Country Experience
Benin

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Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

- No regulation, strategy or roadmap development for the transition to green hydrogen

Departments, research institutions, technology providers:

- Water and Environment Science and Technology; UAC
- Laboratory;Radiation Physics Laboratory; UAC

Projects, initiatives:

- The West African Scientific Service Centre on Climate Change and Adapted Land Use (WASCAL): Promote the International Programme for Energy Mastery and Green Hydrogen (IMP-EGH) in the fifteen (15) ECOWAS countries, namely: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

Developing a roadmap towards green hydrogen as a vector for energy transition and sustainable growth

Country Experience
Cameroon

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Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

- Cameroon's NDC does not contain emissions reduction through green hydrogen.
- No law specifically mentions green hydrogen. However, the law governing the electricity sector in Cameroon stipulates: Art 59(2) In the context of decentralized rural electrification, and taking into account the constraints linked to environmental protection, priority is given to decentralized production from renewable energy sources, except in the event of deficiency, prohibitive costs or insufficiency thereof. Art 65(1) The State ensures the promotion and development of renewable energies.

Departments, research institutions, technology providers:

- Ministry of Energy
- Fortescue Future Industries Ltd

Projects, initiatives:

- Cameroon signed an agreement in June 2021 with the Australian firm Fortescue Future Industries Ltd, a 100% subsidiary of Fortescue Metals Group. The agreement concerns the conduct of a technical study, with a view to developing the first green hydrogen production project in Cameroon.

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- Establish supportive policies and regulations to incentivize the adoption and use of green hydrogen
- International collaboration on knowledge sharing, joint research projects, and coordination of standards and regulations
- Establishment of facilities for the production of green hydrogen through electrolysis
- Construction of hydrogen production plants, pipelines, and storage facilities

Expérience pays
RDC

Aperçu du paysage de l'hydrogène (vert)

CDN , réglementations , stratégies et feuilles de route :

- La RDC n'a fait aucune mention sur l'Hydrogène Vert dans tous ses documents stratégiques qui touchent à l'environnement et au climat.

Départements , instituts de recherche, fournisseurs de technologies :

- Non encore identifiés (Mais quelques études théoriques existent dans les milieux académiques)

Projets , initiatives :

- Le Ministère de Ressources Hydrauliques et Electricité a mis en place une Task Force sur l'Hydrogène Vert pour refléchir sur le Projet (sous la coordination de l'END).
- Projet de Fortescue Future Industries (Filiale de Fortescue Metals Group) pour développer le projet hydroélectrique Grand Inga pour la production de l'hydrogène vert (actuellement en veilleuse).

Attendu activités concernant hydrogène vert (production , stockage , conversion , utilisation finale) :

- La RDC attend mettre une feuille de route sur l'hydrogène vert.
- La Task Force mise en place doit rapidement élaborer cette feuille de route.
- Notre partcipation à cet atelier de formation nous permettra d'approfondir l'état de l'art sur la productin, le stockage, la conversion et l'utilisation de l'H2 vert et d'identifier les ressources qui pourraient nous accompagner dans cette mission.

Country Experience
The Gambia

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INTRODUCTION

The Government of The Gambia, represented by the Ministry of Petroleum and Energy, and Swiss renewable energy firm NEK Umwelttechnik AG have signed a Memorandum of Understanding (MoU) to develop a 200 MW onshore wind farm and a 350 MW offshore wind farm over several phases.

The Gambia:
A Case for Renewable Energy – OVERVIEW

In The Gambia, access to electricity was at 69% of the population in 2022, while the countries agenda envisages full electricity access at the household level in urban areas and at the community level in rural areas by 2030. NEK's wind farms will contribute to this goal and are also an important step towards

NDCs

The Gambia's declared Nationally Determined Contributions (NDC). The Gambia ratified the Paris Agreement and published in 2022 their second NDC, which also covers the power sector. An expansion of renewable energy technologies is included in The Gambia 's NDC.

