Prospectus

February 2023

Pan-African Decarbonisation Institute

Unlocking Africa's Talent
to harness the decarbonisation opportunity

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Initial Proponents

Reminex
Managem Group

LEAD

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MOPANI
A ZCCM-IH Subsidiary

COPPERBELT UNIVERSITY
Knowledge and Service

NYANSAPO WO SANE NO BADWENNMA

African Centre of Excellence for Batteries (ACEB)
CAEB
Centre Africain d'Excellence pour les Batteries

THE UNIVERSITY OF ZAMBIA
SERVICE AND EXCELLENCE

KNOWLEDGE, TRUTH AND EXCELLENCE

Laboratoire d'Analyses Environnementales
LAE
Air, Eaux, Sols et Déchets

University of Cape Town • iYunivesithi yaseKapa • Universiteit van Kaapstad
SPES BONA

Faculté POLYTECHNIQUE
Scientia Splendet et Conscientia
UNIVERSITE de Lubumbashi

Contents

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Be part of the leading development of Pan-African minerals sector talent and skills that can harness the decarbonisation opportunity

Vision

A self-sustaining pipeline of Pan-African research, operational, and technical leadership, talent, and skills in decarbonisation from resource management through to product development and delivery

Mission

To create a virtual Pan-African institute of complementary and supplementary research, development and training that collaborates, connects, co-ordinates to co-create a pipeline of talented Africans that position Africa as a leading player in the decarbonisation value chain, and that transforms Africa's energy sector by leveraging Africa's new energy material resources and Africa's research, development and training capability.

Overview

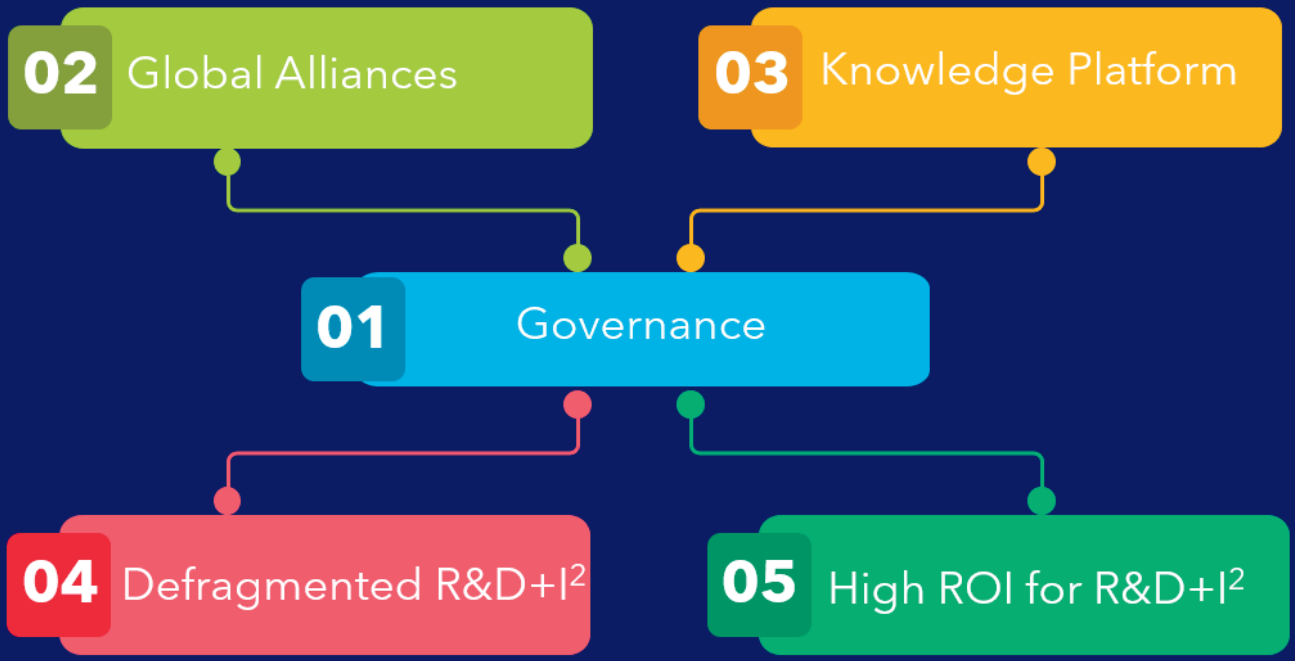
As the world seeks to meet decarbonisation goals, demand for energy resources and products is forecast to increase 10-fold by 2030. Africa is blessed with abundant new energy resources (e.g. copper, cobalt, Rare Earth Elements (REEs) and graphite) that are critical to all decarbonisation efforts. Beyond the resources there is the allied demand for talent and skills to harness the opportunity and to deliver to the scientific and engineering challenges and the leadership and community engagement required across the mine value chain and into product development.

