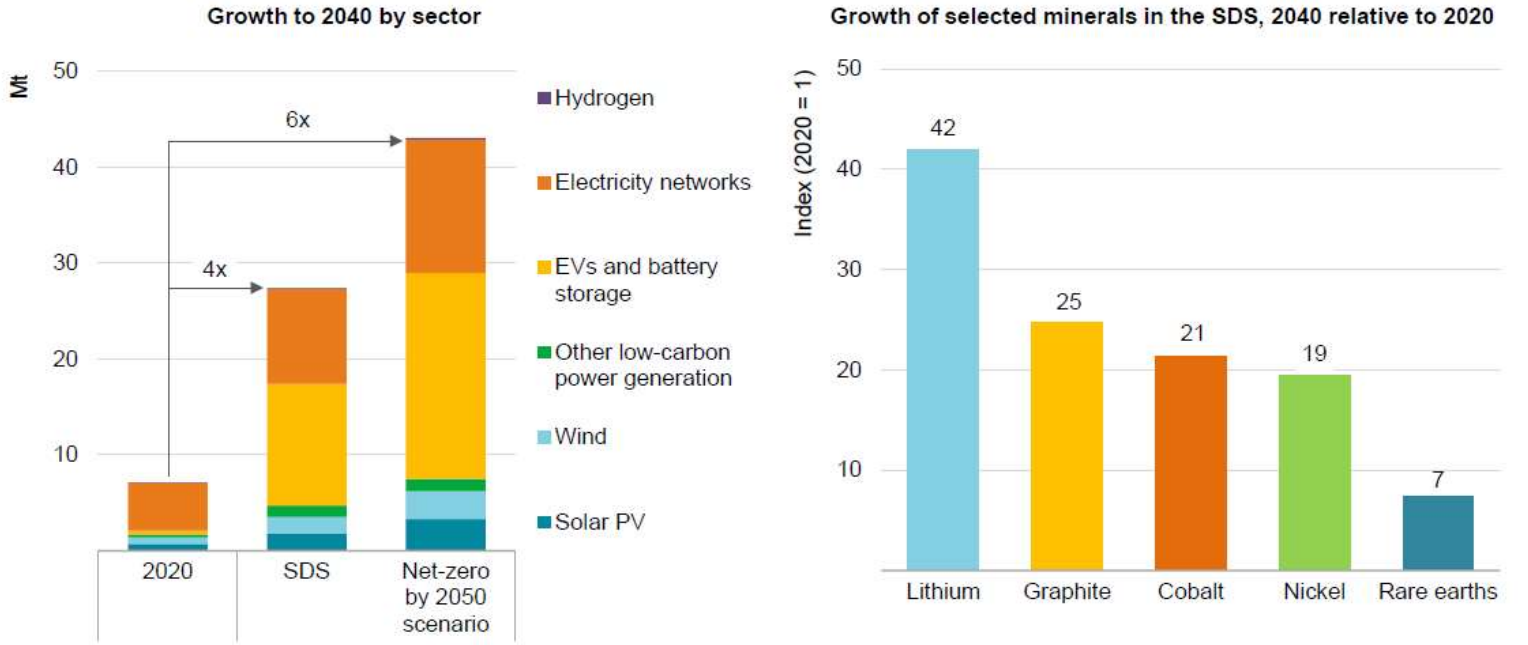
Maavarade nõudluse kasvu prognoos

Mineral demand for clean energy technologies would rise by at least four times by 2040 to meet climate goals, with particularly high growth for EV-related minerals

Mineral demand for clean energy technologies by scenario



Notes: Mt = million tonnes. Includes all minerals in the scope of this report, but does not include steel and aluminium. See Annex for a full list of minerals.

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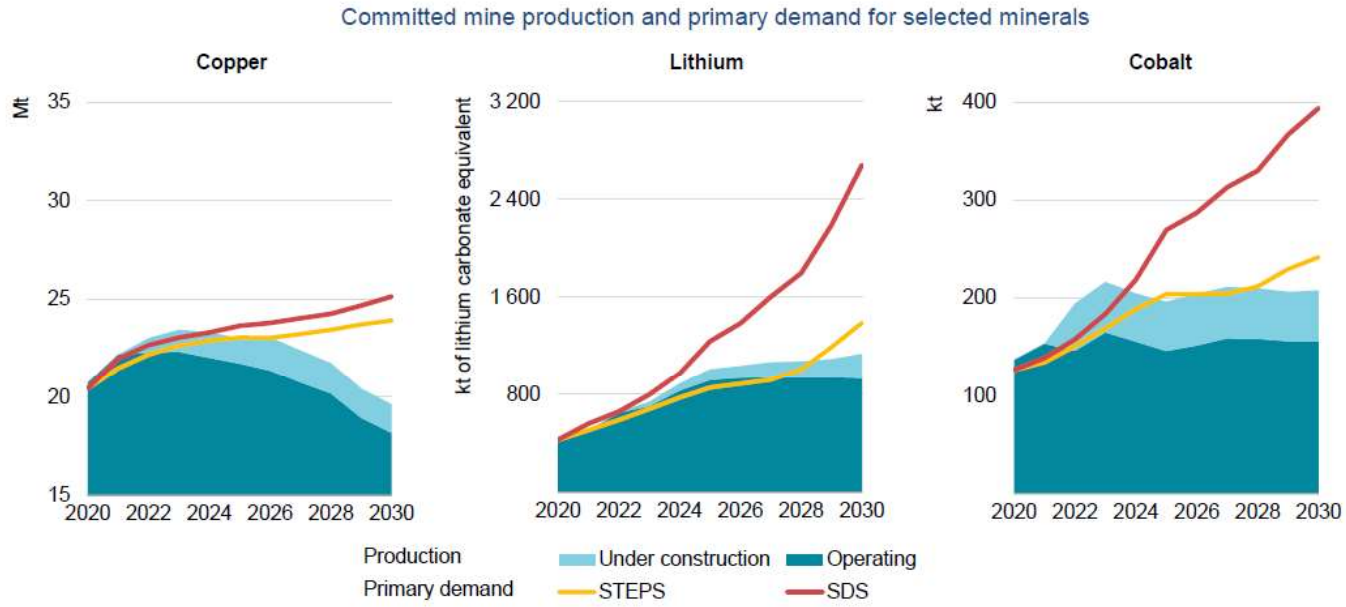
Varustatus ja tootmisvõimekus

