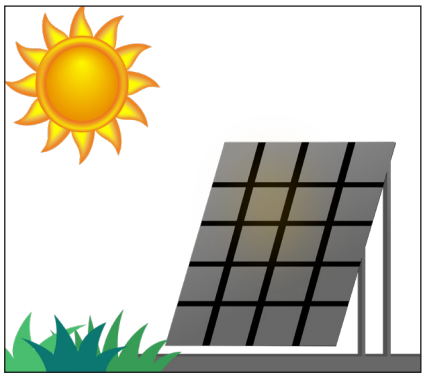
Low-carbon energy technologies and metals mining in British Columbia

British Columbia Geological Survey
Mines and Mineral Resources Division
Ministry of Energy, Mines and Petroleum Resources

Emission-reducing energy technologies need metals

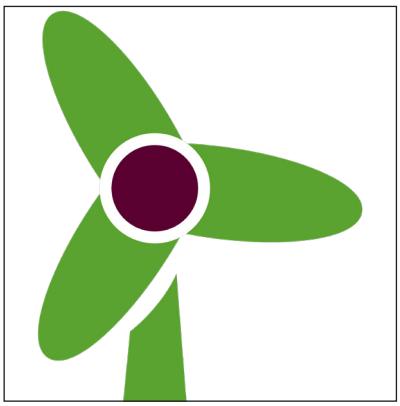
Solar cells



- cadmium
- copper
- gallium
- indium
- germanium
- selenium
- silver
- tellurium
- silicon
- zinc

Most of the metals needed to manufacture solar cells are by-products or co-products of gold, copper, and base-metal mining and processing.

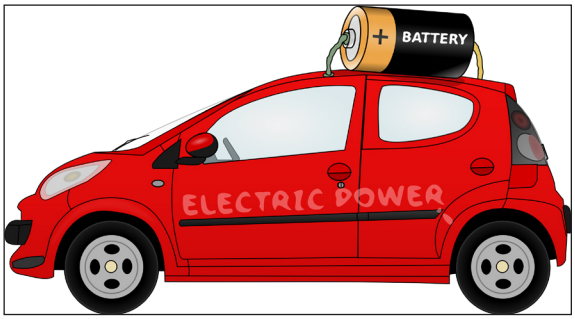
Wind turbines



- aluminium
- chromium
- copper
- iron
- lead
- manganese
- molybdenum
- nickel
- zinc

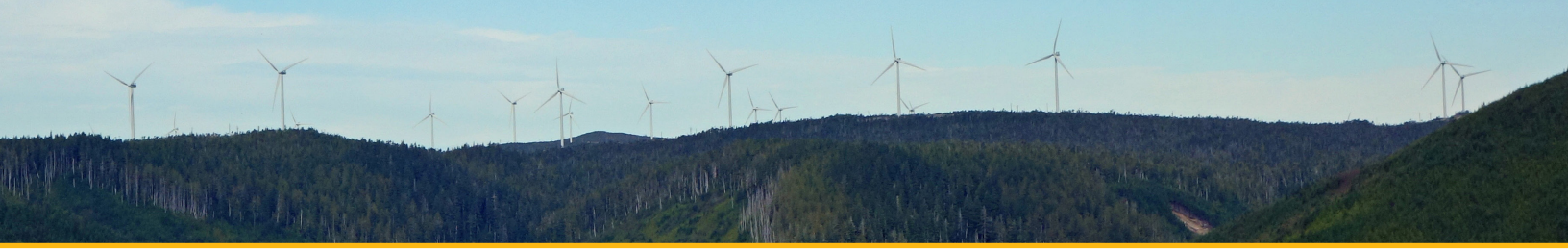
In addition to this list, some Rare Earth elements (neodymium, dysprosium, praseodymium, terbium, and yttrium) are particularly important for 'direct-drive' turbines that rely on permanent magnets.