The world is short of skilled talent.

The Pan-African Decarbonisation Institute will provide leadership for Africa to participate meaningfully in the decarbonisation value chain. It will contribute industry focused research to the development of the whole value chain, transforming energy systems and sectors globally, and ensure economic return is maximised for Africa's new energy resources.

The Institute will connect world class research capability with the needs of the African industry to build knowledge, and develop processes and decarbonisation applications using Africa's resources.

Amira's Framework



Why Amira?

Amira's framework to building collaborative R&D+I2 ensures delivery of outcomes to industry.

Governance:

Amira has delivered a trusted platform for collaborative R&D for over 60 years including financial stewardship and transparency for funders

Global Alliances:

Amira's approach connects researchers, governments, investors and industry at both a regional and global scale. Furthermore, Amira's Global Alliances Program connects the global ecosystem to accelerate transformation through new technologies

Knowledge Platform:

Amira is developing a knowledge platform to provide industry decision makers with efficient access to trusted, validated, verified, and aggregated outcomes from global industry R&D outcomes

Defragmented R&D+I2:

Amira delivers a coordinated R&D+I2 response to industry challenges, which accelerates dissemination and deployment into industry

High ROI on R&D Investment:

Amira's model provides a 15x to 20x multiplier on a company's investment in R&D+I2

The Case for a Pan-African Decarbonisation Institute

Why Now?

- Worldwide decarbonisation targets are driving a surge in demand for new energy minerals
- The minerals industry, a high consumer of energy, is facing it's own decarbonisation aspirations
- However, there is simply not enough talent and skills to unlock and deliver the sciences, engineering, and technology required to meet these demands
- Africa is well placed in both mineral resources and intellectual capabilty to command a leadership role in the globe's and the mining industry's decarbonisation transition

Why Africa?

Africa has a number of competitive advantages:

- Africa is rich with resources - around 30% of the world's resources are found in Africa across commodities,including new energy resources that underpin current and future needs
- Africa has a long history in mining, with a once-in-a-lifetime opportunity to introduce step change in methods, equipment and improved co-creation with communities
- Africa is home to over 1 billion people with 70% of sub-Saharan Africa under 30 years old with a rising leadership voice across Africa

There is opportunity to use this competitive advantage to:

› Align and collaborate across the continent to optimise use of investment in R&D+I
› Accelerate development of step-change knowledge, data, and technology
› Increase capability base to harness the opportunity and provide opportunities for talent to thrive and resolve mining industry's great challenges
› Accelerate adoption of new community engagement protocols to improve relations with communities and investors
› Align decarbonisation policy research & development across Africa

Proposed Activities

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Value Proposition

The Pan-African Decarbonisation Institute will:

- Align and support development of complementary and supplementary research across Africa, and connect current and emerging talent into the global research landscape
- Connect companies with African research and development to support development of regional decarbonisation knowledge, data, technologies, and capability
- Connect government agencies to develop aligned policies and regulations to spring board domestic and export growth in decarbonisation efforts
- Develop leadership skills and talent to support industry and agencies to work with communities in ensuring public trust and social license
- Connect mineral resource operators, Mining Equipment, Technology and Service providers, end users and build critical mass across Africa to address decarbonisation

Proposed Program Potential Focus Areas from Initial Proponents...

Program 4: Leadership, Policy & Economics

Develop industry and agency leadership to address a coordinated Pan-African approach to minerals and decarbonisation policy, economics and industry development and leadership approaches to address Environment, Society, Community and Governance (ESG)

Program 1: Decarbonisation Minerals Discovery & Extractive Technologies

Explore technology and processes that improve the efficiency of mining resources and the processing to refined products used in decarbonisation, including environment, water optimisation; Operations skills training and development; Talent and capability building