Meeting primary demand in the SDS requires strong growth in investment to bring forward new supply sources over the next decade



Notes: Primary demand is total demand net of recycled volume (also called primary supply requirements). Projected production profiles are sourced from the S&P Global Market Intelligence database with adjustments to unspecified volumes. Operating projects include the expansion of existing mines. Under-construction projects include those for which the development stage is indicated as commissioning, construction planned, construction started or preproduction. Mt = million tonnes.

Source: IEA analysis based on S&P Global (2021).

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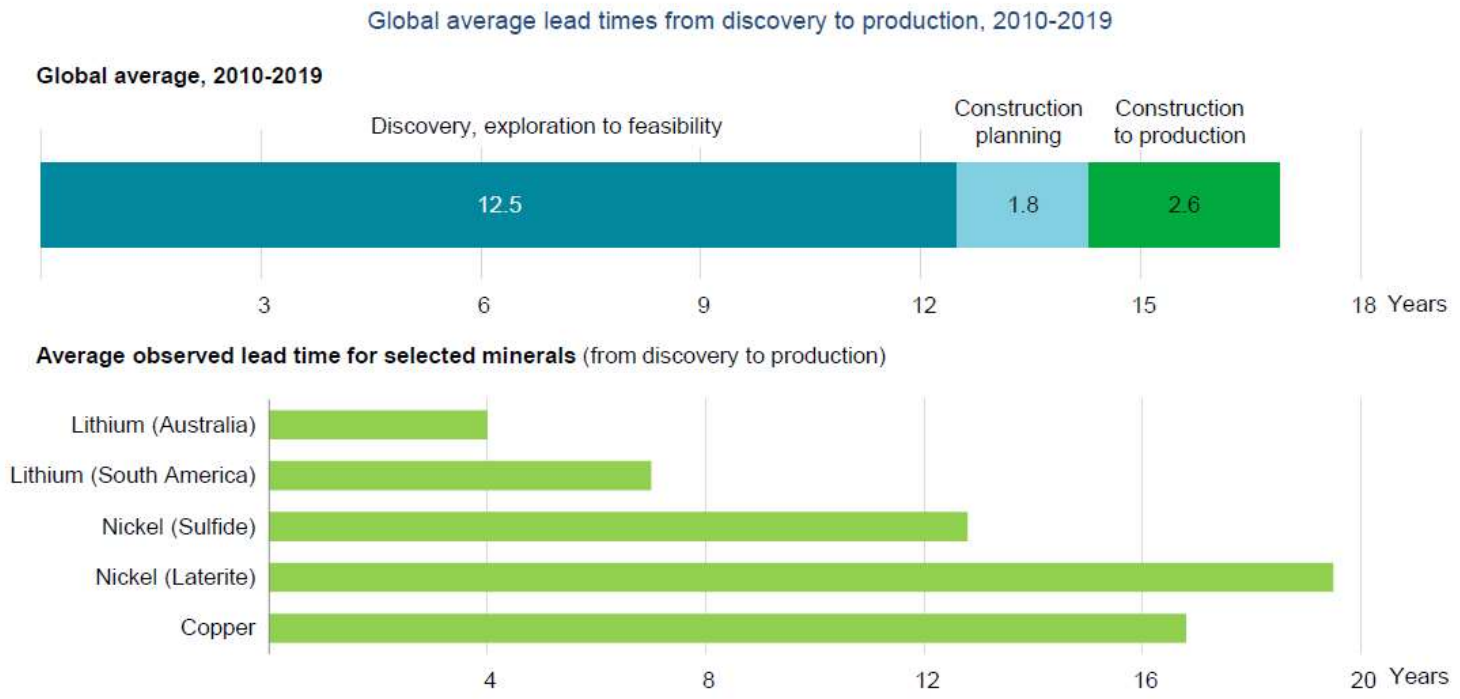
Mäetööstuse arenduseks vajalik aeg

Project development lead times: Market tightness can appear much more quickly than new projects



Note: Global average values are based on the top 35 mining projects that came online between 2010 and 2019.
Source: IEA analysis based on S&P Global (2020), S&P Global (2019a) and Schodde (2017).

