

Speech by Professor S. Adeniran. Afolalu, Director of Hydrogen Research Institute ABUAD (HRI), at the ABUAD International Hydrogen Summit 2023/2024 Academic Session.

Her Excellency, Dr. Olayemi Oyebanji; the Founder and Chancellor of our great University, Aare Emmanuel Afe Babalola (SAN); Our dear mother, Yeye Aare Modupe Babalola; our indefatigable and distinguished Vice Chancellor, Professor E. Smaranda Olarinde; permit me to stand on the existing protocol. I am pleased to stand before you today at this year *International Hydrogen Summit*. This gathering holds profound significance, as it reflects a global convergence of minds, technologies, and innovations – all united by a common goal: to pave the way for a cleaner, sustainable, and more equitable energy future. It is not only an honour but a necessity for us to engage in meaningful discourse on the emerging potentials of hydrogen and how it can transform our energy systems.

The Significance of Hydrogen: A Pathway to a Sustainable Future

At the heart of today's summit lies one core theme – the critical role of hydrogen in our quest to transition from *conventional modes of energy generation* to a cleaner, more sustainable energy system.

For decades, human societies have relied heavily on fossil fuels for energy – oil, coal, and natural gas – fuels that have driven industrial revolutions, powered our vehicles, and heated our homes. While these energy sources have facilitated rapid growth and progress, their use has come at a

great cost to our environment. The combustion of fossil fuels has led to excessive carbon dioxide emissions, contributing to global warming and climate change. We now live in an era where the environmental repercussions of our energy choices are undeniable, and the need for cleaner alternatives has become urgent.

Hydrogen, as an energy carrier, has emerged as one of the most promising solutions to address the global energy and environmental crises. Its potential is vast: it is abundant, versatile, and when utilized, produces only water vapour – leaving no carbon footprint behind. Hydrogen can be used across multiple sectors, including transportation, industrial manufacturing, power generation, and even heating in residential homes. Its versatility and ability to complement other renewable energy sources such as wind and solar make it a critical component of a resilient and sustainable energy future.

In many ways, hydrogen offers us the opportunity to rewrite the narrative of energy production and consumption. By leveraging hydrogen, we can decarbonize energy-intensive sectors, reduce our dependence on finite resources, and mitigate the harmful environmental impacts of traditional energy sources.

Afe Babalola University's Vision and Commitment to Clean Energy

Here at *Afe Babalola University*, we believe in the power of science and innovation to drive meaningful change in society. Our journey into hydrogen research is a testament to the vision of our dear Founder's commitment to clean energy

and sustainable development. It began with a vision – a vision to lead Africa’s transition toward renewable energy, where clean energy solutions are accessible, sustainable, and capable of meeting the energy needs of our communities.

In pursuit of this vision, Afe Babalola University established the *Hydrogen Research Institute* in 2022. This was a decisive step toward positioning our university as a leader in the global energy transition. The institute’s mission is to advance hydrogen-based research, develop innovative technologies, and create pathways for hydrogen to become a mainstream energy source in Nigeria, Africa, and beyond.

Our institute is committed to exploring all facets of hydrogen, from its production and processing to its storage and distribution. We are not only interested in hydrogen as a standalone energy source but also in its integration into broader energy systems, where it can complement other renewable technologies and facilitate a more robust and flexible energy network. By focusing on hydrogen exploration, production, processing, and storage, we aim to drive breakthroughs in renewable energy technologies that will shape the future of sustainable power generation and use.

Collaborations and Partnerships: Building a Hydrogen Ecosystem

It is common knowledge that tackling global energy challenges requires more than just ground-breaking research; it demands collaboration on an international scale. That’s why Afe Babalola University is proud to be working with

strategic partners who share our vision for a cleaner, hydrogen-powered future.

The Institute is blessed with remarkable senior research fellows in the persons of Professor Bamidele Adebisi from Manchester Metropolitan University, United Kingdom, Dr. Solomon Agbo from Forschungszentrum Julich, Germany, and Prof Ayodele Ajayi (Board of Trustee Member on Research and Internationalization ABUAD), who have been instrumental in providing guidance and exposing us to new frontiers of opportunities.

Furthermore, one of our significant partnerships is with the *African Hydrogen Partnership (AHP)*. The AHP is a continent-wide non-profit umbrella association that is dedicated to the development of green and natural hydrogen across Africa. Their work aligns with our goals of promoting hydrogen as an alternative energy source and creating business opportunities that support the growth of the hydrogen economy in Africa.

I am proud to announce that Afe Babalola University is the only Nigerian University that is a member of this prestigious partnership. This collaboration is an affirmation of our leadership in hydrogen research on the continent, and it positions ABUAD as a critical player in shaping Africa's energy future.