Program 3: Supply Chain Development & Integration

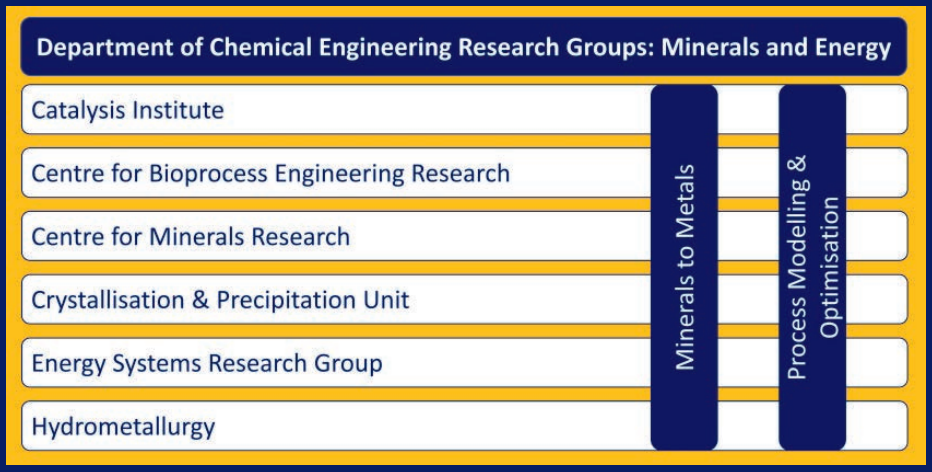
Explore supply chain optimisation, including decarbonised transport routes, regional business development, and Pan-African infrastructure optimisation, battery pre-cursor manufacturing

Program 2: Decarbonising the Mine

R&D + Innovation to step change mining operations to meet operating companies' decarbonisation targets Operational decarbonisation efficiency drives

Integrating the fundamentals of science and engineering into systems design and inter-disciplinary programs to produce world-class graduates and internationally competitive research

The University of Cape Town is the oldest continuously operating public research university in SubSaharan Africa and is consistently the highest-ranked African university in global rankings.The research and post-graduate training programme within the Department of Chemical Engineering has a strong focus on Minerals and Energy across five well-established specialist groups and two crosscutting groups. With a focus on the sustainability challenges facing the minerals sector, Minerals to Metals also collaborates extensively with researchers across non-technical disciplines, including UCT academics from Mineral Law in Africa, and the Development Policy Research Unit at the School of Economics.



UCT R&D&I POTENTIAL AREAS OF CONTRIBUTION

- R&D of technologies and processes for the primary production of critical materials for a decarbonised future, consistent with EESG principles
- R&D of technologies for the generation of green energy and energy sources (biofuels, synthetic diesel, hydrogen, and fuel cells)
- Energy, energy-economic and carbon footprint modelling and scenario analysis on a sectoral, national and regional level
- Analysis and development of national and trans-national mineral value chains for Africa
- Analysis of mine closure risks and post-closure opportunities through the repurposing of degraded mine land, infrastructure and waste.
- Development of research, technical and leadership capacity and skills through short courses and post-graduate degree programmes.
- Industry leadership for community engagem

Potential Focus Areas from Initial Proponents...

Developing New Ways to Beneficiate, Produce, & Recycle Resources and Critical Materials for Energy Transition

Reminex
Managem Group

For over 4 decades, Reminex Research & Valorization Center has been providing innovative solutions to its clients. More than 32 processes have been developed and industrialized for a Energy Transition Metals (Cobalt, Copper, Nickel, …) and Precious Metals (Gold, Silver) in Morocco and Africa (Guinea, Sudan, Gabon, DR Congo). Reminex's Research & Valorization Center strength lies in its team of researchers, engineers and experts from different backgrounds and in its facilities with a wide range of mineral analysis and mineralogical characterization laboratories, hydrometallurgy & mineral processing bench-scale laboratories and piloting units.

REMINEX R&D&I POTENTIAL AREAS OF CONTRIBUTION

- Developing new processes for critical energy transition materials deposits in Africa.
- Developing innovative solutions for synthesis of battery electrodes materials and product (cathodes, graphite, …) from Africa resources.
- Transforming environmental challenges into business opportunities by revalorization of mining wastes.
- Promoting Circular economy by reprocessing and recycling scraps, end-of-life batteries, cathode materials and secondary materials.
- Implementing operational excellence initiatives in mining operations to continuously improve plant efficiency (power consumption, water recycling, …), product recovery, quality & grade improvement.

Development of technologies in Extraction of various Energy Minerals & Metals, Data Science, Pilot Testing Biomass conversion, Energy Grids, Solar PV, & Hydrogeology

The Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana was established to advance knowledge in science and technology and to, among other things, create an environment for undertaking relevant research that help to improve the quality of life. Its College of Engineering (CoE) is the accredited institution responsible for training engineers and technologist, offering various engineering programs that include but not limited to mechanical, chemical, materials, metallurgical, electrical and electronic, computer, telecommunication, civil, geological and geomatic engineering.

The staff are experienced and highly qualified in their areas of expertise, having come from a rich diversity of educational backgrounds and being active in research and development in their areas of expertise.