Energy storage



- cerium
- cobalt
- copper
- lanthanum
- lead
- lithium
- manganese
- nickel
- vanadium
- yttrium
- Platinum Group
- graphite

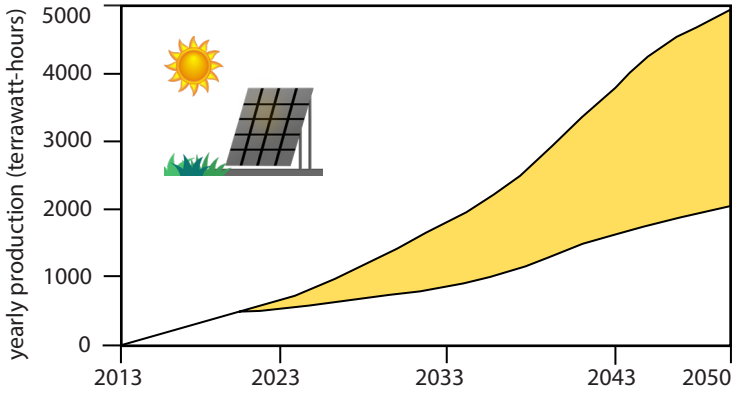
Along with electric vehicles, intermittent power sources such as wind and solar need grid-scale storage devices. Battery-powered cars need significantly more copper than those using fossil fuels, and metals such as niobium, titanium, and magnesium are needed to provide strong but lightweight steel.

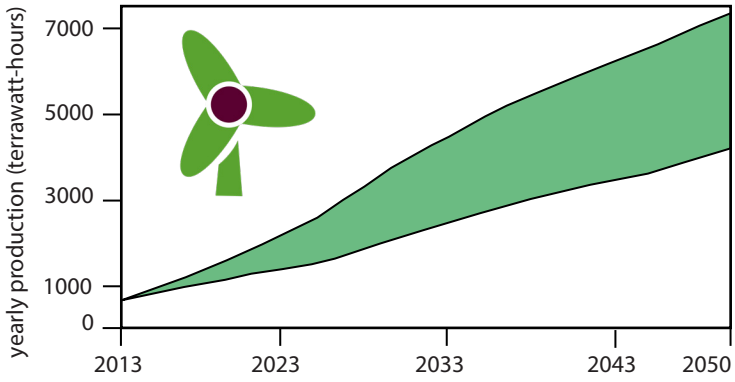


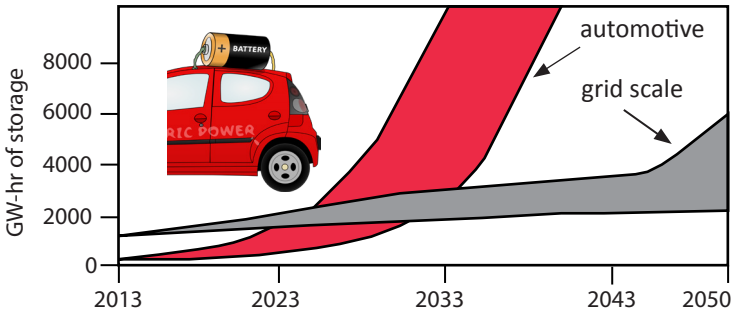
Increased use of low-carbon energy technologies to 2050

Projected increases in the use of solar cells, wind turbines, and energy storage devices

Projection envelopes are bounded by values needed to meet global warming goals of 2°C (upper curves) and 6°C (lower curves).







Modified after Drexhage et al., 2017. The growing role of minerals and metals for a low carbon future. The World Bank, 112p.

