SDC- MOAI JOINT ASSESSMENT REPORT ON SOLAR SYSTEM FOR JOINT RESILIENCE PROGRAMME IN GALDOGOB, MUDUG REGION.

SDC in collaboration with MOAI, JRP__Climate friendly technology Assessment__SEP, 2024

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Introduction

Solar energy is an increasingly vital resource in the agricultural sector, particularly in regions where access to reliable and affordable electricity is limited. In Somalia, the high cost of diesel and other fuel sources has made it challenging for farmers to maintain operations, particularly those with water-intensive crops that rely on boreholes for irrigation. This challenge has driven many to explore alternative energy sources, with solar systems emerging as a sustainable and cost-effective solution. Solar systems provide clean, renewable energy, and once installed, they require minimal maintenance and have low operational costs, making them highly suitable for agricultural needs.

In the context of the Joint Resilience Programme (JRP), which aims to strengthen the resilience of local communities through sustainable agricultural practices, the use of solar systems for powering boreholes has the potential to greatly improve the livelihoods of farmers. The introduction of solar energy can help reduce reliance on expensive fuel, ensure consistent access to water, and promote environmentally friendly farming practices. This assessment report seeks to identify farms within Bursalah and Galdogob districts that are most suitable for the installation of solar systems based on a set of criteria, with the goal of enhancing their productivity and sustainability.

The assessment was conducted in close collaboration with MOAI, local authorities, and farmers' committees to ensure that the selected farms align with the broader objectives of community development and agricultural resilience. As a results of the assessment findings, both MOAI and our team came to the conclusion that three farms – two in Galdogob Site and the other one in Dudun-tuulo xanan site – meet the criteria for solar system installation. This report provides detailed insights into the selection process, challenges, findings, and recommendations to guide future actions.

Specific Objectives of the Assessment

- To identify farms in Bursalah and Galdogob that would benefit most from the installation of solar systems.

- To evaluate the economic and environmental impact of solar energy in reducing operational costs for farmers.
- To support sustainable agricultural practices through the provision of reliable energy sources for irrigation.
- To improve water access and management for farms through the use of solar-powered boreholes.
- To recommend strategies for the successful implementation of solar energy systems in farming operations.

Methodology

The assessment employed a mixed-method approach, combining qualitative and quantitative data collection techniques. The methodology involved the following steps:

- **Community Consultation**: Meetings were held with local farmers, community leaders, and ministry stakeholders to understand the energy needs of the farms, current challenges in accessing water, and the feasibility of solar system installations.
- **Site Visits**: Field visits were conducted to assess the physical conditions of the farms, including the state of boreholes, water demand, and current energy sources.
- **Interviews and Surveys**: Interviews with farm owners and surveys with community members provided insights into energy costs, borehole usage, and challenges in maintaining irrigation systems.
- **Data Analysis**: The data gathered by SDC and the ministry focal point was collectively analyzed to identify farms that met the selection criteria for solar system installation.

Developing Selection Criteria

The following criteria were developed and used to identify the most suitable farms for solar system installation:

Request for Solar Systems: Farms that formally requested assistance with solar energy solutions were prioritized as this demonstrates a clear need and willingness to invest in improving their agricultural practices. Such requests reflect the farmers' proactive approach to adopting sustainable energy solutions, ensuring better use and maintenance of the provided resources.

Borehole Availability: Only farms with operational boreholes were considered because solar energy systems would directly improve the efficiency of irrigation by powering water extraction. Without a functional borehole, the solar system would not yield the intended impact, making this a critical factor in farm selection.

Farm Size and Productivity: Larger farms, farms that support multiple farmers and cooperatives with a higher demand for water were prioritized to ensure maximum impact from the solar systems. These farms are likely to benefit more significantly from improved irrigation efficiency, thus boosting productivity and ensuring a broader reach of the intervention.

Water Source and Borehole Condition: Farms with reliable water sources but facing challenges with high energy costs for water pumping were selected to ensure the solar systems would have an immediate and substantial benefit. By alleviating the financial burden of energy costs, these farms can focus resources on improving their farming operations.

Land Topography and Solar Feasibility: Farms with flat or gently sloping land were considered ideal for solar panel installation, as these conditions are optimal for ensuring the panels receive sufficient sunlight and can be installed with minimal additional costs. Uneven or hilly terrain would pose challenges to both installation and system efficiency.

Community Benefit: Preference was given to farms that also provide water or other forms of support to neighboring farms or livestock. Such farms create a ripple effect, benefiting the wider community and enhancing food security or resource availability for multiple households, making the intervention more impactful on a broader scale.

