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Potential Domestic Sources of Critical Minerals for Our Energy Future

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Critical minerals needed for the U.S. transition to a clean energy economy include cobalt, lithium, nickel, and graphite. These commodities were historically produced on small scales in the U.S., often during wartime, but now are primarily sourced from other countries. As part of the Earth Mapping Resources Initiative (Earth MRI) project, the USGS, in partnership with State geological surveys, identified broad areas of the country (focus areas) that are known to, or have potential to, host deposits containing these and other critical minerals. These focus areas are based on recognition of permissive geologic settings and relevant mineral occurrences considered in a mineral system/deposit type framework. GIS representations of focus areas and supporting information compiled from existing data are the starting point for prioritizing areas across the country for acquisition of new geologic mapping, geochemical data, airborne geophysics, and lidar data. For example, the IOCG system in the Idaho Cobalt Belt is one focus area where Earth MRI is funding new mapping efforts and a geophysical survey across the belt. Cobalt also occurs as a byproduct in some sediment-hosted copper and MVT deposits in basin brine systems, with nickel in mafic magmatic systems, and in laterites formed in chemical weathering systems. Lithium resources in Nevada occur in residual brines and clays in lacustrine evaporite systems, and new mapping is underway in the eastern U.S. highlighting spodumene [$LiAl(SiO_3)_2$] in LCT pegmatites. Two new airborne electromagnetic surveys will refine permissive areas for graphite deposits in Alaska and Alabama. Data from projects such as these will provide new information for future mineral resource assessments and facilitate exploration and development planning by State partners, private industry, and land use managers. A major challenge will be identification of economically viable deposits and determination of their suitability for development and recovery of critical minerals.