



AFRICA HYDROGEN HUB DIALOGUE SERIES (THIRD EDITION)

WEBINAR REPORT

Africa's Hidden Hydrogen: Can White Hydrogen Power the Future?



3RD EDITION

AFRICA HYDROGEN HUB
DIALOGUE SERIES

THEME:

Africa's Hidden Hydrogen:

Can **White** Hydrogen Power the Future?

PANELISTS



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KEYNOTE SPEAKER

MODERATOR



Wed, 14th Oct. 2026
12:00 - 1:30 PM (WAT)

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CONVENER & MODERATOR:

Dr. Chigozie Nweke-Eze. - Facilitator, Africa Hydrogen Hub (AHH)

KEYNOTE SPEAKER:

Joe Spease - CEO, WindSoHy LLC

PANELISTS:

1. Dr. Hancox Hans Jaoko - Co-Founder and Director of Stratum Energy Venture Fund, Kenya.

2. Dr. Omar MAIGA - Research Associate, Harvard University and Natural Hydrogen Geologist, Mali

3. Dr Mohammed Malah - Principal Regulatory Officer, Nigerian Upstream Petroleum Regulatory Commission (NUPRC)

4. Izebe Egwaikhide - Senior Advisor, E&P Focus Africa Consulting and Founder, Sutergy Limited.

1. Overview of Africa's hidden hydrogen potential

The webinar examined whether white hydrogen – naturally occurring hydrogen found in geological formations – could become a viable part of Africa's energy future.

While much of the continent's hydrogen discussion has focused on green hydrogen, the dialogue explored the prospect of identifying, producing and using geological hydrogen for electricity generation, transport and industrial development. The discussion considered where the resource may occur, how it can be located and extracted, and what conditions would allow discoveries to become bankable projects.

The conversation drew on emerging exploration activity in North America, reported African geological prospects and Mali's experience with natural hydrogen-based electricity generation. Speakers addressed the economics of drilling, the role of seismic surveys and modelling, the possibilities of engineered hydrogen production, and the challenge of developing infrastructure and reliable demand around prospective deposits.

The central question was not simply whether white hydrogen exists beneath Africa's surface, but whether it can be developed affordably, responsibly and in ways that benefit local economies.

The speakers considered the regulatory uncertainty, financing risks, market development and regional coordination that would shape any transition from geological promise to commercially useful energy.

2. Key takeaways

- **Africa has promising geological prospects, but resources require confirmation:** The East African Rift, parts of West Africa and southern African formations were identified as prospective areas. Exploration data, successful wells and commercial demonstrations remain critical to establishing the scale and recoverability of deposits.
- **Low projected production costs could be transformative but are not guaranteed:** Prospective geological hydrogen costs below those of grey and green hydrogen. These estimates depend on geology, well design, depth, drilling success and delivery infrastructure; they should not be treated as universal commercial prices.
- **Exploration technology is central to reducing uncertainty:** Seismic imaging, gravity and magnetic surveys, multi-physics modelling and artificial intelligence could serve as tools for identifying traps, understanding subsurface dynamics and reducing drilling risks.
- **Local utilization should guide project development:** Reproducing extractive models that export raw energy resources while local communities receive limited benefits must be avoided. Power generation, fertilizer production, industrial processing and mobility offer possible domestic demand.
- **Bankability extends beyond the cost of producing hydrogen:** Commercial projects need confirmed resources, credible offtakers, affordable transport or on-site conversion, clear licenses, financing instruments and alignment among governments, communities and investors.
- **Regulatory clarity and continental coordination matter:** Ambiguity over whether natural hydrogen falls under mining, petroleum or dedicated hydrogen legislation creates investment risk. Harmonized approaches and knowledge-sharing could support regional development.
- **Africa needs to build capability alongside new energy value chains:** Local engineering skills, geological mapping, training, equitable benefit-sharing and technology partnerships are essential to translating natural hydrogen discoveries into durable economic development.

3. Panel Discussion

Can geological hydrogen provide affordable, reliable energy? — Joe Spease

Joe Spease opened the technical discussion by describing recent geological hydrogen exploration and the growing evidence of potential subsurface accumulations. Referring to work associated with the United States Geological Survey and Dr Jeffrey Ellis, he discussed a 2025 prospectivity map highlighting the mid-continent rift in the United States. He also cited drilling in north-central Kansas, where three wells were reported to have encountered gas containing approximately 96 per cent hydrogen and 4 per cent helium.