The population of The Gambia pays one of the highest electricity tariffs worldwide with an average above USD 0.23 per kWh in 2023, resulting from the very expensive use of fossil power plants. Once NEK's wind projects will produce the first clean, sustainable, never ending, and homemade electricity starting from 2025/2026, the price per kWh for end users will drop sharply due to the relatively low generation costs of the wind farms. In addition, more power capacity is required in The Gambia in the years to come, which will be provided also by the wind farms. Surplus electricity can then also be exported to surrounding countries via the WAPP network.

In addition, the green energy produced in the wind farms can be used to generate Green Hydrogen, which is seen as the “fuel” of the future. The European Investment Bank (EIB) estimated in a recent report that the potential for green hydrogen in Africa is expected to be around 1 trillion euros (USD 1.06 trillion) by 2035.

NEK's Wind Farm Developments – Initiatives

We have started to measure the wind conditions in The Gambia in early 2022. The results for the first complete measurement year were promising, what triggered then the next development steps of the projects. Based on this approach, the Government of The Gambia and NEK decided to sign an MoU which defines the common approaches in developing the wind farms.

The onshore wind farm with a preliminary capacity of approx. 200 MW is planned to be built in the southern coastal region of the country, with further investigations on the specific locations required. Not far from the onshore wind farm, the 350 MW offshore wind farm will be situated between 5 and 15 km off the coast of The Gambia in relatively shallow waters.

This article was also recently published on ESI-africa.com: https://www.esi-africa.com/renewable-energy/the-gambia-explores-wind-energy-hydrogen-to-achieve-energy-access/

Country Experience
Guinea

Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

- Dans notre CDN et nos documents de stratégie, la question des énergies renouvelables est l'un de nos engagements les plus importants, le cas de l'hydrogène vert n'est pas spécifié.

Departments, research institutions, technology providers:

- Vu que la Guinée est l'un des leaders dans le développement des barrages hydroélectriques qui a pu capitaliser les acquis reçois par le biais des partenaires plusieurs lettres d'intention dans le cadre de l'expérimentation de l'hydrogène vert. Mais l'expérimentation n'a pas encore commencé.

Projects, initiatives:

- Ministère de l'énergie
- CERESCOR Guinée
- SEG Guinée

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- Vu que l'expérimentation n'a pas encore commencé, nous n'avons pas de documents spécifiques en termes de production et de l'utilisation de l'hydrogène vert.

Country Experience
Guinea-Bissau

Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

l'Appropriation et la coordination d'un ensemble approche de société dans laquelle le gouvernement, les ONG, les communautés, les structures régionales et locales (gouvernement et structures/villages traditionnels) sont unis pour renforcer la résilience. L'absence de politiques publiques visant l'adaptation au climat constitue également un défi pour créer un environnement plus favorable à la mise en œuvre des actions.

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- [please add here]
-

Country Experience
Guinea-Bissau

Overview of (Green) Hydrogen Landscape

Departments, research institutions, technology providers:

2CI est une société de recherche et de développement de technologie et de prototypage, y compris la mise en application desdites technologies et des systémes assurant la réduction des emissions de (GES) incluant **(i)** l'obtention de crédit carbone **(ii)** la mise en place d'obligation verte pour des projets â forte réduction de GES et **(iii)** ainsi que la mise en place de nouveaux équipements permettant d'améliorer l'efficacité énergétique et l'atteinte de l'autonomie énergétique a l'aide de systéme d'énergie renouvelable combinés a des systémes d'accumulation utilisant l'hydrogéne comme vecteur pour l'alimentation en énergie stationnaire et en énergie mobile (véhicules).

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- [please add here]
-

Country Experience
Guinea-Bissau

Overview of (Green) Hydrogen Landscape

Departments, research institutions, technology providers:

- Sur la base de cette expérience de cette expérience, les Parties s'engagent dans la mise en œuvre et l'intégration des technologies H2Cl.
- et le développement d'applications spécifiques en Guinée-Bissau, basées sur le projet DEMO
- et PILOTE, comprenant des lampadaires multifonctionnels, construction d'une maison modèle entièrement
- énergie autonome, transformation des véhicules pour une utilisation optimisée de l'hydrogène vert, usine de production d'hydrogène vert.

