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Skills training to support Guinea's industrial transformation

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Summary

Guinea has among the largest bauxite reserves in the world. Adding domestic value to these reserves is both a political and a development priority for Guinea. But persistent skills shortages remain a significant constraint. At the same time, access to bauxite is a geopolitical priority for the EU, where critical raw materials (CRMs) are at the heart of its green transition and industrial competitiveness. Meeting both Guinean and EU objectives requires investments in human capital development.

This policy brief analyses an approach being undertaken to address systemic skills shortage and drive industrial transformation through a public-private development partnership. It outlines the rationale for Guinea's newly created Centre d'Excellence et de Perfectionnement pour l'Industrie et l'Alumine de Guinée (CEPIAG). It looks at key challenges and emerging lessons from its design phase, and conditions necessary for the initiative's success. It draws insights from a recent political economy analysis (PEA) of Guinea's skills ecosystem in relation to the emerging alumina industry, conducted as part of UNIDO's WISE framework,[1] and a multi-stakeholder workshop facilitated by ECDPM, which carried out this analysis.[2]

1. The Challenge - skills shortage

Guinean efforts to promote local value addition in the bauxite sector are gathering new momentum. The country holds an estimated 40 billion tons of bauxite reserves, representing around one-third of global reserves, with 23 billion tons located in the Boké region. In 2024, the country was the world's leading bauxite exporter, with 145 million tons shipped. Yet, the potential to convert this mineral wealth into human development is constrained by, among other factors, the lack of local skilled labour and suppliers. As a result, the majority of the exports are raw materials, destined for China to be refined.

Direct job creation in bauxite refining is limited due to the capital intensity of downstream activities. It is therefore key for Guinea's local content policies to focus on developing domestic capabilities to supply to refineries, i.e. generate backward linkages. Without a strong supplier base that fills the 'missing middle' between small (and mainly informal firms) and large foreign and sophisticated operators, most of the economic value will flow abroad.

Persistent skills shortages remain a significant constraint, hindering Guinea's ambitions of greater value addition and beneficiation of raw materials. The national education system faces challenges in producing a skilled industrial workforce needed for many specialised roles (including engineers, industrial mechanics, electricians and precision welders), forcing companies to rely on expatriate workers. Additionally, the lack of skilled workers in industrial maintenance services also hinders local suppliers' ability to meet industrial sector's standards.

Guinea's education and industrial systems involve multiple ministries and agencies, often with overlapping mandates, weak coordination systems, and limited institutional capacities to design and implement policies. More specifically, skills development in Guinea falls under the joint responsibility of the Ministry of Higher Education (MESRSI) and the Ministry of Technical Education and Vocational Training (METFPE), with additional sectoral roles played by the Ministry of Mines and Geology (MMG) and the Ministry of Commerce, Industry and SMEs (MCIPME). These factors put significant brakes on turning Guinea's mineral potential into reality.

2. The opportunity – CEPIAG

The Alteo Refinery Guinea (ARG) is a €1.5 billion greenfield project aimed at constructing a state-of-the-art alumina refinery in Kamsar. ARG investment project will meet 9 to 10% of the European union's demand for specialised alumina and up to 95% of its gallium needs, with buyers exclusively based in the EU. ARG was declared a project of national interest by the Guinean government in May 2024, marking a turning point: it projects generating value addition equivalent to 3% of Guinea's GDP, and includes the creation of the CEPIAG, a public Center of Excellence designed to address the country's persistent industrial skills gap.

The ARG investment reflects a broader shift to implement the 2011 Mining Code (amended in 2013) that increases pressure on mining companies to invest in local refining. The Government of Guinea, Alteo and UNIDO therefore entered into a public-private development partnership (PPDP) to facilitate the design and implementation of the CEPIAG to ensure a suitable trained, skilled workforce.

CEPIAG's mission is not just to fill immediate vacancies (of 800 workers) in the ARG refinery, but to become a catalyst for long-term economic and workforce transformation.[3] It is designed to help Guinea's shift from raw material exporter to industrial player, by creating a pipeline of skilled workers and suppliers meeting the needs of the mineral processing sector, and other industries. In this way, the CEPIAG is a promising private-led, public-good-oriented skills solution.

Moreover, to ensure long-term sustainability the CEPIAG is intended to be integrated into, and to strengthen, existing national education institutions, rather than bypassing the public education and training system or creating a parallel system.

Boké is strategically positioned at the centre of Guinea's mining activities, making it a potential lever for both industrial and educational development, serving not just national but also regional needs. Based on context and institutional analyses, two existing public institutions have been selected for the CEPIAG: the 'Ecole Régionale d'Arts et Métiers de Boké' for the technical training component and the 'Institut Supérieur des Mines et Géologie de Boké' for the higher education component.