CoE is also home to various relevant centres, which activity spans the energy, environment and water sectors. The Brew-Hammond Energy Centre (TBHEC) has collaborated with many international institutions and brings together researchers from various departments of the CoE and the KNUST to participate in projects related to energy. The KNUST Engineering Education Project (KEEP), funded by the World Bank, brings graduate students from across the sub-region to do research in energy-related areas. The Regional Water Environment and Sanitation Centre (RWESCK) is a centre of excellence for research and development in water, environment and sanitation and has attracted international graduate students. These centres bring together expertise from the various departments to work together in many areas of research.

KNUST R&D&I POTENTIAL AREAS OF CONTRIBUTION

- Develop technologies for treatment and extraction of battery materials (Li, Mn, Co, Ni) from primary (ores) and secondary (metallurgical wastes materials) resources
- Develop technologies for hydrometallurgical extraction of the critical metals (Li, Cu, Co, Mn,..) from secondary resources such as e-wastes and batteries
- Evaluation of metallurgical waste (such as slags) for the extraction of battery materials (Co, Ni, Cu, Cr)
- Evaluation of assay crucible wastes and hydrometallurgical conversion to useful products such as perovskite.
- Pilot testing of the conversion of biomass into syngas for electricity generation and its connection to the grid
- Preparation of energy materials from bio and non-bioresources (activated carbon, ores, waste materials)
- Catalytic conversion of lignocellulosic materials into biofuels (biogas, bioethanol, biodiesel)
- Catalytic conversion of organic pollutants in wastewater.
- Distributed grid-connected solar PV systems in rural communities, including the mines.
- Hydrological, hydrogeological and hydrogeochemical assessment of groundwater for sustainable water management.

Decarbonisation of mining activities to position Africa's minerals industry as a competitive in the global industry landscape

University of Mines and Technology (UMaT) is a research university, located in the Western Region of Ghana, with specialization in mining, petroleum and related engineering disciplines, and management studies. UMaT has seasoned professors/researchers in several academic departments including geomatic engineering, geological engineering, mining engineering, minerals/metallurgical engineering, environmental/safety engineering, renewable energy engineering, computer science and engineering, chemical engineering, mechanical engineering, electrical and electronic engineering and mathematical sciences.

UMaT is interested and open to collaborate in all research and development involving extraction and refining of Africa's new energy materials including copper, cobalt, REEs and graphite, with the aim of increasing value chain participation for decarbonisation industries.

UMaT has the expertise in the value chain across exploration geology, process mineralogy, mine development, mineral processing, metallurgical extraction, metal recovery, management of emissions and waste outputs in the development of the critical minerals and optimization through the use of artificial intelligence.

UMAT R&D&I POTENTIAL AREAS OF CONTRIBUTION

- UMaT is well positioned to undertake research on:
- hydrometallurgical extraction of decarbonisation and critical minerals (Li, Cu, Co, Ni, Cr, PGMs, REEs) from secondary host materials (metallurgical slags, e-waste and batteries).
- development of technologies for the metallurgical recovery of lithium from primary lithium ores.
- solar energy and the use of arboretum to manage decarbonisation.
- beneficiation of critical minerals from tailings materials.
- development of technologies to mitigate environmental impact in the extraction of decarbonisation minerals.

African Centre of Excellence for Batteries (ACEB) has been established as a joint research consortium and collaboration between Democratic Republic of Congo (DRC) and Zambian universities and researchers supported by their respective governments

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UNIVERSITE de Lubumbashi.

ACEB R&D&I POTENTIAL AREAS OF CONTRIBUTION

- Development of new electrode and electrolyte formulations for lithium-ion batteries
- Manufacturing of cobalt and battery pre-cursors
- Waste management relevant to the lithium-ion battery value chain
- The use of clean chemicals for mineral processing operations.
- Combined wastewater treatment and electricity generation from effluent.
- Bioflotation and bioleaching

PADI enables research that tackles industry challenges and connects researchers and other sponosrs to maximise the benefits and optimise critical minerals extraction and value

Copperbelt example of a PADI project
Copperbelt University and the University of Zambia

- The Concentrator at Mopani located in Kitwe known as the Nkana Concentrator extracted both copper and cobalt through a differential flotation process.
- The cobalt concentrate was then treated through roasting of the cobalt concentrate and following the hydrometallurgy route.
- The cobalt plant was closed and the differential flotation halted, resulting in the concentrate containing both copper and cobalt
- This concentrate is treated at a copper smelter, which results in cobalt reporting to the slag
- With increasing value and demand for cobalt, the company wishes to recover the cobalt from the smelter slags.
- The company wished to support a research project conducted by the Copperbelt University and the University of Zambia as well as other PADI researchers, that focusses on exploring ways of alternative economic processes that can recover cobalt from the slag. We intend to involve in this work.
- Research questions could then be further developed around this concept.
- It is proposed that the is incorporated into the PADI program so that such benefits can accrue to the the proposing company and the learnings transferred to the benefit of other PADI sponsors

Amira Model of Collaboration

SUPPORTING COLLABORATIVE RESEARCH

The Pan African Decarbonisation Institute will, as with all Amira's research projects since 1959, be jointly funded by industry participants, research organisations, associations, and Government Agencies for an initial period of 5 years.