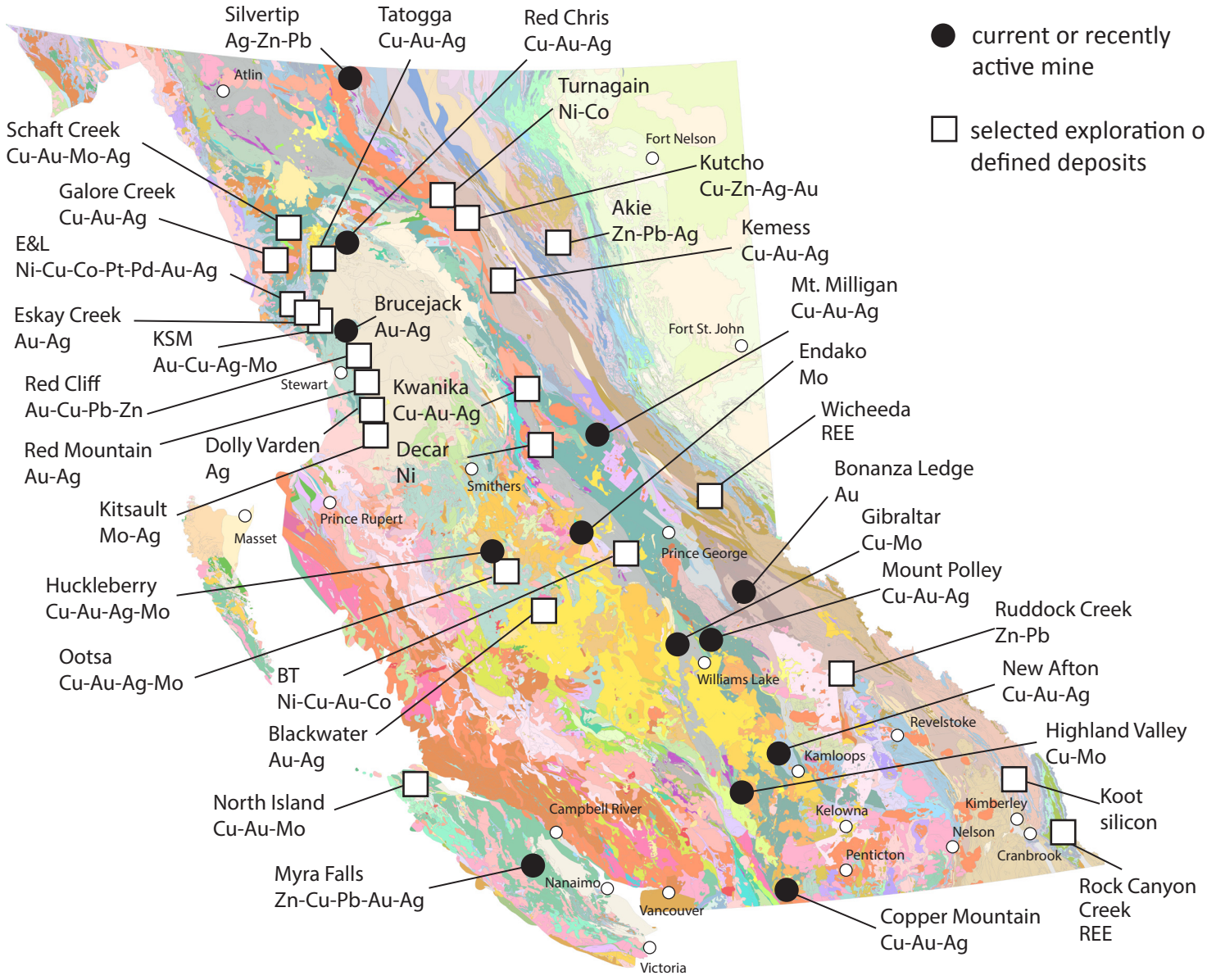
Increased use of low-carbon energy technologies translates to increased demand for metals.

By 2050, the global demand for many metals will be several times greater than now and, coupled with finite mine life expectancies and diminishing grades, could lead to metal shortages.

Some of the metals that may see shortages (copper, zinc, lead, and possibly nickel) are found in British Columbia. Mining of these deposits can help contribute to a lower carbon future.

