



# POLICY FRAMEWORK FOR SOLAR HOME PV SYSTEM IN LIBERIA

## TECHNOLOGY DESCRIPTION

### TECHNICAL DESCRIPTION

Solar photovoltaic (PV), refers to the technology of using solar cells to convert solar radiation directly into electricity. Solar photovoltaic systems for homes are beneficial for power generation, especially in urban and rural areas where no connection to a grid or a local power station is available. A solar home PV system typically includes a PV module, a battery, a charge controller, wiring, light emitting diodes (LED) light bulbs, and outlets for other direct current (DC) appliances. A solar home PV system can eliminate or reduce the need for candles, kerosene, liquid propane gas, and/or battery charging, and provide increased convenience and safety, improved indoor air quality, and a higher quality of light than kerosene lamps for reading.

The size of such a system is typically from 10 to 100 Wp. For example, a 35 Wp solar home system provides enough power for four hours of lighting from four 7W lamps each evening, as well as several hours of television (Reiche et al., 2000). Solar PV has a very low lifecycle cost of pollution per kilowatt-hour as compared to other technologies. Solar cells' major environmental impacts are linked to their manufacturing and decommissioning. Solar resources in Liberia are high and consistent across the country with an average level of 1,712 kWh/m2 /year and potential for generation of 1,400 to 1,500 kWh/kWp.

### CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

As the Solar PV is basically for marketing purposes, the current Commercial Readiness Index (CRI) for Solar PV technology in Liberia can be considered as CRI 1, 2, 3. This CRI status of the Solar PV covers the CRI Research and Development (*pilot scale*), Demonstration (commercial scale) and Deployment (Commercial support). Below are the details / equivalence of the Commercial Readiness Index (CRI):

- Level 1 - Hypothetical commercial proposition
- Level 2 - Commercial trial
- Level 3 - Commercial scale up

### CLIMATE RATIONALE OF THE TECHNOLOGY

As Liberia is strategically located near the equator, the conditions are favorable for any kind of use of solar radiation. Solar Home PV System like other renewable technology prioritized helps



mitigate the effects of climate change; as the use of the technology depends on the sunlight which poses no GHG emissions. Solar home PV system has potential for solar power generation especially in rural areas where no connection to a grid or a local power station can be made available. Moreover, solar home PV system is far less costly than using gasoline/diesel generators or use of kerosene or batteries. Solar PV can play an important role in mitigating climate change because it has a lower greenhouse gas (GHG) emissions lifecycle in the order of 30 to 70 gCO<sub>2</sub>eq/kWh, as against more than 900 gCO<sub>2</sub>eq/kWh for coal and more than 400 gCO<sub>2</sub>eq/kWh for gas.

## AMBITION OF THE TECHNOLOGY

### SCALE FOR IMPLEMENTATION AND TIME-LINE

The Technology Action Plan for the solar home PV system is to be implemented for a period of ten years (2021- 2031). After 2031, it is highly recommended that the TAP 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 rural areas and small towns.

### AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

Relatively, the current Commercial Readiness Index (CRI) for solar PV technology in Liberia can be considered as CRI 1, 2, 3 which falls in line with the AU-ARENA Research and Development and Demonstration (Pilot scale and Commercial scale). The ambition this technology readiness is to create an enabling environment where the most vulnerable can have easy access to affordable lighting system. It is hopeful that the solar home PV system by the target year of implementation will be at least CR 3. CRI 3 = Commercial scale up.

## EXPECTED IMPACTS OF THE TECHNOLOGY

The deployment of the solar home PV system will have positive impact on increasing access to electricity in an affordable, sustainable and environmentally friendly manner particularly to the neglected rural areas and small towns. It will help to reduce poverty as more and more jobs are created and people are gainfully employed. Furthermore, the deployment will help to improve the business environment by encouraging more traders to participate in the sale of the technology.



## 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):** 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 proposed in enhancing the implementation of this Technology:

- Improve the policymaking capacity with better cross sectoral coordination and implementation with focus on low GHG enabling investments.
- Develop a strategy for reducing emissions to improve the energy sector and amend the National Energy Policy and Laws.

### COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

The cost for the implementation and diffusion of a small stand-alone solar PV system is US\$ 12/Wp. Operational and Maintenance costs are basically over the lifetime of the system.



## USEFUL INFORMATION

### CONTACT DETAILS

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### LINKS TO TNA REPORTS

- 1) This link is Liberia's sub-page on the TNA website <https://tech-action.unepdtu.org/country/liberia/>
- 2) The following link is the Environmental Protection Agency of Liberia's website <https://www.epa.gov.lr/>
- 3) The next line is Liberia's Environmental Knowledge Management System website <https://ekmsliberia.info/>
- 4) The following link provides diversified information for the country <https://www.emansion.gov.lr/>