A PROVEN MODEL

Amira Global's collaborative research model is a proven model that supports industry-led collaborations between industry, researchers, government and the community across the globe to develop new technologies, new knowledge, new capability, and build capacity to support industry development and transformation. Through collaborative sponsorship and research, Amira has delivered over 700 collaborative projects to the value of of $1.65B with an average leverage of $15 for every dollar invested.

BENEFITS FOR PADI SPONSORS

By participating in the Pan-African Decarbonisation Institute, organisations will be able to:

- Provide input into the research areas the Institute will focus on, to align with their needs.
- Use outputs and findings from the Institute's research to advance the organisation's own capability
- Have access to a pool of leading academics focusing on major challenges in decarbonisation to provide solutions geared towards end use and commercialisation
- Obtain significant leverage on their contribution to solve industry problems, with Amira's average leverage of investment to pooled resources at 1:15
- Be at the forefront of developments in Africa's decarbonisation industries, reaping the benefits of the Institute's research
- Enhance credibility with community and be recognised as an organisation that supports development of Africa's talent and delivers significant benefit to Africa's economies
- Provide input into the skills and training required for the region's workforce in decabonisation
- Have access to post-graduate and PhD students to support the organisation.

Timeline

PHASE 3: Establish the Institute

October 2023 - December 2023

Once minimum funding for the Institute has been confirmed, the Pan-African Decarbonisation Institute will be set up, including establishing initial governance structures (appoint Chair, Board and Executive Director) and working with sponsors to finalize the participants agreement with an expected start in January 2024.

PHASE 2: Confirmation of Sponsorship

June 2023 - September 2023

Participants to review Proposal and confirm funding commitments. Additional participants invited to join in line with the Proposal.

PHASE 1: Proposal Development

February 2023 - May 2023

Early investors (industry, government agencies, associations, and funders) are invited to participate in the development phase to influence and drive the strategy, focus, and content.

How to Participate

PHASE 1: Proposal Development

February 2023 - May 2023

Early investors (industry, government agencies, associations, and funders) are invited to participate in the development phase to influence and drive the strategy, focus, and content.

Activities during this phase include:

- Establish a governance team to prepare deliverables required for the Full Proposal
- Engage with industry, government and research institutes to refine scope and confirm participation agreements
- Prepare research project agreements with core research institutes and industry participants to build an Institute budget
- Prepare the Institute's budget
- Map Africa's capability across proposed programs in R&D, Innovation, technology development, skills and training
- Gap analyses and prioritized programs and projects for Pan-African Decarbonisation Institute

Participants can join at any time during the Proposal Development.
At the completion of the Proposal Development phase, the funding provided by all participants will be equal. Proponents contribute an equal share to development costs, notionally between $30,000 to $60,000 per proponent, depending on the number of proponents.

Should the final Proposal be funded, Proposal Development phase proponents will join the Institute as Essential Participants and their Institute fees for year 1 are reduced by an amount equal to the funding provided in Proposal Development phase.

PHASE 2: Confirmation of Sponsorship

June 2023 - September 2023

Participants to review Proposal and confirm funding commitments.
Additional participants invited to join in line with the Proposal.
In order to provide timely impact and delivery of talent and skills and match the pace of change in decarbonisation technologies, the term of the Institute is proposed to be a minimum of 5 years, dependent on final research project time lines. Rights will be commensurate with contributions. Participant Agreements will be executed with notional annual commitments:

- Core Participant: more than $500,000 pa
- Affiliate Participant: $50,000 to $500,000 pa
- Essential Participant: Core or Affiliate Participant with first year's sponsorship reduced by development fee

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Next Steps

To register your interest in participating follow the QR Code

A participant pack will be sent to you. The pack will include information on the Pan-African Decarbonisation Institute, the program and the forms that will need to be completed to confirm your participation for the Phase 1 Proposal Development.

Please contact us if you have any questions on the participant pack or need support with completing any of the forms for Phase 1.

Contact us

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