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- [please add here]
-

Country Experience
Liberia

UN environment programme

CTCN
UN Climate Technology Centre & Network

Overview of (Green) Hydrogen Landscape

- Liberia is overall lack of energy. In most rural areas in Liberia, less than 5% of the population has access to electricity while most homes run mini generators.
- The current energy situation in Liberia is characterized by a dominance of traditional biomass consumption, low access to poor quality, and relatively expensive modern energy services. It is estimated that over 95% of the population relies on firewood, charcoal, and palm oil for their energy needs.
- Liberia also has an abundance of well-distributed precipitation, rivers, and streams across its land area, and the hydropower potential of the country is estimated to be 2300 MW. However, the Country has only managed to install an 88MW plant.

NDCs, regulations, strategies and roadmaps:

The NDC commitment is ambitious for the Energy sector because it is the large contributor of GHG in the country, accounting for over 67% of national GHG emissions, primarily due to the intensive use of gasoline and diesel in power generation.

This NDC ambition is also based on the strong renewable energy resources that Liberia possesses- solar, hydro, and biomass resources.

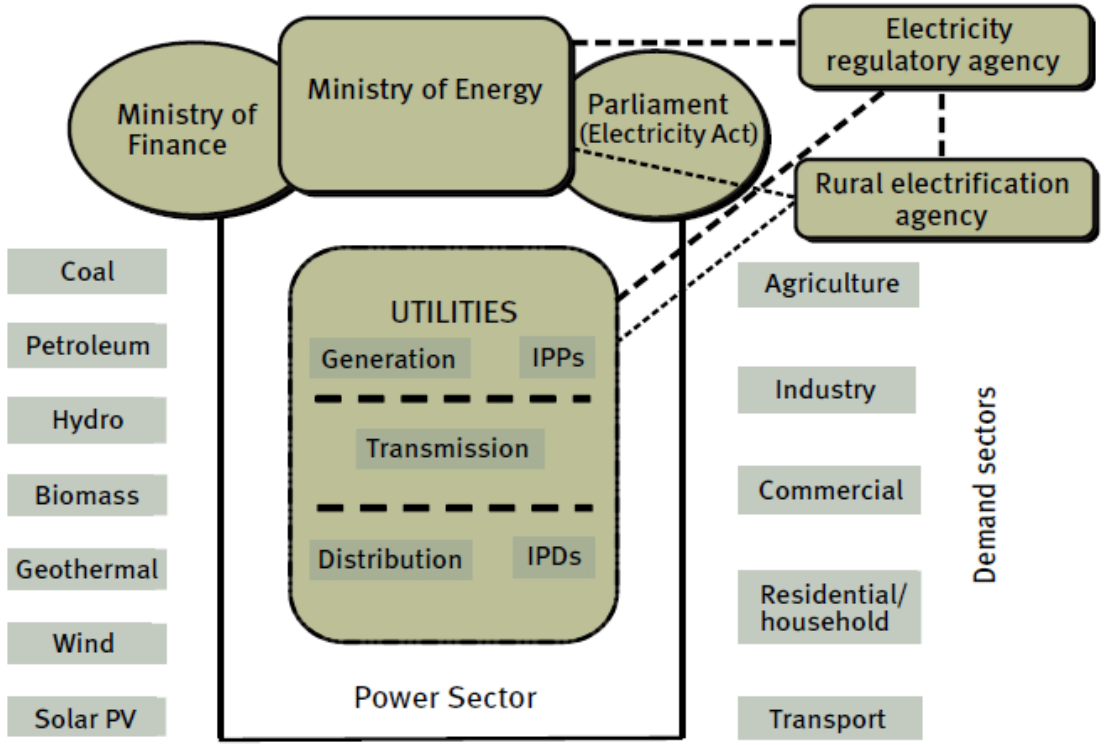
Liberia's NDC articulates a vision of making Liberia carbon neutral by 2050 and also lays out a scenario of increasing the share of renewable electricity in the country to 30% by 2030.

The Rural Energy Strategy and Master Plan (RESMP) for Liberia provides a roadmap for increasing energy access and increasing the share of renewable energy achieving this penetration of renewable energy by 2030.