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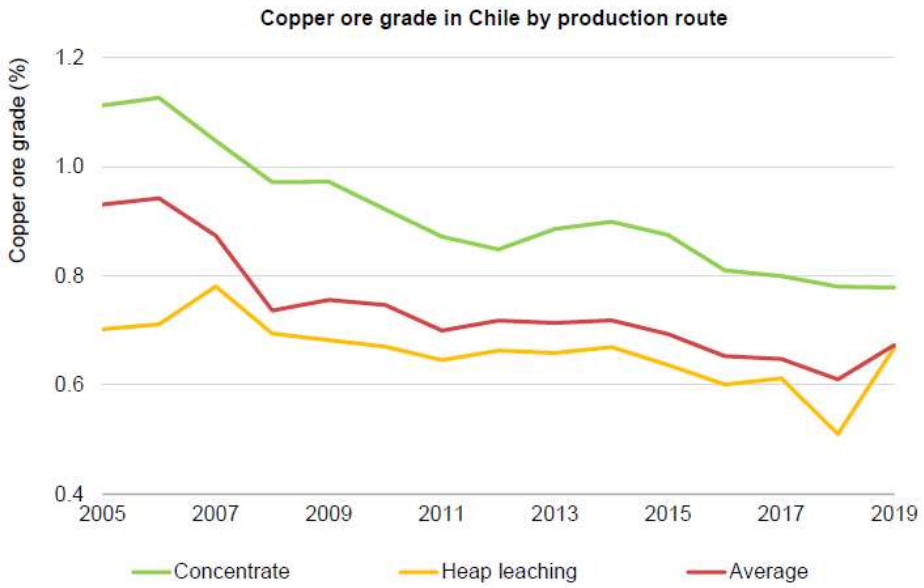
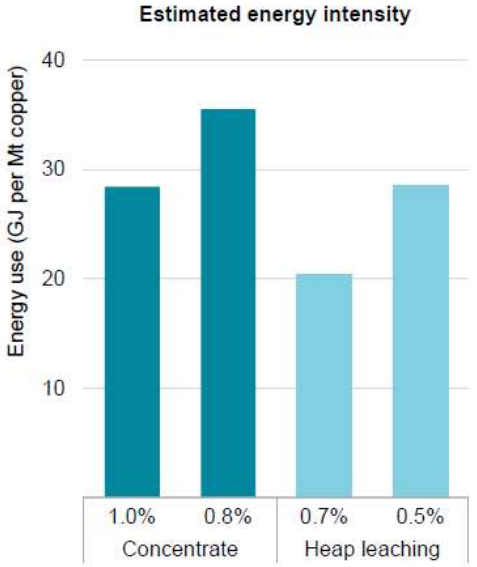
Kaevise kvaliteedi langus

Resources: However, declining ore quality poses multiple challenges for extraction and processing costs, emissions and waste volumes

Average ore grade in Chile and estimated energy intensity by quality





Notes: Energy use for concentrate covers mine, concentrating plant, smelter, refinery and services. For heap leaching, energy use covers mine, leaching, solvent extraction, electro-winning processes and services. GJ = gigajoule.

Source: IEA analysis based on COCHILCO (2019) and Rötzer and Schmidt (2020).

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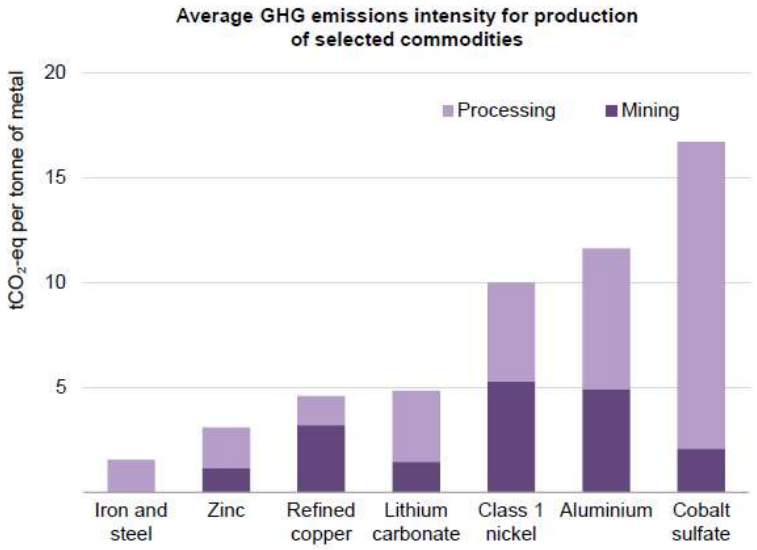
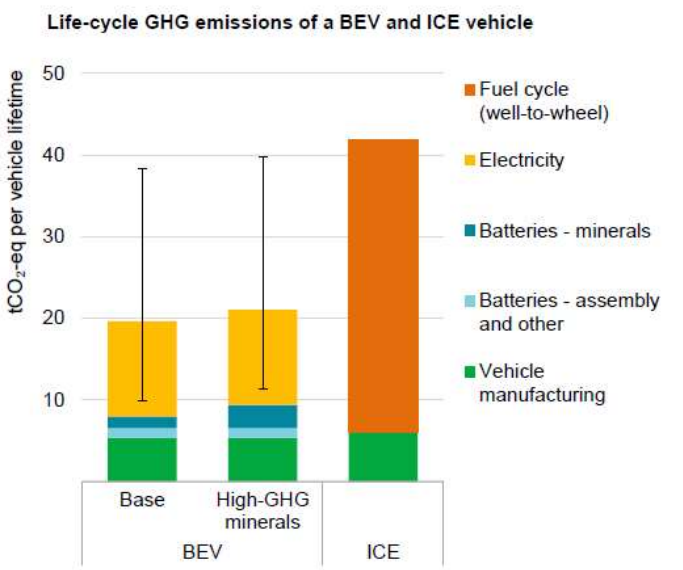
Mäetööstuse kasvuhoonegaaside heitmed