Metals production and potential in British Columbia

British Columbia is a major producer of copper. The province also produces or has produced gold, molybdenum, silver, lead, zinc, and nickel, and exploration remains intense. British Columbia is also being explored for Rare Earth elements (REE), and non-metals such as graphite and silicon needed for green technologies.



current or recently active mine

selected exploration or defined deposits

As much of the world transitions to energy sources that minimize greenhouse gas emissions, searching for and mining these materials will remain important in the province.

BRITISH COLUMBIA GEOLOGICAL SURVEY

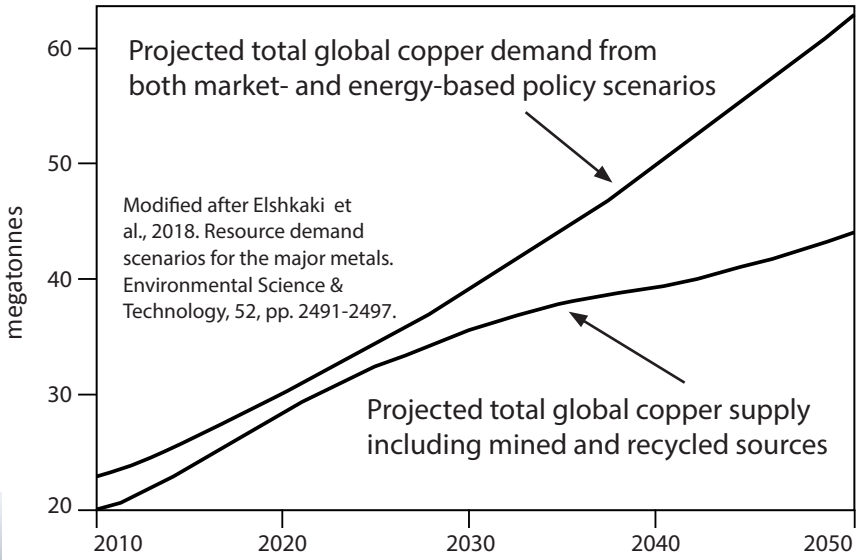
Copper in British Columbia

Copper is essential for energy production, transmission, and storage

British Columbia has a long history of copper mining. In 2017, eight British Columbia mines supplied about 290,000 tonnes, accounting for almost half of Canada's annual copper production.

Resource supply-demand scenarios indicate that significant global copper shortages are likely to appear in the next few decades.

Continued exploration will position British Columbia to help meet the increasing global copper demands needed by low-carbon emission technologies.



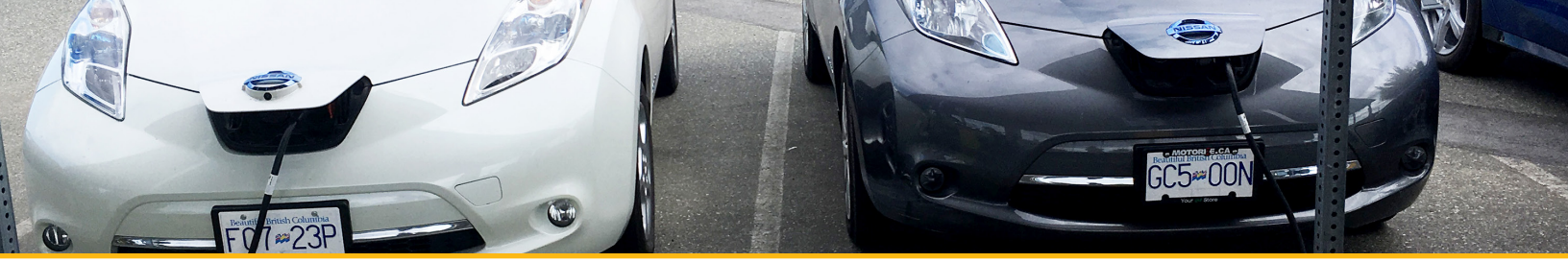
Exploration and mining in British Columbia

Reflecting diverse geological processes that have operated for almost 2 billion years, British Columbia is endowed with abundant and varied mineral deposits. In 2017, the total value of mine production in the province is estimated at $9.82 billion.