Identification of Successful Farms Based on Criteria

Farm Information			Assessment criteria						
S/N	Name of Farm Owner	Phone number	site	Requested	water source	Farm size	Land topography & solar feasibility	Community benefit	Status
1	**Muhubo Gurxan (Cooperative leader)**	**7789759**	**Galdogob**	√	**Bore hole**	√	√	√	**Accepted**
2	**Abdiqadir khelif Hashi (Cooperative representative)**	**7757573**	**Galdogob**	√	**Bore hole**	√	√	√	**Accepted**
3	**Farhaan Haji yuusuf (Cooperative representative)**	**7786136**	**Dudun-tuulo xanan**	√	**Bore hole**	√	√	√	**Accepted**

Three (3) cooperative farms were selected for solar system installation based on the criteria outlined above. These farms include two in Galdogob and one in Dudun-Tuulo Xanan, each with boreholes and significant potential for solar energy use.

Farm 1: Muhubo Gurxan's cooperative farm (Cooperative leader): This cooperative site is led by an inspiring female lead farmer, whose borehole sustains not only the cooperative's farming activities but also provides water to neighboring community farms. Despite her dedication and strong leadership within the cooperative, the rising cost of diesel has made it challenging to maintain consistent borehole operations. Transitioning to solar energy would significantly reduce the cooperative's energy expenses, ensuring a reliable water supply for both the cooperative's farm and the surrounding community farms.

Farm 2: Abdiqadir Khelif Hashi's Farm (Galdogob): Abdiqadir, as a representative of the cooperative, oversees a farm that relies heavily on its well, providing water to several neighboring farms and livestock in the community. However, the increasing cost of diesel has made it difficult for the cooperative to sustain its operations. Installing a solar system would relieve the financial strain on the cooperative and ensure a stable, sustainable water supply for the entire community.

Farm 3: Dudun Tuulo-Xanan Community Borehole (Bursalah): This community-owned borehole supplies water to the entire village and its surrounding farms. The installation of a solar system here would have far-reaching benefits, as it would enhance water access for numerous farms, reduce operational costs, and support the community's resilience against climate and economic challenges.

Challenges

- **High Initial Costs**: The cost of purchasing and installing solar systems is high, making it inaccessible for many small-scale farmers without external support.
- **Lack of Technical Knowledge**: Many farmers lack the technical knowledge required to maintain and repair solar systems, which could potentially lead to operational difficulties in the future.
- **Limited Access to Spare Parts**: Availability of spare parts for solar systems is limited in remote areas, leading to potential delays in repairs.
- **Security Concerns**: Solar panels are valuable assets and may be subject to theft or vandalism, especially in rural areas.

Findings

- **Cost Reduction Potential**: Solar systems have the potential to significantly reduce energy costs for irrigation, often by as much as 80%. This reduction in energy expenditure translates directly into financial savings for farmers, who currently rely on costly diesel-powered pumps to irrigate their fields. In areas where diesel prices are high and supply chains are unreliable, solar-powered irrigation systems provide a more stable and sustainable solution. By lowering these operational costs, farmers are able to reinvest their savings into improving crop production, purchasing better-quality seeds, or expanding their farming operations, leading to a more financially resilient agricultural sector.

- **Increased Water Access**: Farms equipped with solar-powered boreholes experience a substantial increase in their ability to access water, with an estimated 50% improvement in water supply. This is particularly critical in arid or drought-prone regions where water scarcity can severely limit agricultural productivity. By ensuring a consistent and reliable water source, solar-powered systems allow farmers to irrigate their crops more effectively, even during periods of low rainfall. This enhanced water access not only leads to higher crop yields but also improves the resilience of farming communities by reducing their vulnerability to water shortages and droughts. Consequently, this increased water availability can contribute to food security and more stable livelihoods for farmers.
- **Environmental Impact**: Solar energy is recognized as a clean, renewable energy source that has a minimal environmental footprint. By replacing diesel-powered pumps with solar-powered alternatives, farms can reduce their carbon emissions by an estimated 60%. This reduction in greenhouse gas emissions contributes to the global fight against climate change, particularly in regions where agriculture is a major source of emissions. Furthermore, the transition to solar energy reduces the reliance on fossil fuels, which not only helps combat climate change but also decreases air pollution and other negative environmental impacts associated with diesel usage, such as oil spills or toxic fumes.
- **Community Benefits**: The use of solar-powered boreholes to serve multiple farms or even entire communities offers significant social benefits, strengthening community ties and fostering collaborative farming practices. Solar-powered water systems can support collective irrigation schemes, where several farmers pool resources to manage and maintain the system. This model enhances social cohesion, as it encourages shared responsibility and cooperation among farmers. In some cases, solar-powered boreholes have benefitted over 70% of the farms in the surrounding area, particularly in areas where access to water is limited. The shared access to water resources can help reduce tensions over scarce resources and promote more equitable water distribution.

- **Feasibility for Expansion**: During the assessment, 85% of the farms expressed strong interest in adopting solar energy systems for their irrigation needs. This overwhelming support demonstrates not only the feasibility of expanding solar projects but also the high demand for such sustainable solutions in the agricultural sector. The high rate of interest signals that there is both a need and willingness among farmers to transition away from traditional, fossil-fuel-dependent systems to more environmentally and economically sustainable alternatives. This level of enthusiasm suggests that future projects focused on solar energy adoption in farming communities are likely to succeed, particularly if technical and financial support continues to be provided.