Stronger actions are required to counter the upward pressure on emissions from mineral production, but the climate advantages of clean energy technologies remain clear





Notes: BEV = battery electric vehicle; ICE = internal combustion engine. The "High-GHG minerals" case assumes double the GHG emissions intensity for battery minerals. Includes both Scope 1 and 2 emissions of all GHG from primary production. See Chapter 4 for more detailed assumptions.

Source: IEA analysis based on IEA (2020a); IEA (2020b); Kelly et al. (2020); Argonne National Laboratory (2020); Argonne National Laboratory (2019); Rio Tinto (2020); S&P Global (2021); Skarn Associates (2021); Marx et al. (2018).

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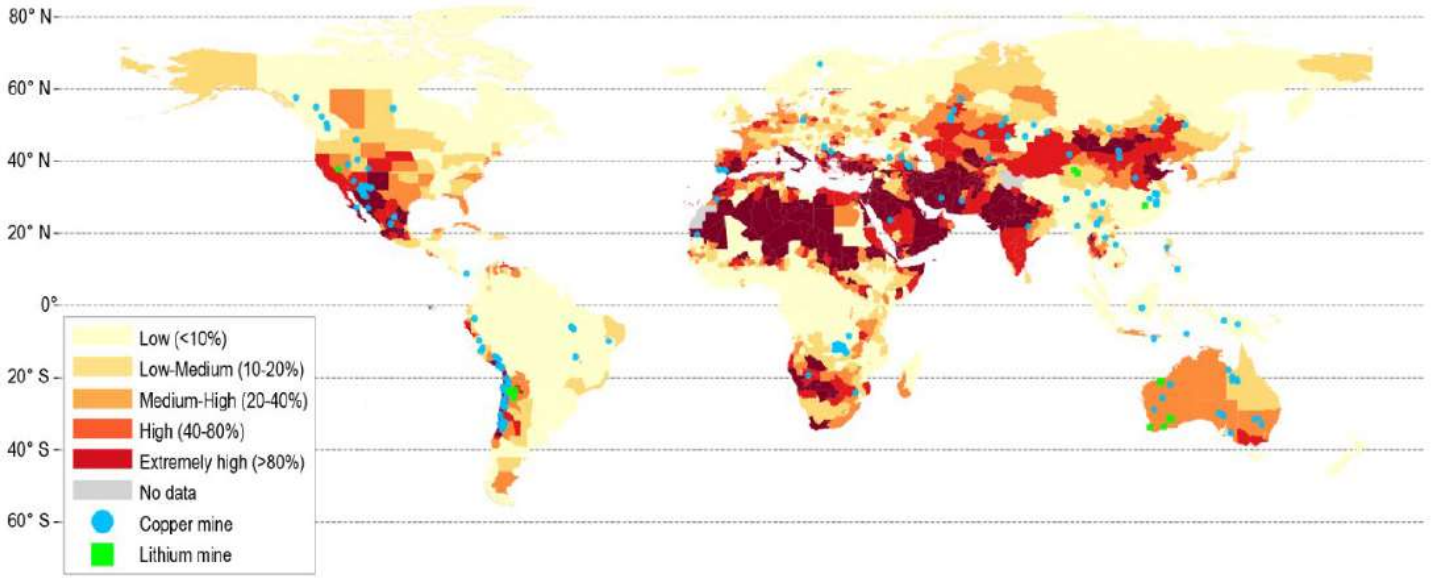
Kliimamuutuste mõju mäetööstusele

Climate risk: Mining assets are exposed to growing climate risks and water stress

Location of copper and lithium mines and water stress levels, 2020



Note: The exact water stress levels vary by location. While we assessed the share of mines located in water stress areas according to granular regional representations (shown on the following page), we aggregated them at the sub-national level on the map for the sake of simplification. Water stress levels are as defined in the Aqueduct 3.0 dataset according to the ratio of total water withdrawals over the total available surface and groundwater supplies.
Source: IEA analysis based on WRI Aqueduct 3.0 dataset.