Turning to the African continent, he identified the East African Rift and its iron-rich ultramafic rocks and ophiolites as promising geological settings. He referred to Barakabogu in Mali, where hydrogen reportedly discovered during water drilling in 1987 has been used for local electricity generation since 2012. For Spease, the Mali example demonstrated a possible direct link between a geological resource and productive local energy use.

He explained two processes associated with natural hydrogen formation: radiolysis, involving the breakdown of water through natural radiation, and serpentinization, involving reactions between water and suitable iron-bearing rocks. Hydrogen may migrate through fractures and accumulate beneath sealing rock formations. He also discussed engineered approaches intended to stimulate hydrogen generation, including fluid injections into suitable rocks and drilling configurations designed to accelerate subsurface reactions.

Spease emphasized that identifying commercially viable accumulations remains a major exploration challenge. He described 3D seismic surveys as a way to image subsurface structures, and 4D seismic approaches as a means of examining changes over time. Gravimetric surveys, magnetic methods, artificial intelligence and multi-physics modelling could complement these techniques. He quoted indicative early-stage costs of around US\$2 million per exploration well, potentially reduced to

US\$750,000 with improved targeting, US\$200,000–300,000 for gravity studies, and US\$2–3 million for 3D seismic coverage of approximately 250 km².

On production economics, he cited an analysis attributing potential geological hydrogen costs of US\$0.40–1.45/kg, compared with approximately US\$2/kg for grey hydrogen. He also described an engineered mineral-hydrogen concept associated with Vimma, which he said could produce up to five tonnes per day per well at less than US\$1/kg under favourable assumptions. Such performance projections would require field validation and site-specific assessment.

Finally, Spease discussed how hydrogen could be used close to its source without relying exclusively on extensive pipeline networks. The options he outlined included compressed-air energy storage, hydrogen-fuelled power plants and microgrids serving facilities such as data centres. He referred to proposed large-scale hydrogen power plants of up to 600 MW and smaller microgrids with shorter development periods. In his assessment, pairing geological hydrogen with long-duration storage could complement wind and solar generation while creating opportunities for employment, manufacturing and lower-emission transport.

How can African hydrogen corridors become bankable? — Dr. Hancox Jaoko / Enercom Africa

Dr Hancox Jaoko shifted attention from resource discovery to the commercial and institutional conditions required for deployment. He argued that low production cost alone is insufficient: the cost of moving hydrogen to the point of use, the availability of infrastructure and the existence of paying customers must be considered from the outset. He advocated prioritizing local utilization rather than simply repeating export-oriented oil and gas development models.

He outlined three broad prospective development corridors: a West African corridor including Mali, Senegal, The Gambia, Burkina Faso and Mauritania; an East African Rift corridor encompassing Djibouti, Ethiopia,

Kenya and Tanzania, with potential links to geothermal brines and helium discoveries; and a southern corridor involving Mozambique and South Africa. He identified organizations reported to be active or interested in the sector, including Hydroma in Mali, H2AU in South Africa, Gerard Energy Resources in Mozambique and Helium One in Tanzania. In Kenya, he described collaboration involving Stratum and international technology partners and pointed to geological prospects around Marich and Orum in West Pokot and the Nyanza Greenstone Belt, including Migori, Homa Bay and Transmara.

Regulatory ambiguity, he argued, is a significant obstacle. Governments must determine whether natural hydrogen is governed by petroleum law, mining law or a dedicated regime, and clarify ownership, licensing and permitting rights. He identified geological derisking, demonstration projects, infrastructure planning, blended finance, development finance institution participation, first-loss guarantees, technical assistance and stakeholder alignment as prerequisites for investment. Equitable community benefits and credible governance structures were also presented as safeguards against future conflict.

What can Africa learn from Mali's experience? — Omar Maiga

Omar Maiga drew on exploration experience in Mali, including the Barakabogu field, which he described as a particularly well-documented natural hydrogen accumulation. He noted that some discoveries have occurred unexpectedly during water drilling, while dedicated exploration and prospectivity mapping are now helping move the sector from speculation towards more systematic resource assessment. He also described advisory work supporting geological mapping in Africa and other regions.

He highlighted potential productive uses beyond electricity, particularly local ammonia and fertilizer manufacturing. In his view, hydrogen development should support industries that generate value near the resource, rather than depend solely on exporting a raw commodity. He also pointed to capacity-building initiatives, including the training of young African engineers and the preparation of prospective maps to support future exploration.

