Climate Compatible Growth

Identifying Mineral Value Addition Potential in Africa: CCG Geospatial Platform & Country Co-Creation Offer

CCG CONTACTS

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THE OPPORTUNITY

Demand for critical (or energy transition) minerals is accelerating due to the clean energy transition. Africa holds significant reserves of cobalt, copper, lithium, graphite, manganese, and nickel. Yet, Africa mainly participates upstream in the supply chains for clean energy technologies. Key processing and manufacturing steps of mineral value chains are concentrated in manufacturing countries. This concentration poses risks to global mineral supply and therefore for achieving the clean energy transition. Given global interest in these minerals, countries in Africa have an opportunity to add value, diversify economies, and strengthen regional cooperation.

THE CHALLENGE

Careful analysis and strong in-country capacity is required to ensure that African economies, investors and donors fully understand the opportunities and negotiate the most benefit, especially given:

- Limited existing local processing capacity in Africa;
- Inadequate energy and transport infrastructure;
- Environmental, social and biodiversity concerns;
- Fragmented country and regional strategies;
- Governance and equity considerations;
- Poor data quality and complex stakeholder networks;

To realise the opportunity, decision-makers can benefit from evidence-based, integrated, and forward-looking in-country capacity, tools, and analysis.

OUR SOLUTION

Through a set of leading university partners (Imperial College, Oxford, Cambridge, and UCL), CCG offers two modes of engagement; shorter-term rapid analysis of critical minerals opportunities using the existing mineral value chain geospatial modelling platform, and longer-term bespoke engagement built upon comprehensive co-creation with local partners to foster capacity, tools, data and analysis tailored to local needs.

1. CCGs existing critical minerals **geospatial modelling** platform allow exploration of alternative future scenarios for mineral processing and value chain development. The platform brings together minerals, infrastructure, economics, and the environment. It focuses on intermediate and advanced stages of mineral refining to produce materials used in battery supply chains. The platform can be applied to other critical mineral supply chains, where adequate input data is available.

2. CCG also carries out comprehensive **co-creation of critical mineral tools, data and knowledge** in collaboration with country partners. This research further develops and extends critical minerals analytical capability, alongside fostering in-country capacity to support effective analysis and decision-making in the future.

The Geospatial Modelling Platform

The geospatial platform currently covers six battery precursor minerals (cobalt, copper, graphite, lithium, manganese, nickel) across 14 countries of Southern Africa (Angola, Botswana, Burundi, DRC, Kenya, Madagascar, Malawi, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia, Zimbabwe, shown in image). It can be applied to other critical mineral value chains and geographies.

It compiles and reconciles the best available public and private data sources on the location of mineral deposits at different stages of development, as well as identifying suitable steps in the mineral supply chain, their associated energy and transport infrastructure needs, changes in global mineral trade flows due to projected value added mineral production and environmental attributes.

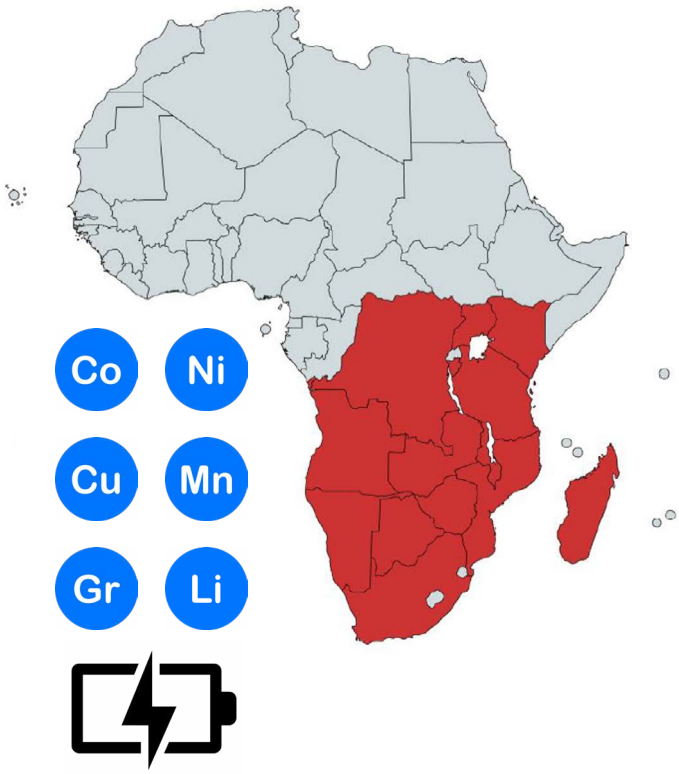
The platform supports parallel national and regional scale analysis, allowing an individual country's potential to be examined in the context of the wider regional setting.