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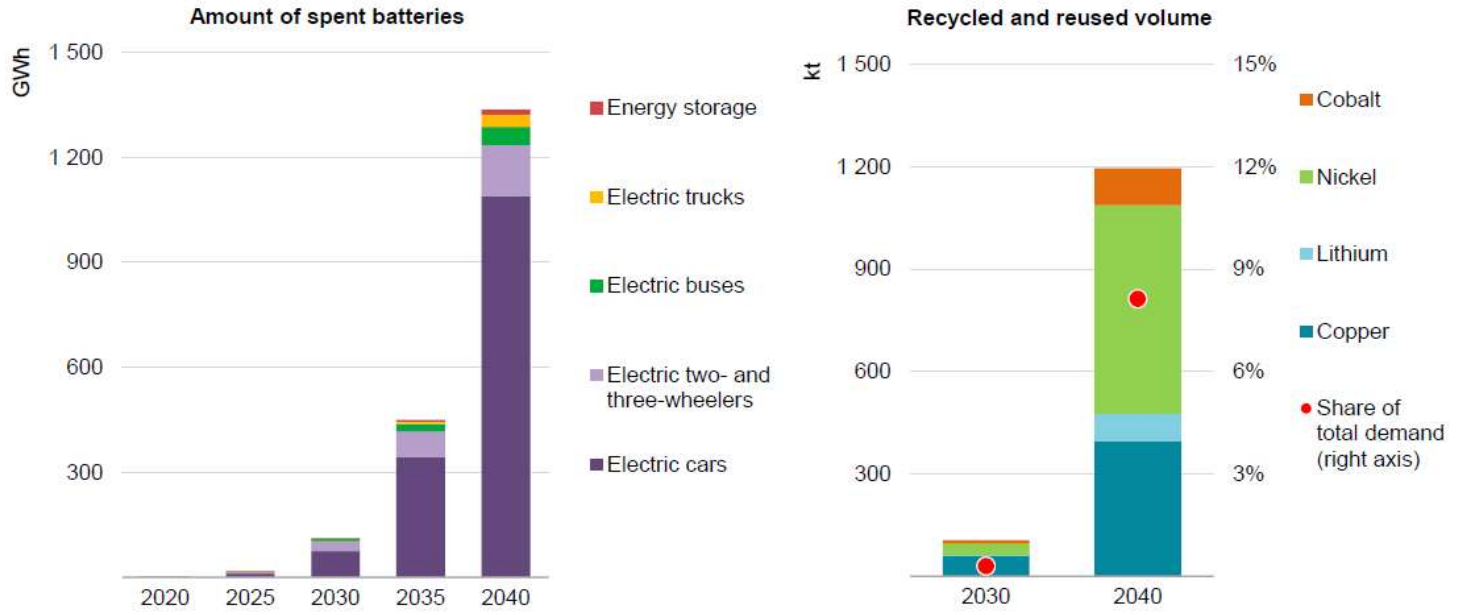
Materjalide taaskasutus

The projected surge in spent battery volumes suggests immense scope for recycling

Amount of spent lithium-ion batteries from EVs and storage and recycled and reused minerals from batteries in the SDS



Note: GWh = gigawatt hour.

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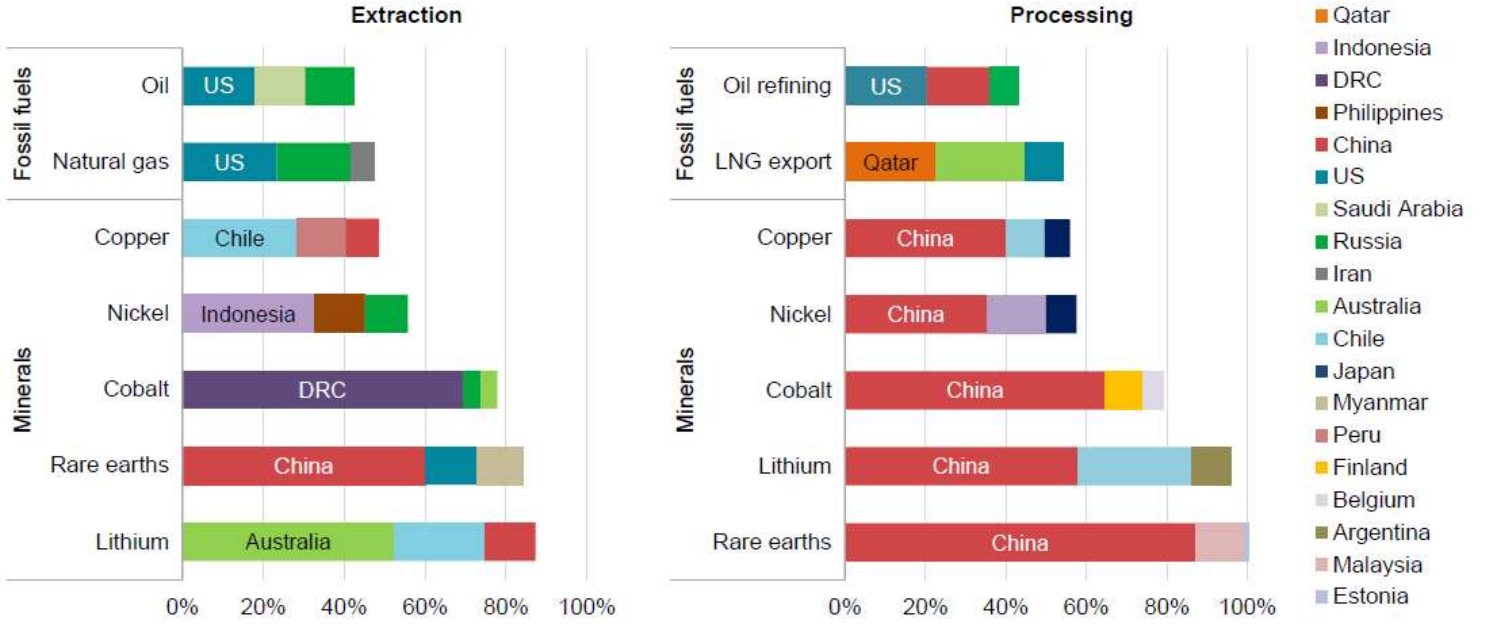
Maailmapoliitika ja julgeolek

Production of many energy transition minerals today is more geographically concentrated than that of oil or natural gas

Share of top three producing countries in production of selected minerals and fossil fuels, 2019



Notes: LNG = liquefied natural gas; US = United States. The values for copper processing are for refining operations.
Sources: IEA (2020a); USGS (2021), World Bureau of Metal Statistics (2020); Adamas Intelligence (2020).