How should national policy accommodate white hydrogen? — Mohammed Malah

Mohammed Malah argued that Africa already has evidence of the technical feasibility of using natural hydrogen, but that broader deployment depends on enabling policy. He referred to Nigeria's work on a draft national hydrogen policy intended to accommodate different hydrogen pathways, including applications in power generation and industry.

He emphasized the need for clear licensing and permitting processes, identifiable offtakers and predictable government requirements. He also called for cross-country knowledge-sharing, suggesting that Nigeria could draw on existing petroleum-sector geological data and learn from Mali's operational experience rather than begin exploration and policy design without reference to available evidence.

Can white hydrogen compete in African energy markets? — Izebe Egwaikhide

Izebe Egwaikhide framed the opportunity in terms of market development and risk allocation. He noted that exploration and early production carry substantial uncertainty, making credible offtake agreements essential to obtaining financing. He cited indicative green hydrogen costs of around US\$8/kg and prospective white hydrogen costs of US\$0.50–1.50/kg, arguing that the difference could be significant if geological hydrogen can be produced and delivered at scale.

He stressed, however, that African markets lack extensive interconnected natural gas pipeline infrastructure, making the location of discoveries and the availability of local demand central to commercialization. He identified industrial uses including methanol and ammonia for lower-emission shipping, possible bunkering hubs, and hydrogen demand from major refining and industrial facilities such as the Dangote refinery in Nigeria.

On policy, he called for greater African Union coordination to reduce divergent national rules and for institutions such as the African

Development Bank to help lower capital costs and mitigate early-stage investment risks. He also proposed that hydrogen development be reflected in national energy transition and climate policy frameworks in ways that recognize countries' differing economic circumstances.

4. Follow-up questions

Following the main presentations, the conversation turned to practical questions about the risks of exploration, environmental safeguards, economic viability and the steps required to establish a functioning hydrogen industry.

What are the environmental implications of exploration and how shallow and inexpensive can natural hydrogen wells be? — Omar Maiga

Responding to questions about groundwater and ecosystems, Maiga argued that natural hydrogen exploration need not damage groundwater and noted the role of subsurface water in geological hydrogen processes. However, project-specific groundwater, drilling and environmental assessments would remain necessary to avoid potential risks.

Maiga referred to shallow deposits in parts of West Africa, including Mali, at depths of approximately 60–72 meters. He suggested that shallow drilling could improve project economics once exploration costs are recovered.

How can exploration risk be reduced? — Joe Spease

Returning to the challenge of locating hydrogen accumulations, Spease highlighted specialist software and analytical tools designed to improve geological targeting. He referred to firms and developers working on advanced exploration programs and reiterated the potential role of modelling and data analysis in reducing unsuccessful drilling. The

discussion underscored that improved software may lower uncertainty but cannot replace field data and successful appraisal wells.

What must happen before projects can attract financing? — Dr. Hancox Jaoko and Izebe Egwaikhide

The financing discussion brought together several conditions: verified geological resources, clear regulatory rights, credible customers, infrastructure matched to the intended end use and financial instruments able to absorb early-stage risks. Dr. Jaoko emphasized blended finance and stakeholder alignment, while Egwaikhide stressed offtake commitments and the importance of policy harmonization. Together, their contributions suggested that project bankability depends on the entire hydrogen value chain, not only the cost of extraction.

What should governments and organisers do next?

The session identified practical follow-up priorities:

- Specify the benefits that host communities and other stakeholders should receive;
- Establish measurable project indicators; and develop a verifiable framework for project implementation and monitoring.

5. Closing reflections

The webinar presented white hydrogen as a potentially important addition to Africa's energy options, particularly where geological resources can be verified and converted into affordable power, industrial feedstocks and productive local demand. Mali's experience provided a concrete point of reference, while the discussion of exploration corridors and new technologies illustrated the breadth of interest in the resource.

At the same time, the discussion made clear that geological promises do not automatically translate into a commercial energy industry. Exploration uncertainty, infrastructure constraints, delivery costs, uncertain legal classifications, financing needs and the availability of offtakers will determine whether individual projects succeed.

The wider development question is who will benefit if natural hydrogen becomes commercially viable. The speakers repeatedly linked the opportunity to domestic energy access, industrialization, fertilizer production, local engineering skills, regional cooperation and equitable participation. Africa's white hydrogen future will therefore be shaped not only by what can be extracted from beneath the ground, but by whether countries can build the institutions, infrastructure and capabilities needed to turn the resource into lasting economic value.

6. Acknowledgement

IAP extends heartfelt appreciation to all speakers, participants, and partners for their valuable contributions toward shaping Africa's sustainable energy future.



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