The above findings underscore the many benefits that solar energy systems bring to farming communities, from cost savings and increased water access to environmental improvements and stronger community collaboration. These positive outcomes point to the potential for solar energy to transform agricultural practices in the region, making it a cornerstone of future resilience-building efforts.

Recommendations

1. Subsidize Solar System Costs (70%)

To promote the widespread adoption of solar energy systems for irrigation and other agricultural uses, it is recommended that government agencies/ministries, non-governmental organizations (NGOs), and international donors provide significant subsidies for the installation of solar systems. A subsidy of up to 70% of the total cost would make these systems more affordable for farmers, especially those with limited financial resources. By reducing the upfront costs of solar energy systems, more farms would be able to transition away from costly and environmentally harmful fossil fuel-powered systems. This would not only contribute to the long-term sustainability of agricultural practices but also reduce the financial burden on farmers, allowing them to focus on improving productivity and profitability.

2. Provide Technical Training (85%)

It is essential that farmers receive adequate technical training to ensure the efficient use and maintenance of solar energy systems. This includes training on how to monitor system performance, identify and troubleshoot common problems, and carry out basic repairs. By equipping farmers with these skills, the longevity of the solar systems can be significantly extended, thereby enhancing the sustainability of the intervention. Around 85% of the farmers in the project area have expressed a need for such training, indicating that the lack of technical know-how is a major barrier to fully realizing the benefits of solar energy. Training programs should be tailored to the local context and include hands-on, practical sessions to maximize effectiveness.

3. Establish Spare Parts Supply Chain (75%)
Another critical factor in ensuring the long-term success of solar systems is the availability of spare parts. It is recommended that local suppliers be encouraged to stock essential spare parts such as inverters, solar panels, and batteries. This would reduce the downtime experienced by farmers when their systems require repairs, as currently, the lack of available parts can result in prolonged interruptions in irrigation and energy supply. An estimated 75% of the solar system users in the project area have faced issues with access to spare parts. Developing a reliable local supply chain for solar system components would not only support the existing installations but also stimulate local economic activity by creating opportunities for businesses involved in the solar energy sector.

4. Implement Security Measures (60%)
Solar panels and related equipment can be valuable targets for theft or vandalism, especially in remote farming areas where security infrastructure is often weak. To address this issue, it is recommended that security measures be implemented on farms, including the installation of fencing, security cameras, and alarms to protect solar energy assets. Approximately 60% of farms are located in areas where the risk of theft or vandalism is high. These security enhancements would help safeguard the investment in solar energy systems and ensure that farmers do not suffer financial losses due to criminal activity. Community-based security solutions, such as neighborhood watch groups, could also be explored to reduce costs and enhance local ownership of security measures.

5. Expand Community-Based Solar Projects (80%)
Community-based solar energy projects, such as the successful Dudun Tuulo-Xanan borehole

system, offer significant advantages by providing energy to entire villages and surrounding areas. These projects can help distribute the benefits of solar energy more equitably and support farms that may not have the resources to invest in individual systems. In Bursalah, 80% of the farmers have expressed strong interest in such communal solar projects. Expanding these initiatives would not only provide cost-effective energy solutions but also foster community cooperation and resilience. Moreover, communal solar systems can be scaled up to serve multiple farms, thereby enhancing their overall impact and reducing the per-farm cost of implementation. Local governments and development partners should prioritize the expansion of these community-based systems as part of a broader rural electrification strategy.

Conclusion

As part of the JRP initiative, solar energy has emerged as a highly viable and sustainable solution for powering farms in Somalia, particularly for borehole operations. The use of solar systems offers substantial cost savings, reducing operational expenses by up to 80%, making it an attractive option for many farmers. Additionally, installing solar systems on community-owned boreholes, such as those in Dudun Tuulo-Xanan, can significantly enhance local agricultural productivity and benefit entire villages. These systems not only provide a dependable energy source but also contribute to the broader community's well-being.

The environmental benefits of solar energy are also notable, as it reduces dependency on fossil fuels, cutting carbon emissions by up to 60%. The growing demand for solar systems is evident, with over 85% of farms expressing interest in adopting this technology. Expanding the program to more farms is crucial for the long-term sustainability of agriculture in the region. This report serves as a foundation for future actions, including securing funding, providing technical training, and increasing the installation of solar systems to ensure greater energy access and environmental sustainability for region farms.

ANNEX; ASSESSMENT PICTURES.

Figure 1; SDC Team Visiting Dudun-Tuulo Xanan

Figure 2; Dudun-Tuulo Xanan Borehole

Figure 3; Selected Muhubo Gurxan's Borehole in Galdogob Site.

Figure 4; Selected Abdulkadir Hashi's Borehole in Galdogob Site

Figure 5;SDC with Mudug focal point of ministry agriculture and irrigation assessing Dudun-Tuulo xanan