In line with our commitment to research and field exploration, a team from the *Afe Babalola University Hydrogen Research Institute* recently conducted a pre-fact-finding reconnaissance visit to various sites across three (3) Nigerian states – Benue, Enugu, and Anambra states. The

purpose of this mission was to carry out a preliminary assessment of the availability of Natural hydrogen and other useful gases at these sites. This is just the first step in a broader fact-finding field study scheduled to take place later this month. The outcome of this research will provide critical data to inform future hydrogen production strategies in Nigeria.

Collaborative Research for Agricultural Advancement

Our exploration into hydrogen goes beyond energy production. We are currently conducting a study in collaboration with the Federal Government of Nigeria and the German Government on the *conversion of ammonium to fertilizer*. This research aims to boost agricultural production and enhance food security in Nigeria while promoting sustainable practices. By exploring the potential of hydrogen in the agricultural sector, we are opening new avenues for innovation and demonstrating hydrogen's versatility as a game-changing technology.

The UKRI Ayrton Challenge: Multi-Energy Systems Powered by Digital Technology

In addition to our work on hydrogen exploration and agricultural applications, the Hydrogen Research Institute is also involved in the *UKRI Ayrton Challenge*. Alongside partners from the UK and other African countries, we are working on the development of a community-based multi-energy contributory system powered by digital technology. This innovative system is designed to encourage community participation in energy generation and management while creating a more efficient energy supply chain. The ARYTON

Challenge represents a bold step toward integrating digital solutions into the energy sector, and we are excited to be at the forefront of this transformative project.

ABUAD Energy Transformation Policy

To maintain the reputation, we already have in the international community – as evident by the award we received from the Times Higher Ranking as the best University on clean and sustainable energy (SDG 7). The Hydrogen Research Institute is in the process of developing an energy transition policy that will further reduce the carbon footprint of the university in the next 10 years leveraging Hydrogen and other clean sources of renewable energy.

We hope that the ABUAD energy policy – on its completion, inspires other organizations and institutions of higher learning to take the bold step of coming up with a similar policy that promotes clean energy generation and usage.

Shaping the Future: Research, Conferences, and Knowledge Sharing

Knowledge sharing is a key pillar of our work at the Afe Babalola University Hydrogen Research Institute. In 2023, we organized a landmark International Conference on Clean Energy in Africa (ICCA 2023), to promote hydrogen as a clean and sustainable energy source. This event brought together experts and researchers from across the world to exchange ideas and discuss the potential of hydrogen in driving the global energy transition. We have published over 150 articles

indexed in Scopus and research findings, further contributing to the body of knowledge on hydrogen and its applications.

Our research spans multiple areas, including hydrogen production technologies, storage solutions, and the development of integrated energy systems. As we push the boundaries of hydrogen research, we remain committed to sharing our findings with the global community and fostering collaboration across industries, academia, and government institutions.

The 2024 Hydrogen Summit: A Platform for Shaping the Future

This year's *Hydrogen Summit* is a significant milestone in our journey toward a hydrogen-powered future. It provides a unique platform for industry leaders, innovators, and policymakers to come together and reason on how best to shape the future of green hydrogen in Nigeria and beyond. We are here to discuss, debate, and collaborate on the role of hydrogen as a sustainable energy source, and how it can drive the transition to a greener, cleaner, and more prosperous future.

The summit also underscores the importance of collective action. No single institution or country can achieve the energy transition alone. It requires concerted efforts from governments, industries, academia, and civil society. By coming together at this summit, we are sending a powerful message: we are ready to embrace hydrogen as the energy of the future, and we are committed to building the partnerships and frameworks necessary to make that future a reality.

The Road Ahead: Challenges and Opportunities

As we look to the future, we recognize that the road to a hydrogen-powered economy will not be without challenges. There are still many technical, economic, and policy hurdles to overcome. From scaling up hydrogen production and improving storage technologies to creating regulatory frameworks and securing investment—these are all areas that require our attention and collaboration.

However, with every challenge comes opportunity. The opportunities presented by hydrogen are immense. Hydrogen can decarbonize energy-intensive industries, reduce greenhouse gas emissions, and contribute to energy security. It can create jobs, stimulate economic growth, and position Africa as a leader in the global clean energy transition.

At Afe Babalola University, we are committed to seizing these opportunities. We will continue to drive innovation, conduct cutting-edge research, and work with our partners to advance hydrogen technologies that will benefit not only Nigeria but the world.

Conclusion: A Call to Action

In closing, I want to emphasize that the time for action is now. Hydrogen is not just an energy source for the future – it is an energy source for today. The decisions we make now will shape the trajectory of our energy systems for generations to come.

I encourage all of you – industry leaders, researchers, policymakers, and innovators – to join us on this journey. Let us collaborate, innovate, and take bold steps toward a cleaner, more sustainable energy future. Together, we can harness the power of hydrogen to create a world where energy is abundant, clean, and accessible to all.

Thank you for your attention