3. Lessons learnt so far

In fulfilling the CEPIAG's dual objectives of addressing the skilled labor needs of an individual investor (Alteo) and strengthening Guinea's broader education and industrial systems, several challenges became apparent. These offer valuable lessons for other opportunity-driven TVET initiatives.

Reconcile immediate needs with structural reform

The CEPIAG's dual objectives represent different timelines and scope – whereas ARG represents an immediate skills need of an individual refinery investment, systemic change within Guinea's education system is a long-term ambition - and underlying priorities don't naturally align.

There is a deeper tension between the way the two actors operate – while industry is faster to react and adapt, driven by short-term operational demands and profit considerations, public institutions, are focused on long-term sustainability, often move slower, and grapple with limited resources, bureaucratic fragmentation, and competing political and budgeting priorities. Thus, the CEPIAG must follow a sequencing process to balance immediate (private) and long-term (public) priorities.

To achieve this, the CEPIAG will deliver tailored-made one year training courses for the ARG during the construction and commissioning phases. This will be accompanied by simultaneous efforts to reform the country's higher education and TVET system by developing long-term courses that can be rolled-out in other training centres, including modular professional training courses for other employers.

Focus on transferable skills

Beyond the specific needs of the ARG, public curricula and training programmes must prioritise foundational industrial skills in trades where high demand is projected. These include industrial mechanics, electricity, welding, industrial engineering, and chemistry, among others.

Given the broad applicability of these skills, workers in these trades will be employable beyond the scope of a single industrial project, ensuring long-term workforce adaptability and sustainability.

Industry-driven skills development

There is a tension between being demand-driven for specific investments and demand-driven for the labour market as a whole. In order to meet the wider economic transformation needs of the economy, curricula must be demand-driven to meet labour market expectations. This involves co-developing curricula with industry - beyond specific firms - prioritising practical training over theory (including internships or apprenticeships), and equipping training centres with modern training equipment and trained trainers that can prepare trainees for current industry standards. The challenge is to respond to the narrower, specific, short-term investment needs of a firm while satisfying wider industry needs.

Collective solutions and economies of scale to address skills shortages

If designed as a trusted, turnkey solution to address Guinea's industrial skills shortages, the CEPIAG may also help to boost private sector confidence in the national education and TVET system. The ARG investment in the CEPIAG includes support to institutional capacities for opportunity-driven TVET. Further, the purchase of modern equipment, curricula development and training of trainers could serve as a proof of concept for other industrial actors to invest in the CEPIAG, ensuring long-term sustainability for the newly created centre of excellence. This is provided the CEPIAG is framed as a collective solution, not just for the ARG.

Achieving this 'crowd-in' effect will require clear communication, strategic compromises and joint ownership by public and private actors, including broader industry engagement in curriculum design.

4. Work in progress

The CEPIAG was officially and legally created in August 2025, as a public Center of Excellence. As the learning curve continues, some issues around the CEPIAG still remain to be resolved. The most prominent among them include the following.

Building trust for collaborative governance in the skills sector

Beyond the technical and financial challenges, the creation of CEPIAG is also a governance and institutional coordination issue. In order to overcome institutional fragmentation between the multiple ministries with a mandate (see above), and sometimes duplication, the CEPIAG project has already brought together public institutions, a private investor (ARG), and development partners (UNIDO) around a shared objective of skills development for alumina. This alignment must now evolve into functional collaborative governance in the CEPIAG: one that fulfils the vision for systemic change in industrial skills development by effectively engaging the private sector (beyond ARG) in its governance, financing and training delivery, while enabling joint public-private leadership, avoiding institutional silos, and ensuring accountability.

However, collaborative governance can be slow, clashing with investors' strict timelines, and resulting delays could undermine the ability to address both immediate private sector's needs and long-term workforce development goals.

Balancing responsibilities and securing long-term support

Key questions still remain on how to ensure the long-term sustainability of the CEPIAG: who should pay, for how long, and under what terms?[4]

While Alteo has committed funding to the initial phase,[5] future success will depend on defining roles, sharing costs and mobilising diverse funding to ensure financial sustainability of the CEPIAG. The relevant question is how to achieve it in practice.

Scaling up of the CEPIAG requires further capital investment, necessitating funds from a wider range of sources, including private firms, development banks and partners. But while private firms will contribute if skills training by CEPIAG are relevant for their workforce, development partners will emphasise public-goods orientation.