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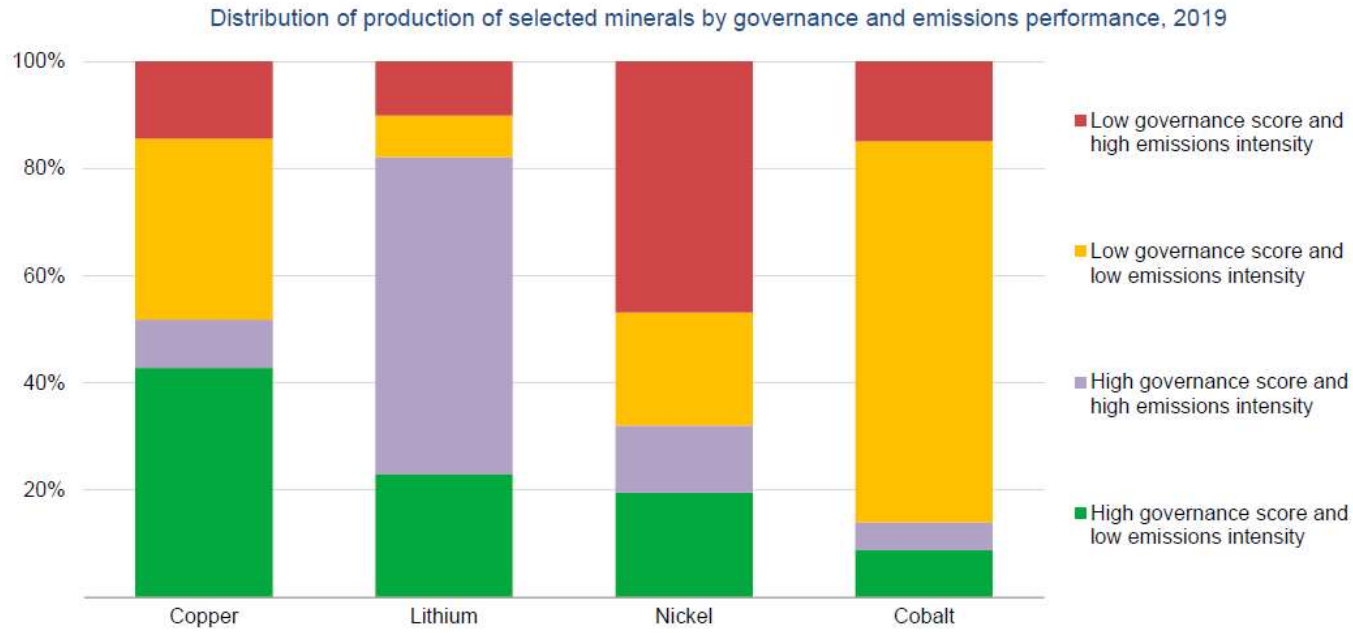
Keskkond, sotsiaalsed faktorid ja juhtimisstruktuur

Scrutiny of ESG issues: The majority of current production volumes come from regions with low governance scores or high emissions intensity



Notes: Analysis using the World Bank Worldwide Governance Indicator (as a proxy for governance) and electricity CO_2 intensity (as a proxy for emissions performance). Composite governance rank scores below 50 were classified as low governance; electricity CO_2 emissions intensity above 463 g CO_2/kWh (global average value in 2019) was classified as high emissions intensity.

Source: World Bank (2020), IEA (2020).