Departments, research institutions, technology providers:

The national institutional framework for Climate Change in Liberia consists of the National Climate Change Steering Committee (NCCSC) and Secretariat, established in 2010, and is responsible for ensuring an intergovernmental framework for combatting climate change in Liberia. The Environmental Protection Agency (EPA) of Liberia is the Secretariat for NCCSC and the primary agency responsible for climate change in the country. EPA is also the Climate Change Focal point for the United Nations Framework Convention on Climate Change (UNFCCC), the National Designated Authority (NDA) to GCF, and the National Designated Entity (NDE) for the Climate Technology Centre and Network (CTCN).

Other institutions responsible for Energy services include the Ministry of Mines and Energy (MME), the Rural and Renewable Energy Agency (RREA), the Liberia Electricity Corporation (LEC), the Liberia Electricity Regulatory Commission (LERC), Ministry of Finance and Development Planning, (MFDP), and the Liberia National Investment Commission (LNIC),



Projects initiatives:

Liberia has not yet been successful in attracting private IPP investments to achieve the renewable energy IPP program because of the absence of the necessary regulatory and policy framework and associated institutional capacity, the lack of an appropriate de-risking mechanism, and the absence of paradigm-shifting pipeline development.

Liberia estimates that a total of 100 MW of renewable energy generation (solar, biomass, and small hydro) and investments of about $ 242 million will need to be made by independent Power Producers (IPP) to achieve the national climate change and energy targets.

Through the CTCN, we have secured 600,000 USD from the GCF Readiness program to develop the Investment program for the Energy Sector.

Currently, there is no Green Hydrogen project in Liberia. However, there are plans to invest in a solar project with a capacity of 20 MW. We hope for a fruitful conversation around this topic that will leverage support in this regard.

Thank you for your attention….

Country Experience
Mauritania

UN environment programme | CTCN UN Climate Technology Centre & Network

Overview of (Green) Hydrogen Landscape

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

Country Experience
Mauritius

Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

- None
-

Departments, research institutions, technology providers:

- Mauritius Research and Innovation Council (MRIC)
- Mauritius Renewable Energy Agency (MARENA)

Projects, initiatives:

- La Compagnie Industrielle de Louest Ltd
- HAF Industries Ltd

(See Note 1)

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- In the Budget Speech 2023-24, Government announced the development of a strategic plan for the deployment of green hydrogen in various sectors of the economy.
- The Ministry of Energy and Public Utilities has developped a ToR for the recruitment of a Consultant for this purpose.

Country Experience
São Tomé e Príncipe

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Overview of (Green) Hydrogen Landscape

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

Country Experience
Senegal

Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

- Dans le NDC du Sénégal, la promotion des énergies renouvelables est généralement recommandé. L´hydrogène n´y est pas spécifiquement nommé.

Departments, research institutions, technology providers:

- L´académie des sciences du Sénégal
- Le centre des recherches sur les énergies renouvelables
- La direction des énergies renouvelables du Ministère en charge de l´énergie

Projects, initiatives:

Évaluation et analyse du potentiel de la production d'hydrogène, de ses applications et des possibilités d'investissement au Sénégal.

Dans le cadre de la coopération financière entre l'Allemagne et le Sénégal, le ministère fédéral allemand du développement économique et de la coopération (BMZ) a chargé la KfW d'analyser le potentiel de l'hydrogène au Sénégal. Cette analyse devrait servir de point de départ à de futures discussions qui pourraient aboutir à des programmes communs le long de la chaîne de valeur de l'hydrogène.

Politique hydrogène vert de la CDEAO

La politique de la CEDEAO en matière d'hydrogène vert est élaborée avec la vision stratégique de positionner la région comme l'un des producteurs et fournisseurs les plus compétitifs d'hydrogène vert et de ses dérivés tout en abordant la croissance socio-économique et le développement durable de tous les États membres. Dans cette mesure, certains objectifs à court et à long terme de la politique sont identifiés, tels que le développement de l´écosystème, nouer des partenariats strtatégiques, mettre en place les infrastructures nécessaires, améliorer la sécurité énergétique, prompuvoir un développement durable équitable et respectueux des aspects genres.