Private firms may require skills that are plant-specific and as such may be expected to take greater financial responsibility for training in such skills, including capital expenditures, such as the initial investment in infrastructure, equipment, and facilities, curricula development and training of trainers. On the other hand, the costs of highly transferable skills may be more equally distributed with the public sector covering operational costs, including staff salaries, maintenance, and curriculum updates, as these are aligned with its mandate to foster long-term societal benefits.

5. Conditions for future success

Positioning CEPIAG at the core of Guinea's industrial transformation will require targeted action in other key areas after the pilot phase.

These include the following:

Empowering local suppliers and SMEs

Turning Guinea's resource wealth into real industrial development – along with job creation – will require the emergence of a class of larger and more productive firms that can provide goods and services required for large mining projects.

The CEPIAG could play a game-changing role in this regard. With a mandate that goes beyond individual private projects, CEPIAG training could be linked to supplier development, enabling domestic SMEs to scale by building the right technical, managerial and compliance related skills to become such reliable suppliers.

Exploring regional opportunities

The CEPIAG was conceived to serve Guinea's alumina value chain, but has broader relevance given the largely transferable skills, not just in Guinea but also in the sub-region. In fact, the CEPIAG's long-term viability depends on its ability to serve multiple sectors, attract multiple partners, and meet evolving needs. In that sense, Boké is more than a location, it is a strategic launchpad.

With the right support, CEPIAG could evolve into a regional hub for industrial and technical training, similar to AUDA-NEPAD's Centres of Excellence that anticipate sectoral skills needs across Africa, especially in CRM sectors. Realising this ambition requires planning for scale: designing modular programmes in partnership with industry, investing in infrastructure and staff capacity, and forging partnerships with other world-class Centers of Excellence, and regional institutions like ECOWAS, the African Minerals Development Centre (AMDC), among others.

Placing skills at the centre of a 'mutually beneficial EU–Africa partnership'

The EU's Global Gateway strategy reaffirms that strengthening global supply chains must go hand in hand with investments in human capital, including education, training, and research systems.

ARG's investment directly supports the development of the local workforce and indirectly suppliers, driving value addition in the Guinean bauxite-alumina sector, enhancing local industrial capacities, and promoting inclusive economic development. In so doing, it aligns with the EU's strategic objectives of diversifying CRM supply sources and reducing dependence on high-risk providers in the aluminium value chain.

The CEPIAG can therefore be positioned as a shared-value project, fostering skills development and industrial growth in Guinea while strengthening Europe's supply chain resilience and corporate sustainability agenda.

Beyond this narrative alignment, the strategic relevance of the CEPIAG needs to be optimised by proactively positioning it within EU frameworks, particularly those related to CRMs, and mutually beneficial investments, and engaging relevant EU instruments.[6]

At the same time, challenges around the timelines and modality of the EU's programming and funding cycles also point to the need for a shift towards more flexible and adaptive approaches to support skills development for sustainable investments.[7]

Importance of a neutral facilitator

As highlighted above, public and private entities work with very different timelines, with distinct ambitions and objectives. Thus, a public-private partnership, while potentially serving the public good, requires much coordination and facilitation to derive benefits. Such facilitation requires time, resources and specialised expertise to align expectations, build institutional capacities to drive public-private collaboration in TVET and strengthen the CEPIAG, until such a time that it can stand independently.

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Endnotes

1. The Workforce Investment for Skills and Employment (WISE) framework is a methodology developed by UNIDO to align skills development with strategic industrial investments.
2. The workshop, in April 2025, included participants from industry, development practitioners, European Commission, as well as academic experts who discussed the finding of the political economy analysis, prepared by ECDPM, and its implications.
3. Both during stakeholder interviews and the workshop, Guinean authorities made it clear that the EFIAG should not be limited to serving Alteo's refinery but should instead be developed as a strategic lever for the country's broader industrialisation efforts.
4. The PEA reveals diverging expectations regarding who should contribute, under what terms, and for how long. This highlights the need for a clearly negotiated cost-sharing model between government, investors, and development partners.
5. Alteo, as the first private donor of the CEPIAG, has committed so far to funding the design phase (including studies and UNIDO's facilitation work) and a pilot phase focused on industrial mechanics, their support totalling nearly 3 million EUR.
6. These could include instruments such as the EU's Neighborhood, Development and International Cooperation Instrument (NDICI), the Opportunity-Driven (OP-VET) Team Europe Initiative, the OACPS-EIB Critical Raw Materials Facility or the EIT Raw Materials for high-impact CRM funding.
7. Several experts have pointed to the need to match the EU's geopolitical ambitions with the right instruments.

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