ACTIONS FOR UPSCALING SOLAR-POWERED BOREHOLES IN SOMALIA

TECHNOLOGY DESCRIPTION

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For many years, electricity generated by solar panels (photovoltaic power) has been used to power pumps. The technique is already being routinely deployed in remote location where it can provide water with little monitoring. Solar-powered boreholes have the capacity to work autonomously and convey water over a prolonged duration. This can aid in borehole pressure reduction by distributing yield over the course of the day. Moreover, in situations of severe demand, low cloud cover, or overnight, the tank storage capacity of such systems may serve as an essential buffer, allowing for the utilisation of surplus water. A solar-powered borehole system capable of pumping water to a depth of 50 metres through a surface pipe that supplies a tank positioned 5 metres above ground level can serve around 2,000 individuals. Technology for solar-powered homes is the pinnacle of sustainable growth. If properly implemented, it can lift rural populations out of poverty while being ecologically benign.

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

It is challenging to find information and data about Somalia's solar-powered boreholes. It is not the customs department's practice to formally collect data from local businesses. This complicates the task of precisely determining the market's dimensions and characteristics, especially in light of the unofficial distribution routes. However, unverified data sources from the Somalia Electricity Access Project (SEAP) suggests that there has been an upward trend in the purchase of standalone solar systems between the years 2019 and 2020. Despite this, Somalia has an ambition to develop solar-powered boreholes as outlined in the countries NDC and the National Water Strategy 2021-2025. Throughout the year, Somalia enjoys one of the brightest sunlight in the world. The average daily solar energy experienced is around 5-7 kWh/m^2/day (Samatar et al., 2023). Parts of Somalia have some of the highest daily average total solar radiation levels in the world, according to calculations based on the relative sunlight duration. There are between 2900 and 3100 hours of sunlight on average per year (8 to 8.5 hours per day) (Khan & Jama, 2024). Apart from those who live along the Juba and Shabelle Rivers, the Somali population is largely reliant on groundwater for residential water supplies, livestock, and agriculture.

CLIMATE RATIONALE OF THE TECHNOLOGY

Ensuring sustainable access to safe water in rural communities in Somalia presents many challenges, particularly for households, schools, healthcare facilities, pastoralists, and is likely to become even more difficult with the increasing impact of climate change. To address these challenges, there is need to design and implement programmes which incorporate the risks associated with climate change and uses renewable energy to provide sustainable access to safe water for communities in rural areas in Somalia. In contrast to motorised pumps, which are not only noisy but also polluting in terms of greenhouse gases emission, and are extremely subject to fluctuations in fuel prices, solar-powered pumps have been demonstrated to have nearly negligible emissions and operating expenses. Solar panels emit around

40g of CO^2 equivalent emissions per kilowatt-hour of electricity generated (Hsu et al., 2012). Most of these lifecycle emissions are tied to the process of manufacturing panels and are offset by clean energy production within the first three years of operation. With the climate change problem in mind, solarizing water pumps is a strategy for lowering power costs and minimizing service disruptions, while also enhancing climate resilience and promoting renewable energy. Thus, solar-powered boreholes provide safe, sustainable water systems that might resist harsh weather conditions and operate year-round.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The project is to meet the water needs of 25,000 households and farmers through 300 solar-powered boreholes by the year 2032. This ambition is in line with the Somalia National Adaptation Programme of Actions (NAPA) and the National Water Resource Strategy 2021-2025, which aim to increase the quantity of water available through the rehabilitation of boreholes and the construction of new ones. Somalia's NDC also explicitly mentions the development of solar-powered boreholes as a priority action under the Water Resource Management and Public Health. The pastoral zones, as well as the northern eastern and central plateaus, which are characterised by a significantly extended dry season, are the target areas. The project will involve working together with the Ministry of Energy and Water Resources to identify the regions where boreholes have been failing and where new installations are needed. There will also be training of young people locally to build, install, and maintain solar and borehole equipment in collaboration with federal, state, and regional administrations, private sector, and non-governmental organisations. The project will also entail strengthening the organisational capacity of water users' associations with regard to the administration and management of solar-powered boreholes and bolstering the capacity of extension agents to provide advisory support for solar-powered boreholes.

EXPECTED IMPACTS OF THE TECHNOLOGY

The technology is expected to increase water access in Somalia for households, pastoralists, schools and hospitals. The following are the anticipated impacts of the technology.

- The provision of clean water to 25,000 households, with a particular emphasis on regions susceptible to drought thus increasing access to water by about 60%.
- Since there will be more water stations, there will be less wait times for walking and queuing to get water. The time taken to source for water will be reduced by more than half.
- Since there would be shorter traveling distances and shorter wait times, more water will be gathered (approximately 60% more), which can significantly enhance family hygiene and other economic prospects.
- There will be reduced absenteeism (by 80%) in schools and improved health of students.
- Emissions will be reduced by over 90% when diesel-powered systems are replaced with solar-powered ones.
- Young people in rural areas will be trained and skilled to start their own businesses in making soler-powered borehole equipment and accessories.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

Somalia Updated NDC 2021, National Water Resource Management Strategy 2021-2025, NAP Framework, and NDP 9 2020-2024 recognise the challenge of water shortage in Somalia due to its Arid and Semi-Arid nature coupled with the impact of climate change. Establishing solar-powered boreholes is a mitigation action prioritised under the Updated NDC submitted to UNFCCC and Somalia's energy policy. The Federal Government's strategy to enhance water and sanitation services nationwide is also embodied in the national WASH Sector Policy (2019). It includes a number of policy initiatives pertaining to the provision of water services, including water quality, community-level water resource management, and urban and rural water supply. The National Adaptation Programme of Action (NAPA) (2013) seeks to improve access to water by improving water capture and natural storage and also improving water quality through water treatment plants.

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

To enhance implementation and uptake of solar-powered boreholes in Somalia, policies in the following areas will be necessary.

- Formulate policies and regulations to enable local production of spare components for solar-powered boreholes.
- Introduce and implement tax waivers for solar-powered borehole equipment.
- Formulate policies and regulations that strengthen water user committees' governance capacity.
- Provisions in the sector policies that support water users' committees with a recurrent budget.
- Formulate policies that aid in securing legal land rights for solar-powered borehole establishment.

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

Policy/Strategy	**Cost (USD)**
Formulate policies and regulations to enable local production of spare components for solar-powered boreholes	62,000
Introduce and implement tax waivers for solar-powered borehole equipment	12,000
Formulate policies and regulations that strengthen water user committees' governance capacity	235,400
Provisions in the sector policies that support water users' committees with a recurrent budget	12,500
Formulate policies that aid in securing legal land rights for solar-powered borehole establishment	12,500
Total	**334,400**

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USEFUL INFORMATION

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LINKS TO TNA REPORTS

https://tech-action.unepccc.org/country/somalia/

https://moecc.gov.so/policies-and-strategies/

https://moa.gov.so/department-of-irrigation-and-early-warning/

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