Exploration companies continue making significant investments, spending an estimated $247 million in 2017. Flanked by the Pacific Ocean, British Columbia offers easy access to global markets. Exploration benefits from an online mineral tenure system and extensive geoscience knowledge.

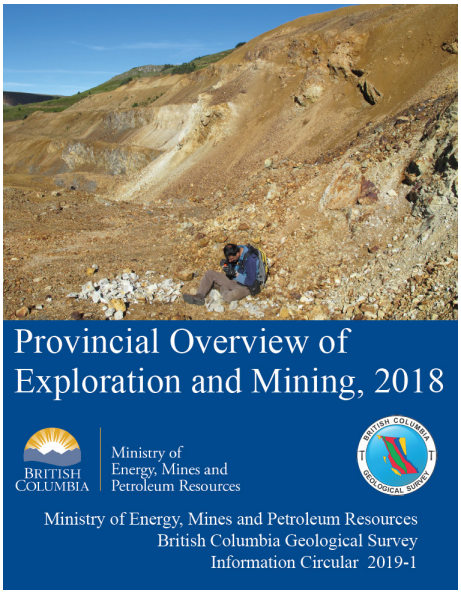
With more than 800 exploration and mining companies headquartered in Vancouver, British Columbia is recognized as a global investment centre for the minerals industry.

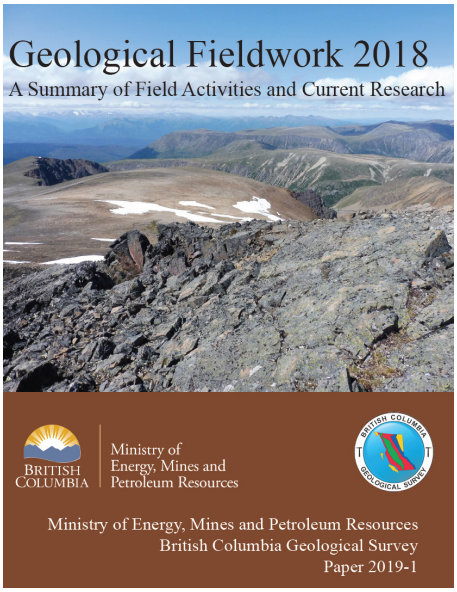
BRITISH COLUMBIA GEOLOGICAL SURVEY

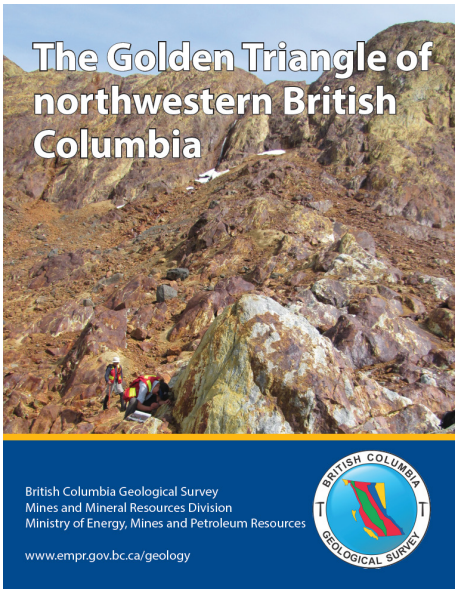


Further information

Reports published by the British Columbia Geological Survey dating back to 1874 can be searched for, and downloaded from, our publication catalogue without charge. Each year in January, the Survey releases an annual overview of exploration and mining, and Geological Fieldwork, a volume highlighting current research.







MapPlace
digital geoscience for British Columbia

MapPlace, the Survey's geospatial web service, allows anyone with an internet connection to mine multiple provincial geoscience databases.

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