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- Le développement et la réalisation de projets de démonstration
- Aider à la mise en place d´un cadre législatif approprié
- Aider à l´adaptation des curricula existants, en y incluant la formation d´experts dans le domaine de l´hydrogène vert.
- Faciliter la recherche et le développement sur la production, la manipulation, le stockage et l´utilisation de l´hydrogène vert.
- Aider au développement d´équipements fonctionnant avec de l´hydrogène, c´est à dire à la mise en place d´une réelle industrie basée sur l´hydrogène vert.
- Aider au développement d´un vaste réseau de stockage et de transport de l´hydrogène vert.

Country Experience
Sierra Leone

UN environment programme | CTCN UN Climate Technology Centre & Network

Overview of (Green) Hydrogen Landscape

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

Country Experience
Togo

Overview of (Green) Hydrogen Landscape
NDCs, regulations, strategies and roadmaps:

In March 2023, the ECOWAS Energy Ministers adopted the ECOWAS Green Hydrogen Policy and Strategy Framework, which aims to harness the potential and with the strategic vision of positioning the region as one of the most competitive producers and suppliers of green hydrogen and its derivatives while addressing socio-economic growth and sustainable development of all member states. The Policy was subsequently adopted by the ECOWAS Council of Ministers in July 2023.

Departments, research institutions, technology providers:

Research institutions:

WASCAL -university of Lomé with technology on bioenergy/ biofuels and green hydrogen technology. A regional pilot laboratory of biogas and green hydrogen is built on the campus of the university of Lomé

A master programme is ongoing to train young professionals on energy and green hydrogen. The first batch has just graduated.

Projects, initiatives:

- Lab Togo project at WASCAL for bioenergy funded by BMBF
- Green Hydrogen Atlas is developed to have the potentials of green hydrogen production in west Africa
- A master programme on bioenergy/biofuels and green hydrogen technology is ongoing. The second batch is already selected

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- Continue the master research programme on green Hydrogen technology
- Use the potential of hydrogen production in Togo to start pilot Hydrogen production- research should identify the location
- End users: transport, export to Europe

Country Experience
Zambia

NDCs, regulations, strategies and roadmaps:

- Currently, Zambia has no clear indication in the NDCs, regulatutions for Green Hydrogen. However, the country, through its Energy Development Strategies (MOE,2022), Zambia has developed the energy efficient and distribution Transformers Roadmap through the SADC CTCN/GCF Readiness Technical Assistance. Zambia has also commenced the development of a Green Growth Strategy (GGS) to act as a blueprint for guiding country's economic growth towards a trajectory that is resource efficient, low-carbon, climate-resilient, and socially inclusiv

Departments, research institutions, technology providers:

- Ministry of Energy, Ministry of Green Economy and Environment, Ministry of Financy, Ministry of Technology and Science, Ministry of Water Development and Sanitation, Ministry of Lands and Natural Resources, Zambia Electricity Supply Cooporation, University of Zambia, Copperbelt University

Projects, initiatives:

- Southern African Science Service Centre for Climate Change and Adaptive Land Mnagement (SASSCAL)- supported the mapping of Green Hydrogen Potential in Zambia, development of project proposal to access funding for Green Hydrogen Production in Zambia.

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- Develop regulation, strategies and roadmaps towards the production, storage, transfer, use of Green Hydrogren in Zambia.
- Conduct Environmental feasibility for potential production areas.
- Development of Energy Efficient Standards and regulations that will include green hydrogen to streamline the achievements of the Energy Efficient Roadmap.

Country Experience
Zimbabwe

UN environment programme | CTCN UN Climate Technology Centre & Network

Overview of (Green) Hydrogen Landscape

NDCs, regulations, strategies and roadmaps:

- Not recognised in Zimbabwe's Revised NDCs
- Recognised in the LT-LEDS
- New technological concept that the country is researching for green energy solutions
- Policies that will enable the adoption of green hydrogen
  - Zimbabwe's Draft Energy Efficiency Policy (2023)
  - National Climate Policy (2017)
  - LT-LEDS (2021)
  - National Renewable Energy Policy (2019)

Departments, research institutions, technology providers:

- Climate Change Management Department
- Zimbabwe Energy Regulatory Authority
- Ministry of Energy and Power Development
- Sable Chemicals Manufacturing Company

Expected activities regarding green hydrogen (production, storage, conversion, end-use):

- Investment in R&D
- Feasability studies
- Investment in Pilot study (Kariba)