It also models the different stages of up- and midstream value addition for critical minerals, including infrastructure requirements related to energy and transport for trade, economic factors and environmental, social and governance (ESG) factors.

CCG offers to apply this platform for rapid analyses such as:

- project **future mineral production** at different locations;
- simulate alternative mineral processing scenarios with different ambition levels;
- stimate export earnings, value addition and relative/absolute competitiveness;
- project the resulting demand for grid and off-grid energy infrastructure;
- portray the resulting **mineral traffic flows** through the global transport network;
- explore the potential constraints posed by water availability and biodiversity;
- explore **emissions** due to **transport and energy** for different scenarios;
- compare resource nationalist versus regional collaboration approaches to developing value chains.

Figure 1: *Countries included in the geospatial platform across six minerals: cobalt, copper, graphite, lithium, nickel and manganese across 14 countries in Southern Africa (Angola, Botswana, Burundi, DRC, Kenya, Madagascar, Malawi, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia, Zimbabwe)*



Demand-Led Co-Creation with CCG

In addition to the off-the-shelf modelling platform analysis described above, CCG has pioneered a dynamic, collaborative approach to minerals value chain research to meet the bespoke needs of partner country stakeholders. Our demand-led co-creation methodology brings together:

- World-class expertise from six leading research institutions across Europe.
- Cutting-edge data, tools, and methods from CCG's established capabilities.
- Integrated analysis on technical, economic, environmental, and social aspects.
- Deep partnerships with country institutions and stakeholders.

Research Excellence Through Collaboration

CCG research teams developed the geospatial modelling platform described above - delivering unique capabilities in technoeconomic geospatial assessment of battery-related minerals processing, and potentially other critical mineral value chains. It illustrates how our approach can be applied across all Global South countries with critical minerals potential. Building on this foundation, and based on the needs of partner countries, we integrate analytical and interpretation capabilities across CCG research teams to offer the creation of new data, tools, and analysis that provide new insights into:

1. **Mining Prospects and Infrastructure Planning**
   - Advanced geospatial mapping, resource assessment & decision support
   - Electricity/energy and transport infrastructure needs and co-benefits

2. **ESG Aspects and Finance**
   - Economic, social and environmental assessment of mining activities and plans
   - Governance analysis
   - Investment framework development & sustainable tax regime modelling

3. **Global Value Chain Connections**
   - Strategic positioning analysis for global markets
   - Value chain integration opportunities
   - Supply chain resilience and risk assessment
   - Market demand forecasting and scenario planning

Building Lasting Impact

Our approach goes beyond traditional research. We focus on building deep analytical capacity with partner country institutions, ensuring that partners develop the expertise needed to make informed policy decisions about minerals value chain planning, attract and manage sustainable investment, navigate complex global value chains, and ultimately drive long-term economic growth in the minerals sector. This capacity-building strives for impact lasting beyond CCG support, creating self-sustaining capabilities for effective decision making.

Modes of Engagement with CCG

The Geospatial Modelling Platform Offer

CCG offers short-term (up to 1 year) engagements that apply the existing geospatial modelling platform.

Minerals Value Chain Country Co-Creation Offer

For longer-term (> 1 year) engagements with bespoke support requests (e.g. where local needs require data improvements, tool upgrade or creation, and tailored analysis), where in-country capacity is a desired outcome, CCG's country co-creation offer is appropriate.

Climate Compatible Growth

CLIMATE COMPATIBLE GROWTH (CCG) PROGRAMME

CCG is a UK Aid-funded project which aims to support investment in sustainable energy and transport systems to meet development priorities in the Global South. The program brings together some of the UK's leading universities including Imperial College, UCL, Oxford, Cambridge, and the Open University, with the Centre for Global Equality, KTH Royal Institute of Technology, and Climate Parliament. CCG operates under a partnership model and typically develops modelling tools on an open-source basis, with a view to supporting the work of international organizations, while empowering local decision makers. In this case, the same objectives apply, although a slight complication is some reliance on proprietary data which can be navigated as needed.

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