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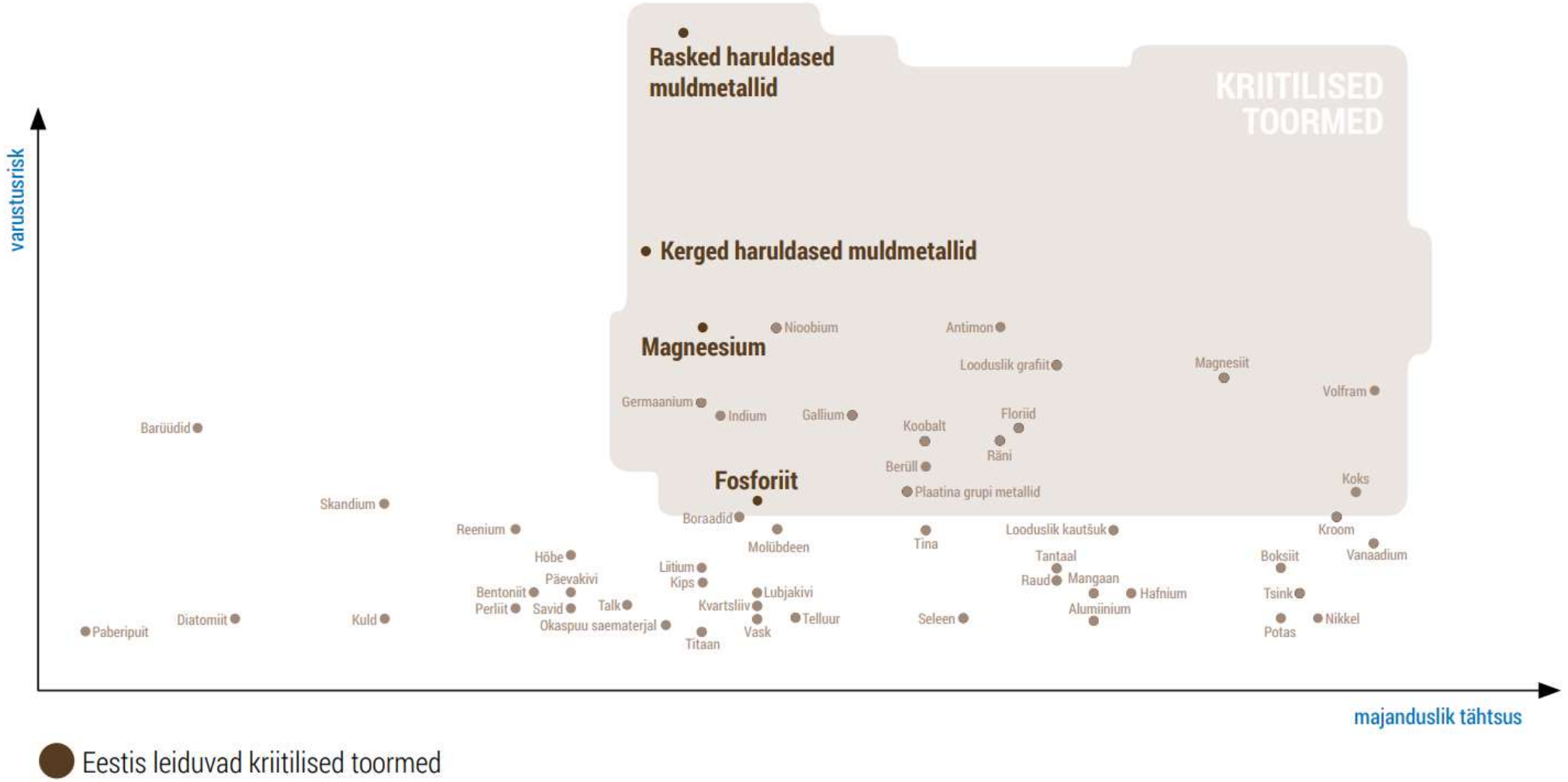
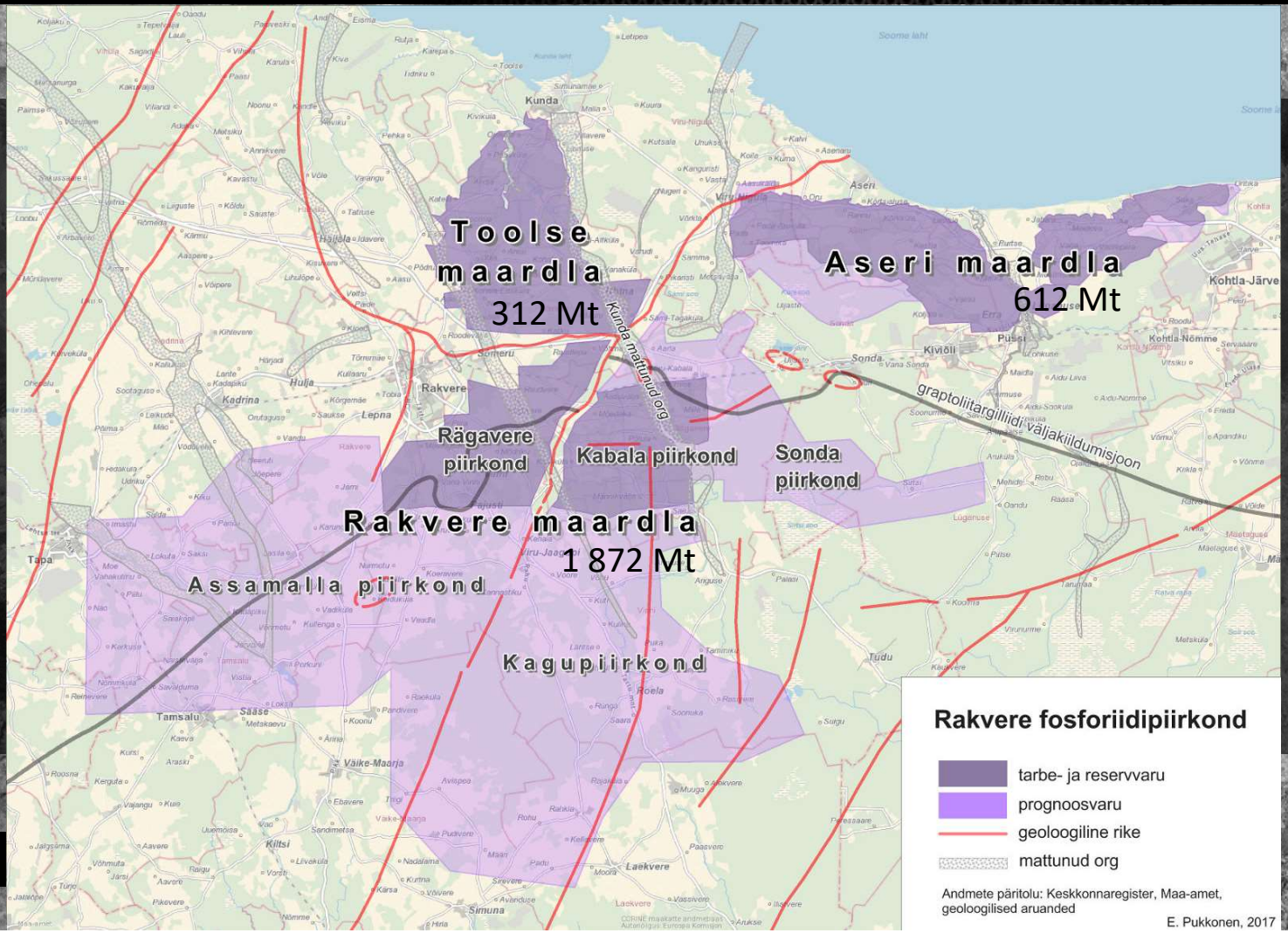


