



GREEN HYDROGEN IN KENYA

By Vanessa Molla and Chigozie Nweke-Eze

Introduction

Green hydrogen refers to hydrogen gas produced using renewable energy sources, such as wind, solar, or hydroelectric power. This type of hydrogen production is considered environmentally friendly because it doesn't emit greenhouse gases during its production process, unlike traditional methods that rely on fossil fuels. One of the most common production methods is water electrolysis where electricity from renewable sources is used to split water (H_2O) into hydrogen (H_2) and oxygen (O_2).

Applications of green hydrogen include:

- Energy storage since hydrogen can store excess energy generated by renewable sources and be converted back into electricity when needed. Hydrogen is an energy carrier (a fuel) that can be used to store, move, and deliver energy produced from other sources.
- Green hydrogen can be implemented in transport solutions and used as a fuel for fuel cell vehicles (FCVs), including cars, buses, and trucks. This provides a zero-emission alternative to fossil fuels.

- Hydrogen is useful in industrial applications such as steel manufacturing, ammonia production, and refining, where hydrogen is already used but traditionally sourced from fossil fuels.
- Hydrogen also provides a heating alternative to natural gas applications in residential and commercial systems.

Key factors driving green hydrogen in Kenya include:

1. Abundant renewable energy sources and potential in Kenya.

- The presence of geothermal wells within the Rift Valley region of Kenya provides a stable and continuous source of electricity for hydrogen production.
- Kenya is endowed with favorable wind speeds with 73% of the country experiencing wind speeds of 6 m/s or higher at a hundred meters above ground level. Of this 28228 sq. km experiences wind speeds of between 7.5 – 8.5 m/s and 2825 sq. km experiences wind speeds of between 8.5 – 9.5 m/s. These above-average land wind speeds are sufficient for green hydrogen production.
- The estimated solar potential in Kenya is almost 15000 MW. This is a clear indication that opportunities exist for investment in the setting up of solar power plants, manufacturing of associated components such as charge controllers, inverters, and batteries, and also the use of solar energy to provide energy conservation solutions.

2. Government support and policies

- Kenya's Vision 2030 emphasizes sustainable energy development. The government has been supportive of renewable energy projects.
- The Energy and Petroleum Regulatory Authority invited green hydrogen developers to send an Expression of Interest (Eoi) accompanied by a pre-feasibility study report to the Ministry of Energy and Petroleum. The pre-feasibility study should include the intended location of the project; the size of land required; source of electricity in (MW/MWh) for the electrolyzer and renewable energy technology (where applicable); Source of water; capacity of the electrolyzer in MW to be installed; source of financing for the project; partners to the project; potential infrastructure requirements such as transmission lines, pipeline, railway; and Proposed off-taker(s) of the green hydrogen and use (whether own use, domestic or export).
- Kenya has established export processing zones (EPZ) where investors in green hydrogen and its derivatives can benefit from multiple incentives including
 - a) A 10-year tax holiday;
 - b) Perpetual exemption on duty and value-added tax (VAT) on machinery and raw materials;
 - c) Operation under a single license;
 - d) Perpetual exemption from stamp duty;
 - e) A 10-year withholding tax holiday;
 - f) 25% corporate tax after the first 10-year tax holiday expires;
 - g) 100% investment deduction allowance over 20 years; and

h) No exchange controls; Kenya has a liberalized foreign exchange regime.

- Green Hydrogen Program Coordination Committee (GH2- PCC) has been established. GH2-PCC is a multisectoral committee comprising government ministries and state agencies relevant to the green hydrogen economy, private sector, and civil society. The committee provides strategic oversight and monitors the implementation of the Green Hydrogen Strategy and Roadmap for Kenya. The GH2-PCC is supported by a Green Hydrogen Secretariat (Secretariat) hosted by the Ministry of Energy and Petroleum. The Secretariat operates as a "one-stop-shop" to streamline project approval, fast-track implementation of flagship projects, and provide market research and value chain analysis.

3. Strategic Location and Infrastructure.

Kenya's strategic location on the eastern coast of Africa makes it a potential hub for green hydrogen export to global markets. The development of infrastructure, including ports and transportation networks, supports this potential.

4. Economic and Environmental Benefits.

Green hydrogen can help Kenya reduce its carbon footprint and meet its climate goals. It can also drive economic growth by creating new industries and job opportunities. Collaborations with international entities can bring in technical expertise and funding. Partnerships with countries leading in green hydrogen, such as Germany and Japan, could be instrumental.

Challenges

1. High capital costs: The initial investment required for green hydrogen infrastructure and technology can be high. Financial incentives and subsidies might be necessary to make projects economically viable.
2. Technical expertise: Developing the technical expertise required for green hydrogen production, storage, and distribution will be crucial. Training and capacity-building programs can help address this challenge.
3. Regulatory framework: Establishing a clear and supportive regulatory framework for green hydrogen production and use is essential. Streamlining regulatory processes can accelerate project development.

Authors

Vanessa Molla
Researcher, Africa Hydrogen Hub

Chigozie Nweke-Eze.
Managing Director, Africa Hydrogen Hub

About AHH

Africa Hydrogen Hub (AHH) is the working and networking hub of stakeholders and experts in the Africa hydrogen space. Our vision is to increase cross-level, cross-sectoral and cross-national stakeholder engagement, participation and contributions in the emerging Africa hydrogen economy.

Cite as: Molla, V. & Nweke-Eze, C. *Green Hydrogen in Kenya. Africa Hydrogen Hub (AHH). December 2024*