



POLICY FRAMEWORK FOR SMALL HYDROPOWER IN LIBERIA

TECHNOLOGY DESCRIPTION

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Small hydropower (SHP) is an appropriate technology for tackling the issues of energy security, access to clean energy and the mitigation of climate change simultaneously and in a sustainable way. SHP technology can make a significant contribution to meeting the electricity needs of urban and peri-urban areas as well as remote rural areas. SHP uses the flow of water to turn turbines connected to a generator for the production of electricity. The amount of electricity power produced is proportional to the head drop and the water flow discharged on turbine.

Liberia has more than 2.3 GW of hydro potential identified under the Rural Energy Strategy and Master Plan (RESMP) for Liberia until 2030 study. The country's hydro potential includes numerous potential small hydropower sites with indicative capacities of less than 10 MW. Twenty-four of these sites have an estimated combined total capacity of 86 MW. By leveraging the abundant hydropower potential in Liberia, small hydropower mini-grids can provide for an economically viable, environmentally sustainable and climate-friendly power supply alternative to fossil fuel-based energy sources.

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

The current Technology Readiness Level (TRL) for the small hydropower technology in Liberia can be considered as TRL 1, 2, 3, 6 and 7. This TRL status of the Small Hydropower covers the EU-HLG Technological Research (*pillar 1*) and the KET pilot line and demonstration projects (*pillar 2*). Below are the details / equivalence of the TRL *Technology Readiness Levels (TRL)*:

- *TRL 1 – basic principles observed*
- *TRL 2 – technology concept formulated*
- *TRL 3 – experimental proof of concept*
- *TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)*
- *TRL 7 – system prototype demonstration in operational environment*

CLIMATE RATIONALE OF THE TECHNOLOGY

As Liberia seeks to reduce rising GHG emissions from the energy sector, the use of renewable energy, particularly small hydropower, is an option. Small-scale hydropower emits no carbon dioxide during operation, considerably contributing to GHG emission reduction efforts. When



compared to traditional coal power plants, hydropower saves roughly 3 GtCO₂ per year, or about 9% of global annual CO₂ emissions. It also helps to decrease the use of wood, charcoal and fossil fuels.

Small hydropower creates jobs for the local community by promoting and creating new economic activities and increasing income in areas that have access to electricity. Another objective for implementing small hydropower plants across the country is to impact the country's development priorities by increasing energy security.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The Technology Action Plan for the Small Hydropower is to be implemented for a period of ten years (2021- 2031). After said duration, it is highly recommended to be reviewed and updated as per the current/ prevailing future situation following a needs assessment and gap analysis. The scale of implementation is at the national level across the country.. The activities of the technology will initially give priority to the most vulnerable cities.

AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

The current Technology Readiness Level (TRL) for the Small Hydropower technology in Liberia can be considered as TRL 1, 2, 3, 6 and 7 which correspond to the EU-HLG Technological Research (*pillar 1*). The ambition for the deployment and diffusion of the Small Hydropower in Liberia is to address the growing needs faced by the population regarding electricity nationwide and significantly help to reduce the country's GHG emissions. It is expected and recommended that the TRL for Small Hydropower by the target year of implementation to be at least TRL 6. *TRL 6 = technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies).*

EXPECTED IMPACTS OF THE TECHNOLOGY

The lack of electricity is a problem for Liberians in both urban and rural areas. Small hydropower is an alternative solution to Liberia's energy crisis because it will increase the country's energy security while also helping to reduce GHG emissions.

Furthermore, small hydropower installations across the country will have an impact on the local communities in terms of job creation and the establishment of new businesses.



POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

The National Environmental Policy of Liberia (NEP, 2003): is a legal instrument that provides a broad framework for the implementation of national environmental objectives and plans. The primary objective of the policy is to “ensure a sound management of resources and the environment, and attempts to avoid any exploitation of these resources in a manner that might cause irreparable damage to the environment”. The policy seeks to integrate environmental considerations in sectoral, structural, regional, and socioeconomic planning at all levels.

National Energy Policy of Liberia (NEP, 2009): Activities in Liberia’s energy sector are guided by a National Energy Policy (NEP) that was adopted by cabinet in 2009. The policy articulates the country’s national vision for the energy sector of Liberia and set clear development goals for the short, medium and long term in the energy sector at the urban, rural and regional levels. The primary objective of the NEP is to ensure universal and sustainable access to affordable and reliable modern energy supply in order to foster the economic, political, and social development of Liberia.

Nationally Determined Contribution of Liberia (NDC), 2021: The Liberia’s revised NDC is the nation’s 5 years commitment submitted to the UNFCCC in 2021. The NDC indicates Liberia’s commitment to climate change mitigation targets for nine key sectors: Agriculture, Forests, Coastal zones, Fisheries, Health, Transport, Energy, Industry and Waste; as well as cross-cutting targets for urban green corridors.

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

The following actions are recommended to enhance the implementation of small hydropower technology:

- Improve the policymaking capacity with better cross sectoral coordination and implementation with focus on low GHG enabling investments.
- Develop a strategy for reduction for the improvement of the energy industries sector and revised the National Energy Policy and Laws.
- Create a private investment enabling environment focusing on Power Purchase Agreements (PPAs) for renewable energy.



COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

The cost estimate compiled by the African Development Bank (AfDB) for a range of capital costs for small hydro projects in various African countries is between US\$ 5,060/kW – US\$12,000/kW with an average of US\$ 7,600/kW. According to the Rural Energy Strategy and Master Plan (RESMP) for Liberia until 2030, a small hydropower plant project with a projected capacity of 1 MW on the Mein River in Suakoko District, Bong County, to electrify 500 households and 250 commercial consumers will cost about USD 5.8M. Another small hydropower project on the St. John River with a capacity of 10 MW has an expected cost of USD 26M.

USEFUL INFORMATION

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LINKS TO TNA REPORTS

The below link is Liberia's sub-page on the TNA website <https://tech-action.unepdtu.org/country/liberia/>

The below link is the Environmental Protection Agency of Liberia's website <https://www.epa.gov.lr/>

The next line is Liberia's Environmental Knowledge Management System website <https://ekmsliberia.info/>

The following link provides diversified information for the country <https://www.emansion.gov.lr/>