Eestis leiduvad kriitilised toormed

Fosforiit ja harduldased muldmetallid



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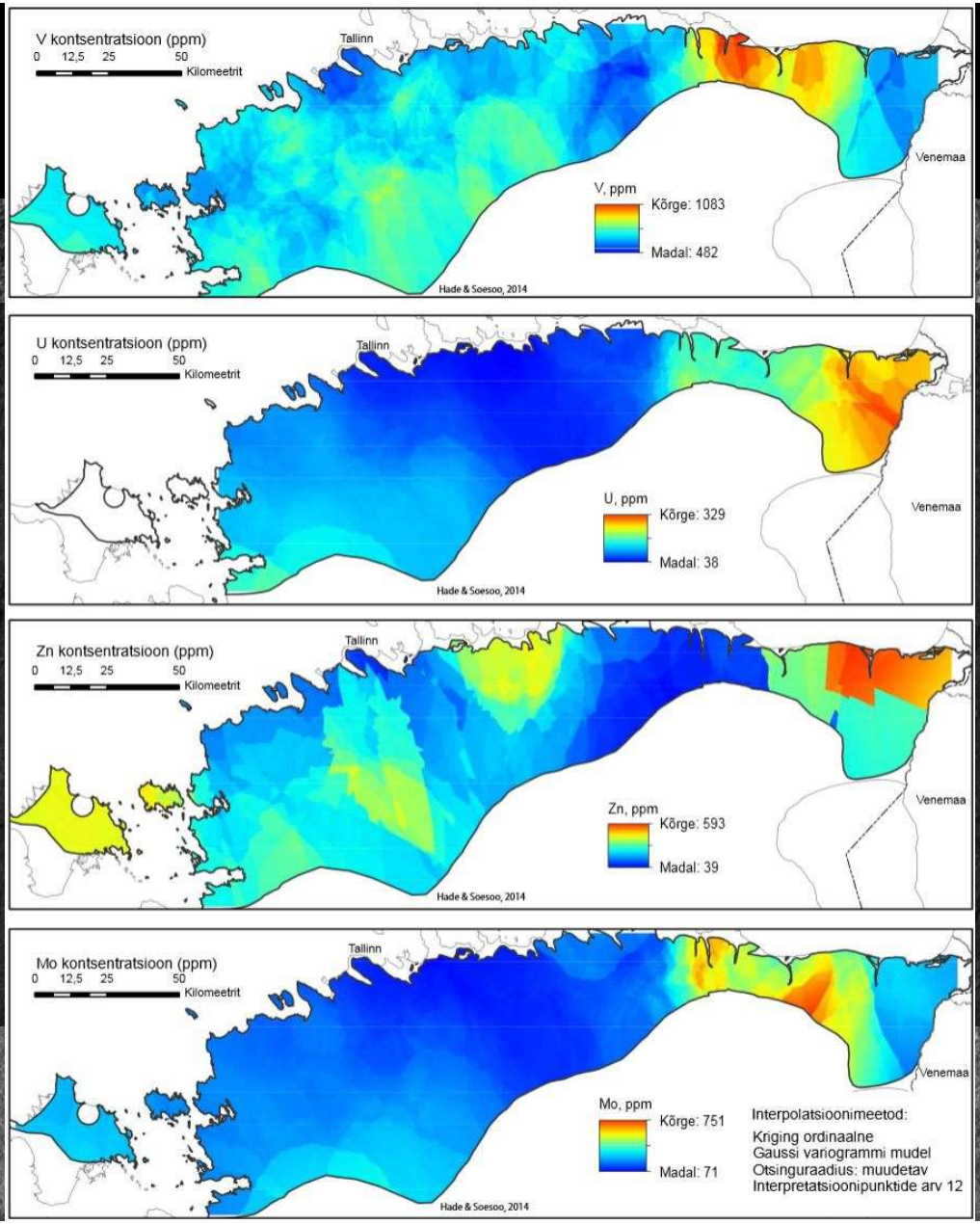
Graptoliitargilliit



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