

Ghana's decades-old ambition to build an integrated aluminum industry faces a new hurdle: The clean energy transition

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It has been more than 60 years since Ghana's first post-independence

leader Kwame Nkrumah first [mooted](#) the idea that Ghana should produce aluminum from the country's ample supply of bauxite.

Under the [Volta River Project](#), Nkrumah's vision was to construct a dam on Ghana's Volta River to provide dedicated electricity to a newly built smelter. The smelter was to be run by the [Volta Aluminum Company \(Valco\)](#) in the new industrial city of Tema.

The smelter would be linked to a refinery to process Ghana's bauxite, currently estimated at [900 million tons](#). Ghana has the second largest reserves in Africa after [Guinea](#).

Successive Ghanaian governments have pursued this strategy over the decades. The most recent push came in 2017 when the government embarked on its [latest drive](#) to develop an aluminum producing capacity.

Since then, the Ghana Integrated Aluminum Development Corporation (Giadec) has [invested](#) in [new mines](#) and is looking to partner with foreign and domestic companies to actualise a harmonized aluminum industry, including an alumina refinery.

The logic has always been that [heavy industries](#) that turn natural resources into useful products are critical for structural transformation. That is, [moving an economy](#) "from low productivity and labor-intensive activities to higher productivity and skill-intensive ones".

Such transformation is also [associated](#) with rising wages and living standards. Heavy industries can also reduce reliance on imports.

Recent [works](#) have identified gaps in geography-specific research on industrial decarbonization in developing economies. Sub-Saharan Africa

is particularly under-researched, with research only really examining the case of [South Africa](#).

We [examined](#) Ghana's long-standing challenges to the dream of a fully developed aluminum industry. We also assessed the most recent attempts to realize these plans against the backdrop of the energy transition and [industrial decarbonization](#).

We found that new uncertainties and challenges stand in the way of Ghana's latest efforts to develop an integrated aluminum industry. These are linked to the unfolding global energy transition agenda and shifts towards "green" manufacturing.

Why aluminum

Aluminum is both a constraint to and an enabler of a [net zero](#) future.

On the one hand, it has numerous energy transition [applications](#), from solar panels and wind turbines to electricity cables and batteries.

But aluminum is also the [second most](#) carbon-intensive industry, after steel. It accounts for [about 4%](#) of global emissions. Emission-reduction technologies are costly and, in many cases, still being developed.

Challenges—old and new

The [obstacles](#) Ghana has faced in its aluminum industry over the decades have included a lack of investments in new mines, lack of refinery, limited [electricity](#) for smelting, and a lack of investments to upgrade the existing Valco smelter.

More recently, other constraints have come into play that make it hard

for peripheral economies like Ghana to develop and sustain competitive aluminum industries.

Firstly, they are not financially in a position to use the latest sustainable production technologies, such as [carbon capture, use and storage](#) and [green hydrogen](#). These are needed to improve energy intensity and reduce emissions.

Secondly, Ghana faces tough new conditions, known as "[green taxonomies](#)", being set by key export markets in the global north. Countries or trading blocs like the [European Union](#) are demanding that importers in targeted heavy industrial sectors monitor and declare emissions embedded in products. They are also required to buy [Carbon Border Adjustment Mechanism certificates](#) to offset such emissions. The mechanism, which has already been introduced on a trial basis, will charge levies from January 2026.

There are strong critics of these mechanisms, with some [arguing](#) that they [threaten](#) Africa's sustainable development. These arguments are unlikely to see the EU dropping these measures.

The third obstacle that Ghana faces revolves around how to make its refineries and smelters produce competitively priced aluminum. The cost of power is a sticking point as it has been in prior years.

According to Ghana's recently published [National Energy Transition Framework](#), [natural gas](#) will serve as Ghana's primary transition fuel. The government argues that it can provide the base load electricity that Ghana requires for industrialization.

But choosing gas as the energy solution for Ghana's aluminum chain could jeopardize the export potential of the aluminum it produces. About [80%](#) of Ghana's aluminum is exported to Europe and could be

subjected to carbon taxes if production is powered by gas.

Hydro electricity would, in many respects, be the ideal solution. It is Ghana's cheapest and greenest energy source. And it would allow the country to compete in markets regulated by carbon considerations.

But this isn't as straightforward as it may seem. If Valco and a new smelter were to operate at envisaged levels of production it would remove almost all the hydropower output of Akosombo Dam from Ghana's broader electricity mix. The hydropower also plays a key role in bringing down overall [electricity prices](#).

Thus, while hydro electricity may be a technically good solution, it may not be politically acceptable in a country where electricity prices are a key [electoral issue](#).

Finally, other concerns are emerging around plans to mine bauxite in some of Ghana's last remaining green forests, including the [Atewa Forest Reserve](#).

National and international civil society organizations and environmental activists are resisting the move. Many local businesses support it, however, because of the potential economic gains a mine and refinery would bring.

These are some of the trade-offs that policymakers must consider.

Moving forward

Collectively, these issues may frustrate Ghana's ambitions once more.

At an international level, peripheral economies like Ghana need clarity about how particular energy technologies will be classified.

Lastly, climate financing and green technology transfer pledges from developed to developing economies need to be honored.

We suggest the Ghanaian government can overcome some of these issues through dialogue with stakeholders and being frank about the trade-offs involved. But a national discussion about benefits and costs is only possible if it's clearer what choices around energy will be made.

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